



Fear of Obama: An empirical study of the demand for guns and the U.S. 2008 presidential election[☆]



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ABSTRACT

Using monthly data constructed from futures markets on presidential election outcomes and a novel proxy for firearm purchases, this paper analyzes the response of the demand for guns to the likelihood of Barack Obama being elected in 2008. Point estimate suggests the existence of a large Obama effect on the demand for guns. This political effect is larger than the effect associated with the worsening economic conditions. This paper presents robust empirical evidence supporting the hypothesis that the unprecedented increase in the demand for guns was partially driven by fears of a future Obama gun-control policy. Conversely, the evidence for a racial prejudice motivation is less conclusive. Furthermore, this paper argues that the Obama effect did not represent a short-lived intertemporal substitution effect, and that it permanently affected the stock of guns in circulation. Finally, states that had the largest increases in the demand for guns during the 2008 election race experienced significant changes in certain categories of crime relative to other states following Obama's election. In particular, those states were 20% more likely to experience a shooting event where at least three people were killed.

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1. Introduction

During 2008 and early-2009, the United States media reported on skyrocketing sales of firearms as well as shortages in common types of handgun ammunition (see, for example, [Johnson \(2008\)](#), [Bohn \(2008\)](#), and [NPR \(2009\)](#)). The increase in gun sales was measurably large: federal tax receipts from the sales of pistols and revolvers increased by almost 90% during the fourth quarter of 2008 compared to the same quarter a year earlier.¹ Some states experienced substantial increases in the number of applications for permits for carrying concealed weapons.² Even though this nationwide gun phenomenon was especially evident in the weeks following the election of Barack

Obama as president, gun sales had already begun to spike prior to Election Day. In some parts of the United States gun purchases reached unprecedented peaks in July and September of 2008, the months following Hillary Clinton's concession speech and the Democratic Convention, respectively. In December 2008, by which time firearm sales were soaring, President-elect Obama urged gun owners “not rush out and stock up on guns” ([Pallasch, 2008](#)).

Although the concurrent timing of growing gun sales and permit applications with the 2008 U.S. presidential election is suggestive of an effect of Obama's election on the demand for guns, these correlations could also arise from other confounding factors, such as worsening economic conditions or a more general election effect. In this paper I quantify how the anticipation and realization of Obama's success in the presidential election affected the demand for guns. Using data constructed from futures markets on presidential election outcomes and a novel proxy for firearm purchases (i.e. FBI's firearm background check reports), I show how the demand for guns responded to monthly information concerning the likelihood that Obama would be elected. After controlling for state fixed effects, different time fixed effect specifications, and state level-time varying covariates accounting for the economic climate, my point estimate provides strong evidence for the existence of a large “Obama effect.” According to my most conservative specification, a 10-point increase in the probability of Obama being elected is associated with a 4.5% increase in the demand for guns nationwide. Moreover, this political effect is larger than the effect associated with worsening economic conditions.

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¹ This figure is double the highest growth rates for 1993–1994 when both the Brady Handgun Violence Prevention Act and the Federal Assault Weapons Ban were introduced (arguably two of the most important gun control laws since the Gun Control Act of 1968 signed by Lyndon Johnson), and more than doubles the panic buying that took place during the aftermath of the 9/11 terrorist attacks.

² See the [Discussion](#) section for further analysis.

Why would the election of Barack Obama have affected the demand for guns? I examine two potential underlying mechanisms by exploiting monthly variation in the odds of an Obama victory interacted with cross-sectional variation in a set of relevant state characteristics. First, a common explanation for the gun sales surge is the perception and fear that the election of Obama would lead to stronger legal restrictions on gun ownership and their use in the near future (see, for example, Johnson (2008), and Neary (2009)). I refer to this potential mechanism as the “fear of gun control” hypothesis and exploit heterogeneity in gun laws to evaluate its validity. While there is an important federal component to gun regulations, most gun control policy in the United States is decentralized. As a result, there exist substantial cross-state differences in the degree of gun law strictness in terms of the regulation of the sale, possession, and use of firearms. My identification strategy assumes forward looking agents and presumes that the potential enactment of a more restrictive federal gun control legislation was expected to be binding on those states with weak gun control and thus could trigger a surge in gun sales.³ Consistent with the “fear of gun control” hypothesis, I find that the effect of the Obama election on the demand for guns was much larger in states with weaker gun laws.

I also evaluate racial prejudice as another potential mechanism, what I refer here as the “race bias” hypothesis. Although some social scientists have argued that the election of Obama is the *prima facie* evidence that race no longer matters in American politics, empirical work analyzing Obama's performance during the 2008 election shows mixed results (e.g., Mas and Moretti, 2009; Hutchings, 2009; Enos, 2010; Stephens-Davidowitz, 2014). Sears and Tesler (2010) argue in fact that the 2008 presidential campaign was “the most sharply racialized campaign” of the last two decades, given the extent to which public opinion was “polarized by racial attitudes.” It is conceivable therefore that for some individuals the election of the United States' first African-American president was viewed as a personal threat (see, for example, Huppke (2009), and U.S. Department of Homeland Security (2009)). Nonetheless, the empirical evidence toward the “race bias” hypothesis is less conclusive. Although the Obama effect appears to be larger in states with higher levels of prejudice against blacks, this statistical result is not especially robust when including state-specific linear trends.

Why study the demand for guns? The prevalence of guns, especially handguns, is very high in the United States when compared to other developed countries.⁴ Moreover, gun violence has enormous implications for mortality and morbidity.⁵ Firearm-related homicide, suicide, and fatal accident rates are far higher than those in other high-income countries.⁶ Furthermore, guns constitute “one of the most intensely divisive cultural issues” in the United States (Rostron, 2009). The gun debate has taken over not only the political arena but also the academia.⁷ Irrespective of their stances, participants from both sides of the debate agree that guns matter. In fact, the private decision to acquire a firearm may represent an externality for the rest of society. It is still under scrutiny whether the net externality is positive (by deterring criminals and increasing society's overall safety levels) or a negative

(by increasing crime, gun accidents and suicide rates). Cook and Ludwig (2000) estimate the annual social cost of gun violence at \$ 100 billion. Therefore, understanding the economic and non-economic determinants of this private decision provides a valuable input for the analysis of future gun policies and their social, economic, and political ramifications. I exploit a unique historical event to shed light on the determinants of the demand for guns. I argue that the Obama effect did not represent a short-lived intertemporal substitution effect and document that the stock of guns in circulation permanently increased. Additionally, states that experienced the largest increases in the demand for guns during the 2008 election race experienced significant changes in some categories of crime relative to other states following Obama's election. In particular, those states were 20% more likely to experience a shooting event where at least three people were killed.

My work contributes to the empirical literature on the effects of both the realization and anticipation of political events, such as the passage of a new law or the election of a candidate, on different economic outcomes.⁸ More specifically, it advances the empirical and theoretical work done on consumers' behavior in anticipation of *future* gun policies in two respects.⁹ Firstly, it provides empirical evidence consistent with stockpiling behavior as a reaction to expected future increases in the cost of acquiring firearms. Secondly, it sidesteps previous empirical impediments due to limitations in the data. Specifically, my panel data setting has a considerably improved statistical power compared to previous work and allows me to incorporate different fixed effects in both a time and a cross sectional dimension so as to address potential omitted variable problems. Moreover, my analysis of (relative) high-frequency data for my gun purchases proxy mitigates the problem of reverse-causality from the gun market to the likelihood of a political event. Finally, by interacting the time variation to the prospect of an Obama presidency with cross-state differences in the stringency of gun control laws, my setting also helps to identify heterogeneous reactions across states that might otherwise be masked by the aggregation of the data at the national level.

My paper also relates to the empirical literature on the demand for guns and its relationship to the existing gun regulation environment. In particular, Glaeser and Glendon (1998), and Kleck and Kovandzic (2009) argue that gun-control laws in general do not appear to affect gun ownership. By studying how gun trafficking (a key element of the secondary market) across states responds to cross-state differences in gun policies, Knight (2013) finds that the necessary condition for the existence of cross-state externalities is empirically satisfied. Dube et al. (2013) shows that Mexican locations closer to those U.S. states that did not renew the Federal Assault Weapons Ban in 2004 experienced differential increases in different types of crime. In this sense, they argue that the changes in U.S. gun laws exerted a spillover on the supply of guns across U.S.–Mexican borders. Similarly, my paper argues that concerns regarding more restrictive federal gun control legislation in the future exerted a heterogeneous effect in the demand for guns which in turn differentially impacted gun-related crime.

My paper also contributes to the empirical literature on how racial attitudes may relate to the prevalence of firearms (see Kleck and Kovandzic, 2009 among others). To the best of my knowledge, my work is the first empirical study linking high-frequency gun purchases data (a flow) to racial attitudes at the state-level.

³ There is empirical and anecdotal evidence supporting the hypothesis that consumers of durable goods are forward-looking (e.g., Chevalier and Goolsbee (2009), and Mullin (2001) for the particular case of guns).

⁴ Different studies suggest that gun ownership runs as high as 35 to 40%, with as many as 300 million firearms being privately owned in the United States (See, for example, Duggan et al., 2010 for background on gun ownership).

⁵ According to the Center for Disease Control and Prevention, in 2009 roughly 30,000 people died from gun-related homicides, suicides, and accidents, while about 70,000 suffered non-fatal injuries from firearm shots. By comparison, car accidents were the leading cause of injury-related deaths in 2009, causing 35,000 fatalities.

⁶ When compared to 23 high-income countries, firearm-related homicide, suicide, and unintentional fatality rates in the United States are 19.5, 5.8, and 6.9 times higher, respectively (Hemenway and Richardson, 2011).

⁷ Researchers in economics, political sciences, criminology, and public health have mainly focused on studying the relationships between gun prevalence and (a) crime rates, and (b) gun-related suicide and accident rates.

⁸ Economic outcomes such as the stock market performance of private firms (Gyourko and Sinai, 2004; Knight, 2006), the spread between taxable and municipal securities (Greimel and Slemrod, 1999); investment decisions (Durnev, 2011), nominal interest rates (Fowler, 2006), and a variety of financial indices (Snowberg et al., 2007).

