



RESEARCH REPORT

A Neighborhood-Level Analysis of the Economic Impact of Gun Violence

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Executive Summary

National conversations on the economic costs of gun violence tend to focus on the health care costs faced by victims, lost productivity, and the financial burden of gun-related health care, enforcement, and correctional supervision costs on taxpayers. Despite broad interest in estimating the economic costs of gun violence at the national and individual levels, these conversations rarely address the impact of gun violence on the health of local economies. We know little about how local economies respond to increased gun violence, especially sharp and sudden increases (or surges) in gun violence.

Do surges in gun violence slow business growth and lower home values, homeownership rates, and credit scores in communities? How do increases in gun violence shape local economic health over time? To answer these important questions, we assembled and analyzed newly available business establishment and credit score data, as well as gunshot and sociodemographic data by census tract, for six cities: Baton Rouge, LA; Minneapolis, MN; Oakland, CA; Rochester, NY; San Francisco, CA; and Washington, DC. Police departments in four of these cities (Minneapolis, Oakland, San Francisco, and Washington, DC) provided gun homicide data. Baton Rouge gun homicide data were retrieved from the Parish of East Baton Rouge Open Data Portal. Gun homicide data were not available for Rochester. Because the gun violence data and economic indicators did not cover the same time period in all six cities, we examined the relationship between gun violence and local economic health differently in different cities, considering the availability of data for each city.

Our findings demonstrate that surges in gun violence can significantly reduce the growth of new retail and service businesses and slow home value appreciation. Further, higher levels of neighborhood gun violence can be associated with fewer retail and service establishments and fewer new jobs. Higher levels of gun violence were also associated with lower home values, credit scores, and homeownership rates.

We interviewed homeowners, renters, business owners, and representatives of neighborhood associations and other nonprofit organizations in these six cities to see how they perceive and respond to gun violence. Business owners said they were determined to not allow hardships caused by gun violence to put them out of business, but they also detailed the significant costs they incur (in both security expenses and lost revenue) to stay open. Respondents of all types noted that gun violence has led to certain types of retail and service businesses moving out of the areas where they live and work. Across the board, they shared that gun violence hurts housing prices and drives people to relocate from or avoid moving to affected neighborhoods. Homeowners, like business owners, are also financially affected by gun violence and may be compelled to invest in security technologies to protect themselves,

their homes, and their families. The data and research findings from this study can lend a new, economically driven lens to responses to gun violence.

Research Highlights and Implications

Impact of Gun Violence Surges on Local Business Growth, Home Values, Homeownership Rates, and Credit Scores across Cities

- *Gun homicide surges* in census tracts reduced the growth rate of new retail and service establishments by 4 percent in Minneapolis, Oakland, San Francisco, and Washington, DC.
- *Gun homicide surges* in census tracts slowed home value appreciation by 3.9 percent in Baton Rouge, Minneapolis, Oakland, San Francisco, and Washington, DC.
- *Gunshot surges* in census tracts slowed home value appreciation by 3.6 percent in Oakland, Rochester, San Francisco, and Washington, DC.
- Neither *gun homicide* nor *gunshot* surges were observed to reduce homeownership rates or credit scores in these cities. These results might indicate that credit scores may be less useful than home values for observing the economic impact of gun violence, perhaps because low-income people of color (who often live in cities) are underrepresented in credit data. Homeownership rates might not fall as quickly as home values in response to sudden surges in gun violence because selling a home and moving may take a long time or may simply not be feasible for some residents.

Relationships between Gun Violence and Business Outcomes, Home Values, Homeownership Rates, and Credit Scores within Cities

- In Minneapolis, each additional *gun homicide* in a census tract in a given year was associated with 80 fewer jobs the next year.
- In Oakland, each additional *gun homicide* in a census tract in a given year was associated with 5 fewer jobs in shrinking businesses the next year.

- In Washington, DC, every 10 additional *gunshots* in a census tract in a given year were associated with 20 fewer jobs among new establishments, one less new business opening, and one more business closing *the same year*.
- In Washington, DC, each additional *gun homicide* in a census tract in a given year was associated with two fewer retail and service establishments the next year.
- In San Francisco, there was no association between levels of gun violence in census tracts in a given year and business outcomes the next year.
- Analysis of *gun homicides* in 2014 and home values, homeownership rates, and credit scores in 2015 demonstrated that each additional *gun homicide* in a census tract was associated with the following outcomes:
 - » A \$22,000 decrease in average home values in Minneapolis census tracts and a \$24,621 decrease in Oakland census tracts.
 - » A 20-point decrease in average credit scores in Minneapolis census tracts and a 9-point decrease in Oakland census tracts.
 - » A 3 percent decrease in homeownership rates in Washington, DC, census tracts and a 1 percent decrease in Baton Rouge census tracts.
- There were no associations between *gun homicides* in a given year and home values, homeownership rates, and credit scores the next year in Minneapolis, Oakland, San Francisco, or Washington, DC, census tracts from 2009 to 2014 or in Baton Rouge census tracts from 2011 to 2014.

Implications

Our results demonstrate that gun violence reduces new business growth and local job opportunities, slows home value appreciation, and can impact community members in many ways. To escape a vicious cycle where gun violence reduces the economic resilience of communities whose residents are already at risk of gun violence, public policy and local efforts should promote a virtuous cycle by simultaneously promoting business development, strengthening the economic resilience of communities, and reducing gun violence. This requires homeowners and business owners to recognize the benefits of collaborating with local governments and other community members to outline local issues and create policies and

practical solutions that are connected to the needs of communities. We propose the following recommendations to translate our findings into action:

- Publicize the economic impact of gun violence and promote success stories showing how communities benefit from reducing gun violence.
- Engage businesses as advocates for gun violence reduction strategies.
- Support collaboration among stakeholders to build on community-based approaches to reducing gun violence.
- Build the evidence base on how gun violence impacts the economic health of local communities.

Thinking Differently about Gun Violence: Gun Violence as a Local Economic Health Issue

National conversations on the economic costs of gun violence tend to focus on the health care costs of treating gunshot injuries and the costs associated with lost productivity from people unable to work because they commit or are the victims of gun violence. These discussions are mainly concerned with the financial burden gun violence places on victims and taxpayers through health care, enforcement, and correctional supervision costs. Despite broad interest in estimating the costs of gun violence at the national and individual levels, research on the economic impact of gun violence rarely addresses the health of local economies.

What We Know about Prevention Costs and Costs to Victims

Gun violence exacts a physical, emotional, and financial toll on survivors and their families as well as the families of victims who lose their lives. The effects of gun violence are also felt by communities in the form of reduced investment from businesses and entrepreneurs. Gun violence also imposes significant costs on taxpayers and the local governments tasked with addressing the issue.

At an immediate cost of around \$23,000 per patient, gun violence places an immense financial strain on victims and the hospitals that serve them.¹ In 2010, the total cost nationwide of medical care for firearm assaults was just under \$630 million, with a significant share of emergency room care costs paid by taxpayers (Howell and Abraham 2013). Mental health treatment alone cost an additional \$410 million.² And Cook and Ludwig (2000) estimated \$20–26 billion dollars in lost earnings as a result of gun violence in 1997.

