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Ain't no Silver Bullet?
Gun Laws and Suicide in the US♣

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Abstract

We revisit the effect of gun laws on suicide rates in the US states in the past 30 years by departing from the correlational analysis inherent in the previous literature and, instead, leveraging an instrumental variable (IV) approach based on policy convergences between contiguous states. The empirical analysis relies on the estimated gun law stringency constructed as the number of gun laws per state-year. Our causal results show that the gun control stringency significantly reduces firearm suicide rates (both in correlational and IV estimations), corroborating previous findings; yet this decline does not translate into fewer overall suicides – contrary to what was previously found in correlational studies. This novel finding suggests that gun laws are not effective in curbing overall suicide rates.

JEL classification: I12, I18, Z18

Keywords: Gun laws; Suicides; Endogeneity; Instrumental variables; US states

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1 Introduction

In 2021, a record number of 48,830 people were killed with a firearm in the United States. While homicides and mass shootings receive a lot of media attention, the majority of firearm-inflicted fatalities were suicides (54%, CDC 2024), roughly half of them committed with guns. The US has the highest suicide rate among the G7 countries (14.5 per 100,000 population) and ranks in the highest quartile among OECD countries (WHO 2024). At the same time, the US has one of the highest gun ownership shares and one of the most permissive gun laws worldwide. This begs the question of whether the stringency of gun laws has an impact on suicide rates, gun-inflicted and overall, or, put differently, whether more restrictive gun laws could have saved the lives of suicidal individuals.

Early research has found a positive correlation between gun prevalence and firearm suicide rates in the US in the 1970s (Markush and Bartolucci 1984); a finding that has been corroborated by Anestis and Houtsma (2018) for the continental US states in 2013. They find that overall suicide rates are positively related to gun ownership but much less so than firearm suicide rates. Kposova et al. (2016) related 2011-13 suicide rates for 49 US states to 2013 gun ownership data and find a significant positive association. Yet, it remains unclear to what extent gun laws are responsible for the difference in suicide rates across American states. Studdert et al. (2020) calculate the hazard rates for suicide of 21 years and older Californian residents over a period of 12 years and find that hazard rates for overall suicides were more than three times higher for male gun owners than for males not owning a gun; for females the hazard rate was above 7, both effects being driven by much higher firearm suicide rates for gun owners. As the purchase of a gun is a deliberate decision, it remains unclear, however, whether the ownership of the gun as such gives rise to a higher likelihood of suicide or whether individuals deciding to acquire a gun are more likely to be suicidal.[1]

In addition, the problem with this approach is that data on gun ownership (by state and year) are unavailable. Gun ownership data have been derived from nationally representative surveys that are probably not representative at the state level and that are only very

[1] A third factor, for instance the degree of masculinity in culture, could affect gun ownership rates and suicide rates at the same time even without a causal relationship between these variables.

infrequent (Markush and Bartollucci 1984, Kposova et al. 2016, Anestis and Houtsma 2018).[2] Vitt et al. (2018) use the number of background checks as a proxy for increases in gun ownership and they instrument background checks by Google Trends search intensity for terms "second amendment" or "gun ban" hypothesizing that this would proxy the fear of future gun restrictions and therefore lead to increased present gun sales. Yet, the FBI data on background checks is highly unreliable as a proxy for changes in gun ownership,[3] Google Trends data have been shown to be inaccurate and not to portray long-run trends (Cebrián and Domenech 2023, Eichenauer et al. 2021); these endogenous searches could very well have other motivations than fear of future restrictions that lead to additional gun purchases, and if at all, they would only proxy for additional purchases, not for gun ownership. Moreover, Miller et al. (2017) show in an online survey in 2015 that 22 percent of all gun owners who acquired a gun in the past 2 years did so without a background check, with a strong difference between states that regulate private firearm sales and those that do not.

The only convincing evidence on the relationship between gun ownership and suicide stems from outside the US. Balestra 2018 shows that in Switzerland, a reform that reduced the prevalence of military-issued guns (accounting for half of the guns in private households) has led to a significant decline in suicide rates. Leigh and Neill (2010) and Duenow and Connelly (2023) analyze a program in Australia implemented in 1996 that made specific types of firearms, mostly automatic and semiautomatic long arms, illegal and offered a buyback at market prices. This almost halved the number of households with firearms and has led to a decline in firearm suicides by almost 80 percent.[4] These large-scale interventions were nonexistent in the US; gun regulations changed in a more incremental way. And while part of the effect of tightened gun laws may work through reduced gun ownership, the data do not allow for assessing the effect of gun restrictions on gun ownership in the US. Moreover, gun ownership is not an actionable parameter – gun laws are.