⁹ Bice and Hemley (2002) estimate a supply and demand model using aggregate U.S. annual data for the period 1961–1994 and show that the demand for new handguns increased during the years of the discussion and passage of the 1968 Gun Control Act (GCA). Mullin (2001) presents a conceptual model of consumer demand for guns, wherein the impact of a buyback program on gun ownership depends on whether the program is permanent or unanticipated and never-to-be-repeated.

In addition, my paper contributes to the literature in economics and political science on the effect of black candidates on behavior (see, for example, [Washington \(2006\)](#)). More specifically, it is relevant to the growing literature on the relationship between racial attitudes and the candidacy and subsequent election of Obama (e.g.; [DellaVigna, 2010](#); [Mas and Moretti, 2009](#); [Stephens-Davidowitz, 2014](#)).¹⁰ Most previous empirical work shows little evidence of the existence of a link between negative racial attitudes and the election of Obama and appears to contradict my findings. My analysis, however, is based on a different margin. My paper focuses on a specific sub-population—individuals who own or are willing to acquire a firearm—and may thus substantially differ, for instance, from the median American voter. Moreover, my findings suggest that different aspects of Obama personality, in combination with his being a Democrat, may have helped trigger a surge in gun sales. Perhaps, as [Washington \(2006\)](#) suggests, black Democrats might be perceived “as far more liberal than their non-black counterparts” and, thus, more willing to push a gun-control agenda.

2. Data and aggregated empirical evidence on gun sales

2.1. A proxy for the demand for guns

Measuring the demand for guns is not straightforward.¹¹ Neither national nor state level data on gun purchases is available. Moreover, most states do not require the registration of firearms, and only a few states require permits to buy them ([Azrael et al., 2004](#)). Even among states where some requirements exist, the information is incomplete, outdated and difficult to obtain ([Jacobs, 2002](#)). Quarterly data on tax receipts from gun sales is available only at the national level which prevents me from examining time variation across states. However, there is a federal data source that provides some indication of the level of the demand for guns by state and month: the National Instant Criminal Background Check System (henceforth, NICS), launched by the FBI in 1998 and mandated by the 1993 Brady Handgun Violence Prevention Act (henceforth, BHVPA). Before selling any firearms, federal licensee dealers must call the FBI or other designated agencies to ensure that a potential buyer does not have a criminal record or is not ineligible to acquire a firearm ([Adams et al., 2010](#)).

Nevertheless, it is pertinent to note that the number of background check reports does not necessarily indicate the exact number of firearms sold ([FBI, 2011](#)). First, after a report is emitted a customer might ultimately buy several guns, or decide not to buy any gun at all. Second, if the prospective buyer fails the criminal background check, the sale is not consummated. Third, some states do not exclusively use the NICS to conduct background checks on a potential gun sale by federal licensee dealers ([Mayors Against Illegal Guns, 2008](#)).¹² Finally, private-party gun sales are exempt from background check unless required by state

law (see [Wintemute \(2009\)](#)). Specifically, gun shows represent an emblematic case in the gun control debate since federal statutes do not regulate them. Unlicensed vendors or “occasional” sellers, who are not required to initiate a background check are responsible for up to 50% of all gun sales at gun shows ([Bureau of Alcohol, Tobacco and Firearms, 1999](#)).

Despite the aforementioned drawbacks, the number of background check reports provides a good proxy for the overall demand for guns for several reasons. The NICS's figures are the most common firearm sales indicator used in the firearm industry's reports. The number of background checks is highly correlated with tax receipts from firearm sales at the national level.¹³ Moreover, the number of background check reports in per capita terms is also highly correlated with measures of gun ownership at the state level.¹⁴ It can be argued then that the higher the gun prevalence (stock) in a given state, the higher the level of desired transactions (flow) per number of inhabitants in that state. Furthermore, according to business publications in the firearm industry, about 98% of all inquiries to the NICS result firearm sales.¹⁵ Finally, although there are thousands of gun shows annually in the United States ([Duggan et al., 2010](#)) they represent a minor percentage of all gun sales, accounting for only 4–9% of total sales in the country, according to the best available estimates ([Wintemute, 2009](#)).¹⁶ Therefore, gun sales at gun shows that are not captured by NICS's statistics would represent no more than 4.5% of the total gun sales in the United States.

2.2. A descriptive analysis of the aggregated evolution of gun sales

In this section, I present preliminary evidence of an unusual change in the demand for guns that took place around the time of the 2008 presidential election. The primary purpose is to provide a descriptive account of the evolution of gun sales via an inspection of the aggregated figures. Discussion on the application of stricter firearm regulations has been a hot topic in almost every presidential election. I thus provide in [Fig. 1](#) my first piece of evidence by comparing the evolution of my proxy for gun sales around the time of the 2008 presidential election with its evolution during the 2000 and 2004 presidential elections. For a two-year symmetric window comprising the period before and after the election week for each of the three aforementioned presidential elections, I plot the aggregate evolution of the weekly number of firearms background check reports relative to the same week the prior year. The vertical black line denotes the week of the election (week 0). The solid black line, which represents the relative weekly numbers for the weeks surrounding the 2000 presidential election, does not suggest any increase in the demand for guns during that period, with the notable exception of the aftermath of the 9–11 terrorist attacks (weeks 45 to 48).¹⁷ It is important to note that, arguably, the gun control debate was a relevant issue during that election race, in part because of the Columbine High School massacre, which occurred one year earlier. In fact, many believe that Al Gore lost his home state Tennessee, and also Arkansas, New Hampshire and West Virginia, due to his vocal pro-gun control stance during the Democratic primaries ([Cowan and Kessler \(2001\)](#)).

¹⁰ [DellaVigna \(2010\)](#) finds no evidence that key events in Obama's election affected either discriminatory behavior among whites or different economic outcomes for blacks. [Mas and Moretti \(2009\)](#) argue that the available evidence does not suggest that racial attitudes negatively affected Obama's vote share in the 2008 presidential election whereas [Stephens-Davidowitz \(2014\)](#) arrives at opposite conclusions – as does some political science research (see for instance, [Hutchings \(2009\)](#)).

¹¹ Gun-related empirical works have mainly relied on the use of proxies for gun prevalence across geographic regions. Different alternatives have been proposed such as gun magazine subscriptions, suicides with guns, percentage of different type of crimes with guns, fatal gun accident rates, NRA members per 100,000 resident population, hunting license rate, carry permits rate, Federal firearms license rate, stock of guns manufactured in United States, and weapon arrests as percentage of total arrests. None of these proxies is pertinent to my work because, to the best of knowledge, they are not available on a monthly basis. Therefore, I am unable to exploit variation within a year in order to study the situation before and after the 2008 presidential election.

¹² Some states use the NICS system for the application and renewal of gun permits or for purchases in secondary markets such as at gun shows. Meanwhile, the NICS figures for Kentucky are greatly inflated since it appears that they have been performing monthly NICS checks on concealed carry permit holders ([Mayors Against Illegal Guns, 2008](#)).

¹³ I find a correlation of 0.70 when using quarterly data for the period 1999–2010.

¹⁴ The correlation with state-level gun ownership as estimated by the Behavioral Risk Factor Surveillance System in North Carolina (henceforth, BRFSS) in 2001 is 0.78. This correlation is high not only in a cross-section but also in a time-series analysis. The correlation of the proxy with the 9-census region level (there is no panel data of gun ownership at the state level) gun ownership from GSS for 5 different waves is 0.84.

¹⁵ See, for instance, [American Firearms Industry Magazine \(2010\)](#).

¹⁶ According to the U.S. Department of Justice, 2007, estimates on the number of gun shows per year range between 2000 and 5200.

¹⁷ There were almost 470,000 more firearm background checks during the six months following the terrorist attacks. The same figures ascend to 1.6 million during the six months following the presidential election day in 2008.

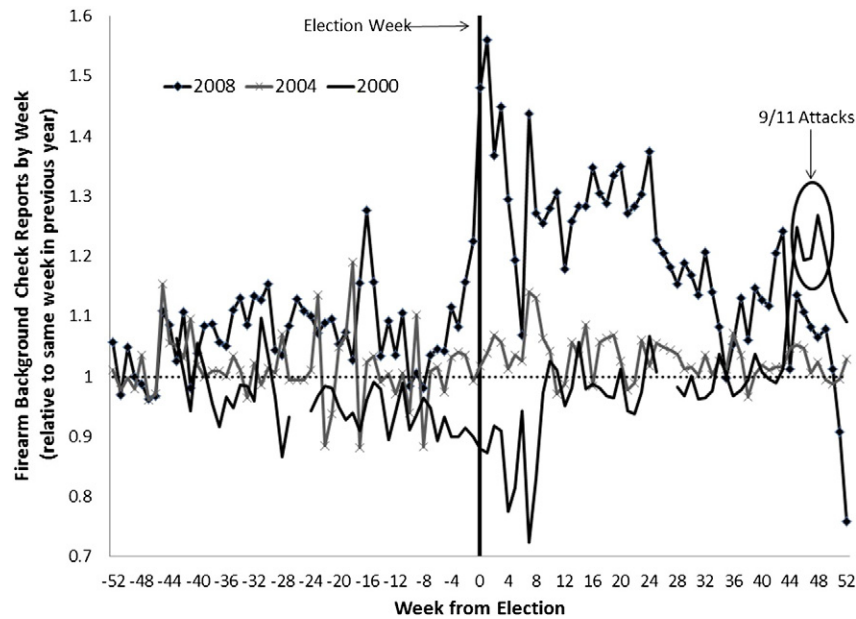


Fig. 1. Presidential elections and firearm background check reports.

No abnormal evolution in the demand for guns during the two-year period surrounding the 2004 presidential election can be inferred from the solid gray line.¹⁸ The implied year-on-year weekly growth rate of the number of background check reports for that period ranges between –10 and 10%. The solid black line with diamond markers shows a sharp increase in the demand for guns during the week of the 2008 presidential election as well as during the ensuing weeks. The average implied year-on-year weekly growth rate of the number of background check reports for the 24-week period following that election is above 30%, with the highest figure of 60% occurring immediately after the election. Additionally, a 30% increase in firearm background check reports took place in mid-July after Obama won the Democratic primaries.

