Thoughts and Prayers Are Not Enough: How Mass Shootings Harm Communities, Local Economies, and Economic Growth

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Abstract

We investigate the economic consequences of mass shootings in the U.S. We find that mass shootings have negative effects on targeted counties' economies. Estimates using three different comparison groups yield similar results. Examining the mechanisms, we find that residents of targeted areas: (i) develop pessimistic views of financial and local business conditions; and (ii) are more likely to report poor mental health, which hinders usual activities such as work, suggesting that shootings lead to decreases in productivity. Further, we find that greater national media coverage of shootings exacerbates their local economic consequences.

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1. Introduction

In the United States, gun violence imposes significant direct costs in its human toll (Cook and Ludwig (2000)), and indirectly affecting society as a whole (e.g., Lowe and Galea (2017)). Mass shootings are intense events of gun violence which, though they represent less than 1 percent of gun-related deaths, contribute disproportionately to public policy (Luca, Malhotra and Poliquin (2020)) and public health (Rossin-Slater et al. (2020)). From 2000 to 2015, there have been more than 200 mass shootings in the U.S. leading to more than 1,000 fatalities and thousands of injuries. Given that mass shootings are a common occurrence, it is crucial to identify the economic impacts of these tragedies. While a growing literature acknowledges the importance of mass shootings and analyzes its consequences on mental health (Lowe and Galea (2017) and Rossin-Slater et al. (2020)), electoral outcomes (Yousaf (2021)), student performance (Abouk and Adams (2013), Beland and Kim (2016) and Poutvaara and Ropponen (2018)), and gun laws (Donohue, Aneja and Weber (2019) and Luca, Malhotra and Poliquin (2020)), few studies have investigated whether mass shootings have significant economic consequences on targeted areas.[1]

In this testimony, we estimate the impacts of mass shootings on economic outcomes for the targeted counties. Mass shootings are plausibly sporadic acts of violence that are geographically scattered instead of repeatedly affecting one region. They are events with well-defined start and end dates, which helps us analyze their short-term and long-term effects. Mass shootings lead to low physical capital and human loss relative to other forms of violence, helping us to understand the non-mechanical impact of violence.

In terms of methodology, we employ a difference-in-differences (DiD) framework with staggered events. We begin by using all county-year observations to estimate the impact of mass shootings. Before estimating our results, we compare counties with and without mass shootings and find that those with mass shootings are more populated and have higher

[1] To date, the only studies linking mass shootings to the economy analyze the effect of mass shootings on stock prices (e.g., Gopal and Greenwood (2017)). There is some anecdotal evidence that mass shootings have long-lasting consequences for the towns targeted (Rowhani-Rahbar, Zatzick and Rivara (2019)).

employment per capita, real earnings per capita, establishments per capita, and housing prices. This is not surprising as mass shootings tend to occur disproportionately in urban areas. However, we document that the trends in these variables are not systematically different between counties with and without mass shootings, strengthening the credibility of our empirical strategy.

We show that earnings per capita decrease by 2.4% after mass shootings relative to other counties. The estimated effects persist for more than three years after the shootings. We also find that earnings per employed worker decrease by 1.1%, suggesting that both the intensive (decrease in earnings per employed job) and extensive margins (decrease in employment per capita) contribute to the effect of mass shootings on earnings. We also provide evidence that mass shootings lead to a 1.3% decrease in employment in counties with mass shootings relative to other counties. We also do not document a significant impact of mass shootings on establishments per capita. Overall, our results show that mass shootings result in significant economic losses for local economies. The estimated effect of a 1.3% decrease in employment suggests that mass shootings decrease the number of jobs by about 466 in an average county (out of an average of 35,863 jobs).

It is difficult to claim that the effect estimated using all county observations reflects a causal effect of mass shootings due to the potential endogenous nature of violence (Blattman and Miguel (2010) and Pinotti (2015)). We further address this concern with our empirical strategy by using three alternative comparison groups. First, one may be concerned that counties with mass shootings are systematically different from other counties. Thus, we exploit the inherent randomness in the success or failure of mass shootings.[2] "Failed" mass shootings are defined as those in which the shooter opens fire in a public place intending to kill indiscriminately but "fails" to kill at least four individuals. This identification strategy is appealing since counties targeted by "successful" and "failed" mass shootings are balanced along a large number of socioeconomic characteristics pre-shooting. In the second sample,

[2]This strategy is similar in methodology to Brodeur (2018) and Jones and Olken (2009), who compare the economic impact of successful relative to failed terrorist attacks and political assassinations.

we use the neighboring counties of ones with mass shootings as a comparison group. This comparison group is appealing since mass shootings are more likely in urban areas, and geographically close counties may thus represent a good comparison group. In the third sample, we use matched counties as a comparison group to overcome these differences in levels. We use lagged population, economic activity, crime controls, gun-related controls, and geographic controls to predict mass shootings. We match each mass shooting to the three closest neighbors based on the propensity score. In all three samples, we confirm our main results, adding credibility that the estimated effects reflect the causal impact of mass shootings on economic outcomes.

Next, we try to understand the channels through which mass shootings might affect local economies. We divide the channels into internal (i.e., direct effect on residents of targeted areas) and external (i.e., indirect effect on local areas through outsiders). We first investigate the internal mechanisms focusing on consumer sentiment and the health of the labor force. More precisely, we analyze how mass shootings impact personal finance, business conditions, consumption decisions, and expectations about future economic conditions. We find that respondents living in targeted counties are more likely to report that business conditions are worse now relative to a year ago, and they express greater pessimism about their future personal finance. These results show that consumers change their expectations about current business conditions and the future state of their personal finances due to mass shootings. We also explore whether mass shootings impact the economy through their effect on the (health of the) labor force. We find that the number of days respondents report having poor overall health increases in counties with mass shootings relative to other counties. The negative effect of mass shootings on health outcomes is driven by the deterioration of mental health. These results suggest that mass shootings increase the likelihood that poor health, especially poor mental health, makes the residents of targeted counties unable to engage in their usual activities such as work.

For the external mechanisms, we first examine the effect of mass shootings on housing prices. We find that housing prices decrease by 1.6% in counties with mass shootings relative to other counties, showing that mass shootings are a negative shock to household wealth. We then explore whether the national media coverage of mass shootings might exacerbate their economic impact. Following Eisensee and Stromberg (2007), we exploit the variation generated by news pressure from other events on the national media coverage of mass shootings to study its role on economic outcomes. Specifically, we explore how the lack of national media attention due to natural disasters in the U.S. on the day of a mass shooting affects local economic activity. We first find that mass shootings that occur during a natural disaster receive significantly less national media coverage. We then show that mass shootings that garner greater media attention lead to a more significant reduction in targeted counties' employment and earnings. Our estimates suggest that one additional news story about the mass shooting in the national media leads to a 0.4% decrease in county employment. These results reveal that greater media coverage may make these counties less attractive to outsiders, worsening the impact of mass shootings on local economies.

Our study relates to the existing literature on the economics of hate crime, terrorism and violent crime (Dustmann, Fabbri and Preston (2011); Esteban, Morelli and Rohner (2015); Falk, Kuhn and Zweimüller (2011); Fryer and Levitt (2012); Krueger and Pischke (1997); Levitt and Venkatesh (2000); Lin (2008)). The literature has documented both positive and negative relationships between economic conditions and violent crime (Box (1987)). The scant literature in various disciplines finds little evidence that local area characteristics are related to the likelihood of mass shootings. See Muschert (2007) for a literature review and Duwe (2014) for a history of mass shootings in the U.S. Our results shed light on additional costs of gun violence by showing that notable gun violence events affect the economy and the labor force. Our back-of-the-envelope calculations suggest that from 2000 to 2013, mass shootings have led to $104,850$ fewer jobs in the affected counties relative to other counties.

Our paper is also directly related to a growing literature on the relationship between violence and media (Adena et al. (2015); Dahl and DellaVigna (2009); Durante and Zhuravskaya (2018); Jetter (2017); Yanagizawa-Drott (2014)). Jetter and Walker (2018) empirically analyze the relationship between media and mass shootings. The authors provide evidence that the media coverage of mass shootings on ABC World News Tonight (2013–2016) encourages future mass shootings. We contribute to this literature by showing that national media coverage of tragedies such as mass shootings may exacerbate their negative effects on the economy.

The remainder of this testimony is structured as follows. In Section 2, we present a simple conceptual framework that details the potential mechanisms through which mass shootings may impact local economies. In Section 3, we describe the data sets and provide summary statistics. Section 4 illustrates the identification strategy, and Section 5 reports the baseline econometric evidence and the sensitivity analysis, respectively. Section 6 documents the channels through which mass shootings affect local economies. The final section concludes and presents policy implications.

2. Conceptual Framework

The effect of mass shootings on local economies is a priori ambiguous since many channels are at work. An established literature shows that regions exposed to conflict and violent crime tend to experience deteriorating labor market conditions (Abadie and Gardeazabal (2003); Blattman and Miguel (2010); Keefer and Loayza (2008)). Our context is somewhat different since mass shootings do not lead to the direct widespread destruction of human and physical capital. Furthermore, mass shootings typically do not occur in the same location, whereas terrorists and criminals often target the same areas repeatedly. Therefore, channels other than direct economic losses may likely explain our main findings.

Below, we provide a simple conceptual framework, splitting potential mechanisms into two categories: internal (i.e., how mass shootings directly impact residents) and external (i.e., how outsiders perceive locales hit by mass shootings).

In our empirical analysis, we first study whether mass shootings impact local economies through their direct effect on residents. Mass shootings are highly salient events, as recent surveys suggest that being killed in a mass shooting is one of the top fears among the U.S. population (Bader (2016)). Thus, it is plausible that mass shootings may spur fear and uncertainty among residents, leading them to hold more pessimistic views of their current and future economic conditions (Bloom, Bond and Van Reenen (2007); Baker, Bloom and Davis (2016)). We test this channel using data on consumption decisions, current economic conditions, and future economic expectations of households.

A vast literature links violence (e.g., terror attacks and violent crime) to poor individual mental health conditions due to stress or fear (e.g., Metzl and MacLeish (2015)). Thus, it is likely that mass shootings may negatively affect residents' mental health. Consequently, declining mental health among workers in the labor force may affect the economy either by decreasing labor productivity or increasing absenteeism. We test this channel by using data on respondents' self-reported mental and physical health.[3]

We also investigate the role of external factors in the aftermath of mass shootings. For example, mass shootings may evoke significant behavioral responses from non-residents making the affected counties less desirable. An extensive literature documents how crime and domestic terrorism impact housing prices (see, for example, Ratcliffe and von Hinke Kessler Scholder (2015)). The lack of desirability of counties affected by mass shootings may manifest in the local housing prices.[4] Individuals living in targeted areas may be concerned about the resale value of their properties and potential buyers may be concerned about the areas' safety.