Although these figures are striking, they are small compared to what governments and individuals spend trying to reduce the threat of gun violence. Cook and Ludwig (2000) estimated that, in 1997, government spending on the criminal justice system and on government preventive expenditures (such as funding for the Secret Service; the Bureau of Alcohol, Tobacco, Firearms and Explosives; and airport security and to purchase additional bulletproof vests for law enforcement) would have been \$3 billion

less in the absence of gun violence. This estimate excluded other potential savings for local public housing authorities, public schools, and other government organizations that are more difficult to measure. **To put this in perspective, the US government spent nearly as much money that year to fund entire government agencies—the Department of Commerce’s 1997 discretionary spending budget was \$4.8 billion.**³

These numbers are even more significant when we consider that the cost of preventive measures is not fully covered by government expenditures. Every American is financially affected by the threat and fear of gun violence. Because most gun homicides and assaults take place in public spaces (Cook and Goss 2014), gun violence can create a sense of vulnerability in communities and among the general public. Fear has a financial impact when it leads people to spend money on protective measures such as home security technologies. Business owners and community members we interviewed said these expenditures played a central role in their struggle to keep their small businesses afloat or otherwise deal with gun violence in their daily lives.

In 1998, a national survey asked respondents how much they would be willing to pay to reduce gun violence by 30 percent. Researchers found that the public was willing to pay \$24.5 billion annually, or \$1.2 million per gun-related injury (Ludwig and Cook 2001). Hamermesh (1998, 1999) found that workers in US metropolitan areas were less likely than workers elsewhere to work in the evenings and at night and that gun homicides are likely to displace night and evening work to daytime work hours. In 1998, Hamermesh estimated the cost of this displacement to be between \$4 and \$10 billion (between \$6 and \$15 billion in 2017 dollars).

Gun violence has a pervasive effect on communities and on the lives of community members. The emotional burden of fear weighs on residents exposed to gun violence as well as employees, visitors, and consumers (Cook and Ludwig 2000). Residents might take longer and more complex trips to avoid neighborhoods with a reputation for gun violence. Fewer tourists visit cities and states that experience chronic gun violence or acute surges in gun violence.

The impact of gun violence on people and businesses translates into costs to taxpayers and productivity losses that dampen the economy. A small number of recent studies provide the framework needed to think about these greater costs and have quantified and substantiated the public’s willingness to invest in gun violence reduction efforts. One can easily intuit the potential effects of reduced gun violence on local property values and business openings, closures, operations, and profitability based on the protection, avoidance, and investment decisions of consumers and investors, but only a handful of studies have explored the economic impact of gun violence on communities.

What We Know about Violent Crimes and Local Economic Health

Increases in violent crime can lower property values, reduce business profitability, and decrease investment in communities. A longitudinal study by Greenbaum and Tita (2004) found that a localized surge in gun homicides can cause businesses in the area to downsize and discourage new businesses from opening. Conversely, declines in violent crime have been shown to coincide with economic growth (Stacy, Ho, and Pendall 2017).

Business built around customer interaction, such as those in the retail and service sectors, may see revenues drop faster than other nearby businesses as the threat of violence causes patrons to shop in safer communities (Greenbaum and Tita 2004). Business owners may also have trouble hiring employees willing to travel at night through communities experiencing surges in gun violence (Hamermesh 1998). Certain businesses may choose to close rather than spend more on insurance and security while bringing in less revenue. However, the high cost of relocating a business means that some may be forced to stay in neighborhoods with high levels of gun violence and absorb those losses. But the greatest damage to local economies may come from entrepreneurs who choose not to invest in a community in the first place because of gun violence.

Commercial and residential property values have been shown to decrease as levels of gun violence increase (Hipp, Tita, and Greenbaum 2009; Kirk and Laub 2010; Shapiro and Hassett 2012). Such costs are difficult to measure, but a 2006 analysis of home values and crime at the census tract level found that each additional violent crime per 1,000 in low-income neighborhoods was related to a 3.6 percent decline in home values the following year, representing an average loss of \$4,144 in value in the neighborhoods least able to absorb such a drop in wealth (Tita, Petras, and Greenbaum 2006).

Other studies have measured how property values would benefit from a reduction in gun violence. Across five cities, researchers found that a 10 percent reduction in homicides would lead to a 0.83 percent increase in home values the following year, with a 25 percent reduction producing a 2.1 percent increase (Shapiro and Hassett 2012).

Study Goals

In this study, we focus on the local economic impact of both *surges* in gun violence and *levels* of gun violence. *Surges* in gun violence are sudden increases over and above the typical level of violence in a

neighborhood that residents have factored into their daily routines and business plans (Greenbaum and Tita 2004). This helps us understand how changes in gun violence affect communities differently. It also lets us control for existing levels of gun violence to yield more robust findings. This is critical because a study that only examines the relationship between *levels* of gun violence and indicators of economic health may provide a “big picture” perspective of the effect of violence on cities but not a *complete* picture.

Below, we briefly describe our study methodology (box 1). A more detailed discussion is available in the appendixes. The next section presents our findings on the relationship between levels of gun violence and local economic health indicators as well as our findings on how surges in gun violence affect business growth, home values, homeownership rates, and credit scores.

BOX 1

Project Methodology

We collected quantitative and qualitative data on local economic health indicators to (1) understand the impact of levels of gun violence and surges in gun violence on local economic health and (2) make relevant policy recommendations. At the census tract level, we analyzed a broad range of economic indicators (number of businesses and employment in those businesses, home values, homeownership rates, and credit scores) and two gun violence indicators (number of and surges in gun homicides and gunshots).

We conducted regression analyses to compare pre- and postsurge economic indicators between neighborhoods that experienced surges and those that did not. We also ran panel and cross-sectional regression analyses to explore the association between levels of gun violence and economic outcomes.

We observed our indicators across six cities: Baton Rouge, LA; Minneapolis, MN; Oakland, CA; Rochester, NY; San Francisco, CA; and Washington, DC. These cities were selected for their geographic and economic diversity and their wide coverage of gunshot detection data. The economic indicators and gun violence data covered different periods in different cities from 2009 to 2015, and the period covered by longitudinal data did not overlap for all cities. We used both individual city data and pooled data to conduct the analyses needed to examine the relationship between gun violence and indicators of local economic health over time, considering the availability of data for each city.

We also conducted in-person and phone interviews and focus groups to gain local perspectives on the economic impact of gun violence. We facilitated a total of 25 semistructured interviews and four focus groups with local homeowners, renters, business owners, and other city stakeholders (e.g., business and neighborhood associations and other nonprofit organizations). We selected the business owners and homeowners by identifying the communities in the study cities that experienced surges in gun violence in 2015 and then contacting neighborhood organizations and businesses in those areas. In each interview and focus group, we asked how gun violence affected business operations, profitability, and investment; home investment and decisionmaking; the housing and rental markets; the daily activities of residents; local policies to address gun violence; and the factors that increase a community's resilience against or vulnerability to gun violence. We analyzed interview data with NVivo qualitative analysis software. We then synthesized the findings from the quantitative and qualitative analyses into this report to provide recommendations framed and supported by existing literature in the field.

The details of our methodology and regression findings are presented in appendixes B, C, and D.

Findings

City-Specific Analyses of the Relationship between Gun Violence Levels and Local Economic Health

We first examined the relationship between gun violence levels and local economic health within cities. For the cities with at least four years of available data, we looked at the relationship between levels of gun violence in a census tract in a given year and the number of establishments, employment at those establishments, average home value, average credit score, and rate of homeownership the next year. This analysis used panel regression models. We also conducted a cross-sectional (one-year) analysis to explore the short-term relationship between gun violence and average home values, rates of homeownership, and average credit scores after controlling for sociodemographic factors.

As detailed in box 2, our findings were mixed. The panel regression analyses showed that an increase in gun violence levels can be associated with fewer retail and service establishments and fewer new jobs. The cross-sectional regression analyses showed that gun violence in a given year can lower home values, rates of homeownership, and credit scores the next year. However, the damage gun violence inflicted on neighborhoods differed by city. We did not see the same relationships in panel regressions observing repeated measures of gun violence, home values, homeownership rates, and credit scores. The details of this analysis and the associated regression tables are in appendix B.

