Job Displacement and Earnings Losses: The Role of Joblessness*

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Abstract

A large literature finds that workers displaced in mass layoffs experience persistent earnings losses. We find that the earnings penalty from job displacement is mediated by the length of the jobless spell after displacement. Workers who experience little or no joblessness suffer no losses on average; those who experience a prolonged period of joblessness experience large, persistent earnings losses. Job movers who experience joblessness tend to move to lower paying firms, a phenomenon which informs our understanding of the mechanisms that generate earnings losses. We also find that jobless duration predicts earnings outcomes for separators generally, not only displaced workers.

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1 Introduction

A large literature finds that displaced workers—i.e., workers who separate from their employer during a mass layoff—suffer persistent earnings losses.[1] While the earnings losses from displacement are well documented, the source of these earnings losses are less well understood. Motivated by the literature on job-to-job moves, which finds that job switchers who move quickly between jobs generally experience earnings gains, we examine how outcomes for displaced workers vary by whether they experience a jobless spell between jobs. Our results shed light on why job displacement leads to earnings losses.

We find that the length of joblessness between jobs is a key mediator by which displacement leads to earnings losses. Using administrative data from the United States, we estimate a distributed lag model that has become the standard empirical model in the displaced worker literature. Consistent with earlier work, we find that displacement leads to large, persistent reductions in earnings. We extend the empirical model to allow for heterogeneous effects by the duration of joblessness between jobs. Our main finding is that workers who experience little or no joblessness after a mass layoff suffer no earnings losses on average, while those who experience a prolonged period of joblessness experience large, persistent earnings losses. Specifically, six years after the mass layoff event, average quarterly earnings losses exceed $3,000 for workers who experience four or more quarters of joblessness but workers who find a new job within the same quarter experience no losses on average.

Workers who experience joblessness between jobs also tend to move to lower-paying firms. Measuring employer pay premiums with an AKM decomposition of earnings, we find that workers tend to move down the "job ladder" in this sense when they experience extended jobless spells, while direct job-to-job flows yield movements up the job ladder.[2] Thus, our findings build on recent empirical evidence that connects the earnings losses of displaced workers to movements to lower-paying firms (Bertheau et al. 2023; Schmieder et al. 2023; Fackler et al. 2021; Raposo et al. 2021; Lachowska et al. 2020; Moore and Scott-Clayton

[1] Papers in the displaced worker literature include Jacobson et al. (1993a); Schoeni and Dardia (2003); Couch and Placzek (2010); Von Wachter et al. (2009b); and Davis and Von Wachter (2011). See Hamermesh (1989) and Jacobson et al. (1993a) for surveys of early research on displaced workers.

[2] AKM refers to the Abowd et al. (1999) decomposition of earnings.

2019).[3] Krolikowski (2017), Jung and Kuhn (2019), Jarosch (2021), and Audoly et al. (2022) develop models in which job ladders play a role in generating persistent earnings losses following job losses. While these models offer a partial explanation of our results, they do not explain why the duration of nonemployment is so strongly related to movements down the job ladder. Extending these models to account for the relationship between duration of joblessness, earnings losses, and movements down the job ladder should be a priority for future research. Possible mechanisms that could produce this relationship include features that cause the reservation wage of a worker to decline with time spent in nonemployment (such as assets as in Chetty (2008) or stock-flow search) or on-the-job search with differences in search efficiency based on employment status (Faberman et al. 2022).

Worker heterogeneity, local labor market conditions, or skill depreciation could all plausibly drive an observed relationship between earnings losses and the length of the jobless spell; however, we find little evidence to support these factors. One explanation is that less strongly attached workers may be both slower to become re-employed and more likely to find a new job with reduced hours or lower wages. However, our findings are robust when looking within groups of workers that are more homogeneous in terms of their labor force attachment (i.e., new mothers or prime-age males). We also find that our results are robust to controlling for linear individual-specific time trends and the duration of joblessness from prior job transitions, which is a measure of persistent, unobserved heterogeneity in labor force attachment. Alternatively, workers who separate into labor markets with little demand for their skills may struggle to find a new job quickly and may command lower earnings. However, our main findings hold up within samples in both strong and weak labor markets and persist even among workers who separate from the same firm. Lastly, we find much larger earnings losses for workers who experience even short periods of joblessness (i.e., one quarter) versus none and the estimated losses persist for years after the separation. If

[3]Our finding that job separators who experience joblessness have greater earnings losses is also consistent with papers finding that displaced workers who experience joblessness in the United States (Addison and Portugal 1989) and Europe (Raposo et al. 2021; Hijzen et al. 2010; Bender et al. 2002) have greater earnings losses. These papers did not explore the role of the job ladder or whether separators from nondistressed firms experienced a similar earnings penalty if they transitioned through nonemployment before starting a new job. Our finding that attached job movers who find jobs within one quarter experience minimal earnings losses also resembles the "alpha" type workers in Gregory et al. (2021), who create a taxonomy of worker attachment types also using the LEHD data.

earnings losses were driven by skill depreciation we would expect short periods of joblessness to have much smaller effects and any losses to fade over the subsequent years.

Another possibility is that the duration of nonemployment is correlated with the type of separation: workers who spend less time in nonemployment may be more likely to have quit their current job to move to a better job. Our focus on displaced workers is motivated by this concern, as these separations are thought to more likely arise from decisions made by the firms as opposed to the workers (i.e., layoffs not quits). Nevertheless, we extend our analysis to include workers who separate from nondistressed firms and find a similarly strong relationship between the duration of joblessness and subsequent changes in earnings. That is, regardless of the health of the origin firm, workers that separate and immediately find a new job tend to experience gains in earnings and move to higher-paying firms. While workers who experience joblessness prior to finding a new jobs suffer persistent earnings losses and move to lower-paying firms. Furthermore, workers who separate from distressed and nondistressed firms tend to experience similar amounts of time in nonemployment. The results for the nondistressed separators are more difficult to interpret, since job mobility could be driven by decisions made by the workers that could also be related to subsequent changes in earnings. But the similarity between the patterns for workers who separate from distressed and nondistressed firms is suggestive of a common mechanism. Taken together, our results are most consistent with an explanation in which time spent in nonemployment leads to earnings losses, which is consistent with empirical work that finds a causal negative effect of joblessness on subsequent earnings (Nekoei and Weber 2017; Schmieder et al. 2016; Autor et al. 2015; Kroft et al. 2013).

The U.S. labor market is highly dynamic, with millions of workers changing jobs every month. A large literature has shown that workers both benefit from and are harmed by these dynamics. On the one hand, workers generally reap positive benefits from job-to-job moves, allowing them to sort into better matches and experience positive earnings growth.[4] On the other hand, the research on displaced workers discussed above finds that job separations result in persistent earnings losses. These two perspectives on the consequences of labor

[4]A finding that dates back at least to Topel and Ward (1992). More recent papers on job-to-job moves include Brown et al. (2006); Haltiwanger et al. (2018a); Haltiwanger et al. (2018b); and Liu (2019).

market dynamics are not necessarily in conflict but largely remain silo-ed from one another in the literature. Our findings help reconcile the divergent findings on the earnings consequences from job change: inclusion of workers with longer nonemployment spells is a key reason the displaced worker literature finds that job separations harm workers, while the job mobility literature, which focuses on direct job-to-job moves, finds that workers benefit.

The paper proceeds as follows. Section 2 describes our data. Section 3 presents our estimating equations and main results, and relates our findings to the literature on job mobility. Section 4 discusses possible explanations for the strong relationship between earnings outcomes and duration of nonemployment. Section 5 concludes.

2 Data

2.1 Data Sources and Sample Construction

We analyze the employment and earnings consequences of changing jobs using linked employer-employee data from the Longitudinal Employer-Household Dynamics (LEHD) program (Census (2024c)). The LEHD data are produced by the U.S. Census Bureau and include quarterly earnings records collected by state-level unemployment insurance (UI) programs linked to establishment-level data from the Quarterly Census of Employment and Wages (QCEW). The UI system covers 96 percent of private-sector employment; although, state-level data availability varies by year. We define a firm (or employer) as the collection of workers who share a common unemployment insurance system identifier and define a job as an employment spell with a particular firm. The data allow us to measure quarterly earnings, a limited set of worker demographics (e.g., sex and date of birth), and firm characteristics (e.g., industry and geographic location.).[5] See Abowd et al. (2004) for detailed discussion of the LEHD.

From the LEHD data we construct a panel of linked employer-employee observations, pooling the wage histories from five large states: California, North Carolina, Oregon,

[5]Data quality issues produce a small number of large outlier observations in the earnings data. We identify outliers by comparing quarterly earnings records to the median earnings value observed over the sample for each individual and winsorize these outliers at the 95th percentile. This approach is more appealing than winsorizing by earnings levels, since it does not incorrectly adjust the earnings of high-wage workers.

Washington, and Wisconsin.[6] From these data we create a sample of workers with at least three years of job tenure in their main job in one of four reference quarters—1999:2, 2001:2, 2005:2, and 2009:2—that span a variety of macroeconomic conditions. For simplicity, much of our analysis focuses on reference quarter 2005:2, but we also show results for the other reference quarters. We include in our sample both male and female workers, age 25-55, in the reference quarter. Although our sample comprises workers from five states, we track their earnings outcomes on a national basis. That is, for a worker who separates from one of our five states, we use all available national LEHD data to track earnings and employment outcomes.

We classify workers into three categories: stayers, job changers (or "permanent" separators), and recalls.[7] We define "stayers" as workers who are continually employed with the same employer for at least the three quarters after the reference quarter. We define "job changers" or "separators" as workers who separate from their employer in the reference quarter and become re-employed with a new employer within eight quarters.[8] We further categorize job changers into six duration categories based on when the worker was re-employed at a new job:[9]

1. In the same quarter as separation ("within");

2. In the quarter adjacent to the quarter of separation ("adjacent");

3. After one full quarter of nonemployment ("one");

4. After two quarters of nonemployment ("two");

5. After three quarters of nonemployment ("three");

[6]We narrow the sample to these five states in part to reduce the size of the analysis as well as to have the longest possible time series, as the availability of LEHD data for a particular year varies by state. Approximately 10 states have data available in the early 1990s.

[7]The importance of separating recalls from job changers or permanent separators has been emphasized by Fujita and Moscarini (2017).

[8]We do not include in the sample apparent employment separations that occur in the administrative data due to firm ID changes or mergers/acquisitions. We use the pattern of worker flows to identify separations and accessions due to such events and suppress the flows that result.

[9]Both our paper and Bjelland et al. (2011) were instrumental in the development of the Census Bureau's Job-to-Job Flows statistics. Our paper uses an early prototype of the Job-to-Job Flows microdata to identify moves across firms.

6. After four to eight quarters of nonemployment ("≥four").

We define "recalls" as workers who separate from their employer in the reference quarter but return to the same employer. Note that we can only identify recalls if the worker experiences a full quarter of nonemployment before rejoining the firm.[10] Recalls that do not experience a full quarter of nonemployment are, perforce, categorized as stayers. Our analysis excludes workers who do not fall within one of the three categories. Specifically, we exclude workers who do not separate in the reference quarter but separate in one of the subsequent three quarters and workers who separate in the reference quarter but remain in nonemployment for more than eight quarters.

We further categorize workers by whether they are employed at a distressed firm in the reference quarter. We define a "distressed firm" as one that experiences a 30 percent or larger decline in employment in the year ending in the quarter subsequent to the separation.[11] This is similar to the definition of "distressed firm" used in Jacobson et al. (1993a) (henceforth JLS). However, in order to facilitate comparisons between separators and stayers from like firms, we do not include separators in the reference quarter from closed firms in our sample. Sensitivity analysis shows that retaining the separators from closed firms does not substantially change our results, partly because separators from closed firms are a small proportion of separators.[12] A worker separated from a distressed firm is the operative definition of a displaced worker in much of the empirical literature. Although some of the "distressed separators" may have quit regardless of the firm's distress or have been fired for cause, the majority likely would not have occurred in the absence of the displacement event (Davis et al. 2006, 2012).

[10] Attempts to use variation in quarter earnings to identify likely short temporary layoffs have proven unsuccessful.

[11] Because this categorization works less well for smaller firms, for all analysis where separations are broken out by the growth rate of the separating employer, we restrict our analysis to firms with at least 50 employees.

