Fear itself: The effects of distressing economic news on birth outcomes

Carlson, Kyle

California Institute of Technology

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FEAR ITSELF: THE EFFECTS OF DISTRESSING ECONOMIC NEWS ON BIRTH OUTCOMES*

KYLE CARLSON†

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Abstract

I use new administrative data on mass layoffs and plant closings to study the effects of distressing economic news. Exposure to stressful events during pregnancy can impair fetal development. I find that announcement of impending job losses leads to a transient decrease in the mean birth weight within the firm's county 1–4 months before the job losses. A loss of 500 jobs corresponds roughly to a decrease of 15–20 grams and 16 percent greater risk of low birth weight. Further analyses show that the initial effect results from curtailment of gestation, while slower intrauterine growth plays a later role.

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†Division of the Humanities and Social Sciences, MC 228-77; California Institute of Technology; 1200 E. California Blvd.; Pasadena, CA 91106; email: kcarlson@caltech.edu; phone: (617) 858-6190

Anne Hubbard has not lost her job, house or savings, and she and her husband have always been conservative with money. But a few months ago, Ms. Hubbard, a graphic designer in Cambridge, Mass., began having panic attacks over the economy, struggling to breathe and seeing vivid visions of "losing everything," she said. She "could not stop reading every single economic report," was so "sick to my stomach I lost 12 pounds" and "was unable to function," said Ms. Hubbard, 52, who began, for the first time, taking psychiatric medication and getting therapy. — *The New York Times*, April 9, 2009[1]

1. Introduction

Each year in the United States some 20 million jobs are lost through layoffs or discharges. Workers who lose employment face serious problems, including long-term loss of earnings and damaged health, which have been documented in the economics literature.[2] However, each time someone loses employment, he first receives the unfortunate news of the impending event. And, each time a firm announces the decision to lay off workers or shut down, those residing nearby must consider how the change might affect the local economy and their future livelihoods. Many forms of distressing news appear as a part of the normal course of economic activity, but we know relatively little about the effects and costs associated with these messages.

Considered broadly, previous work suggests a variety of angles on the question of bad news and distress. Recent empirical work by Deaton (2012) on nationally-representative polling data shows a surprisingly strong relationship between negative hedonic experience and the S&P 500 index during 2008–2010, even after conditioning on unemployment and income and even among those who own few stocks. He conjectures that the S&P 500 served to aggregate and channel pessimistic news to the U.S. population. Such waves of pessimistically distorted beliefs might explain substantial portions of business cycle fluctuations (Milani 2011). Additionally, stress and emotionality can exacerbate reference dependence in decisions (Porcelli and Delgado 2009; Sokol-

[1] Belluck, Pam. "Recession Anxiety Seeps Into Everyday Lives." (2009, April 9). *The New York Times*, p. A1.

[2] Displaced workers' long-term earnings losses can range from 10 to 25 percent (Ruhm 1991; Jacobson et al. 1993; Couch and Placzek 2010). Recently displaced workers are likely to drop out of the labour force (Huttunen et al. 2011) and can experience enormously elevated mortality risk (Sullivan and von Wachter 2009). A parent's job loss can also reduce the health of subsequently born children (Lindo 2011).

Hessner et al. 2009), which has been cited as a potential source of friction in the labor market (Katz 2010).[3]

In this study I consider bad news about mass layoffs and plant closings in light of the human capital literature which studies the damaging effects of stress experienced by women during pregnancy. Shocking events, for example, terrorism and natural disasters, can decrease birth weights and shorten gestation (see, for example, Camacho 2008 or Simeonova 2011). Such findings suggest that brief events can have long-lasting consequences for the human capital of the next generation. These studies exploit quasi-experiments that provide clear exogenous variation to provide a solid basis for causal inference. However, these events are very extreme and may not generalise well to more common situations that lack physical destruction and involve less acute experiences of stress.

The setting of distressing economic news is exceptionally appropriate for overcoming these concerns. Perhaps the most common stressors are personal finances, jobs, and economic conditions (American Psychological Association 2011). To address the question of causal identification, I construct a novel data set containing the dates of major job loss events and information about the amount of forewarning given to the local community. These data allow me to analyze the particularly interesting period in which news of job losses is taking effect, but the job losses *themselves* have not yet occurred. My empirical model is constructed to rule out the direct consequences of job loss and isolate *anticipatory effects*. In this context I refer to stress in a broad sense which includes both physiological and behavioral responses in anticipation of economic change. Pregnant women who receive negative information about the future might decrease consumption of healthful goods, increase consumption of unhealthful goods, become more neglectful of their health in other ways, experience stress as a result of initiating a job search, or be burdened with extra responsibilities when another member of the household initiates a job search. The various behavioral and physiological mechanisms of stress cannot be untangled further without data of much greater scope and detail than is available.

[3]Theoretical approaches to these questions might conceptualise the immediate psychological costs in terms of preferences over the temporal resolution of uncertainty (Kreps and Porteus 1978) or over lotteries of one's own psychological states (Caplin and Leahy 2001).

I study administrative data on mass layoffs and plant closings in Alabama, New York, Texas, and Washington. These data, derived from notices filed under the Worker Adjustment and Retraining Notification (WARN) Act, are merged with natality data at the county-by-month level to link each birth with job losses occurring in the mother's community. The results indicate that mean birth weights drop by 15–20 grams during a brief period *before* a large job loss event (defined as one at the 95th percentile or approximately 500 workers in an average U.S. county). However, the effect is almost entirely restricted to job losses where the firm in question provides a large amount of forewarning rather than little, suggesting that bad news is the driving factor. Finally, the effect on birth weights is similar in size to those previously associated with violent disasters.

This literature's focus on birth weight and gestational age is well-known as an important limitation (Currie 2011),[4] but I utilize the joint distribution of the two variables to provide additional insight into the dynamics and mechanisms of depressed birth weights. A baby's birth weight depends on the length of gestation and the rate of fetal growth. When a decrease in the mean birth weight appears, it is difficult to determine which factor contributes more, if only the marginal distributions are examined. I study two complementary measures, (1) the proportion of babies born both prematurely and with low weight plus (2) age-conditional birth weight z-scores, and find that the birth weight responses are marked by an initial cluster of babies born too early and too small, followed by babies that grew too slowly *in utero*. This result suggests that the arrival of bad news may be marked by a sharp increase in low weight and preterm births.

The study has several limitations. Births and dislocations are linked only by time and place, so, like other studies using "ecological" designs, the estimates represent only effects averaged over the affected community. In addition, the arrival time of the bad news about worker dislocations is only approximately known, which "blurs" the estimated form of the response. Finally, caution is required when considering policy implications. One should not conclude that worker notification laws are harmful on the basis of this study. Others have found that displaced workers can find

[4] Nevertheless, birth weight and gestational age are important intermediate outcomes (Cunha and Heckman 2007) that consistently predict health and socioeconomic success (Behrman and Rosenzweig 2004; Black et al. 2007; Currie and Moretti 2007; Royer 2009). A broad review of child health and socioeconomic status is provided by Currie (2009).

new jobs more quickly when protected by notification laws (Friesen 1997; Jones and Kuhn 1995). Any policy is bound to have unintended consequences. My results should instead be considered evidence that announcements of common business decisions are associated with substantial psychological and physiological costs that occur before the decision takes effect.

Section 2 reviews research on mental and physical health responses to economic insecurity along with research on prenatal stress. Section 3 describes the data on birth outcomes and worker dislocations. Section 4 describes the empirical model, and Section 5 presents the results.

2. Background

I review previous research in order to support the two key mechanisms underlying the hypothesis of the study: (1) News of impending job losses is likely to affect a community by increasing stress, and (2) pregnant women who experience high stress tend to give birth sooner and have smaller babies. The review first examines how peoples' mental and physical health may suffer due to deteriorating economic conditions. The most important lesson for this study is that news of job losses is likely to increase anxiety and stress in a broad way. Workers losing employment will be affected, but so will their family members, remaining co-workers, and other members of the community.[5] The second part of the review covers the extensive research on prenatal stress, with a focus on quasi-experiments and recent work by economists.

2.1. Mental and physical health under difficult economic conditions

2.1.1. Anticipation of job loss

Researchers have accumulated evidence that looming plant closings or workplace upheaval can negatively affect the mental and physical health of employed workers. During the period before termination, workers may suffer from anxiety about their future livelihoods or worsening conditions in the workplace. Studies of U.S. factory workers by Kasl and Cobb (1970, 1980) show changes in blood pressure and other physiological measurements before plant closings. Hamilton

[5] For a model of how individuals use news coverage to form expectations about the labour market, see the paper by Carroll (2003). For recent empirical evidence that people's beliefs are highly responsive to economic conditions, see the paper by Davis and von Wachter (2011).

et al. (1990) report a large quasi-experimental study that exploits a decision by General Motors to shut down several auto plants. At sites slated for closure, workers exhibited elevated physical symptoms, depression, and anxiety. Ferrie et al.'s (1995; 2002) quasi-experimental study of the Whitehall II cohort shows that white collar office workers can also experience health effects in anticipation of job losses. Many workers were expected to lose employment as a result of the privatisation of government agencies in the 1990s. The researchers compare an agency facing early privatisation with 19 other agencies in London. Although workers in the target agency had equal health and more salutary behaviour at baseline, they showed lower mental and physical health after the announcement of the privatisation plan.

2.1.2. Perception of job insecurity

Workers' health may also suffer when they feel job insecurity that is not tied to a specific, impending layoff or plant closing. Layoffs can cause remaining workers to feel less secure in employment (Moore et al. 2004) or overburdened by additional responsibilities. Vahtera et al. (1997) use administrative data on Finnish government workers to show that after mass layoffs the remaining workers exhibited increased rates of absenteeism, musculoskeletal disorders, and trauma. Grunberg et al. (2001) report similar findings in a study of a large U.S. organisation with both blue- and white-collar employees. The researchers compare workers who had no layoff contact against those who had any of three forms of contact: (1) a co-worker or within-company friend laid off, (2) receipt of a WARN notice which was subsequently rescinded, and (3) laid off and rehired. Compared with the control group, each contact group showed significantly higher indices of depression, poor physical health, and changes in eating behaviour. Kalimo et al.'s (2003) nationally-representative survey of Finland reveals that workers with higher expectations of future layoffs also had more psychological symptoms. De Witte (1999) and Sverke et al. (2002) provide reviews of the psychological effects of job insecurity.

Researchers also report other indirect effects of layoffs. A manager who is responsible for layoffs can feel significant stress (Maki et al. 2005) and a wife may feel stress due to her husband's layoff or job troubles (Dew et al. 1987; Rook et al. 1991; Vinokur et al. 1996; Westman et al. 2001).

2.1.3. General economic conditions and mental health

Numerous studies link economic difficulties to worsening of people's mental well-being.[6] Paul and Moser's (2009) extensive meta-analysis shows that unemployed people experience more distress, depression, and anxiety. A comprehensive review by Goldman-Mellor et al. (2010) concludes that (1) loss of employment significantly decreases an individual's mental health and raises his risk of suicide and (2) aggregate rates of suicide, attempted suicide, and violence increase during economic contractions. Results from the Moving to Opportunity experiment suggest that mental health and subjective well-being are especially sensitive to the economic and social characteristics of the local community (Ludwig et al. 2012).

2.2. Prenatal stress

Mothers who experience high stress levels during pregnancy tend to have poorer birth outcomes. The risks of preterm birth and low birth weight are linked to (1) subjective reports of stress (Copper et al. 1996; Dole et al. 2003; Rondó et al. 2003) and (2) maternal levels of stress hormones during middle and late pregnancy (Hobel et al. 1999; Inder et al. 2001; Wadhwa et al. 2004). Researchers who investigate the underlying physiological mechanisms have focused on stress-induced changes in immune system function (Wadhwa et al. 2001a,b) along with cortisol and corticotropin-releasing hormone, which regulate the response to stressors, the development of the fetus, and the timing of birth (Erickson et al. 2001).[7]

Research on the predictive power of biomarkers and subjective reports is important but provides limited grounds for inferring the causal effect of an individual's environment, so many researchers use quasi-experiments. These experiments often exploit catastrophic events. One of the earliest examples is Catalano and Hartig's (2001) study of birth weights in Sweden after the murder of the prime minister in 1986 and a maritime disaster in 1994. Several studies examine U.S. birth

[6] However, overall mortality rates tend to decrease during recessions (Ruhm 2000; Tapia Granados and Diez Roux 2009).

[7] Prenatal stress can also cause long-lasting changes in the offspring's behaviour. Van den Bergh et al. (2005) and Weinstock (2005, 2008) provide comprehensive reviews of the behavioural and cognitive effects of prenatal stress in humans and animals.

outcomes following the attacks on September 11, 2001. The risk of very low birth weight increased during the week following September 11 in New York City (Eskenazi et al. 2007). And, throughout New York state, fetuses who were in early or middle pregnancy at the time of the attack had an elevated risk of very low birth weight (Eskenazi et al. 2007). Arabic-named women also showed elevated risk of preterm and low weight birth after the attacks (Lauderdale 2006). Eccleston (2011) reports a 14-gram drop in the mean birth weight and a 0.2-week drop in the mean gestational age in New York City and that children who were *in utero* at the time of the attacks subsequently performed worse in school. Camacho (2008) reports the negative effects of landmine explosions on birth weights in Colombia, which reach 28 grams for frequent explosions, and Simeonova's (2011) study of disasters in the United States reports birth weight losses ranging from a few grams for storms to 30 grams for floods.[8] A detailed tabulation of many previous studies is available in the appendix.

