# Locate Your Nearest Exit: Mass Layoffs and Local Labor Market Response

## ONLINE APPENDIX

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In this Online Appendix we show extra tables and figures not included in the main results of the paper, and also explain two points about the data. First, in Appendix 1 we discuss issues with weighting, trends, and data irregularities in the year 2000. In Appendix 2 we explain how we handle issues with suppressed data in the SSDI Application data file. We show additional tables and figures mentioned in the text in Appendix 3.

## 1 Weighting, Trends, and the Year 2000

This appendix serves to explain why we have opted to display un-weighted estimates in the main results throughout. We show first that the estimates for net labor force are unchanged if we weight, but do not include county-specific trends. Then we discuss differences in the results when including both weights and trends.

The first column of Table 1 shows the estimate of the total effect of a mass layoff (including lags) on net labor force change. Comparing the first, second, and third rows show similar estimates. However, in the fourth row, where we include weights as well as trends, our estimate shrinks considerably.

One reason why the estimate changes so much when we include both weights and trends is that the labor force changes in 2000 have some error built into them. The Bureau of Labor Statistics incorporated major changes and revisions to the employment and labor force numbers, which were adjusted between December 1999 and January 2000, and December 2002 and January 2003. The former adjustment is the largest of these adjustments, and also has the largest impact on our estimates.[1] This suggests that the year 2000 is problematic.

To show why this adjustment would affect our estimates, we demonstrate two main facts: (1) This adjustment differentially affected different sizes of counties (which would affect estimates with weighting); and (2) This adjustment would have affected the county-specific detrending of the estimates (which would be affect estimates with trends). Taken together, this would suggest that dropping the year 2000 should mitigate these problems. We show how this affects the estimates in the second column of Table 1, which shows that omitting the year 2000 for net labor force changes our estimates only when weighted with trends.

Again, there are two key conclusions from this exercise. First, the BLS adjustment differentially affected different sizes of counties. In order to see this fact, consider Figure 1. Each panel shows the distribution of net labor force changes, by quartile of county size in 1996. Most years (1999, 2001, and 2002) the distributions are rather tight, and similar across county size. However, in 2000, the distribution is not as tight, and importantly, becomes less tight for smaller counties than for larger counties. While we know this is true in other years as well, it is much more stark in 2000. Therefore, this adjustment by the BLS differentially affected different sizes of counties.

The second key finding is that the BLS adjustment affects county-specific trends, differentially by size of county. The previous fact showed that the adjustment the BLS made had different effects on changes between large and small counties. Figure 2 graphs the average net LF changes over time, once again by quartile of county population in 1996. Notice that while the time series for counties in the fourth quartile of population evolves smoothly over time from 1996 to 2010, counties in the other quartiles do not follow the same smooth pattern. In fact, in 2000, the average for these counties spikes, and then falls back to its normal level the year before (the numbers in 1999 and 2001 are almost identical). For the smallest quartile, the 2003 adjustment is evident as well; but the other quartiles are unaffected.

If we include trends, then these changes for counties will change the value of the $\eta_c$ in equation 6, and adjust the slope of the county-specific trend. However, because this effect is differential by county size, it only affects our estimates when we also weight. For this reason, our preferred estimate includes county trends but does not include weights.

One additional comment is warranted here. If only the smallest counties were affected by this problem, then weighting would be enough; however, Figure 2 shows that the bottom three quartiles of counties were affected, and so weighting does not mitigate the problem.

