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What Happens to the Employers Involved in Mass Layoffs?

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Abstract

We apply the empirical framework of the displaced worker literature to the study of outcomes for displacing employers. Long-term patterns of employment, average wages, and closure probabilities before and after mass layoffs vary by the reason for layoffs, the industry of employers, employer age, and the period in which the layoff took place. Employers with mass layoffs during the Great Recession and the recovery that has followed have different patterns of employment levels and closure probabilities than employers with layoffs in previous periods. These differences are not explained by changes in the observable characteristics of employers and layoffs.

Keywords: Employment Dynamics, Wage Dynamics, Great Recession, Business Closures

1 Introduction

A large and growing literature traces the causes and impacts of mass layoffs for both workers and their employers. Much evidence shows negative impacts of mass layoffs on workers, with wage losses and other negative outcomes that persist over time. However, the impact of mass layoffs on employers, whether on wages for remaining workers, or on other outcomes, such as employer closure, is less clear. More fundamentally, there has been little study of the relationship between mass layoffs and the employment level of employers over time. To our knowledge, this paper represents the first study of the relationship between mass layoffs and employers' overall employment and wage levels before and after the layoff, relative to comparison employers. It is the first to take the empirical framework used in studying outcomes for displaced workers over time, and apply this framework to the study of their displacing employers.

Beginning with the classic work of Jacobson, Lalonde, and Sullivan, 1993 [JLS], many studies have combined longitudinal data on displaced and non-displaced workers with an event-study empirical model to trace the impact of displacement over time. These studies, including Schoeni and Dardia, 2002; Couch and Placzek, 2007; Kodrzycki, 2007; and von Wachter, Song, and Manchester, 2009, clearly show that workers suffer long term reductions in wages when they are displaced from their jobs during employment contractions. Other studies have used this same longitudinal approach to show an impact of job loss on increased mortality (Sullivan and von Wachter, 2009) and decreased homeownership levels (Handwerker and von Wachter, 2010). Von Wachter, Handwerker, and Hildreth, 2009, show that the results of these studies depend on the comparison of displaced workers with a 'control' group of non-displaced workers.

The scholarship on employers involved in mass layoffs is not as well established. As summarized in Datta, Guthrie, Basuil, and Pandey, 2010, and Hallock, Strain, and Webber, 2011, few studies compare employers involved in mass layoffs with a true comparison group of other employers. For example, McKinney and Vilhuber, 2006, follow displacing employers over time, comparing employers with slow declines in employment with employers with fast employment declines, without a comparison group of non-displacing employers. Studies that do include comparison employers include Lengermann and Vilhuber, 2002 and

Schwerdt, 2011, who show that employers affected by mass layoffs see a disproportionate loss of higher-wage workers in the quarters before the displacement or closure, as well as Abowd, McKinney, and Vilhuber, 2009, who show that employers of low-skilled workers are more likely to have mass layoffs, and conditional on a mass layoff, employers are more likely to close if they employ lower-skilled workers.

In recent years, there has been a great expansion of the literature on employer dynamics over the business cycle, following the construction of new datasets at annual and quarterly frequencies. For example, using the microdata of the Longitudinal Employer-Household Dymanics (LEHD), Hyatt and McEntarfer, 2012, show a great decline in job mobility among workers during the Great Recession, with particularly low rates of re-employment for displaced workers. Lazear and Spletzer, 2012, use the Job Openings and Labor Turnover Survey (JOLTS) microdata to show a great decline in employer hiring to replace departing workers during the Great Recession. Foster, Grim, and Haltiwanger, 2013, use the annual data of the Business Dynamics Statistics (BDS) and the quarterly data of the Business Employment Dynamics (BED) to show that the Great Recession had a dramatic fall in job creation, especially among young firms (earlier recessions saw more increased job destruction), and less reallocation of labor in the Great Recession than other recessions. Fort, Haltiwanger, Jarmin, and Miranda, 2013, use the BDS data to show that young and small firms have the strongest cyclical patterns of job creation and destruction, and were particularly affected by the Great Recession. However, none of these studies address the specific employment dynamics of employers with layoffs.

This paper examines the long-term histories of employers that have extended mass layoffs—events when 50 or more employees are let go and file for unemployment insurance, and their former employer tells a state workforce agency that these layoffs will be for at least 31 days duration. Following the work of Handwerker, Hildreth, and von Wachter, 2009, who demonstrate the importance of a comparison group of unaffected workers when studying wage impacts for workers, we compare these employers with a comparison group of employers without concurrent mass layoffs, selecting each comparison employer to be similar in age, size, and industry (as of a date just before the layoff date) to a firm with a mass layoff. In Section 2, we describe how we match the microdata of the Mass Layoff

Statistics Program (MLS) with these employers' records in the BLS Longitudinal Business Database (LDB). We also describe our methodology, analogous to JLS, to show patterns of outcomes over time for employers with mass layoffs, relative to the comparison group.

In Section 3, we examine several aspects of the relationship between mass layoffs and the long term employment patterns of employers.[1] We show how patterns of employment vary by the reason for the layoff, the industry of employers, the age of the employer, and whether there were changes to the set of establishments reported by the employer. We examine the patterns of employment for layoffs taking place during different portions of the business cycle, with and without controlling for employer and layoff characteristics. Section 4 repeats these analyses for patterns of average wages paid by these employers. Section 5 repeats these analyses for the probability of a closure of the employer. Section 6 concludes.

2 Data and Methodology

2.1 The MLS data

We match microdata from the Mass Layoff Statistics (MLS) with the employment, wage, and industry microdata of the Quarterly Census of Employed Workers (QCEW), linked across time in the Longitudinal Business Database (LDB). The MLS microdata contain detailed information on major employment cutbacks, collected directly from the employers. This survey was conducted by state workforce agencies from 1995 to 2013. These agencies contacted employers with at least 50 initial claims for unemployment insurance filed against them during a consecutive 5-week period and determined whether these layoffs would last at least 31 days. If so, the MLS program collected information on the nature of the layoff, including the total number of people laid off and the reason for the layoff. More information about the MLS, the QCEW, and the LDB is given in the Data Appendix. The total number of mass layoffs is shown in Table 1, in total and by the reasons for the layoffs, the industries in which the layoffs occurred, and the ages of the employers in these layoffs.

[1]This work greatly extends a project begun by Hyson and Spletzer at the Bureau of Labor Statistics. To their analyses, we add additional years of data and data for multi-establishment employers, and add the comparisons to comparable 'control' employers. We also examine a broader range of outcomes.