This research frequently faces two serious limitations involving causal mechanisms and generalisability. First, when the stressor is highly destructive, the observed changes in birth outcomes might also stem from disruptions to the provision of medical services or essential commodities. Second, the stress caused by catastrophic events may not be similar to the stress caused by more common problems. My study addresses these concerns by focusing on a common stressor before there is likely to be a significant material effect. Since the stressor in this study occurs relatively frequently and varies in magnitude, the empirical model is like that used by Currie and Schmieder (2009) to study pollution releases. Following their approach, I aggregate data at the county level and estimate how births respond to within-county variation in a continuous treatment variable.

[8] The last three papers are part of a broader economics literature that uses quasi-experiments to investigate how a pregnant woman's environment affects the fetus. Economists have made important contributions by considering a wide range exposures (Almond and Currie 2011), which include *economic crises and shocks*, (Dehejia and Lleras-Muney 2004; Banerjee et al. 2010; Bozzoli and Quintana-Domeque 2010; Burlando 2011), *policy changes* (Baker 2008; Almond et al. 2009b; Chung and Kim 2011), *school openings* (Currie and Moretti 2003), *epidemics* (Almond and Mazumder 2005; Almond 2006; Mazumder et al. 2010), *pollution* (Currie et al. 2009; Currie and Schmieder 2009; Almond et al. 2009a; Currie and Walker 2011; Currie et al. 2011), and *climate change* (Deschênes et al. 2009).

3. Data

This study examines births during the period 1999–2008 using a county-month panel data set that includes all 422 counties in Alabama, New York, Texas, and Washington. The core of the dataset is composed of 7,113,083 births and 6,526 WARN notices. State-level agencies keep records of WARN notices, but the available histories vary greatly in length from state to state. Thus, I traded off geographic coverage against panel length while forming a balanced panel. Table 1 summarises the basic components of the data. Extended summary statistics for all data are available in the appendix.

TABLE 1: Summary of dataset

				WARN notices		
	Births	% Births	Counties	Advance	Short	Total
Alabama	546,870	7.7	67	282	486	768
New York	2,327,954	32.7	62	891	1,411	2,302
Texas	3,476,622	48.9	254	1,142	1,573	2,715
Washington	761,637	10.7	39	311	430	741
Total	7,113,083	100.0	422	2,626	3,900	6,526

3.1. Layoffs and plant closings

3.1.1. Description

The United States Congress enacted the Worker Adjustment and Retraining Notification Act of 1988 in order to help individuals and communities anticipate worker dislocations. Under this law, private employers must notify workers and authorities at least 60 days in advance of a plant closing or mass layoff. Closings and layoffs trigger the law only if they meet certain criteria, which mainly specify thresholds for the number of workers involved. If a worksite with at least 50 workers will close, then the employer must provide notice. Similarly, the law applies to (1) layoffs of 500 or more workers and (2) layoffs of 50–499 workers when they constitute at least 33 percent of a site's workforce.[9] When one of these conditions applies, the employer must give detailed, written

[9] For a complete description of the criteria in the Act, see the guide published by the Employment and Training Administration (2003).

notices to (1) the affected workers, (2) the workers' representatives, (3) the local government, and (4) the state's dislocated worker unit (DWU). Upon receipt of a notice, the DWU's Rapid Response team contacts workers and the employer to arrange meetings and provide services to the affected workers. Typical services include guidance on unemployment insurance, career counseling, and job search assistance.

Several DWUs have provided electronic records of WARN notices for this study. Each notice specifies several key pieces of information: (1) the employer's name and address, (2) the number of workers affected, (3) the date on which the DWU was notified,[10] and (4) the date on which worker dislocations were to occur or begin. This combination of details allows me to identify distressing events that are locally salient, something not possible with other data. For example, the BLS Mass Layoff Statistics program lacks information about the amount of forewarning given by employers and provides coarser temporal and geographic resolution.

Based on the difference between the notice date and dislocation date, I categorize each notice into one of two types: *Advance notices* (ANs) provide at least 60 days' notice, while *short notices* (SNs) provide less. Advance notices make up about 40 percent of the total, a finding like those of U.S. government studies (U.S. General Accounting Office 1993, 2003). A small portion of notices, about 5 percent, arrived more than 30 days after the dislocation or more than 120 days early. These were regarded as erroneous or atypical situations and discarded. Nevertheless, the inclusion of these notices has no substantial effect on the results. Advance notices provide on average 70 days of forewarning, while short notices provide on average 31.

There are several reasons why notices giving less than 60 days' notice can appear. Employers are suspected to violate the WARN Act's requirements because of confusion, weak enforcement, and small penalties (U.S. General Accounting Office 1993). No government agency is directly responsible for enforcement of the Act. Following a violation, workers or local governments may file suit against employers in U.S. District Court to extract back pay. Such law suits can be costly and

[10]The Alabama and New York records include just the date of the notification document, but the data from Washington include just the date on which the DWU received the notification. Only Texas includes both dates. I use the date of receipt in the analysis, but the results are not substantially changed by using the other date.

uncertain because the criteria in the Act are complicated and courts have interpreted the WARN Act inconsistently. These factors also contribute to underreporting. It is estimated that employers fail to file a notice for one-half to two-thirds of events that should be reported (U.S. General Accounting Office 1993, 2003). However, the WARN Act also encourages employers to file notices even if they are not obligated to do so, and these notices are not distinguished in the data. Finally, I contacted DWU staff to ask about differences between the two types. They denied that there is any clear difference (Faraone 2012; Jordan 2012).

A key feature of the notices is that the two types implicitly attribute different amounts of bad news to the months *before dislocations*. The notice date represents an important point in the process that disperses information about the impending job losses. However, the notice date should not be viewed as the single point at which full information about the job losses is instantaneously revealed to all. First, the notice is generally an "early bound" on the date at which workers learn of the planned job losses because employers want to break the news to the workers before Rapid Response makes contact. The U.S. General Accounting Office (1993) reports that workers generally receive somewhat more forewarning than DWUs. Second, workers also receive informal signals of the impending notice filing and dislocation. Previous studies of worker notification laws have considered this "spillover" problem (Friesen 1997; Jones and Kuhn 1995). Finally, the employer must also notify the community's authorities, and local media often report WARN notices. Thus, when a dislocation follows an advance notice rather than a short one, the news of the impending job losses will have had a relatively long time to spread throughout the community and exert an effect.

A dislocation's potential impact depends in part on the number of workers affected and the size of the community. Thus, I operationalise this potential as the ratio of (a) the number of workers affected to (b) the population of working-age people in the county of the employer. AN and SN dislocations have very similar distributions of potential. In the set of county-month cells with at least one AN dislocation, the mean (median) potential is 0.124 (0.024) percent. The corresponding mean (median) for SN dislocations is 0.125 (0.026) percent. The first and third quartiles are also nearly equal across the two types. The mean number of workers affected by an AN notice is 114, while SN notices affect 117 on average.

WARN notices are rare in the sense that about 6 percent of county-month cells contain one. However, 67 percent of counties have at least one. The second percentage would be above 90 if not for Texas, where 50 percent of the counties have no notices. The WARN Act applies only to employers with at least 100 employees in total, regardless of how many workers lose employment at a single worksite operated by the employer, and there may be few or no such large employers in the many small counties of Texas. Figure 1 shows that WARN notices are highly dispersed over the study period. No single year has more than 13 percent of the notices nor less than 7 percent.

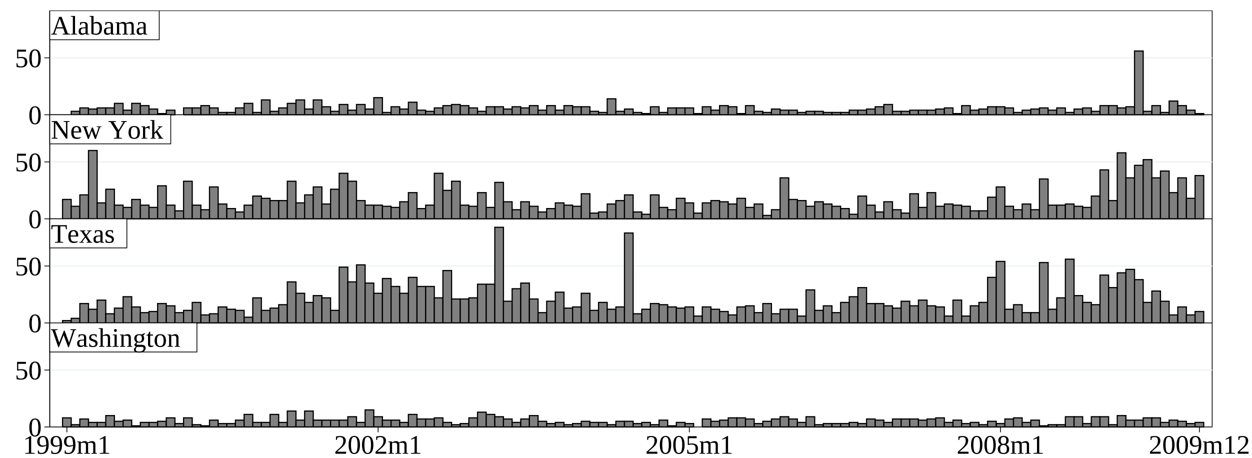

FIGURE 1: Monthly frequency of WARN notices by state, 1999–2009

3.2. Natality data

The National Center for Health Statistics at the Centers for Disease Control (CDC) has provided a confidential version of the Vital Statistics natality data that identifies each mother's county of residence. The CDC does not yet provide the confidential data for years after 2008. Practically all births in the United States appear in this data. The available variables include the birth weight (BWT) in grams, the gestational age (GA) in weeks, the month of birth, and the mother's demographic characteristics. Births were included based on these criteria: (1) The birth was a singleton, (2) the mother resided and gave birth within the same state, and (3) the mother was 18 to 45 years of age. If a record had a missing value in the birth weight, gestational age, plurality, or location variables, then it was dropped before analysis. The mean age of mothers at the time of birth is 27.6 years. Births to Hispanic, white, black, and "other" mothers make up 33, 47, 14, and 6 percent of the sample. The means of birth weight and gestational age are 3,318 grams and 38.7 weeks.

By convention, babies born at a weight below 2,500 grams are classified as low birth weight (LBW), and births before 37 weeks are classified as preterm (PTB). I also consider age-conditional z-scores and the proportion of babies that are both LBW and PTB. The z-scores indicate how much a baby's birth weight deviates from the median birth weight given the length of gestation, so they are sensitive to changes in fetal growth but not changes in gestational age. The z-scores are calculated using the tables and reference population provided by Oken et al. (2003). Z-scores are only defined for gestational ages between 22 and 44 weeks, so births outside this range, which make up less than one percent of the sample, are dropped when z-scores are analyzed.

3.3. Other data

The Bureau of Labor Statistics provides unemployment data at the county-by-month level through the Local Area Unemployment Statistics program. Finally, birth rates and working-age populations are calculated using intercensal population estimates from the U.S. Census and National Cancer Institute/SEER. The Census estimates July populations for each county, so linear interpolation provides figures for the remaining months.

4. Empirical model

In order to estimate how birth outcomes respond to dislocations, I use a county fixed effects model that incorporates the following key features. First, each month's outcomes are allowed to depend on dislocations up to 6 months in the future. Second, the AN dislocations and SN dislocations have separate effects. Third, dislocations enter the model as a proportion of the working-age population in the county. The estimated equation is

$$Y_{i,t} = \sum_{\tau=0}^{6} \beta_{\tau}^{\text{AN}} (\text{AN})_{i,(t+\tau)} + \sum_{\tau=0}^{6} \beta_{\tau}^{\text{SN}} (\text{SN})_{i,(t+\tau)} + \mathbf{Z}_{i,t}\boldsymbol{\delta} + \epsilon_{i,t},$$

where for each county i and month t

- $Y_{i,t}$ is the mean of a birth outcome,
- $(\text{AN})_{i,t}$ is the proportion of the working-age population dislocated under an advance notice,
- $(\text{SN})_{i,t}$ is the proportion of the working-age population dislocated under a short notice, and
- $\mathbf{Z}_{i,t}$ is a vector that potentially includes the means of characteristics of women giving birth and county-specific quadratic time trends along with indicators for county of birth, year of birth, and calendar month of birth.

Each observation is weighted by the number of births to increase efficiency, and standard errors are adjusted for clustering at the county level. Some specifications also include a window of unemployment rates, which is detailed in the results section.

While it may seem counter-intuitive to use the month of the job losses as a reference point, this specification is a natural result of the identification strategy. The statistical model must be designed so as to clearly separate the effects of job loss from the anticipatory effects caused by bad news. If the model were to use the month of the notification as a reference point, the proper comparison would be impossible. The month following an advance notice is *before* the job loss, but the month following a short notice is likely to fall *after* the job loss. Thus, comparing changes following notices would fail to isolate the effects of distressing news.

Mother characteristics enter as proportions of mothers in groups defined following Currie et al. (2011). The age groups are “Less than 20”, “20 to 34”, “Over 34”, and “Missing”. The race and ethnicity groups are “Hispanic”, “White”, “Black”, “Other”, and “Missing”. The educational attainment groups are “Less than high school”, “High school”, “Some college”, “College or higher”, and “Missing”. The marital status groups are “Married” and “Not married”. Finally, the categories for total birth order are 1, 2, 3, 4, 5 or more, and “Missing”. However, these categories are omitted from birth rate models because they are undefined in months with no births. Smoking variables are omitted because of possible endogeneity, but their inclusion has minimal effect on the results. Birth rates are calculated as the number of births per 1,000 women aged 18–45.