[1] (http://www.bls.gov/cps/cpscomp.pdf)

Figure 1: Distributions of Net Labor Force Change, by Quartile and Year

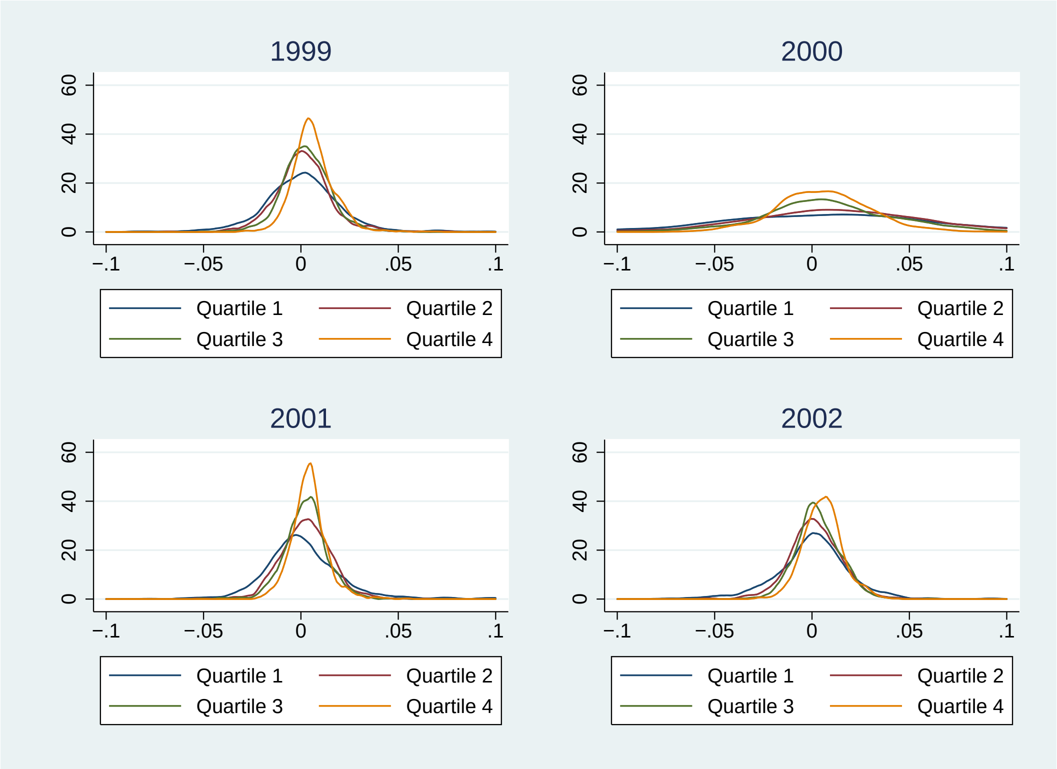



Figure 2: Average net LF changes over time, by quartile of county population

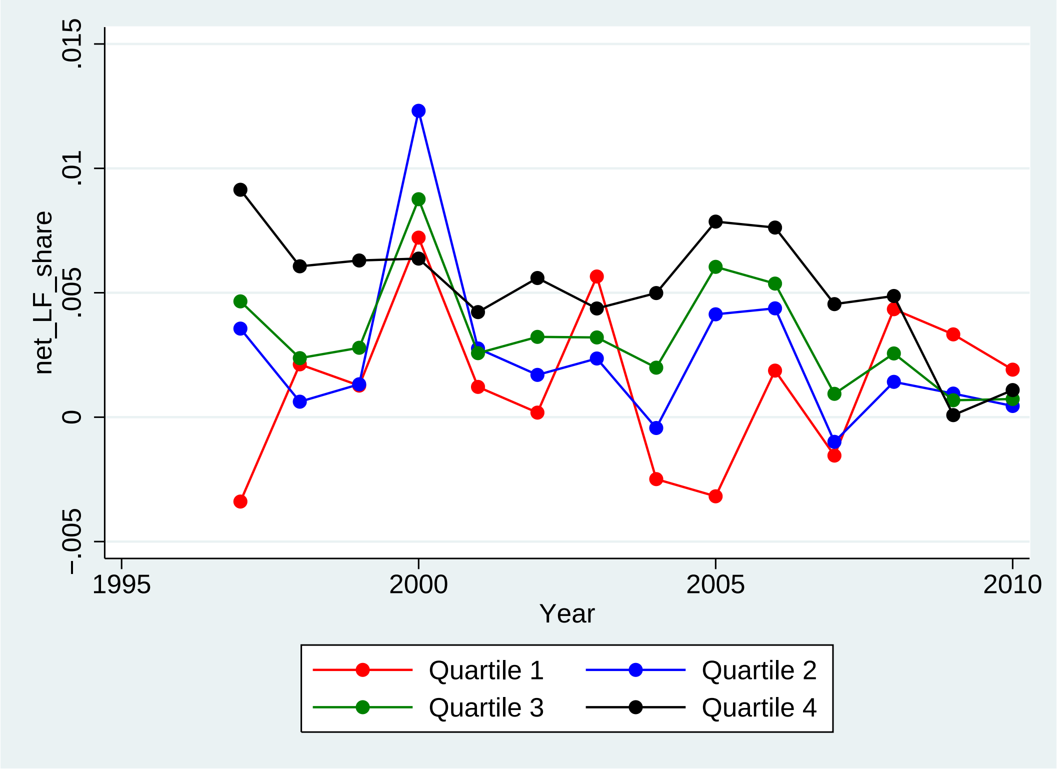


Table 1: Effect of Layoff Events on Net Labor Force

| | All years | Omitting 2000 |
|---|---|---|
| *A: Un-weighted* | | |
| No Trends | -0.1513*** | -0.2107*** |
| | (0.0486) | (0.0436) |
| Trends | -.1501 | -0.2055 |
| | (0.0610) | (0.0602) |
| *B: Weighted* | | |
| No Trends | -0.1463** | -0.1812*** |
| | (0.0681) | (0.0606) |
| Trends | -0.0527 | -.0999 |
| | (0.0757) | (0.0784) |

The dependent variable is change in labor force size. Each cell is a different regression, and the coefficients are the sum of the layoffs coefficients, estimated using equation 5. The first column includes all years, while the second column excludes the year 2000. Panel A displays estimates from unweighted regressions, while Panel B displays estimates from regressions weighted by lagged county population. Standard errors in parentheses are clustered on state. Each regression also includes county and year fixed-effects; the second row of each panel includes trends. * p <.10, ** p < .05, *** p < .01

## 2 SSDI Applications and Missing Data

To maintain the confidentiality of SSDI applicants, the Social Security Administration suppressed cells in the county-level aggregation of the Disability Research File (DRF) if the count was less than 10. In order to allow us to observe aggregate counts, however, the DRF had counts suppressed for all subgroups it at least one subgroup had a count of less than 10, but reported the aggregate number.[2]