Table 1: Characteristics of Layoffs in the MLS and the Employers involved

	1990s expansion	2001 Recession	2000s expansion	Great Recession	2010s expansion	Total
Total Layoffs	25,514	7,110	29,836	16,876	24,209	103,545
Layoffs per quarter	1,343	1,778	1,297	2,411	1,614	1,523
Reason for Layoff						
Business Demand	7,983	2,795	10,050	7,453	8,935	37,216
Disaster	553	61	654	73	107	1,448
Financial	1,708	894	2,084	1,505	1,612	7,803
Reorganization	3,571	1,070	3,985	941	1,151	10,718
Production	869	146	577	161	263	2,016
Seasonal	8,613	1,508	9,662	3,714	7,865	31,362
Other	1,129	379	696	169	299	2,672
Nonresponse	1,088	257	2,128	2,860	3,977	10,310
Industry						
Construction	4,313	760	5,270	3,273	5,304	18,920
Manufacturing	10,138	3,135	9,142	5,459	4,681	32,555
Retail Trade	1,562	436	1,989	1,092	1,504	6,583
Administrative and Support	1,588	575	2,877	1,398	2,934	9,372
Accommodation and Food	1,151	351	1,629	901	1,743	5,775
Other	6,762	1,853	8,929	4,753	8,043	30,340
Age						
Less than 2 years	1,033	239	815	234	444	2,765
2–3 years	1,183	330	946	271	417	3,147
4–5 years	4,328	362	1,138	418	512	6,758
More than 5 years	18,200	5,959	26,0621	5,451	22,781	88,453

Table 1 shows that the reasons for layoffs, the industry composition of layoffs, and the age composition of employers with layoffs varied over the business cycle during 1995-2013.

- Reasons for layoffs: In the most recent subperiods, the Great Recession and the expansion that has followed, the fraction of layoffs due to Business Demand reasons has been unusually high. The fraction of layoffs due to Financial reasons was unusually high in both recessions covered by the MLS, while the fractions of layoffs due to Reorganization was highest from the 1990s expansion through the 2000s expansion.

- Industry composition of layoffs: The fraction of layoffs in the manufacturing industry was particularly high during the 1990s expansion and the 2001 recession. The fraction of layoffs in the construction industry has been particularly high during the current expansion (more so than during the Great Recession). Overall, the Great Recession saw layoffs happen in a very similar pattern of industries to the period as a whole.

- Age composition of employers with layoffs: Most of the employers appearing in the MLS have been reporting their employment to the Unemployment Insurance system and thus appear in the QCEW for some time before the layoff. The age distribution of these employers (multiple-establishment employers are listed in this table by the age of their oldest establishment) is listed in Table 1 The fraction of all layoffs happening in young employers has been steadily falling over time, regardless of the business cycle. This is consistent with other evidence that new businesses have been starting with decreasingly few employees and growing at decreasing rates (see for example Choi and Spletzer, 2012)—without employing at least 50 employees, it is impossible for an employer to lay off 50 employees and appear in the MLS.

Handwerker and Mason, 2012, show that the distribution of these characteristics not only differs from the overall distribution of industry and age among US employers, but also differs from the characteristics of all employers with large declines in employment. The employers in the MLS are larger, with more establishments and more workers, paying higher wages, and having larger layoffs, than employers with large declines in employment that do not appear in the MLS. They are also more likely (until 2010) to be in manufacturing.

Additional information about the MLS, including coverage, response rates, item refusal rates, and characteristics of employers in the MLS, can be found in the data appendix.

2.2 Regression methodology for comparing employment dynamics

We use the JLS event-study methodology to examine the long-term impact of mass layoffs in a regression context. This allows us to model employment and wage dynamics by capturing the displacement effect given a mass layoff with a subset of the model's parameters. The subset of model parameters is estimated using dummy variables that represent the number of quarters before or after the mass layoff, and is invariant to the specific date the mass layoff occurred.

This framework requires a set of comparison employers, and so we select one comparison employer for every mass layoff event in the MLS. These comparison employers are randomly selected from the QCEW in the quarter before the layoff date. These comparison employers do not have mass layoffs in the quarter after selection, although some of them may have mass layoffs in other quarters. We select each comparison employer to match the age group and size class of an employer in the MLS, in an industry that is as close a match as possible to the MLS employer. More information about the selection of comparison employers can be found in the data appendix.

For both employers with layoffs and comparison employers, we aggregate establishments to the Unemployment Insurance account level, aggregating employment and total wages each quarter. Some employers are involved in consolidations (combining many previous establishments into one) and break-outs (turning one previous establishment into many) during the 5 years before and after the quarter of a layoff. We compile the full set of establishments that are ever part of each UI account over the five years (20 quarters) before and after the event quarter. Overall, 46% of the events in the MLS data are associated with an employer consisting of a single establishment that never consolidates or breaks apart, 32% are associated with employers consisting of multiple establishments without changes in structure, and 22% are associated with an employer involved in the breakup or

consolidation of multiple establishments.[2]

The JLS event-study methodology can be expressed more formally where $D_i t^k$ equals 1 if in period t employer i had a mass layoff k quarters earlier and $D_i t^k$ equals 0 otherwise. For outcomes such as employment and wages, with a non-zero value in most quarters, the model is specified as:

$$y_{it} = \alpha_i + \sum_{1995Q2 \leq t \leq 2012Q4} T^t \gamma_t + x_{it}\beta + \sum_{|k| \leq 20} D^k \delta_k + \epsilon_{it}, \tag{1}$$

where y_{it} is the outcome of interest (employment, wages), α_i is an employer fixed effect, which normalizes the overall difference between employers with a mass layoff and those without to zero, γ_t is a time fixed effect, and x_{it} are observed, time-varying characteristics of the employer, such as industry classification.

Of most interest to us are the dummy variables D_{it}^k that jointly represent the mass layoff event and the parameters $\delta_k, k = -20, \cdots, 20$ which give the displacement effect of a mass layoff. Graphically, the parameters δ_k allow us to show the dynamics of employment and wages visually.[3] These parameters can be summarized for subgroups of layoffs, again following JLS (with slight adjustments to better fit the patterns we observe in the employer data), using the following variables:

$F_{it}^1 = t - s$, if employer i has a mass layoff at time s and $t < s$, the linearly growing gap between employers with and without mass layoffs during the five years before the layoff

$F_{it}^2 = 1$, if employer i has a mass layoff at time s and $t > s$, the constant gap after the

[2]Over time, there has been a small decrease in the fraction of MLS events associated with single establishments, and a large increase in the fraction of events associated with multiple establishments with changes in the structure of unemployment insurance accounts. Single-establishment employers have fewer workers, on average, than multiple-establishment employers, and their layoffs are smaller. Examining the total number of people laid off in an MLS event, 38% are laid-off from single establishment employers, 35% are laid-off from multi-establishment employers without changes in structure, and 26% are laid-off from employers with changing structure. Looking at the total number of pre-layoff employees at employers reporting events in the MLS, 17% of the employees are with single establishment employers, 35% of the employees are with multi-establishment employers with unchanging structure, and 48% of employees are with employers that have breakouts and/or consolidations.