5. Results

5.1. Preliminary results for birth weight in each state

As a preliminary step, the estimates from separate regressions using each of the four states are displayed in table 2.[11] The estimate of β_0^{AN} is labeled "Advance notice layoff: Mo. of layoff", the estimate of β_1^{AN} is labeled "Advance notice layoff: 1 mo. before", and so on. All estimates are scaled so as to represent the effect of a 95$^{\text{th}}$ percentile dislocation event, or 0.7 percent of the working-age population. The results suggest that birth weights decrease before dislocations with advance notice but not short notice. In particular, the ten most negative coefficients are associated with advance notice. However, these estimates exhibit substantial heterogeneity across states. The two large states, New York and Texas, show the strongest evidence of anticipation of AN dislocations. The effect magnitudes in New York are typically 20–25 grams but with a peak of over 40 grams, while the magnitudes in Texas are around 20 grams. However, the smaller states show more equivocal results. The estimates from Washington are suggestive of decreased birth weight prior to AN dislocations, while Alabama shows no evidence of a decrease.

This heterogeneity demands some conceptual and methodological consideration before the analysis can proceed. Differences in anticipatory effects might arise from variation in regional labor market features or policies, locals' prior beliefs about job losses, spatial relationships among employers and employees, or numerous other factors. These possibilities are worthy of future research, but at this early stage I focus simply on the possibility and basic characteristics of the anticipatory effect.

Heterogeneity of treatment effects presents some complications when estimating average treatment effects. Angrist (1998) shows that when treatment effects are heterogeneous across groups an OLS estimator which allows just one treatment effect will not in general estimate the average treatment effect. Instead, the estimator will estimate a weighted average of the group-specific treatment effects where each weight is proportional to the group-specific variance of the treatment

[11] For typographical convenience, tables refer to all dislocations as "layoffs".

Table 2: Estimated effects of layoff anticipation on birth weight (grams) by state

	Alabama		New York		Texas		Washington	
Advance notice layoff:								
- 6 mos. before	-1.90	(5.90)	-3.75	(8.94)	-8.94	(8.42)	18.60^{+}	(9.26)
- 5 mos. before	6.74	(5.47)	9.88	(11.27)	-17.89^{*}	(8.43)	-0.76	(14.98)
- 4 mos. before	3.25	(3.13)	-19.94	(13.95)	-22.87^{**}	(7.49)	-7.79	(10.37)
- 3 mos. before	2.10	(3.91)	-42.79^{*}	(17.66)	-8.52	(9.13)	-14.94	(8.97)
- 2 mos. before	5.67	(3.47)	-18.42	(12.72)	-19.59^{*}	(7.92)	-1.13	(8.14)
- 1 mo. before	0.15	(2.80)	-18.08	(16.96)	-19.08^{*}	(8.21)	-9.39	(7.50)
- Mo. of layoff	-3.51	(2.70)	13.25	(17.31)	-2.97	(9.03)	-20.40^{+}	(11.68)
Short notice layoff:								
- 6 mos. before	-6.90	(5.13)	9.47	(10.53)	1.60	(6.13)	12.61^{**}	(3.50)
- 5 mos. before	-6.06	(6.55)	20.41^{+}	(10.71)	-2.65	(7.25)	-10.09	(9.57)
- 4 mos. before	7.64	(5.54)	-1.22	(8.88)	-0.95	(6.07)	7.60	(5.55)
- 3 mos. before	-0.28	(5.31)	0.66	(10.59)	3.65	(5.68)	-7.54	(8.12)
- 2 mos. before	5.68	(6.32)	-12.87	(10.64)	-5.62	(6.28)	-4.59	(8.86)
- 1 mo. before	-4.81	(5.62)	-2.02	(11.01)	-3.96	(5.27)	5.28	(5.61)
- Mo. of layoff	-1.93	(4.59)	15.48	(11.62)	-8.25	(6.42)	2.38	(8.82)
Cells	8,008		7,435		29,166		4,514	
Adj. R-sq.	0.404		0.751		0.480		0.473	

Notes. Average treatment effects of a 95th percentile layoff printed with standard errors in parentheses. All models include county, year, and month fixed effects along with county-specific trends and mothers' characteristics. Statistical significance symbols: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

variable. The estimator then depends on the marginal distribution of the treatment variable within each group. Morgan and Winship (2007) propose addressing this problem by a simple stratification method which estimates the group-specific treatment effects and then averages them using weights proportional to the number of observations in each group. I implement this estimator by computing one regression which allows each state to have a separate set of anticipation effects. A single treatment effect is then estimated by averaging these four state-specific effects using the proportion of births in each state as weights. These estimates are presented as the main results in the next subsection.

5.2. Main results for birth weight and gestational age in full sample

Table 3 presents the main results for birth weight and gestational age. The estimates show that both variables selectively decrease in anticipation of AN dislocations. During the period four months to one month before AN dislocations, the mean birth weight is depressed by 15–20 grams and the mean gestational age by roughly one half to one day. However, both outcomes show little evidence of a decrease prior to SN dislocations. Some marginal evidence of a decrease in birth weights, which is about half the size of the AN effect, appears two months before SN dislocations.

Estimates from four specifications allow us to consider the potential influence of omitted variables. The most basic specification includes just county fixed effects and state-specific year and calendar month fixed effects. This relatively simple model is sufficient to show the basic form of the anticipatory response to AN dislocations. The addition of the mothers' demographic characteristics increases the magnitude of the birth weight coefficients associated with advance notice and tends to increase the precision of the estimates. These additional covariates also slightly increase the magnitude of the gestational age coefficients. This result suggests that the effects are not driven by changes in the demographic composition of mothers.

Since the study period spans ten years, one might be concerned that the counties underwent heterogeneous drift in some unobserved factors related to birth outcomes and job loss activity, which could bias the estimates. This problem appears unlikely because the birth outcomes show transient responses. Nevertheless, the third specification includes county-specific quadratic time trends. These trends should capture the effects of unobserved influences that vary in a smooth way within each county. This change adds over 800 parameters to the model, but has little effect on the estimated coefficients and standard errors. The birth weight effects slightly increase in magnitude, while the gestational age effects slightly decrease in magnitude.

Finally, it might also be suspected that dislocation activity simply reflects more general economic conditions. The state-by-year fixed effects in the basic model should control for economic activity varying at the state level. However, county-level heterogeneity might still be a source of bias. The quadratic trends might not properly account for varying economic activity since two recessions occured during the study period. So, the last specification includes a 19-month window of county-level unemployment rates. Twelve months of lags are included to capture effects occuring around the time of conception and during pregnancy. Six months of leads are included

TABLE 3: Estimated effects of layoff anticipation on birth weight and gestational age

	Birth weight (grams)				Gestational age (days)			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Advance notice layoff:								
- 6 mos. before	0.20	-1.82	-3.53	-3.51	-0.20	-0.21	-0.06	-0.08
	(4.77)	(4.46)	(5.14)	(5.18)	(0.21)	(0.21)	(0.22)	(0.22)
- 5 mos. before	0.22	-3.26	-5.28	-5.53	-0.20	-0.24	-0.11	-0.11
	(6.43)	(5.72)	(5.84)	(5.85)	(0.21)	(0.20)	(0.23)	(0.23)
- 4 mos. before	-17.19**	-18.06**	-18.61**	-18.98**	-0.87**	-0.93**	-0.77**	-0.79**
	(6.05)	(5.90)	(5.92)	(5.89)	(0.20)	(0.21)	(0.20)	(0.20)
- 3 mos. before	-16.46*	-18.61*	-19.84**	-20.53**	-0.29	-0.33	-0.18	-0.21
	(7.58)	(7.48)	(7.44)	(7.43)	(0.22)	(0.22)	(0.19)	(0.19)
- 2 mos. before	-10.55+	-14.46**	-15.87**	-16.83**	-0.59*	-0.63**	-0.49*	-0.53*
	(5.92)	(5.51)	(5.68)	(5.74)	(0.24)	(0.24)	(0.22)	(0.22)
- 1 mo. before	-11.98+	-14.45*	-16.24*	-17.50*	-0.23	-0.26	-0.11	-0.16
	(7.18)	(7.00)	(6.92)	(6.87)	(0.27)	(0.28)	(0.24)	(0.24)
- Mo. of layoff	3.62	0.71	0.32	-0.83	-0.06	-0.10	0.07	0.05
	(7.41)	(7.51)	(7.28)	(7.49)	(0.27)	(0.28)	(0.26)	(0.26)
Short notice layoff:								
- 6 mos. before	5.92	4.65	5.08	4.72	0.28	0.25	0.30	0.28
	(4.41)	(4.36)	(4.55)	(4.57)	(0.20)	(0.19)	(0.19)	(0.19)
- 5 mos. before	4.76	3.22	3.07	2.11	0.22	0.20	0.22	0.19
	(5.09)	(4.93)	(5.08)	(5.08)	(0.17)	(0.16)	(0.15)	(0.16)
- 4 mos. before	1.55	-0.05	0.16	-0.65	0.13	0.11	0.15	0.13
	(4.43)	(4.25)	(4.12)	(4.07)	(0.19)	(0.19)	(0.19)	(0.19)
- 3 mos. before	2.99	2.23	1.04	0.57	0.20	0.20	0.21	0.18
	(4.40)	(4.38)	(4.49)	(4.49)	(0.14)	(0.15)	(0.17)	(0.16)
- 2 mos. before	-5.17	-6.62	-7.41	-8.13+	-0.14	-0.13	-0.09	-0.13
	(4.97)	(4.74)	(4.78)	(4.84)	(0.19)	(0.18)	(0.18)	(0.18)
- 1 mo. before	-0.63	-2.01	-2.76	-3.44	0.15	0.14	0.15	0.11
	(5.17)	(4.82)	(4.45)	(4.45)	(0.19)	(0.19)	(0.18)	(0.18)
- Mo. of layoff	2.49	1.82	1.08	0.60	0.42**	0.40**	0.43**	0.40**
	(4.87)	(4.74)	(5.08)	(5.09)	(0.16)	(0.15)	(0.14)	(0.14)
County, yr., mo. FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Moms' characteristics	.	Yes	Yes	Yes	.	Yes	Yes	Yes
County quad. trends	.	.	Yes	Yes	.	.	Yes	Yes
Unemp. rates	.	.	.	Yes	.	.	.	Yes
Cells	49,123	49,123	49,123	49,123	49,123	49,123	49,123	49,123
Adj. R-sq.	0.655	0.665	0.674	0.674	0.536	0.539	0.561	0.561

Notes. Average treatment effects of a 95$^{\text{th}}$ percentile layoff printed with standard errors in parentheses. FE=Fixed effects. Statistical significance symbols: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

to allow for pregnant women to react to expectations about future economic activity. Inclusion of unemployment rates slightly increases the magnitude of the birth weight and gestational age effects, suggesting that local fluctations in general economic activity are not a serious problem.

5.3. Differences-in-differences and placebo tests on earlier periods

In order to show that the period just before AN dislocations is unusual, table 4 displays the main results along with three placebo tests looking back up to 27 months before AN dislocations. All the results here come from the specification which includes mothers' characteristics and county-specific trends. The placebo tests use the same model as the main results except that the distributed lead variables are shifted into the future by 7, 14, or 21 months. In addition, for each month, the table shows the difference between the advance notice effect and the short notice effect, which I refer to as a difference-in-differences.

Taken together, these results make two important points. First, the period just before an AN dislocation is unusual compared to the corresponding period before an SN dislocation. The differences-in-differences suggest a decrease in birth weight of about 20 grams and a decrease in gestational age of roughly half a day are associated with advance notice. Second, the period just before an AN dislocation is unusual compared to other time periods before the dislocation. In particular, the four most negative estimates appear in the main results rather than in any of the three placebo periods. The probability of this occuring under a random permutation of the estimates is less than 0.002. Additionally, the period just before the dislocation shows four statistically negative differences-in-differences, while the placebo tests show none. Finally, the period immediately before the dislocation is also the only one in which statistically significant effects on birth weight and gestational age occur simultaneously.