BOX 2

Relationship between Gun Homicides and Gunshots and Business Outcomes

In three of the four cities for which we had the necessary data (Minneapolis, Oakland, San Francisco, and Washington, DC), we observed a negative relationship between gun violence and business outcomes from 2010 to 2012:

- In Minneapolis, each additional *gun homicide* in a census tract in a given year was associated with 80 fewer jobs the next year.
- In Oakland, each additional *gun homicide* was associated with 5 fewer job opportunities in shrinking businesses the next year.
- In Washington, DC, every 10 additional *gunshots* were associated with 20 fewer jobs among new establishments, one less new business opening, and one more business closing *the same year*.
- In Washington, DC, each additional *gun homicide* was associated with two fewer retail and service establishments the next year.
- In San Francisco, there was no significant association between levels of gun violence and the number of establishments and employment outcomes the next year.

Relationship between Gun Homicide Levels and Home Values, Homeownership Rates, and Credit Scores

In the five cities for which we had the necessary data for a panel regression analysis (Baton Rouge, Minneapolis, Oakland, San Francisco, and Washington, DC), we did not observe a significant relationship between gun homicides in a given year and home values, homeownership rates, and credit scores the next year:

- **Home values.** Each additional gun homicide in a census tract in 2014 was associated with a \$22,000 decrease in the average home value in Minneapolis and a \$24,621 decrease in Oakland in 2015. However, our observations of gun homicide levels from 2009 to 2014 in Minneapolis, Oakland, San Francisco, and Washington, DC, and from 2011 to 2014 in Baton Rouge show no significant association between gun homicides in a given year and home values the next year.
- **Homeownership rates.** Each additional gun homicide in a census tract in 2014 was associated with a 3 percent decrease (approximate) in homeownership rate in Washington, DC, and a 1 percent decrease in Baton Rouge in 2015. However, our observations of gun homicide levels from 2009 to 2014 in Minneapolis, Oakland, San Francisco, and Washington, DC, and from 2011 to 2014 in Baton Rouge show no significant association between gun homicides in a given year and homeownership rates the next year.
- **Credit scores.** Each additional gun homicide in a census tract in 2014 was associated with a 20-point decrease (approximate) in average credit score in Minneapolis and a 9-point decrease in Oakland in 2015. However, our observations of gun homicide levels from 2009 to 2014 in Minneapolis, Oakland, San Francisco, and Washington, DC, and from 2011 to 2014 in Baton Rouge show no significant association between gun homicides in a given year and credit scores the next year.

The details of this analysis and the associated regression tables are in appendix B.

Cross-City Analyses of the Impact of Gun Homicide Surges on Business Growth

In this section, we present the results from our regression analyses of the impact of gun homicide surges on business growth outcomes at the census tract level in Minneapolis, Oakland, San Francisco, and Washington, DC. We also present findings from our interviews with business owners, homeowners, renters, and other city stakeholders.

We borrow from the work of Greenbaum and Tita (2004) to compare pre- and postsurge economic indicators between neighborhoods that experienced surges and those that did not (see appendix C for our methodology, including our business growth measures and definition of gun homicide surges).

Our results indicate that surges in gun homicides led to a reduced growth rate of new retail and service businesses in comparison to neighborhoods with no surges (box 3). However, surges did not affect business closures or cause businesses to lose employees.

Interviews and focus groups in these cities provided context for these findings. We learned that business owners were determined to remain open despite the hardships associated with gun violence. Business owners spoke with great pride about their communities but also detailed the significant security costs they incur because of gun violence. Owners said these costs, which include camera systems, Plexiglass, bulletproof windows, motion sensors, barred doors, and extra security staff, are necessary if they wish to stay open.

Business owners and residents described the coping mechanisms they incorporate into their daily lives, such as closing businesses early and keeping doors locked at night during operating hours. Residents avoid shopping at night, and employees working night shifts avoid public transit. Residents believe these mechanisms are necessary to mitigate the harmful impact of gun violence on their economic behavior and businesses. These interviews and focus groups point to the resilience of local communities affected by violence, which deserves further study. They also demonstrate that these hardships significantly limit investment and the willingness of entrepreneurs to open new businesses in these communities. The details of this analysis and the associated regression tables are in appendix C.

BOX 3

The Impact of Gun Homicide Surges on Local Business Growth

- In cities with the necessary data for our analysis (Minneapolis, Oakland, San Francisco, and Washington, DC), gun homicide surges led to a 4 percent reduction (approximate) in the growth rate of new retail and service establishments.
- Gun homicide surges did not affect business closures or cause businesses to lose employees.

The details of this analysis and the associated regression tables are in appendix C.

Stakeholders may be reluctant to invest money and resources in communities experiencing surges in gun violence because of the fear such violence induces among potential clients. Businesses that rely on foot traffic may be especially discouraged from investing in these communities. The following section highlights responses from our stakeholder interviews that provide more context on the potential disincentive to invest in communities with high levels of and surges in gun violence as well as the coping mechanisms residents and business owners use to mitigate the harmful effects of violence.

Insights from the Interviews

LACK OF CERTAIN TYPES OF BUSINESSES

Residents, business owners, and other stakeholders shared that, as a result of violence, the areas where they live and work lack certain types of businesses, especially grocery stores, mom-and-pop stores, and banks. One Oakland stakeholder said that the neighborhood went a long time without a supermarket, and community members had to travel up to 20 miles to find one. Another said people in his community are afraid to go out at night and that many empty storefronts remain in areas he believes are ideal for restaurants and entertainment venues. Stakeholders and business owners also suggested that violence discourages companies of all sizes from opening businesses in their communities.

We are venturing into opening a grocery store, with health and wellness integrated, in an area that has historically been violent. Windows and lighting have been a concern. Is this a place where people will do harm? People have asked, "This is where we want to be and build?" Safety is a consideration.—City stakeholder, Minneapolis

BUSINESS CLOSURES

Many interviewees know people who have considered closing or relocating their businesses because of gun violence or have already done so. One focus group participant said, “We had a [civic association] meeting. Practically every business in attendance had been robbed.”

We lost a McDonald’s. You practically never see that happen. That was because of crime...[the store] kept getting robbed.—Focus group participant, homeowner

FEAR OF VICTIMIZATION AND BEHAVIORAL COPING MECHANISMS

Fear of violence can drive business and consumer behavior. Our interviews with people living and working in the study cities provided in-depth context on how gun violence can significantly impact business and employee decisionmaking and overall business performance and profitability.

As the number of shootings in the city has increased significantly, even the beauty salon that I go to had a bullet through the window, and it grazed the head of a pastor’s sister. The business has been there for 25 years. For the first time in 25 years, the owners thought about safety and whether they can stay.—City stakeholder, Minneapolis

Interviewees highlighted a perception of violence associated with their neighborhoods. But despite the violence, they also see peace and positivity in their communities even if people from outside the neighborhood, including close family and friends, do not. Residents and business owners in focus groups informed us that their friends and family outside the area fear visiting their neighborhoods or refuse to visit at all. This fear impacts businesses as well because people do not move to or shop in these neighborhoods and the perception of violence makes it difficult to find and retain employees.

Interviews also provided insight into the coping mechanisms used by businesses in areas with disproportionate levels of gun violence. A common theme was a deep sense of pride and dedication to

their communities. Some interviewees shared examples of how community members encouraged and supported business owners to remain open in the face of gun violence.

At a certain point, we were done with the business because of the violence. But I feel like I was born and raised here, and you shouldn't just quit on your own community. ...As bad as it is, it's not just here; it's in other places as well, and I feel like you shouldn't run away from the violence. You should be a part of changing the violence.—Business owner, Oakland

Some interviewees had a negative perception of their own communities, and several stakeholders said they are afraid to go outside in their neighborhoods. One business owner in Oakland referred to his neighborhood as “the gutter of the gutter,” and a San Francisco resident told us, “I can’t get a permit for my show to be in the playground in the evening because the city said it’s dangerous. But other areas get permits. It’s because of [the perception of] this area.”