[3]In the working-paper version of this paper, we model variations of (1) to show graphically the time-varying patterns of displacement effects for different subgroups of employers. These variations take the form: $y_{it} = \alpha_i + \sum_{1995Q2 \leq t \leq 2012Q4} T^t \gamma_t + x_{it}\beta + \sum_{|k| \leq 20} D_1^k + \delta_{1k} + \cdots + \sum_{|k| \leq 20} D_n^k \delta_{nk} + \epsilon_{it}$, where D_1 through D_n are dummy variables for displacements among n separate subpopulations of layoffs, classified by employer industry, employer age, or the reason reported for the separation, and the estimation of parameters δ_{nk} allow us to plot the differing dynamics of employment and wages for each subgroup.

layoff date between employers with and without mass layoffs

$F_{it}^3 = t - s$, if employer i has a mass layoff at time s and $t > s$, the linearly growing gap between employers with and without mass layoffs during the five years after the layoff

The differential patterns of parameters for subgroups of layoffs j can then be summarized using equations of the form

$$y_{it} = \alpha_i + \sum_{1995Q2 \leq t \leq 2012Q4} T^t \gamma_t + x_{it}\beta + \sum_{|k| \leq 20} D_{it}^k \delta_k + \sum_j E_{it}^j (F_{it}^1 c_i \phi_{1j} + F_{it}^2 c_i \phi_{2j} + F_{it}^3 c_i \phi_{3j}) + \epsilon_{it} \tag{2}$$

, in which E_{it}^j is an indicator variable for employers with layoffs in subgroup j. This summary formulation includes both estimates of the overall displacement dummies δ_{nk}, as well as estimates of the variables summarizing the specific impact of layoffs for subgroups, relative to these mean impacts, ϕ_1, ϕ_2, and ϕ_3. These summary variables are forced by construction to sum (when weighted) to zero. For an employer with a layoff of characteristics c_i, the estimated change in y at k quarters after the layoff is $\delta_k + c_i\phi_2 + c_i\phi_3 k$ (and at k quarters before the layoff, is $\delta_{-k} - c_i\phi_1 k$).

For outcomes such as a closure, where the outcome variable is binary and will have a value of zero in most quarters, models (1) and (2) are specified without employer fixed effects, and so overall differences in outcomes between employers with and without mass layoffs are not necessarily zero in the layoff quarter.

3 Findings: employment

3.1 Overall patterns of employment over time

We use the regression methodology above to generalize the comparison of employers with mass layoffs to comparison employers without mass layoffs in all quarters of the MLS data. Figure 1 graphs the coefficient estimates $\hat{\delta}_k$ from equation (1),[4] showing the relationship between mass layoffs and employment for 5 years (20 quarters) before and after mass layoff events. The QCEW data we use is linked longitudinally from 1990Q2 to 2013Q1, and so this analysis considers mass layoff events that occurred from 1995Q2 to 2012Q4.

[4]For ease of interpretation, the 'omitted quarter' in this regression is chosen as the quarter of the layoff.

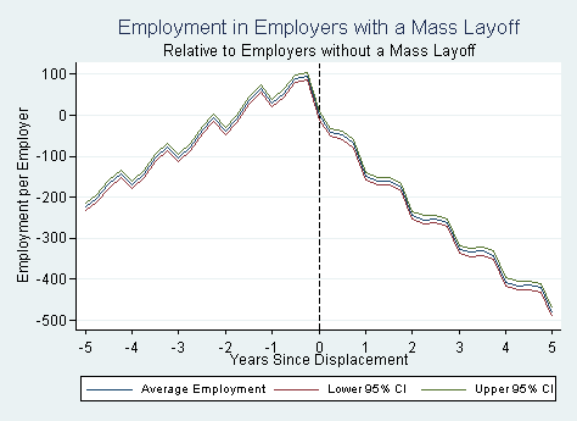

Figure 1: Regression estimates $\hat{\delta}_k$ of the impact of Mass Layoffs on Employment

Figure 1 shows a pronounced seasonality of employment for the employers with mass layoffs, relative to their comparison employers. Employers with mass layoffs are growing more quickly than comparison employers before the mass layoffs, with higher employment in the quarter preceding the mass layoff, and permanently lower employment afterwards.

3.2 Comparing patterns for employers with different reasons for the layoff

The seasonality of employment patterns for employers with mass layoffs shown in Figure 1, strongly suggests that the patterns of employment before and after mass layoffs, relative to comparison employers, differs by the reason for the layoff. Employment patterns by primary layoff reason are calculated from equation (2) with the set of parameters $\hat{\phi}_1, \hat{\phi}_2, and \hat{\phi}_3$ estimated for each primary layoff reason. These estimates are shown in Table 2, for all employers appearing in the mass layoff statistics.

The first row of estimates shown in Table 2 give the pattern of employment changes before and after mass layoffs for business demand reasons. This category includes "Contract cancellation and completion," "Domestic or import competition," "Excess inventory / saturated market," and "Slack work / insufficient demand / non-seasonal business slowdown." It shows that relative to other reasons for layoffs, those occurring for Business Demand reasons occurred at employers which were growing in employment at the greatest pace before the layoff date ($\hat{\phi}_1$). In contrast, as shown in the second row estimates show, layoffs for

seasonal reasons occurred at employers with the least amount of employment growth before the layoff date, and the least declines in employment over the five years after the layoff date ($\hat{\phi}_3$). Employers which report mass layoffs due to other reasons, such as "Organizational Reasons," "Financial Reasons," "Production Reasons," or "Disaster/Safety Reasons," and employers which did not state a reason for the layoff, show slowly growing levels of employment before the mass layoff (similar to the overall pattern of pre-layoff employment growth shown in Figure 1), and particularly sharp declines in employment over the years after the mass layoff ($\hat{\phi}_3$).

Table 2: Regression estimates of the impact of Mass Layoffs on Employment (relative to employment in the quarter before layoff), by Employer and Layoff Characteristics

Estimate (Standard Error)	pre-layoff $\hat{\phi}_1$	post-layoff $\hat{\phi}_2$	post-layoff $\hat{\phi}_3$	$\hat{\Delta}$8 quarters after layoff	$\hat{\Delta}$20 quarters after layoff
Reason for Separation					
Business Demand	6.82	19.68	-4.35	-259.38	-553.64
	(0.17)	(2.75)	(0.18)	(5.62)	(6.92)
Seasonal	-7.54	97.87	16.03	-18.21	-68.00
	(0.19)	(3.09)	(0.20)	(5.83)	(7.27)
All other (or missing) reasons	-0.39	-109.37	-9.91	-432.89	-793.87
	(0.17)	(2.87)	(0.18)	(5.69)	(7.03)
Primary Industry of Employer					
Manufacturing	-18.87	-35.40	5.95	-225.34	-381.07
	(0.28)	(4.68)	(0.30)	(7.07)	(9.35)
Construction	-7.43	107.99	10.80	-43.19	-140.77
	(0.28)	(4.62)	(0.30)	(7.04)	(9.35)
Retail Trade	16.51	-132.90	-19.27	-524.59	-982.95
	(0.63)	(10.84)	(0.73)	(13.20)	(19.02)
All Other Industries	14.22	1.29	-5.86	-283.12	-580.55
	(0.17)	(2.82)	(0.18)	(5.70)	(7.15)
Employer Age					
Less than 2 years	20.47	123.31	-5.71	-169.38	-477.14
	(0.74)	(12.18)	(0.75)	(14.36)	(20.00)
2 - 3 years	33.60	-59.22	3.00	-282.24	-485.50
	(0.69)	(11.31)	(0.69)	(13.43)	(18.57)
4 - 5 years	12.19	-26.34	-4.58	-310.00	-604.21
	(0.49)	(7.64)	(0.45)	(9.67)	(12.98)
More than 5 years	-2.85	0.40	0.44	-243.14	-477.19
	(0.05)	(0.80)	(0.05)	(4.79)	(5.44)
Layoff Date, no additional controls					