5.4. Dynamic features of the birth weight response

The four-month period before AN dislocations shows a fairly stable depression in birth weights, but this stability hides interesting dynamics. In particular, the initial response is marked by a precipitation of babies born too early and too small. Later parts of the response show decreased

TABLE 4: Effects, differences-in-differences, and placebo tests of advance notice layoffs

	Birth weight (grams)				Gestational age (days)			
	ATE	SE	DD	SE_{DD}	ATE	SE	DD	SE_{DD}
Mo. of layoff	0.32	(7.28)	-0.76	(8.76)	0.07	(0.26)	-0.36	(0.27)
1 mos. before	-16.24*	(6.92)	-13.47	(8.64)	-0.11	(0.24)	-0.26	(0.33)
2 mos. before	-15.87**	(5.68)	-8.45	(7.64)	-0.49*	(0.22)	-0.40	(0.27)
3 mos. before	-19.84**	(7.44)	-20.88*	(8.57)	-0.18	(0.19)	-0.39+	(0.23)
4 mos. before	-18.61**	(5.92)	-18.77*	(7.73)	-0.77**	(0.20)	-0.92**	(0.28)
5 mos. before	-5.28	(5.84)	-8.35	(7.87)	-0.11	(0.23)	-0.33	(0.27)
6 mos. before	-3.53	(5.14)	-8.61	(6.88)	-0.06	(0.22)	-0.36	(0.29)
Adj. R-sq.	0.674				0.561			
7 mos. before	4.64	(7.48)	-3.61	(8.61)	-0.03	(0.27)	-0.06	(0.34)
8 mos. before	1.72	(4.86)	2.58	(7.52)	0.78**	(0.21)	0.63*	(0.26)
9 mos. before	-4.32	(6.98)	3.59	(9.18)	0.16	(0.19)	0.19	(0.27)
10 mos. before	-15.39**	(5.43)	-12.99	(7.93)	0.04	(0.21)	-0.04	(0.33)
11 mos. before	-1.42	(7.21)	5.47	(9.76)	0.16	(0.20)	0.00	(0.30)
12 mos. before	-9.58	(6.12)	-7.50	(7.58)	0.15	(0.16)	0.12	(0.26)
13 mos. before	2.05	(6.25)	12.02	(8.45)	0.26	(0.17)	0.66*	(0.26)
Adj. R-sq.	0.673				0.560			
14 mos. before	-2.09	(5.84)	-4.64	(7.76)	0.32	(0.20)	0.65*	(0.26)
15 mos. before	3.85	(6.15)	0.40	(7.89)	0.25+	(0.15)	0.19	(0.22)
16 mos. before	3.52	(6.26)	2.32	(7.70)	0.17	(0.19)	0.42+	(0.25)
17 mos. before	2.34	(7.23)	-1.33	(7.72)	-0.04	(0.20)	0.03	(0.28)
18 mos. before	-6.00	(5.71)	-10.84	(7.71)	0.13	(0.20)	0.09	(0.32)
19 mos. before	-3.58	(5.59)	-10.66	(7.85)	0.19	(0.20)	0.07	(0.34)
20 mos. before	-3.35	(5.71)	-2.24	(7.26)	-0.32	(0.20)	-0.36	(0.27)
Adj. R-sq.	0.668				0.557			
21 mos. before	-4.89	(7.89)	-7.94	(8.97)	-0.24	(0.21)	-0.20	(0.25)
22 mos. before	-5.68	(7.05)	3.48	(8.41)	0.23	(0.29)	0.28	(0.35)
23 mos. before	1.51	(6.27)	-2.24	(8.70)	0.06	(0.27)	0.07	(0.34)
24 mos. before	4.04	(5.75)	1.60	(7.90)	-0.31	(0.19)	-0.15	(0.31)
25 mos. before	12.17*	(5.80)	6.93	(6.96)	0.10	(0.21)	-0.04	(0.33)
26 mos. before	7.56	(5.43)	7.74	(7.10)	-0.03	(0.22)	-0.24	(0.29)
27 mos. before	4.70	(6.51)	5.67	(8.76)	-0.04	(0.23)	0.07	(0.27)
Adj. R-sq.	0.664				0.553			

Notes. ATE=Average treatment effect of a 95th percentile layoff. DD=Difference-in-differences, the ATE of an advance notice layoff minus the ATE of a short notice layoff. Standard errors (SEs) in parentheses. Statistical significance symbols: $^{+}\ p < 0.10$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$.

fetal growth and possibly some selection. With these two mechanisms in mind, I now consider several additional variables. Selection would be suspected if the *birth rate* decreased. For example, emigration and abortion, either spontaneous or induced, would tend to decrease birth rates. If this phenomenon was systematically related to factors affecting birth weight, then selection bias could occur.

The main physiological contributors to birth weight are the length of gestation and the rate of intrauterine growth. These contributions can be partially disentangled by considering the joint distribution of birth weight and gestational age. Decreased birth weights caused by shorter gestation should be reflected in the *proportion of babies born both preterm and with low weight*. However, this variable is not sensitive to a change merely in fetal growth rates. Alternatively, birth weights caused by lower growth rates can be detected in *age-conditional z-scores*, which are sensitive to changes in birth weight conditional on gestational age.

Table 5 displays the estimated effects of an AN dislocation on the (1) mean birth weight, (2) birth rate, (3) proportion low birth weight, (4) proportion both low birth weight and preterm, and (5) mean age-conditional z-score of birth weight. Several results suggest that the initial decrease in birth weight at month four can be attributed to reduced gestational age. First, at this point the proportion LBW is increased by one percentage point, or 16 percent of the overall rate. And, the proportion LBW & PTB increases by 0.75 percentage points, or 20 percent of the overall rate, revealing that the additional low weight births are largely also additional preterm births. Second, the contemporaneous results in table 3 also show a tight link between decreased birth weight and decreased gestational age. To a first-order approximation, a 0.8 day decrease in gestational age implies a decrease of 18.9 grams, which is almost exactly the estimated change in mean birth weight.[12] Finally, the contemporaneous effect on the birth rate is just -0.01 and not statistically significant, indicating that selection is not a major influence. There is some evidence of a decrease in births during the period before job loss, but it appears to be small.

[12]Oken et al.'s (2003) supplemental tables indicate that a median baby born at 38 weeks should weigh 165 grams more than one born at 37 weeks. The calculation $(3,301 - 3,136) \times \frac{1}{7} \times 0.8 \approx 18.9$ suggests that around this point in pregnancy a decrease of 0.8 days in GA should result in a 18.9 gram decrease in birth weight.

TABLE 5: Dynamics of the anticipatory response to advance notice layoffs

	BWT		BR		LBW		LBW&PTB		Z-score	
6 mos. before	-3.53	(5.14)	-0.03	(0.07)	0.18	(0.29)	0.00	(0.20)	-0.18	(1.03)
5 mos. before	-5.28	(5.84)	-0.09	(0.07)	0.07	(0.23)	0.01	(0.19)	-1.13	(1.09)
4 mos. before	-18.61**	(5.92)	-0.01	(0.06)	1.00**	(0.27)	0.75**	(0.23)	-0.74	(1.07)
3 mos. before	-19.84**	(7.44)	-0.14+	(0.07)	0.86**	(0.28)	0.33+	(0.18)	-3.57*	(1.40)
2 mos. before	-15.87**	(5.68)	0.01	(0.05)	0.21	(0.29)	0.01	(0.21)	-1.97+	(1.09)
1 mo. before	-16.24*	(6.92)	-0.22**	(0.07)	0.28	(0.28)	0.16	(0.19)	-3.31**	(1.14)
Mo. of layoff	0.32	(7.28)	-0.09	(0.07)	-0.16	(0.35)	-0.21	(0.27)	-0.66	(1.24)
Cells	49,123		50,640		49,123		49,123		49,108	
Adj. R-sq.	0.674		0.840		0.254		0.177		0.572	

Notes. Average treatment effect of a 95th percentile layoff printed with standard errors in parentheses. All models include county, year, and month fixed effects along with county-specific trends. Models other than BR include mothers' characteristics. BWT=Birth weight (grams). BR=Births per 1,000 women. LBW=Proportion low birth weight $\times$ 100. PTB=Proportion preterm birth $\times$ 100. Z-score represents BWT conditional on gestational age and is multiplied by 100 for display. Statistical significance symbols: $^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

Closer to the dislocation month, there appear changes in intrauterine growth. The effect on the proportion LBW progressively diminishes from month four onwards while the decrease in mean birth weight is about 16 grams. Months three through one show z-scores decreased by 0.02–0.04, suggesting that retarded intrauterine growth is reducing birth weights. Converting the z-score effect to grams gives a decrease of 11–17 grams.[13] This result indicates that decreased growth, due to physiological stress responses or increased levels of unhealthful behaviour by pregnant women, can account for most or all of the estimated change in birth weight.

Finally, it is possible that the changes in birth outcomes might result from changes in the types of women giving birth, that is, selection bias. Two checks indicate that this concern is minor. First, table 5 shows that changes in the monthly birth rate cannot account for the decreases in birth weight and gestational age. Second, table 6 presents the results from regressions of the mother characteristic variables on advance notice layoffs.[14] These models are of the same form as those used for birth outcomes. The estimated coefficients are small and only sporadically reach significance at level 0.05. The results reveal no pattern of changes in the composition of mothers

[13]For a birth at 39 weeks, Oken et al.'s (2003) supplemental tables associate a loss of 11 grams with a decrease of 0.03 in z-score. Alternatively, the standard deviation of birth weight in the data is 562 grams. So, a change of 0.03 standard deviations corresponds to 17 grams.

[14]The results for short notice layoffs are available in appendix table C.4.

which might account for the birth outcome results.

TABLE 6: Estimates of the effect of advance notice layoffs on mothers' characteristics

	Age		Race/Ethnicity			Education			Married
	< 20	> 34	Hispanic	Black	Other	High school	Some college	College+	
Adv. notice									
- 6 mos. before	-0.42	-0.08	-0.27	0.14	-0.16	0.07	-0.10	0.06	-0.19
	(0.29)	(0.29)	(0.45)	(0.37)	(0.23)	(0.61)	(0.47)	(0.41)	(0.52)
- 5 mos. before	-0.02	-0.00	0.37	-0.44	-0.09	-0.17	0.90^{+}	-0.07	0.65
	(0.34)	(0.36)	(0.35)	(0.35)	(0.19)	(0.58)	(0.53)	(0.56)	(0.67)
- 4 mos. before	0.35	-0.23	-0.03	-0.20	0.28	0.45	0.09	-0.96*	0.28
	(0.35)	(0.38)	(0.38)	(0.29)	(0.23)	(0.62)	(0.44)	(0.43)	(0.63)
- 3 mos. before	0.26	0.78*	0.03	-0.06	0.31	-0.60	0.21	0.68	-0.25
	(0.29)	(0.39)	(0.30)	(0.32)	(0.28)	(0.60)	(0.55)	(0.52)	(0.65)
- 2 mos. before	-0.40	0.24	-0.40	-0.22	0.15	-0.27	0.24	0.56	0.46
	(0.30)	(0.32)	(0.46)	(0.35)	(0.25)	(0.78)	(0.54)	(0.39)	(0.82)
- 1 mo. before	-0.05	0.42	0.10	0.01	0.22	-0.04	-0.18	-0.12	0.61
	(0.29)	(0.33)	(0.42)	(0.36)	(0.22)	(0.71)	(0.63)	(0.46)	(0.63)
- Mo. of layoff	-0.18	-0.34	-0.99*	0.61*	0.06	0.30	-0.58	1.32**	0.70
	(0.32)	(0.36)	(0.45)	(0.25)	(0.22)	(0.66)	(0.54)	(0.44)	(0.63)
Cells	49,123	49,123	49,123	49,123	49,123	49,123	49,123	49,123	49,123

Notes. Average treatment effect of a 95$^{\text{th}}$ percentile layoff printed with standard errors in parentheses. All models include county, year, and month fixed effects along with county-specific trends. Estimates are multiplied by 100 so as to represent percentage point changes. Statistical significance symbols: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

6. Conclusion

Several months before mass layoffs and plant closings, birth weights transiently decrease by 15–20 grams within the affected community. The risk of falling below the clinically defined threshold for low birth weight can increase by 16 percent. However, this effect is restricted to situations where significant forewarning of the job losses was provided. When there is little notice, the evidence of a decrease in birth weights is much weaker. These results suggest that the arrival of commonplace bad news about the local economy generates a wave of stress that harms pregnancies. In addition, the response of birth weights has an intuitive dynamic. The curtailment of pregnancies can affect birth weights abruptly, while changes in growth rates require time to integrate up to a significant effect. This pattern appears in the results. The initial response to bad news appears to be babies born too early and too small, while later decreases are associated mostly with slower intrauterine growth.

My results do not suggest that earlier studies of birth weight and stress are highly contaminated by substantial non-stress causal mechanisms. While it is unclear how a job loss event compares to a disaster, my estimates are in line with those from similar studies of destructive events, which have reported mean birth weight losses in the single- or low double-digits (for example, Camacho 2008, Simeonova 2011, or Eccleston 2011). If previously reported effects capture large non-stress channels in addition to stress, then the effects I estimate in the absence of significant physical disruption should be much smaller in comparison.

The finding that the economy's normal functions can have negative effects similar to those of a disaster indicates that additional attention is warranted. Future research on the effects of distressing economic information should expand the scope of inquiry. Bad news could aggravate numerous other health variables and behaviours, for example, cardiovascular conditions, mental illnesses, or criminal activity. One might also imagine that an individual who experiences significant distress over the economy could develop overly pessimistic beliefs about important economic variables, possibly leading him to make erroneous choices about the labour market or investments. Finally, policy makers might consider the possibility of offering health assessments or counselling to workers facing imminent job loss.

References

Almond, D. (2006). Is the 1918 influenza pandemic over? Long-term effects of *In Utero* influenza exposure in the post-1940 US population. *Journal of Political Economy*, 114(4):672–712.

Almond, D. and Currie, J. (2011). Killing me softly: The fetal origins hypothesis. *Journal of Economic Perspectives*, 25(3):153–72.

Almond, D., Edlund, L., and Palme, M. (2009a). Chernobyl's subclinical legacy: Prenatal exposure to radioactive fallout and school outcomes in Sweden. *Quarterly Journal of Economics*, 124(4):1729–1772.

Almond, D., Hoynes, H. W., and Schanzenbach, D. W. (2009b). Inside the war on poverty: The impact of food stamps on birth outcomes. NBER working paper.

Almond, D. and Mazumder, B. (2005). The 1918 influenza pandemic and subsequent health outcomes: An analysis of SIPP data. *American Economic Review*, 95(2):258–262.