[12] In the quarterly data, for a closing firm the final quarter of activity has less relevance than in annual data because closings often occur in stages. We also think that potential linkage issues may underlie any residual large last quarter apparent closings even with our use of worker flows to abstract from such issues. In any event, our results are robust to the inclusion of such closings.

2.2 Descriptive Statistics

Tables 1 and 2 describe the workers in the sample in more detail. Table 1 presents descriptive statistics for the 2005:2 reference quarter. Columns 1 and 2 show that relative to stayers, job changers from distressed firms are younger and less likely to be employed at a large firm. The industry that contributed the largest share of distressed separators is manufacturing, with 21 percent of distressed separators coming from that sector. For comparison, columns 3 and 4 present statistics for nondistressed firms, to which we will return later.

Column (1) of Table 2 shows the employment outcomes of the workers separated from distressed firms in our 2005 sample. Eighty percent of the distressed separators are re-employed at a new employer within 8 quarters, with 50 percent of these re-employed within the same quarter as separation and another 25 percent re-employed in the adjacent quarter. Columns (3), (5), and (7) show the employment outcomes for distressed separators in the 1999, 2001, and 2009 samples, respectively. In the tight labor market of 1999, re-employment rates at new employers and durations of nonemployment for distressed separators are similar to the 2005 sample; neither are those for the mild recession year of 2001 greatly different. However, the re-employment rate at new employers (and overall) are substantially lower for the reference quarter in the deep recession year of 2009, and nonemployment durations are substantially greater.

Comparing the odd-numbered and even-numbered columns within each year, Table 2 also shows that separators from distressed employers are less likely to be recalled than separators from nondistressed firms, but overall the rates of re-employment within eight quarters of separation are not much different. Moreover, conditional on changing jobs, for the reference quarters in the favorable economic years of 2005 and 1999 separators from distressed and nondistressed employers spend similar amounts of time in nonemployment before finding a new job. In contrast, durations for distressed separators are longer than for nondistressed separators from the recession years of 2001 and 2009.

3 Earnings Following Separation

Our main finding is previewed in Figure 1, which plots the average quarterly earnings for workers who separate from distressed firms in 2005:2. Each line represents the average earnings for a group defined by the type of job transition. Post-separation earnings losses are strongly related to the duration of the nonemployment spell, with longer periods of nonemployment being associated with greater and more persistent losses. This figure excludes recalls, as the primary focus of our paper is the earnings outcomes for job changers from distressed employers, that is, separators from distressed firms who find a new job at a different firm.

To formalize this observation, we start by estimating fairly standard models of earnings losses, which demonstrate that, on average, job changers from distressed firms tend to experience large and persistent earnings losses. We then show that periods of nonemployment after separation are strongly predictive of subsequent earnings outcomes.

3.1 Earnings Losses for Displaced Workers

Since the publication of JLS, it has become standard in the literature on the earnings outcomes of displaced workers to estimate a distributed lag model of the following sort:

$$y_{it} = \alpha_i + \gamma_t + X_{it}\beta + \sum_{k \geq -12} D_{it}^k \delta^k + u_{it}, \tag{1}$$

where y_{it} is the quarterly earnings of worker i in quarter t; α_i is an individual fixed effect, γ_t is a quarter fixed effect; X_{it} are time-varying individual characteristics, which include the interactions between sex, age, and age squared; D_{it}^k is an indicator equal to one if individual i separated from a distressed firm k quarters ago as of quarter t; and u_{it} is a regression residual, which is clustered at the level of the employer in the reference quarter. The specification is often estimated on a sample of workers initially employed at distressed firms, thereby comparing displaced workers to those that remain employed at these firms.

We estimate a specification that is similar but better suited for exploring heterogeneity across time periods and the distressed status of the initial employer. In keeping with Jacobson

et al. (1993a) and Couch and Placzek (2010), among others, for comparison we also estimate losses for separators from non-distressed firms.

For each reference quarter separately we estimate the following specification,

$$y_{it} = \alpha_i + X_{it}\beta + \sum_{j\in\{0,1\}} \Big[\sum_{k\geq -23} A_{it}^{jk}\gamma^{jk} + \sum_{k\geq -12} D_{it}^{jk}\delta^{jk} \Big] + u_{it}, \tag{2}$$

where $j = 1$ denote distressed firms and $j = 0$ denotes nondistressed firms A_{it}^{jk} is equal to one if i was employed at firm type j k quarters ago as of quarter t, and D_{it}^{jk} is equal to one if i separated firm type j k quarters ago as of quarter t.[13] We estimate equation (2) with ordinary least squares (OLS) on a balanced sample that includes quarterly earnings records (including quarters with zero earnings) from 24 quarters before and after the reference quarter. The sample includes separators and stayers from both distressed and nondistressed firms but excludes recalls.

The estimated earnings losses for distressed separators identified by equations (1) and (2) are essentially the same (i.e., $\delta^k \approx \delta^{1k}$), but equation (2) will allow us to study the outcomes for distressed and nondistressed separators in a unified empirical framework.[14] Initially we estimate equation (2) for reference quarter 2005:2 and present the results for the distressed separators, but later we will discuss results for other reference periods and for nondistressed separators.

Figure 2 plots the estimates of δ^{1k} from equation (2) for the 2005:2 reference quarter. The results replicate the familiar finding that separators from distressed firms experience large reductions in earnings that persist for years. We find an initial drop of $4,070 in quarterly earnings, and even six years after the separation, these workers earn around $1,000 less per quarter.

[13] As noted in Jacobson et al. (1993b), distinguishing stayers by type of firm can be interpreted as estimating the effects of separation itself as opposed to the effects of the firm-side conditions that contributed to the separation.

[14] The only difference between equations (1) and (2) is that the coefficient β is identified based on workers from both distressed and nondistressed firms in equation (2).

3.2 Earnings Losses by Duration of Nonemployment

Our aim is to investigate the role of jobless duration in explaining the post-separation earnings patterns, allowing outcomes to vary for direct job-to-job moves versus those with longer jobless spells. To do this, we expand upon equation (2) to take into account duration of nonemployment and estimate:

$$y_{it} = \alpha_i + X_{it}\beta + \sum_{j\in\{0,1\}} \Big[\sum_{k\geq -23} A_{it}^{jk}\gamma^{jk} + \sum_{k=-12}^{0} D_{it}^{jk}\delta^{k} + \sum_{N=0}^{5} \sum_{k\geq max\{N-1,0\}} D_{it}^{jkN}\delta^{jkN} \Big] + u_{it}, \quad (3)$$

where D_{it}^{jkN} is an indicator equal to one if individual i separated from firm type j (as before, $j = 1$ denotes distressed) k quarters ago as of quarter t and had a duration of nonemployment equal to N, where N is defined by the duration categories listed in Section 2. D_{it}^{jk} is defined as before and the lack of the N superscript illustrates that we do not allow for the pre-separation effects to differ by the subsequent duration of nonemployment.[15] The sample includes earnings records from 24 quarters before and after the reference quarters.[16]

The estimates of δ^{1kN} from equation (3) are presented in Figure 3. A clear pattern emerges: The duration of time spent in nonemployment prior to finding a new job is strongly related to the magnitude and persistence of earnings losses. We find an immediate earnings gain but not much persistent earnings change for distressed separators who find re-employment within the quarter of separation. For those who find re-employment in the adjacent quarter the loss in quarterly earnings six years after separation exceeds $1,000, while for those who experience four or more quarters of nonemployment the loss exceeds $3,000. The figure displays a clear monotonic relationship in which longer periods of nonemployment are associated with larger, more persistent earnings losses.

It is important to highlight that earnings variation induced by changes in hours or fraction of weeks worked within a quarter, in addition to changes in hourly wage rates, are included in these estimates. This approach is consistent with the literature and implies that some of the

[15] As above, pre-separation effects are allowed to differ by firm distress. However, the duration of nonemployment conditional on separating is a function of the worker, not the origin firm, so the same logic does not apply.

[16] For separators that experience at least one full quarter of nonemployment we drop from the sample the quarter following the separation up through one quarter prior to when they find a new job because these quarters have zero earnings by construction. As before, quarters of zero earnings after finding a new job are included in the sample.

persistent earnings losses observed for job changers with spells of joblessness may reflect such variation in hours and employment. That is, the large and persistent earnings losses after six years reported above for those who experience four or more quarters of nonemployment may reflect subsequent spells of joblessness (although we restrict our analysis to workers who find a new job within eight quarters after separating). Examining implications for earnings fluctuations more closely linked to wage rates is challenging with these administrative data. However, we include an exercise below in Section 3.4 that takes an important step in that direction by focusing on the full quarter earnings implications of changing jobs.

3.3 Heterogeneity Across Macroeconomic Conditions

The duration of nonemployment plays a similar role with respect to earnings losses over a variety of macroeconomic conditions. The reference quarter 2005:2 which we feature may be thought of as a fairly neutral period, in which, for example, the unemployment rate was close to the Congressional Budget Office's estimate of its natural rate. We also estimate equation (3) on samples defined by the reference quarters 1999:2 (a tight labor market), 2001:2 (a mild recession), and 2009:2 (a severe recession). Figure 4 shows that the relationship of earnings losses to duration of nonemployment following separation is similar across this variation in macroeconomic conditions, even comparing a boom year like 1999 to the global financial crisis year of 2009. This finding does not imply that the unconditional distribution of earnings outcomes are similar over the cycle for separators from distressed firms. As shown in Table 2, longer durations of nonemployment are more common in recessions, implying that earnings losses on average are more severe. This finding reinforces our main finding that it is the duration of nonemployment that matters for earnings losses.

3.4 Earnings Changes Throughout the Distribution

The literature has documented a large dispersion in earnings outcomes for displaced workers. Because of the many parameters involved, examining dispersion using equation (3) would be difficult in practice. Instead, we estimate the change in log earnings from before to after the job separation, in particular from four quarters before the reference quarter (e.g., 2004:2

for reference quarter 2005:2) to the first full quarter of earnings after re-employment.[17] A distinction of this approach relative to equation (3) is that we focus on full-quarter earnings changes so that the inferences are more closely linked to changes in wages.

For each subsample of job changers based on the duration of nonemployment N (as defined in Section 2), we estimate,

$$\Delta y_i = \alpha^N + X_i\beta^N + Z_{j(i)}\gamma^N + D_i\delta^N + S_i\lambda^N + u_i, \tag{4}$$

where Δy_i is the change in log real earnings; X_i is a vector of worker characteristics that include age, sex, and tenure as of the reference quarter; $Z_{j(i)}$ is a vector of characteristics of the firm of employment as of the reference quarter that includes size, state, and the growth rate of the industry within the state; D_i is a dummy variable equal to 1 if the worker separated from a distressed firm in the reference quarter; S_i is a dummy variable equal to 1 if the worker separated from a nondistressed firm in the reference quarter and u_i is a regression residual, where standard errors are clustered at the level of the employer in the reference quarter.

This first difference specification implies that we are abstracting from fixed unobserved heterogeneity that affects the level of earnings. The vectors X and Z control for differences in earnings trajectories along the dimensions that we can measure in our data.[18] To ease the computational burden, we select a subsample of stayers who are observably similar to the separators using propensity score matching. In the interests of space, we show the results of these regressions for only the 2005:2 reference quarter.

We start by estimating equation (4) via OLS. The results are summarized in Figure 5(A). The panel plots the predicted average earnings changes for distressed separators relative to stayers, evaluated at the means of the other covariates. Our main findings are robust to this alternative estimation strategy: Average earnings losses vary substantially by duration of nonemployment.

[17] A full quarter of earnings is one in which earnings from the employer were positive in both the previous and subsequent quarters. In this case it is likely that the worker was employed by that employer for the entire quarter in question.

[18] We restrict the sample to individuals who had changes in log earnings between -1.2 and 0.8, to eliminate outliers.

To see if this pattern holds throughout the distribution of earnings changes, we estimate quantile regressions of the same form as equation (4) for the 10th, 25th, 50th, 75th, and 90th quantiles. The predicted earnings changes at each quantile (again, evaluated at the means of the other covariates) are shown in Figure 5(B). At the 10th, 25th, 50th, and 75th percentiles, earnings changes fall markedly as the observed nonemployment duration increases. At the 90th percentile, while longer periods of nonemployment are also generally associated with worse outcomes, the relationship is weaker and noisier relative to the other percentiles.