Interviews showed that customers are afraid to visit some businesses because of their reputations for violence. Often, businesses choose to close earlier in the evening than desired because of an incident of gun violence. In certain places, businesses had been put under curfew by the city and forced to close at certain hours. When asked about how gun violence affects her daily personal and work routines, one Minneapolis business owner said, “If we are here at night, we lock the door at six or seven and we don’t open if we are not satisfied. After six, [we] don’t get customers. Sometimes we are here later but don’t open the door.” When asked about city regulations on the operating hours of businesses, another business owner said, “Yes, [I] have to close at 10:00 p.m., regulated by the city. I wish during the winter they close early. I want to close at nine, but my business will go to someone else who will be open at ten.”

As customers, residents described situations in which they needed the services of a particular business in their neighborhood after they got off of work only to find these businesses would close early during the week or close entirely on the weekend. One city stakeholder referred to this as a “trickle-down effect” where stores close early because residents do not want to be outside at night.

FEAR OF CRIME AND INCREASED BUSINESS INVESTMENT IN SECURITY

One of the most frequently discussed financial burdens was increased investment in security for businesses. Stakeholders in Minneapolis, Oakland, San Francisco, and Washington, DC, indicated that gun violence has caused businesses to invest in security strategies such as camera systems, Plexiglass, bulletproof windows, motion sensors, barred doors, and extra security staff. These purchases were either made on the business owner's own initiative or were mandated by the city after a violent incident on the premises.

There are clear financial burdens associated with running a business in a violent area. In these areas, stores are robbed frequently and subsequently experience reduced profits or shut down completely. Businesses may need to invest additional time and funds to attract customers and overcome the stigma associated with their locations. As one focus group participant said, "There is a stigma of [this] being a rough neighborhood, and a lot of people don't come here because of that. The shootings right here in this area, it has a big effect on business and we see it."

Think about that visible ingesting of it from multiple angles. As a customer coming in, you think a place has been hit up, is it safe to get something to eat? Who is coming in the door? An employee has to be in bulletproof space every day. Maybe they weren't there when it was robbed, but this is the only job I can get. I have to be in harm's way/traumatize myself for my livelihood. What are the health risks in those scenarios? Is it higher anxiety, higher stress? What are the impacts there that may correlate to more doctor's visits, medication?—City stakeholder, Oakland

ADDITIONAL STRESS ON BUSINESS OWNERS, MANAGERS, AND EMPLOYEES

Employees may be directly or indirectly impacted by gun violence. Employees working in violent areas may experience longer commutes, especially if they work at night. They can also experience heightened levels of stress. The manager of a small business in Minneapolis said she no longer uses public transit to go to work at one or two in the morning despite using it at other times of day.

Even if it is not too late, I am worried about getting home from work and staying late.

—Resident, San Francisco

These responses point to how economic behavior is impacted by violence, forcing residents to make employment, commuting, and other daily-life choices that have economic costs and consequences for both themselves and the community.

Cross-City Analyses of the Impact of Gun Violence Surges on Home Values, Homeownership Rates, and Credit Scores

In this section, we present the results from our regression analyses of the impact of gun violence surges on home values, homeownership rates, and credit scores. We observed gun violence surges using gun homicide data from Baton Rouge, Minneapolis, Oakland, San Francisco, and Washington, DC, and gunshot data from Oakland, Rochester, San Francisco, and Washington, DC (see appendix D for detailed methodology and results). Again, our interviews with business owners, homeowners, renters, and other city stakeholders supplement our findings.

Our results indicate that surges in gun homicides and gunshots in census tracts across these cities slowed the appreciation of home values (box 4) but did not affect the growth of homeownership rates or credit scores. In 2010, close to 20 percent of the adult population nationwide was credit invisible or had unscorable credit histories. Members of low-income black and Hispanic communities are more likely to be part of this group (CFPB 2015). Accordingly, credit scores might not be as useful of an indicator as home values because of the potential underrepresentation of low-income communities of color in credit data. Homeownership rates pose their own issue, as they are determined by the long-term demographic economic fundamentals of neighborhoods and might not reflect sudden surges in gun violence.

Our interviews and focus groups provided insight into the perceived negative impact of gun violence on the real estate market. Respondents also detailed the significant costs homeowners incur because of gun violence. Some homeowners who lived in increasingly violent neighborhoods either chose to relocate or knew people who had. The details of this analysis and the associated regression tables can be found in appendix D.

BOX 4

The Impact of Gun Homicide and Gunshot Surges on Home Values, Homeownership Rates, and Credit Scores

- In cities with the necessary data for our analysis (Baton Rouge, Minneapolis, Oakland, San Francisco, and Washington, DC), surges in *gun homicides* slowed home value appreciation by 3.9 percent.
- In cities with the necessary data for our analysis (Oakland, Rochester, San Francisco, and Washington, DC), surges in *gunshots* slowed home value appreciation by 3.6 percent.
- *Gun homicide* and *gunshot* surges were not observed to affect homeownership rates or credit scores.

The details of this analysis and the associated regression tables can be found in appendix D.

Insights from the Interviews

GUN VIOLENCE AND HOUSING VALUES

Across the board, residents, business owners, and stakeholders believed that gun violence hurts housing prices and drives people to relocate from or avoid moving to affected neighborhoods. For instance, one focus group participant mentioned that a friend “paid \$250,000 for their house and now they can’t sell it for \$100,000 because of the violence.”

IMPACT OF GUN VIOLENCE ON RESIDENTS AND WITNESSES OF VIOLENCE

All interviewees said they have changed their daily routines or lifestyles to avoid violence. Many stay home more than they might otherwise, and some do not stay out late or go out alone in the evenings. Business owners and other focus group participants reiterated that violence changed their routines and limits their activities outside of work. Interviewees also shifted their routines to protect their children. One Oakland business owner and resident said, “I want to move to some other area, especially for my kids. They are growing up. Sometimes they close the school down because there’s a shooting outside and I can’t pick up my kids because the school gets shut down.”

Gun violence affects both victims of violence and the neighbors who witness violent incidents. One Minnesota business owner and resident shared an incident that occurred on their street in 2012: “The man was robbed, shot, and [his house was] set on fire. I saw the police dragging out his body and trying to resuscitate him. ...[I] moved when I was able to move—lived there for six years.”

GUN VIOLENCE, VACANCY RATES, AND ABSENTEE HOMEOWNERS

Stakeholders said that vacancy rates are high in violent neighborhoods. They also identified absentee homeownership as problematic because these owners do not maintain their properties or feel invested in the community.

GENTRIFICATION, RENTAL VALUES, AND GUN VIOLENCE

Many interviewees expressed their concern over displacement caused by increasing rents. Respondents have seen changes in the racial makeup of their neighborhoods, and some held negative views of gentrification. Despite the ongoing racial and economic change, they said, crime rates remain high and rents continue to climb.

GUN VIOLENCE AND INCREASED SAFETY MEASURES AT HOME

Homeowners use a variety of security technologies to protect their homes and families. Respondents mentioned tall fences, door gates, motion sensors, and cameras as the primary security measures they use. In some cities, interviewees said the local government subsidizes the cost of home security equipment to help residents protect themselves.

Translating Research into Action

Publicize the Economic Impacts of Gun Violence and Promote Success Stories Showing How Communities Benefit from Reducing Gun Violence

Raise awareness of the risks of increasing levels of gun violence for diverse geographies, groups, and businesses. Local campaigns should focus on the economic issues that plague business development and sustainability.