Missing data are relatively common. In the study period, between 350 and 800 counties had missing totals each year, suggesting that this number of counties had fewer than 10 applicants at all. For the age breakouts, the number of missing observations is greater. For the older age groups (45-54, 55 and over) approximately a third of counties were not reported, while in some years half of counties were not reported for the younger age groups (under 30, 31-44). Approximately half (47 percent) of counties had non-missing data in all years.

These missing data do not reflect inconsistencies in the data, but are rather the results of small numbers of applications. As such, our preferred specification, reported in the body of this paper, drops these missing observations. For robustness we also explored other strategies.

Table 2 shows the results of various missing-data specifications. Panel A shows a summary of the results from Table 2. Panel B excludes any county that ever had missing data. Panels C, D, and E assign values of 0, 1, and 9 to any missing cell, respectively. Assigning a 0 to all observations would generate a result based on the lower bound of missing data, while assigning a 9 would create a result based on the upper bound. Panel F assigns a random number, chosen from a uniform distribution between 0 and 9. There are negligible differences between these panels.

[2]For example, if in county X in year YYYY there were 5 males under 30 years old who applied and 15 females, the cell for males under 30 and the cell for females under 30 would be suppressed. However, the cell for total applications under 30 would show a value of 20. This keeps the confidentiality of the cell under 10 while allowing us to observe the aggregate count.