The OLS results imply that the average worker also experiences a modest earnings increase relative to stayers following a job change within the same quarter. At the 50th percentile the earnings gain is less than 10 log points but rises to above 20 log points at the 75th percentile and to about 40 log points at the 90th percentile. Job changers that do not transition immediately fare poorly especially if the spell of nonemployment is two quarters or more. At the mean, a job changer with four to eight quarters of nonemployment has an earnings decline relative to stayers that exceeds 20 percent. For the lower percentiles, the earnings losses are even greater. At the 25th percentile, the earnings losses for job changers with four to eight quarters of nonemployment exceeds 40 percent.

There are subtle differences between the interpretations of Figures 3 and 5, but the broad implications are the same. Essentially, both figures indicate that distressed job changers with longer spells of joblessness fare worse. However, the two figures convey somewhat different information. Figure 5 conveys information about the difference in pay between the new and old job and suggests that workers who make a within quarter job transition move to higher paying jobs, which is especially true at the 50th percentile and above. In contrast, workers who experience a spell of nonemployment move to lower paying jobs with the decline in pay increasing in the duration of the nonemployment spell. Figure 3 conveys information about total earnings after the separation (which may include periods of nonemployment). Workers who make a within quarter transition experience an increase in earnings immediately after the separation but the gains are not persistent. Workers who experience nonemployment experience persistent earnings losses with the losses increasing in the duration of the nonemployment spell.

Comparing Figure 5 to estimates of earnings gains from job-to-job flows from Haltiwanger

et al. (2018a) highlights an important feature of the current analysis. Both papers find earnings gains from job-to-job flows using the LEHD data. However, the magnitudes are not directly comparable since the current paper imposes additional restrictions on the sample to be consistent with the displaced worker literature. Specifically, in the current paper we focus on workers with at least three years of tenure at their main job prior to the reference quarter of the separation, are 25-55 years old, and are re-employed within eight quarters. The first two of these restrictions implies that we are likely missing the rapid moves up the job ladder for younger workers and the associated earnings gains highlighted by Haltiwanger et al. (2018b). Still in spite of these restrictions, we find earnings gains from direct job-to-job flows in Figure 5 for workers on average and at the 50th percentile and above. The sample restrictions also offer a likely explanation for why we find little persistent differences in earnings (and not earnings gains for movers) between within quarter job changers and stayers in Figure 3.

3.5 Separations from Nondistressed Firms

To further elucidate the role of nonemployment, as in Jacobson et al. (1993a) and subsequent literature we compare our sample of separators from distressed firms to a sample of separators from nondistressed firms who are similarly reemployed at a new firm within 8 quarters of separation. As noted above, we included permanent separators from nondistressed firms in equation (3) to facilitate this comparison. The losses of distressed and nondistressed separators conditional on duration of nonemployment are similar both qualitatively and quantitatively. See Appendix B.1 for details.

Moreover, as indicated in Table 2, permanent separators from distressed and nondistressed firms also have similar distributions of nonemployment following separation. We have confirmed this by estimating a competing risks hazard model in which recall to one's former employer or reemployment at new employer are possible routes out of nonemployment. While separators from nondistressed firms are more likely to be recalled to their previous jobs, conditional on permanent separation the distribution of nonemployment spells is similar to that of distressed separators.[19] See Appendix B.2 for details.

[19]Bear in mind that our findings are about spells of nonemployment, not only unemployment. Matched

Given the similar importance of nonemployment in determining the earnings outcomes for distressed and nondistressed permanent separators alike, as well as the similarity in nonemployment outcomes, it is no surprise that studies which concentrate on job-to-job transitions find that mobility enhances earnings while studies that follow a broad range of nonemployment spells find substantial average earnings losses.[20]

How should we interpret the role of nonemployment in generating earnings losses, in light of the similarity in outcomes for permanent separators from distressed and nondistressed firms? Since Jacobson et al. (1993a), it has been common in the literature to use firm distress to identify worker displacement, that is, exogenous separations.[21] Under this identifying assumption, the fact that the earnings losses following nonemployment are similar regardless of firm distress suggests that the cause of nonemployment following separation is immaterial; nonemployment itself does the damage. In this case, nonemployment does not so much mediate the effects of displacement on earnings loss as mediate the effects of separation on earnings loss. For further discussion, see Fallick et al. (2021).

4 Why is Jobless Duration Related to Earnings Losses?

Why is the duration of time spent in nonemployment so strongly related to post-separation earnings losses? A number of possible economic explanations have important—and potentially conflicting—implications for how we understand the experiences of displaced workers and of the more general process through which earnings are determined. One may divide explanations into three potentially overlapping classes. First, differences in time spent in nonemployment may reflect heterogeneity across workers not yet taken into account that is correlated with earnings, and in particular heterogeneity in degree of labor market attachment or other individual economic circumstances. Second, spending an extended period of time in nonemployment might itself produce earnings losses. This could happen

CPS data reveal that many workers leave the labor force even within sub-groups with seemingly strong labor force attachment.

[20] We find these similarities also in the other reference periods and demographic subsamples analyzed below.

[21] On the use of firm distress as an indicator of displacement, see Flaaen et al. (2019), Von Wachter et al. (2009a), Davis et al. (2006), and Davis et al. (2012).

because of a depreciation of human capital (or lack of human capital gained), because spending time in nonemployment sends a bad signal to potential employers, or because separation with nonemployment causes a worker to fall to a lower rung of the job ladder. Third, the duration of joblessness prior to finding a new job may be a symptom of other factors that lead to earnings losses. Notably, the propensity to move up or down the firm earnings ladder may be related to whether the worker makes a direct job-to-job transition. Alternatively, workers whose local economies have suffered decline might have a harder time finding a new job and might have to settle for lower wages upon re-employment. In this section we discuss several possible explanations about which we can offer some evidence.

4.1 Worker Heterogeneity

As in previous research in the JLS tradition, heterogeneity across workers in our sample in their degree of labor force attachment is limited by the restriction that every separated worker in our sample has at least three years of tenure prior to separating and is observed to be re-employed within eight quarters of separation. Even so, it is possible that significant heterogeneity along this dimension remains. Less strongly attached workers may be both slower to become re-employed and more likely to choose to accept jobs with reduced hours or lower wages.[22]

Several observations argue against this possibility. One is the similarity in the earnings outcomes by duration across widely varying macroeconomic conditions that we noted in Section 3.3. Because one would expect the mix of labor force attachment among job changers to vary with the cyclical state of the labor market, the similarity in results across the reference years argues against worker heterogeneity in attachment as an explanation for our results. Another is that if heterogeneity in labor market attachment were a major factor, we would expect to see differences in post-separation earnings between separators from distressed firms and separators from nondistressed firms because separations from nondistressed employers are more likely to result from decisions made by the worker. As we saw in Section 3.5, the earnings outcomes across these two types of separated workers are similar.

[22] A related possibility is that employers take the duration of nonemployment as a signal of worker quality. See, for example, Van Belle et al. (2018).

To explore the possibility of heterogeneity further, we pursue several strategies focusing on distressed separators.

First, we follow Jacobson et al. (1993a) and others in adding linear individual-specific time trends to our main specification in equation (3). We continue to find that average earnings losses are monotonically and strongly increasing in the duration of nonemployment. These results suggest that workers who spend more time in nonemployment were not simply on flatter earnings trajectories prior to separating.

Second, we re-estimate equation (3) on a number of subgroups of workers that are each likely to be more homogeneous in labor market attachment than is the full sample. Specifically, we re-estimate equation (3) on the following subsamples:

a Workers re-employed within four quarters of separation;

b Workers with at least five years of tenure before separation;

c Omitting jobs with particularly low quarterly earnings (average annual earnings in three years prior to reference quarter do not exceed $10,000);

d Omitting jobs in the temporary help and related industries (NAICS 5623);

e Men ages 35-44;

f Women ages 25-34;[23]

g Women who gave birth during the 2005 reference quarter or the adjacent quarters.[24]

These results are summarized in Table 3, which presents the average earnings losses for each group measured in the 20 quarters after re-entry into the labor market—more formally, the average values of δ^{1kN}, for k=[max{N-1,0},max{N-1,0}+19]. Because the level of average earnings differs across the groups, for greater comparability Table 3 presents the losses as percent of average pre-separation earnings instead of dollars. Our main result is robust within every group: Nonemployment duration is a key factor associated with earnings losses.

[23]That is, women in the post-schooling age groups with the highest fertility rates.

[24]We use the ages of own-children in the 2010 decennial census to identify these women (see Census (2024a)). To increase power, we retain all stayers in the sample, but limit the sample of separators to new mothers.

Third, we examine a sample of workers with more than one separation. As argued in Alvarez et al. (2016), a positive correlation between the durations of nonemployment across spells may indicate that unobserved characteristics of the worker, rather than some aspect of nonemployment itself, drives the relationship between earnings and nonemployment durations. We examine distressed separators in our 2005:2 reference quarter who changed jobs in some previous quarter. Columns 1 and 2 of Table 4 present coefficients from regressions of the duration of nonemployment following the separation in 2005:2 on the duration of nonemployment following the previous job separation, both with and without the additional covariates from equation 4. We also present the correlation between the duration spells in the rows below. The durations of nonemployment in these two episodes are positively correlated, but the correlation is not large (correlation of 0.0141 and 0.0049 for variables unadjusted and adjusted for covariates, respectively), and the coefficient is not significantly different from zero.[25] These results cast doubt on the possibility the our results are driven by unobserved heterogeneity across workers.

Taken together, these results lead us to conclude that it is unlikely that worker heterogeneity from either observed or unobserved factors accounts for the relationship between the duration of nonemployment and earnings losses.

4.2 Depreciation of Human Capital

Many models of earnings suggest that human capital depreciates in an absolute sense from nonuse during periods of nonemployment. While depreciation of human capital would predict larger earnings losses for workers who spend more time in nonemployment, two features of our results argue against this explanation. The first is the steep increase in earnings losses between workers with within-quarter versus adjacent-quarter transitions, and again between workers with adjacent-quarter transitions and one quarter of nonemployment. It seems unlikely that human capital would depreciate so quickly. The second is the long persistence

[25]Table A.1 present analogous results for nondistressed separators. While the coefficient for the nondistressed separators is relatively larger, the absolute magnitude is small, and suggests that increasing the duration of the prior nonemployment spell by 4 quarters increases the current spell by $0.08 = 4 * 0.02$ of a quarter. We also estimate a version of equation (4) for the 2005:2 separation event in which we control for the duration of nonemployment for the previous separation. Figure A.4 presents the estimates and shows that the estimated earnings changes are quite similar to those in Figure 5(A).

of these losses following re-employment. Human capital depreciation from a short jobless spell should be regained long before that point. Thus, it seems unlikely that depreciation in human capital explains our results, although we do caution that we do not have direct evidence that would rule out this mechanism.[26]

4.3 Falling Down the Job Ladder

Job ladders are a feature of many models with on-the-job search in the presence of search and matching frictions in the labor market. In many of these models (Moscarini and Postel-Vinay 2013, to name one), workers move up the job ladder, defined by firms ranked by productivity and by firm-specific earnings premia correlated with such productivity differentials, via job-to-job flows. Firms at the top of the job ladder primarily hire from lower ranked firms while firms at the bottom primarily hire from nonemployment. Haltiwanger et al. (2018a), Haltiwanger et al. (2018b), and Haltiwanger et al. (2021) provide empirical support for such predictions showing that job-to-job flows tend to move workers up the job ladder for firms ranked by firm-level pay premia, firm-level productivity, or average firm earnings. The findings using firm-level pay premia are especially relevant in the current context since such premia abstract from worker heterogeneity.

Building on these findings, we ask whether movement down the job ladder is related to the duration of the spell of nonemployment following a separation.[27] To start, we decompose earnings using an AKM decomposition using the LEHD data.[28] With the AKM firm fixed effects, we use the specification described in equation (4) to estimate the relationship between firm distress, duration of nonemployment, and job mobility to firms with higher (or lower) AKM firm-fixed effects. Specifically, we estimate a version of equation (4) where we replace the change in earnings on the left-hand side with the difference between the AKM firm fixed

[26]Direct evidence on the depreciation of human capital during nonemployment is not abundant and tends to be highly specific. See, for example, Dinerstein et al. (2020), Edin and Gustavsson (2008), and Albrecht et al. (1999).

[27]This would be consistent with Faberman et al. (2022), who find that that employed job-searchers tend to receive better job offers than do unemployed searchers.