[2] Markush and Bartollucci (1984) use four waves of the National Opinion Research Center surveys for 1973, 1974, 1976, and 1977 with 1,500 respondents each and for nine census divisions; Kposova et al. (2016) and Anestis and Houtsma (2018) use gun ownership data for 2013 only, which were compiled by an online survey of YouGov.

[3] For instance, Florida has zero permits for Nov 1998 through March 2013 with 10 single digit exceptions and 30 permits in one month in between, in April 2013 it jumps from zero to 29479. Illinois has 125,075 permits in July 2016, 17,735 a month later, and 911 in March 2017. These are just two examples in a data set which contains many consecutive zeros for a substantial number of states and months.

[4] Chapman et al. (2016), however, observed a decline in non-firearm suicides following the Australian buyback program, suggesting a pre-existing downward trend in suicides that complicates a causal interpretation of the relationship between gun laws and suicide rates.

The impact of gun laws on suicide rates in the US has been the subject of several studies. Edwards et al. (2018) analyzed the effect of mandated delays between handgun purchases and delivery on suicide and found a small but significant reduction in firearm and overall suicide rates. Lott and Whitely (2001) could not find any effect of safe storage laws on overall suicide rates. Ghiani et al. (2019), using an index of gun law stringency by Siegel et al. (2017), found in a panel analysis for 2005-2015 that increasing the number of gun laws was associated with fewer suicides. Siegel et al. (2019) studied the effect of ten gun laws on suicide rates for the 50 states in 1991 – 2016 and found that only the junk gun law reduced the number of suicides, and the permitless carry law increased them; gun ownership was not associated with suicide rates. In a cross-section approach for 2014/15, Kalesan et al. (2016) found that only firearm identification laws reduced suicide rates. Kappelman and Fording (2021) showed that relatively strict child access prevention laws and minimum age requirements have reduced youth suicides.

While early studies have been largely correlational and cross-sectional, subsequent panel studies have used difference-in-difference estimation techniques (Ghiani et al. 2019; Siegel et al. 2019). Yet, all of the extant studies suffer from potential endogeneity problems such as omitted variable bias or reverse causality, as changes in gun laws are not exogenous but the consequence of deliberate policy decisions. For instance, gun laws may be tightened in response to exceptionally high or rising suicide and homicide rates; a subsequent decline in the rates may be due to tighter gun laws or simply due to a reversal to the long-term mean.[5] The endogeneity concern thus raises an important question: do gun laws effectively reduce suicide, or do the previous findings arise due to the endogeneity of gun law-making?

We propose a novel solution to the endogeneity of gun laws: we introduce an instrumental variable (IV) approach using a well-known feature of the American legislative environment – cross-state policy diffusion, which occurs when policymaking in a given state is directly affected by the policies adopted by the contiguous states. The policy diffusion has been widely documented in studies on state policies in general (e.g., Bricker and LaCombe 2021), including gun laws (e.g., LaCombe et al. 2022), and other specific policies such as state lotteries (Berry and Berry 1990), abortion policies (Mooney and Lee 1995), smoking restrictions (e.g.,

[5] For instance, Goel and Nelson (2023) show that gun laws are introduced in response to mass shootings.

Desmarais et al. 2015; Shipan and Volden 2006; Gilardi et al. 2021), or tax policies (e.g., Gordon and Lee 2007; Aghion et al. 2016).

We construct the instrument variable for the state's gun law stringency - measured as the number of gun control laws in the current state - by averaging the number of gun laws in the neighboring states in the previous year. This approach is in line with other studies using regional averages as an instrument: see, for example, Fisman and Svensson (2007) for corruption in Uganda, Gründler and Potrafke (2019) for corruption across the world, and Alavuotunki et al. (2019) for tax policies in the international setting. Then, we perform the IV estimation of firearm-related and total suicide rates on the number of gun laws in the state with a two-way fixed effects estimator (TWFE) and various control variables for the panel of the US states from 1992 to 2020. Alongside the IV estimations, we also provide results for a typical TWFE OLS regression used in previous studies as a benchmark.