Estimate (Standard Error)	pre-layoff $\hat{\phi}_1$	post-layoff $\hat{\phi}_2$	post-layoff $\hat{\phi}_3$	$\hat{\Delta}$8 quarters after layoff	$\hat{\Delta}$20 quarters after layoff
Expansion:	1.32	6.48	-6.58	-290.84	-539.45
1995Q2 - 2000Q4	(0.23)	(3.52)	(0.25)	(6.21)	(8.36)
Contraction:	7.87	-85.72	-3.66	-359.67	-573.23
2001Q1 - 2001Q4	(0.48)	(7.60)	(0.46)	(9.66)	(13.21)
Expansion:	4.78	8.79	-5.15	-277.05	-508.43
2002Q1 - 2007Q3	(0.20)	(3.16)	(0.23)	(5.96)	(7.98)
Contraction:	-7.21	-7.74	7.46	-192.70	-272.76
2007Q4 - 2009Q2	(0.30)	(4.93)	(0.36)	(7.40)	(10.43)
Expansion:	-7.06	17.44	13.60	-118.45	
2009Q3 - 2012Q4	(0.26)	(4.59)	(0.59)	(8.09)	
Layoff Date, with controls for layoff reason, employer age, and primary industry					
Expansion:	2.48	0.09	-8.19	-299.99	-556.28
1995Q2 - 2000Q4	(0.24)	(3.67)	(0.26)	(6.32)	(8.61)
Contraction:	6.24	-67.97	-1.36	-313.46	-487.89
2001Q1 - 2001Q4	(0.48)	(7.59)	(0.46)	(9.67)	(13.27)
Expansion:	4.63	7.79	-5.22	-268.55	-489.25
2002Q1 - 2007Q3	(0.20)	(3.16)	(0.23)	(5.97)	(8.08)
Contraction:	-7.92	9.77	8.00	-160.80	-222.84
2007Q4 - 2009Q2	(0.30)	(4.96)	(0.36)	(7.43)	(10.54)
Expansion:	-7.22	5.63	14.69	-111.46	
2009Q3 - 2012Q4	(-)	(4.62)	(-)	(-)	

Overall, employment declines most after the layoffs ($\hat{\phi}_1$)for employers with mass layoffs for 'All Other'–or missing reasons, and least for employers with mass layoffs for 'Seasonal' reasons. Eight quarters after mass layoffs, employment at employers with "Seasonal" layoffs has nearly recovered to that of similar employers without mass layoffs in that quarter, and twenty quarters after the mass layoff, employment levels are little lower. In contrast, twenty quarters after mass layoffs for "Business Demand" reasons, employment levels at employers with such layoffs are more than 550 people lower than employment levels at comparable employers without these layoffs, and at employment levels at employers which had other types of mass layoffs are nearly 800 people lower than employment levels at comparable employers.

3.3 Comparing patterns for employers in different industries

These employment patterns also differ markedly by industry. We classify employers with multiple establishments according to the industry of the establishments employing the greatest number of their employees. Because we used industry as one of the criteria for identifying comparison employers, our estimates compare employment patterns for employers with mass layoffs to employers with similar industries[5] that do not have a mass layoff at that time. The resulting coefficient estimates for selected industry groups are shown in second section of Table 2.

Manufacturing employers (31.0% of mass layoffs), show the least amount of pre-layoff employment growth ($\hat{\phi}_1$), while Retail employers (6.3% of all mass layoffs) have the fastest increases in pre-layoff employment of the groups shown. After mass layoffs, retail employers have the greatest declines in employment ($\hat{\phi}_2$ and $\hat{\phi}_3$), while construction employers (18.3% of mass layoffs) have much more stable employment levels. Five years after the layoff date, Retail trade employers with mass layoffs have employment levels nearly 1000 people below those of comparison employers, while Construction employers with mass layoffs have employment levels only 140 lower than comparison employers. In results not shown here [6], we examine all industries at the 2-digit NAICS level, and find employment patterns before and after mass layoffs that vary widely by industry.

3.4 Comparing patterns for employers of different ages

Haltiwanger, Jarmin, and Miranda, 2013 and Fort, Haltiwanger, Jarmin, and Miranda, 2013, show that employment dynamics vary greatly by employer age, and so we examine differences in employment patterns before and after layoffs by employer age, classifying employers with multiple establishments according to the age of their oldest establishment. The resulting coefficients are shown in the third section of Table 2. Employer age is one of the criteria used in identifying comparison employers, and so these estimates compare employment patterns for employers with mass layoffs to employers of the same age without mass layoffs.

[5]There were a few very large employers for which no comparison employer in the same industry could be found without a layoff, in which case comparison employers were chosen from other large employers.

[6]these results are available in the appendix to our longer working paper

Since a Mass Layoff involves 50 or more workers, by definition, young employers could not have a mass layoff without rapid growth in employment before the layoff date. Indeed, the estimates in Table 2 show that younger employers with a mass layoffs were growing more quickly before the layoff date than older employers, relative to employers the same age without mass layoffs ($\hat{\phi}_1$). However, there is no clear pattern of employment losses after mass layoffs across employer age groups ($\hat{\phi}_2$ and $\hat{\phi}_3$).

3.5 Employment Patterns by Business Cycle

The fourth part of Table 2 shows estimates of the relationship between mass layoffs and employment by the date when these layoffs take place. Layoffs occurring during the Great Recession of 2007-2009 and during the week expansion that has followed show more muted patterns of long-term employment changes, relative to comparison employers, than layoffs occurring during earlier periods—even during the recession of 2001. In earlier periods, mass layoffs occurred at employers that were growing more quickly over the 5 years before the layoff ($p\hat{h}i_1$), and lost more employees than comparison employers over the 5 years after the layoff ($p\hat{h}i_3$), relative to the mass layoffs that occurred during the Great Recession and the expansion that has followed. 5 years after their layoff dates, employers with mass layoffs happening during the 1990s or the 2000s expansions had lost more than 500 employees, relative to comparison employers, and employers with mass layoffs happening during the 2001 recession had lost nearly 600 employees. However, 5 years after their layoff dates, employers with mass layoffs during the Great Recession had lost less than 300 employees, relative to comparison employers. The convergence of employment trends between employers with mass layoffs and their comparison employers in more recent periods suggests that mass layoffs in these recent periods have been less driven by employer-specific conditions, and driven more by larger forces that have impacted the entire economy.