[28]The firm fixed effects are estimated on an annual sample that contains average quarterly earnings of the main employer between 2002 and 2009. In addition to individual and firm fixed effects, the empirical model also controls for year fixed effects and the interaction between education, sex, and a third-order polynomial in age. Following Card et al. (2018), age is normalized to 40. See Appendix C for details.

effects of the destination and origin firms. Given the nature of this outcome variable, these regressions include only separators. We focus on the results for distressed separators.

The results presented in Figure 6(A) indicate that transitions to firms with a lower firm fixed effect are strongly related to the duration of time spent in nonemployment. On average, workers who make a within-quarter transition move to firms with fixed effects that are 2 log points lower, whereas workers who spend four or more quarters in nonemployment move to firms with fixed effects that are 15 log points lower. In other words, the qualitative patterns in changes in individual earnings are mirrored in changes in the firm fixed effect.

In the bottom panel of Figure 6(B), we also report the relationship between the estimated difference between the predicted change and the change in AKM firm fixed effect and duration. For this difference, we first computed the difference between the change in individual earnings and the AKM fixed effect. This difference includes the contribution of worker effects, match effects and the residual from the AKM estimation. We then use that difference as a dependent variable in a version equation (4). By the properties of OLS, the predicted overall change (depicted in Figure 5) can be decomposed into the contribution of the AKM fixed effect and everything else. In comparing these results, we can thus quantity the contribution of the change in the AKM fixed effect for the overall change in earnings. We find, for example, that for workers who spend four or more quarters in nonemployment that the reduction in firm effects account for 69 percent of overall reduction in individual log earnings. Thus, these estimates imply that workers who spend significant time in nonemployment suffer earnings losses, in large part, because they move to lower paying firms upon re-employment. Our results imply that being hired by a higher paying firm becomes increasingly less likely for workers as they get back on the job ladder following an extended spell of joblessness.

We consider alternatives to the AKM firm premia for ranking firms in Figure 7. The estimates in these panels indicate that the duration of time spent in nonemployment is also strongly related to movements down the job ladder defined by average earnings and productivity, respectively.[29] The patterns for the productivity job ladder are noisier, which

[29]The firm-level measures of average earnings and productivity are measured between 2002 and 2009. Productivity data are measured as the log revenue per worker deviated from the four-digit industry average (see Haltiwanger et al. 2021). Percentile ranks are calculated across the national distribution and are

may be because our measure of productivity is only a valid measure of productivity within industries. For this purpose, we use a within industry relative ranking of firms' productivity as in Haltiwanger et al. (2021). See Appendix C for details.

4.4 Local Labor Demand

Workers who separate into labor markets with little demand for their skills may struggle to find a new job quickly and may command lower earnings, generating the observed correlation between nonemployment and earnings losses. To explore this possibility, we measure the strength of the relevant local labor market by the employment growth rate in each industry in each state and each occupation in each state.

In particular, we measure industry-by-state employment growth by 3-digit NAICS industry using the LEHD and assigned to each worker by her industry in 2005:2; we categorize observations into three groups: weak, average, and strong. We measure occupation-by-state employment growth by 3-digit Census occupation from the BLS' Occupational Employment Studies program (see BLS (2024)) and is assigned to each worker using his occupation in the 2000 Decennial Census. Thus, for the results by occupation, we use the sample based on the 2001 reference quarter. Given that the sample for which we can measure occupation is much smaller, we defined only weak and strong labor markets based on above and below the median employment growth rate for the occupation class within the state. We then estimate equation (4) separately for samples defined by the strength of the local labor market based on the industry and occupation classifications (see Census (2024d)). Again we focus on results for distressed separators.

Table 5 presents the estimates of the earnings consequences and shows that within all subsamples, we continue to find a strong association between earnings losses and duration of time spent in nonemployment.[30,31] While state may be too crude a measure of geography and the industry and occupation measures may be too broad to fully capture changes in

employment weighted.

[30] As in Table 3, Table 5 presents the average earnings losses for each group measured in the 20 quarters after re-entry into the labor market, more formally, the average values of $\delta^{k,N}$, for $k = [max\{N-1,0\}, max\{N-1,0\}+19]$.

[31] We also find in unreported results that there is little difference between the earnings losses by firm distress. Differences in the distributions of nonemployment durations are also not large.

"local" labor demand, these results suggest that declining local demand is not the primary explanation of our main findings.

To provide additional evidence against the role of local labor market conditions, we also estimate a version of equation (4) that includes fixed effects for the origin firm.[32] Figure A.5 present estimates of β^N. Even when comparing workers employed at the same firm, separators who find a job quickly experience minimal earnings losses relative to stayers while separators who spend time in nonemployment before finding a new job experience large earnings losses relative to stayers.

5 Conclusion

Our paper contributes to the large literature that documents persistent earnings losses from job displacement. We find that the length of joblessness between jobs is a key mediator by which displacement leads to earnings losses. Workers who experience little or no joblessness after displacement suffer no losses on average, while those who experience a prolonged period of joblessness experience large, persistent earnings losses and move to lower-paying firms. Interestingly, we also find that jobless duration predicts earnings outcomes for job separators generally, not only displaced workers. Extending existing models to account for the relationship between duration of joblessness, earnings losses, and movements down the job ladder should be a priority for future research.

It is worth emphasizing that, despite our finding that displaced worker outcomes are generally quite similar to those of other attached job changers, we do not argue that the focus on displaced workers in the economics literature is misplaced. This group of workers is of interest for at least two reasons. First, they may be more likely to experience the separation as an unanticipated shock, and thus while the earnings consequences are similar to those of other separators, the welfare consequences may be different. Second, separations are more likely to be exogenous, which makes for a more straightforward interpretation of the empirical results. However, we do encourage future researchers to direct their focus on

[32] In order to identify the firm fixed effects the analysis sample includes all stayers, as opposed to a subset selected by propensity score matching.

the role of jobless duration in understanding earnings losses for displaced workers as opposed to factors unique to mass layoff events.[33]

[33]Another explanation having to do with changes in the worker's market is that losses occur because the skill mix demanded by the market has changed over time making the displaced worker's skills less valuable, as in Braxton and Taska (2023). We have no evidence to bring to bear on this possibility.

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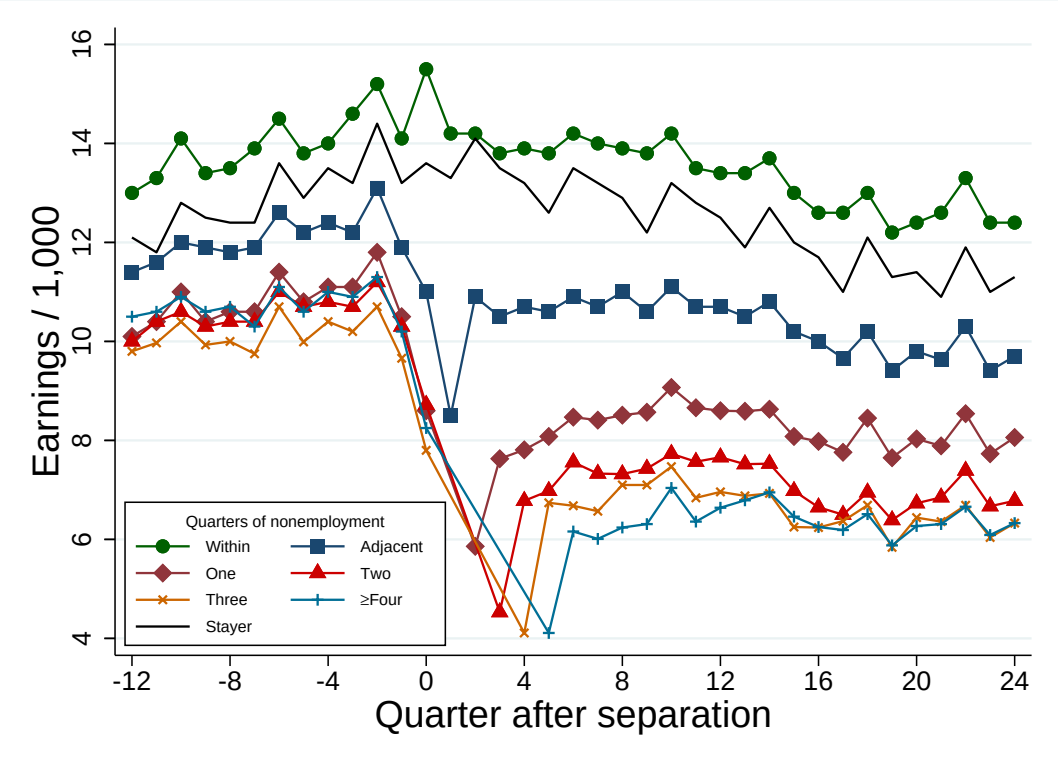
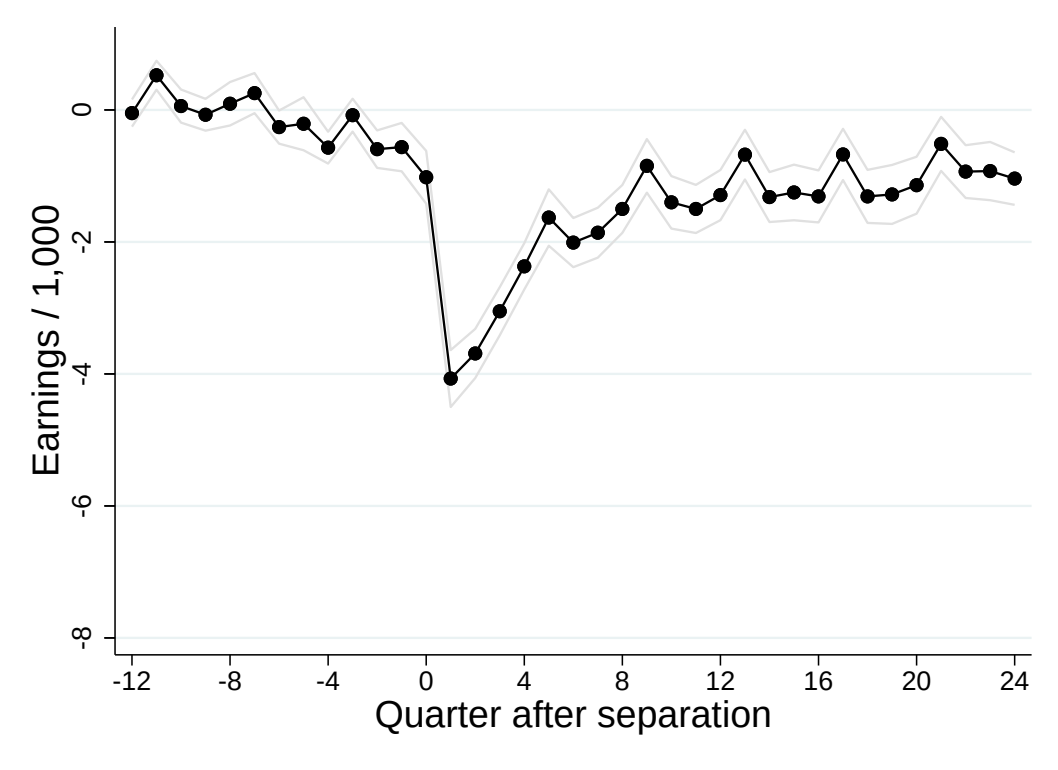
6 Figures

Figure 1: Earnings by Length of Jobless Spell After Displacement



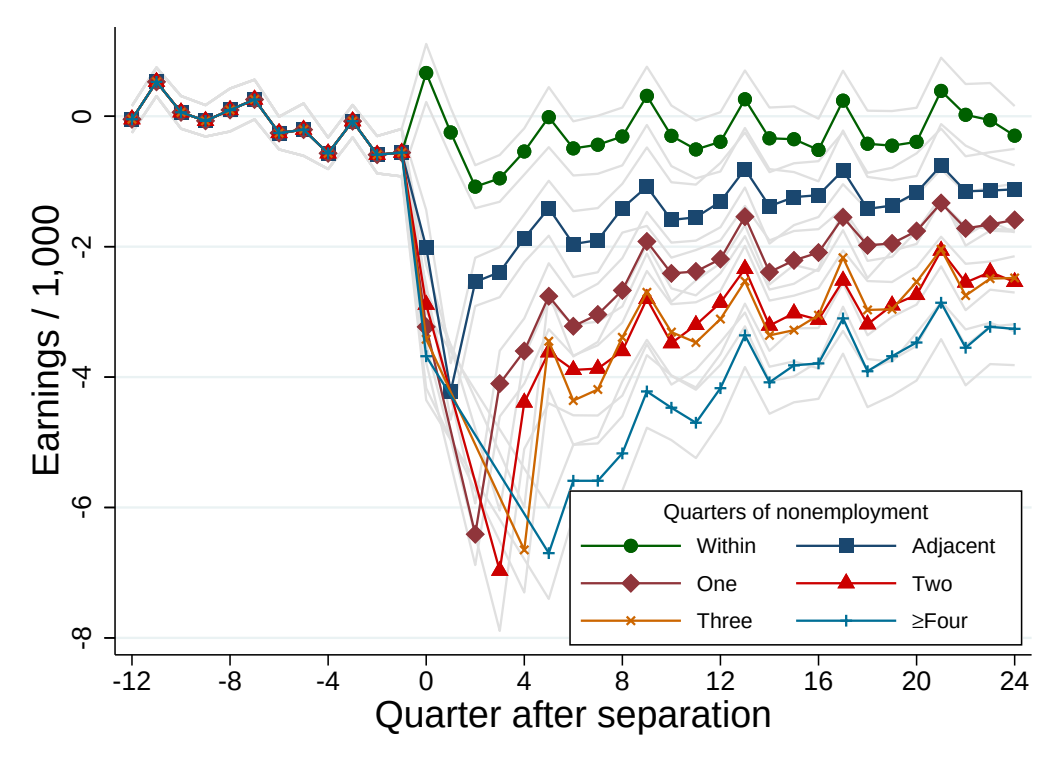
Notes: The figure presents the average earnings of workers in the three years before and six years after workers were displaced in 2005:2, by the length of their jobless spell between displacement and being reemployed.