Fig. 2 presents a geographical distribution of year-over-year increases in the demand for guns for the period June–November 2008. I aggregate the data for these cumulative values to facilitate the exposition and emphasize the heterogeneous behavior of the demand for guns during the most important part of the election campaign. I will later exploit monthly variation in the number of firearm background check reports. I divide the map into quintiles in terms of the growth rate of my proxy for the demand for guns. It is worth noting that although, on average, southern states have higher growth rates, there does seem to be some variation even within that region.¹⁹ The states with the highest growth rates, from 28% in Texas to 71% in Utah, are roughly evenly distributed across the U.S. from the East Coast (Connecticut and Rhode Island) and the South (Georgia and South Carolina), to the central part of the Mountain Region (Nevada, Utah, and Colorado) and the West (Alaska and Hawaii). Although the group with the second highest figures is mostly represented by southern states (Florida, North Carolina, Oklahoma, and Tennessee) it also includes such central states as Indiana, Maryland, Kansas, and Delaware. The group of states with the lowest growth rate (growth rates ranging from –35% in Massachusetts to 8% in Pennsylvania) is very heterogeneous not only in terms of geographic location but also in levels of ruralism and average

income. New York, California, and Massachusetts as well as Idaho, Montana, Mississippi, and North Dakota belong to this group.

3. Empirical strategy and results

3.1. Quantifying the Obama effect

3.1.1. The Obama victory effect

Table 1 provides a first statistical test for the existence of an Obama effect in the demand for guns. Using monthly data at the state level for the number of background check reports in per capita terms for the period March 2007–December 2009, I estimate the following equation:²⁰

$$\log(y_{i,t}) = \alpha + \beta * \text{Obama}_t + \gamma * Z_{i,t} + \delta * \tau_t + \lambda_i + \Psi_t + \varepsilon_{i,t} \quad (1)$$

where the subscripts i and t denote state and month respectively. The variable $y_{i,t}$ is the number of firearm background check reports per 1000 inhabitants. Obama_t is a dummy variable that takes the value 1 beginning in November 2008. $Z_{i,t}$ is a monthly indicator accounting for the economic situation at the state level. τ_t is a simple time trend, and λ_i is the state i fixed-effect. The term Ψ_t denotes a collection of time related fixed-effects consisting of season, year, month of year, and month of year $\times$ state fixed-effects. Table 1 presents the main results for the different specifications of Eq. (1). The error term is allowed to be arbitrarily correlated within-state and within-month. I follow the approach in Cameron et al. (2011) and cluster standard errors at the state and at the month levels. All the regressions are weighted by state population in 2008 and include state and year fixed effects to capture time-invariant state characteristics and year specific conditions that may be related to the demand for guns. In order to capture within year specific time variation I also include season fixed-effects in columns 1 and 2, whereas in columns 3 I include month of year fixed-effects.²¹ In the specifications in columns 4 to 5 I include month of year $\times$ state fixed-effects to capture monthly seasonal patterns in the demand for guns that may be state specific.

¹⁸ Due to an internal software problem, the NICS shut down for three days, beginning on May 11, 2000, thus temporarily halting all gun sales nationwide. For that reason, the relative numbers of background checks are artificially underestimated and overestimated for the weeks 26/27 and –26/–27, respectively. I omit those four weeks, which explains the two discontinuities in the solid gray line.

¹⁹ In the robustness checks of the econometric analysis I show that none of the main results are driven by southern states. There is no evidence of spatial autocorrelation in the growth rate of background check reports (Moran's I statistic of 0.0362).

²⁰ I start the analysis in March 2007 in order to be consistent with the rest of the paper. In addition, I use monthly data for states instead of weekly data because the latter is not publicly available through the FBI's NICS section.

²¹ Gun sales peak during the Fall, when hunting season begins, and during the holidays; they reach their lowest levels during the Summer.

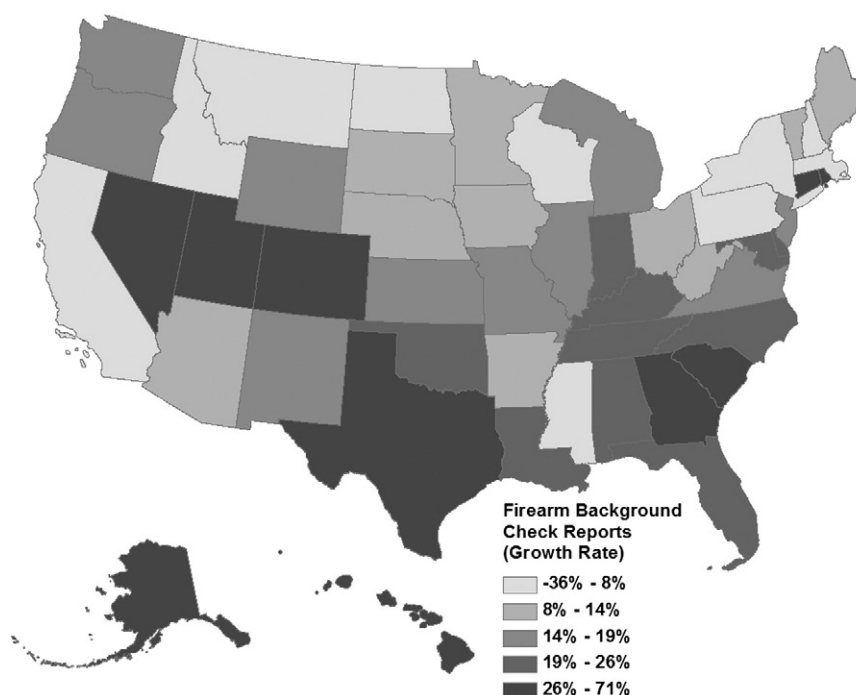


Fig. 2. Growth in background checks by state (June–November 2008 vs June–November 2007).

Column 1, where I consider $\gamma = \delta = 0$, suggests that the demand for guns significantly positively correlates with Obama's election. The point estimate from my semi-log specification indicates that Obama's election victory is related to a 37.8% increase in the demand for guns (i.e., $100 \times (e^{0.32} - 1) = 37.8$). The next specification in column 2 includes a time trend that does not affect the previous finding. The introduction of month of year, and month of year $\times$ state fixed-effects in columns 3 and 4 leads to almost identical point estimates. In column 5 I control for expectations regarding the future state of the economy. There is no substantial empirical evidence for a strong causal link for economic conditions on crime rates (see Cook and Wilson (1985), and Freeman (2001) among others). However, if people perceive the existence of such a causal mechanism, it is possible that the demand for guns presents a counter-cyclical behavior. That is, during a recession, a fear of future crime due to an expected deterioration in economic conditions could make people more willing to buy guns. Inasmuch as the election of Obama in 2008 coincided with worsening economic

conditions, omitting variables related to the business cycle such as might potentially affect the demand for guns would introduce a bias on the estimation of the Obama effect. I add a monthly leading indicator to account for the six-month forecast of the growth rate of the coincident index.²² As expected, the introduction of this economic indicator reduces the size of the main Obama effect. A one-point expected decrease in the six-month growth rate is statistically associated with 2% increase in the demand for guns. Nonetheless, the "Obama effect" remains statistically large: the election of Obama is associated with an almost 25% increase in the demand for guns, the equivalent of the induced effect of an enormous expected economic downturn (i.e.; an approximately 15 point decrease in the expected growth rate of activity in one year).

3.1.2. Incorporating information from future market on election outcomes

I now focus on the 2008 presidential election race and the month immediately following the election. More specifically, I examine how changes in the perception that Barack Obama would likely win the election affected the demand for guns. I continue basing my empirical analysis on the period March 2007–December 2009.²³ Using data from the Iowa Electronic Market (IEM) I construct a proxy for the probability of Obama winning the presidential election (see Knight, 2006 for discussion on the IEM). The IEM provides information about two future markets relevant to my purposes: one where payoffs were determined by the outcomes of the 2008 U.S. National Convention of the Democratic Party and another where the outcome depended on the results of the 2008 U.S. Presidential election.²⁴ The price of the asset in the first market accounts for the probability of Obama winning the primaries

Table 1
Obama victory effect.

Dependent variable: Log of criminal firearm background checks per 1000 inhabitants					
	(1)	(2)	(3)	(4)	(5)
Obama _t	0.321*** (0.0251)	0.304*** (0.0297)	0.295*** (0.0267)	0.295*** (0.0437)	0.214*** (0.0425)
Leading Indicator _{t,t}					−0.0221*** (0.00537)
State FE	Y	Y	Y	Y	Y
Season FE	Y	Y	N	N	N
Year FE	Y	Y	Y	Y	Y
Trend	N	Y	Y	Y	Y
Month of year FE	N	N	Y	N	N
Month of year–state FE	N	N	N	Y	Y

***Significant at the 1%. **Significant at the 5%. *Significant at 10%. Standard errors adjusted for two-way clustering within states and within months in parentheses. Obama takes the value 1 starting November 2008, 0 otherwise. All models are weighted by state population in 2008. All specifications included constant (not reported). Sample size is 1700 state-month observations (50 states). The leading indicator for each state predicts the six-month growth rate of the coincident index.

²² The coincident index combines four state-level indicators (i.e.: non-farm payroll employment average hours worked in manufacturing, unemployment rate, and real wage and salary disbursement) in a single statistic to summarize current economic conditions (Clayton-Matthews and Crone, 2005). The leading indicator is produced by the Federal Reserve Bank of Philadelphia.

²³ March 2007 is the first month in my analysis because it was on February 10th, 2007, that Barack Obama announced his candidacy for president.