Table 2: Robustness Check: Imputation of Missing Disability Application Data

| | Total | Under 30 | 31-44 | 45-54 | 55 over |
|---|---|---|---|---|---|
| *A. Preferred* | | | | | |
| Total Effect | 0.0089** | 0.0146 | 0.0009 | 0.0178** | 0.0047 |
| | (0.0037) | (0.0120) | (0.0059) | (0.0087) | (0.0057) |
| | 33599 | 20911 | 26406 | 27376 | 27733 |
| *B. No-Missing* | | | | | |
| Total Effect | 0.0073 | 0.0010 | 0.0063 | 0.0213* | 0.0048 |
| | (0.0049) | (0.0171) | (0.0076) | (0.0116) | (0.0069) |
| | 19190 | 11533 | 20471 | 20627 | 20276 |
| *C. Impute 0's* | | | | | |
| Total Effect | 0.0107** | 0.0398*** | 0.0088 | 0.0200** | 0.0087 |
| | (0.0044) | (0.0124) | (0.0064) | (0.0102) | (0.0068) |
| | 39921 | 39921 | 39921 | 39921 | 39921 |
| *D. Iimpute 9's* | | | | | |
| Total Effect | 0.0104** | 0.0731** | -0.0139** | 0.0242** | 0.0127** |
| | (0.0043) | (0.0343) | (0.0069) | (0.0099) | (0.0054) |
| | 39921 | 39921 | 39921 | 39921 | 39921 |
| *E. Random Impute* | | | | | |
| Total Effect | 0.0110*** | 0.0553** | -0.0006 | 0.0244** | 0.0117** |
| | (0.0042) | (0.0242) | (0.0065) | (0.0098) | (0.0052) |
| | 39921 | 39921 | 39921 | 39921 | 39921 |

Dependent variable for each column is the share of an age group that filed an application for disability insurance. The reported coefficients are the sum of contemporaneous and two lagged effects. Panel A drops cells with missing data. Panel B drops counties with missing data in any year. Panel C and D impute a 0 (minimum) or 9 (maximum) for each missing observation, and panel E imputes a number chosen randomly between 0 and 9 from a uniform distribution. Observations that were suppressed were randomly assigned a number between 0 and 9, uniformly. Standard errors in parentheses, clustered on state. Each regression also includes county and year fixed-effects, as well as county-specific trends. * p <.10, ** p < .05, *** p < .01