We arrive at two main findings. First, we find a substantial and economically significant negative effect of the gun law stringency on firearm-related suicide rates in both OLS and IV estimation, in line with the previous literature. This demonstrates also that the number of gun laws serves as a valuable proxy for the overall restrictiveness of gun regulations. Yet, second, the IV estimation for overall suicide rates shows a null effect of gun laws, suggesting a substitution effect of non-firearm suicide for firearm suicide, which has been overlooked in previous studies using OLS estimations (which we are also able to reproduce in our analysis). Our findings update the prevalent belief that stricter gun laws are a solution for reducing overall suicides when, in fact, their effect is limited to preventing only firearm-inflicted suicides.

Our paper makes several contributions. First, we advance the literature on the effects of gun control laws by introducing a new instrument to overcome endogeneity concerns, which may also be applied in studies on other firearm-related violence and crime. Second, the instrument additionally highlights the existence of gun control policy diffusion in the US states. Finally, our analysis draws a more nuanced picture of the relationship between gun law stringency and suicide rates by firearms and overall suicide.

The paper is structured as follows: Section 2 describes the data and trends in suicide and gun laws in the US. Section 3 presents the results. Section 4 concludes.

2 Data

Our analysis is at the state-year level, covering all 50 US states over the period of 1992-2020 (N=1450).[6]

2.1 Gun Laws

Our main explanatory variable of gun control stringency is the number of gun laws in each state and year. Data on gun laws were obtained from Michael Siegel and the State Firearm Laws Database, which provides state-year level observations on the presence of 133 specific firearm law provisions for the years 1992-2020 in the 50 US states (*State Firearm Law Database*, 2020). This database was compiled using both the Thompson Reuters Westlaw database of state statutes and laws and a database built by Everytown for Gun Safety (Siegel et al., 2017; Siegel et al., 2019).

Our data show that the number of gun control laws was increasing due to policy innovations: the average state had about 17 gun laws in 1992, then reached 22 laws in the early 2000s, and finally, had 28 laws in the last year of our period under investigation. Figure 1 plots the map of the evolution of gun law numbers by state over the years (1992, 2000, 2010, 2020). This map not only captures the overall dynamics in the rising number of gun laws but also visually confirms the hypothesis of the convergence of gun policy, with, for example, gun laws increasing in numbers around three main growing clusters centered in New York State, Illinois, and California – where the neighboring states gradually adopt more and more laws.

2.2 Firearm Suicides

The variables of interest are annual suicide rates per 100,000 of the state's population. The data for all 50 US states comes from the Center for Disease Control (CDC). The mortality files contain an extensive set of variables from death certificates, including data for state of

[6] District of Columbia is not included in the analysis due to the lack of data.

residence, year of death, race, sex, age group, and cause of death. The CDC suppresses information on deaths when the overall number of deaths is less than 10; however, in our time period, it affects only the female suicide rates, which we were able to back out by subtracting male suicides from total suicides, therefore, preserving a complete set of observations.

We differentiate between firearm-inflicted and total suicides to evaluate both the direct and aggregate effects of gun laws. To illustrate how the rates of the two categories evolved over time, we plot suicide rates by firearms and overall suicide rates in Figure 2. It also includes the trend in the average number of gun control laws. We plot the trends for all 50 States in Panel A and then separately for three almost equally sized subgroups of states where the number of laws either decreased between 1992 and 2020 (n=17), increased moderately (n=17), or increased significantly (n=16).

Panel A shows that the average number of gun laws has grown substantially over the period under investigation, but that did not seem to deter firearm-related suicides in the long run: suicide rates by firearms were high in the 1990s, then declined until 2007, after which they grew again and reached a level somewhat higher than the 1992 level. This pattern of relatively stable firearm suicide rates can be observed across all three subgroups of states classified by the change in the number of gun laws between 1992 and 2020. The picture is different for overall suicide rates, which show persistent and substantial growth for all the states (Panel A), but also in the three subgroups (Panels B – D). Overall, these trends tell an interesting story of a general upward trend in total suicide rates that, however, matched the upward trends in firearm suicides only in states where gun laws were decreasing in numbers (Panel A), potentially indicating an ability of gun laws to contain growth in firearm suicides. The relationship between gun laws and overall suicide, however, remains less clear.