Increase media engagement to address the economic impact of gun violence. Media sources play a key role in establishing perceptions of neighborhood crime and violence and can support gun violence prevention strategies (Bieler et al. 2016). Positive media coverage can help raise awareness and showcase efforts to reduce gun violence and support local economic development. Local governments and businesses should collaborate to develop strategies for traditional and social media.

Engage Businesses as Partners and Advocates for Gun Violence Reduction Strategies

Support and develop public-private-community partnerships. One model is Detroit's Project Green Light, which mixes technology and community policing to improve neighborhood safety, promote the revitalization and growth of local businesses, and strengthen police efforts to deter, identify, and solve crimes.⁴ This partnership between the City of Detroit and local business owners installs and maintains high-definition indoor and outdoor cameras, high-speed network connections capable of consistent video streaming to local police departments, and adequate lighting on properties to ensure they are customer-friendly, safe, and inviting.

Incentivize safety measures. Implement (or continue providing) incentives to install additional safety features (e.g., cameras, property and street lighting). Small but meaningful rewards could be given to encourage business owners to partner with police.

Prioritize local resources to support efforts to reduce gun violence and promote local business and community development. Efforts should target the local business districts most affected by gun

violence while promoting broader conversations about local solutions to local problems and emphasizing use of economic incentive programs to bring in new businesses.

Support Collaboration among Stakeholders to Build on Community-Based Approaches

Create nonenforcement community engagement opportunities. Local governments should focus on building long-term, positive collaborations between government, community members, and business owners to develop solutions to gun violence.

Implement violence reduction strategies at the city, neighborhood, and community levels. A holistic violence reduction model should include stakeholders with knowledge of the economic impact of gun violence in areas with disproportionate levels of or surges in gun violence. Preventive approaches that focus on educating youth and young adults about gun violence should be aligned with education and training to improve their economic prospects.

Mobilize business and community stakeholders for strategic planning and publicize their successes. This report provides considerable evidence to support the inclusion of economic stakeholders at all levels in gun violence prevention strategies. Local entities should expand economic stakeholder groups to include local business owners, chambers of commerce and business organizations, and local government officials associated with business development. In communities without strong private-sector involvement in city or community politics, businesses of all types should be key proponents of community and city branding activities.

Promote cross-sector collaboration among researchers, community organizations, community development institutions, police practitioners, and funding agencies. Crime reduction should be seen as a multifaceted economic health issue that requires bringing business owners into stakeholder conversations with other public and private sector entities.

Invest in evidence-based social services interventions. Local governments should encourage state and national governments to invest in evidence-based research on the impact of gun violence on local economies. They should also ask state and national policymakers to support evidence-based interventions and cross-sector collaboration across a diverse range of stakeholders, including local business owners.

Build the Evidence Base on the Impact of Gun Violence on the Economic Health of Local Communities

Establish a link between gun violence and the choices of business owners and residents. Local stakeholders, including governments, policymakers, and social services providers, should collaborate to develop data collection systems that examine local perceptions of the economic impact of gun violence through local business owner and resident decisionmaking. A hyper-local (e.g., city, county, etc.) review of economic health is an essential first step for devising strategies to support local businesses in areas disproportionately affected by violence. This study can stand as a model for mixed-method data collection at the community level and for data analysis in cities across the United States.

Use new data sources to showcase the relationship between gun violence and local economic health. Local stakeholders should develop local data repositories to enhance decisionmaking and collaboration across organizations. Local partners should also focus on collecting and storing new data on local economies in areas disproportionately affected by gun violence. A central repository accessible by all local stakeholders should focus on increasing local data quality through standardized implementation and updating practices.

Conclusion

This study helps show that gun violence can perpetuate or even cause economic decline. Gun violence slows new business growth, which leads to fewer job opportunities for community residents—including those at risk of engaging in gun violence. Gun violence also decreases home values, which along with slow business growth impacts government revenue and affects the economic resilience of communities, further increasing their vulnerability to surges in gun violence.

To escape this vicious cycle, public policy and local efforts should seek to promote a virtuous cycle where business development promotes economic well-being, creates jobs, and reduces gun violence. Both homeowners and business owners have strong incentives to collaborate to reduce gun violence. Community members should be incentivized to join these collaborations to outline pressing issues and ensure that policies address those issues and the needs of the community.

Appendix A. Retail and Service Industry Codes

TABLE A.1

Retail and Service Industry Codes

Code	Industry title
52	Building materials, hardware, garden supply, and mobile home dealers
53	General merchandise stores
54	Food stores
55	Automotive dealers and gasoline service stations
56	Apparel and accessory stores
57	Home furniture, furnishings, and equipment stores
58	Eating and drinking places
59	Miscellaneous retail
70	Hotels, rooming houses, camps, and other lodging places
72	Personal services
73	Business services
75	Automotive repair, services, and parking
76	Miscellaneous repair services
78	Motion pictures
79	Amusement and recreation services
80	Health services
81	Legal services
82	Educational services
83	Social services
84	Museums, art galleries, and botanical and zoological gardens
86	Membership organizations
87	Engineering, accounting, research, management, and related services
89	Services not elsewhere classified

Appendix B. Methodology and Regression Results for City-Specific Analyses

Data Sources

The analysis presented in this section is based on the following data sources:

- Gun homicide data were acquired from the city police departments of Minneapolis, MN; Oakland, CA; San Francisco, CA; and Washington, DC; as well as the City of Baton Rouge, LA, and the Parish of East Baton Rouge, LA, Open Data Portal.
- Washington, DC, gunshot data were obtained through a data file made publicly available online by the Metropolitan Police Department in response to a Freedom of Information Act request. Gunshot data for the other cities were obtained from SST, Inc.
- Business data were retrieved from the 2013 National Establishment Time-Series Database.
- Data on home values, homeownership rates, and credit scores were obtained from a major credit bureau.
- Sociodemographic data were retrieved from the US Census Bureau American Community Survey five-year estimates.

Dependent Variables

We used five annual measures to operationalize local economic health at the census tract level: number of establishments, employment at those establishments, average home value, average credit score, and homeownership rate (see table B.1).

The data to calculate establishment and employment outcomes were acquired from the 2013 National Establishment Time-Series Database, which was developed through a partnership with Dun & Bradstreet and includes more than 52 million establishments with time-series information about their

industries, location (by street address), headquarters, employment, and many other indicators from 1990 to 2012.

While observing the number of establishments and employment at those establishments, we conducted subcategory analyses for shrinking, new (birth), and closed (death) establishments in all industry categories and in retail and service industry categories specifically (see appendix A for the list of retail and service industries). We used Greenbaum and Tita's (2004, 2499) definitions to formulate our definitions of shrinking, birth, and death establishments. A birth establishment had no employment at its location in the previous year and positive employment in the current year. A death establishment had positive employment in the previous year and no employment in the current year. Shrinking establishments had some employment in the previous year and less employment in the current year.

To measure the average home value, homeownership rate, and credit score outcomes, we constructed panel data of consumer credit score measures at the census tract level. Our data are based on a random 2 percent sample of depersonalized consumer data from a major credit bureau. The same information was collected for each consumer from 2010 to 2015, creating panel data with six snapshots. To identify each consumer's census tract location, the credit bureau matched their name and address to a national public property record database maintained by CoreLogic. The credit bureau data are a random sample of all US consumers who have a credit record with the bureau, and the national public property record database covers the market very well. Still, 31 percent of consumers did not have a match between the two databases. To address potential biases, we weighted the matched data with American Community Survey Public Use Microdata Sample data to make the matched credit bureau and property record data follow the same joint distribution as the Public Use Microdata Sample data on three attributes: consumer age, housing tenure status, and geographic location.

