Safety Concerns and Student Mobility: U.S. Gun Violence and Chinese K–12 Enrollment*

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Abstract

We examine how U.S. gun violence impacts international student enrollments, focusing on Chinese K–12 students. Using administrative data and a single-origin design, we document how a 10% increase in a county's shooting rate is associated with a 3.1% decline in Chinese K–12 enrollment. Event-study checks show no pre-trends, with effects emerging after a one-year lag —consistent with application timelines— and persisting thereafter. Patterns are similar for *all* international K–12 students and when gun violence exposure is proxied by school-shooting incidents. We also explore Chinese-language coverage of U.S. shootings as a potential channel. Each additional mention is associated with a 16% decline in K–12 Chinese enrollment. By contrast, we find no significant effects in higher education, where enrollment choices of older students are more tightly linked to admissions and funding mechanisms. Overall, domestic safety—and its portrayal abroad—appears to shape educational exports, with the strongest sensitivity among younger K-12 students.

JEL Codes: F22, I21, D83.

Keywords: Gun violence, International student enrollments, Media exposure, Parental decision-making, China–U.S. relations.

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1 Introduction

International students significantly impact the social and economic landscapes of the United States by enhancing cultural diversity, promoting economic growth, and advancing intellectual contributions (Hunt and Gauthier-Loiselle, 2010; Iranzo and Peri, 2009; Kantor and Whalley, 2014). In the 2023-2024 academic year, international students contributed $43.8 billion to the U.S. economy and supported 378,175 jobs, according to NAFSA's latest analysis (NAFSA, 2024). According to this report, for every three international students, one U.S. job is supported through spending in sectors such as higher education, accommodation, dining, retail, transportation, telecommunications, and health insurance. The significant externalities associated with international students underscore the relevance of research into the patterns and determinants of their enrollments.

A variety of factors in the home and host countries have been recognized as pivotal in shaping international student enrollments. Conditions in the home country —such as the presence of high-quality undergraduate and graduate programs, employment opportunities, exchange rates, and the size of the college-age population— affect the volume of international students (Bird and Turner, 2014; Bound et al., 2021). In addition, host country traits, including employment opportunities, tuition costs, institutional prestige and quality, financial assistance, visa policies, and training programs, play important roles in shaping such enrollments (Amuedo-Dorantes et al., 2019, 2023; Bound et al., 2015, 2020; Demirci, 2019; Kato and Sparber, 2013; Lowell and Khadka, 2011; Rosenzweig, 2010; Shih, 2016; Stephan et al., 2016). Yet, even with the underscored relevance of a host country's perception as welcoming (Amuedo-Dorantes, 2022; McMurtrie, 2001) and reports on the salience of safety concerns among international students (Skinner et al., 2019), our understanding of how safety concerns impact international student enrollments is limited. In this study, we address this question with an analysis of how prevailing gun violence in the United States impacts international student enrollments.

Nearly 47,000 people died from gun-related injuries in the United States in 2023, with 38 percent of these deaths classified as murder (Gramlich, 2025). Although most fatalities were not related to school shootings, the fear of such incidents is growing among parents. In 2022, one in five parents reported being extremely worried about the possibility of their children being shot (Gramlich, 2023). Similarly, parents of prospective international students express apprehensions regarding their children's safety, which may deter them from sending their children to study abroad in locations perceived as more dangerous (Fischer, 2021). Notably, international students from Southeast Asia and China rank as the group most worried about safety at their educational institutions and in their local communities (Johnson, 2018; Knox, 2023; Skinner et al., 2019). Such concerns are not surprising given the warnings issued by foreign consulates following school shootings that claimed some of their nationals as victims and the broadcasting of these incidents back home (Fischer, 2023).

We examine the impact of rising gun violence on the enrollment of Chinese students in K–12 programs in the United States. According to the Institute of International Education (2024), since the 2009–10 academic year, China has been the largest source of international students in the U.S., accounting for nearly one-third of this population. While the majority of these students pursue higher education, many Chinese families opt to begin their children's educational trajectories in U.S. K–12 schools, aiming to enhance future career prospects and visa opportunities.[1]

We focus on K–12 enrollment for several factors. First, despite extensive work on higher education, there is virtually no systematic evidence on international enrollments at the K–12 level—particularly for China. Yet, as noted above, K–12 students constitute the pipeline for future international enrollments in U.S. colleges and graduate programs. As such, shocks that deter K–12 entry can propagate to later stages of the international student market (Institute of International Education, 2024). Second, unlike graduate students—who often access research/teaching assistantships and other forms of insti-

[1] As shown in Appendix Table A1, close to one-third of all international K–12 students between 2006 and 2017 were from China.

tutional support—K–12 students rely on parents as the primary decision-makers and financial sponsors. Because these minors typically live apart from their parents during the school year (e.g., with guardians or in homestay/boarding arrangements), parental assessments of safety risk are especially salient. Concerns about exposure to gun violence may translate more directly into enrollment decisions. Finally, by focusing on a single origin, we can trace how media-amplified safety concerns among parents translate into changes in K–12 enrollment, yielding a sharper test of the relationship.