²⁴ To have a better sense of the thickness of the IEM, an average of 450 units were traded daily for the contracts linked to the democratic primaries (i.e., concerning whether Obama, Clinton, or Edwards won the primaries).

while the price of the asset in the second market accounts for the probability of a Democratic candidate winning the presidential election.²⁵ By multiplying these two probabilities I obtain a proxy for the probability of Barack Obama being elected president. Given that in my new specification I attempt to disentangle the Obama effect from an overall Democrat effect, I also construct another control variable denoted the probability of other Democrat candidates winning the presidential election using the same aforementioned approach. My new identification strategy is summarized by the following equation:

$$\log(y_{i,t}) = \alpha + \beta * P(\text{Obama})_t + \gamma * P(\text{Democ. Obama})_t + \rho * Z_{i,t} + \delta * \tau_t + \lambda_i + \psi_t + \varepsilon_{i,t} \quad (2)$$

where $P(\text{Obama})_t$ and $P(\text{Democ. Obama})_t$ are the 2008 election victory probabilities for Barack Obama and any other Democrat candidates respectively, as implied by future contracts from the IEM.²⁶ The remaining right-hand-side variables are the same as those defined in Eq. (1). Table 2 presents the main results for the different specifications of Eq. (2). In column 1, where I consider $\gamma = \rho = 0$, the point estimate suggests that a 10 point increase in the probability of Obama winning the election is statistically associated with a 4.3% increase in the demand for guns. The Democrat Party has long been identified with gun control. Therefore, if a fear of future gun control policies was operating during the election campaign, it could be expected that regardless of the identity of the candidate, so long as he or she was a Democrat, advocates of gun rights would buy more guns in the event of a Democrat was more likely to win. In order to differentiate an Obama effect from a Democrat effect, I control for the probability of any other Democrat candidates being elected in column 2. As expected, due to the fact that the two probabilities are (strongly) negatively correlated, the Obama effect is much larger than in the first specification while the precision of the estimate is improved ($\beta = 0.54$, $sd = 0.034$). Note also that the probability of other Democrats being elected is significantly and positively related to the demand for guns but the size of the coefficient estimate is smaller.

The point estimate for the Obama effect decreases to 0.508 when I add a time trend in column 3. The addition of month of year fixed effect in column 4 does not substantially affect the estimation of the Obama effect. Finally, the introduction of month of year $\times$ state fixed-effects in columns 5 – arguably the most conservative specification – reduces the size of the main Obama effect to 0.453, though does not affect its statistical significance. The point estimate for the leading indicator variable remains fairly constant across specifications.²⁷ Not weighting the regression by state population leads to very similar point estimate for the “Obama effect” (i.e.; $\beta = 0.44$, $sd = 0.107$) whereas it reduces by 30% the size of the point estimate for the probability of other Democrats being elected (results not reported).

3.2. Potential mechanisms

In this section I exploit heterogeneity in state characteristics, such as strength of gun laws and racial animus, interacted with time variation in the likelihood of Obama being elected to shed light on potential mechanisms underlying the Obama effect.²⁸

²⁵ In order to build a monthly probability value I use all the daily available information on prices and transactions for a given month. The final monthly value is the result of the weighted average of the daily available prices, where the daily price is the average price of the day and the weights are the shares of total daily transactions of the total number of monthly transactions.

²⁶ Note that the variable $P(\text{Obama})$ takes the value 1 from November 2008 onwards, while the variable $P(\text{Democ. Obama})$ takes the value 0 from September 2008 onwards. See the robustness check for the results omitting the November 2008 aftermath.

²⁷ Adding a time-varying control for the evolution of consumer expectations at the national level (using either the Reuters/University of Michigan Index of Consumer Sentiment or the Conference Board's Consumer Confidence Index[®]) does not explain away the estimated Obama effect (results not shown).

²⁸ Summary statistics for the most relevant variables are displayed in Table 10.

Table 2
Obama effect.

Dependent variable: Log of criminal firearm background checks per 1000 inhabitants					
	(1)	(2)	(3)	(4)	(5)
$P(\text{Obama})_t$	0.434*** (0.0533)	0.546*** (0.0341)	0.502*** (0.0433)	0.456*** (0.0517)	0.453*** (0.0892)
$P(\text{Democ. Obama})_t$		0.437** (0.212)	0.539*** (0.179)	0.481*** (0.100)	0.485*** (0.149)
Leading Indicator _{it}	−0.0153* (0.00803)	−0.0182** (0.00820)	−0.0227*** (0.00767)	−0.0223*** (0.00643)	−0.0228*** (0.00687)
State FE	Y	Y	Y	Y	Y
Season FE	Y	Y	Y	N	N
Year FE	Y	Y	Y	Y	Y
Trend	N	N	Y	Y	Y
Month of year	N	N	N	Y	N
FE					
Month of year–state FE	N	N	N	N	Y

***Significant at the 1%. **Significant at the 5%. *Significant at 10%. Standard errors adjusted for two-way clustering within states and within months in parentheses. $P(\text{Obama})$ is the probability of Obama winning the election constructed from IEM. All models are weighted by state population in 2008. All specifications included constant (not reported). Sample size is 1700 state-month observations (50 states). The leading indicator for each state predicts the six-month growth rate of the coincident index.

3.2.1. Fear of gun control

The stockpiling of firearms as a reaction to potential restrictions on gun purchases seems a reasonable and plausible explanation for the surge in sales in a context with forward looking agents who recognize Democrats as being more prone to support gun control laws, saw that Obama was leading in the polls, and were bombarded by constant negative advertising about his position on gun issues.²⁹

Consistent with this line of argument is that the trend in attitudes toward gun control started to show a substantial change coming up on the 2008 presidential election. According to Smith (2007), support for stricter regulation on the sales and possession of firearms was widespread in 2006.³⁰ However, since 2008, there has been increasing support for gun rights (Pew Research Center 2010).³¹

The existence of statistically significant coefficients for either the dummy Obama or the probability of Obama winning the election, as documented in the previous section, does not constitute evidence that stockpiling decisions originated out of fears of future anti-gun laws. It is possible that some people were making the decision to buy guns based on impressions corresponding not only to Obama's stance on gun control but also to other perceived characteristics related to Obama's identity (even independent of his race). For instance, people may have perceived his Muslim sounding name as indication of a potential threat to their security. Other people may have perceived Obama as a potential socialist and as being against American values. In order to identify a gun-control fear mechanism underlying the Obama effect I estimate different specifications of the following two equations:

$$\log(y_{i,t}) = \alpha + \beta * \text{Obama}_t + \gamma * \text{Obama}_t \times WGC_i + \sum \delta_s * \text{Obama}_t \times X_{s,i} + \rho * Z_{i,t} + \lambda_i + \psi_t + \varepsilon_{i,t} \quad (3)$$

²⁹ The NRA spent 7 million dollars advocating the position that Obama posed a serious threat to “Second Amendment rights” (Brady Campaign to Prevent Gun Violence, 2008). This figure represents more than thirty times the amount devoted against Al Gore in 2000 (Brady Campaign to Prevent Gun Violence, 2008).

³⁰ According to the National Opinion Research Center more than 80% of those surveyed favored criminal background checks for all sales of guns, including private sales between individuals, and requiring a police permit to buy guns.

³¹ In April 2007, the fraction of people who said it is more important to control gun ownership was almost double the fraction of people who said it is more important to protect gun rights (See Fig. S.1 in the online appendix). However, that gap began to shrink just prior to the 2008 election and it completely closed by March 2010. Interestingly, the Tucson Shooting of January, 2011 did not appear to affect gun control preferences.

Table 3
Obama effect and gun-control fear.

Dependent variable: Log of criminal firearm background checks per 1000 inhabitants						
	Panel A: F (Obama) = Obama			Panel B: F (Obama) = P (Obama)		
	(1)	(2)	(3)	(1)	(2)	(3)
F (Obama) _t	0.0125 (0.0770)	0.185* (0.111)		0.191* (0.111)	0.422*** (0.152)	
F (Obama) _t * Weakness State Gun Control _i	0.337*** (0.118)	0.375*** (0.110)	0.358*** (0.113)	0.491*** (0.164)	0.539*** (0.145)	0.521*** (0.149)
State FE	Y	Y	Y	Y	Y	Y
Season FE	Y	Y	N	Y	Y	N
Year FE	Y	Y	N	Y	Y	N
Month FE	N	N	Y	N	N	Y
Additional interaction terms	N	Y	Y	N	Y	Y
Mean Obama effect	0.290	0.275	–	0.596	0.578	–
Chi ² -test Obama effect	137.5	125.5	–	115.5	158.9	–

***Significant at the 1%. **Significant at the 5%. *Significant at 10%. Standard errors adjusted for two-way clustering within states and within months in parentheses. Obama takes the value 1 starting November 2008, 0 otherwise. P (Obama) is the probability of Obama winning the election constructed from IEM. All models are weighted by state population in 2008. All specifications included constant and the leading indicator as control (not reported). Sample size is 1700 state-month observations (50 states). The leading indicator for each state predicts the six-month growth rate of the coincident index. Columns (1) and (2) in Panel B include the Probability of other democrats winning the election as control. The additional interaction terms are F (Obama) * Average Republican Margin and F (Obama) * Gun ownership.

$$\log(y_{i,t}) = \alpha + \beta * P(Obama)_t + \beta^d * P(Democ-Obama)_t + \gamma * P(Obama)_t * WGC_i + \sum \delta_s P(Obama)_t * X_{s,i} + \rho * Z_{i,t} + \lambda_i + \Psi_t + \varepsilon_{i,t} \quad (4)$$

Eq. (3) focuses only on the actual victory of Obama, while Eq. (4) incorporates information regarding the market consensus on the likelihood of Obama being elected president. WGC_i is a measure of the stringency of gun laws based on the 2008 Brady Score Card for state i . The Brady Center to Prevent Gun Violence computes a state score card that grades, each state from 0 to 100, according to the strength of its gun laws (the higher the score, the stronger the state gun laws). I define $WGC_i = (100 - 2008\text{BradyScoreCard}_i)/100$ thus the higher the value of WGC_i , the weaker the state gun law.³² $X_{s,i}$ is a vector of characteristics s for state i such as might correlate with both the demand for guns and the strength of state gun laws. I pay special attention to the characteristics Republican prevalence and gun ownership levels. I include a Republican prevalence interaction term for two reasons. First, I wish to account for a proxy of conservative concern that also correlates with lower levels of gun control, inasmuch as the values associated with the gun culture are mostly politically related to the Republican party, which has historically been against gun control measures (Spitzer, 1988; Gimpel, 1998). Note, however, that empirical research linking ideology with attitudes toward gun control has shown mixed results (Curry and Jobu, 2001). Second, given the two party system of the United States, a person who is “afraid of Obama” is more likely to be Republican. The inclusion of the last interaction terms attempts to control for the fact that gun ownership is more common among Republicans and Conservatives (Curry and Jobu, 2001; Azrael et al., 2007) and also higher in states with weaker state gun control. Republican prevalence is measured as the average margin of votes for the Republican candidates in 1992, 1996, 2000, 2004, and 2008 presidential elections whereas gun ownership levels are 2001 household estimates from the Behavioral Risk Factor Surveillance System in North Carolina (BRFSS).³³