As described in Section 2, layoffs during the Great Recession were more likely to occur due to Business Demand and Financial Reasons and layoffs in young employers have been falling over time. Thus, we also show these trends controlling for layoff reason, industry groups, and age, in the final section of Table 2. These additional controls do not change our major finding that more recent mass layoffs have occurred at employers that were

growing more slowly before the layoff date ($\hat{\phi}_1$) and have had slower declines in post-layoff employment ($\hat{\phi}_3$) than mass layoffs before the Great Recession. However, including these additional controls does explain most of the differences in post-layoff employment trends between employers with mass layoffs occurring during the 2001 recession and those with mass layoffs occurring in the 1990s and 2000s expansions.

4 Patterns of Wages

The second outcome we examine is average wage levels by employer, before and after mass layoffs. The wage data available to us in the Quarterly Census of Employment and Wages comes from employer reports of total quarterly wage bills for each establishment. States vary slightly in their instructions to employers concerning these wage reports, but these generally include bonuses, stock options, profit distributions, the cash value of meals and lodging, tips and other gratuities, and—particularly relevant for examining employers with mass layoffs—severance pay.[7] We examine average wage bills per quarter[8], using the regression framework of equations (1) and (2).

In Figure 2, we show the set of parameters $\hat{\delta}_k$ that estimate the relationship between mass layoffs and wages from equation (1), as well as the 95% confidence intervals surrounding these coefficient estimates, for all employers with mass layoffs and for the subset of mass layoffs not for seasonal reasons. For clarity of presentation, in this figure, the omitted quarter (in which the difference in wages between employers with and without mass layoffs is zero by construction) is the quarter before the layoff, and we include overall controls for employer size groups as well as for industry at the 4-digit NAICS level.

The parameter estimates in Figure 2 show that relative to comparison employers, employers with mass layoffs have a strong seasonal component to average wages (not observed among employers with mass layoffs not for seasonal reasons), a sharp spike in average wages in the quarter of the layoff date, and a large, permanent, increase in average wages after the layoff date. These changes suggest that in mass layoffs, employers lay off lower-paid

[7] In certain states, reported wages also include employer contributions to deferred compensation plans, such as 401(k) plans.

[8] Total quarterly nominal wage bill in each quarter divided by the number of employees in that quarter

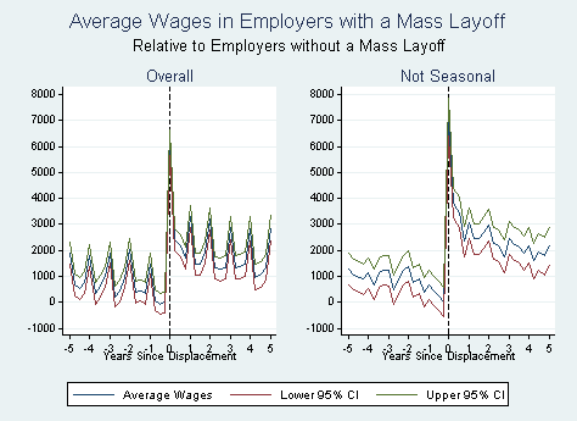

Figure 2: Regression estimates $\hat{\delta}_k$ of the impact of Mass Layoffs on Wages

workers. We observe a sharp increase in average quarterly wages in the quarter of the layoff, with similar increases every four quarters, but these quarterly patterns are not observed among employers with layoffs for non-seasonal reasons. This suggests that employers with layoffs for seasonal reasons lay off their lower paid workers at the same time every year in these seasonal layoffs.

In the quarter when mass layoffs took place, there is a spike in wages of more than $6000 per employee at employers with mass layoffs—perhaps due to some combination of the payment of severance pay and of final paychecks being paid to laid-off workers who are not included in employment counts for that quarter. This spike in wages is followed by a permanent relative increase in the level of average quarterly wages per employee.[9] After the layoff date, the gap in wages between the employers with mass layoffs and their comparison employers shows no overall trend. For employers with non-seasonal mass layoffs, the gap in average wages, relative to the wages of comparison employers, remains roughly constant at about $2000 from 2 quarters following the layoff date until the end of the period. This suggests that mass layoffs lead to permanent losses of lower-paid workers for these employers.

Unsurprisingly, the strongly seasonal pattern of differences in average wages between

[9]This permanent relative increase in average quarterly wages per employee is only observed when we drop employer observations with zero employees from our regression specifications in the quarters when they have no employees. If, instead, we treat such employers as if they paid average wages of zero in the quarters when they have no employees, we observe no overall increase in wages after the layoff quarter.

employers with mass layoffs and comparison employers is a feature only of employers with seasonal layoffs. All other layoff reasons yield patterns of average wages before and after layoffs that are similar to the overall pattern shown in the non-seasonal panel of Figure 2, although the magnitude of the difference in wages before and after the layoff varies by the layoff reason.

Following the methodology of equation (2), we compare patterns of average quarterly wages by the reason given for the mass layoff, and the estimates are shown in Table 3. Before the layoff date, we find the greatest declines in average wages ($\hat{\phi}_1$) at employers with layoffs for seasonal reasons. At the time of the layoff, the greatest increases ($\hat{\phi}_2$) in average quarterly wage levels are in employers that specified specific other reasons for layoffs, such as "Organizational Reasons," "Financial Reasons," "Production Reasons," "Disaster/Safety Reasons," or "Other/Miscellaneous reasons,"for the layoff (or do not answer the Mass Layoff Survey)—the smallest increases in average quarterly wage levels at this time are for employers with layoffs for seasonal reasons. However, the employers with mass layoffs for seasonal reasons are the only employers to have average wage levels that are trending upwards after the layoff date ($\hat{\phi}_3$). By 20 quarters after the layoff date, employers with mass layoffs for seasonal reasons pay average quarterly wages that are about $2500 higher (and rising) than similar employers without mass layoffs. Meanwhile, employers with mass layoffs for reasons other than Business Demand or seasonal reasons are paying average quarterly wages that are about $3600 higher (but falling) than similar employers without mass layoffs.

When we estimate equation (2) by industry group, we compare employers with mass layoffs to employers in the same industry that do not have a mass layoff at that time. As shown in Table 3, we find the greatest downward trends in wages before the layoff date ($\hat{\phi}_1$) in Manufacturing and Retail Trade employers, while Construction employers with mass layoffs have an increasing trend in wages, relative to comparison employers, before the layoff.