2.3 Control Variables

The choice of control variables is motivated by the previous literature (see, for example, Siegel et al., 2019; Knopov et al., 2019; and Kappelman & Fording, 2021) and includes unemployment rates and logarithm of per capita income (collected from the Bureau of Labor Statistics), share of the population living in poverty (Historical Poverty Tables, in %), number of law

enforcement officers to control for state capacity (obtained from FBI Uniform Crime Reports (UCR) and the Crime Data Explorer, in logs), alcohol consumption (from the National Institute on Alcohol Abuse and Alcoholism (NIAAA), measured as gallons of ethanol per capita in logs), demographic characteristics (from US Census) such as population size (in logs) and a gender ratio of young men to women, share of African-American and Hispanic populations, and the political affiliation of the state governor. All control variables are lagged by one year. Descriptive statistics are found in Table A1 in the appendix.

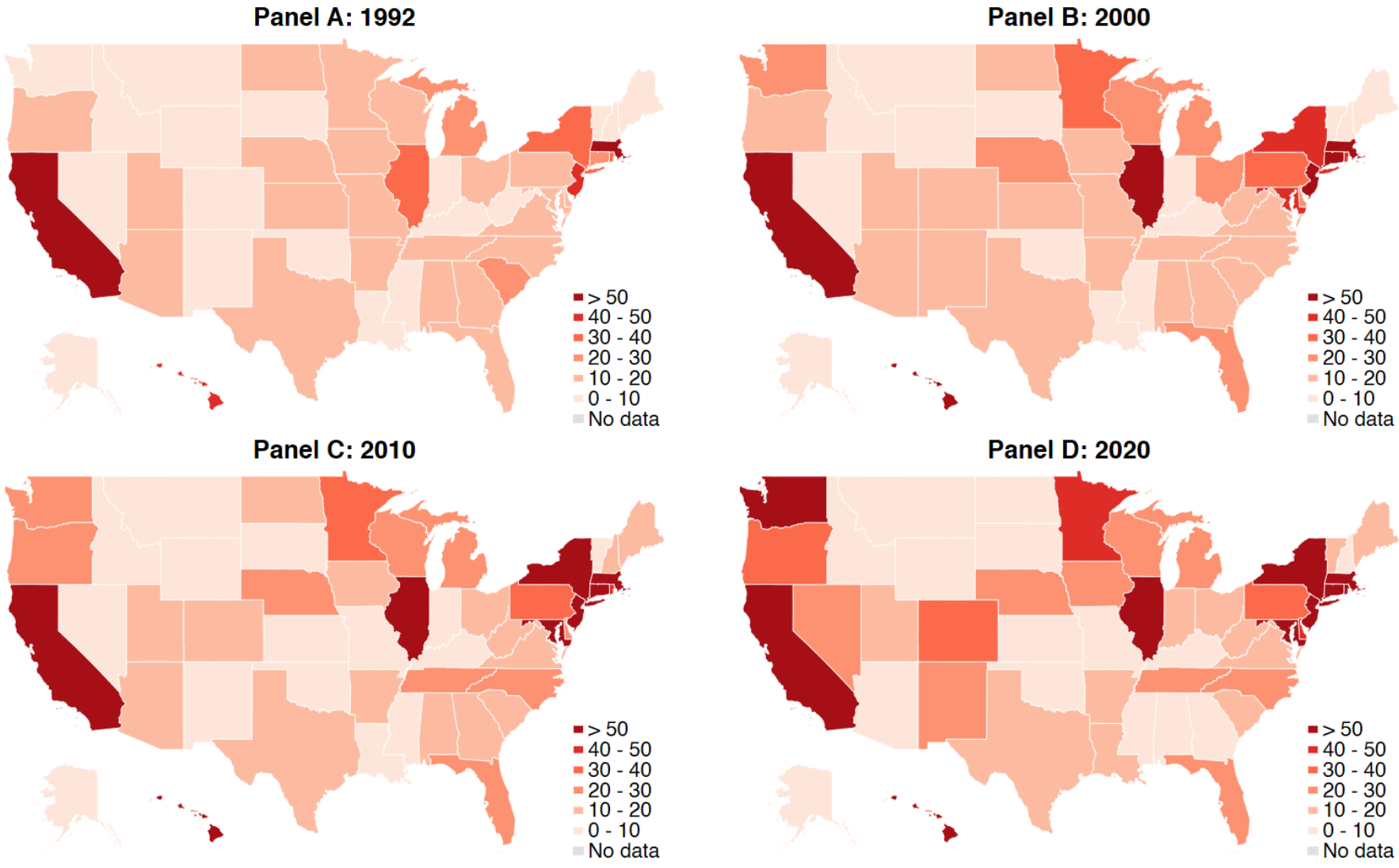

Figure 1: Gun laws by state.