Panels A and B in Table 3 present regression outcomes for Eqs. (3) and (4), respectively. The variables $Z_{i,t}$, λ_i , and Ψ_t are the same as those defined for Eqs. (1) and (2). Given that the interaction terms are not demeaned I report the implied Obama victory effect (i.e., $P(Obama) = Obama = 1$) at the mean value of interacted variables along with the Chi squared-statistics for the null hypothesis $\beta = \gamma = \delta_s = 0$ (i.e., no existence of

the Obama effect). Finally, the coefficient γ captures the differential Obama effect in the demand for guns for state with weaker gun laws. $\gamma > 0$ is therefore consistent with the hypothesis of the existence of a firearm stockpiling reaction induced by fears of stronger legal restrictions on guns.³⁴

The results in column 1 in Panel A of Table 3 are consistent with the existence of a large effect of Obama's election on the demand for guns (Chi squared-statistic 137.5 for the null $\beta = \gamma = 0$). More importantly, the point estimates for γ suggests that there was a differential increase in sales in states with less state gun control. The magnitude of the effect is large. The point estimates suggest, for instance, that assuming Obama's election, states with no compulsory universal background checks and gun purchase permit requirements (25 points in the Brady Score) hypothetically experienced a demand for guns 8.4% larger than states with those requirements in 2008. The addition of the other interaction terms in column 2 does not substantially affect the size of γ but does improve its statistical precision (the t-statistic increases by more than 20%). The point estimates for the other interaction terms are not reported in order to save space. Nonetheless, they suggest that following Obama's election, the demand for guns was also higher in states with a higher Republican prevalence but smaller in states with high levels of gun ownership.³⁵ The addition of month fixed-effects in column 3 does not substantially affect the results for γ . In sum, the election of Obama implied a differential increase in the demand for guns with low levels of gun control and a mean effect of around 29% (mean Obama effect = $\exp(\hat{\beta} + \hat{\gamma} \times \overline{WGC} + \sum \hat{\delta}_s \times \overline{X}_s) - 1$).

In Panel B of Table 3, I present the regression outcomes for different specifications of Eq. (4). After controlling for state, season, and year fixed-effects, the probability of other Democrats being elected and the expected growth rate of economic activity, the point estimate for γ in column 1 in Panel B suggests that a 0.1-point increase in the WGC is statistically associated with an additional 5% increase in the demand for guns. Accounting in column 2 for both Republican prevalence and gun ownership interacting with the probability of an Obama victory in column 2 does not affect the size of the differential effect (significant

³² See Table S.1 for each state score card.

³³ I also allow flexibility in the functional form for the interaction terms. Table S.2 in the online appendix includes the specifications for which the interaction terms are discrete variables. In those additional regressions $WGC(X_{s,i})$ is a dummy variable for whether state i has a value of $WGC(X_{s,i})$ below (above) the median.

³⁴ Although there are no accurate statistics about the exact number and location of gun shows, Lott (2003) collected state level figures for the period 1989–2001 from the Gun Show Calendar. Using this data I find that the prevalence of gun shows is negatively associated with some different measures of state gun control laws. If the “gun control fear” hypothesis is correct, one would expect to see an increase in the demand for guns in the secondary market (inclusive of gun shows) as well. Should that be the case, the negative correlation between the weakness of state gun laws and the prevalence of gun shows would suggest that my point estimates for γ should be interpreted as lower bounds.

³⁵ This pattern holds across all of the specifications in this paper.

Table 4
Obama effect and race bias.

Dependent variable: Log of criminal firearm background checks per 1000 inhabitants						
	Panel A: F (Obama) = Obama			Panel B: F (Obama) = P (Obama)		
	(1)	(2)	(3)	(1)	(2)	(3)
F (Obama) _t	−0.0317 (0.157)	0.0892 (0.146)		0.181 (0.234)	0.336 (0.216)	
F (Obama) _t * Prejudice _t	0.435* (0.244)	0.466*** (0.180)	0.423** (0.186)	0.544 (0.361)	0.576** (0.271)	0.522* (0.277)
State FE	Y	Y	Y	Y	Y	Y
Season FE	Y	Y	N	Y	Y	N
Year FE	Y	Y	N	Y	Y	N
Month FE	N	N	Y	N	N	Y
Additional interaction terms	N	Y	Y	N	Y	Y
Mean Obama effect	0.237	0.251	–	0.518	0.545	–
Chi ² -test Obama effect	275.6	16.82	–	211.2	295.9	–

***Significant at the 1%. **Significant at the 5%. *Significant at 10%. Standard errors adjusted for two-way clustering within states and within months in parentheses. Obama takes the value 1 starting November 2008, 0 otherwise. P (Obama) is the probability of Obama winning the election constructed from IEM. All models are weighted by state population in 2008. All specifications included constant and the leading indicator as control (not reported). Sample size is 1700 state-month observations (50 states). The leading indicator for each state predicts the six-month growth rate of the coincident index. Columns (1) and (2) in Panel B include the probability of other Democrats winning the election as control. The additional interaction terms are F (Obama) * Average Republican Margin and F (Obama) * Gun ownership.

at 1% level). The addition of month fixed-effect in columns 3 does not substantially affect the results, namely: (i) the implied partial effect of an Obama victory at the mean value of the interacted controls is consistent with roughly 60% increments in the demand for guns; and (ii) in line with a pattern consistent with a fear of future gun control measures, the Obama effect is statistically larger in states with weaker gun control laws. The point estimate in the most conservative case (column 4 wherein I include state and month fixed-effects), suggests that the fear of the hypothetical implementation of the same gun measures currently existing in California (the state with the strongest gun control measures according to the Brady Campaign) results in an Obama effect more than 32.5% larger in Arizona. In addition, for all specifications I obtain large Chi squared-statistics for the null hypothesis $\beta = \gamma = \delta_s = 0$.

3.2.2. Race bias

It could be argued that, despite the NRA's negative advertising; there was no clear rationale for believing ex-ante that Obama's gun policies would be considerably more restrictive than those of Hillary Clinton or John McCain. Although Obama had consistently supported gun control measures in the past (Brady Campaign to Prevent Gun Violence, 2008), he also repeatedly claimed to advocate upholding and respecting the "Second Amendment".³⁶ The fact that Obama did not have a especially stronger anti-gun record or campaign position relative to John McCain and Hillary Clinton – both of whom have had been criticized by the NRA prior till then (see Rostron, 2009; Lapierre, 2008, respectively) – begs the question as to why the likelihood of his being elected should induce a surge in gun sales.

Focusing on local biracial elections, Rich (1989) argues that Black candidates may induce "intense apprehensions and fear" among Whites. Northwood et al. (1978) suggest that White working class antipathy toward Blacks partially explained the rise of gun ownership in the urban non-South during the 1970s. In this vein, the election of the first Black president may have represented a unique driver for racial tension, especially among prejudiced people.³⁷ Can prejudice partially

account for the unusual surge in gun sales documented in the previous section? In order to study this question I consider regressions of a similar form to those in Eqs. (3) and (4) and focus on the interaction between a measure of racial attitude toward Blacks at the state level and time-varying information regarding the likelihood of Obama becoming president. The prejudice measure comes from Stephens-Davidowitz (2014) and is based on the volume of (normalized) Google search for racially charged language.^{38,39}

The two panels in Table 4 emulate Table 3. I continue controlling for the interaction terms including Republican prevalence and gun ownership in order to partially account for differences in conservatism. Any measure of prejudice against Blacks may have a component of symbolic racism such as arguably confound with conservative ideology (Feldman and Huddy, 2005). The results in column 1 in Panel A suggest that Obama's election is statistically associated with a 24% increase in the demand for guns for a state with mean values of prejudice. The point estimate ($\hat{\gamma} = 0.423$) from column 3 in Panel A suggests that a two standard deviation increase in the level of racial animus (for instance, Louisiana's racial animus level is two standard deviation above Virginia's) implies an additional 12% increase in the demand for guns when Obama was elected. The coefficient estimates for all the other covariates are consistent with the ones obtained in Table 3. Additionally, the Chi squared-statistics for the hypothesis testing of the existence of an Obama effect are very large. The implied Obama effects evaluated at the mean are slightly smaller for all of the specifications but remain very similar to the ones documented in Table 3.

I find a larger effect for prejudice when using market prices from IEM in Panel B. The coefficient estimates for the prejudice interaction terms are positive and statistically significant in all of the specifications but one, indicating a pattern consistent with racial sentiments playing a role in the unusual increase of the demand for guns during my period of analysis. The magnitude of this race related effect is very large. For instance, the most conservative estimation implies that a hypothetical

³⁶ For example, at a campaign rally in Lebanon, Virginia, on September 9, 2008, Obama stated: "I believe in the second amendment. I believe in people's lawful right to bear arms. I will not take your shotguns away. I will not take your rifle away. I won't take your handgun away...there are some common-sense gun safety laws that I believe in. But I am not going to take your guns away".

³⁷ There is some anecdotal evidence suggestive of this possibility. The major white nationalist web site temporarily shut down in the days following the presidential election due to the large amount of internet traffic (see Wright (2010)) and Huppke (2009)), while the Southern Poverty Law Center (2009) reported an increased activity among racialized right-wing groups. Homeland Security (2009) noted that "the high volume of purchases and stockpiling of weapons and ammunition by right-wing extremist (...) [is a] primary concern to law enforcement".

³⁸ Stephens-Davidowitz (2014) racial animus measure is based on the percentage of searches in a given state that included explicit racially derogatory terms during the period 2004–2007.

³⁹ A measure of prejudice is not required to be perfect for the purposes of my estimations; it only needs to provide some indication of differences in the extent of racial prejudice across states. Nevertheless, one should expect some measurement error in this Google-based proxy for prejudice (Stephens-Davidowitz, 2014). Under classical errors-in-variables, an OLS estimation of my prejudice interacted term will likely be underestimated and bias the results against finding statistically significant results. Notwithstanding, the magnitude and nature of the measurement error in this variable are not clear, and I find similar results when using different prejudice measures (see Table S.7 in the online appendix).

Table 5
Both hypotheses together.