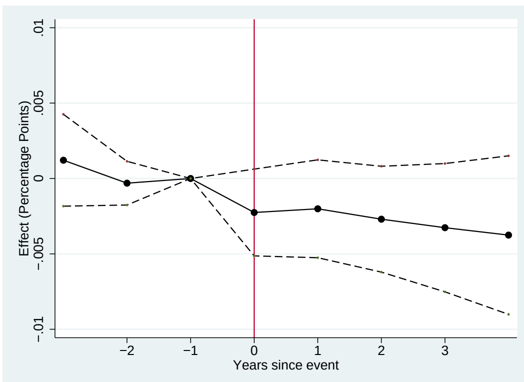
# 3 Additional Tables and Figures

Table 3: Effect of Layoff Events on Migration

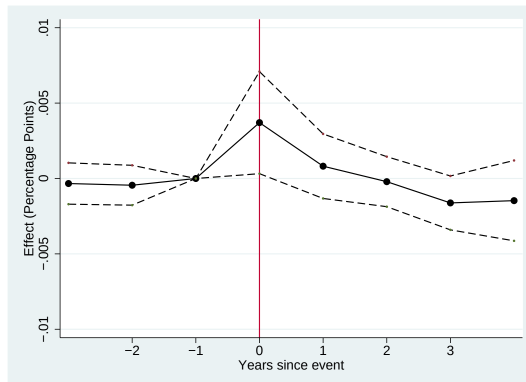
| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Panel A. Out-migration Rate | | | | |
| Layoffs, $t$ | 0.0437*** | 0.0414*** | 0.0392*** | 0.0446*** |
| | (0.0110) | (0.00952) | (0.0107) | (0.0114) |
| Layoffs, $t-1$ | | 0.0186** | 0.0144*** | 0.0183*** |
| | | (0.0059) | (0.0053) | (0.0063) |
| Layoffs, $t-2$ | | | 0.0076 | 0.0181*** |
| | | | (0.0058) | (0.0058) |
| Total Effect | 0.0437*** | 0.0599*** | 0.0612*** | 0.0809*** |
| | (0.011) | (0.0133) | (0.0159) | (0.0192) |
| Panel B. In-migration Rate | | | | |
| Layoffs, $t$ | -0.0403*** | -0.0335** | -0.0343** | -0.0192 |
| | (0.0145) | (0.0134) | (0.0145) | (0.0156) |
| Layoffs, $t-1$ | | -0.0230* | -0.0139 | -0.0015 |
| | | (0.0116) | (0.0109) | (0.0118) |
| Layoffs, $t-2$ | | | -0.0133 | 0.0068 |
| | | | (0.0082) | (0.0106) |
| Total Effect | -0.0403*** | -0.0565** | -0.0615** | -0.0139 |
| | (0.0145) | (0.0232) | (0.0284) | (0.0323) |
| County FEs | YES | YES | YES | YES |
| Year FEs | YES | YES | YES | YES |
| Trends | | | | YES |
| N | 36755 | 33650 | 30566 | 30566 |

Standard errors in parentheses, clustered on state. Dependent variables are listed at the headings of each panel. $Layoffs$ is the number of extended mass layoffs, divided by the lagged labor force. In-migration and out-migration rates are number of migrants divided by the sum of out-migrants and non-migrants. Each regression includes county and year fixed-effects; county specific trends are included in column 4. * p <.10, ** p < .05, *** p < .01

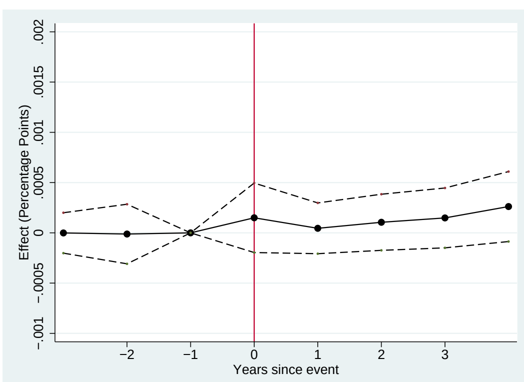
Figure 3: Event Studies, 3% Mass Layoff Event (N=196 counties)