Using administrative data on all Chinese international enrollments in K-12 in the United States from the Student and Exchange Visitor Information System (SEVIS), along with data on shootings from the Uniform Crime Reporting (UCR) Program, we explore the impact of gun violence on international student enrollments. We apply the methodology outlined by de Chaisemartin et al. (2023), which accommodates staggered and non-binary treatment effects, to estimate the influence of increased gun violence on Chinese enrollments at the county level. Our analysis shows that increases in gun violence significantly reduce Chinese enrollment in U.S. K–12 schools. In our main estimates, a 10% rise in the shooting rate—about three additional incidents per 100,000 residents—is associated with a 3.1% decline in enrollment. The effect emerges only after the increase in shootings (no pre-trends) and persists over multiple years, indicating a lasting impact. Results are robust across identification checks, including an instrumental–variables approach that uses state gun laws as instruments for county shooting rates, an extension of the analysis to *all* international K–12 students, and the use of K–12 school–shooting incidents as an alternative measure of gun violence.

We then examine parental safety awareness as a mechanism. Using Chinese–language coverage from China Central Television (CCTV), we find that each additional mention of a U.S. shooting location is associated with an approximately 16% decline in Chinese K–12 enrollments in the affected state's counties, consistent with media–amplified parental safety concerns. By contrast, we detect no significant impacts for Chinese *higher–education* enrollments (Associate's/Bachelor's or Master's/Ph.D.), consistent with

older students' decisions placing greater weight on program quality, funding, and career considerations than on parental safety assessments.

In summary, our findings emphasize that safety concerns play a pivotal role in shaping student mobility patterns—domestically and internationally—particularly for younger students whose educational choices can be responsive to parental anxiety about safety. By demonstrating how gun violence and its media coverage deter Chinese K-12 enrollments, we provide novel evidence of the far-reaching consequences of public safety perceptions. As noted earlier, these younger students often pursue education in the U.S. to enhance their long-term prospects, contributing significantly to cultural exchange, innovation, and economic growth. As such, these findings have implications for policymakers and educational institutions, suggesting that strengthening school safety can help sustain international student mobility and its associated benefits.

2 Gun Violence in Educational Settings

For quite some time, the United States has been grappling with gun violence. Statistics from the CDC reveal alarming figures. In 2012, there were 26,608 gun-related deaths, amounting to an estimated cost of $229 billion—approximately 1.4 percent of the GDP (Follman et al., 2015). By 2021, gun-related injuries claimed 48,830 lives. Gun deaths among children and teens alone had surged by 50 percent, rising from 1,732 in 2019 to 2,590 in 2021 (Gramlich, 2023). The ramifications of this violence are devastating, impacting victims, their families, and communities at large.

Research has highlighted the role of gun violence in elevating fear and promoting emigration (Márquez-Padilla et al., 2019), impacting work productivity (Brodeur and Yousaf, 2022), and influencing the introduction of gun-related legislation (Luca et al., 2020). Specifically focusing on educational settings, various studies have documented the effects of gun violence on student well-being (Levine and McKnight, 2020), school financing (Yang and Gopalan, 2023), and both public and private school enrollments

(Abouk and Adams, 2013; Beland and Kim, 2016; Yang and Gopalan, 2023). These investigations have also explored its impact on student performance (Beland and Kim, 2016; Poutvaara and Ropponen, 2010), underscoring how violence not only triggers selective migration from schools but also deteriorates school performance due to students' diminished ability to concentrate (Glew et al., 2005) and engage in group learning activities (Buhs et al., 2006).

Despite the well-documented effects of gun violence on domestic school settings, its influence on international students remains largely unexplored. This oversight is particularly important given the increasing role of international students in the U.S. education system. While the early 2000s witnessed a surge in enrollments—including younger students whose parents sought to enhance their prospects for college admission by enrolling them in U.S. high schools—these trends are not immune to external shocks. Given their substantial contributions to the U.S. economy, understanding the factors influencing these flows is crucial. Some studies highlight the pursuit of educational opportunities unavailable in their home countries (Bird and Turner, 2014; Rosenzweig, 2010), while others focus on the students' aspirations to reside and work in the U.S. post-graduation as primary motivators (Bound et al., 2015; Kato and Sparber, 2013). Additionally, factors like family reunification can also drive international students to migrate for education, with the potential of remaining in the U.S. subsequently. Immigration policy has also been identified as a key determinant of these patterns (Amuedo-Dorantes et al., 2023). However, the role of safety perceptions, particularly critical when the students are minors and parental decision-making is paramount, has not yet been thoroughly investigated.

We examine how U.S. gun violence affects Chinese K–12 enrollments, focusing on safety concerns conveyed through media coverage in the home country. Unlike adult students, who may independently consider a range of personal, academic, and economic factors when choosing where to enroll, younger students in K-12 rely almost entirely on their parents to make these decisions. Parental concerns about the safety and well-being of international students may be heightened by limited familiarity with the host country,

leading families to rely on media portrayals that can intensify those concerns (Shi, 2021; Surette, 1992). By focusing on K–12 enrollments, we capture the direct influence of parental safety concerns, minimizing confounding factors such as career aspirations, job market considerations, or the personal agency that shapes older students' decisions.

3 Safety, Media, and International Student Enrollments

Research has documented the psychological and behavioral impacts of fear stemming from victimization, affecting both individuals and communities (Lowe and Galea, 2017; Stafford et al., 2007). In the aftermath of violent incidents, affected individuals often experience heightened distress, ranging from anxiety to panic (Dolan and Peasgood, 2007). Households with school-aged children are particularly vulnerable to these concerns (Vuori et al., 2013), as safety-related fears can disrupt students' academic engagement and performance (Bowen and Bowen, 1999; Kaminski et al., 2010). In response, parents may relocate their children to perceived safer environments (Márquez-Padilla et al., 2019).