After the layoff date, the biggest increases in wages $\hat{\phi}_2$ (suggestive of a changed composition of workers remaining with these employers) is in Retail Trade, while the smallest increase in wages after the layoff date is in Construction. However, average quarterly wage

Table 3: Regression estimates of the impact of Mass Layoffs on Average Wage Bill (relative to employment in the quarter before layoff), by Employer and Layoff Characteristics

Estimate (Standard Error)	pre-layoff $\hat{\phi}_1$	post-layoff $\hat{\phi}_2$	post-layoff $\hat{\phi}_3$	$\hat{\Delta}$8 quarters after layoff	$\hat{\Delta}$20 quarters after layoff
Reason for Separation					
Business Demand	11.46	-712.88	22.45	$2770.58	$2665.74
	(7.73)	(125.95)	(8.41)	(262.06)	(329.34)
Seasonal	-26.89	-2003.83	77.19	$1917.57	$2469.64
	(8.62)	(140.34)	(9.18)	(271.31)	(343.15)
All other (or missing) reasons	12.22	2566.93	-93.59	$5122.04	$3624.69
	(8.06)	(132.91)	(8.97)	(266.97)	(337.93)
Primary Industry of Employer					
Manufacturing	-8.91	263.37	35.36	$3888.25	$4022.81
	(12.97)	(216.52)	(14.84)	(336.53)	(449.63)
Construction	23.88	-616.07	39.62	$3042.92	$3228.65
	(12.83)	(210.39)	(14.19)	(330.30)	(438.15)
Retail Trade	-7.98	1192.32	-145.68	$3368.94	$1331.11
	(29.26)	(511.77)	(36.58)	(647.18)	(929.75)
All Other Industries	-2.02	-114.24	-20.42	$3064.41	$2529.62
	(7.81)	(130.22)	(8.96)	(268.33)	(341.03)
Employer Age					
Less than 2 years	-58.91	3123.54	-184.79	$4864.00	$2347.47
	(48.26)	(630.26)	(39.09)	(753.72)	(1035.70)
2 - 3 years	-593.20	2733.15	-89.96	$5232.25	$3853.68
	(54.73)	(586.75)	(35.83)	(703.80)	(960.20)
4 - 5 years	-3.12	24.58	-30.74	$2997.40	$2329.42
	(23.60)	(356.74)	(22.31)	(463.33)	(625.01)
More than 5 years	23.77	-200.09	11.58	$3111.28	$2951.14
	(2.95)	(39.02)	(2.43)	(221.57)	(261.06)
Layoff Date, no additional controls					
Expansion: 1995Q2 - 2000Q4	15.92	-798.95	32.02	$2655.92	$2710.59
	(10.96)	(161.94)	(11.74)	(290.84)	(395.17)
Contraction: 2001Q1 - 2001Q4	19.15	1404.36	-76.13	$3994.05	$2750.95
	(22.19)	(351.50)	(22.20)	(458.99)	(628.89)
Expansion: 2002Q1 - 2007Q3	-14.25	450.40	-6.06	$3600.66	$3198.42
	(9.29)	(144.69)	(10.68)	(278.17)	(376.00)
Contraction: 2007Q4 - 2009Q2	-11.20	469.89	-25.56	$3464.18	$2827.98
	(13.84)	(223.89)	(16.37)	(344.99)	(481.74)
Expansion: 2009Q3 - 2012Q4	3.22	-595.89	17.26	$2740.91	$2618.48
	(11.88)	(207.21)	(26.59)	(383.95)	(632.94)

levels after the layoff date have the most downward trend $\hat{\phi_3}$ for Retail Trade employers with mass layoffs.

By 20 quarters after the layoff date, average quarterly wages at Manufacturing employers with mass layoffs are more than $4000 higher than at similar employers without mass layoffs, while average quarterly wages at Retail Trade employers with mass layoffs are about $1300 higher than at similar employers without mass layoffs.

Differences in wage patterns before and after layoff dates by age group are more muted. Wages are falling most before the layoff date at younger employers, they rise most at the layoff date for younger employers, and they fall most after the layoff date for younger employers. Eight quarters after the layoff date, wages have increased by about $5000 per employee for employers that are less than two or two to three years old, while wages have increased by about $3000 per employee for employers that are four to five or more than five years old at the layoff date. However, by 20 quarters after the layoff date, comparing employers that still have employees, the differences in average quarterly wages by employer age are no longer statistically significant.

There are few differences in average quarterly wage patterns by layoff date. Differences in wage trends before the layoff date ($\hat{\phi_1}$) by the period of time in which the layoff took place are not statistically significant. The change in average wages at the layoff date ($\hat{\phi_2}$) is largest during the 2001 recession, and smallest during the expansions of the 1990s and the 2010s. Average wage trends after the layoff date ($\hat{\phi_3}$) are most negative for the recessionary periods. By twenty quarters after the layoff date, the difference in wages between employers with mass layoffs and comparison employers was smallest ($2600) for the layoffs which took place in the 2010s recession, and largest ($3200) for the layoffs which took place in the 2000s expansion. Adding controls for layoff reason, age, and industry to these estimates (not shown) does not change their relative magnitudes, and has little impact on their absolute magnitudes.

5 Patterns of closures

The last outcome we examine is the probability that an employer to employ anyone following a mass layoff. Employers are required by law to report their employment each quarter

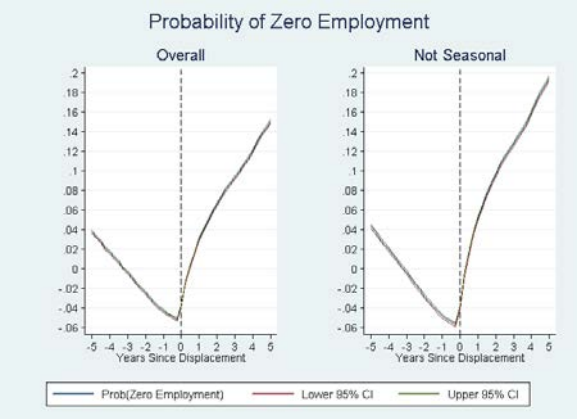

Figure 3: Regression estimates $\hat{\delta}_k$ of the impact of Mass Layoffs on Employer Closure

to state Unemployment Insurance offices, and these records are compiled into the Quarterly Census of Employment and Wages data used here. Employers may appear in the QCEW for several quarters after closing, with zero employment recorded in their records. Thus, we use zero employment without a later increase in employement as a marker of employer closure, and examine the likelihood of having zero employment for employers with mass layoffs, relative to the likelihood of zero employment for comparison employers. Employers will also have zero employment before they open, and so differences in the likelihood of zero employment before a mass layoff can be interpreted as differences in employer age between employers with mass layoffs and comparison employers (although age was a factor used in selecting appropriate comparison employers). We use the methodology presented in equations (1) and (2), omitting employer fixed effects α_i, so that we can examine absolute differences in probabilities between employers with and without mass layoffs.

Overall, employers with mass layoffs are more likely to have zero employment than comparison employers. This difference decreases before the layoff date, and increases monotonically as time elapses after the layoff date. However, in the quarters surrounding the layoff quarter, the MLS employers are less likely than comparison employers to have zero employment; they would not be covered by the MLS without laying off 50 workers who filed for unemployment benefits, and thus appearing in the QCEW with 50 or more workers in the quarter before the layoff. The probability of zero-employment following a layoff is higher for employers with layoffs for non-seasonal reasons.