Dependent variable: Log of criminal firearm background checks per 1000 inhabitants	(1)	(2)	(3)
$P(\text{Obama})_t$	−0.0474 (0.197)	0.175 (0.188)	
$P(\text{Obama})_t * \text{Weakness State Gun Control}_i$	0.463*** (0.147)	0.486*** (0.129)	0.476*** (0.135)
$P(\text{Obama})_t * \text{Prejudice}_i$	0.385 (0.259)	0.470* (0.245)	0.420* (0.253)
State FE	Y	Y	Y
Season FE	Y	Y	N
Year FE	Y	Y	N
Month FE	N	N	Y
Additional interaction terms	N	Y	Y
Mean Obama effect	0.572	0.549	–
Chi ² -test Obama effect	112.2	180.2	–

***Significant at the 1%. **Significant at the 5%. *Significant at 10%. Standard errors adjusted for two-way clustering within states and within months in parentheses. $P(\text{Obama})$ is the probability of Obama winning the election constructed from IEM. All models are weighted by state population in 2008. All specifications included constant and the leading indicator as control (not reported). Sample size is 1700 state-month observations (50 states). The leading indicator for each state predicts the six-month growth rate of the coincident index. Columns (1) and (2) include the probability of other Democrats winning the election as control. The additional interaction terms are $P(\text{Obama}) * \text{Average Republican Margin}$ and $P(\text{Obama}) * \text{Gun Ownership}$.

2 standard deviation increase in the level of average prejudice is statistically associated with a 15% increment in the demand for guns following Obama's election.

3.3. Robustness checks and extensions

In this section, I consider a variety of robustness checks. The results in Table 5 provide evidence that the two aforementioned mechanisms are not necessarily competing or mutually excludable.⁴⁰ In Table 6 I report the unweighted results. The point estimates for the weak state gun control interaction term tend to be around 30% smaller than those in Tables 3, 4, and 5, whereas the standard errors are 50% larger. Nonetheless, the point estimates are still statistically different from zero at the 10% level. The differences between the weighted and unweighted results would suggest that the fear of gun control effect should be larger in more populous states and that weighting improves the precision of the estimations. For the prejudice interaction term, the point estimates tend to be smaller and only statistically significant at the 14–19% level. The mean Obama effect is still significantly different from zero and remains in the order of 50%.

In Table 7 I explore the sensitivity of my results to the inclusion of region-specific linear trends, state-specific linear trends, and state-specific quadratic trends. The addition of unit-specific time trends substantially improves the precision of the point estimates for the fear of gun control effect. On the other hand, it greatly increases the standard errors for the prejudice interaction term and reverses the sign of its point estimate when the linear trend is specific to the states (p-value of 0.75). Nonetheless, I cannot reject the null hypothesis that the point estimates for the prejudice interaction term in Table 7 are statistically different from the ones presented in Table 5.

In the online appendix I discuss several additional robustness checks: exclusion of the aftermath of November 2008 (Table S.5); the use of poll data, instead of futures market data (Table S.6); the use of different measures to account for prejudice (Table S.7); the exclusion of southern states (Table S.8); controlling for the probability of another Democrat candidate winning the election and its interaction with the

⁴⁰ To save space Table 5 only reproduces specifications with the probability of an Obama Victory and with continuous interaction terms (to be compared with the panels B in Tables 3 and 4). The same qualitative results remain for Panels A (see Table S.4 in the online appendix).

Table 6
Unweighted results.

Dependent variable: Log of criminal firearm background checks per 1000 inhabitants	(1)	(2)	(3)	(4)	(5)	(6)
$P(\text{Obama})_t$	0.522** (0.203)	0.565*** (0.195)	0.361 (0.247)			
$P(\text{Obama})_t * \text{Weakness State Gun Control}_i$	0.401* (0.229)		0.403* (0.210)	0.403* (0.230)		0.405* (0.213)
$P(\text{Obama})_t * \text{Prejudice}_i$		0.302 (0.210)	0.304 (0.207)		0.274 (0.216)	0.276 (0.213)
State FE	Y	Y	Y	Y	Y	Y
Season FE	Y	Y	Y	N	N	N
Year FE	Y	Y	Y	N	N	N
Month FE	N	N	N	Y	Y	Y
Additional interaction terms	Y	Y	Y	Y	Y	Y
Mean Obama effect	0.502	0.498	0.498	–	–	–
Chi ² -test	64.84	61.93	63.13	–	–	–

***Significant at the 1%. **Significant at the 5%. *Significant at 10%. Standard errors adjusted for two-way clustering within states and within months in parentheses. $P(\text{Obama})$ is the probability of Obama winning the election constructed from IEM. All specifications included constant and the leading indicator as control (not reported). Sample size is 1700 state-month observations (50 states). The leading indicator for each state predicts the six-month growth rate of the coincident index. Columns (1) to (3) include the probability of other Democrats winning the election as control. The additional interaction terms are $P(\text{Obama}) * \text{Average Republican Margin}$ and $P(\text{Obama}) * \text{Gun Ownership}$.

Table 7
Adding unit-specific trends.

Dependent variable: Log of criminal firearm background checks per 1000 inhabitants	(1)	(2)	(3)	(4)
$P(\text{Obama})_t * \text{Weakness State Gun Control}_i$	0.476*** (0.135)	0.355*** (0.0902)	0.246*** (0.0576)	0.245*** (0.0679)
$P(\text{Obama})_t * \text{Prejudice}_i$	0.420* (0.253)	0.225 (0.393)	−0.158 (0.458)	−0.153 (0.472)
Unit specific trend	None	Region	State – Linear	State – Quadratic
State FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
Additional interaction terms	Y	Y	Y	Y

***Significant at the 1%. **Significant at the 5%. *Significant at 10%. Standard errors adjusted for two-way clustering within states and within months in parentheses. $P(\text{Obama})$ is the probability of Obama winning the election constructed from IEM. All models are weighted by state population in 2008. All specifications included constant and the leading indicator as control (not reported). Sample size is 1700 state-month observations (50 states). The leading indicator for each state predicts the six-month growth rate of the coincident index. The additional interaction terms are $P(\text{Obama}) * \text{Average Republican Margin}$ and $P(\text{Obama}) * \text{Gun Ownership}$.

relevant state characteristics (Table S.8); inclusion of lags in monthly crime (Table S.8); accounting for heterogeneity based on cross-state differences in consumer confidence, income, previous levels of crime and other demographic characteristics such as share of rural population and relative share of Black population (Table S.8); and using an alternative measure as my dependent variable based on Google searches for the term “guns” (Table S.9).

I now focus on the evolution of gun sales during the 2012 election race in order to analyze whether the fear of gun control presents some systematic feature. Nonetheless, in light of the fact that the Obama administration did not push any substantial gun control legislation during its first term, one should expect a weaker Obama effect (if any) in the 2012 election. On the other hand, the NRA opposed Obama's re-election under the premise that this event would harm gun owner's rights.⁴¹ Fig. 3 (Panel A) plots the evolution of weekly Google searches for the term “gun control” for the 2008 (black solid line) and 2012

⁴¹ See, for example, <http://www.nrapublications.org/index.php/11920/obamas-secret-plan-to-destroy-the-second-amendment-by-2016/>.

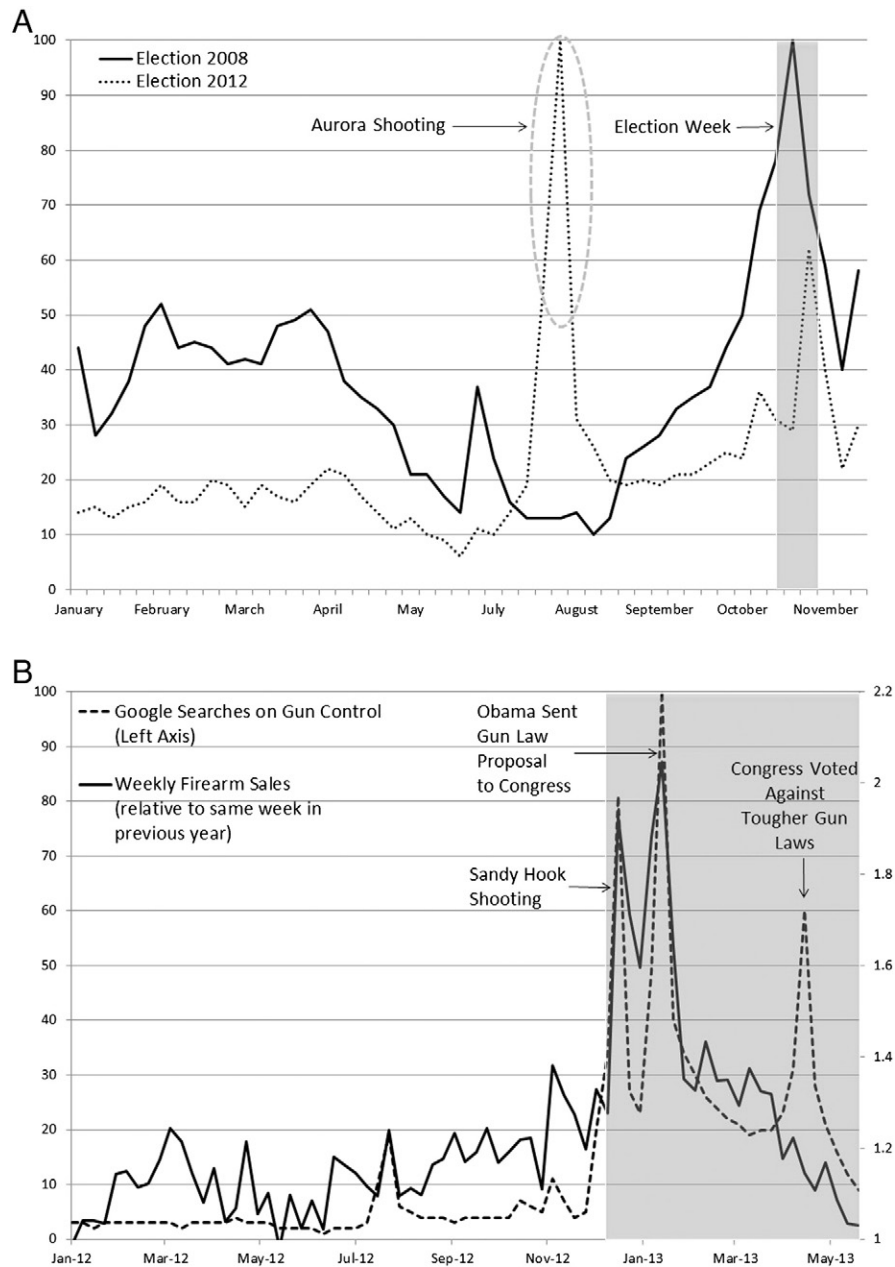


Fig. 3. Gun control interest.