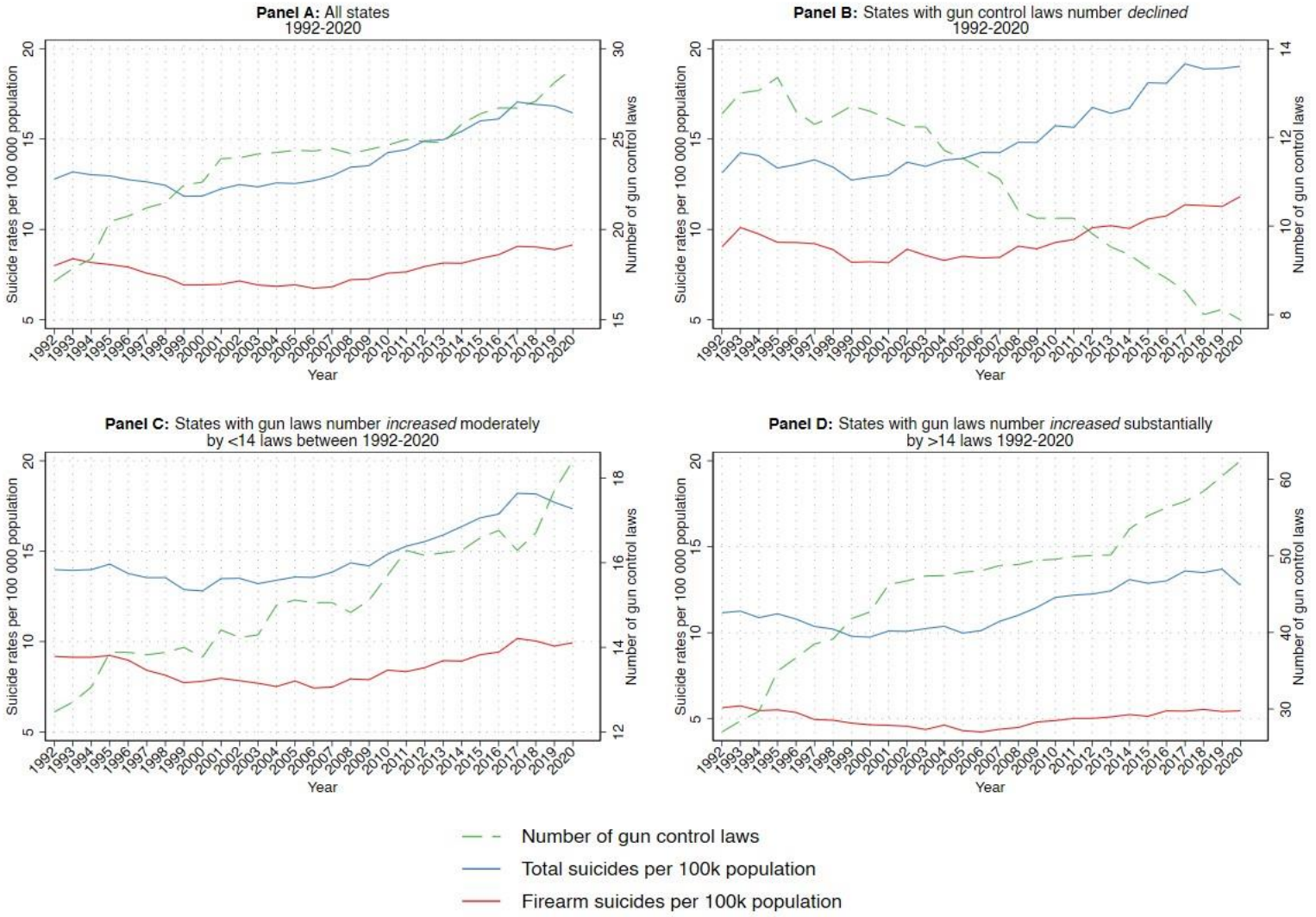

Figure 2: Trends in suicide rates by firearms and total and gun laws: total averages and by tertiles