Figure 2: Effect of Displacement



Notes: The figure presents the effect of separating from a distressed firm in 2005:2. Specifically, the figure presents estimates of δ^{1k} from equation (2) by the quarter relative to displacement. Recalls are excluded from the sample. Standard errors are clustered at the level of the employer in the reference quarter and the solid gray lines depict the 95 percent confidence interval around the estimates.

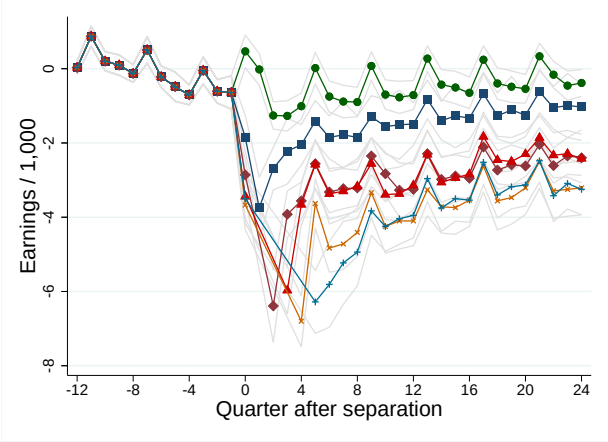
Figure 3: Effect of Displacement by Duration of Nonemployment



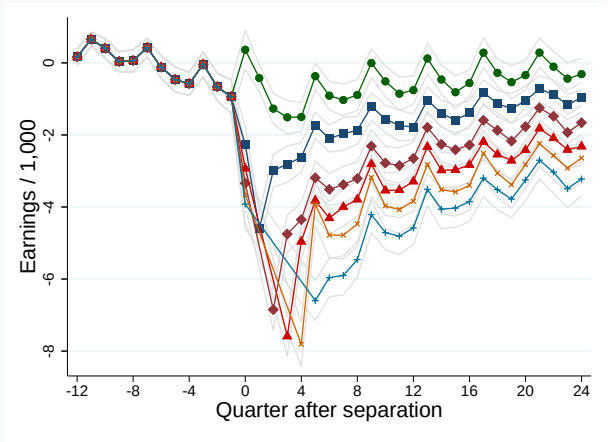
Notes: The figure presents the estimated earnings consequences of displacement in 2005:2 by duration of nonemployment. Displaced workers subsequently recalled to the same employer are excluded. The figure displays estimates of δ^{1kN} from equation (3). Standard errors are clustered at the level of the employer in the reference quarter and the solid gray lines depict the 95 percent confidence interval around the estimates.

Figure 4: Effects of Displacement in Other Reference Periods

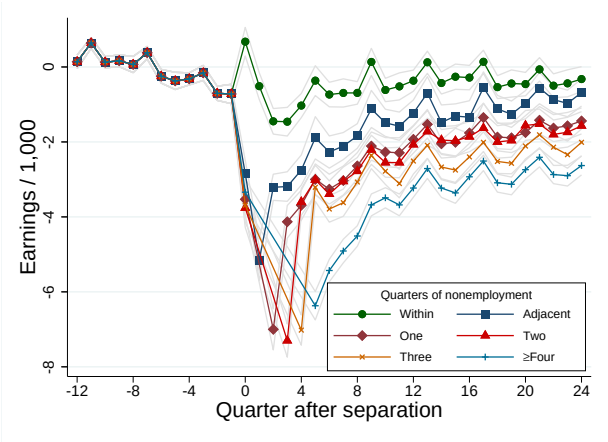
(A) Displaced in 1999



(B) Displaced in 2001



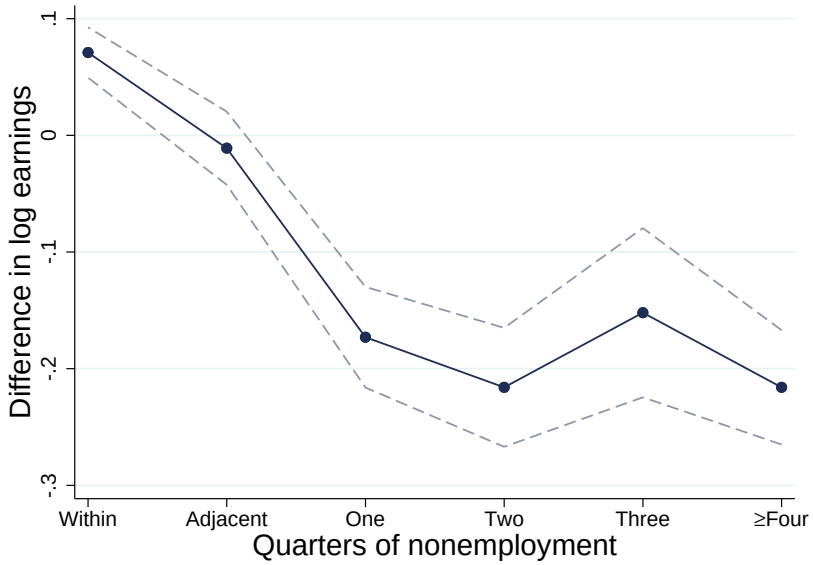
(C) Displaced in 2009



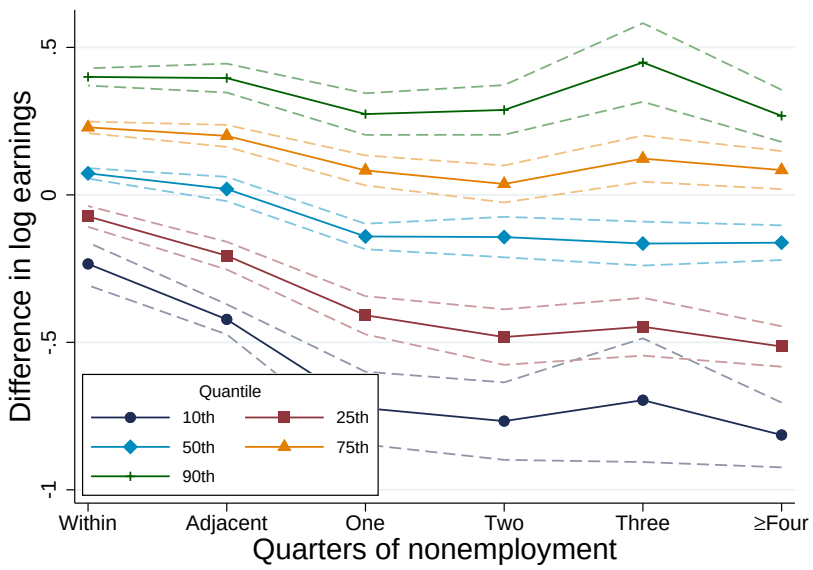
Notes: The figure presents the estimated earnings consequences of displacement, duration of nonemployment, for workers displaced in 1999:2, 2001:2, and 2009:2, respectively. The figure displays estimates from equation (3), plotting δ^{1kN} against the quarter relative to displacement. Standard errors are clustered at the level of the employer in the reference quarter and the solid gray lines depict the 95 percent confidence interval around the estimates.

Figure 5: Predicted Changes in Earnings of Displaced Workers

(A) Ordinary Least Squares



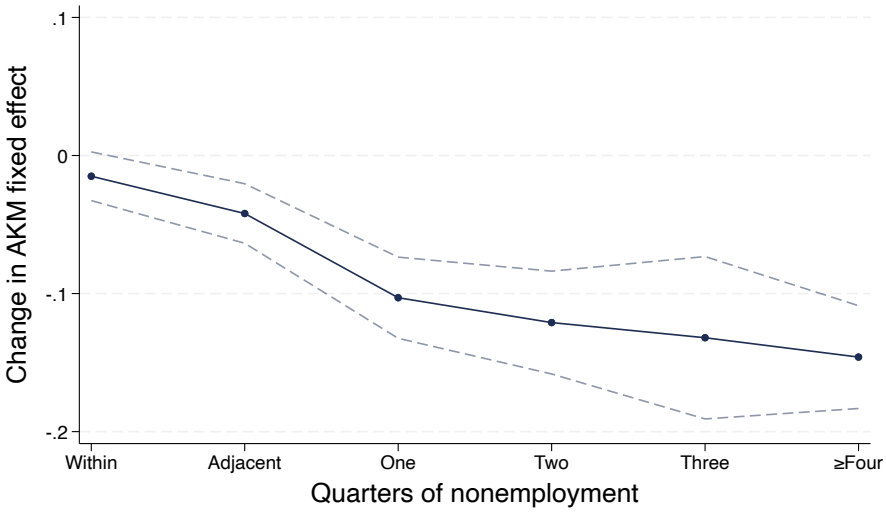
(B) Quantile Regressions



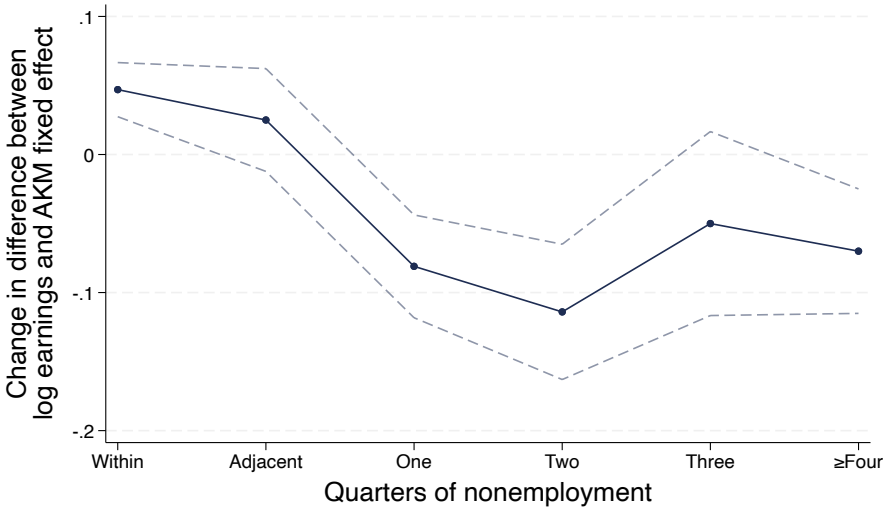
Notes: The figures present the predicted earnings penalties for distressed separators relative to stayers, evaluated at the means of the other covariates. The estimates are obtained from equation (4). Earnings prior to separation are measured four quarters prior to separation and earnings post-separation are measured one quarter after re-employment. Panel (a) presents results from ordinary least squares (OLS) and panel (b) presents results from quantile regressions, where the 10th, 25th, 50th, 75th, and 90th percentiles are reported. Within each figure, the horizontal axis denotes the duration of time spent in nonemployment prior to re-employment. Standard errors are clustered at the level of the employer in the reference quarter and the dotted lines represent the 95 percent confidence interval.