TABLE B.1

Local Economic Health Measures**Employment**

Employment in all establishment categories (hereinafter referred to as “all establishments”)

Employment in retail and service industry establishments (hereinafter referred to as “retail and service establishments”)

Employment in all new (birth) establishments

Employment in new (birth) retail and service establishments

Employment in all shrinking establishments

Employment in shrinking retail and service establishments

Establishment count

Number of all establishments

Number of retail and service establishments

Number of all new establishments

Number of new retail and service establishments

Number of all out-of-business (death) establishments

Number of out-of-business (death) retail and service establishments

Number of all shrinking establishments

Number of shrinking retail and service establishments

Average home value**Homeownership rate****Average credit score**

Panel Regressions with Fixed Effects

We explored the impact of gun violence on our five local economic health indicators over time. In our analysis, we were unable to capture the annual change in demographic variables because the American Community Survey provides only five-year estimates for demographics at the census tract level and smaller territorial boundaries (such as block groups).

Considering the panel nature of our data and the unavailability of annual demographic variables, we incorporated year and census tract fixed effects estimates into our panel regression models to benefit from within-group variation over time and overcome endogeneity issues. A fixed effects regression model essentially assumes that unobservable factors that might simultaneously affect the outcome and the predictor are time-invariant.

To estimate the effect of gun violence on economic activity, we ran fixed effects regressions in the following form:

$$(E_{it}) = \delta_0 + \beta_1 GV_{it-1} + \gamma_i + \lambda_t + u_{it} \quad (1)$$

where the equation was estimated at the census tract level for each city separately. E_{it} is the observed economic outcome in census tract i in year t . GV is the total number of homicides (or gunshots for Washington, DC, only) in census tract i in year $t-1$, and γ_i and λ_t are year and census tract fixed effects, respectively. Specifically, we modeled the relationship between gun violence and our local economic health indicators as follows:

- We first explored the impact of gun homicides in a given year on business outcomes (i.e., number of establishments and number of employees) in the next year from 2010 to 2012. We conducted this analysis for Minneapolis, Oakland, San Francisco, and Washington, DC, the cities for which we had the four-year data overlap necessary to observe the association between one year's gun homicides and the next year's business outcomes over three years.
- In Washington, DC, where the gunshot and business data time spans overlapped exactly, we also explored the impact of gunshots in a given year on business outcomes *in the same year* from 2010 to 2012, assuming increased levels of gunshots have an immediate rather than lagged effect on business growth.
- We ran additional regression analyses to explore the association between gun homicides in a given year and average home values, average credit scores, and homeownership rates in the next year from 2010 to 2015 in Minneapolis, Oakland, San Francisco, and Washington, DC. For Baton Rouge, where gun homicide data were only available as of 2011, we explored the impact of gun homicides on those indicators from 2012 to 2015.
- We further explored the association between gunshots in a given year and average home values, average credit scores, and homeownership rates in the next year from 2014 to 2015 in Oakland, Rochester, and San Francisco. In Washington, DC, where gunshot data were available from 2010 to 2012, we explored the impact of gunshots on those indicators from 2011 to 2012.

Cross-Sectional Regressions with Sociodemographic Controls

To examine the relationship between gun homicides and average home value, homeownership rate, and average credit score over a year, we ran additional cross-sectional regression analyses on the relationship between gun homicides in 2014 and our chosen indicators in 2015, controlling for the effects of several sociodemographic variables: percent black population, percent population with high

school education or higher, median household income, and population density. We focused on outcomes from 2015 to better control for the effects of the sociodemographic factors using the American Community Survey 2014 five-year estimates.

Detailed Results

THE RELATIONSHIP BETWEEN GUN VIOLENCE LEVELS AND BUSINESS OUTCOMES

Table B.2 shows the results of our regression analyses on the 14 establishment and employment outcomes over the number of gun homicides in Minneapolis, Oakland, San Francisco, and Washington, DC. The results reported in the table control for year and census tract fixed effects.

We further examined the relationship between gunshots in a given year and the number of establishments and employment in those establishments that same year in Washington, DC. Our analysis showed that, in census tracts covered by gunshot detection sensors, every 10 additional gunshot incidents were related to 20 fewer jobs in new establishments ($p \leq 0.01$), one less business opening ($p \leq 0.05$), and one more business closure ($p \leq 0.05$) the same year.

TABLE B.2

Gun Homicide Fixed Effects Ordinary Least Squares Regression on Establishment Number and Employment

City and industry	Birth	Death	Shrinking	Total
Minneapolis				
<i>All</i>				
Establishment	-3.4 (2.8)	1.5 (1.2)	-0.1 (0.2)	-2.42 (1.55)
Employment	-79.8 (60.9)	N/A	-4.3 (7.7)	-80.0 (44.8)†
<i>Retail and service</i>				
Establishment	-3.0 (2.3)	0.7 (0.7)	-0.01 (0.17)	-1.8 (1.1)
Employment	-79.8 (60.9)	N/A	-0.3 (5.1)	-42.8 (27.0)
Oakland				
<i>All</i>				
Establishment	0.6 (0.8)	0.3 (0.4)	0.1 (0.1)	0.5 (0.6)
Employment	16.3 (9.7)	N/A	-5.2 (3.1)†	12.1 (11.5)
<i>Retail and service</i>				
Establishment	0.3 (0.7)	0.2 (0.3)	0.16 (0.1)	-0.8 (4.1)
Employment	-0.14 (2.9)	N/A	-0.9 (1.3)	-2.6 (5.6)
Washington, DC				
<i>All</i>				
Establishment	-5.2 (3.5)	0.4 (0.5)	-0.1 (0.5)	2.9 (1.8)
Employment	4.7 (21.6)	N/A	1.29 (2.44)	-31.5 (129.2)
<i>Retail and service</i>				
Establishment	0.9 (1.3)	-2.7 (1.3)	-0.1 (0.1)	-1.9 (0.8)*
Employment	-6.4 (10.7)	N/A	0.8 (1.2)	34.9 (22.9)
San Francisco				
<i>All</i>				
Establishment	5.7 (8.3)	-0.9 (1.6)	-0.06 (0.3)	3.1 (1.93)
Employment	39.6 (49)	N/A	13.8 (14.4)	90.2 (103.6)
<i>Retail and service</i>				
Establishment	3.5 (5.4)	-1.51 (1.93)	-0.05 (0.24)	-9.1 (18)
Employment	17.8 (19.3)	N/A	4.86 (3.13)	-912 (800)

Note: Standard errors in parentheses.

† $p \leq 0.1$; * $p \leq 0.05$

RELATIONSHIP BETWEEN GUN VIOLENCE LEVELS AND HOME VALUES, HOMEOWNERSHIP RATES, AND CREDIT SCORES

We further examined the association between gunshots and gun homicides in a given year and average home values, homeownership rates, and credit scores in the next year by running panel regression analyses with fixed effects estimates. We found no significant associations for any city included in this analysis.

CROSS-SECTIONAL REGRESSION ANALYSES WITH SOCIODEMOGRAPHIC CONTROLS

To examine any potential immediate relationship between gun homicides in 2014 and home values, homeownership rates, and credit scores in 2015, we ran additional regression analyses controlling for 2014 sociodemographic variables. Table B.3 shows those results.