2.4 Empirical Strategy

First, we employ a two-way fixed effects OLS model standard in the literature to test the correlation between gun laws and suicide rates (firearm-related and total) in the following form:

$$Suicides_{it} = \alpha + \beta Laws_{it} + X_{it-1} + \mu_i + \tau_t + \varepsilon_{it}, \quad (1)$$

Where *i* and t indicate state and year; $Suicides_{it}$ is a dependent variable, which is either firearm or total suicides per 100,000 population in logarithmic form; $Laws_{it}$ represents the number of laws in the state-year; X_{it-1} is a vector of lagged control variables; μ_i and τ_t are state and year-fixed effects, respectively. This regression specification is intended as a benchmark – a quasi-replication of the previous studies.

Our main specification is an instrumental variable estimation. It addresses the endogeneity of gun laws prevalence in each state by instrumenting it with a past level of gun control laws in the contiguous states (*regional average*). The instrument is rooted in policy diffusion across the states – a well-known feature of the US legislative activity (e.g., Desmarais et al. 2015; LaCombe et al. 2020; Bricker and LaCombe 2021; Gilardi et al. 2021).

To corroborate the diffusion channel, we empirically test the relationship between a given state's gun laws and the neighboring states' past-year gun laws. The results of this estimation and robustness checks are reported in Table 1. We find a strong positive effect of gun laws in contiguous states in the previous year on the current number of gun laws in each state, regardless of including control variables (Columns 1 and 2). In Column 3, we test a range of lags and leads for our instrument and confirm that the effect is driven by the neighbors' average in the previous year.[7] Additionally, to ensure the robustness of the results to spatial autocorrelation, we estimate the relationship controlling for lagged suicide rates in neighboring states – with firearm suicides in Column 4 and overall suicides in Column 5. In both estimations, we find no significant effect of suicide rate averages on the state's number of gun laws. Finally, we acknowledge that some states have only a few neighbors and, thus, our instrument might be less appropriate for those cases. To address this issue, we exclude six states with fewer than three neighbors (Florida, Alaska, Rhode Island, Maine, South

[7] The magnitude of the coefficient is significantly smaller due to multicollinearity.

Carolina, and Hawaii) in our baseline specification (Column 6). The predictive power of our instrument only increases in this case. Consequently, we use the two specifications – for the full sample and restricted samples as the first stage for our IV estimations (columns 2 and 6, respectively).

Table 1: Gun law policy diffusion across neighboring states

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:			Number of Gun Laws			
Neighboring Average Gun Laws: Lag 1	0.488***	0.349***	0.080**	0.314**	0.345**	0.495***
	(0.141)	(0.127)	(0.038)	(0.124)	(0.135)	(0.138)
-- Lag 2			0.003			
			(0.067)			
-- Lag 3			0.134			
			(0.096)			
-- Lag 0 (current)			0.04			
			(0.078)			
-- Lead 1			0.048			
			(0.068)			
-- Lead 2			0.052			
			(0.081)			
-- Lead 3			0.057			
			(0.098)			
Neighboring Average Firearm Suicides: Lag 1				-5.631		
				(4.963)		
Neighboring Average Total Suicides: Lag 1					-1.115	
					(7.042)	
Controls	No	Yes	Yes	Yes	Yes	Yes
Observations	1400	1400	1150	1400	1400	1232
N of States	50	50	50	50	50	44
R squared	0.95	0.96	0.97	0.96	0.96	0.96

Notes: SE clustered at the state level in parentheses; * indicate $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All estimations include state and year FE. List of controls: Income per capita (log), poverty rate, unemployment rate, alcohol consumption (ethanol per capita, log), number of police officers per capita (log), the gender ratio of young men to women, share of Hispanic population, share of the Afro-American population, political affiliation of the governor of the state (1 if Republican, 0 otherwise). Estimations 1-5 include the full sample; estimation 6 includes only US states with three or more neighboring states (this excludes Florida, Alaska, Rhode Island, Maine, South Carolina, and Hawaii).