Individuals from outside the affected counties are likely to hear about mass shootings through the media. Of particular importance is the role of national media coverage, which provides exposure to large and diverse audiences around the nation. Analyzing national

[3]A related channel through which mass shootings could affect well-being is the locus of control (Caliendo, Cobb-Clark and Uhlendorff (2015)). People may simply feel less in control of their destiny after a shooting, i.e., the locus of control shifts from internal to external. A growing empirical literature shows that having an internal locus of control is associated with labor market success (Cobb-Clark (2015)). Thus, a (temporary) shift from internal to external due to mass shootings may decrease labor market success. Unfortunately, we cannot test this channel due to the lack of available data.

[4]We, unfortunately, cannot test empirically whether mass shootings lead to a change in the inflow or outflow of investment due to a lack of information on the county-to-county investment flow.

media coverage is key as shootings that receive more national coverage may remain more salient and be retained longer in people's minds. Moreover, national media coverage of these events may change the national perception of safety within the affected counties. We explore how the national media coverage of mass shootings mediates their local economic impacts. Specifically, we test whether more extensive national media coverage of the shooting amplifies the incident's negative effect.

3. Data Sources

Our analysis combines economic outcomes from the U.S. Census Bureau with variation at the county level from data that we assembled and enriched with details related to mass shooting events. We first present the data on mass shootings and then data on economic variables. We then describe data sources employed to study the mechanisms driving the economic factors.

3.1 Mass Shootings

Throughout, we use the FBI definition of a mass shooting, i.e., four or more people, excluding the perpetrator(s) killed in a shooting incident (Krouse and Richardson (2015)). We compile the list of mass shootings using two data sources. Our primary data source is the Supplementary Homicide Reports (SHR) provided by the Federal Bureau of Investigation (2018). The SHR are detailed incident-based reports recorded after each homicide. The data is provided monthly by each local enforcement agency. It contains information on the homicide location, the number of people killed and injured, the weapon used, and the probable motive(s) for the reported homicide.[5] We use these reports to extract mass shootings

[5] The FBI SHR, available to download from: `https://www.icpsr.umich.edu/web/NACJD/series/57?q=Supplementary`, includes direct information on the county of the incident. Specifically, variable V8 contains information on the county where the incident took place. In addition, the USA Today data contains the latitude and longitude of the incident. This limits any concern regarding the measurement issues associated with the location of shootings.

incidents as (i) homicide events with four or more fatalities, (ii) the weapon used for the homicide was a type of gun, and (iii) the probable motive for the homicide was unclear.[6] Since the exact event date is not reported in the data, we manually search for local (city) media coverage of mass shootings during the month in which the event appears to obtain the exact date of each shooting.[7]

Second, we complement the FBI SHR data set with the list of mass shootings compiled by USA Today (2019), which analyzed local news reports, unreported local court documents, and law enforcement agency materials to compile a list of mass shootings not reported in the FBI SHR. This data contains information on the exact date and location of the shooting, the number of victims, and the type of shooting (school, public, family, other). Overall, our data contains 225 mass shootings in 173 counties from 2000 to 2013.

3.2 Employment, Earnings, and Other Data

Our primary data source for economic outcomes is County Business Patterns (CBP), an annual series maintained by the U.S. Census Bureau (United States Census Bureau (2019)). CBP contains county-level information on employment, the number of establishments, and annual payroll during the week of March 12. It covers the vast majority of NAICS industries but excludes establishments engaged in rail transportation and public administration, private households, organizations with government employees, and a few additional industries. Data for single-establishment companies are retrieved from different Census Bureau surveys, while data for multi-establishment enterprises come from the Company Organization Survey. We

[6] This excludes gang-related shootings from our sample.

[7] As with any large-scale administrative data that does not count averages across geographic regions but instead records detailed event-level information, it is bound to have some limitations. These limitations are discussed in detail in Fox and Swatt (2009), who state that: "Like other elements of the UCR [Uniform Crime Reporting] program, SHR data are submitted voluntarily by law enforcement agencies nationwide. Because of the voluntary nature of the initiative, agencies may fail to provide SHR information to the FBI without penalty or consequence. As an extreme example, in 1976, New York City provided SHR data for only the first 6 months of the year. In addition, Washington DC failed to submit SHR data for several years. Unit missingness (homicides not reflected in the SHR data) is a problem that plagues information from agencies of all sizes." (p. 53). However, the authors note that: "Overall, the SHR file is approximately 90% complete." (p. 53)

use data from 1995 to 2018 to ensure that we have sufficient amount (at least six years) of data, both pre- and post-mass shootings. Moreover, since the economic variables are recorded during the week of March 12, we merge mass shootings in January and February to the same year's economic data and the remaining mass shootings to the subsequent year's economic data.

To estimate the impact of mass shootings on different industries and show that the results are robust to alternate data sources, we rely on data from the Quarterly Census of Employment and Wages (QCEW) provided by the Bureau of Labor Statistics (2019). The QCEW program provides the county-level employment and wage data of establishments that report to Unemployment Insurance (UI) programs. The data reported by employers cover more than 95 percent of civilian jobs.[8] In addition to employment and earnings data, the QCEW reports employment and earnings from private and government jobs and different industries. Both the CBP and QCEW measure the number of jobs in a county on a place of work basis. Thus, our empirical analysis investigates the effect of mass shootings on employment in targeted counties rather than where workers live.

We use the Federal Housing Finance Agency (FHFA) data to measure housing prices at the county level. FHFA creates single-family housing price indices by county since 1975, which are built by using repeat-sales and refinancing for houses with mortgages that have been purchased or securitized by Fannie Mae or Freddie Mac (Bogin, Doerner and Larson (2019)).

To measure the impact of mass shootings on health outcomes, we use data from the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS–representative of each state's non-institutionalized adult population–is a telephone survey coordinated by state health departments in collaboration with the Centers for Disease Control and Prevention (CDC).[9]

[8]Jobs not covered by the QCEW (excluded from UI coverage) include self-employed workers, most agricultural workers on small farms, military personnel, elected officials in most states, rail transportation workers, and those employed in a few additional industries.

[9]More information on this survey is available on the CDC's website (http://www.cdc.gov/brfss). Information on the county of residence is available until 2012.

The survey asks respondents about socioeconomic and health-related information. We rely on the following question to measure the effect of mass shootings on physical, mental, and overall health: "During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?", "Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?", and "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?". We exclude respondents older than 65 and those who report being disabled, homemakers, retired, or students.

To measure the impact of mass shootings on consumer sentiment, we use the Michigan Surveys of Consumers (MSC) to study changes in consumption or business decisions and expectations for the future. MSC is a nationally representative monthly telephone survey of more than 500 consumers. Its main objective is to measure temporal fluctuations in consumer confidence.

We collect data on the media coverage of mass shootings from the Vanderbilt Television News Archive. We perform an exhaustive manual search to collect data on media coverage of mass shootings. We read the detailed description of each news story about a city during the weeks around the mass shootings. For each mass shooting, we construct whether it was covered in the national news, and record the number of different news stories, and the number of minutes dedicated to the shooting during the week it took place. Following DellaVigna and La Ferrara (2010) to account for scale effects, we also count the number of minutes of coverage and the total number of news stories related to the city (excluding those related to the shooting) where it happened. In total, we have data on media coverage for 188 mass shootings.

To establish the causal impact of media coverage, we collect data on natural disasters in the United States. Following Eisensee and Stromberg (2007), we assemble this data from the Emergency Disaster Database (EM-DAT) as provided by the Centre for Research on the Epidemiology of Disasters (CRED). The data contains information on the start and end dates of each disaster, its location, and the disaster type. We restrict our attention to natural disasters during our sample period, i.e., 2000 to 2015. This leaves us with 310 natural disasters, of which 72% are storms, 26% are floods, and 2% are earthquakes. On average, a natural disaster leads to 18 deaths, affects more than 68,000 individuals, and leads to an estimated economic loss of more than $1.6 million. Overall, 48 mass shootings occur during a natural disaster. Of note, we exclude natural disasters that occur in the same state to avoid the violation of exclusion restriction.[10]

3.3 Summary Statistics

We restrict data to six years around mass shootings for counties with mass shootings and observations for other counties. Overall, we have 70,823 county-year observations from 1995 to 2018, 2% of which are in counties after a mass shooting. Table 1 provides summary statistics. The mean of our dependent variables, the natural logarithm of employment per capita, real earnings per capita, and establishments per capita, is -142, 54, and -381, respectively.

Figure 1 shows the location of different mass shootings. We see that mass shootings are (i) spread across the United States and (ii) more likely to occur in more populated places.

4. Empirical Strategy

In this section, we first discuss our main empirical strategy and illustrate differences between counties with and without mass shootings. We then discuss three alternate samples to ensure that our reported results reflect the causal impact of mass shootings on economic outcomes.

Our empirical strategy relies on employing difference-in-differences (DiD) with staggered

[10] This results in six natural disasters not being included in our sample.

events. As a natural starting point, we use all county-year observations to estimate the impact of mass shootings. However, all counties are less likely to be comparable to counties with mass shootings. Thus, using a sample of counties that is more comparable to those with mass shootings provides more credible identification. To address this concern, we replicate the results of the main empirical strategy using three alternate samples.

To estimate the average impact of mass shootings, we estimate the following empirical models:

$$Y_{ct} = \gamma_c + \rho_t + \beta \text{Post-Treatment}_{ct} + \varepsilon_{ct}, \tag{1}$$

where Y_{ct} is an economic outcome of interest in county c in the year t. Since counties with and without mass shootings have different population levels, we use economic variables per capita (i.e., normalized by total population). Post-Treatment$_{c,t}$ is a dummy variable equal to one if county c had a mass shooting in year t and zero otherwise. We include county-year observations up to six years around a shooting for counties with a shooting, and all observations for other counties.

In all the estimations, we include county fixed effects to absorb differences in the economic variables, in levels, across counties. County fixed effects account for time-invariant factors such as location and local legislation. In addition, we include year fixed effects to absorb business cycle fluctuations. In augmented specifications, we further include interaction between regional dummies and the year dummies, and interaction between U.S. Census Division dummies and the year dummies. We cluster the standard errors at the county level to allow for correlation in county observations across time.