American Psychological Association (2011). *Stress in America: Our Health at Risk*.

Angrist, J. D. (1998). Estimating the labor market impact of voluntary military service using Social security Data on military applicants. *Econometrica*, 66(2):249–288.

Baker, K. (2008). Do cash transfer programs improve infant health: Evidence from the 1993 expansion of the earned income tax credit. Manuscript: University of Notre Dame.

Banerjee, A. V., Duflo, E., Postel-Vinay, G., and Watts, T. (2010). Long-run health impacts of income shocks: Wine and phylloxera in nineteenth-century France. *Review of Economics and Statistics*, 92(4):714–728.

Behrman, J. R. and Rosenzweig, M. R. (2004). Returns to birthweight. *Review of Economics and Statistics*, 86(2):586–601.

Belluck, P. (2009, April 9). Recession anxiety seeps into everyday lives. *The New York Times*, page A1.

Black, S. E., Devereux, P. J., and Salvanes, K. G. (2007). From the cradle to the labor market? The effect of birth weight on adult outcomes. *Quarterly Journal of Economics*, 122(1):409–439.

Bozzoli, C. and Quintana-Domeque, C. (2010). The weight of the crisis: Evidence from newborns in Argentina. Working paper.

Burlando, A. (2011). Transitory shocks and birth weights: Evidence from a blackout in Zanzibar. Working paper.

Camacho, A. (2008). Stress and birth weight: Evidence from terrorist attacks. *American Economic Review*, 98(2):511–515.

Caplin, A. and Leahy, J. (2001). Psychological expected utility theory and anticipatory feelings. *Quarterly Journal of Economics*, 116(1):55–79.

Carroll, C. D. (2003). Macroeconomic expectations of households and professional forecasters. *Quarterly Journal of Economics*, 118(1):269–298.

Catalano, R. and Hartig, T. (2001). Communal bereavement and the incidence of very low birthweight in Sweden. *Journal of Health and Social Behavior*, 42(4):333–341.

Chung, W. and Kim, B. (2011). Money transfer and birth weight: A causal link from Alaska. Working paper.

Copper, R. L., Goldenberg, R. L., Das, A., Elder, N., Swain, M., Norman, G., Ramsey, R., Cotroneo, P., Collins, B. A., and Johnson, F. (1996). The preterm prediction study: Maternal stress is associated with spontaneous preterm birth at less than thirty-five weeks' gestation. *American Journal of Obstetrics and Gynecology*, 175(5):1286–1292.

Couch, K. A. and Placzek, D. W. (2010). Earnings losses of displaced workers revisited. *American Economic Review*, 100(1):572–589.

Cunha, F. and Heckman, J. J. (2007). The technology of skill formation. *American Economic Review*, 97(2):31–47.

Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *Journal of Economic Literature*, 47(1):87–122.

Currie, J. (2011). Inequality at birth: Some causes and consequences. *American Economic Review*, 101(3):1–22.

Currie, J., Greenstone, M., and Moretti, E. (2011). Superfund cleanups and infant health. *American Economic Review*, 101(3):435–41.

Currie, J. and Moretti, E. (2003). Mother's education and the intergenerational transmission of human capital: Evidence from college openings. *Quarterly Journal of Economics*, 118(4):1495–1532.

Currie, J. and Moretti, E. (2007). Biology as destiny? Short-and long-run determinants of intergenerational transmission of birth weight. *Journal of Labor Economics*, 25(2):231–263.

Currie, J., Neidell, M. J., and Schmieder, J. F. (2009). Air pollution and infant health: Lessons from New Jersey. *Journal of Health Economics*, 28(3):688–703.

Currie, J. and Schmieder, J. F. (2009). Fetal exposures to toxic releases and infant health. *American Economic Review*, 99(2):177–83.

Currie, J. and Walker, R. (2011). Traffic congestion and infant health: Evidence from E-ZPass. *American Economic Journal: Applied Economics*, 3(1):65–90.

Davis, S. J. and von Wachter, T. M. (2011). Recessions and the cost of job loss. NBER working paper.

De Witte, H. (1999). Job insecurity and psychological well-being: Review of the literature and exploration of some unresolved issues. *European Journal of Work and Organizational Psychology*, 8(2):155–177.

Deaton, A. (2012). The financial crisis and the well-being of Americans: 2011 OEP Hicks Lecture. *Oxford Economic Papers*, 64(1):1–26.

Dehejia, R. and Lleras-Muney, A. (2004). Booms, busts, and babies' health. *Quarterly Journal of Economics*, 119(3):1091–1130.

Deschênes, O., Greenstone, M., and Guryan, J. (2009). Climate change and birth weight. *American Economic Review*, 99(2):211–217.

Dew, M. A., Bromet, E. J., and Schulberg, H. C. (1987). A comparative analysis of two community stressors' long-term mental health effects. *American Journal of Community Psychology*, 15(2):167–184.

Dole, N., Savitz, D. A., Hertz-Picciotto, I., Siega-Riz, A. M., McMahon, M. J., and Buekens, P. (2003). Maternal stress and preterm birth. *American Journal of Epidemiology*, 157(1):14–24.

Eccleston, M. (2011). In utero exposure to maternal stress: Effects of 9/11 on birth and early schooling outcomes in New York City. Working paper.

Employment and Training Administration (2003). The Worker Adjustment and Retraining Notification (WARN) Act. Employers guide to advance notice of closings and layoffs. U.S. Department of Labor.

Erickson, K., Thorsen, P., Chrousos, G., Grigoriadis, D. E., Khongsaly, O., McGregor, J., and Schulkin, J. (2001). Preterm birth: Associated neuroendocrine, medical, and behavioral risk factors. *Journal of Clinical Endocrinology & Metabolism*, 86(6):2544–2552.

Eskenazi, B., Marks, A. R., Catalano, R., Bruckner, T., and Toniolo, P. G. (2007). Low birthweight in New York City and upstate New York following the events of September 11th. *Human Reproduction*, 22(11):3013–3020.

Faraone, J. M. (2012). Personal communication. New York State Department of Labor.

Ferrie, J. E., Shipley, M. J., Marmot, M., Stansfeld, S., and Smith, G. D. (1995). Health effects of anticipation of job change and non-employment: Longitudinal data from the Whitehall II study. *British Medical Journal*, 311(7015):1264–1269.

Ferrie, J. E., Shipley, M. J., Stansfeld, S., and Marmot, M. (2002). Effects of chronic job insecurity and change in job security on self reported health, minor psychiatric morbidity, physiological measures, and health related behaviours in British civil servants: The Whitehall II study. *Journal of Epidemiology and Community Health*, 56(6):450–454.

Friesen, J. (1997). Mandatory notice and the jobless durations of displaced workers. *Industrial and Labor Relations Review*, 50(4):652–666.

Goldman-Mellor, S. J., Saxton, K. B., and Catalano, R. C. (2010). Economic contraction and mental health. *International Journal of Mental Health*, 39(2):6–31.

Grunberg, L., Moore, S. Y., and Greenberg, E. (2001). Differences in psychological and physical health among layoff survivors: The effect of layoff contact. *Journal of Occupational Health Psychology*, 6(1):15–25.

Hamilton, V. L., Broman, C. L., Hoffman, W. S., and Renner, D. S. (1990). Hard times and vulnerable people: Initial effects of plant closing on autoworkers' mental health. *Journal of Health and Social Behavior*, 31(2):123–140.

Hobel, C. J., Dunkel-Schetter, C., Roesch, S. C., Castro, L. C., and Arora, C. P. (1999). Maternal plasma corticotropin-releasing hormone associated with stress at 20 weeks' gestation in pregnancies ending in preterm delivery. *American Journal of Obstetrics and Gynecology*, 180(1):S257–S263.

Huttunen, K., Møen, J., and Salvanes, K. G. (2011). How destructive is creative destruction? Effects of job loss on job mobility, withdrawal and income. *Journal of the European Economic Association*, 9(5):840–870.

Inder, W. J., Prickett, T. C. R., Ellis, M. J., Hull, L., Reid, R., Benny, P. S., Livesey, J. H., and Donald, R. A. (2001). The utility of plasma CRH as a predictor of preterm delivery. *Journal of Clinical Endocrinology & Metabolism*, 86(12):5706–5710.

Jacobson, L. S., LaLonde, R. J., and Sullivan, D. G. (1993). Earnings losses of displaced workers. *American Economic Review*, 83(4):685–709.

Jones, S. R. G. and Kuhn, P. (1995). Mandatory notice and unemployment. *Journal of Labor Economics*, 13(4):599–622.

Jordan, R. (2012). Personal communication. Alabama Department of Economic and Community Affairs.

Kalimo, R., Taris, T. W., and Schaufeli, W. B. (2003). The effects of past and anticipated future downsizing on survivor well-being: An equity perspective. *Journal of Occupational Health Psychology*, 8(2):91–109.

Kasl, S. V. and Cobb, S. V. (1970). Blood pressure changes in men undergoing job loss: A preliminary report. *Psychosomatic Medicine*, 32(1):19–38.

Kasl, S. V. and Cobb, S. V. (1980). The experience of losing a job: Some effects on cardiovascular functioning. *Psychotherapy and Psychosomatics*, 34(2-3):88–109.

Katz, L. (2010). Long-term unemployment in the great recession. In *Testimony for the Joint Economic Committee, US Congress, April*, volume 29.

Khashan, A. S., McNamee, R., Abel, K. M., Pedersen, M. G., Webb, R. T., Kenny, L. C., Mortensen, P. B., and Baker, P. N. (2008). Reduced infant birthweight consequent upon maternal exposure to severe life events. *Psychosomatic Medicine*, 70(6):688–694.

Kreps, D. M. and Porteus, E. L. (1978). Temporal resolution of uncertainty and dynamic choice theory. *Econometrica*, 46(1):185–200.

Lauderdale, D. S. (2006). Birth outcomes for Arabic-named women in California before and after September 11. *Demography*, 43(1):185–201.

Lindo, J. M. (2011). Parental job loss and infant health. *Journal of Health Economics*, 30(5):869–879.

Ludwig, J., Duncan, G. J., Gennetian, L. A., Katz, L. F., Kessler, R. C., Kling, J. R., and Sanbonmatsu, L. (2012). Neighborhood effects on the long-term well-being of low-income adults. *Science*, 337(6101):1505–1510.

Maki, N., Moore, S., Grunberg, L., and Greenberg, E. (2005). The responses of male and female managers to workplace stress and downsizing. *North American Journal of Psychology*, 7(2):297–314.

Mazumder, B., Almond, D., Park, K., Crimmins, E. M., and Finch, C. E. (2010). Lingering prenatal effects of the 1918 influenza pandemic on cardiovascular disease. *Journal of Developmental Origins of Health and Disease*, 1(01):26–34.

Milani, F. (2011). Expectation shocks and learning as drivers of the business cycle. *The Economic Journal*, 121(552):379–401.

Moore, S., Grunberg, L., and Greenberg, E. (2004). Repeated downsizing contact: The effects of similar and dissimilar layoff experiences on work and well-being outcomes. *Journal of Occupational Health Psychology*, 9(3):247–257.

Morgan, S. and Winship, C. (2007). *Counterfactuals and causal inference: Methods and principles for social research*. Cambridge University Press.

Oken, E., Kleinman, K., Rich-Edwards, J., and Gillman, M. (2003). A nearly continuous measure of birth weight for gestational age using a United States national reference. *BMC Pediatrics*, 3(1):6.

Paul, K. I. and Moser, K. (2009). Unemployment impairs mental health: Meta-analyses. *Journal of Vocational Behavior*, 74(3):264–282.

Porcelli, A. J. and Delgado, M. R. (2009). Acute stress modulates risk taking in financial decision making. *Psychological Science*, 20(3):278–283.

Rondó, P. H. C., Ferreira, R. F., Nogueira, F., Ribeiro, M. C. N., Lobert, H., and Artes, R. (2003). Maternal psychological stress and distress as predictors of low birth weight, prematurity and intrauterine growth retardation. *European Journal of Clinical Nutrition*, 57(2):266–272.

Rook, K., Dooley, D., and Catalano, R. (1991). Stress transmission: The effects of husbands' job stressors on the emotional health of their wives. *Journal of Marriage and Family*, 53(1):165–177.

Royer, H. (2009). Separated at girth: US twin estimates of the effects of birth weight. *American Economic Journal: Applied Economics*, 1(1):49–85.

Ruhm, C. J. (1991). Are workers permanently scarred by job displacements? *American Economic Review*, 81(1):319–324.

Ruhm, C. J. (2000). Are recessions good for your health? *Quarterly Journal of Economics*, 115(2):617–650.

Simeonova, E. (2011). Out of sight, out of mind? Natural disasters and pregnancy outcomes in the USA. *CESifo Economic Studies*, 57(3):403–431.

Smits, L., Krabbendam, L., de Bie, R., Essed, G., and van Os, J. (2006). Lower birth weight of Dutch neonates who were in utero at the time of the 9/11 attacks. *Journal of Psychosomatic Research*, 61(5):715–717.

Sokol-Hessner, P., Hsu, M., Curley, N., Delgado, M., Camerer, C., and Phelps, E. (2009). Thinking like a trader selectively reduces individuals' loss aversion. *Proceedings of the National Academy of Sciences*, 106(13):5035–5040.

Sullivan, D. and von Wachter, T. (2009). Job displacement and mortality: An analysis using administrative data. *Quarterly Journal of Economics*, 124(3):1265–1306.