(black dashed line) election periods. Each series shows the intensity of interest in gun control issues during each period of analysis (i.e., January through November of the election year) and reaches the value 100 at the highest peak of internet searches for the term “gun control” (note that the levels are not meant to be compared between series). Although gun control concerns were more prevalent during the last months of the 2008 election campaign (peaking in November 2008) one can still identify a substantial volume of internet searches between February and May 2008 as well as a local peak in July when Obama won the primaries. Conversely, “gun control” searches for the period January–November 2012 were almost exclusively concentrated during the week following the mass shooting that took place in Aurora, Colorado (albeit there was a local peak during the week just prior to election-day).

Extending the series of weekly searches for “gun control” to mid-2013 so as to include the aftermath of the Sandy Hook Elementary

School shooting (which occurred on December 14, 2012, in Newtown, Connecticut) reveals some striking phenomena: First, “gun control” concerns proxied by Google searches are extremely responsive to gun-related events. The black dashed line in Fig. 3 (Panel B) reaches its highest peaks the week following the Sandy Hook shooting, the weeks during which Obama both sent a gun legislation proposal to the congress (on January 2013), and gave the “A shameful day for Washington” speech after the U.S. Senate voted against tougher gun legislation (in April 2013). Note that Google searches after the Aurora shooting are now relatively low. The second striking fact is the strong correspondence between these gun control concerns and weekly firearm sales (proxied by background check reports). The solid black line in Fig. 3 (Panel B) represents weekly firearm sales for those weeks relative to the same weeks during the previous year. Weekly firearm sales almost doubled the week after the Sandy Hook, likewise the week during which Obama proposed a new gun legislation.

Table 8
Proximity to 2012 election.

Dependent variable: Log of criminal firearm background checks per 1000 inhabitants	(1)	(2)	(3)	(4)	(5)
P (Obama) _t * Weakness State Gun Control _i	0.980*** (0.179)	0.611* (0.358)	0.577 (0.527)		
Sandy Hook _t * Weakness State Gun Control _i		0.234* (0.131)	0.275 (0.186)	0.266*** (0.0523)	0.386*** (0.0543)
State FE	Y	Y	Y	Y	Y
Month FE	Y	Y	Y	Y	Y
State-specific linear trend	Y	Y	Y	Y	Y
Additional interaction terms P (Obama)	Y	Y	Y	N	N
Additional interaction term Sandy Hook	N	N	N	Y	Y
Regression weighted by population	Y	Y	N	Y	N

***Significant at the 1%. **Significant at the 5%. * significant at 10%. Standard errors adjusted for two-way clustering within states and within months in parentheses. P (Obama) is the probability of Obama winning the election constructed from IEM. All specifications included constant and the leading indicator as control (not reported). Sample size is 1500 state-month observations (50 states). The leading indicator for each state predicts the six-month growth rate of the coincident index. The additional interaction terms for P (Obama) are Average Republican Margin, Gun Ownership, and Prejudice. Sandy Hook is a dummy taking the value of 1 in December 2012 and January 2013. The additional interaction terms for Sandy Hook are Average Republican Margin and Gun Ownership. The index of weakness of state gun control is based on the Brady Score Card for 2011.

Table 8 presents a formal statistical test for the aforementioned results. The point estimate in column 1 suggests that the demand for guns was much higher in states with weaker gun laws when the probability of Obama winning the 2012 election increased.⁴² If I include an interaction term between weak gun control and a dummy to account for the Sandy Hook shooting (taking a value of 1 for December 2012 and January 2013) the previous result becomes statistically weaker though remains significant at the 10% level. The point estimate for the interaction between the probability of an Obama victory and a weak gun control indicator is no longer statistically significant if I do not weight the regressions. Columns 4 and 5 focus on the interaction between the Sandy Hook event and weak state gun control. Regardless of the weighting procedure, the point estimates suggest that the demand for guns was much larger in those states with the weaker state gun control immediately after the shooting.⁴³ Since Sandy Hook event undoubtedly renewed the debate on gun control, the aforementioned statistical results strengthen the “fear of gun control” hypothesis.

4. Discussion

4.1. Dynamic of the stockpiling behavior

I now analyze the dynamic effect of the fear of an Obama victory by looking at the evolution of my proxy for gun purchases in the months following Obama's election. The purpose of this analysis is to shed some light on whether the documented Obama effect only represented a short-lived intertemporal substitution effect with no major implication for the total stock of guns in circulation. If the Obama effect was just an intertemporal substitution effect one would expect a sharp

decline in monthly purchases at some points in the months following Obama's election. This reversion effect should be more evident for those states that had the highest increases in sales during the election campaign. Notably, one would also expect to some degree a mean-reversion effect given that the increases during the election campaign were unusually large. I therefore estimate the following equation for each month from December 2008 to December 2012:

$$\Delta \text{Guns}_i = \alpha + \beta \Delta \text{Guns Obama}_i + e_i \quad (5)$$

where ΔGuns_i is the year-over-year growth rate in my gun proxy for the state i for a given month following Obama's election. The variable $\Delta \text{Gun Obama}_i$ is the year-over-year growth rate for the time period July 2008–November 2008 (i.e; during the presidential election campaign). Fig. 4, where I plot the forty nine estimated coefficients along with their 95% confidence intervals, displays a very large increase in the demand for guns in the immediate aftermath of the 2008 election followed by a small contraction, insufficient to justify the explanation that the documented effect was a mere intertemporal substitution in the purchase behavior of firearms.

4.2. Did this unusual increase in the flow of guns due to Obama's election raise the stock of guns in circulation?

Unfortunately, detailed data on gun ownership is scarce. In particular, no data on the evolution of gun ownership at the state level exists to test across different states whether Obama's election had an effect on the fraction of households owning guns. Moreover, available data from the NICS allows for no distinction between people buying guns for the first time and gun owners increasing their stocks. Nonetheless, I find evidence consistent with the hypothesis that the Obama effect had a heterogeneous effect on the number of guns in circulation. In Fig. 5 I plot the evolution from 2003 to 2012 of the average quarterly firearm background check reports per 1000 inhabitants (notice that this is a flow) for the states that saw increases above (i.e; a large Obama effect) and below the median (i.e; a small Obama effect) during the election campaign.⁴⁴ Fig. 5 shows that the two categories of states saw a similar demand for guns prior to the 2008 election. Beginning with the 2008 election campaign, however, the two series start to diverge suggesting that the stock of guns in “large Obama effect” states became permanently larger. In fact, four years after the election, the demand for guns is 30% larger in the states that had the largest increases during the election campaign.

In the online appendix I show evidence for a group of selected states – that is, for which data were available – of a substantial increase in the number of concealed carry weapons and gun permits during the period 2007–2009 (See Table S.11). I also construct a time series of the stock of firearms and show that almost 50 million additional guns have been consumed since 2008 (see Fig. S.2).

4.3. Implications of the Obama effect: crime and shooting events

I now investigate whether states that experienced the largest increases in gun sales (which also translates into permanent increases in the stock of guns, as discussed above) had any significant impact on crime relative to other states. I construct quarterly crime data for the time period 2004–2012. Crime data comes from two datasets produced

⁴² Due to future market data availability I focus on the time period July 2011–December 2013 (Thus, the probability of Obama winning the election takes a value of 1 beginning in November 2012). When focusing on the interaction between the probability of an Obama victory and the weakness of state gun control I use the Brady Score for 2011.

⁴³ These point estimates are conditional on the interactions of Sandy Hook indicator with gun ownership rates and Republican prevalence – point estimates not shown –, state fixed effects, month fixed effects, an economic leading indicator, and state-specific trends.

⁴⁴ The two series in Fig. 5 have been deseasonalized using a multiplicative method. The “large Obama effect” states are: Alabama, Alaska, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Indiana, Kentucky, Louisiana, Maryland, Michigan, Nevada, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, Texas, Utah, Washington, and Wyoming.

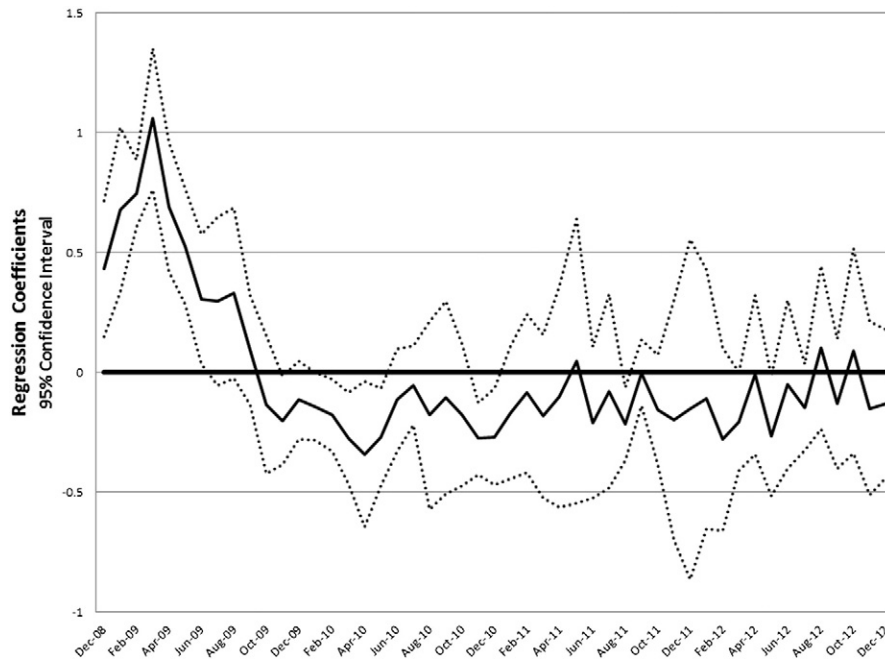


Fig. 4. Election race increases and post-election demand for guns.