Figure 6: Change in Firm-Level Characteristics

(A) Firm Fixed Effect



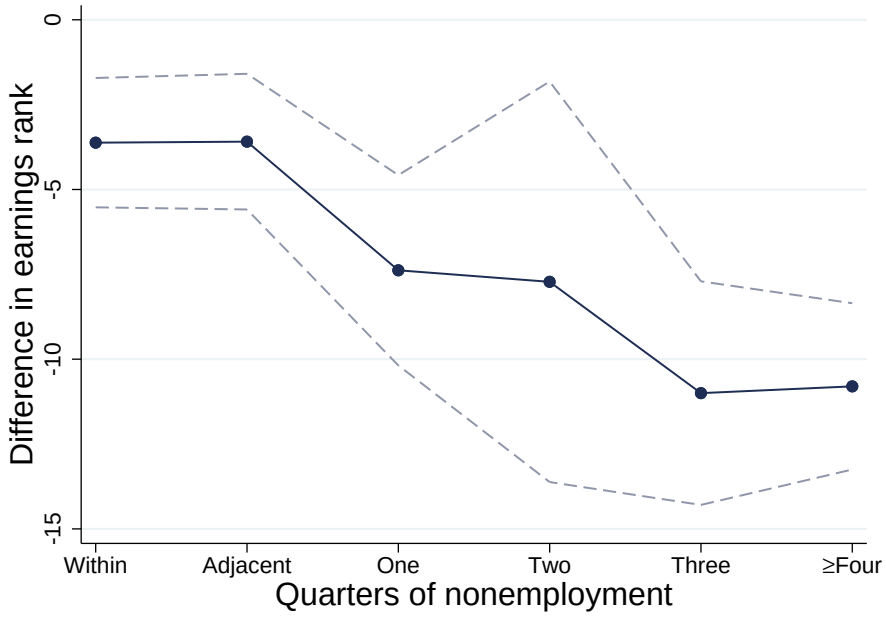
(B) Difference Between Log Earnings and AKM Firm Effect



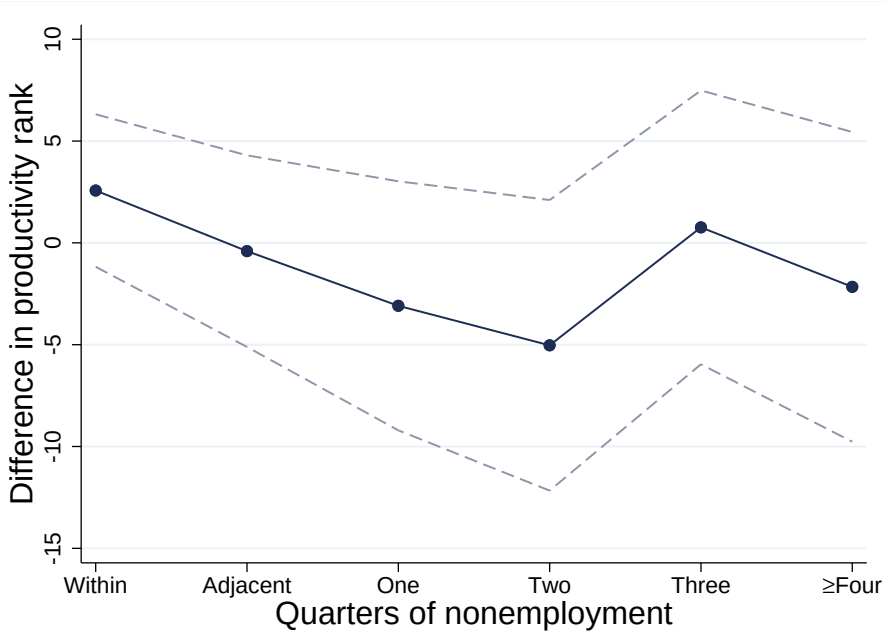
Notes: The top panel presents the difference between the origin and destination AKM firm fixed effect for displaced workers by duration, evaluated at the means of the other covariates. The bottom panel presents the change in the difference between log earnings and the AKM firm fixed effect for displaced workers by duration, again evaluated at the means of the other covariates. The estimates are obtained from equation (4) estimated via Ordinary Least Squares – reporting the results for distressed separators. The horizontal axis denotes the duration of time spent in nonemployment prior to re-employment. Standard errors are clustered at the level of the employer in the reference quarter and the dotted lines represent the 95 percent confidence interval.

Figure 7: Change in Alternative Firm-Level Characteristics

(A) Average Earnings Rank



(B) Productivity Rank



Notes: Each panel presents the predicted change in a different firm-level variable for displaced workers, evaluated at the means of the other covariates. The estimates are obtained from equation (4) estimated via Ordinary Least Squares – reporting the results for distressed separators. The outcome variable in panels (a) and (b) are the difference between the destination and origin based on the average earnings rank, and productivity rank, respectively. The horizontal axis denotes the duration of time spent in nonemployment prior to re-employment. Standard errors are clustered at the level of the employer in the reference quarter and the dotted lines represent the 95 percent confidence interval.

7 Tables

Table 1: Descriptive Statistics

	Distressed Firms		Nondistressed Firms	
	Stayers (1)	Job changers (2)	Stayers (3)	Job changers (4)
Age at time of separation				
25≤age≤34	22.6	28.7	24.9	37.9
35≤age≤44	34.8	36.4	34.8	34.7
45≤age≤55	42.5	34.9	40.3	27.4
Sex				
Male	53.5	59.6	50.5	52.1
Industry				
Finance, insurance, and real estate rental and leasing	3.8	5.3	7.3	8.6
Administrative and support	4.4	8.4	3.0	5.7
Agriculture, forestry, fishing, and hunting	2.1	1.6	0.8	0.8
Arts, entertainment, and recreation	1.3	1.0	1.4	1.6
Construction	11.3	10.6	3.2	4.2
Manufacturing (durable)	16.8	21.0	16.4	13.5
Educational services	21.4	5.3	14.8	9.0
Accommodation and food services	3.6	3.6	3.6	6.4
Health care and social assistance	5.6	5.4	13.9	11.5
Information	2.4	3.4	4.6	5.2
Management of companies and cnterprises	0.4	0.8	1.8	1.8
Mining, quarrying, and oil and gas extraction	0.0	0.0	0.2	0.2
Manufacturing (nondurable)	7.1	7.4	3.3	3.0
Other services	2.2	2.0	1.3	1.6
Professional, scientific, and rechnical services	5.8	8.6	4.6	5.6
Retail trade	4.0	5.5	10.7	13.6
Transportation and warehousing	4.0	5.2	3.7	3.3
Utilities	0.1	0.0	1.2	0.3
Wholesale trade	3.7	4.6	4.3	4.3
Firm size				
50≤firm size<100	22.5	23.8	10.6	12.6
100≤firm size<500	45.0	49.7	27.6	31.6
500≤firm size	32.6	26.5	61.8	55.8
Observations	13,000	14,000	680,000	178,000

Notes: The sample includes workers who are employed in 2005:2 with at least three years of tenure at a firm that has at least 50 workers. Workers in the mass layoff sample were at firms that experienced a decline in employment by at least 30 percent between 2005:2 and 2006:2. Stayers are workers who have strictly positive earnings at their initial employer at least until 2006:2. Job changers are workers who separate from their employer in 2005:2 and have strictly positive earnings at a different employer by 2007:2.

Table 2: Distribution of Re-employment and Nonemployment Outcomes

	2005		1999		2001		2009	
	D	ND	D	ND	D	ND	D	ND
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Distribution of Separators								
New employer	0.80	0.71	0.79	0.68	0.77	0.68	0.67	0.59
Recall	0.11	0.18	0.15	0.22	0.13	0.20	0.18	0.25
Not re-employed within 8 qtrs	0.09	0.11	0.07	0.10	0.10	0.12	0.15	0.16
B. Quarters of nonemployment before finding new employer								
Within	0.50	0.50	0.49	0.50	0.41	0.49	0.31	0.36
Adjacent	0.25	0.26	0.28	0.28	0.29	0.28	0.23	0.25
One	0.09	0.09	0.09	0.08	0.11	0.09	0.11	0.11
Two	0.05	0.05	0.05	0.05	0.06	0.04	0.06	0.06
Three	0.03	0.03	0.03	0.03	0.04	0.03	0.07	0.05
≥Four	0.07	0.07	0.06	0.06	0.09	0.07	0.21	0.17
C. Sample Size								
Stayers	13,000	680,000	17,000	628,000	23,000	648,000	40,000	687,000
Separators	18,000	250,000	22,000	240,000	32,000	224,000	42,000	198,000

Notes: The table presents statistics for non-distressed (ND) and distressed (D) firms by year. The top panel describes the composition of separators by presenting the share of separators who fall into one of three mutually exclusive categories: found new employer, recalled, and did not return to the labor market within eight quarters after the separation. The middle panel presents the share of job changers who make a transition within quarters, in the adjacent quarter or spend one to four (or more) quarters in nonemployment. The bottom panel presents the total number of stayers and separators, respectively.

Table 3: Effect of Displacement within Subsamples

	Quarters of nonemployment					
	Within	Adjacent	One	Two	Three	≥Four
	(1)	(2)	(3)	(4)	(5)	(6)
A. Re-employed within four quarters						
	-.02	-.12	-.22	-.26	-.28	-.34
	(.01)	(.02)	(.02)	(.02)	(.03)	(.02)
B. At least five years tenure						
	-.07	-.18	-.28	-.34	-.33	-.39
	(.01)	(.02)	(.02)	(.03)	(.03)	(.02)
C. Exclude temporary help industries						
	-.02	-.12	-.22	-.26	-.28	-.35
	(.01)	(.02)	(.02)	(.03)	(.03)	(.02)
D. Pre-separation earnings>10,000						
	-.03	-.12	-.21	-.26	-.27	-.32
	(.01)	(.02)	(.02)	(.02)	(.03)	(.02)
E. Men ages 35-44						
	-.03	-.14	-.21	-.26	-.3	-.34
	(.01)	(.02)	(.02)	(.03)	(.03)	(.02)
F. Women ages 25-34						
	-.01	-.09	-.22	-.27	-.26	-.36
	(.02)	(.02)	(.03)	(.04)	(.04)	(.03)
G. New mothers						
	-.14	-.14	-.17	-.39	-.70	-.41
	(.08)	(.08)	(.14)	(.17)	(.19)	(.13)

Notes: This table presents post-separation earnings changes for displaced workers by quarters spent in nonemployemnt. Each panel presents results estimated from a different subsamples that include individuals that: (A) spent less than five quarters in nonemployment after separation, (B) had at least five years of tenure in 2005:2, (C) do not work for firms in the temporary help industry, (D) had average annual earnings that exceed 10,000 in the three years leading up to 2005:2, (E) are male ages 35-44, (F) are female ages 25-34, and (G) are women that give birth in the first three quarters of 2005 or are a stayer. The table summarizes estimates obtained from estimating equation (3) and presents the average post-separation earnings in the four years following re-employment divided by the average earnings in the three years prior to the separation. Standard errors are clustered at the level of the origin firm.

Table 4: Durations of Nonemployment for Workers with Two Displacement Events

	(1)	(2)
Duration of previous nonemployment	0.00789	0.00275
	(0.00704)	(0.00721)
Correlation	0.0141	0.0049
Covariates included	no	yes
observations	8400	8400

Notes: This table presents estimates in which we regress the number of quarters spent in nonemployment following the current separation on the the number of quarters spent in nonemployment following the most recent job separation. The results are estimated for the mass layoff sample. Columns 1 and 2 do not and do include a vector of additional covariates. Standard errors are clustered at the level of the origin firm. We also present the correlation between the duration spells. For the columns with covariates, we first residualize both the current and past duration of nonemployment on the covariates and then present the correlation between the residualized values.