Our identification of β relies on comparing changes in trends in the economic variables in counties with mass shootings to other counties. For β to reflect the causal impact of mass shootings, we must assume that absent the mass shooting economic outcomes would have evolved similarly in counties with and without mass shootings. To examine this assumption, and provide evidence in favor of causal identification, we compare differences in levels and trends in population and economic variables in counties with mass shootings with those without shootings. We include five years before a mass shooting for counties with a mass shooting and all observations for other counties. Table 1 (Column 1) shows that counties with mass shootings are more populated and have higher employment per capita, real earnings per capita, establishments per capita, and housing price. This is not surprising as mass shootings tend to occur disproportionately in urban areas. However, in Column 2, we see the trends in these variables do not differ between counties with and without mass shootings. Only 2 out of 13 variables are statistically significant at the 10% level. This result strengthens the credibility of our empirical strategy.

An important remaining concern with using all county-year observations for estimation is that counties without mass shootings may not be a valid comparison group for counties with mass shootings. If this is the case, our estimates above would be biased. To establish the credibility of our empirical strategy, we use more comparable control groups to estimate the impact of mass shootings. Specifically, we use three different control groups to estimate the impact of mass shootings: counties with "failed" mass shootings, neighboring counties, and matched counties.[11] We discuss why these counties are more likely to be comparable to counties with mass shootings below.

To overcome the concern that counties with mass shootings are systematically different from other counties, we use "failed" mass shootings from the FBI Active Shooter Incidents reports as a comparison group in the first sample. The FBI defines an incident as an active shooting if "an individual is actively engaged in killing or attempting to kill people in a populated area." These incidents provide a valid counter-factual because the shooter opens fire in a public place intending to kill indiscriminately. This strategy relies on inherent randomness in the success or failure of mass shootings.[12] We use these reports to characterize active shooting incidents with less than four deaths as "failed" mass shootings. Altogether,

[11]See Appendix Table A1 for differences in levels and trends between counties with a mass shooting and the alternative control groups.

[12]Failed mass shootings may end due to four reasons: (1) law enforcement intervention, (2) citizen(s) restrained or subdued the perpetrator, (3) suicide before law enforcement arrived, and (4) the perpetrator fled the scene before law enforcement arrived. Approximately 34%, 15%, and 15% of failed mass shootings ended because the perpetrator committed suicide before law enforcement arrived, citizen(s) subdued the perpetrator until law enforcement arrived, or the perpetrator fled the scene, respectively.

there are 108 failed mass shootings in 91 counties from 2000 to 2013. Altogether, 239 counties are included in this sample.

One key feature of mass shootings is that they are more likely to happen in urban areas. Geographically close counties to those affected by mass shootings may thus represent a fitting comparison group for counties with mass shootings. Hence, in the second sample, we use neighboring counties as a comparison group, using the county adjacency files to record them. In total, 901 counties are included in this sample. One potential issue with this second comparison group is spillover effects. We return to this potential issue when describing our results.

As a third comparison group, we rely on matched counties. The rationale for using this comparison group is that counties with mass shootings may be systematically different due to the levels of economic variables. We use lagged population, economic outcomes (employment per capita, real earnings per capita, and establishments per capita), crime controls (violent and property crime), gun-related controls (homicides and suicides by gun), and geographic controls (indicator equal to one if the county is a state capitol, a coastal county, a large transport hub, or a medium transport hub) to predict mass shootings. This strategy ensures that counties with and without mass shootings are similar according to several observables, including previous economic outcomes. We match each mass shooting to its three closest neighbors based on propensity score (excluding the counties with a mass shooting). Altogether, there are 503 counties included in this sample.

Figure 1 shows the location of "failed" mass shootings and matched mass shootings. Their locations seem to be geographically close to the counties with mass shootings, which is important to ensure that they represent valid comparison groups.

Finally, to study the dynamic effect of mass shootings, we estimate a fully dynamic difference-in-differences estimation by including leads and lags of the Post-Treatment variable. Specifically, we estimate the following:

$$Y_{ct} = \gamma_c + \rho_t + \sum_{\tau=-6,\tau\neq-1}^{\tau=6} \xi \text{Post-Treatment}_{c,t-\tau} + \varepsilon_{ct}, \qquad (2)$$

where Y_{ct} is an economic outcome of interest in county c and year t. Post-Treatment$_{c,t-\tau}$ is a dummy equal to one for year τ before ($\tau > 0$) or after ($\tau < 0$) there was a mass shooting. We include county-year observations six years around a mass shooting for counties with a mass shooting, and all observations for other counties. The year before the shooting is the omitted category.

5. Main Results

In this section, we first present results from the average impact of mass shootings. We then discuss the results from the event-study analysis.

5.1 Average Effect of mass shootings on economic variables

In this subsection, we estimate a DiD using all U.S. counties in the analysis. The main independent variable is "Post-Treatment," which is equal to one after a mass shooting and zero otherwise. Table 2 shows the estimates. In Columns 1, 4, and 7, we include only county and year fixed effects. In Columns 2, 5, and 8, we add Census region × year fixed effects. In Columns 3, 6, and 9, we include Census divisions × year fixed effects.

Column 1 (Table 2) shows that employment per capita decreases by 2.6% after a mass shooting relative to other counties. In Column 4, we see that earnings per capita decrease by about 4.8% after a mass shooting relative to other counties. In Column 7, we see that the number of business establishments decreases by approximately 0.8% (statistically significant at the 10% level) after a mass shooting relative to other counties. We see that the magnitude of the estimates are unchanged if we include Census region × year fixed effects in Columns 2 and 5, but the estimate becomes statistically insignificant for the number of establishments in Column 8.

Our preferred specification includes Census divisions × year fixed effects (Columns 3, 6, and 9). In Column 3, we see that employment decreases by about 1.3% after mass shootings relative to other counties. The estimate is statistically significant at the 1% level. In Column 6, we see that earnings per capita significantly decrease by 2.4% after a mass shooting relative to other counties. In contrast, we do not find evidence that mass shootings significantly impact the number of establishments per capita.

To show that our results are not sensitive to the choice of comparison group, Table 3 shows the estimates in different samples. In Panel A, our sample consists of counties with mass shootings and "failed" mass shootings. Columns 1–3 show that mass shootings result in a 1.1% to 1.3% decrease in employment per capita in counties with mass shootings relative to "failed" mass shootings. In Columns 4 to 6, we see that mass shootings result in a 2.0% to 2.4% decrease in real earnings per capita in counties with mass shootings relative to "failed" mass shootings. In Columns 7 to 9, we do not see a change in the number of establishments per capita in counties with mass shootings relative to "failed" mass shootings.[13]

In Panel B, our estimation sample consists of counties with mass shootings and their neighboring counties. We find that mass shootings result in a 0.9% to 1.1% decrease in employment per capita and a 1.6% to 2.1% decrease in real earnings per capita in counties with mass shootings relative to neighboring counties. In Columns 7 to 9, we do not see a change in the establishment per capita in counties with mass shootings relative to neighboring counties. Of note, it is possible that neighboring counties' employment and earnings are also negatively affected by the shootings. This may explain why our point estimates are slightly smaller in this sample compared to the estimates obtained using other comparison groups.

Finally, in Panel C, our sample consists of counties with mass shootings and counties

[13]In Columns 1 to 6, we see that the coefficient on "Post-"Failed" Treatment" is consistently positive and half the size of the "Post-Treatment" coefficient. However, the coefficient is statistically insignificant at the 10% significance level, with t-values ranging between 0.76 to 1.30, suggesting a null effect.

matched based on lagged population, economic, crime, gun-related, and geographic variables. In Columns 1 to 3, we see that mass shootings result in a 1.0% to 1.4% decrease in employment per capita and a 1.9% to 2.4% decrease in real earnings per capita in counties with mass shootings relative to matched counties. As before, our estimates are small and insignificant for the number of establishments per capita.

Together, these results show that mass shootings result in significant economic losses for local economies. The estimated effect of 1.3% presented in Table 2 suggests that mass shootings decrease the number of jobs by about 466 in an average county (which has 35,863 jobs). Our back-of-the-envelope calculation suggests that mass shootings eliminated roughly 104,850 jobs in the United States from 2000 to 2013.

We benchmark these estimates to the impact of domestic terrorism and natural disasters, drawing upon Brodeur (2018), who analyzes the impact of terror attacks (e.g., radical environmental, hate, and religious groups) in the U.S. on employment and earnings. He finds that terror attacks decrease targeted counties' employment and earnings by approximately 2% in the years following the attack. Similarly, Groen, Kutzbach and Polivka (2020) find that hurricanes Katrina and Rita reduced earnings by about 3% in the year after the disaster. Our results indicate that the impact of mass shootings on earnings is comparable, albeit slightly smaller in magnitude, to terror attacks and natural disasters. In contrast to natural disasters, mass shootings result in a small direct economic loss (e.g., capital and infrastructure loss). In Section 6, we shed light on the potential mechanisms that may explain why we find an impact of mass shootings on local economies.

Next, we delve deeper into the effect of mass shootings on employment, earnings, and establishments to understand which part of the economy is more heavily affected by these events. Appendix Table A2 shows the effect of mass shootings on different economic outcomes. Since we show that employment per capita decreases, it is natural that earnings per capita would also decrease. Thus, in Column 1, we explore whether mass shootings result in a change in earnings per employed worker and find that it decreases by 1.1%. The effect is 45% as large as the effect of mass shootings on earnings per capita. This finding suggests that both the intensive margin (decrease in earnings per employed job) and extensive margin (decrease in employment per capita) contribute to the effect of mass shootings on earnings. We also analyze whether the decrease in jobs originates from firms shutting down or reducing their workforce. In Column 2, we find that employment per establishment decreases by 1.3%, suggesting that the entire effect of the decrease in employment per capita is explained by a decrease in employment per establishment.

5.2 Dynamic Effect of mass shootings on economic variables

Next, we study the dynamic effect of mass shootings by estimating Equation 2. We include county-year observations six years around a mass shooting for counties with mass shootings and observations for other counties.[14] The year before the shooting is the omitted category. Figures 2a, 2b and 2c illustrate the effect of mass shootings on employment per capita, earnings per capita, and establishments per capita for each period around a mass shooting, respectively. (Appendix Table A4 shows the point estimates.)