TABLE B.3

2014 Gun Homicide Ordinary Least Squares Regression on 2015 Average Home Values, Homeownership Rates, and Average Credit Scores

City	Home value	Homeownership rate	Credit score
Minneapolis			
Homicides	-22,009†	-0.01	-19.7***
Percent black	-551	-0.001	-1.55***
Percent high school education or higher	1,145	0.002	1.14†
Median household income	2.1***	2.143E-6***	0.001**
Population density	1.9	-2.641E-6	0.001
R ²	0.47	0.34	0.56
Oakland			
Homicides	-24,621†	-0.004	-8.7*
Percent black	-1,848*	0.001	-1.8***
Percent high school education or higher	4,151***	0.001	1.6***
Median household income	3.56***	2.669E-6***	0.001
Population density	1.68	1.758E-6	0.001
R ²	0.75	0.44	0.63
Washington, DC			
Homicides	1,500	-0.03*	-6.4
Percent black	-4,374***	0.002**	-1.3***
Percent high school education or higher	-5,307†	0.005**	0.6
Median household income	3.38***	1.408E-6***	0.001
Population density	-4.48**	4.270E-7	0.001
R ²	0.60	0.20	0.63
San Francisco			
Homicides	-31,564	-0.025	-7.4
Percent black	-6,548*	-0.001	-1.17***
Percent high school education or higher	-4,543	0.004	0.464
Median household income	5.611***	-4.257E-7**	0.001
Population density	1.12	4.612E-7	-0.001*
R ²	0.32	0.06	0.24
Baton Rouge			
Homicides	-179	-0.01†	0.49
Percent black	-946***	0.001	-1.01***
Percent high school education or higher	1,660***	0.002	1.72**
Median household income	0.8**	4.208E-6***	0.001
Population density	-1.09	7.043E-6	-0.002
R ²	0.69	0.56	0.64

† $p \leq 0.1$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Appendix C. Methodology and Results for Gun Violence Surge Analysis with Business Growth Outcomes

Data Sources

The analysis presented in this section is based on the following data sources:

- Gun homicide incident data were retrieved from the city police departments of Minneapolis, MN; Oakland, CA; San Francisco, CA; and Washington, DC.
- Business data were retrieved from the 2013 National Establishment Time-Series Database, described in appendix B.
- Sociodemographic data were retrieved from US Census Bureau American Community Survey five-year estimates.

Methods

This analysis explored the impact of gun homicide surges on business growth outcomes in census tracts across different cities. Our methodology borrows from the work of Greenbaum and Tita (2004), who studied the impact of *structural changes or surges* in the level of violence, rather than only *levels of violence*, on ZIP code-level growth rates in the number of establishments and employment in those establishments. As Greenbaum and Tita explain, the definition of surges in crimes requires an operationalization based on arbitrary decisions.

Because of differences in gun homicide levels across cities, surges were defined for each city. For the purposes of our analysis, we considered a census tract to have experienced a surge if, following a baseline year (2010), it had at least one more gun homicide in the subsequent (observation) year and its level of gun homicide was above the 50th percentile among all census tracts with increases in gun homicides. Census tracts in each city that experienced a surge in 2011 were matched with control

census tracts that had an increase in gun homicides but not a surge. Our dependent variables were annual growth rates, at the census tract level, of net employment and components of net employment: establishment births, deaths, and shrinkages (see table C.1 for the list of growth outcomes and appendix B for a definition of establishment births, deaths, and shrinkages).

We calculated growth rates for all establishment categories and retail and service industry categories. The growth rate for each category of establishment is estimated as follows:

$$G_{it}^j = (E_{it}^j - E_{it-1}^j) / E_{it-1}^j \quad (2)$$

where growth G in each category j (all establishments, new establishments, and shrinking establishments) in census tract i is calculated by subtracting the employment in that category in the census tract in the previous year from the employment in the same category and census tract in the current year and dividing it by the total employment in the census tract in the previous year.

Growth rates for the number of establishments that are births and deaths for each category are defined as follows:

$$G_{it}^j = N_{it}^j / N_{it} \quad (3)$$

where N is the number of establishments. To calculate the growth in the number of shrinking establishments in equation 3, the E in equation 2 is replaced with N .

TABLE C.1

Dependent Variables

Employment growth outcomes

- Employment growth in all new (birth) establishments
- Employment growth in new (birth) retail and service establishments
- Employment growth in all shrinking establishments
- Employment growth in shrinking retail and service establishments

Establishment growth outcomes

- Growth in the number of all establishments
 - Growth in the number of all retail and service establishments
 - Growth in the number of all new establishments
 - Growth in the number of new retail and service establishments
 - Growth in the number of all out-of-business (death) establishments
 - Growth in the number of out-of-business (death) retail and service establishments
 - Growth in the number of all shrinking establishments
 - Growth in the number of shrinking retail and service establishments
-

We used propensity score matching and difference-in-difference estimates to examine the impact of surges in gun homicides on the aforementioned growth outcomes. We ran these analyses at the census tract level for all establishment types and for a subset of retail and service establishments (see appendix A for the list of retail and service establishments).

Propensity Score Matching

To compare economic activity in census tracts that experienced a surge in gun homicides with activity in census tracts with no surge, every census tract in each city that had a surge in 2011 needed to be matched with a census tract in the same city that did not. As explained earlier, prior research shows that business activity could respond to crime and violence levels in the area where the business is located (Greenbaum and Tita 2004). Thus, substantial changes in violence levels in a neighborhood can affect business activity differently than in a neighborhood with consistent violence levels.

Data to match the gun homicide surge and control census tracts on key sociodemographic indicators in each city—percent black population, median household income, percent with a high school education or higher, and population density—were retrieved from American Community Survey five-year estimates for 2006–10.

Table C.2 shows the number of gun homicides in each city in 2010 and 2011, and table C.3 shows the number of census tracts in each city that had an increase in gun homicides in 2011 and whether the increase qualified as a surge.

TABLE C.2

Number of Gun Homicides

	2010	2011
Minneapolis	39	37
Oakland	78	100
San Francisco	33	35
Washington, DC	97	77

Sources: City police departments of Minneapolis, MN; Oakland, CA; San Francisco, CA; and Washington, DC.

TABLE C.3

Census Tract Surge by City

	Surge	Increase but no surge
Minneapolis	5	15
Oakland	15	33
San Francisco	2	22
Washington, DC	11	18
Total	33	88

The surge and control census tracts were also matched on a baseline level of gun homicides. In each city, we used nearest neighbor matching with replacement to match the propensity score of each census tract with a surge in gun homicides to a census tract without a surge that had the closest score in its probability to surge based on demographic indicators. After matching, we used difference-in-difference estimates to compare changes in the growth indicators (see table C.5) from before and after surges in the 33 census tracts that surged with their matched control census tracts that did not.

Detailed Results

Table C.4 presents the summary results from the eight regression analyses to observe the impact of surges on annual growth rates in new business creation (establishment births), business destruction (establishment deaths), and business shrinkage (establishments losing employees).

TABLE C.4

Ordinary Least Squares Regression on Establishment Growth Rates

Establishment type	New	Closed	Shrinking	Total
All	-0.030	-0.002	0.018	-0.013
Retail and service	-0.038†	-0.011	0.001	-0.014

Notes: Reported coefficients are the difference between the pre- to postsurge change in the surge census tracts and matched control census tracts with no surge. The sign in front of the coefficients indicates the direction of the relationship between surges and measured outcomes. For instance, a negative sign in front of the coefficient for new retail and service establishments indicates that surges result in a decrease in growth, whereas a positive coefficient for shrinking businesses indicates an increase in growth rate of shrinking businesses.

† $p \leq 0.1$

Surges reduced the growth rate of retail and service establishments by 3.8 percent, though the results showed no significant impact on business creation for all industry categories. No other impact estimates were significant. Surge census tracts experienced higher growth rates of business shrinkage

in all establishment categories (1.8 percent) and retail and service establishment categories (0.1 percent) than control census tracts. Again, this impact estimate did not reach statistical significance. Gun homicide surges did not have a significant impact on business deaths either. We further examined if these surges in gun homicides had any significant impact on employment growth in new and shrinking establishments. As shown in table C.5, we found no statistically significant impact across all establishments or the subset of retail and service establishments.