Sverke, M., Hellgren, J., and Näswall, K. (2002). No security: A meta-analysis and review of job insecurity and its consequences. *Journal of Occupational Health Psychology*, 7(3):242–264.

Tapia Granados, J. A. and Diez Roux, A. V. (2009). Life and death during the Great Depression. *Proceedings of the National Academy of Sciences*, 106(41):17290–17295.

Torche, F. (2011). The effect of maternal stress on birth outcomes: Exploiting a natural experiment. *Demography*, 48(4):1–19.

U.S. General Accounting Office (1993). Worker Adjustment and Retraining Notification Act not meeting its goals. GAO/HRD-93-18. United States Congress.

U.S. General Accounting Office (2003). The Worker Adjustment and Retraining Notification Act. GAO-03-1003. United States Congress.

Vahtera, J., Kivimaki, M., and Pentti, J. (1997). Effect of organisational downsizing on health of employees. *The Lancet*, 350(9085):1124–1128.

Van den Bergh, B. R., Mulder, E. J., Mennes, M., and Glover, V. (2005). Antenatal maternal anxiety and stress and the neurobehavioural development of the fetus and child: Links and possible mechanisms. A review. *Neuroscience & Biobehavioral Reviews*, 29(2):237–258.

Vinokur, A. D., Price, R. H., and Caplan, R. D. (1996). Hard times and hurtful partners: How financial strain affects depression and relationship satisfaction of unemployed persons and their spouses. *Journal of Personality and Social Psychology*, 71(1):166–179.

Wadhwa, P. D., Culhane, J. F., Rauh, V., and Barve, S. S. (2001a). Stress and preterm birth: Neuroendocrine, immune/inflammatory, and vascular mechanisms. *Maternal and Child Health Journal*, 5(2):119–125.

Wadhwa, P. D., Culhane, J. F., Rauh, V., Barve, S. S., Hogan, V., Sandman, C. A., Hobel, C. J., Chicz-DeMet, A., Dunkel-Schetter, C., Garite, T. J., and Glynn, L. (2001b). Stress, infection and preterm birth: A biobehavioural perspective. *Paediatric and Perinatal Epidemiology*, 15:17–29.

Wadhwa, P. D., Garite, T. J., Porto, M., Glynn, L., Chicz-DeMet, A., Dunkel-Schetter, C., and Sandman, C. A. (2004). Placental corticotropin-releasing hormone (CRH), spontaneous preterm birth, and fetal growth restriction: A prospective investigation. *American Journal of Obstetrics and Gynecology*, 191(4):1063–1069.

Weinstock, M. (2005). The potential influence of maternal stress hormones on development and mental health of the offspring. *Brain, Behavior, and Immunity*, 19(4):296–308.

Weinstock, M. (2008). The long-term behavioural consequences of prenatal stress. *Neuroscience & Biobehavioral Reviews*, 32(6):1073–1086.

Westman, M., Etzion, D., and Danon, E. (2001). Job insecurity and crossover of burnout in married couples. *Journal of Organizational Behavior*, 22(5):467–481.

Appendix A. Natality data

TABLE A.1: Natality records by variable

	Alabama No.	%	*New York* No.	%	*Texas* No.	%	*Washington* No.	%	*Total* No.	%
Mother's age										
Under 20	88,328	14.3	187,560	7.4	538,776	14.1	74,225	8.9	888,889	11.4
20–34	473,900	76.8	1,845,071	73.1	2,853,842	74.9	631,219	76.0	5,804,032	74.6
Over 34	54,711	8.9	491,109	19.5	415,367	10.9	124,890	15.0	1,086,077	14.0
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0
Race/Origin										
Hispanic	34,080	5.5	565,164	22.4	1,844,531	48.4	138,809	16.7	2,582,584	33.2
Non-Hispanic White	383,390	62.1	1,268,007	50.2	1,390,250	36.5	549,762	66.2	3,591,409	46.2
Non-Hispanic Black	190,572	30.9	441,030	17.5	424,801	11.2	33,778	4.1	1,090,181	14.0
Non-Hispanic other	8,451	1.4	212,097	8.4	138,823	3.6	87,493	10.5	446,864	5.7
Missing	446	0.1	37,442	1.5	9,580	0.3	20,492	2.5	67,960	0.9
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0
Mother's education										
Less than high school	138,310	22.4	486,508	19.3	1,183,836	31.1	146,636	17.7	1,955,290	25.1
High school	194,940	31.6	704,531	27.9	1,110,602	29.2	211,359	25.5	2,221,432	28.6
Some college	149,518	24.2	571,058	22.6	752,837	19.8	227,688	27.4	1,701,101	21.9
College	132,781	21.5	737,392	29.2	721,313	18.9	212,474	25.6	1,803,960	23.2
Missing	1,390	0.2	24,251	1.0	39,397	1.0	32,177	3.9	97,215	1.2
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0
Plurality										
Plural	20,888	3.4	95,213	3.8	110,428	2.9	25,114	3.0	251,643	3.2
Singleton	596,051	96.6	2,428,527	96.2	3,697,557	97.1	805,220	97.0	7,527,355	96.8
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0
Total birth order										
First	218,062	35.3	792,201	31.4	1,256,378	33.0	263,829	31.8	2,530,470	32.5
Second	190,777	30.9	693,886	27.5	1,092,164	28.7	224,841	27.1	2,201,668	28.3
Third	113,329	18.4	458,754	18.2	735,771	19.3	145,813	17.6	1,453,667	18.7
Fourth	52,689	8.5	255,690	10.1	381,970	10.0	81,773	9.8	772,122	9.9
Fifth or higher	41,482	6.7	306,887	12.2	321,158	8.4	90,124	10.9	759,651	9.8
Missing	600	0.1	16,322	0.6	20,544	0.5	23,954	2.9	61,420	0.8
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0
Sex										
Male	315,078	51.1	1,292,951	51.2	1,946,627	51.1	425,426	51.2	3,980,082	51.2
Female	301,861	48.9	1,230,789	48.8	1,861,358	48.9	404,908	48.8	3,798,916	48.8
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0
Low birthweight										
No	554,129	89.8	2,319,751	91.9	3,501,876	92.0	776,672	93.5	7,152,428	91.9
Yes	62,322	10.1	202,023	8.0	303,160	8.0	50,197	6.0	617,702	7.9
Missing	488	0.1	1,966	0.1	2,949	0.1	3,465	0.4	8,868	0.1
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0
Preterm birth										
No	518,353	84.0	2,225,952	88.2	3,288,585	86.4	740,629	89.2	6,773,519	87.1
Yes	97,895	15.9	294,027	11.7	505,753	13.3	84,294	10.2	981,969	12.6
Missing	691	0.1	3,761	0.1	13,647	0.4	5,411	0.7	23,510	0.3
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0
Sample										
Excluded	70,069	11.4	195,786	7.8	331,363	8.7	68,697	8.3	665,915	8.6
Included	546,870	88.6	2,327,954	92.2	3,476,622	91.3	761,637	91.7	7,113,083	91.4
Total	616,939	100.0	2,523,740	100.0	3,807,985	100.0	830,334	100.0	7,778,998	100.0

TABLE A.2: Natality data summary statistics

	Alabama	New York	Texas	Washington	All
Mother's age (years)	26.27	28.94	26.85	27.99	27.61
	(5.56)	(5.96)	(5.76)	(5.83)	(5.90)
Married	0.664	0.628	0.668	0.711	0.659
	(0.47)	(0.48)	(0.47)	(0.45)	(0.47)
Hispanic	0.0565	0.224	0.479	0.165	0.330
	(0.23)	(0.42)	(0.50)	(0.37)	(0.47)
Non-Hispanic white	0.629	0.501	0.372	0.663	0.465
	(0.48)	(0.50)	(0.48)	(0.47)	(0.50)
Non-Hispanic black	0.300	0.173	0.108	0.0401	0.137
	(0.46)	(0.38)	(0.31)	(0.20)	(0.34)
Non-Hispanic other	0.0143	0.0873	0.0382	0.107	0.0598
	(0.12)	(0.28)	(0.19)	(0.31)	(0.24)
Less than high school	0.193	0.180	0.281	0.160	0.228
	(0.39)	(0.38)	(0.45)	(0.37)	(0.42)
High school	0.328	0.287	0.304	0.260	0.296
	(0.47)	(0.45)	(0.46)	(0.44)	(0.46)
Some college	0.252	0.233	0.208	0.282	0.227
	(0.43)	(0.42)	(0.41)	(0.45)	(0.42)
College	0.225	0.292	0.197	0.260	0.237
	(0.42)	(0.45)	(0.40)	(0.44)	(0.43)
Female	0.489	0.488	0.489	0.487	0.488
	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
Birthweight (grams)	3244.0	3329.7	3298.8	3422.1	3317.9
	(588.4)	(568.9)	(553.1)	(551.6)	(562.5)
Low birthweight	0.0802	0.0602	0.0618	0.0447	0.0609
	(0.27)	(0.24)	(0.24)	(0.21)	(0.24)
Gestational age (weeks)	38.43	38.90	38.63	39.02	38.74
	(2.66)	(2.40)	(2.41)	(2.23)	(2.42)
Preterm birth	0.138	0.0980	0.116	0.0847	0.108
	(0.34)	(0.30)	(0.32)	(0.28)	(0.31)
Low weight and preterm	0.0507	0.0373	0.0382	0.0280	0.0377
	(0.22)	(0.19)	(0.19)	(0.17)	(0.19)
Births	546,870	2,327,954	3,476,622	761,637	7,113,083

Standard deviations in parentheses. Categories specified as proportions.

TABLE A.3: Previously estimated effects of prenatal exposures

Study	Location	Exposure	Timing[†]	BWT effect	GA effect
Camacho (2008)	Colombia	Landmine	Trimester 3	-0.4g ns	.
Camacho (2008)	Colombia	Landmine	Trimester 2	-0.8g ns	.
Camacho (2008)	Colombia	Landmine	Trimester 1	-2.0g	.
Catalano & Hartig (2001)	Sweden	*Estonia* sunk	Trimester 3	-18 vLWBs ns	.
Catalano & Hartig (2001)	Sweden	*Estonia* sunk	Trimester 2	+26 vLWBs	.
Catalano & Hartig (2001)	Sweden	*Estonia* sunk	Trimester 1	-15 vLWBs ns	.
Catalano & Hartig (2001)	Sweden	Palme murder	Trimester 3	+44 vLWBs	.
Catalano & Hartig (2001)	Sweden	Palme murder	Trimester 2	+13 vLWBs ns	.
Catalano & Hartig (2001)	Sweden	Palme murder	Trimester 1	+16 vLWBs ns	.
Deschênes et al. (2009)	USA	Temp.>85F	Trimester 3	-0.009 %	.
Deschênes et al. (2009)	USA	Temp.>85F	Trimester 2	-0.008 %	.
Deschênes et al. (2009)	USA	Temp.>85F	Trimester 1	-0.003 %	.
Eccleston (2011)	NYC	9/11 attack	Trimester 3	ns	ns
Eccleston (2011)	NYC	9/11 attack	Trimester 2	-14.3g	-0.12 ws.
Eccleston (2011)	NYC	9/11 attack	Trimester 1	-11.9g	-0.22 ws.
Eskenazi et al. (2007)	NYC	9/11 attack	+0–1 ws.	1.44[a], vLWB	1.30[a], vPTB ns
Eskenazi et al. (2007)	NYC	9/11 attack	+0–1 ws.	1.67[a], mLBW	.
Eskenazi et al. (2007)	NYC	9/11 attack	+13–16 ws.	1.36[a], vLWB	ns
Eskenazi et al. (2007)	NYC	9/11 attack	+17–20 ws.	1.28[a], vLWB	∼1.20[a], vPTB
Eskenazi et al. (2007)	NYC	9/11 attack	+33–36 ws.	1.29[a], vLWB	ns
Eskenazi et al. (2007)	Upstate NY	9/11 attack	+17–20 ws.	1.46[a], vLWB	∼1.10[a], mPTB
Eskenazi et al. (2007)	Upstate NY	9/11 attack	+33–36 ws.	1.32[a], vLWB	ns
Eskenazi et al. (2007)	NYC	9/11 attack	+0–8 ws.	ns	0.87[a], mPTB
Eskenazi et al. (2007)	Upstate NY	9/11 attack	+0–4 ws.	ns	0.89[a], mPTB
Khashan et al. (2008)	Denmark	Relative dies	Trimester 3	-29g	.
Khashan et al. (2008)	Denmark	Relative dies	Trimester 2	-47g	.
Khashan et al. (2008)	Denmark	Relative dies	Trimester 1	-27g	.
Khashan et al. (2008)	Denmark	Relative ill	Trimester 3	-10g	.
Khashan et al. (2008)	Denmark	Relative ill	Trimester 2	-13g	.
Khashan et al. (2008)	Denmark	Relative ill	Trimester 1	-15g	.
Simeonova (2011)	USA	Ext. weather	Birth−1 mo.	-0.7g ns	ns
Simeonova (2011)	USA	Ext. weather	Birth−2 mo.	-1.6g	ns
Simeonova (2011)	USA	Ext. weather	Birth−3 mo.	-1.6g	-0.01 ws.
Simeonova (2011)	USA	Strong storm	Birth−1 mo.	-1.8g	-0.01 ws. ns
Simeonova (2011)	USA	Strong storm	Birth−2 mo.	-2.2g	-0.20 ws.
Simeonova (2011)	USA	Strong storm	Birth−3 mo.	-1.1g ns	-0.01 ws. ns
Smits et al. (2006)	Netherlands	9/11 attack	Trimester 3	-71g	-0.5 days ns
Smits et al. (2006)	Netherlands	9/11 attack	Trimester 2	-67g	-1.1 days
Smits et al. (2006)	Netherlands	9/11 attack	Trimester 1	+2g ns	+0.7 days
Torche (2011)	Chile	Earthquake	Trimester 3	+2.6g ns	+0.03 ws. ns
Torche (2011)	Chile	Earthquake	Trimester 2	+17g ns	+0.01 ws. ns
Torche (2011)	Chile	Earthquake	Trimester 1	-51g	-0.19 ws.