The estimated coefficients for employment are consistently negative throughout the post-shooting period and statistically significant from the second year following the shooting onward. The effect does not fade over time but remains between -1.1% to -1.4% three to five years after the event. For earnings per capita, we find that the effect of mass shootings on earnings is immediate: real earnings decrease by about 1% in the year of the mass shooting. The effect of mass shootings on real earnings increases from the second period to the remaining periods, remaining between -2.1% to -3.4% three to five years after the event. Lastly, we find that mass shootings do not significantly affect establishments, even in the first couple of years after shootings.

Notably, the figures illustrate that counties with and without mass shootings had similar employment and earnings per capita trends before the event. The estimates range from -0.2

[14] We do not use other samples to estimate Equation 2, as the problem of under-identification is particularly exacerbated in the estimation of fully dynamic DiD with zero or only a few never treated units.

to 0.4 for employment and are statistically insignificant at the 10% significance level (the absolute t-values range between 0.33 and 0.74). Similarly, the estimates for earnings range from -0.3 to 0.1 and are all statistically insignificant at the 10% significance level.

Together, these results show that mass shootings result in a long-term decrease in earnings per capita. In contrast, we do not see a change in establishments per capita due to mass shootings.

5.3 Robustness Checks

In this subsection, we test the robustness of our main findings. One important concern about the two-way fixed effect estimator raised by the recent econometric literature on staggered DiD is that the estimated parameter of interest (β in our case) in the presence of staggered treatment timing can be biased and may be of opposite sign relative to the average treatment effect. We provide evidence that our results are not sensitive to these concerns by following the methods suggested by de Chaisemartin and D'Haultfoeuille (2020).[15] We find that only 14 out of 1,340 (1%) treatment effects receive negative weights.[16] Nevertheless, in Appendix Table A5 we estimate our two-way fixed effects using the methods proposed by de Chaisemartin and D'Haultfoeuille (2020). The table shows the immediate impact of mass shootings. We see that mass shootings result in an immediate decline in employment and earnings that is similar to the results obtained in our main analysis.

In addition, we perform the decomposition of treatment effects estimated by difference-in-differences into the magnitude of the effect and weight using the methods proposed by Goodman-Bacon (2021). Appendix Table A6 shows the results. We see that the DiD estimator heavily relies on the comparison between treated versus never treated counties.

[15]We also perform the interaction-weighted estimator proposed by Sun and Abraham (2021) by allowing for the treatment effect to differ for each county. We find that the average treatment effect on employment, earnings, and establishments is -2.7, -4.9, and -0.9, respectively, and the median treatment effect on employment, earnings, and establishments is -2.5, -5.0, and -1.8, respectively.

[16]As a comparison, 253 out of 1397 (18%), 15 out of 1340 (1.1%), and 41 out of 1340 (3%) treatment effects receive negative weights in our sample of counties with mass shootings and "failed" mass shootings, the sample of neighboring counties, and the sample of matched counties, respectively.

We further see that all comparisons–earlier-treated versus later-control, later-treated versus earlier-control, treated versus never treated, and treated versus already treated–yield a negative treatment effect. These results suggest that our results are robust to various comparison groups in Goodman-Bacon (2021)'s decomposition.

Another potential concern may be that our results stem from differences in mass shootings and economic activity across states. Of particular concern is that mass shootings might be endogenous to state gun policy laws. In Appendix Table A7 and A8, we include state dummies interacted with the year dummies to control for state-specific trends in mass shootings and economic activity. Our main results remain unchanged, though of a slightly smaller magnitude. In addition, one may be concerned that counties with multiple mass shootings may drive the main findings. In Appendix Table A9, we find that the main results are unchanged if we omit counties with multiple mass shootings from our estimation.

Next, one may be concerned that a particular data source of mass shootings may drive the main findings. In Appendix Table A10, we separately estimate the effect of mass shootings based on whether it is recorded in FBI SHR or USA Today.[17] We find that the effects of mass shootings recorded in USA Today on employment and earnings are larger in comparison to the effect of mass shootings recorded in FBI SHR. This makes sense as the USA Today records mass shootings more widely covered in the media that may be missing from the FBI SHR data source.

Next, in Appendix Table A11, we vary the definition of mass shootings based on fatalities. In Panel A, we consider mass shootings as shootings with two or more deaths (2,579 events). We see that the effects are much smaller in magnitude and statistically insignificant for employment and earnings. Surprisingly, the effect on establishments per capita is statistically significant. In Panel B, we consider mass shootings as shootings with three or more deaths (754 events). We see that the effects are relatively smaller than those obtained in the main analysis, but statistically significant. In Panels C and D, we define mass shootings as

[17]Thirty-five mass shootings originate from the USA Today data source. The remaining shootings are from FBI SHR.

shootings with five or more and six or more deaths (90 and 52 events), respectively. We see that the estimates are comparable to the ones obtained in the main analysis.

Another plausible concern is that mass shootings may be related to the characteristics of the event or the efficiency of local law enforcement agencies. This concern is particularly relevant for determining the success or failure of mass shootings. In Appendix Table A12 we use the sample of counties with mass shootings and "failed" mass shootings and include shooter characteristics such as shooter's age, whether the shooter was male, and the weapon used to perform the shooting. We see that the estimates are similar to the ones obtained in the main analysis, showing that shooter characteristics do not explain away the main results.[18]

6. Potential Mechanisms

In this section, we examine and document potential mechanisms through which mass shootings may affect local economies. Based on our conceptual framework, we characterize these mechanisms as internal and external.

6.1 Internal Mechanisms: Consumer Expectations and Labor Productivity

In this section, we analyze the internal mechanisms that may explain the effect of mass shootings on economic outcomes. We first examine the effect of mass shootings on consumer sentiment. In Table 4, Columns 1 to 4 (Panel A), we analyze how mass shootings impact personal finance, business conditions, consumption decisions, and expectations about future economic conditions. In all estimations, we include individual controls (age, age squared, gender, education categories, and marital status) and weight observations by sample weights.

In Column 1, we do not see that respondents in counties with mass shootings are more

[18]We also find that the impact of mass shootings on economic outcomes does not vary depending on the shooter's age, whether the shooter was male, or the weapon used to perform the shooting.

likely to say that their personal finances are worse now relative to one year ago. The coefficient is economically small and statistically insignificant at the 10% level. In Column 2, we document that respondents are 4.6 percentage points (mean of the dependent variable is 56.9) more likely to report that business conditions are worse now relative to a year ago. In Column 3, we find that respondents are not more likely to cite that it is a bad time to buy major household items relative to one year ago. The coefficient is economically small and statistically insignificant at the 10% level. Last, in Column 4, we document that mass shootings lead respondents to become pessimistic about their future personal finances. We see that respondents are 2.1 percentage points (mean of the dependent variable is 13.5) more likely to report that their personal finances would worsen one year from now.

These results suggest that mass shootings are negative shocks to household wealth and are directly responsible for household economic decision-making, as they negatively affect current business conditions and expectations about future personal finances.

Next, we explore whether mass shootings impact the economy by affecting the mental health of the labor force. Specifically, we use the BRFSS to measure whether mass shootings lead to negative health outcomes. In Panel B, Columns 1 to 3 of Table 4 present the estimates. In all estimations, we include individual controls (age, age squared, gender, education categories, and marital status) and weight observations by sample weights. We restrict our sample to two years around mass shootings for counties with mass shootings and all observations for other counties.[19]

In Column 1, we see that the number of days respondents report having poor overall health increases, on average, by 0.36 days (mean of the dependent variable is 5.6) in counties with mass shootings relative to other counties. In Column 2, we see that respondents are not more likely to report having poor physical health in counties with mass shootings relative to other counties. The coefficient is both economically small in magnitude and statistically insignificant at the 10% level. Finally, in Column 3, we see that the number

[19] We chose to restrict the sample to two years around mass shootings to make our estimates comparable to other studies (e.g., Rossin-Slater et al. (2020)).

of days respondents report having poor mental health increases, on average, by 0.30 days (mean of the dependent variable is 3.2) in counties with mass shootings relative to other counties.

To sum up, the effect of mass shootings on health is driven by mental health deterioration among the labor force. This finding is consistent with Rossin-Slater et al. (2020), who find a large, persistent negative impact of school shootings on mental health among youths. These results suggest that mass shootings increase the likelihood that poor health, especially poor mental health, makes residents of targeted counties unable to engage in their usual activities such as work. It is thus plausible that shootings may decrease labor productivity or lead to an increase in absenteeism due to poor health.

6.2 External Mechanisms: Housing Prices, Migration, and Media Coverage

We now turn to external mechanisms. In Appendix Table A13, we investigate whether mass shootings impact migration patterns. We find that mass shootings do not result in a change in population or migration into affected counties, showing that the composition and total labor force remain unchanged.[20] In the aftermath of a disaster, long-term earnings have been shown to increase due to reduced labor supply (e.g., Groen, Kutzbach and Polivka (2020)). Our null result on population and migration suggests that earnings do not recover in counties with mass shootings, perhaps due to the lack of a reduction in labor supply.

We then analyze the effect of mass shootings on housing prices. Housing represents the greatest component of household wealth, with, on average, over 60% of household wealth held in home equity (Banks, Blundell and Smith (2004)). Table 4, Column 4 (Panel B), shows the estimates. We see that housing prices decrease by approximately 1.6% in counties with mass shootings relative to other counties. According to hedonic pricing models of housing, this result of the decreased valuation of housing in affected areas, in conjunction

[20]Unfortunately, our data does contain direct information on the population that migrated from the affected counties.

with no change in population in the affected counties, suggests that the demand for housing decreases in affected areas.

We now test whether media coverage exacerbates the negative economic outcomes of mass shootings. It is difficult to answer this question because the national media coverage of mass shootings is likely to be endogenous. For instance, mass shootings that occur close to the county population center may be more likely to receive higher national media coverage. Simultaneously, these mass shootings likely have a stronger effect on the county's economic outcomes. This may lead to a downward bias in the OLS estimates.

To establish the causal impact of media coverage of mass shootings on the economic outcome, we use news pressure on the day of the shooting. We also include the fact that natural disasters on the day of a mass shooting may lead to less extensive coverage crowd out the news on the shooting entirely. Conceptually, our approach is similar to the news pressure first employed by Eisensee and Stromberg (2007).