The pattern of differences in the probability of zero employment by additional reasons for the layoff is shown in the first rows of Table 4, using the methodology of Equation (2). The differences by layoff reason are small. Overall, layoffs for seasonal reasons are least likely to become employer closures over the following 20 quarters, and layoffs for all other reasons—or employers who did not answer the survey—are most likely to become employer closures.

Examining differences by industry sector, in the next few rows of Table 4, we find little difference by industry in patterns of employer opening before mass layoffs (little variation in $\hat{\phi}_1$). However, after mass layoffs, the greatest probability of closure, relative to comparison employers in the same industry, is found among manufacturing and retail trade employers. For employers in these groups, five years after a mass layoff, there is a 25% increase in the probability of zero employment, relative to comparison employers. For wholesale and retail trade employers, much of this increased probability of zero employment happens quickly after the mass layoff (high values of $\hat{\phi}_2$), while for manufacturing employers, the probability of zero employment increases more with each quarter following the layoff (high values of $\hat{phi}_3$). For employers in the construction industry, five years after a mass layoff, employers with mass layoffs are less than 8% more likely to close than comparison employers.

The patterns of differences in the probability of zero employment before and after mass layoffs vary considerably by age. As shown in Table 4, the relationship between mass layoffs and zero employment at an employer is strongest for young employers. Within each employer age group, the employers with layoffs had zero employment at more recent dates before the layoff than comparison employers without mass layoffs, and this is sharpest for the youngest employers ($\hat{\phi}_1$),[10]. After the mass layoff, younger employers appearing in the MLS are more likely to close than older employers, relative to each group's comparison employers ($\hat{\phi}_2$ and $\hat{\phi}_3$). By 5 years after the layoff date, employers that were less than 2 years old or 2 - 3 years old at the time of the layoff are about 30% more likely to close than comparison employers. In contrast, employers that were more than 5 years old at the time

[10]The patterns of deltas calculated from equation (1) (not shown) clearly depict that employers aged 2-3 years at the layoff date are less likely to have zero employment between 0 and 2 years of the layoff date than their comparison employers. However, between 2 and 4 years of the layoff date, they are increasingly likely to have zero employment as the time before the layoff date increases. Within the age range of 2 and 4 years pre-layoff date, the employers with mass layoffs must be younger than their comparison employers. Similar patterns hold for all other employer age groups.

Table 4: Regression estimates $\hat{\delta}$ of the impact of Mass Layoffs on the probability of Closure, by Employer and Layoff Characteristics

Estimate (Standard Error)	pre-layoff $\hat{\phi}_1$	post-layoff $\hat{\phi}_2$	post-layoff $\hat{\phi}_3$	$\hat{\Delta}$8 quarters after layoff	$\hat{\Delta}$20 quarters after layoff
Reason for Separation					
Business Demand	-0.001	-0.014	-0.00	0.053	0.140
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Seasonal	0.001	-0.038	-0.004	-0.001	0.042
	(0.001)	(-0.038)	(-0.004)	(0.001)	(0.001)
All other (or missing) reasons	0.000	0.049	0.003	0.141	0.266
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Primary Industry of Employer					
Manufacturing	0.001	0.012	0.005	0.130	0.280
	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)
Construction	0.000	-0.033	-0.003	0.022	0.077
	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)
Retail Trade	0.000	0.101	-0.001	0.172	0.254
	(0.000)	(0.002)	(0.000)	(0.003)	(0.004)
All Other Industries	-0.001	-0.010	-0.002	0.056	0.130
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Employer Age					
Less than 2 years	-0.036	0.049	0.005	0.155	0.296
	(0.000)	(0.002)	(0.000)	(0.003)	(0.004)
2 - 3 years	-0.034	0.037	0.006	0.153	0.308
	(0.000)	(0.002)	(0.000)	(0.002)	(0.004)
4 - 5 years	-0.001	0.010	0.003	0.098	0.214
	(0.000)	(0.001)	(0.000)	(0.002)	(0.003)
More than 5 years	0.002	-0.004	-0.001	0.056	0.129
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Layoff Date, no additional controls					
Expansion: 1995Q2 - 2000Q4	0.000	-0.016	0.005	0.084	0.123
	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)
Contraction: 2001Q1 - 2001Q4	-0.001	-0.002	0.005	0.097	0.136
	(0.000)	(0.001)	(0.000)	(0.002)	(0.003)
Expansion: 2002Q1 - 2007Q3	0.000	-0.006	0.002	0.070	0.109
	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)
Contraction: 2007Q4 - 2009Q2	0.001	0.022	-0.005	0.044	0.083
	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)
Expansion: 2009Q3 - 2012Q4	0.000	0.015	-0.007	0.023	
	(0.000)	(0.001)	(0.000)	(0.002)	

of the layoff are only about 13% more likely to close than comparison employers.

The last section of Table 4 shows how these changes in the probability of zero employment differ for employers with mass layoffs by the date of the layoff date. Before the layoff date, there is little difference between time periods in closure probabilities ($\hat{\phi}_1$). However, after the layoff date, the probability that an employer with a mass layoff will close, relative to comparison employers, has generally been falling. For employers with layoffs during the 1990s expansion or the 2001 contraction, the increased probability of closure was about 13% by 5 years after the layoff date, while the increased probability 5 years after a mass layoff that took place during the Great Recession was only about 8%. This pattern of reduced probability of closure happens gradually over the quarters after the mass layoff (a falling value of $\hat{\phi}_3$).

These falling probabilities of closure over time stem in part from the falling proportion of mass layoffs at manufacturing or young employers, which have particularly high probabilities of zero employment following mass layoffs. In results now shown, we added controls for layoff reasons, industries, and employer ages to the estimates of the impact of layoff date. These controls only served to widen the gaps in the impact of mass layoffs in different periods on the probability of later employer closures.

6 Conclusions

This paper gives (to our knowledge) the first estimates of the relationships between mass layoffs and employer outcomes over time, such as employment patterns, wage patterns, and the probability of employer closures. It also shows how these relationships differ for employers with different industries or ages, for layoffs occurring in different portions of the business cycle, and by the reason for the mass layoff. These relationships are estimated using the microdata of the Mass Layoff Statistics program, linked with the microdata of these employers in the administrative records of the Unemployment Insurance system. All estimates are relative to observations of a comparison group of employers similar in age, industry, and size, but without contemporaneous mass layoffs.

We show that employers with mass layoffs were growing more quickly than comparison employers before the mass layoffs, with higher employment in the quarter preceding the

mass layoff, and permanently lower employment afterwards.

The impact of mass layoffs on long-term employment patterns varies by the reason for the mass layoff, the industry of the employer, the age of the employer, and the date of the mass layoff. Mass layoffs for seasonal reasons have much less impact on long-term employment levels than layoffs for other reasons. Mass layoffs for business demand reasons follow periods of sharp employment growth. Mass Layoffs to manufacturing employers are associated with permanent declines in employer size, while mass layoffs to construction employers look like returns to baseline levels of employment after a boom. Young employers with mass layoffs had particularly strong employment growth before the layoffs, relative to comparison employers.