3 Results

3.1 Main results

We present our baseline results in Table 2. Columns 1 and 2 in Panel A demonstrate a significant and negative correlation between gun laws and firearm suicide rates in a standard TWFE OLS estimation with and without controls, respectively. The magnitude is relatively moderate, with one standard deviation in the number of gun laws associated with about three percent of a standard deviation in firearm suicides. The effect is statistically significant and of a larger magnitude in estimations that use past averages in gun laws in the contiguous states as an instrument, explaining 4-10 percent of a standard deviation in the dependent variable due to a one standard deviation change in the number of gun laws. The consistency across all estimations suggests a causal negative effect of gun laws on firearm suicide rates.

However, the results are different when we turn to total suicide rates as a dependent variable. While the OLS TWFE estimations produce negative coefficients in line with previous research (Columns 1-2), instrumenting the endogenous variable yields results statistically indistinguishable from zero. For robustness, we tested different specifications varying the estimation period, additional sets of controls (e.g., homicides and crime rates), and different lag structures but did not find significant effects.

3.2 Heterogeneous effects by gender

The existing literature persistently finds that the effect of gun laws on suicide almost exclusively operates via reducing suicide rates among the male population but has no or only marginal influence among the female population. We test this prediction using our IV approach. Table 3 first reports the results for the male population (Panel A and B), which closely replicate the general findings in terms of statistical significance and economic magnitudes: the number of gun laws tends to reduce male suicide rates by firearm, but not the overall male suicide rates.

Further, Panels C and D in Table 3 show results for female suicides. The coefficients are mainly positive but not statistically significant across all specifications – the result is in accordance with previous literature, which found female firearm suicides to be unresponsive to gun laws. For overall suicide rates, we observe a statistically significant and negative correlation, which might be a consequence of a spurious correlation due to a small number of female suicides being about four times less common than male suicides. However, the effect disappears in our more robust identification with the IV approach.

This heterogeneous analysis corroborates our main findings of gun control being relevant only for firearm-related suicides, primarily in the male population, but not the overall suicide rates.

Table 2: Effect of gun laws on suicide rates

PANEL A: FIREARM suicide rates (per 100k population, log)

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	OLS	OLS	IV	IV	IV	IV
Number of Gun Laws	-0.006***	-0.004***	-0.009***	-0.010***	-0.007***	-0.006***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
Controls	No	Yes	No	Yes	No	Yes
Observation	1450	1450	1400	1400	1232	1232
Number of States	50	50	50	50	44	44
R squared	0.96	0.96				
F-stat (1st stage)			11.92	7.57	16.11	12.84

PANEL B: TOTAL suicide rates (per 100k population, log)

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	OLS	OLS	IV	IV	IV	IV
Number of Gun Laws	-0.003***	-0.002***	-0.002	-0.000	-0.003	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Controls	No	Yes	No	Yes	No	Yes
Observation	1450	1450	1400	1400	1232	1232
Number of States	50	50	50	50	44	44
R squared	0.94	0.95				
F-stat (1st stage)			11.92	7.57	16.11	12.84

Notes: SE clustered at the state level in parentheses; * indicate $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. All estimations include state and year FE. List of controls: Income per capita (log), poverty rate, unemployment rate, alcohol consumption (ethanol per capita, log), number of police officers per capita (log), the gender ratio of young men to women, share of Hispanic population, share of the Afro-American population, political affiliation of the governor of the state (1 if Republican, 0 otherwise). Estimations 3-4 include the full sample; estimations 5-6 include only US states with three or more neighboring states (this excludes Florida, Alaska, Rhode Island, Maine, South Carolina, and Hawaii).

Table 3: Effect of gun laws on suicide rates by gender

PANEL A: MALE FIREARM suicide rates (per 100k population, log)

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	OLS	OLS	IV	IV	IV	IV
Number of Gun Laws	-0.005***	-0.004***	-0.007***	-0.008***	-0.006***	-0.005***
	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)
Controls	No	Yes	No	Yes	No	Yes
Observation	1450	1450	1400	1400	1232	1232
Number of States	50	50	50	50	44	44
R squared	0.95	0.96				
F-stat (1st stage)			11.92	7.57	16.11	12.84

PANEL B: MALE TOTAL suicide rates (per 100k population, log)