[†] Large plus symbol indicates timing of observed effect relative to exposure. Notation: BWT=Birthweight; (v,m)LBW=(very,moderately)Low birthweight; GA=Gestational age; (v,m)PTB=(very,moderately)Preterm birth; [a] adjusted odds ratio; ns=Reported as statisically non-significant; ws.=weeks; g=grams

Appendix B.   WARN data

TABLE B.1: Account of WARN notices, 1999–2009

	Alabama		*New York*		*Texas*		*Washington*		*Total*	
	No.	%	No.	%	No.	%	No.	%	No.	%
Completeness										
Complete	857	99.8	2,443	99.0	2,840	99.8	760	96.9	6,900	99.2
Incomplete	2	0.2	25	1.0	6	0.2	24	3.1	57	0.8
Total	859	100.0	2,468	100.0	2,846	100.0	784	100.0	6,957	100.0
Type										
>30 days late	37	4.3	73	3.0	56	2.0	9	1.1	175	2.5
Short	488	56.8	1,428	57.9	1,576	55.4	441	56.2	3,933	56.5
Advance	282	32.8	899	36.4	1,144	40.2	324	41.3	2,649	38.1
>120 days early	52	6.1	68	2.8	70	2.5	10	1.3	200	2.9
Total	859	100.0	2,468	100.0	2,846	100.0	784	100.0	6,957	100.0
In analysis?										
Included	768	89.4	2,302	93.3	2,715	95.4	741	94.5	6,526	93.8
Excluded	91	10.6	166	6.7	131	4.6	43	5.5	431	6.2
Total	859	100.0	2,468	100.0	2,846	100.0	784	100.0	6,957	100.0

TABLE B.2: Distribution of the number of workers affected by WARN notices

	Notices	Sum	Mean	Max	Q1	Median	Q3
Alabama							
Advance	282	44,300	157	3,157	58	87	167
Short	486	71,922	148	1,714	50	89	165
Total	768	116,222	151	3,157	52	88	166
New York							
Advance	891	92,059	103	1,861	27	64	122
Short	1,411	151,775	108	2,200	28	63	122
Total	2,302	243,834	106	2,200	27	63	122
Texas							
Advance	1,142	114,019	100	1,512	22	72	122
Short	1,573	150,206	95	4,500	8	55	110
Total	2,715	264,225	97	4,500	13	61	115
Washington							
Advance	311	48,041	154	3,400	50	85	160
Short	430	80,920	188	4,611	43	82	144
Total	741	128,961	174	4,611	46	82	150
All							
Advance	2,626	298,419	114	3,400	32	73	130
Short	3,900	454,823	117	4,611	23	66	126
Total	6,526	753,242	115	4,611	26	69	127

Abbreviations: Q#=Quartile #

TABLE B.3: Potential of dislocation-months as a percentage of working-age population

	Mean		Max		Q1		Median		Q3	
State	AN	SN	AN	SN	AN	SN	AN	SN	AN	SN
Alabama	0.345	0.343	8.205	5.028	0.037	0.045	0.121	0.135	0.424	0.411
New York	0.065	0.061	1.333	1.936	0.008	0.008	0.020	0.019	0.069	0.053
Texas	0.111	0.085	3.440	5.350	0.007	0.004	0.018	0.015	0.067	0.052
Washington	0.085	0.097	1.431	1.543	0.009	0.011	0.021	0.031	0.065	0.096
Total	0.124	0.125	8.205	5.350	0.009	0.008	0.024	0.026	0.091	0.092

Note: Each statistic is calculated separately on the set of county-month cells with a positive number of AN dislocations and the set of cells with a positive number of SN dislocations.
Abbreviations: AN=Advance notice, SN=Short notice, Q#=Quartile #

TABLE B.4: Percentage of county-month cells with any WARN notices

State	Advance	Short	Both	Either	Cells	Counties	Any[1]
Alabama	2.60	5.01	0.36	7.25	8,844	67	97.01
New York	6.81	9.96	2.15	14.61	8,184	62	95.16
Texas	2.02	2.68	0.93	3.78	33,528	254	48.82
Washington	4.47	5.26	1.81	7.93	5,148	39	79.49
Total	3.04	4.36	1.10	6.30	55,704	422	66.11

[1] Percentage of counties with at least one WARN notice

TABLE B.5: Dispersion of WARN dislocation events across years, 1999–2009

State	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Alabama	8.7	9.0	11.9	11.5	9.5	7.8	7.8	6.1	7.8	7.6	12.2	100.0
New York	9.6	7.6	9.8	10.6	8.4	7.2	8.0	7.4	8.2	8.8	14.4	100.0
Texas	7.0	6.0	11.0	13.3	11.0	7.4	6.4	6.7	8.3	11.0	11.9	100.0
Washington	8.3	8.6	10.8	10.3	11.5	7.6	7.4	8.8	7.4	8.6	10.8	100.0
Total	8.4	7.4	10.7	11.7	9.9	7.4	7.3	7.1	8.1	9.4	12.7	100.0

Note: Each figure represents the percentage of a given state's WARN dislocations that occured in the listed year.

TABLE B.6: Dispersion of WARN dislocation events weighted by the number of workers affected across years, 1999–2009

State	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Alabama	8.5	9.6	11.0	10.6	10.6	8.2	4.9	6.6	6.9	7.9	15.2	100.0
New York	6.4	7.2	13.6	8.3	7.8	7.3	6.9	6.0	8.6	11.2	16.7	100.0
Texas	6.4	5.6	18.8	15.0	12.4	7.3	5.3	5.2	6.0	8.2	9.8	100.0
Washington	17.4	8.2	13.4	14.2	13.5	4.6	5.0	4.8	3.4	5.3	10.2	100.0
Total	8.6	7.2	15.0	12.0	10.8	7.0	5.7	5.6	6.5	8.6	13.0	100.0

Note: Each figure represents the percentage of a given state's WARN dislocations that occured in the listed year where the dislocations are weighted by the number of workers affected.

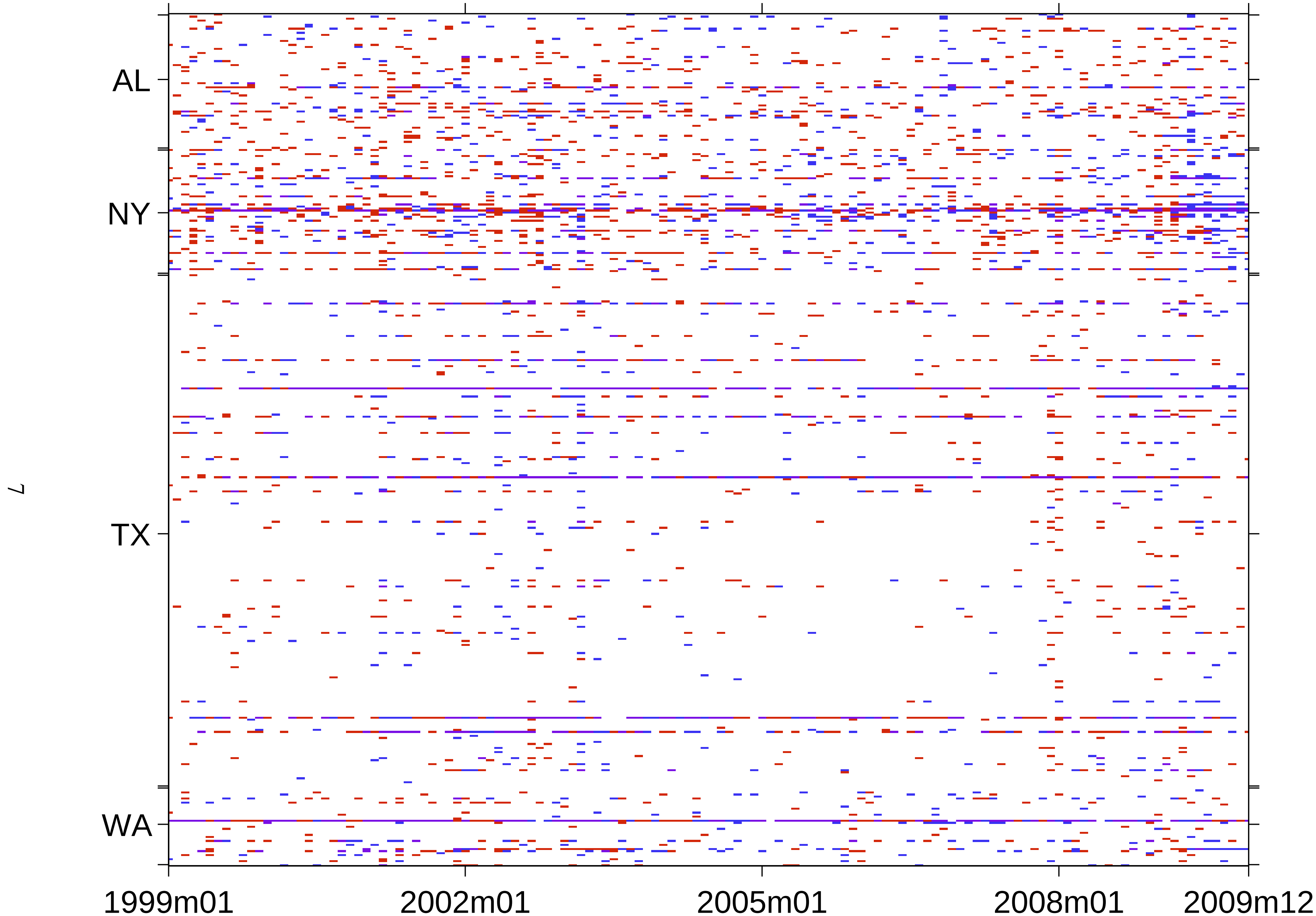

FIGURE B.1: County-month carpet plot of WARN dislocations; blue=AN, red=SN, purple=both

Appendix C. Additional results

TABLE C.1: Additional estimates from birth weight and gestational age results

	Birth weight (grams)			Gestational age (days)		
	(2)	(3)	(4)	(2)	(3)	(4)
Married	67.32**	64.41**	63.87**	0.61+	0.55**	0.52**
	(7.39)	(5.95)	(5.99)	(0.32)	(0.20)	(0.20)
Age 20–34	36.00**	33.97**	34.00**	-0.13	-0.08	-0.08
	(9.70)	(9.35)	(9.37)	(0.34)	(0.32)	(0.32)
Age > 34	30.85*	24.78+	25.01+	-2.05**	-1.73**	-1.74**
	(14.37)	(13.77)	(13.73)	(0.49)	(0.46)	(0.46)
High school	32.23*	24.39**	24.24**	0.05	-0.61**	-0.59**
	(12.82)	(6.90)	(6.92)	(0.69)	(0.22)	(0.22)
Some college	68.49**	79.11**	78.68**	-0.78	-0.83**	-0.84**
	(12.90)	(8.19)	(8.21)	(0.51)	(0.28)	(0.28)
College	109.50**	109.63**	108.87**	-0.22	-0.78*	-0.78*
	(11.48)	(9.09)	(9.04)	(0.56)	(0.34)	(0.34)
Edu. missing	43.04	33.37	33.14	-0.04	0.48	0.58
	(26.42)	(23.73)	(24.32)	(1.30)	(1.06)	(1.08)
Hispanic	-6.81	-12.04	-12.58	-0.36	-0.89**	-0.91**
	(9.70)	(7.83)	(7.84)	(0.43)	(0.30)	(0.30)
Black	-198.23**	-207.08**	-207.70**	-2.73**	-3.54**	-3.56**
	(12.84)	(10.90)	(10.89)	(0.67)	(0.40)	(0.39)
Other rage/origin	-110.19**	-125.49**	-124.89**	-1.04	-1.75**	-1.77**
	(22.52)	(19.74)	(19.87)	(0.81)	(0.62)	(0.62)
Race/origin missing	-31.16+	-48.24**	-49.29**	-0.20	-0.02	-0.15
	(17.10)	(18.46)	(18.70)	(0.53)	(0.82)	(0.82)
Second birth	41.70**	45.56**	45.49**	-1.25**	-1.31**	-1.29**
	(7.31)	(6.63)	(6.60)	(0.30)	(0.26)	(0.26)
Third birth	48.25**	54.72**	54.59**	-1.85**	-2.01**	-2.00**
	(9.39)	(7.70)	(7.69)	(0.38)	(0.29)	(0.29)
Fourth birth	35.80**	42.71**	42.97**	-2.36**	-2.62**	-2.60**
	(12.96)	(9.94)	(9.94)	(0.46)	(0.33)	(0.33)
Fifth birth or higher	45.13**	55.30**	55.95**	-2.72**	-3.18**	-3.13**
	(14.75)	(10.49)	(10.43)	(0.55)	(0.39)	(0.39)
Birth order missing	23.43	40.85**	42.00**	-1.48*	-2.07**	-1.99**
	(19.28)	(14.26)	(14.04)	(0.72)	(0.73)	(0.70)
County, yr., mo. FEs	Yes	Yes	Yes	Yes	Yes	Yes
County quad. trends	.	Yes	Yes	.	Yes	Yes
Unemp. rates	.	.	Yes	.	.	Yes
Cells	49,123	49,123	49,123	49,123	49,123	49,123
Adj. R-sq.	0.665	0.674	0.674	0.539	0.561	0.561