Mass layoffs in the 2001 recession look very similar to mass layoffs in the 1990s expansion and the 2000s expansion, but mass layoffs in the Great Recession of 2007-2009, and in the weak expansion that has followed, occurred at employers with more stable employment levels before and after the layoff. Adding controls for the reasons for the layoffs, employers' industry groups and employers' ages do not change these findings.

We observe permanent increases in average wages per employee following mass layoffs, consistent with low-wage workers being let go during mass layoffs. This pattern of permanent increases in wage levels for remaining workers at these employers is especially strong for Construction and Manufacturing employers, and for mass layoffs that took place during the expansion of the 2000s.

Mass layoffs also increase the probability of observing zero employment at an employer in a later period. This increased likelihood of closure following mass layoffs is particularly high in young employers and for employers in the manufacturing and retail trade industries, and is lower when the employer stated that the layoff took place for 'Seasonal' reasons. We observe smaller relationships between mass layoffs and later closures for layoffs taking place in the Great Recession or the expansion that has followed. These differences in the probability of closure by the period in which the layoff takes place are not explained by differences in employer ages, industries, and layoff reasons between periods. Overall, it appears that the mass layoffs that took place during the Great Recession or the current expansion may have less permanent impact on employers than mass layoffs that took place

in earlier periods.

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8 Data Appendix

8.1 The MLS data

The MLS microdata contain detailed information on major employment cutbacks, collected directly from the employers. This survey was conducted by state workforce agencies from 1995 through March 2013 (when funds for the program were cut as part of the government funding sequester). These state agencies contacted employers with at least 50 initial claims for unemployment insurance filed against them during a consecutive 5-week period and determined whether the layoffs would last at least 31 days. If so, the MLS program collected information (by Unemployment Insurance (UI) account) on the total number of people laid off, the reason for the layoff, and so forth.

This '50 initial claims for unemployment insurance from one UI account during a 5-week period' definition of a mass layoff has several important differences from the definition of mass layoffs used by several other authors. These authors, beginning with Jacobson, Lalonde, and Sullivan (1993), generally define mass layoffs as permanent separations of 30% or more of long-tenured workers from an employer with 50 or more employees. This is a different definition of a layoff—a permanent separation of workers in the academic literature, and separation notices given to the UI system in the MLS. In some cases in the MLS, 'laid-off' workers are eventually recalled to work. Second, there is a difference in the workers considered—workers who have been at the same firm for several years in the academic literature, and workers who are eligible for unemployment insurance in the MLS. Last, there is a difference in the size requirement for a mass layoff—30% below an earlier level in the academic literature, and 50 workers in the MLS. Handwerker and Mason, 2012, show that employers in the MLS are larger, with more establishments and more workers, paying higher wages, and having larger layoffs, than employers with large declines in employment that do not appear in the MLS. They are also more likely (in earlier sub-periods) to be in manufacturing.

The MLS program began tracking employers who were eligible for the survey but refused to answer starting in 2002, and began tracking employers who could not be contacted for MLS interviews starting in 2006. More than 85% of layoff events in the MLS have occurred to employers that answer the survey. Employers that cannot be contacted or refused the survey appear to be somewhat larger and pay higher quarterly wages on average (as measured in the QCEW data in the quarter before the layoff) than the employers that do answer the survey. They are also more likely to be engaged in manufacturing or wholesale trade.

Examining the employers who respond to the MLS and whose employment histories can be matched to the QCEW data, about 90% answer key questions such as the reason for the layoff and whether they expect to recall laid-off employees. Fewer employers answer these questions during periods with more layoffs. The employers in the MLS are large employers, with average pre-layoff employment levels of 1,827 employees and median employment levels of 484 employees in the QCEW. There are no strong trends in mean or median employer size over time (as measured in the QCEW) in the MLS. Employers tell the MLS program that they let go an average of 189 employees in these layoffs, while the difference in quarterly employment in their QCEW records is 193. Although the total number of layoffs in the MLS is seasonal, the number of employers appearing in the MLS for the first time has little seasonal pattern. Both the number of employers appearing in the MLS for the first time and the number of employers appearing in the MLS multiple times in the same quarter increase during recessions.

8.2 The QCEW data

The records of the QCEW summarize employment and wage data for workers covered by State unemployment insurance (UI) laws. These data are collected at the establishment level.[11] Most employers have only one establishment, but larger employers can be comprised of multiple establishments. When the establishments of the QCEW are linked into the Longitudinal DataBase (LDB), notations are made of the changing structure of em-

[11] An establishment is an economic unit, such as a factory or store that produces goods or provides services. It is typically at a single physical location and engaged in one, or predominately one, type of economic activity for which a single industrial classification may be applied.

ployers over time, as establishments merge, break-out, and pass from the ownership (and UI accounts) of one employer to another over time.

8.3 Selecting Comparison Employers from the QCEW data

To examine the impact of layoffs on the long-run employment and wage patterns of employers in a regression framework, we work with a set of comparison employers without mass layoffs. For every mass layoff event in the MLS, we randomly select a comparison employer from the QCEW in the same quarter as the layoff. These comparison employers do not have mass layoffs in the selection quarter, although some of them may have mass layoffs in other quarters. We select each comparison employer to match the age group[12] and size class of an employer in the MLS, in an industry that is as close a match as possible to the MLS employer.

To select these comparison employers, we aggregate the establishments of the LDB up to the UI account level, summing employment and total wages each quarter over all establishments within each UI account. Some employers are involved in consolidations (combining many previous establishments into one) and break-outs (turning one previous establishment into many) from any quarter to the next during the 5 years before and after the quarter of a layoff. We want to account for changes in employment and wage dynamics due to layoffs, rather than to changes in employer structure. Thus, for employers with multiple establishments, we use the full set of establishments that are ever part of the employer's UI accounts over the five years (20 quarters) before and after the event quarter. Overall, 46% of the events in the MLS data are associated with an employer consisting of a single establishment with unchanging structure, 32% are associated with employers consisting of multiple establishments without changes in structure, and 22% are associated with an employer involved in the breakup or consolidation of multiple establishments.

[12]Drawing on the work of Haltiwanger, Jarmin, and Miranda (2010), we group employers into the following age groups: ¡1 year, 1 year, 2 years, 3 years, 4 years, 5 years, and more than 5 years

8.4 Choosing appropriate comparison employers from the QCEW

Employers with multiple establishments can have multiple establishment ages. We choose the oldest age among the establishments in selecting an appropriate comparison employer. Employers with multiple establishments can have multiple NAICS codes. We choose the code with the largest fraction of employment in selecting an appropriate comparison employer. We choose comparison employers prior to adjusting for breakouts and consolidations. Thus both the MLS employer and/or the sampled comparison employers can be involved in breakouts/consolidations changing the size class and possibly the industry group as well.

Comparison groups are less comparable as size classes get larger. There are only so many 'big' employers. Also, layoff events can be related to the demand and supply shocks affecting particular industries. There may be few appropriate comparison employers without mass layoffs for large employers in industries with many mass layoffs.