Table 5: Effect of Displacement by Strength of Local Labor Market

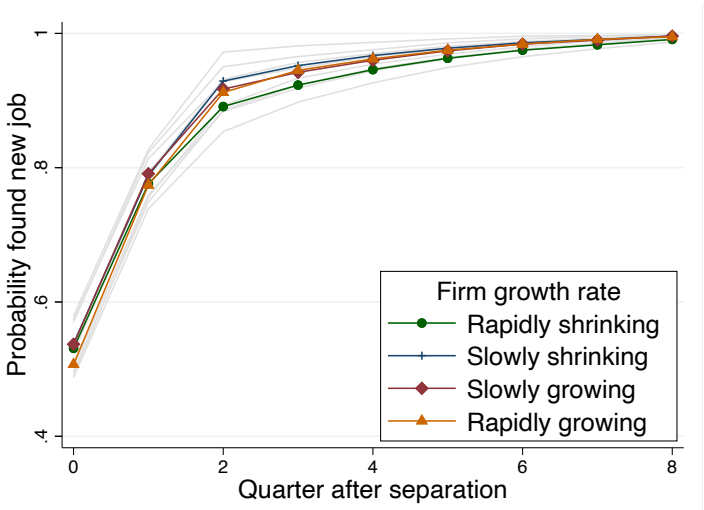
	Quarters of nonemployment					
	Within	Adjacent	One	Two	Three	≥Four
	(1)	(2)	(3)	(4)	(5)	(6)
A. Industry						
Weak						
	-.01	-.1	-.16	-.27	-.25	-.27
	(.02)	(.03)	(.03)	(.04)	(.05)	(.03)
Average						
	-.05	-.14	-.31	-.33	-.43	-.42
	(.03)	(.04)	(.03)	(.04)	(.08)	(.04)
Strong						
	-.02	-.11	-.19	-.22	-.21	-.33
	(.02)	(.02)	(.03)	(.04)	(.03)	(.03)
B. Occupation						
Weak						
	-.05	-.12	-.18	-.33	-.29	-.37
	(.02)	(.03)	(.04)	(.05)	(.06)	(.04)
Strong						
	-.01	-.1	-.15	-.2	-.25	-.36
	(.02)	(.04)	(.04)	(.05)	(.06)	(.06)

Notes: This table presents post-separation earnings changes for displaced workers by quarters spent in nonemployemnt. Each panel presents results estimated from a different subsample. Panel A defines the subsample based on the employment growth rate of the industry within the state. Panel B defines the subsamples based on the employment growth rate within the occuption and state. The table summarizes estimates obtained from estimating equation (3) and presents the average post-separation earnings in the four years following re-employment divided by the average earnings in the three years prior to the separation. Standard errors are clustered at the level of the origin firm.

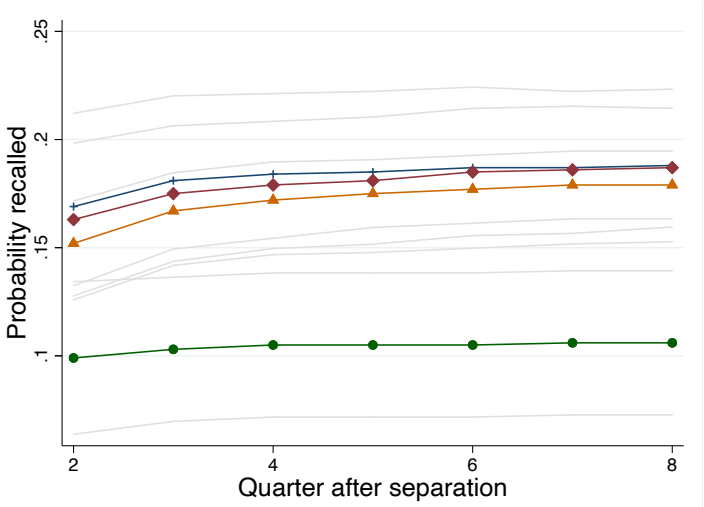
Appendix A Additional Figures and Tables

Figure A.1: Duration of Nonemployment

(A) Job Changers



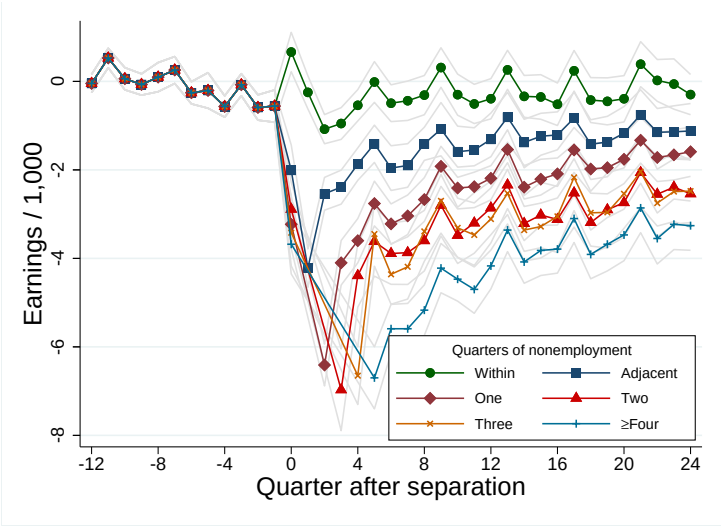
(B) Recalls



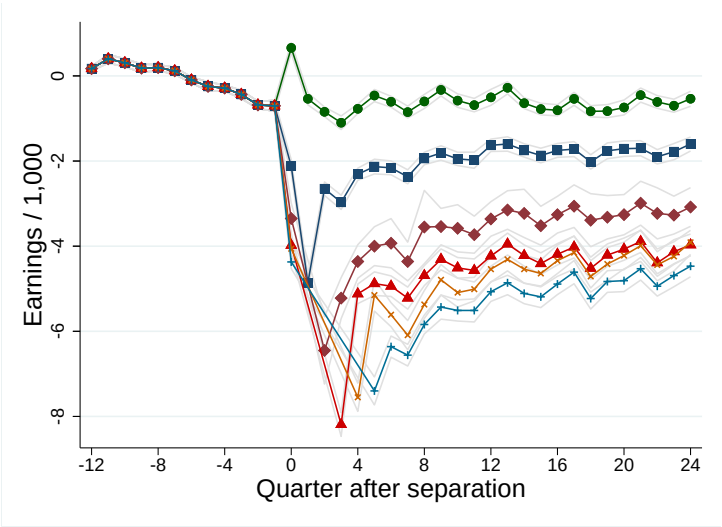
Notes: Panels (A) and (B) present the probability of exiting nonemployment by a given quarter after separation for job changers and recalls, respectively. The probability of a separator finding a new job in a given quarter after separation and the probability of a separator being recalled in a given quarter after separation are estimated by logistic regression. We then use these estimated probabilities to calculate the probability of finding a new job by a given quarter after separation conditional on never being recalled as well as the probability of being recalled by a given quarter after separation. Note that the sample excludes separators who do not return within eight quarters of the separation; thus, the probability of a job changer finding a new job within eight quarters conditional on not being recalled is one. Standard errors are clustered at the level of the employer in the reference quarter and the dotted lines represent the 95 percent confidence interval.

Figure A.2: Effect of Separation by Jobless Duration: Distressed vs. Non-Distressed Firms

(A) Distressed

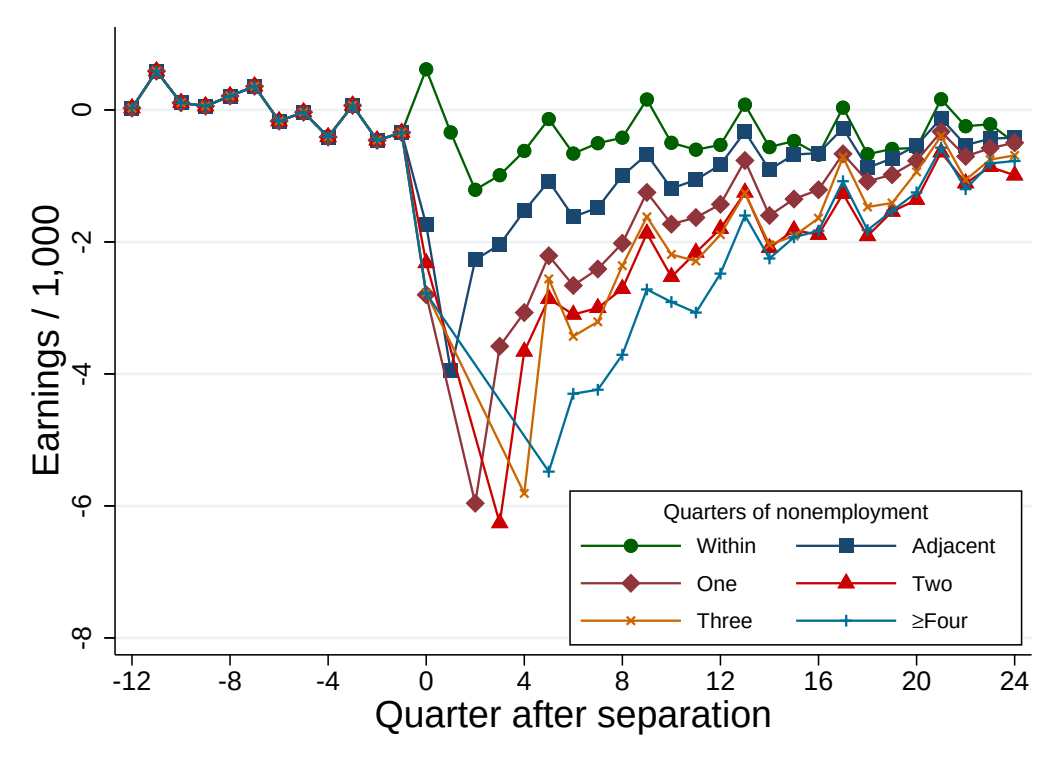


(B) Non-Distressed



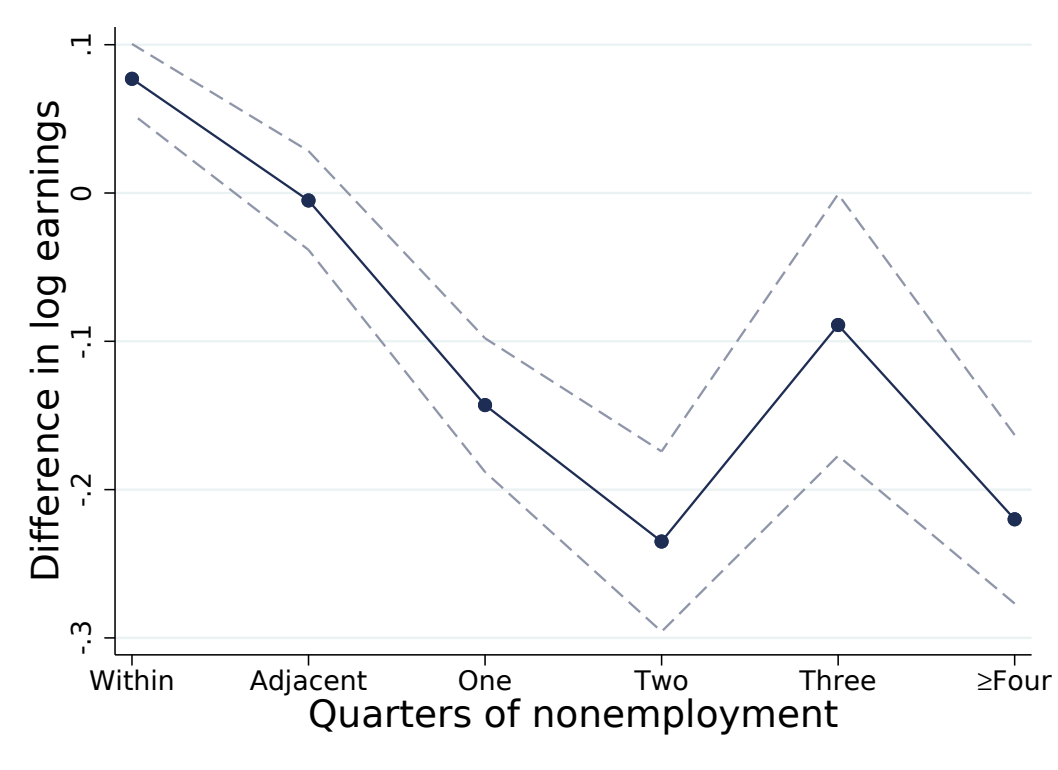
Notes: The figure presents the estimated earnings consequences of a job separation by firm health (distressed and non-distressed) and duration of nonemployment. The results are derived from a sample that excludes recalls but includes all other stayers and separators. The sample corresponds to reference period 2005:2. The figure displays estimates obtained from equation (3). Panel (a) plots δ^{1kN} (also shown in Figure 3) and panel (b) plots δ^{0kN} against the quarter relative to displacement. Standard errors are clustered at the level of the employer in the reference quarter and the solid gray lines depict the 95 percent confidence interval around the estimates.