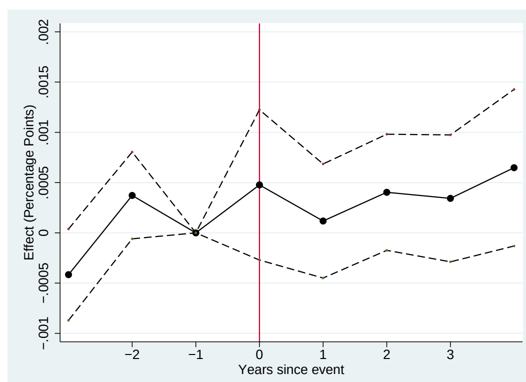

In-migration




Out-migration



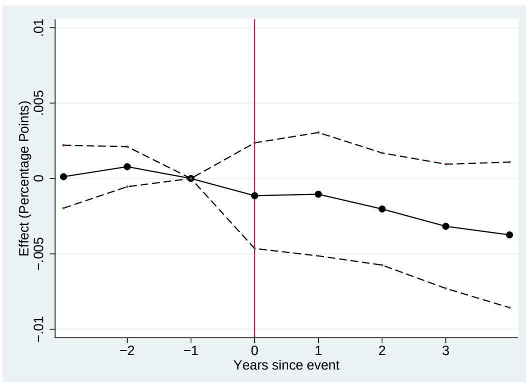

Disability



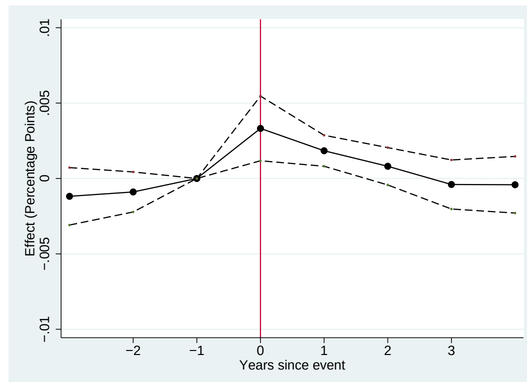

Retirement

Figures display coefficients from equation (5) in text, and a 95% point-wise confidence interval is shown, with standard errors clustered at the state level. Outcome variables listed below each sub-figure. Event study methodology is described in greater detail in the text. Sample is restricted to counties that experienced just one layoff event surpassing three percent of the labor force in the years 2000-2007. Specifications include county and year fixed effects.

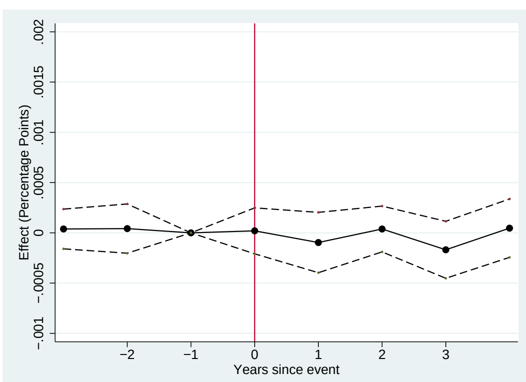
Figure 4: Event Studies, 2% Mass Layoff Event (N=254 counties)



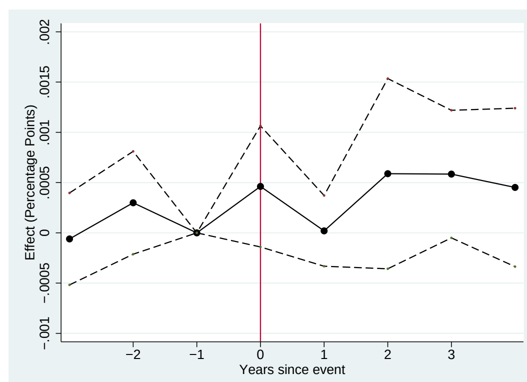

In-migration




Outmigration




Disability




Retirement

Figures display coefficients from equation (1) in text, and a 95% point-wise confidence interval is shown, with standard errors clustered at the state level. Outcome variables listed below each sub-figure. Event study methodology is described in greater detail in the text. Sample is restricted to counties that experienced just one layoff event surpassing two percent of the labor force in the years 2000-2007. Specifications include county and year fixed effects.

Table 4: Effect of Layoff Events on Disability Applications

| | (1) Total | (2) Under 30 | (3) Age 30-44 | (4) Age 45-54 | (5) Age 55+ |
|---|---|---|---|---|---|
| *Panel A: All Layoffs* | | | | | |
| Total Effect | 0.0052 | 0.0140 | -0.0027 | 0.0119 | 0.0073*** |
| | (0.0039) | (0.0092) | (0.0071) | (0.0083) | (0.0036) |
| *Panel B: Age-Specific Layoffs* | | | | | |
| Subgroup Effect | 0.0052 | 0.0269*** | -0.0027 | 0.0082 | 0.0286*** |
| | (0.0039) | (0.0111) | (0.0071) | (0.0073) | (0.0085) |
| Y-Mean | 0.0058 | 0.0062 | 0.0067 | 0.0108 | 0.0066 |
| Observations | 33599 | 19818 | 24558 | 25476 | 25850 |

Dependent variable for each column is the share of an age group that filed an application for disability insurance. The key independent variables in panel A are the number of laid off workers as a share of the county's labor force. For panel B, the key independent variables are the number of age-specific laid off workers as a share of the age-specific population. The reported coefficients are the sum of contemporaneous and two lagged effects. Standard errors in parentheses, clustered on state. Each regression also includes county and year fixed-effects, as well as county-specific trends. * p <.10, ** p < .05, *** p < .01