TABLE C.5

Ordinary Least Squares Regression on Employment Growth Rates

Establishment type	New	Shrinking
All establishments	0.03	-0.01
Retail and service	-0.01	-0.01

Notes: Reported coefficients are the difference between the pre- to postsurge change in the surge census tracts and matched control census tracts with no surge. The sign in front of the coefficients indicates the direction of the relationship between surges and measured outcomes.

Appendix D. Methodology and Results for Gun Violence Surge Analysis with Home Values, Homeownership Rates, and Credit Scores

Data Sources

The analysis presented in this section is based on the following data sources:

- Gun homicide data were acquired from the police departments of Minneapolis, MN; Oakland, CA; San Francisco, CA; and Washington, DC; as well as the City of Baton Rouge, LA, and the Parish of East Baton Rouge, LA, Open Data Portal.
- Gunshot data for the analysis were available for Oakland, CA; Rochester, NY; San Francisco, CA; and Washington, DC. Washington, DC, gunshot data were obtained through a data file made publicly available online by the Metropolitan Police Department in response to a Freedom of Information Act request. Gunshot data for the other cities were obtained from SST, Inc.
- Home values, homeownership rates, and credit scores were retrieved from a major credit bureau (see appendix B for a detailed description of these data).
- Sociodemographic data were retrieved from US Census Bureau American Community Survey five-year estimates.

Methods

This analysis explored the impact of surges in gun homicides and gunshots on average home value, homeownership rate, and average consumer credit score at the census tract level. We used propensity score matching and difference-in-difference estimates to examine if surges affected these outcomes.

Propensity Score Matching

To compare home values, homeownership rates, and credit scores in census tracts that experienced a surge in gun violence with those in census tracts that had not, every census tract that had a surge in the observation year needed to be matched with a similar census tract that had not. We used two different operationalizations to formulate gun homicide and gunshot surges because gunshots are more frequent than gun homicides.

First, we operationalized gun violence surges with the gun homicide data acquired from the city police departments. We considered a census tract to have experienced a surge if, following a baseline year (2013), the census tract had at least one more gun homicide in the subsequent (observation) year and its level of gun homicide was above the 50th percentile of gun homicides in all census tracts with increases in gun homicides. The census tracts in each city that experienced a surge were matched with control census tracts that had an increase in gun homicides but not a surge. Table D.1 shows the number of gun homicides in each city in 2013 and 2014, and table D.2 shows the number of census tracts in each city that had an increase in gun homicides in 2014 and whether the increase qualified as a surge.

TABLE D.1

Number of Gun Homicides

	2013	2014
Baton Rouge	53	70
Minneapolis	28	26
Oakland	82	73
San Francisco	45	33
Washington, DC	81	71

Sources: City police departments of Baton Rouge, LA; Minneapolis, MN; Oakland, CA; San Francisco, CA; and Washington, DC.

TABLE D.2

Census Tract Surge by City

	Surge	Increase but no surge
Baton Rouge	12	12
Minneapolis	3	8
Oakland	2	23
San Francisco	6	17
Washington, DC	10	20
Total	33	80

Data to match the gun homicide surge and control census tracts on key sociodemographic indicators—percent black population, median household income, percent with a high school education

or higher, and population density—were retrieved from American Community Survey five-year estimates for 2010–14. Surge and control census tracts were also matched on baseline number of gun homicides in the census tract. In each city, we used nearest neighbor matching with replacement to match the propensity score of each census tract with a surge to a control census tract without a surge that had the closest score.

Second, we operationalized gun violence surges with gunshot data acquired from SST, Inc and the Metropolitan Police Department of Washington, DC. We considered a census tract to have experienced a surge if it had an increase in gunshots in a given year from the baseline year and was in the top 25 percentile of all census tracts with the highest count increase in gunshots from the baseline. The 33 surge census tracts were matched with control census tracts in the same city that had an increase in gunshots but were not in the top 25 percentile. Table D.3 shows the number of gunshots in each city in the baseline year and the observation year, and table D.4 shows the number of census tracts in each city that had an increase in gunshots in the observation year and whether the increase qualified as a surge.

TABLE D.3

Number of Gunshots

	Baseline	Observation
Oakland	3,823	3,575
Rochester	2,588	1,534
San Francisco	1,570	1,457
Washington, DC	4,760	5,338

Sources: City Police departments of Minneapolis, MN; Oakland, CA; San Francisco, CA; and Washington, DC.

Notes: Baseline and observation years for Oakland, Rochester, and San Francisco are 2013 and 2014. The baseline and observation years for Washington, DC, are 2010 and 2011. The number of gunshots excludes records of gunshots on December 31, January 1, and July 4.

TABLE D.4

Census Tract Surge by City

	Surge	Increase but no surge
Oakland	6	26
Rochester	2	6
San Francisco	10	37
Washington, DC	15	55
Total	33	124

After matching, we used difference-in-difference estimates to compare pre- and postsurge home values, homeownership rates, and credit scores in surge and control census tracts.

Detailed Results

Impact of Gun Homicide Surges on Home Values, Homeownership Rates, and Credit Scores

Table D.5 presents the summary regression results from the regression analyses conducted to observe the impact of gun homicide surges on home values, homeownership rates, and credit scores at the census tract level. Gun homicide surges led to a decrease in average home values. Home value appreciation in census tracts that had a surge in gun homicides was 3.9 percent lower after the surge than in control census tracts ($p \leq 0.05$). No other impact estimates were significant.

TABLE D.5

Gun Homicide Ordinary Least Squares Regression on Home Values, Homeownership Rates, and Credit Scores

	Difference-in-difference coefficient	Standard error	t	p > t
Credit score growth	7.342	12.227	0.60	0.549
Home value appreciation	-3.998	1.957	-2.04	0.043*
Homeownership growth	0.001	0.037	0.04	0.969

Notes: Reported coefficients are the difference between the pre- to postsurge change in the surge census tracts and matched control census tracts with no surge. The sign in front of the coefficients indicates the direction of the relationship between surges and measured outcomes.

* $p \leq 0.05$

Impact of Gunshot Surges on Home Values, Homeownership Rates, and Credit Scores

We further examined if gunshot surges had any significant impact on home values, homeownership rates, and credit scores at the census tract level. Table D.6 summarizes the results from three regression analyses. Gunshot surges in census tracts also led to a decrease in average home values. Home value appreciation in census tracts that had a surge in gunshots was 3.6 percent lower after the surge than in control census tracts ($p \leq 0.01$). Again, we detected no significant relationship between surges in gun homicides and mean credit scores and homeownership rates.

TABLE D.6

Gunshot Ordinary Least Squares Regression on Home Values, Homeownership Rates, and Credit Scores

	Difference-in-difference coefficient	Standard error	t	p > t
Credit score growth	6.903	15.518	0.44	0.657
Home value appreciation	-3.603	1.288	-2.80	0.006**
Homeownership growth	0.009	0.045	0.21	0.833

Notes: Reported coefficients are the difference between the pre- to postsurge change in the surge census tracts and matched control census tracts with no surge. The sign in front of the coefficients indicates the direction of the relationship between surges and measured outcomes.

** $p \leq 0.01$

Notes

1. Natasha Bertrand, "A Breakdown of the \$229 Billion Gun Violence Tab that American Taxpayers Are Paying Every Year," *Business Insider*, April 24, 2015, <http://www.businessinsider.com/gun-violence-costs-america-more-than-229-billion-every-year-2015-4>.
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3. "1997 United States Budget," InsideGov, accessed April 25, 2017, <http://federal-budget.insidegov.com/l/100/1997>.
4. "About Project Green Light Detroit," Project Green Light Detroit, accessed April 24, 2017, <http://www.greenlightdetroit.org/about/>.

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