Specifically, we implement an instrumental variable strategy where we predict the news coverage of mass shootings in a first stage by whether it occurs during the time of a natural disaster. We use the exact dates of the shootings and natural disasters to characterize whether a mass shooting occurs during a natural disaster. We then omit natural disasters that occur within the same state on the day of a mass shooting to reduce concerns about violation of exclusion restrictions.[21] Overall, 42 mass shootings occur during a natural disaster. We then use this predicted media coverage of each shooting in the second stage to estimate the impact of media coverage of mass shootings on economic outcomes. We focus only on (successful) mass shootings in the year of the shooting for our analysis. We estimate the following specification:

$$\begin{cases} Media_{cst} = \gamma_s + \rho_{dt} + \pi ND_{cst} + \text{MS-deaths}_{cst}\lambda + u_{cst}, \\ \Delta Y_{cst} = \gamma_s + \rho_{dt} + \beta \widehat{Media}_{cst} + X'_{cst}\gamma + \varepsilon_{cst}, \end{cases} \tag{3}$$

[21]This impacts six mass shootings that occur during a natural disaster in the same state.

where $Media_{cst}$ measures the media coverage of the mass shooting in the national media (either the number of news stories or the total duration of news stories). ND_{cst} equals one if there is a natural disaster in the U.S. on the exact date of the shooting and zero otherwise.[22] ΔY_{cst} is the change in the economic variable of interest from the previous year. $\widehat{Media}_{cst}$ is the predicted media coverage from the first stage. MS-deaths controls for the total number of individuals killed in the mass shooting .

In the specification, we use first-difference in economic outcome to absorb county-specific time-invariant factors.[23] Our strategy is only able to capture the contemporaneous effect of the media coverage of mass shootings on economic outcomes.[24]

Appendix Table A14 shows estimates of the first stage. We obtain a Montiel-Pueger F Statistic (Olea and Pflueger (2013)) of 9.4 and 7.4 in Columns 1 and 2, respectively, showing that our instrument is relevant. We see that mass shootings that occur the same day as a natural disaster attract 3.4 fewer stories (mean of dependent variable 6.6) and receive 11.7 fewer minutes of news coverage (mean of dependent variable 24.38) relative to mass shootings that occur at other times.

Table 5 shows the results from the OLS estimation (Columns 1, 3, and 5) and the second stage (Columns 2, 4, and 6). In Panel A, the main independent variable is the number of news stories in the national media. The OLS estimate in Column 1 shows that the estimate of media coverage is economically small and statistically insignificant. However, the IV estimate in Column 2 shows that national media coverage of mass shootings leads to a decrease in employment. One additional news story on a mass shooting in the national

[22]The instrument using the number of deaths due to a natural disaster (instead of the indicator variable for natural disaster) does not yield a strong first stage, thus resulting in a weak instrument.

[23]This specification is comparable to a fixed-effects specification with two periods in which the first period is before the shooting and the second period is the year of the shooting.

[24]One concern about the validity of the instrument could be that there is an overlap in the timing of mass shootings and natural disaster. In particular, we would be concerned if the counties with a mass shooting had a natural disaster in the same or the preceding year. This would violate the exclusion restriction because natural disasters will directly affect economic outcomes. We investigate the location and timing of natural disasters and find that none of the counties with a mass shooting were directly affected by the natural disaster. Moreover, we omit natural disasters that occur within the same state on the day of a mass shooting to reduce concerns about violation of exclusion restrictions.

media leads to a 0.44% decrease in employment per capita. In Column 3, we see that the OLS estimate of the effect of media coverage on real earnings is statistically insignificant. The IV estimate in Column 4, however, shows that national media coverage of mass shootings leads to a decrease in earnings. For example, one additional news story on a mass shooting in the national media leads to a 0.82% decrease in earnings per capita. In Columns 5 and 6, we see that media coverage does not impact establishments per capita.

In Panel B, the main independent variable is the duration of news stories on mass shootings (in minutes) in the national media. The OLS estimate in Column 1 shows that the estimate of media coverage is economically small and statistically insignificant. The IV estimate in Column 2, however, shows that the duration of the national media coverage of mass shootings leads to a decrease in employment. One additional minute of a news story on a mass shooting in the national media leads to a 0.13% decrease in employment per capita. In Column 3, we see that the OLS estimate of the effect of the duration of media coverage on real earnings is statistically insignificant. However, the IV estimate in Column 4 shows that the duration of national media coverage of mass shootings leads to a decrease in earnings. One additional news story on a mass shooting in the national media leads to a 0.24% decrease in earnings per capita. In Columns 5 and 6, we see that media coverage does not impact establishments per capita. Together, these results reveal that greater national media coverage of mass shootings exacerbates their local economic impact.

7. Conclusion

We provided detailed accounts of the economic consequences of mass shootings. We found that, on average, mass shootings have an economically significant negative effect on local labor markets. Our estimates suggest that mass shootings reduce earnings by about 2%. The effect persists for more than three years after the shootings. We showed that earnings per employed worker decrease by 1.1%, suggesting that both intensive and extensive margins contribute to the effect of mass shootings on earnings. We then provided evidence that mass shootings decrease employment by about 1%. We found that the economic consequences of mass shootings are larger for services, manufacturing, and goods producing industries, and entirely driven by the private sector. We did not find an impact of mass shootings on establishments per capita.

We then investigate plausible channels, characterizing them into internal and external mechanisms. In the internal mechanism, we found that mass shootings are a negative shock to household wealth, expectations about current business conditions, and expectations for future personal finances–variables that are directly responsible for household economic decision-making. Moreover, we found that mass shootings lead to poor mental health making the residents of targeted counties unable to engage in usual activities such as work, suggesting that shootings may decrease labor productivity or lead to an increase in absenteeism due to poor health. In the external mechanisms, we found that the national media coverage of mass shootings exacerbates the negative economic consequences for targeted areas. Greater national media coverage of mass shootings may make these places more salient in the nation and worsen their local impact.

Taken as a whole, our results show that mass shootings are major local labor market shocks. Our results show that mass shootings operate through internal mechanisms such as a decrease in household wealth, pessimistic expectations about the current and future state of the economy, and the deterioration of residents' mental health. These results suggest that public policy efforts in the aftermath of mass shootings should be aimed at managing expectations about future economic conditions so that individuals feel confident about the economy. Moreover, public policy efforts should aim to identify the groups most vulnerable to the negative mental health consequences of mass shootings and provide them with low-cost access to relevant medical treatment. Finally, national media outlets should avoid sensationalizing the coverage of mass shootings, which would help avoid making these areas less attractive to individuals and businesses located elsewhere.

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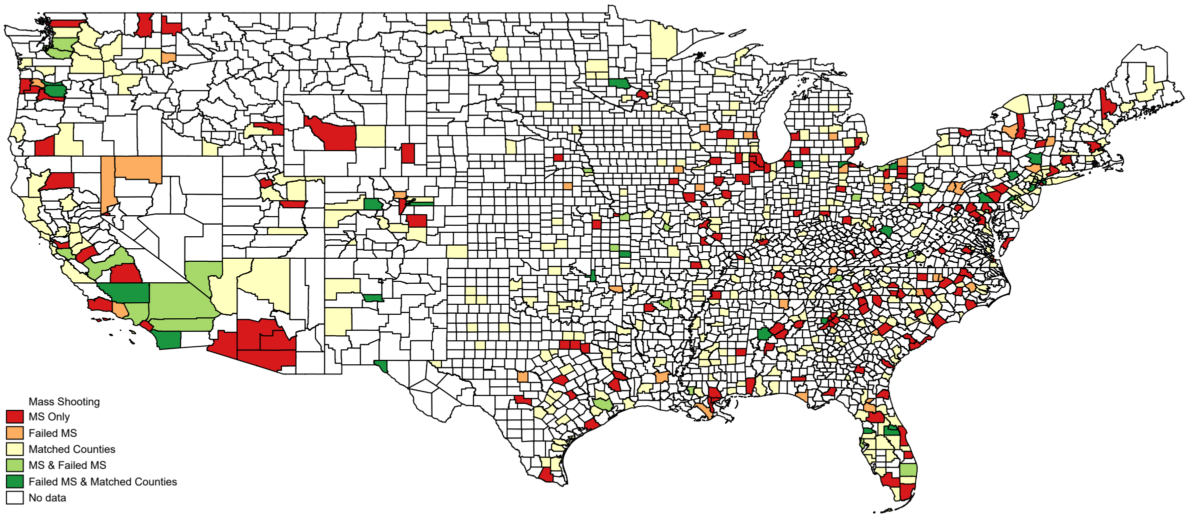
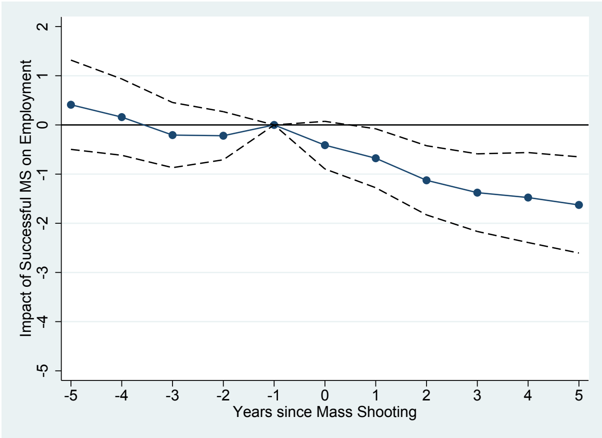
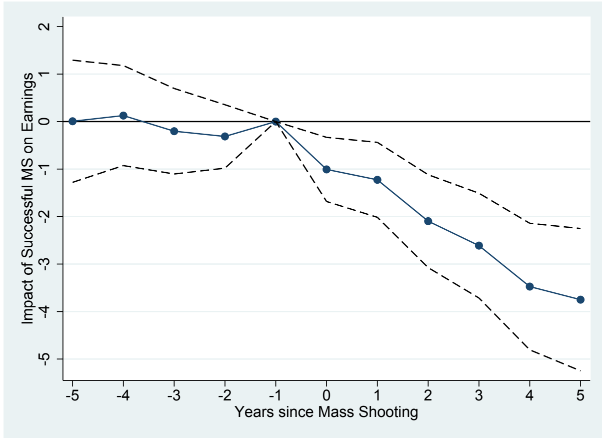


Notes: The Figure shows the location of mass shootings. Red colored counties are counties with mass shootings only. Orange colored counties are counties with failed mass shootings only. Yellow colored counties are counties that represent matched mass shootings. Light green colored counties are counties with both mass shootings and failed mass shootings. Finally, dark green colored counties are counties with failed mass shootings and matched mass shootings. There is no overlap between matched mass shootings and mass shootings by construction.