For international students, these concerns may be amplified due to unfamiliarity with local safety conditions, language barriers, and the absence of close family support networks (Marginson et al., 2010; Sawir et al., 2012). Media coverage of gun violence further exacerbates these fears, as studies have shown a strong link between crime-related media exposure and fear of crime (Chiricos et al., 2000; Reid-Nash et al., 1987). With limited firsthand knowledge of U.S. communities, international families may rely heavily on media portrayals, reinforcing heightened perceptions of risk (Shi, 2021; Surette, 1992).

We hypothesize that rising gun violence in the U.S. negatively affects Chinese student enrollment in K–12 programs, with media coverage amplifying this effect. Specifically, we expect greater media attention to gun violence to correspond with steeper enrollment declines, highlighting the role of perceived safety in educational decisions. These effects should be strongest for younger students, whose enrollment is primarily shaped

by parental concerns, and less pronounced for older students, whose choices are more influenced by career goals, job prospects, and immigration pathways.

4 Data and Some Descriptive Evidence

To examine whether gun violence affected Chinese enrollments in U.S. K–12 schools, we assemble multiple data sources. Our primary source is individual-level SEVIS records for 2006–2017, covering 58,692 Chinese international students and the schools they attended. From these records, we construct county–year enrollment counts.

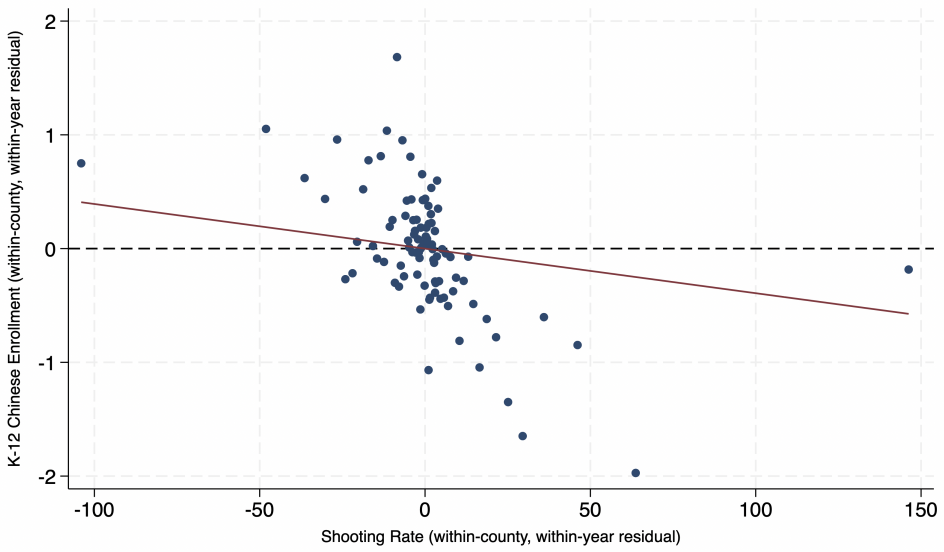
To measure gun violence, we use incident counts from the FBI's Uniform Crime Reporting (UCR) program, which codes firearm involvement in aggravated assaults and robberies. UCR is the long-running national series, but it understates gun violence because it does not flag firearm use in homicide and some other offenses (James, 2021). Although the FBI transitioned to the National Incident-Based Reporting System (NIBRS) on January 1, 2021, coverage during our study window was limited (about 53% of the U.S. population in 2019, versus >90% for UCR), raising completeness concerns (Parker, 2022). Hence, consistent with prior work for this period (Boutwell et al., 2017; Braga, 2022; Carter and Binder, 2018; Lauritsen and Lentz, 2019; Siegel et al., 2020), we rely on UCR to construct county–year shooting rates (incidents per 100,000 residents).[2]

Figure 1 presents a binned scatter of within-county, within-year variation by absorbing county fixed effects (time-invariant traits) and year fixed effects (nationwide shocks), where points are equal-frequency bin means.[3] The fitted slope is negative, indicating that within a county, years with high shooting rates coincide with lower-than-expected Chinese enrollment. A negative residual indicates the observed value falls below the level predicted for that county–year after removing fixed effects. This local pattern aligns with the variation our panel design exploits.

[2]In robustness checks, we use school-shooting measures as an alternative proxy for gun violence.

[3]Points are means within equal-frequency (quantile) bins of the residualized shooting rate. In this figure, Stata's `binscatter` produced 95 bins (points), which is the effective maximum for this sample (Stepner, 2013).

Figure 1
Partial Correlation between K–12 Chinese Enrollment and Shooting Rates
(Within-County, Within-Year Residuals)



Notes: Residuals are from regressions of each series on county and year fixed effects using the main analysis sample.
Sources: (1) U.S. shooting rates (per 100,000 pop) from UCR; (2) K–12 Chinese enrollments from SEVIS.

5 Methodology

Our primary goal is to examine how gun violence may impact the enrollment of Chinese international students in K-12 education. To do so, we construct a panel dataset combining administrative records of international student enrollments with county-level gun violence data, measured as the shooting rate per 100,000 people. Given the panel structure of our dataset, we employ an event-study Difference-in-Differences (DiD) framework. To account for the continuous nature of the treatment, we adopt the methodology of de Chaisemartin et al. (2023), which offers several advantages. First, it models the dynamic effects of non-binary changes in gun violence, capturing potential non-linear impacts. Second, it accommodates staggered treatments, recognizing that counties experience changes in gun violence at different points in time. Finally, it incorporates lagged treatment effects, allowing us to assess how past incidents influence both immediate and longer-term enrollment trends.