Figure A.3: Inclusion of Individual-Specific Time Trend



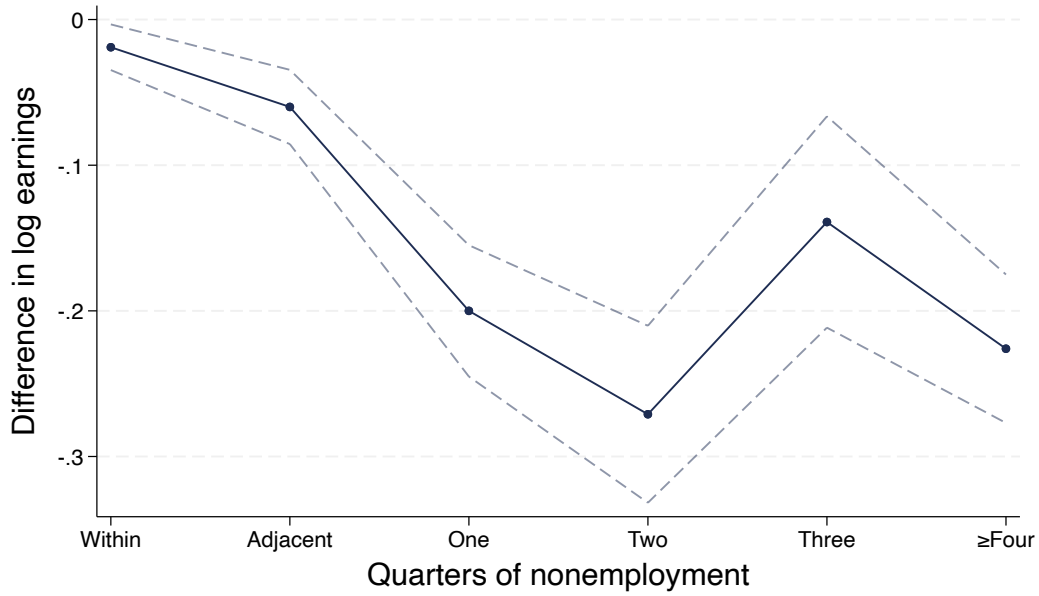
Notes: The figure presents the estimated earnings consequences of displacement by duration of nonemployment. The results are derived from a sample that excludes recalls but includes all other stayers and separators. The sample corresponds to reference period 2005:2. The figure displays estimates obtained from a modified version of equation (3), which also includes a linear individual-specific time trend. This figure plots δ^{1kN} against the quarter relative to displacement.

Figure A.4: Earnings Losses Controlling for Prior Nonemployment Duration



Notes: This figure presents the predicted earnings penalties for distressed separators relative to stayers, evaluated at the means of the other covariates. The estimates are obtained from equation (4), with the duration of nonemployment after previous separation added to the vector of covariates. Earnings prior to separation are measured four quarters prior to separation and earnings post-separation are measured one quarter after re-employment. Results are presented for Ordinary Least Squares (OLS). The horizontal axis denotes the duration of time spent in nonemployment prior to re-employment. Standard errors are clustered at the level of the employer in the reference quarter and the dotted lines represent the 95 percent confidence interval.

Figure A.5: Earnings Change Regression with Origin Firm Fixed Effects



Notes: This figure presents coefficient estimates from a modified version of equation (4), which includes a fixed effect for the origin firm. Earnings prior to separation are measured four quarters prior to separation and earnings post-separation are measured one quarter after re-employment. The horizontal axis denotes the duration of time spent in nonemployment prior to re-employment. Standard errors are clustered at the level of the employer in the reference quarter and the dotted lines represent the 95 percent confidence interval.

Table A.1: Durations of Nonemployment for Workers with Two Displacement Events: Non-Distressed Separators

	(1)	(2)
Duration of previous nonemployment	0.0256	0.0209
	(0.00193)	(0.00217)
Correlation	0.0552	0.0448
Covariates included	no	yes
observations	103000	103000

Notes: This table presents estimates in which we regress the number of quarters spent in nonemployment following the current separation on the the number of quarters spent in nonemployment following the most recent job separation. This is for the sample of non-distressed separators. Columns 1 and 2 do not and do include a vector of additional covariates. Standard errors are clustered at the level of the origin firm. We also present the correlation between the duration spells. For the columns with covariates, we first residualize both the current and past duration of nonemployment on the covariates and then present the correlation between the residualized values.

Appendix B Discussion of Additional Results

B.1 Quantifying the Importance of Nonemployment

Panel A of Figure A.2 reproduces Figure 3, showing the estimated effects on earnings for distressed separators; i.e., it plots the estimates of δ^{1kN} from equation (3). Panel B A.2(B) presents the analogous coefficients δ^{0kN} for nondistressed separators. Comparing the two panels of Figure A.2 indicates that the duration of time spent in nonemployment is predictive of post-separation earnings outcomes while the health of the employer is not.

In order to further quantify this statement, we estimate two restricted versions of equation (3) and compare their explanatory power to that of the unrestricted model. In the most restrictive model, we do not allow for differential effects of separations by either employer type or duration of nonemployment. Formally, we require that $\delta^{jkN} = \delta^{k}$. In the intermediate model, we allow the effect of separation to differ by the health of the firm but not by duration of nonemployment. Formally, we require that $\delta^{jkN} = \delta^{jk}$. To quantify the explanatory power of each model, we implement the fixed effects estimation using a within estimator, which allows us to interpret the resulting R-squared as the proportion of within individual variation explained by the model. All specifications are estimated on the same sample described for the estimation of equation (3).

The results indicate that the most restrictive model, in which the effects of separations do not vary by employer type or nonemployment duration, explains 3.7 percent of the within individual variation in earnings (that is, the R-square is 0.037). As expected, we find that allowing the effect of separation to vary by employer type, but not by nonemployment duration, adds virtually no explanatory power to the model, increasing the R-squared by only 0.005 percent. In contrast, the unrestricted version in equation (3) , which allows the effects of separation to vary by nonemployment duration, explains about 6.9 percent more of the within individual variation than the most restrictive model. While the overall increase in explanatory power may be considered modest, clearly the differential effects of separation by nonemployment duration are far more important than the differential effects by firm health.

B.2 Competing Risks Hazard Model of Nonemployment Duration

We estimate a competing-risks hazard model where the two risks are becoming re-employed at a new employer and becoming re-employed at the same employer from which one separated (recall). We assume that recalls dominate new jobs, in the sense that a worker recalled in a particular quarter is not in the risk set for taking a new job in that quarter, while a worker taking a new job in a given quarter is in the risk set for being recalled in that quarter. We use the same categories of nonemployment duration as we have throughout, and finer categories of firm employment growth that disaggregate nondistressed firms into three distinct categories (slowly shrinking, slowly growing, and quickly growing). We model the probability of becoming re-employed at a new job at each duration of nonemployment, conditional on not already being re-employed, as

$$\begin{aligned} prob(\text{new job in t}|\text{not reemployed before t and not recalled in t})_i = \\ \alpha_t + \beta_t X_i + \gamma_t Z_{j(i)} + \lambda_t g_{j(i)} + \mu_{it} \end{aligned} \tag{B.1}$$

and the probability of recall analogously as

$$prob(\text{recalled in t}|\text{not reemployed before t})_i = \alpha'_t + \beta'_t X_i + \gamma'_t Z_{j(i)} + \lambda'_t g_{j(i)} + \mu'_{it} \tag{B.2}$$

where, X_i is a vector of worker characteristics that includes age, sex, and tenure at the separating firm; Z_i is a vector of characteristics of the separating firm, namely, size, state, and the growth rate of the industry within the state; and $g_{(j(i))}$ is an indicator variable for the category of firm growth (rapidly shrinking, slowly shrinking, slowly growing, and rapidly growing).

From these two models we then obtain predicted probabilities for each of the four growth rate categories evaluated at the mean of all other covariates. We use these predicted probabilities to construct the cumulative distribution function (CDF) of time until re-employment, that is, the probability of exiting nonemployment by a given quarter after separation.

The results are displayed in Figure A.1. Panel (A) displays the CDF for new jobs (conditional on no recall) and illustrates that the duration of time spent in nonemployment is unrelated to the growth of the firm from which the worker separated. Panel (B) shows analogous results for recalls, where there are markedly different patterns for distressed and other separators. As expected, individuals who separate from rapidly shrinking firms are far less likely to be recalled. The greater likelihood of a spell of nonemployment for distressed separators is driven by their lower probability of recall.

B.3 Linear Time Trends

The results of adding linear individual-specific time trends to our main specification in equation (3) are presented in Figure A.3. (We omit confidence intervals because computational constraints prevent us from clustering standard errors.) Although the earnings losses of distressed separators are slightly smaller and the strength of the association between duration of nonemployment and earnings losses is somewhat weaker than in our main results, qualitatively the relationship between duration of nonemployment and earnings losses is robust to the inclusion of the individual-level trend. We continue to find that average earnings losses are monotonically and strongly increasing in the duration of nonemployment. These results suggest that workers who spend more time in nonemployment were not simply on flatter earnings trajectories prior to separating.

B.4 Sensitivity Analysis on Samples and Specifications with JLS

As noted in Section 3.5, JLS found that nondistressed separators tended not to experience persistent earnings losses, in stark contrast to our findings. We explored a number of differences between our sample design and specification and those of JLS and found them to be unable to explain the difference in our main results. The possible explanations we explored (estimates not reported but available upon request) include:

- JLS included in their comparison group workers who were observed to separate and later returned to the same employer (recalls), while we omit these individuals.

- JLS included in their sample separators from firms that closed, while we omit these individuals.
- JLS restricted their sample to workers with at least six years of tenure, while our tenure restriction is three years.
- In pooling the sample across dates of separation, JLS hold coefficients constant over time, and therefore across macroeconomic conditions, whereas our separate samples allow those coefficients to vary.
- JLS's data do not allow them to follow workers who become re-employed in another state, while our data infrastructure allows us to track individuals who cross state lines.[34]

This sensitivity analysis suggests that the differences between our results for non-distressed separators and those in JLS are not due to differences in data quality, sample construction, or specification.

[34]In addition, JLS restricted their sample to workers with positive earnings in every calendar year, whereas we require positive earnings within eight quarters of separation. Von Wachter, Song, and Manchester (2009) show that the earnings losses for non-distressed separators are larger and more persistent when separators with zero annual earnings are included in the sample. JLS also appear to limit their sample of stayers to stayers at firms that experienced some separations. We have not replicated these sample restrictions, but we expect that the differences between them and our restrictions are too small to account for the large difference in estimated outcomes.

Appendix C Construction of Firm-Level Variables

C.1 AKM Firm Effects

To estimate the AKM firm fixed effect, we use data on the earnings of all workers who appear in the LEHD between 2002 and 2009. For each worker and each year, we identify the main employer (i.e., the employer that provides over 50 percent of total earnings in that year) and we calculate the annual earnings associated with that employer in that year as the average quarterly earnings across all quarters in which the worker had strictly positive earnings at the employer. Using these worker-by-year data we then regress log of annual earnings on an individual fixed effect, a firm fixed effect, year fixed effect, and the interaction between education, sex, and a third-order polynomial in age. To ease computational burden, we estimate this specification within nine distinct subsamples defined by the Census region in which the firm is located. Within each of these samples, we limit the sample to the largest connected set. To make the firm fixed effects comparable across Census regions, we normalize firm fixed effects by subtracting the mean value of the firm fixed effect for firms in the accommodation and food services industry. This normalization assumes that firms in this industry offer a pay premium of zero, on average.

C.2 Firm Productivity

We measure firm productivity using revenue and employment data from the Census Business Register and the Longitudinal Business Database (LBD – Census (2024b)). We measure productivity as log revenue per worker, which is a measure that has been commonly used to measure productivity at both the macro and micro level. While this is a relatively crude measure of productivity compared to total factor productivity (TFP), other research has found log revenue per worker is highly correlated with TFP within industries. We measure the productivity of each firm as the employment-weighted log revenue per worker between 2002 and 2009. We then calculate employment-weighted ranks within four-digit North American Industry Classification System (NAICS) industry codes. We are able to measure log revenue per worker for approximately 80 percent of firms in the LBD and the ranks are calculated within the universe of firms for which we can measure productivity between 2002 and 2009.