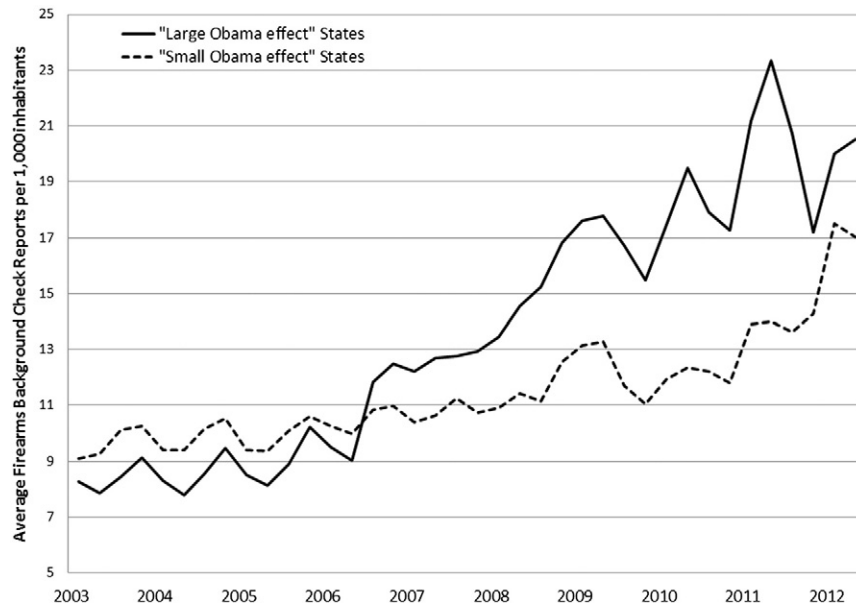


Fig. 5. Evolution of quarterly demand for guns by type of states.

by the Uniform Crime Reporting Program.⁴⁵ I conduct my analysis by running the following specifications:

$$y_{i,t} = \alpha + \beta * \text{Treated}_i \times \text{AfterObama}_t + X'_{i,t} \gamma + \delta_t + \theta_i + \eta * T_t \times \theta_i + e_{i,t} \quad (6)$$

⁴⁵ The main dataset is “offenses known and clearances by arrest” wherein I exploit data corresponding to different crime categories (i.e., total crime, violent crime, property crime, homicide, murder, manslaughter, and violent crime committed with a gun). I excluded data from Alabama and Florida because in most of those states’ counties, offenses are mainly reported bi-annually. The second dataset is “supplementary homicide reports” wherein I exploit data on homicides committed with a gun (murder and manslaughter) as well as the number of shooting events (defined as events where 3 or more people were killed by a gunman). The datasets were obtained from ICPSR data collections. See the on-line appendix for the bibliographic citation.

where $y_{i,t}$ is the outcome variable of interest. I focus on 11 different outcomes: Firstly, I focus on total crime, violent crime, property crime, homicide, murder, and manslaughter. Secondly, I focus on those outcomes in which the type of weapon used is known.⁴⁶ The variable Treated_i defines the “treatment” group and takes the value 1 for those states that saw increases in the demand for guns above the median during the election campaign (i.e; “large Obama effect” states, as discussed above). The variable AfterObama_t takes the value 1 beginning with the last quarter of 2008. The parameter of interest is thus β , which measures the differential change in the outcome under study for the “treatment” group following Obama’s election.

⁴⁶ Apart from the shooting event indicator, all the variables are in logs.

Table 9
Obama effect and crime.

Dependent variable	Coefficient estimates for Treated States; * After Obama _t		
	(1)	(2)	(3)
Log of total crime (n = 1692)	−0.00704 (0.0338)	0.00467 (0.0211)	0.0162 (0.0165)
Log of violent crime (n = 1692)	−0.0157 (0.0179)	−0.00805 (0.0138)	0.00857 (0.0140)
Log of property crime (n = 1692)	−0.000967 (0.0397)	0.0115 (0.0256)	0.0201 (0.0200)
Log of homicide (n = 1692)	0.0502 (0.0317)	0.0561* (0.0303)	0.0173 (0.0664)
Log of murder (n = 1692)	0.0429 (0.0333)	0.0503 (0.0316)	0.0591 (0.0683)
Log of manslaughter (n = 1692)	0.258 (0.169)	0.239 (0.174)	−0.0197 (0.115)
Log of violent crime with gun (n = 1692)	0.205 (0.178)	0.150** (0.0636)	0.132* (0.0792)
Log of homicide with gun (n = 1467)	0.0853** (0.0417)	0.0846* (0.0432)	0.0793 (0.101)
Log of murder with gun (n = 1690)	0.0712* (0.0360)	0.0718* (0.0382)	0.0684 (0.0894)
Log of manslaughter with gun (n = 1469)	0.115 (0.123)	0.117 (0.123)	0.0337 (0.0647)
Shooting event indicator (3 or more killed) (n = 1692)	0.185* (0.0918)	0.211** (0.0960)	0.200*** (0.0726)
State FE	Y	Y	Y
Quarter FE	Y	Y	Y
State-specific linear trend	Y	Y	Y
Economic controls	Y	Y	Y
Four lags of log of total crime	N	Y	Y
Weighted by population	Y	Y	N

Note: This table displays the estimated coefficients for the interaction between Treated States and After Obama for several regressions.

Coefficients in a given row correspond to regressions with the same dependent variable (listed at the left). Each column represents a different specification (depending on the addition of controls or weighting method implemented).

***Significant at the 1%. **Significant at the 5%. *Significant at 10%. Standard errors clustered at state level in parentheses. All specifications include state-quarter observations for 2004–2012. Treated are the states that had increases in the number of fire-arm background check reports above the median during the period June–November of 2008. After Obama takes the value 1 starting the fourth quarter of 2008. Economic controls are log of coincident index and state leading indicator.

The point estimates for β are displayed in Table 9. Each row in the table represents a different outcome, which is listed at the left. For each outcome variable I run three different specifications, which are presented in columns 1 through 3. All of the specifications include state fixed effect, quarter fixed effect, state-specific trends, and two controls to account for changes in the economic environment.⁴⁷ All the regressions for the first two specifications (columns 1 and 2) are weighted by population in 2008. The second and third sets of specifications include 4 lags of the log of total crime so as to account for crime dynamics. The last set of specifications (in column 3) present the unweighted results.⁴⁸

As is clear from the coefficient estimates, total crime, violent crime, property crime, homicide, murder, and manslaughter are not statistically different for the “treatment” states after the election of Obama. On the contrary, there is a stronger statistical relationship when considering crimes committed with guns. For most of the specifications I find that the “treatment” states experienced more crime with guns following Obama's election. Nonetheless, the results are statistically weaker when the regressions are not weighted by population essentially because the standard errors more than double in all cases. Except for

Table 10
Summary statistics.

Variable	Level of variation	Mean	Std. dev.	Min	Max	Observations
Ln of # BCR/1k inhab.	Overall	1.20	0.74	−1.23	3.88	N = 1700
	Between		0.70	−0.87	3.60	n = 50
	Within		0.25	0.33	2.01	T = 34
Prob (Obama), from IEM	Overall	0.58	0.37	0.09	1.00	T = 34
Prob (Democrat-Obama), from IEM	Overall	0.14	0.17	0.00	0.44	T = 34
	(within)					
Leading indicator (Prediction of Six-month growth rate)	Overall	−0.96	1.88	−8.46	3.64	N = 1700
	Between		0.86	−3.84	0.86	n = 50
	Within		1.67	−6.95	3.40	T = 34
Weakness of State Gun Control Laws	Overall	0.82	0.18	0.21	0.98	n = 50
Prejudice	(between)					
	Overall	0.62	0.14	0.33	1.00	n = 50
	(between)					
Average Republican Margin	Overall	0.01	0.14	−26.03	30.77	n = 50
	(between)					
Gun Ownership	Overall	0.38	0.13	0.09	0.60	n = 50
	(between)					

BCR: background check reports. N, n, and T denote state-month, state, and month observations respectively.

Weakness of Gun Control indicator is based on Brady State Score Card 2008. Prejudice measure comes from Stephens-Davidowitz (2014).

Average Republican Margin is based on all the presidential elections from 1992 to 2008. Gun Ownership comes from BRFSS 2001.

the log of manslaughter with guns (which is a much rarer event), the point estimates are not substantially different between weighted and unweighted cases. The “treatment” states experienced between 8 and 15% more crime with guns following Obama's election. Finally, “treatment” states were 20% more likely to experience a shooting event (an event where 3 or more people were killed by a gunman) after the election of Obama.⁴⁹

5. Conclusions

Using monthly data constructed from futures markets on presidential election outcomes and monthly-state information on a novel proxy for demand for guns, I document a large Obama effect on the demand for guns. I present evidence consistent with the hypothesis that the unusual increase in the demand for guns was partially driven by fears of Obama's future gun-control policy. The evidence for a motivation based on racial prejudice is less conclusive.

I provide additional evidence for the gun control fear explanation by showing that the demand for guns substantially increased in the aftermath of the Sandy Hook shooting, arguably one of the most salient moments for the gun control debate. The sensitive response of the demand for guns to the public debate on gun control, as an apparent reaction to expected restrictions in the future, has important policy implications. For instance, a gun policy aimed at reducing the number of guns in circulation may have unintended consequences: increasing the demand for guns. I argue that the Obama effect did not represent a short-lived intertemporal substitution effect and permanently affected the stock of guns in circulation. Moreover, states that saw the largest increases in the demand for guns during the 2008 election campaign experienced significant changes in some categories of crime relative to other states following Obama's election. In particular, those states were 20% more likely to experience a shooting event where at least three people were killed.

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jpubeco.2015.04.008>.

⁴⁹ One-fourth of the state-quarter observations recorded at least one shooting event during the period 2004–2012.

⁴⁷ The controls are the log of coincident index and the leading indicator.

⁴⁸ The figures for murder and manslaughter from the two datasets employed are not identical. I thus exclude state-quarter observations (less than 15% of the sample) where the differences in the counts of manslaughters and murders are larger than one standard deviation (3 for the case of manslaughter and 90 for the case of murder).

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