Our benchmark model is given by the following equation:

$$ChnStd_{c,t} = \beta_0 + \sum_{k=-3}^{7} \delta_k \cdot D_{c,t}^{(k)} + X'_{c,t}\rho + \theta_c + \gamma_t + \epsilon_{c,t} \tag{1}$$

where $ChnStd_{c,t}$ is the number of Chinese international students enrolled in K-12 in county c and year t. The vector $D_{c,t}^{(k)}$ is an indicator for whether county c is k periods away (*e.g.*, $k = -1$ for one year before, $k = +1$ for one year after; $k = -1, -2, -3, 1, 2...6, 7$, and 0 otherwise) from a change in gun violence, as captured by the shooting rate per 100,000 inhabitants. As such, the vector of coefficient estimates δ_k helps us gauge the effect of gun violence k periods before or after a change in the shooting rate.

The model includes the vector $X_{c,t}$, which accounts for county-level demographic characteristics that may influence both crime and education outcomes. These controls include the share of county residents who identify as Asian, unemployed, or live below the federal poverty line. To account for time-invariant county characteristics and national trends that may affect enrollments, the model incorporates county and year fixed effects, θ_c and γ_t. Lastly, the error term, $\epsilon_{c,t}$, captures any remaining unobserved factors, and standard errors are clustered at the county level to account for serial correlation over time.

In this methodology, the control group comprises counties with a shooting rate of zero throughout the observation period, while the treated group, referred to as switchers, includes counties that experience positive shooting rates in one or more periods. The event-study framework allows us to assess whether differences in international student enrollments existed before the onset of gun violence, providing a partial check for the parallel trend assumption. Furthermore, this framework allows us to examine the dynamic impact of gun violence on enrollment by modeling it as a continuous treatment over time. The estimation is restricted to switchers, ensuring that all effects of the event study are identified while preventing bias from compositional changes in the treated group over time. In this manner, we are able to analyze both the immediate and

long-term effects of gun violence on Chinese parents' decisions to send their children to study in the United States.

6 Gun Violence and Chinese K-12 Enrollments

6.1 Empirical Findings

Table 1 reports the average treatment effect and dynamic event-study coefficients from Equation 1. We present the results from two model specifications: (i) a fixed-effects baseline and (ii) a saturated model that adds county-level time-varying covariates. Results are very similar across columns. In the preferred specification (Panel A, col. 1), the ATE of –0.013 implies that a one-unit increase in the shooting rate (one additional incident per 100,000 residents) reduces Chinese K–12 enrollment by 0.013 students per county-year, which is about 1.0% of the mean (1.280). Thus, a 10% increase in gun violence —namely, an additional three shootings per 100,000 residents, is associated with roughly a 3.1% decline in enrollment.[4]

A key concern is that the estimated impacts might reflect changes that actually predate increases in shootings, suggesting other forces could underlie the observed relationship. To gauge if that is the case, we estimate the event study in Panel B of Table 1. As shown therein, the *pre-treatment* coefficients display no meaningful trend. The estimates at $t = -1$ and $t = -2$ are small and statistically insignificant, supporting our identification strategy.

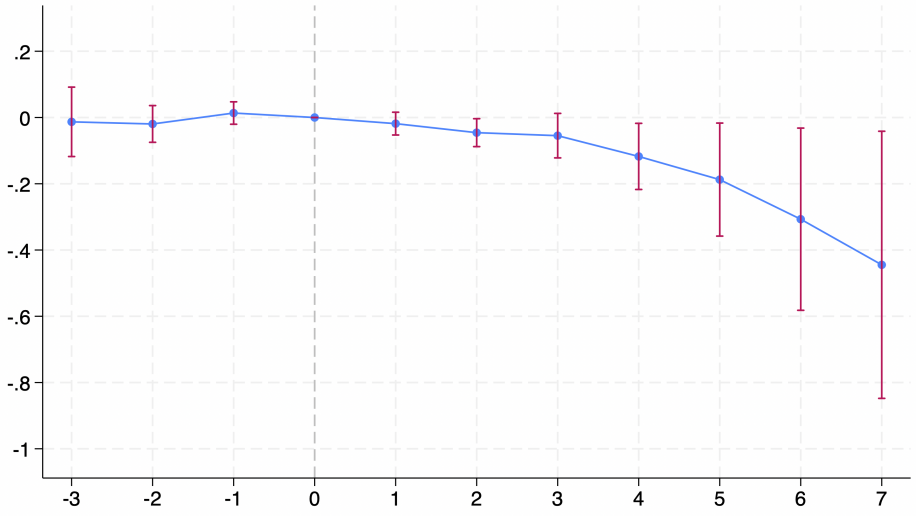
In contrast, we find a statistically significant and sustained decline in Chinese K–12 enrollments *after* increases in gun violence. As shown in Panel B of Table 1, there is no measurable effect in the first year ($t = 1$); rather, enrollments begin to fall in the second year ($t = 2$), with the effect deepening in subsequent years. This delayed response aligns with the timing of educational decisions, which are made well in advance and shaped by

[4]This estimate is computed as: [3 more shootings × (-0.013)/1.280], where 1.280 is the average number of Chinese students in each cell.

academic calendars, visa processing, and application timelines. The pattern indicates a cumulative and persistent response to heightened safety concerns.