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	OLS	OLS	IV	IV	IV	IV
Number of Gun Laws	-0.003***	-0.002***	-0.002	-0.000	-0.003	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Controls	No	Yes	No	Yes	No	Yes
Observation	1450	1450	1400	1400	1232	1232
Number of States	50	50	50	50	44	44
R squared	0.93	0.94				
F-stat (1st stage)			11.92	7.57	16.11	12.84

PANEL C: FEMALE FIREARM suicide rates (per 100k population, log)

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	OLS	OLS	IV	IV	IV	IV
Number of Gun Laws	0.002	0.001	0.002	-0.001	0.005	0.012
	(0.002)	(0.003)	(0.004)	(0.009)	(0.003)	(0.007)
Controls	No	Yes	No	Yes	No	Yes
Observation	1450	1450	1400	1400	1232	1232
Number of States	50	50	50	50	44	44
R squared	0.64	0.64				
F-stat (1st stage)			11.92	7.57	16.11	12.84

PANEL D: FEMALE TOTAL suicide rates (per 100k population, log)

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	OLS	OLS	IV	IV	IV	IV
Number of Gun Laws	-0.004***	-0.003***	-0.003	-0.001	-0.004**	-0.002
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Controls	No	Yes	No	Yes	No	Yes
Observation	1450	1450	1400	1400	1232	1232
Number of States	50	50	50	50	44	44
R squared	0.82	0.83				
F-stat (1st stage)			11.92	7.57	16.11	12.84

Notes: SE clustered at the state level in parentheses; * indicate p < 0.1, ** p < 0.05, *** p < 0.01. All estimations include state and year FE. List of controls: Income per capita (log), poverty rate, unemployment rate, alcohol consumption (ethanol per capita, log), number of police officers per capita (log), the gender ratio of young men to women, share of Hispanic population, share of the Afro-American population, political affiliation of the governor of the state (1 if Republican, 0 otherwise). Estimations 3-4 include the full sample; estimations 5-6 include only US states with three or more neighboring states (this excludes Florida, Alaska, Rhode Island, Maine, South Carolina, and Hawaii).

3.3 Heterogeneous effects by race

Finally, we study the effect of gun laws on suicide rates by race. Due to data availability, we categorize all suicides into suicides by white and non-white populations. The former category comprises 90% of all cases.

Our results (available upon request) for the white population replicate our findings for the overall population presented in Table 2: gun laws reduce firearm suicides among the white population, but they are correlated negatively with total suicide rates only in the OLS while there is no significant effect in the IV regressions.

For the non-white population, gun laws are less predictive of lower firearm suicide rates: even in OLS estimation, the coefficients are half the size of the corresponding estimation for the white population, and IV coefficients are no longer significant. For overall suicide rates, gun laws are not significant, neither in OLS nor in IV regressions.

4 Conclusion

Contrary to a long line of previous research that suggested gun control as an effective means of suicide reduction and which was based on correlational analyses, our causal analysis tells a more cautionary story: gun control can successfully limit only the firearms-inflicted suicides but does not significantly affect overall suicide rates. This points towards a substitution effect in the suicide methods. Unfortunately, gun control is no silver bullet for keeping suicidal people alive.

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Appendix

Table A1: Descriptive statistics

	Obs	Mean	St. Dev.
Number of gun laws	1450	23.78	22.32
Total firearm suicides per 100 000 pop, log	1450	2.09	0.42
Male firearm suicides per 100 000 pop, log	1450	1.98	0.39
Female firearm suicides per 100 000 pop, log	1450	0.99	0.72
All suicides per 100 000 pop, log	1450	2.66	0.27
Male suicides per 100 000 pop, log	1450	2.45	0.26
Female suicides per 100 000 pop, log	1450	1.31	0.24
Population, log, 1-year lag	1450	15.22	0.66
Income per capita, log, 1-year lag	1450	10.41	0.32
Poverty rate, %, 1-year lag	1450	12.59	3.53
Alcohol consumption (ethanol per capita, log), 1-year lag	1450	15.83	0.62
Unemployment rate, 1-year lag	1450	5.43	1.63
Police officers per capita (log), 1-year lag	1450	1.17	0.1
Share of Hispanic, 1-year lag	1450	9.28	6.93
Share of African-Americans, 1-year lag	1450	10.76	7.57
Gender ratio of young men to women, 1-year lag	1450	1.05	0.02
Dummy for Republican governor, 1-year lag	1450	0.55	0.29