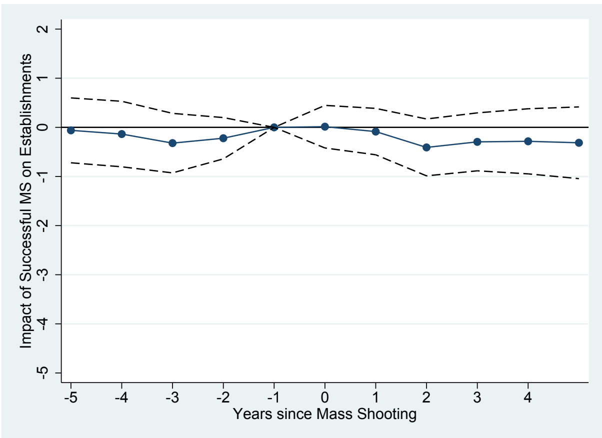
Figure 1: Location of Mass Shootings



(a) Employment



(b) Earnings



(c) Establishments

Figure 2: Event Study

The Figure shows the result from an OLS estimation of Equation 2. The figure plots the β coefficients. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (a), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (b), and 100 times the natural logarithm of the ratio of business establishments to population (c). The independent variable is equal to one for each period around a mass shooting and zero otherwise. All estimates include county, year and U.S. Divisions by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting.

Table 1: Summary Statistics and Differences in Levels and Trends

	Difference between counties in: Levels	Trends	Mean (SD)
Log Population	2.102***	0.0004	10.142
	(0.0432)	(0.0006)	(1.360)
100*Log Employment per capita	5.962***	-0.310	-142.151
	(1.488)	(0.261)	(45.43)
100*Log Real Earnings per capita	3.295*	-0.529	53.513
	(1.930)	(0.355)	(60.75)
100*Log Establishments per capita	3.009**	-0.0544	-381.308
	(1.204)	(0.139)	(35.15)
100*Log Earnings per job	-2.466***	-0.140	195.812
	(0.757)	(0.240)	(24.26)
100*Log Jobs per Establishments	3.455***	-0.273	239.048
	(1.267)	(0.268)	(38.61)
100*Log House Price Index	-2.659***	1.327***	477.300
	(0.727)	(0.176)	(21.50)
Percentage Population > 25 years	-0.114	0.003	67.042
	(0.189)	(0.01)	(4.571)
Percentage Population - White	-0.864	0.000	80.981
	(0.699)	(0.03)	(18.301)
Percentage Population - Blacks	0.0473***	0.002	8.373
	(0.540)	(0.007)	(13.974)
Percentage Population Hispanics	-2.12***	0.02**	7.230
	(0.459)	(0.01)	(11.925)
Percentage Population < HS degree	1.30***	0.007	53.209
	(0.288)	(0.02)	(7.956)
Percentage Population with College degree	-1.42***	0.005	11.960
	(0.180)	(0.01)	(5.022)

Notes: The Table shows the difference in levels and trends in economic variables for counties with and without mass shootings. The dependent variables in Column 1 are the level of economic variables over the five years prior to a mass shooting outlined in the first column. The dependent variables in Column 2 are the change in economic variables over the five years prior to a mass shooting outlined in the first column. Column 3 shows the mean and standard deviation (in parentheses). In all estimates, except first row, we control for population. The sample uses all county-year observations for counties without a mass shooting and up to five years before the mass shooting for counties with a mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table 2: Impact of Mass Shootings on Employment, Earnings, and Establishments

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	100*Log Employment p.c.			100*Log Real Earnings p.c.			100*Log Establishments p.c.		
Post-Treatment	-2.658***	-2.603***	-1.348***	-4.857***	-4.866***	-2.447***	-0.873*	-0.826	-0.0767
	(0.533)	(0.538)	(0.523)	(0.771)	(0.779)	(0.746)	(0.519)	(0.503)	(0.492)
Observations	70,823	70,823	70,823	70,823	70,823	70,823	70,823	70,823	70,823
R-squared	0.934	0.936	0.940	0.926	0.927	0.934	0.962	0.963	0.965
County FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region × Year FE		YES			YES			YES	
Division × Year FE			YES			YES			YES

Notes: The Table shows results from an OLS estimation of Equation 1. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Columns 1–3), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Columns 4–6), and 100 times the natural logarithm of the ratio of business establishments to population (Columns 7–9). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county and year fixed effects. Columns 2, 5, and 8 additionally include U.S. Census Regions by year fixed effects. Columns 3, 6, and 9 alternately include U.S. Census Divisions by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. See Table 1 for variable description. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table 3: Impact of Mass Shootings on Employment, Earnings, and Establishments Using Alternative Control Groups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	100*Log Employment p.c.			100*Log Real Earnings p.c.			100*Log Establishments p.c.		
Panel A	Sample: Counties with Mass Shootings and "Failed" Mass Shootings								
Post-Treatment	-1.321**	-1.232*	-1.088*	-2.002*	-2.337**	-1.990**	-0.073	0.176	0.206
	(0.656)	(0.648)	(0.631)	(1.048)	(1.022)	(0.948)	(0.655)	(0.602)	(0.602)
Post-"Failed" Treatment	0.594	0.514	0.589	0.687	1.024	1.156	-0.525	-0.733	-0.517
	(0.563)	(0.599)	(0.587)	(0.895)	(0.924)	(0.853)	(0.519)	(0.552)	(0.573)
Observations	3,257	3,257	3,253	3,257	3,257	3,253	3,257	3,257	3,253
R-squared	0.985	0.986	0.987	0.987	0.987	0.988	0.979	0.981	0.983
Panel B	Sample: Counties with Mass Shootings and Neighboring Counties								
Post-Treatment	-1.145**	-1.168**	-0.930*	-2.022**	-2.173***	-1.624**	-0.081	-0.035	0.127
	(0.573)	(0.571)	(0.548)	(0.822)	(0.822)	(0.777)	(0.532)	(0.514)	(0.502)
Observations	19,280	19,280	19,280	19,280	19,280	19,280	19,280	19,280	19,280
R-squared	0.952	0.953	0.955	0.952	0.953	0.956	0.963	0.964	0.966
Panel C	Sample: Counties with Mass Shootings and Matched Counties								
Post-Treatment	-1.453**	-1.379**	-1.056*	-2.362***	-2.398***	-1.891**	-0.450	-0.320	-0.272
	(0.584)	(0.588)	(0.572)	(0.855)	(0.863)	(0.816)	(0.530)	(0.515)	(0.514)
Observations	6,743	6,743	6,742	6,743	6,743	6,742	6,743	6,743	6,742
R-squared	0.976	0.976	0.978	0.979	0.980	0.981	0.983	0.984	0.985
County FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region × Year FE		YES			YES			YES	
Division × Year FE			YES			YES			YES

Notes: The Table shows results from an OLS estimation of Equation 1. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Columns 1–3), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Columns 4–6), and 100 times the natural logarithm of the ratio of business establishments to population (Columns 7–9). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county and year fixed effects. Columns 2, 5, and 8 additionally include U.S. Census Regions by year fixed effects. Columns 3, 6, and 9 alternately include U.S. Census Divisions by year fixed effects. Panel A uses the sample of counties with a mass shooting and "failed" mass shooting. Panel B uses the sample of counties with a mass shooting and its neighboring counties. Panel C uses the sample of counties with a mass shooting and matched counties based on lagged value of economic variables (employment, earnings, and establishments), census, gun, crime, geographic, and time controls. The data for "failed" mass shooting is based on FBI Active Shooter Incidents. Neighboring counties are defined using the NBER County Adjacency File. In Panel A, the sample is six years around a mass shooting or "failed" mass shooting. In Panel B, the sample is six years around a mass shooting and all county-year observations for its neighboring counties. In Panel C, the sample is six years around a mass shooting or matched mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. See Table 1 for variable description. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table 4: Impact of Mass Shootings on Consumer Sentiments, Health, and House Prices

	(1)	(2)	(3)	(4)
Panel A	Consumer Sentiment and Household Finance			
Variables	Personal Finance Worse Now	Business Conditions Worse Now	Bad Time Buy HH Items	Personal Finance Worse Future
Post-Treatment	-1.435	4.697***	0.267	2.106**
	(1.809)	(1.680)	(1.351)	(0.944)
Observations	57,654	57,589	57,654	57,640
R-squared	0.150	0.231	0.146	0.125

	(1)	(2)	(3)	(4)
Panel B	Health and House Prices			
Variables	Poor Overall Health	Poor Physical Health	Poor Mental Health	Log. House Price Index
Post-Treatment	0.356**	0.058	0.298***	-1.623**
	(0.151)	(0.0823)	(0.150)	(0.769)
Observations	149,469	149,469	149,469	53,761
R-squared	0.034	0.023	0.032	0.879

Notes: The Table shows results from an OLS estimation of Equation 1. In Panel A, the dependent variables in Columns 1 to 4 are based on answers to the question: "We are interested in how people are getting along financially these days. Would you say that you are better off or worse off financially than you were a year ago?", "Would you say that at the present time business conditions are better or worse than they were a year ago?", "About the big things people buy for their homes–such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or a bad time for people to buy major household items?", and "Now looking ahead–do you think that a year from now you will be better off financially, or worse off, or just about the same as now?". The variables are equal to one if respondents report "Worse" (Columns 1, 2, and 4) or "Bad" (Column 3) and zero otherwise. In Panel B, the dependent variables in Column 1 to 3 are based on answers to the question: "During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?", "Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?", and "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" The dependent variable in Panel B, Column 4 is 100 times the natural logarithm of the House Price Index. The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county and year fixed effects. Estimates include twenty-four months of observations around a mass shooting in Panel A (all columns) and Panel B (columns 1 to 3) for counties with a mass shooting and all county-year observations for counties without a mass shooting. Panel B, Column 4 uses data from the Federal Reserve Bank of St. Louis. The time period is 2000–2015. Panel A, Columns 1 to 4 use the survey data from the Michigan Survey of Consumers. The time period is 2000–2012. Individual controls include age, age squared, gender, four education dummies and four marital status dummies. Household head sampling weights are used. Household head sampling weights are used. Panel B, Columns 1 to 3 use the survey data from the Behavioral Risk Factor Surveillance System. The time period is 2000–2012. Individual controls include age, age squared, gender, four education dummies and five marital status dummies. Individual sampling weights are used. Standard errors, shown in parentheses, are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table 5: Impact of Media Coverage of Mass Shootings on Employment, Earnings, and Establishments