Figure 2 visualizes these estimates. Enrollment levels are flat in the years preceding increases in gun violence, with no evidence of a pre-trend. Following the rise in shootings, a clear and persistent decline emerges from $t = 2$ onward, mirroring the regression results.

Figure 2
Event Study Plot:
Impact of Shooting Rates on K-12 Chinese Enrollments



Notes: Figure plots event–study coefficients ($\hat{\beta}_\tau$) with 95% confidence intervals from Eq. 1, estimated using `did_multiplegt_dyn` (de Chaisemartin et al., 2023). *Outcome*: number of Chinese K–12 students per county–year. *Treatment*: shooting rate per 100,000 residents. Specification matches Table 1, Panel B, column (1); estimates include county and time fixed effects, and standard errors are clustered at the county level. *Sample Period:* 2006–2017. *Sources*: (1) UCR shooting rates (per 100,000); (2) SEVIS Chinese K–12 enrollments.

Overall, the results support a causal link between gun violence and Chinese K–12 enrollments. The lag matches application and placement timelines, and we find a persistent impact of gun violence on subsequent student flows.

6.2 Strengthening Identification

The event study results show that enrollment declines occur only after the rise in gun violence, suggesting a temporal sequence consistent with a causal interpretation. While this approach captures dynamic effects and rules out anticipatory responses, it

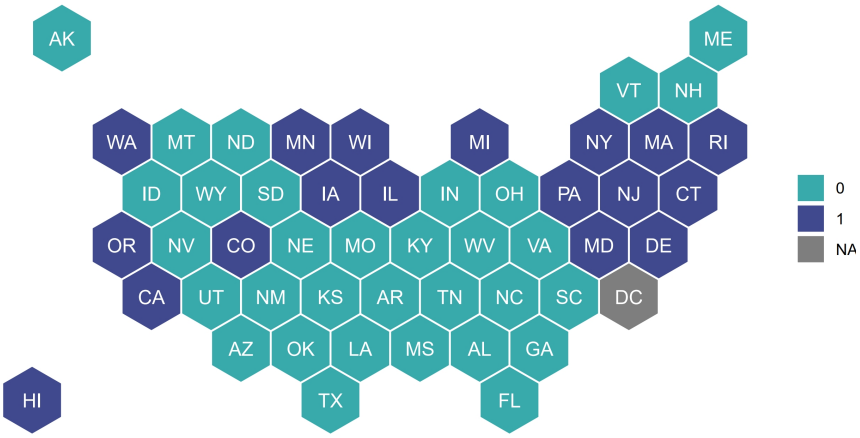
may not fully isolate variation that is exogenous to other county-level characteristics. For instance, counties with more Chinese student enrollments may differ in unobserved ways—such as in their public safety investments, education policy, or openness to international engagement—that also influence exposure to gun violence. To address this possibility, we implement an instrumental variable (IV) strategy that leverages exogenous variation in school shootings, providing a complementary identification framework alongside the event study.

Prior research has documented the effectiveness of stringent firearm regulations —particularly those limiting firearm availability—in reducing gun violence at the state level in the U.S. (Andrés and Hempstead, 2011; Everytown Research and Policy, 2023; Kang and Sharkey, 2023; Sumah et al., 2023; Webster et al., 2020). Similar patterns have been observed in other countries, including Canada and Australia (Chapman et al., 2006; Linteau, 2011). These studies establish a strong empirical relationship between gun laws and firearm violence, providing a foundation for using policy variation to study downstream effects.

Building on this research, we implement an instrumental variable (IV) approach that leverages exogenous variation in shooting rates stemming from the enactment of gun laws in U.S. states where Chinese students enroll. This strategy allows us to identify the causal impact of gun violence on international student enrollment using plausibly exogenous policy shifts. Specifically, we draw on state-level gun law grades from the Annual Gun Law Scorecard, compiled by the legal team at the Giffords Law Center since 2012. The dataset systematically evaluates gun legislation across all 50 states, assigning point values based on the strength or weakness of each state's firearm policies. These grades are constructed independently of short-term fluctuations in gun violence and are compared with recent firearm mortality data from the Centers for Disease Control and Prevention.

For our analysis, we construct a binary variable equal to 1 for states with gun law

Figure 3
State Gun Law Grades:
Permissive vs. Restrictive Policies (2017)



Notes: Hex map of state gun–law *restrictiveness* in 2017 based on the Giffords Law Center grading. We code a binary indicator: 0 = more permissive laws; 1 = more restrictive laws; NA = no grade available. Alaska and Hawaii are shown off–map. This state–level measure is later used as the *Gun Law Grade* instrument in the IV results. *Source*: Giffords Law Center.

grades above the mean and 0 otherwise.[5] As Figure 3 shows, stricter state gun laws are widespread rather than confined to a few states: they cover 36% of states and 25% of counties in our sample, providing the policy variation that underpins our identification.

Using the information on gun legislation strictness, we instrument for gun violence and estimate the following model via two-stage least squares (2SLS):

$$SR_{c,t} = \alpha_0 + \alpha_1 z_{c,t} + X'_{c,t}\delta + \theta_c + \gamma_t + \mu_c t + \varphi_{c,t} \tag{2}$$

$$ChnStd_{c,t} = \beta_0 + \beta_1 \hat{SR}_{c,t} + X'_{c,t}\rho + \theta_c + \gamma_t + \mu_c t + \epsilon_{c,t} \tag{3}$$

where $z_{c,t}$ denotes the instrumental variable — namely, the county's exposure to more restrictive or permissive state gun laws. Other things equal, we would expect the coefficient on $z_{c,t}$, α_1, to be inversely related to the county's shooting rate, as stricter state gun laws have been shown to curtail gun violence (Newman et al., 2008; Suttles, 2006). We would also expect the coefficient on $\hat{SR}_{c,t}$, β_1, to be negative if higher shooting rates

[5]See Appendix Table A3 for descriptive statistics on all variables used in the two-stage least squares (2SLS) model. Shootings in the District of Columbia are excluded due to the absence of a gun law grade from the Giffords Law Center.

result in fewer international students willing to study in the respective county.