Notes. Average treatment effects of a 95th percentile layoff printed with standard errors in parentheses. FE=Fixed effects. Omitted categories are "unmarried", "age less than 20", "less than high school education", "Non-Hispanic white", and "first birth". Statistical significance symbols: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

TABLE C.2: Estimates from unemployment rate models

	Birth weight (grams)				Gestational age (days)			
Advance notice layoff:								
- 6 mos. before	-1.80	(4.52)	-3.51	(5.18)	-0.23	(0.22)	-0.08	(0.22)
- 5 mos. before	-3.61	(5.81)	-5.53	(5.85)	-0.24	(0.21)	-0.11	(0.23)
- 4 mos. before	-18.41**	(5.88)	-18.98**	(5.89)	-0.94**	(0.21)	-0.79**	(0.20)
- 3 mos. before	-19.34**	(7.40)	-20.53**	(7.43)	-0.35	(0.22)	-0.21	(0.19)
- 2 mos. before	-15.03**	(5.74)	-16.83**	(5.74)	-0.65**	(0.24)	-0.53*	(0.22)
- 1 mo. before	-15.51*	(6.85)	-17.50*	(6.87)	-0.29	(0.28)	-0.16	(0.24)
- Mo. of layoff	-0.15	(7.80)	-0.83	(7.49)	-0.11	(0.28)	0.05	(0.26)
Short notice layoff:								
- 6 mos. before	4.94	(4.32)	4.72	(4.57)	0.26	(0.19)	0.28	(0.19)
- 5 mos. before	2.62	(4.91)	2.11	(5.08)	0.19	(0.17)	0.19	(0.16)
- 4 mos. before	-0.82	(4.12)	-0.65	(4.07)	0.10	(0.19)	0.13	(0.19)
- 3 mos. before	1.55	(4.36)	0.57	(4.49)	0.16	(0.14)	0.18	(0.16)
- 2 mos. before	-7.58	(4.80)	-8.13+	(4.84)	-0.19	(0.18)	-0.13	(0.18)
- 1 mo. before	-3.15	(4.79)	-3.44	(4.45)	0.07	(0.18)	0.11	(0.18)
- Mo. of layoff	0.97	(4.73)	0.60	(5.09)	0.34*	(0.16)	0.40**	(0.14)
Co. unemployment rate:								
- 12-mo. lag	0.37	(0.67)	-0.51	(0.64)	0.00	(0.03)	-0.02	(0.02)
- 11-mo. lag	1.82*	(0.85)	1.70+	(0.87)	0.01	(0.03)	0.01	(0.03)
- 10-mo. lag	-0.72	(0.91)	-0.78	(0.93)	0.05	(0.03)	0.05	(0.03)
- 9-mo. lag	0.61	(0.80)	0.52	(0.82)	0.01	(0.03)	0.00	(0.03)
- 8-mo. lag	0.17	(0.75)	0.04	(0.75)	-0.03	(0.03)	-0.03	(0.03)
- 7-mo. lag	-0.90	(0.89)	-0.94	(0.90)	0.03	(0.03)	0.03	(0.03)
- 6-mo. lag	-1.23	(0.80)	-1.08	(0.79)	-0.07*	(0.03)	-0.06+	(0.03)
- 5-mo. lag	-0.79	(0.85)	-1.27	(0.83)	0.04	(0.03)	0.02	(0.03)
- 4-mo. lag	0.85	(0.81)	0.84	(0.82)	-0.06*	(0.03)	-0.05*	(0.03)
- 3-mo. lag	-0.15	(0.82)	-0.35	(0.83)	0.05	(0.03)	0.04	(0.03)
- 2-mo. lag	1.28	(0.82)	1.21	(0.82)	0.01	(0.03)	0.01	(0.03)
- 1-mo. lag	0.75	(0.89)	0.66	(0.88)	0.06+	(0.03)	0.05	(0.03)
- Current mo.	0.80	(0.81)	1.01	(0.82)	0.04	(0.03)	0.04	(0.03)
- 1-mo. lead	-1.58+	(0.93)	-1.52	(0.93)	-0.06*	(0.03)	-0.07*	(0.03)
- 2-mo. lead	-0.11	(0.89)	-0.38	(0.90)	-0.04	(0.03)	-0.05	(0.03)
- 3-mo. lead	0.16	(0.82)	0.01	(0.84)	0.03	(0.03)	0.02	(0.03)
- 4-mo. lead	-0.17	(0.95)	-0.03	(0.97)	0.02	(0.03)	0.02	(0.03)
- 5-mo. lead	-0.03	(0.89)	-0.34	(0.89)	0.01	(0.03)	-0.01	(0.03)
- 6-mo. lead	1.79*	(0.70)	1.51*	(0.71)	0.07+	(0.04)	0.05	(0.04)
County, yr., mo. FEs	Yes		Yes		Yes		Yes	
Moms' characteristics	Yes		Yes		Yes		Yes	
County quad. trends	.		Yes		.		Yes	
Cells	49,123		49,123		49,123		49,123	
Adj. R-sq.	0.665		0.674		0.541		0.561	

Notes. Average treatment effects of a 95th percentile layoff printed with standard errors in parentheses. FE=Fixed effects. Statistical significance symbols: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

TABLE C.3: Estimates for additional outcomes

	LBW	PTB	LBW & PTB	Z-score	BR
Advance notice layoff:					
- 6 mos. before	0.18	-0.14	0.00	-0.18	-0.03
	(0.29)	(0.43)	(0.20)	(1.03)	(0.07)
- 5 mos. before	0.07	-0.28	0.01	-1.13	-0.09
	(0.23)	(0.40)	(0.19)	(1.09)	(0.07)
- 4 mos. before	1.00**	0.90*	0.75**	-0.74	-0.01
	(0.27)	(0.40)	(0.23)	(1.07)	(0.06)
- 3 mos. before	0.86**	-0.43	0.33+	-3.57*	-0.14+
	(0.28)	(0.35)	(0.18)	(1.40)	(0.07)
- 2 mos. before	0.21	0.64	0.01	-1.97+	0.01
	(0.29)	(0.46)	(0.21)	(1.09)	(0.05)
- 1 mo. before	0.28	0.10	0.16	-3.31**	-0.22**
	(0.28)	(0.38)	(0.19)	(1.14)	(0.07)
- Mo. of layoff	-0.16	-0.04	-0.21	-0.66	-0.09
	(0.35)	(0.43)	(0.27)	(1.24)	(0.07)
Short notice layoff:					
- 6 mos. before	-0.18	0.07	-0.15	0.76	-0.00
	(0.20)	(0.30)	(0.14)	(0.94)	(0.06)
- 5 mos. before	-0.27	-0.37	-0.32*	-0.35	-0.02
	(0.20)	(0.26)	(0.14)	(0.91)	(0.05)
- 4 mos. before	0.22	-0.32	0.04	-0.27	-0.11+
	(0.18)	(0.30)	(0.16)	(0.68)	(0.06)
- 3 mos. before	0.06	-0.12	0.04	-0.47	-0.11+
	(0.19)	(0.27)	(0.13)	(0.80)	(0.05)
- 2 mos. before	0.14	0.08	0.21	-0.93	-0.05
	(0.18)	(0.32)	(0.15)	(0.80)	(0.06)
- 1 mo. before	0.22	-0.35	0.05	-0.67	-0.05
	(0.21)	(0.29)	(0.16)	(0.94)	(0.05)
- Mo. of layoff	-0.03	-0.51+	-0.05	-0.86	0.03
	(0.22)	(0.26)	(0.13)	(0.88)	(0.05)
Cells	49,123	49,123	49,123	49,108	50,640
Adj. R-sq.	0.254	0.334	0.177	0.572	0.840

Notes. Average treatment effect of a 95th percentile layoff printed with standard errors in parentheses. All models include county, year, and month fixed effects along with county-specific trends. Models other than BR include mothers' characteristics. BR models use the population of women age 18–45 as weights. BWT=Birth weight (grams). BR=Births per 1,000 women. LBW=Proportion low birth weight × 100. PTB=Proportion preterm birth × 100. Z-score represents BWT conditional on gestational age and is multiplied by 100 for display. Statistical significance symbols: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

TABLE C.4: Estimates of the effect of layoffs on mothers' characteristics

	Age		Race/Ethnicity				Education				Married
	< 20	> 34	Hispanic	Black	Other	Missing	High school	Some college	College+	Missing	
Adv. notice											
- 6 mos. before	-0.42	-0.08	-0.27	0.14	-0.16	0.13	0.07	-0.10	0.06	-0.02	-0.19
	(0.29)	(0.29)	(0.45)	(0.37)	(0.23)	(0.42)	(0.61)	(0.47)	(0.41)	(0.20)	(0.52)
- 5 mos. before	-0.02	-0.00	0.37	-0.44	-0.09	0.49	-0.17	0.90^{+}	-0.07	-0.02	0.65
	(0.34)	(0.36)	(0.35)	(0.35)	(0.19)	(0.42)	(0.58)	(0.53)	(0.56)	(0.18)	(0.67)
- 4 mos. before	0.35	-0.23	-0.03	-0.20	0.28	0.33	0.45	0.09	-0.96^{*}	0.02	0.28
	(0.35)	(0.38)	(0.38)	(0.29)	(0.23)	(0.44)	(0.62)	(0.44)	(0.43)	(0.19)	(0.63)
- 3 mos. before	0.26	0.78^{*}	0.03	-0.06	0.31	0.43	-0.60	0.21	0.68	-0.08	-0.25
	(0.29)	(0.39)	(0.30)	(0.32)	(0.28)	(0.51)	(0.60)	(0.55)	(0.52)	(0.18)	(0.65)
- 2 mos. before	-0.40	0.24	-0.40	-0.22	0.15	0.16	-0.27	0.24	0.56	0.18	0.46
	(0.30)	(0.32)	(0.46)	(0.35)	(0.25)	(0.53)	(0.78)	(0.54)	(0.39)	(0.30)	(0.82)
- 1 mo. before	-0.05	0.42	0.10	0.01	0.22	0.02	-0.04	-0.18	-0.12	0.31	0.61
	(0.29)	(0.33)	(0.42)	(0.36)	(0.22)	(0.45)	(0.71)	(0.63)	(0.46)	(0.23)	(0.63)
- Mo. of layoff	-0.18	-0.34	-0.99^{*}	0.61^{*}	0.06	-0.52	0.30	-0.58	1.32^{**}	0.11	0.70
	(0.32)	(0.36)	(0.45)	(0.25)	(0.22)	(0.51)	(0.66)	(0.54)	(0.44)	(0.25)	(0.63)
Short notice											
- 6 mos. before	-0.19	-0.21	-0.21	0.13	-0.01	0.18	0.92	0.18	-0.26	-0.01	0.20
	(0.22)	(0.26)	(0.35)	(0.27)	(0.18)	(0.30)	(0.61)	(0.42)	(0.33)	(0.15)	(0.46)
- 5 mos. before	-0.24	0.11	-0.01	-0.25	-0.17	0.34	-0.41	0.40	0.01	-0.18	-0.13
	(0.23)	(0.29)	(0.30)	(0.25)	(0.18)	(0.29)	(0.62)	(0.43)	(0.37)	(0.15)	(0.52)
- 4 mos. before	0.02	0.05	0.04	-0.19	-0.00	0.39	-0.06	0.05	0.29	0.02	0.10
	(0.22)	(0.33)	(0.43)	(0.23)	(0.25)	(0.34)	(0.63)	(0.43)	(0.31)	(0.16)	(0.56)
- 3 mos. before	0.15	0.31	0.20	0.09	-0.05	0.40	0.46	-0.64	0.18	0.06	-0.14
	(0.22)	(0.27)	(0.40)	(0.22)	(0.17)	(0.32)	(0.43)	(0.46)	(0.35)	(0.18)	(0.48)
- 2 mos. before	-0.35	0.46^{+}	-0.51	0.29	0.13	0.37	-1.17^{*}	0.69^{+}	0.58	0.11	0.17
	(0.23)	(0.25)	(0.32)	(0.27)	(0.18)	(0.30)	(0.46)	(0.40)	(0.38)	(0.13)	(0.49)
- 1 mo. before	0.00	-0.10	-0.33	0.27	-0.21	0.25	0.24	0.62^{+}	0.09	-0.05	0.10
	(0.26)	(0.24)	(0.27)	(0.24)	(0.15)	(0.30)	(0.54)	(0.32)	(0.41)	(0.10)	(0.57)
- Mo. of layoff	0.13	0.06	0.20	-0.09	-0.03	0.42	0.00	-0.01	0.06	-0.03	-0.50
	(0.22)	(0.25)	(0.32)	(0.20)	(0.17)	(0.30)	(0.61)	(0.47)	(0.35)	(0.23)	(0.49)
Cells	49,123	49,123	49,123	49,123	49,123	49,123	49,123	49,123	49,123	49,123	49,123

Notes. Average treatment effect of a 95th percentile layoff printed with standard errors in parentheses. All models include county, year, and month fixed effects along with county-specific trends. Estimates are multiplied by 100 so as to represent percentage point changes. Statistical significance symbols: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.