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	100*Log Emp p.c.		100*Log Earnings p.c.		100*Log Estab. p.c.	
Panel A	Media measure: Number of news stories on Mass Shooting					
Media Coverage	-0.022	-0.446**	-0.032	-0.817**	-0.015	-0.078
	(0.049)	(0.211)	(0.081)	(0.397)	(0.033)	(0.073)
ln(City News Stories)	1.110	0.149	2.666	0.884	-0.404	-0.548
	(1.200)	(1.234)	(1.715)	(1.749)	(1.287)	(0.874)
R-squared	0.742	0.618	0.672	0.503	0.736	0.731
Montiel-Pflueger F Stat	–	9.378	–	9.378	–	9.378
Panel B	Media measure: Number of minutes on Mass Shooting					
Media Coverage	0.006	-0.131**	0.006	-0.241**	0.011	-0.023
	(0.021)	(0.064)	(0.029)	(0.120)	(0.015)	(0.022)
ln(City News Stories)	1.163	1.131	2.740	2.683	-0.368	-0.376
	(1.174)	(1.162)	(1.716)	(1.733)	(1.264)	(0.907)
R-squared	0.742	0.553	0.672	0.431	0.738	0.716
Montiel-Pflueger F Stat	–	7.361	–	7.361	–	7.361
Estimation	OLS	IV	OLS	IV	OLS	IV
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Division × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	188	188	188	188	188	188

Notes: The table shows results from an OLS and IV estimation of Equation 1. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Columns 1–2), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Columns 3–4), and 100 times the natural logarithm of the ratio of business establishments to population (Columns 5–6). The main independent variables are the number of news stories that the mass shooting received (Panel A), and the total number of minutes of news coverage that the mass shooting received (Panel B). Columns 1, 3, and 5 show results obtained using OLS, while Columns 2, 4, and 6 show results obtained using IV estimation. Media coverage is instrumented with a dummy variable equal to one if there was a natural disaster in the U.S. (not in the same state) on the exact date of the shooting and zero otherwise. Montiel-Pflueger F Statistic are reported below R-squared. The variable "ln(city news stories)" is the natural logarithm of the number of news stories about the city where shooting takes place. The sample is restricted to counties with a successful mass shooting. Only county-year observation in the year of the shooting are included. News coverage data is collected from the Vanderbilt Television News Archive. Natural disasters data is collected from the Emergency Disaster Database (EM-DAT). The time period is 2000–2015. The standard errors are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Appendix

Table A1: Comparing Trends for Counties with Mass Shootings to Alternative Control Groups

Change in:	MS vs Failed MS	MS vs Neighbors	MS vs Matched
Log Population	0.00171**	0.00165**	0.00167***
	(0.000816)	(0.000659)	(0.000606)
100*Log Employment per capita	-0.142	-0.286	-0.173
	(0.245)	(0.216)	(0.195)
100*Log Real Earnings per capita	-0.0449	-0.498*	-0.232
	(0.322)	(0.288)	(0.253)
100*Log Establishments per capita	-0.00696	-0.0423	0.122
	(0.132)	(0.122)	(0.0942)
100*Log Earnings per job	0.292	-0.0246	0.129
	(0.244)	(0.190)	(0.166)
100*Log Jobs per Establishments	-0.140	-0.270	-0.312
	(0.240)	(0.210)	(0.192)
100*Log House Price Index	0.784**	1.682***	1.836***
	(0.377)	(0.190)	(0.230)
Percentage Population > 25 years	0.000330***	-0.000311***	-3.14e-05
	(9.05e-05)	(8.65e-05)	(0.000109)
Percentage Population - White	0.00156***	-0.00276***	-0.000840***
	(0.000549)	(0.000261)	(0.000324)
Percentage Population - Blacks	-2.60e-05	0.000208**	0.000109
	(0.000119)	(8.16e-05)	(7.04e-05)
Percentage Population Hispanics	-1.47e-05	0.000867***	0.000211*
	(0.000155)	(7.90e-05)	(0.000117)
Percentage Population < HS degree	-6.51e-05	-0.000159	-6.42e-05
	(0.000148)	(0.000155)	(0.000139)
Percentage Population with College degree	0.000320***	4.36e-05	9.87e-05
	(8.65e-05)	(8.92e-05)	(6.97e-05)

Notes: The Table shows the difference in trends (past five years) in economic variables for counties with mass shootings in comparison to alternative control groups. Column 1 uses the sample of counties with a mass shooting and "failed" mass shooting. Column 2 uses the sample of counties with a mass shooting and its neighboring counties. Column 3 uses the sample of counties with a mass shooting and matched counties based on lagged value of economic variables (employment, earnings, and establishments), census, gun, crime, geographic, and time controls. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. See Table 1 for variable description. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A2: Impact of Mass Shootings on Different Economic Outcomes

Variables	(1) Earnings per Job	(2) Jobs per Firm
Post-Treatment	-1.143**	-1.333***
	(0.447)	(0.507)
Observations	70,823	70,823
R-squared	0.881	0.927

Notes: The Table shows results from an OLS estimation of Equation 1. The dependent variables are 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Column 1) and 100 times the natural logarithm of the ratio of employment to establishments (Column 2) respectively. The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county, year and U.S. Census Division by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A3: Impact of Mass Shootings on Different Industries

	(1)	(2)	(3)	(4)
Variables	100*Log Employment p.c. in Industry:			
	Private	Federal	Education	Other
Post-Treatment	-1.442***	1.727	0.657	0.320
	(0.553)	(1.061)	(0.799)	(1.169)
Observations	29,813	29,813	29,813	29,813
R-squared	0.970	0.978	0.962	0.920

Notes: The Table shows results from an OLS estimation of Equation 1. The dependent variables are 100 times the natural logarithm of the ratio of employment to population in private, federal, education, and other industries in Columns 1 to 4, respectively. The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county, year and U.S. Census Division by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. The estimates use yearly county level data from 2000 to 2015. Standard errors, shown in parentheses, are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A4: Impact of Mass Shootings on Employment, Earnings, and Establishments: Event Study

Variables	(1) 100*Log Employment p.c.	(2) 100*Log Real Earnings p.c.	(3) 100*Log Establishments p.c.
Treatment t-5	0.410	0.006	-0.061
	(0.554)	(0.784)	(0.403)
Treatment t-4	0.159	0.126	-0.136
	(0.473)	(0.642)	(0.407)
Treatment t-3	-0.206	-0.203	-0.321
	(0.404)	(0.549)	(0.369)
Treatment t-2	-0.219	-0.313	-0.221
	(0.298)	(0.407)	(0.256)
Treatment t	-0.411	-1.007**	0.014
	(0.295)	(0.412)	(0.264)
Treatment t+1	-0.677*	-1.226**	-0.086
	(0.365)	(0.481)	(0.288)
Treatment t+2	-1.126***	-2.097***	-0.408
	(0.429)	(0.596)	(0.353)
Treatment t+3	-1.377***	-2.611***	-0.295
	(0.481)	(0.673)	(0.360)
Treatment t+4	-1.476***	-3.474***	-0.284
	(0.558)	(0.812)	(0.404)
Observations	70,823	70,823	70,823
R-squared	0.940	0.934	0.965

Notes: The Table shows results from an OLS estimation of Equation 2. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Column 1), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Column 2), and 100 times the natural logarithm of the ratio of business establishments to population (Column 3). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county, year, and U.S. Census Divisions by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. See Table 1 for variable description. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A5: Impact of Mass Shootings on Employment, Earnings, and Establishments: Two-Way FE Estimator

Variables	(1) 100*Log Employment p.c.	(2) 100*Log Real Earnings p.c.	(3) 100*Log Establishments p.c.
Post-Treatment	-0.456*	-1.203***	-0.291
	(0.235)	(0.364)	(0.192)
N	41,062	41,062	41,062
Switchers	170	170	170

Notes: The Table shows results from an OLS estimation of Equation 1 using methods for Difference-in-Difference design with multiple groups and periods with heterogeneous treatment effects proposed by de Chaisemartin and D'Haultfoeuille (2020). The coefficients reflect the immediate impact of mass shootings on each variable. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Column 1), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Column 2), and 100 times the natural logarithm of the ratio of business establishments to population (Column 3). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county and year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. Standard errors, shown in parentheses, are bootstrapped using 1,000 replications. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A6: Impact of Mass Shootings on Employment, Earnings, and Establishments: Goodman-Bacon Decomposition

Sample	All observations			
Variable	Weights	Jobs	Earnings	Establishments
Earlier T vs. Later C	0.008	0.584	0.464	0.498
Later T vs. Earlier C	0.009	-1.979	-2.312	-0.127
T vs. Never treated	0.982	-3.771	-6.814	-1.506
T vs. Already treated	0.001	1.299	-4.317	1.239

Notes: The Table shows results from decomposition of difference-in-difference estimator into treatment effect magnitude and weight each treatment effect receives using method proposed by Goodman-Bacon (2021). For details refer to Goodman-Bacon (2021).

Table A7: Impact of Mass Shootings on Employment, Earnings, and Establishments: State Trends

	(1)	(2)	(3)
Variables	100*Log Employment p.c.	100*Log Real Earnings p.c.	100*Log Establishments p.c.
Post-Treatment	-0.852*	-1.720***	0.161
	(0.503)	(0.713)	(0.483)
Observations	70,808	70,808	70,808
R-squared	0.944	0.939	0.968
County FE	YES	YES	YES
Year FE	YES	YES	YES
State × Year FE	YES	YES	YES

Notes: The Table shows results from an OLS estimation of Equation 1. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Column 1), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Column 2), and 100 times the natural logarithm of the ratio of business establishments to population (Column 3). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county, year, and state by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. See Table 1 for variable description. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A8: Impact of Mass Shootings on Employment, Earnings, and Establishments in Different Samples: State Trends

Variables	(1) 100*Log Employment p.c.	(2) 100*Log Real Earnings p.c.	(3) 100*Log Establishments p.c.
Panel A	Sample: Counties with Mass Shootings and "Failed" Mass Shootings		
Post-Treatment	-1.218*	-2.147**	0.0199
	(0.680)	(1.022)	(0.695)
Post-"Failed" Treatment	0.389	1.160	-0.615
	(0.611)	(0.966)	(0.653)
Observations	2,985	2,985	2,985
R-squared	0.990	0.992	0.987
Panel B	Sample: Counties with Mass Shootings and Neighboring Counties		
Post-Treatment	-0.949*	-1.464**	0.001
	(0.539)	(0.718)	(0.493)
Observations	19,243	19,243	19,243
R-squared	0.958	0.960	0.970
Panel B	Sample: Counties with Mass Shootings and "Matched" Counties		
Post-Treatment	-0.570	-1.402**	-0.300
	(0.543)	(0.758)	(0.439)
Observations	6,501	6,501	6,501
R-squared	0.977	0.981	0.980
County FE	YES	YES	YES
Year FE	YES	YES	YES
State × Year FE	YES	YES	YES