The relevance condition requires that a county's exposure to its state's gun laws be strongly correlated with its shooting rate. Panel B of Table 2 reports the first stage and confirms this condition. Across specifications, stricter gun laws are associated with *lower* shooting rates. In our preferred specification (col. 1), the estimate implies roughly 3.66 fewer shootings per 100,000—about $\frac{3.66}{30.165} \approx 12\%$ of the sample mean. Kleibergen–Paap diagnostics also support instrument strength: the LM test rejects underidentification ($\chi^2 = 13.03$, $p = 0.000$), and the Wald F-statistic is $12.04 > 10$, satisfying standard relevance thresholds (Stock and Yogo, 2004).

We next assess the plausibility of the exclusion restriction. Although we cannot directly test whether the instrument—state firearm regulation—affects Chinese K–12 enrollments only through local shooting rates, two points support this assumption. First, prior research shows that gun laws primarily shift realized crime/violence rather than broader safety perceptions or cultural attitudes (Kang and Sharkey, 2023; Webster et al., 2020), reducing concerns that these policies directly influence international families' school choices. Second, our single-origin design compares Chinese students choosing among U.S. locations, limiting confounding from origin-specific shocks and making it less likely that cross-county differences reflect responsiveness to unrelated local factors (e.g., visa policies, education spending, cultural openness) rather than exposure to gun violence.

To probe this assumption empirically, we test whether the instrument (*Gun Law Grade*) correlates with baseline county characteristics that could independently affect enrollments. We regress each pre-treatment covariate (county Asian share, poverty rate, unemployment rate, and population) on the instrument using the same fixed effects as in the 2SLS specification and cluster standard errors at the state level. Appendix Table A4 reports both *univariate* coefficients and a *joint* (omnibus) balance test. Point estimates are small and statistically insignificant, and the joint test fails to reject balance ($F = 0.76$, $p = 0.556$; $R^2 = 0.001$). Overall, these results suggest that the instrument is

not systematically related to observed baseline covariates, which supports the plausibility of the exclusion restriction.

We also test the robustness of our results to model specifications that sequentially add demographic controls to both stages of the IV. Appendix Table A5 shows that the second-stage coefficient on the shooting rate remains stable and statistically significant across all columns (Panel A: -0.175 to -0.183). First-stage results (Panel B) are similarly consistent: stricter gun laws predict lower shooting rates (coefficients ≈ -3.5 to -3.66), and instrument strength remains adequate (LM tests reject underidentification). These patterns indicate that the IV estimates are not driven by observable county differences and further support the exclusion restriction.

Finally, we examine the reduced form between *state* gun laws and Chinese K–12 enrollments. Appendix Table A6 shows higher enrollments in states with stricter laws. The coefficient on *Gun Law Grade* is about 0.64 (roughly 50% of the county–year mean). This intent-to-treat estimate aligns with the hypothesized mechanism and the IV sign, reinforcing the exclusion restriction by documenting a strong instrument–outcome association even without conditioning on the endogenous shooting rate.

Continuing with the second-stage results, Panel A of Table 2 shows how, across specifications with or without demographic controls, higher shooting rates significantly reduce Chinese K–12 enrollments. In our preferred saturated model specification (col. 1), the coefficient on the shooting rate is -0.175. Evaluated at the sample mean enrollment of 2.312 students per county–year, it implies that a 10% increase in the shooting rate (about three additional shootings per 100,000 residents, given a mean of 30.165) results in a 23% decline in enrollments.[6] Results are similar in magnitude when we use a one–year–lagged enrollment outcome (cols. 3–4), indicating that the negative impact persists beyond the first year, as we had seen in the event study results. Overall, the IV estimates are directionally consistent with the dynamic DiD results and point to lasting consequences of gun violence for international student flows.

[6]This estimate is computed as: [3 more shootings $\times$ (-0.175)/2.312], where 2.312 is the average number of Chinese students in each cell.

In sum, the event–study estimates (Table 1, Figure 2), the IV results (Table 2), and the identification checks (Appendix Tables A4–A6) indicate that the estimated effect of gun violence on Chinese K–12 enrollments is *not* driven by preexisting trends or observable confounders. We find no differential pre-trends; the first stage is strong (Kleibergen–Paap $F > 10$); baseline covariates are balanced; estimates are stable to alternative controls and specifications; and reduced–form results consistently link stricter state gun laws to higher enrollments. Altogether, these facts support our identification strategy and a causal interpretation of the main findings.

7 Robustness Checks

To assess the robustness of our findings, we run two additional checks. First, we examine whether the results generalize to international K–12 students from other countries. Second, we test sensitivity to an alternative, school-specific measure of gun violence—namely, school shootings.

7.1 Generalizing to International K-12 Students

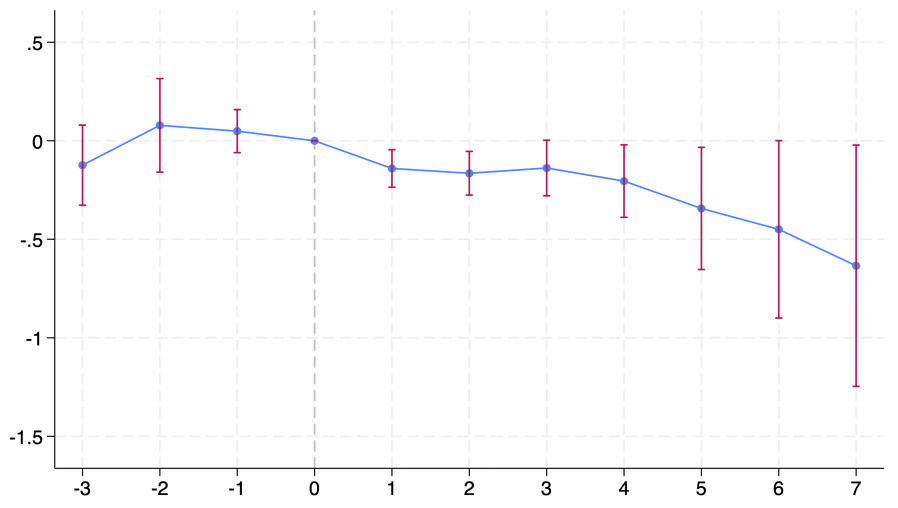
Do our findings apply only to Chinese students, or do they extend to *all* international K–12 students? To assess the external validity of our findings, we re-estimate the model using total international K–12 enrollments as the outcome. Table 3 reports the results from this exercise. According to the estimates in Panel A, there is a clear inverse relationship between shootings and international enrollments. The ATE is -0.023 (SE $= 0.010$). A 10% rise relative to the mean shooting rate is associated with a 1.7% decline in international K–12 enrollments.[7]

As shown in Panel B of Table 3, there is no statistically significant relationship in the *pre-treatment* periods ($t = -3, -2, -1$), indicating that enrollment declines do not predate treatment. After the increase in shootings, effects turn negative and persist,

[7]This estimate is computed as: [3 more shootings × (-0.023)/4.088], where 4.088 is the average number of all international K–12 students in each cell. See Appendix Table A2.

growing in magnitude in later horizons. Consistent with this pattern, Figure 4 shows a clear post-treatment decline in international K–12 enrollments.

Figure 4
Event Study Plot:
Impact of Shooting Rates on K-12 International Enrollment



Notes: Figure plots event–study coefficients ($\hat{\beta}_\tau$) with 95% confidence intervals from Eq. 1, estimated using `did_multiplegt_dyn` (de Chaisemartin et al., 2023). *Outcome*: *All* K–12 students per county–year. *Treatment*: shooting rate per 100,000 residents. Specification matches Table 3, Panel B, column (1); estimates include county and time fixed effects, and standard errors are clustered at the county level. *Sample Period:* 2006–2017. *Sources*: (1) UCR shooting rates (per 100,000); (2) SEVIS K–12 international enrollments.

7.2 K-12 School Shootings as an Alternative Measure

Because our outcome is K–12 enrollment, which responds to families' perceptions of *community* safety as opposed to exclusively on-campus incidents, we use county shooting rates as the primary exposure. Shooting rates (i) are consistently available across places and years; (ii) provide enough variation in treatment timing and intensity to support a difference-in-differences design (allowing credible pre-trend tests and stable estimates); and (iii) capture broader channels relevant for enrollment decisions, such as commute safety and nearby shootings that receive media coverage.

As a salience-focused robustness, we experiment with re-estimating our model using a narrow school-shooting exposure constructed from the K–12 School Shooting database compiled by the Center for Homeland Defense and Security (CHDS) (Riedman and

O'Neill, 2020). The series records shootings in K–12 schools from 1970 onward.

We aggregate the K-12 school shooting data to the state-by-year level for two main reasons. First, the county panel is extremely sparse: over 2006–2017, the data includes only 448 county–year observations drawn from more than 3,100 counties (i.e., >37,000 potential county–years), yielding many structural zeros and unstable cell means. Collapsing to the state level improves statistical precision and mitigates small-cell noise. Second, the data are compiled from news reports, implying imperfect and locally heterogeneous case ascertainment. State-level aggregation attenuates idiosyncratic reporting error by averaging across counties within a state, producing a more reliable exposure measure for our empirical design.

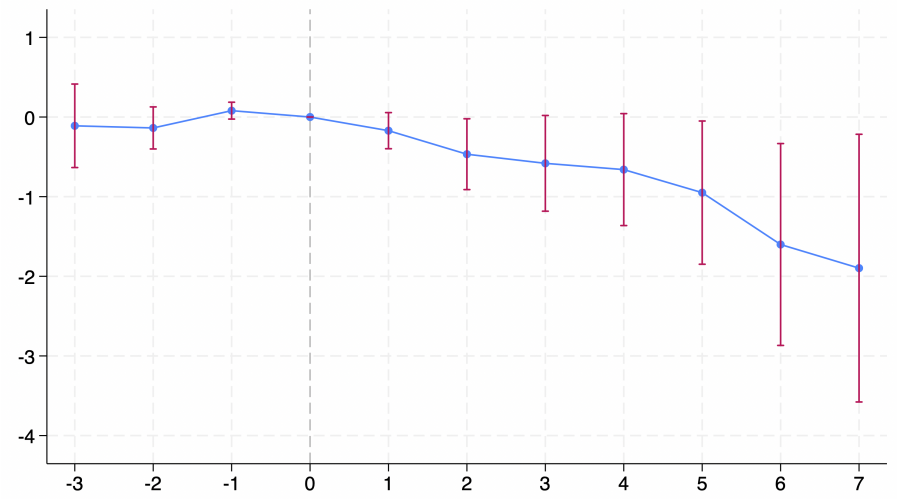
Using this alternative measure of gun violence, we re-estimate Eq. (1) for Chinese K–12 enrollments. Panel A of Table 4 shows negative reduced-form effects. In the specification with demographic controls (col. 1), the ATE is -2.143 and is statistically significant. Using sample means from Appendix Table A2, a 10% increase in school shootings implies a 17.4% decline in Chinese K–12 enrollments.[8] In the baseline model (col. 2), the coefficient shrinks in magnitude to -1.183 and is not statistically significant, resulting in a 9–10% decline for the same 10% increase in shootings.