Notes: The Table shows results from an OLS estimation of Equation 1. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Column 1), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Column 2), and 100 times the natural logarithm of the ratio of business establishments to population (Column 3). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county, year, and state by year fixed effects. Panel A uses the sample of counties with a mass shooting and "failed" mass shooting. Panel B uses the sample of counties with a mass shooting and its neighboring counties. Panel C uses the sample of counties with a mass shooting and matched counties based on lagged value of economic variables (employment, earnings, and establishments), census, gun, crime, geographic, and time controls. The data for "failed" mass shooting is based on FBI Active Shooter Incidents. The data for neighboring counties is based on NBER County Adjacency File. In Panel A, the sample is six years around a mass shooting or "failed" mass shooting. In Panel B, the sample is six years around a mass shooting and all county-year observations for its neighboring counties. In Panel C, the sample is six years around a mass shooting or matched mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. See Table 1 for variable description. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A9: Impact of Mass Shootings on Employment, Earnings, and Establishments: Dropping Counties with Multiple Events

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	100*Log Employment p.c.			100*Log Real Earnings p.c.			100*Log Establishments p.c.		
Post-Treatment	-2.653***	-2.519***	-1.342**	-4.933***	-4.796***	-2.562***	-1.156**	-1.074**	-0.431
	(0.561)	(0.553)	(0.552)	(0.838)	(0.834)	(0.832)	(0.558)	(0.531)	(0.530)
Observations	70,218	70,218	70,218	70,218	70,218	70,218	70,218	70,218	70,218
R-squared	0.934	0.935	0.939	0.924	0.925	0.933	0.962	0.963	0.965
County FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region × Year FE		YES			YES			YES	
Division × Year FE			YES			YES			YES

Notes: The Table shows results from an OLS estimation of Equation 1. The sample uses counties with at most one mass shooting. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Columns 1–3), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Columns 4–6), and 100 times the natural logarithm of the ratio of business establishments to population (Columns 7–9). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county and year fixed effects. Columns 2, 5, and 8 additionally include U.S. Census Regions by year fixed effects. Columns 3, 6, and 9 alternately include U.S. Census Divisions by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. See Table 1 for variable description. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A10: Impact of Mass Shootings on Employment, Earnings, and Establishments: Source of Mass Shooting

Variables	(1)	(2) 100*Log Employment p.c.	(3)	(4)	(5) 100*Log Real Earnings p.c.	(6)	(7)	(8) 100*Log Establishments p.c.	(9)
Panel A	Sample: Counties with Mass Shootings in FBI SHR								
Post-Treatment	-2.456***	-2.372***	-1.004*	-4.634***	-4.661***	-2.021**	-0.889	-0.825	0.0142
	(0.602)	(0.613)	(0.577)	(0.875)	(0.890)	(0.834)	(0.591)	(0.576)	(0.559)
Observations	70,360	70,360	70,360	70,360	70,360	70,360	70,360	70,360	70,360
R-squared	0.934	0.935	0.940	0.925	0.926	0.933	0.962	0.963	0.965
Panel B	Sample: Counties with Mass Shootings in USA Today								
Post-Treatment	-4.345***	-5.225***	-4.574***	-6.812***	-7.469***	-6.229***	-0.514	-1.192	-0.853
	(0.923)	(0.823)	(1.078)	(1.611)	(1.420)	(1.764)	(1.174)	(1.102)	(1.026)
Observations	69,076	69,076	69,076	69,076	69,076	69,076	69,076	69,076	69,076
R-squared	0.933	0.934	0.939	0.923	0.924	0.932	0.962	0.963	0.965
County FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region × Year FE		YES			YES			YES	
Division × Year FE			YES			YES			YES

Notes: The Table shows results from an OLS estimation of Equation 1. In Panel A, the mass shooting are recorded using FBI SHR and in Panel B, the mass shooting are recorded using USA Today. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Columns 1–3), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Columns 4–6), and 100 times the natural logarithm of the ratio of business establishments to population (Columns 7–9). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county and year fixed effects. Columns 2, 5, and 8 additionally include U.S. Census Regions by year fixed effects. Columns 3, 6, and 9 alternately include U.S. Census Divisions by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. The estimates use yearly county level data from 1995 to 2018. Standard errors, shown in parentheses, are clustered at the county level. See Table 1 for variable description. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A11: Impact of Mass Shootings on Employment, Earnings, and Establishments: Definition of Mass Shooting

Variables	(1) 100*Log Employment p.c.	(2) 100*Log Real Earnings p.c.	(3) 100*Log Establishments p.c.
Panel A	Mass Shooting Definition: Two or More Deaths		
Post-Treatment	-0.434	-1.161	-0.913***
	(0.375)	(0.921)	(0.237)
Observations	65,241	65,241	65,241
R-squared	0.943	0.937	0.966

Variables	(1) 100*Log Employment p.c.	(2) 100*Log Real Earnings p.c.	(3) 100*Log Establishments p.c.
Panel B	Mass Shooting Definition: Three or More Deaths		
Post-Treatment	-1.167***	-2.002***	-0.583*
	(0.440)	(0.625)	(0.312)
Observations	68,846	68,846	68,846
R-squared	0.940	0.934	0.966

Variables	(1) 100*Log Employment p.c.	(2) 100*Log Real Earnings p.c.	(3) 100*Log Establishments p.c.
Panel C	Mass Shooting Definition: Five or More Deaths		
Post-Treatment	-1.441**	-2.128**	-0.793
	(0.637)	(0.911)	(0.563)
Observations	69,419	69,419	69,419
R-squared	0.939	0.932	0.965

Variables	(1) 100*Log Employment p.c.	(2) 100*Log Real Earnings p.c.	(3) 100*Log Establishments p.c.
Panel D	Mass Shooting Definition: Six or More Deaths		
Post-Treatment	-1.355**	-1.674	-1.215*
	(0.688)	(1.083)	(0.727)
Observations	69,024	69,024	69,024
R-squared	0.939	0.932	0.965

Notes: The Table shows results from an OLS estimation of Equation 1. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Column 1), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Column 2), and 100 times the natural logarithm of the ratio of business establishments to population (Column 3). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. In Panel A, mass shooting is defined as an event with three or more deaths. In Panel B, mass shooting is defined as an event with two or more deaths. In Panel C, mass shooting is defined as an event with five or more deaths. In Panel D, mass shooting is defined as an event with six or more deaths. All estimates include county, year and U.S. Census Division by year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. Standard errors, shown in parentheses, are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A12: Impact of Mass Shootings on Employment, Earnings, and Establishments: Including Shooter Characteristics

Variables	(1) 100*Log Employment p.c.	(2) 100*Log Real Earnings p.c.	(3) 100*Log Establishments p.c.
Post-Treatment	-1.059*	-1.952**	0.200
	(0.630)	(0.939)	(0.602)
Observations	3,253	3,253	3,253
R-squared	0.987	0.989	0.983

Notes: The Table shows results from an OLS estimation of Equation 1. The estimation uses the sample of counties with a mass shooting and "failed" mass shooting. The dependent variables are 100 times the natural logarithm of the ratio of jobs to population (Column 1), 100 times the natural logarithm of the ratio of total real earnings (2005 dollars) to population (Column 2), and 100 times the natural logarithm of the ratio of business establishments to population (Column 3). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include shooting controls for shooter characteristics: shooter's age, whether shooter was male, and weapon used for shooting. All estimates include county, year and U.S. Census Division by year fixed effects. The sample uses six years around a mass shooting for counties with a mass shooting and "failed" mass shooting. Standard errors, shown in parentheses, are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A13: Impact of Mass Shootings on Population and Migration

Panel A	(1) Population	(2) Pop. 15-65	(3) Pop. <15	(4) Pop. >65
Post-Treatment	0.138	0.464	0.096	-0.787
	(0.358)	(0.329)	(0.508)	(0.627)
Observations	50,564	50,564	50,564	50,564
R-squared	0.999	0.999	0.998	0.997

Panel B	(1)	(2)	(3)	(4)
		Moved From Outside:		
	Same House	County	State	Country
Post-Treatment	0.036	2.625	2.415	-3.448
	(0.172)	(1.657)	(1.630)	(3.209)
Observations	49,674	49,642	49,573	46,648
R-squared	0.864	0.823	0.804	0.737

Notes: The Table shows results from an OLS estimation of Equation 1. In Panel A, the dependent variables are 100 times the natural logarithm of population (Column 1), 100 times the natural logarithm of population between age of 15 and 65 years (Column 2), 100 times the natural logarithm of population of age less than 15 years (Column 3), and 100 times the natural logarithm of population of age more than 65 years (Column 4). In Panel B, the dependent variables are the ratio of households living in the same house to total population (Column 1), and 100 times the natural logarithm of the ratio of households moved from different county, state or country (Columns 2 to 4). The main independent variable is "Post-Treatment" which is equal to one after a mass shooting and zero otherwise. All estimates include county and year fixed effects. The sample uses all county-year observations for counties without a mass shooting and six years around a mass shooting for counties with a mass shooting. The estimates use yearly county level data from 2000 to 2015. Standard errors, shown in parentheses, are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.

Table A14: Impact of Media Coverage: First Stage

	Media Coverage:	
	Stories	Minutes
Natural Disaster	-3.452**	-11.705**
	(1.536)	(5.426)
ln(City News Stories)	-2.432	-0.780
	(2.012)	(7.306)
Shooting Victims	-0.324	-1.181
	(0.238)	(1.076)
Observations	188	188
R-Squared	0.994	0.982
F-Stat	9.378	7.361

Notes: The Table shows estimates of the first stage (Equation 3). The sample is restricted to counties with successful mass shootings. Only county-year observation in the year of the shooting are included. The dependent variables are the number of news stories in Column 1, and the total duration of news coverage in Column 2. "Natural Disaster" is a dummy variable equal to one if there was a natural disaster in the U.S. on the exact date of the shooting and zero otherwise. The variable "ln(City News Stories)" is the natural logarithm of the number of news stories about the city where shooting takes place. The variable "Shooting Victims" counts the number of individuals (not including the shooter(s)) killed in the shooting. News coverage data is collected from the Vanderbilt Television News Archive. Natural disasters data is collected from the Emergency Disaster Database (EM-DAT). The time period is 2000–2015. The standard errors are clustered at the county level. * indicates significance at 10% significance level, ** indicates significance at 5% significance level, while *** indicates significance at 1% significance level.