Panel B of Table 4 reports the event–study estimates, with Figure 5 providing a visual summary. We find no evidence of pre-trends ($t = -3, -2, -1$ are small and insignificant). Following an increase in school-shooting incidents, enrollments decline with a lag: the effect becomes statistically significant at $t = 2$ and grows in magnitude through later horizons ($t = 3$ – $t = 7$), indicating a persistent drop. Once more, the delay aligns with application, visa, and placement timelines; wider confidence intervals at longer horizons reflect the relative rarity of school-shooting events.

In conclusion, the identification and robustness checks in Sections 6 and 7 indicate that increases in gun violence significantly reduce international enrollments in U.S. K–12 schools. This finding is consistent across designs (event–study DiD and IV), mea-

[8] Computed as $(0.10 \times 1.037) \times (-2.143)/1.280 = -0.174$.

Figure 5
Event Study Plot:
Impact of K-12 School Shooting Rates on K-12 Chinese Enrollments



Notes: Figure plots event–study coefficients ($\hat{\beta}_\tau$) with 95% confidence intervals from Eq. 1, estimated using `did_multiplegt_dyn` (de Chaisemartin et al., 2023). *Outcome*: number of Chinese K–12 students per county–year. *Treatment*: K–12 school–shooting incidents. Specification matches Table 4, Panel B, column (1); estimates include county and time fixed effects, and standard errors are clustered at the county level. *Sample Period:* 2006–2017. *Sources*: (1) CHDS K–12 school–shooting data; (2) SEVIS K–12 Chinese enrollments.

sures of violence (UCR shooting rates and K–12 school–shooting incidents), and samples (Chinese-only and all international students). In Section 8, we examine a mediating channel that may help explain these effects.

8 News Media as a Mediating Channel

That international enrollments in K–12 education may respond to increases in gun violence in the United States is not surprising. Parents—who play a central role in decisions about studying abroad, particularly when the students are minors—are understandably concerned about their children's safety and well-being. It is therefore important to consider how parents form their perceptions of safety risks in a foreign context. Because direct experience with U.S. gun violence is rare among Chinese families, their understanding of these risks is largely shaped by media reports. Coverage of mass shootings tends to be extensive, with XinWen LianBo—a major national news program—often reporting repeatedly on affected states both on the day of the event and in the days that

follow. This sustained attention may amplify perceptions of risk in particular states, shaping decisions about where families feel comfortable sending their children to study.

To analyze the influence of media coverage, we examine how Chinese news outlets portray U.S. shootings, focusing on the frequency with which XinWen LianBo reports on these events. As a widely viewed and centrally produced program, XinWen LianBo offers consistent, nationwide exposure to incidents of gun violence in the U.S., making it a suitable source for capturing media salience.

XinWen LianBo, produced by China Central Television (CCTV) since 1978, is broadcast daily across all mainland Chinese television stations, making it one of the most-watched news programs globally. Given the volume and scope of coverage, we apply Natural Language Processing (NLP) techniques to systematically extract information on U.S. shooting incidents reported in XinWen LianBo. These techniques—text mining, topic modeling, keyword extraction, and sentiment analysis—allow us to quantify both the extent and nature of the media coverage.[9] NLP is increasingly used in economic research to extract insights from large volumes of unstructured text, particularly from multilingual news sources (Mahmud et al., 2023; Shapiro et al., 2022).

Specifically, we construct a dataset of U.S. shooting events covered by XinWen LianBo, capturing the timing of news coverage, the location of each incident, and the number of times each event and location was mentioned—categorized by state and year.[10] To test the influence of media salience on school enrollment decisions, we then examine whether each additional mention of a U.S. shooting location in XinWen LianBo corresponds to a decline in the number of Chinese K–12 students enrolled in counties within that state.

Table 5 reports the results. Across specifications, there is a strong negative association between Chinese–language news mentions of U.S. shooting *locations* and Chinese K–12 enrollments in the corresponding counties. Coefficients range from −0.200 to

[9]Figure B1 outlines the NLP techniques applied at each stage of the news text analysis.

[10]Given that Chinese audiences may have limited familiarity with U.S. county-level geography, we aggregate all media coverage data at the state level to ensure clearer interpretation and comparability.

-0.211 (SE = 0.053–0.055), all statistically significant. Using the sample mean of 1.280 students per county–year, one additional mention is associated with a decline of about 15.6% to 16.5% in Chinese K–12 enrollments.[11]

These results underscore the role of parental safety concerns in international enrollment decisions and highlight how public–safety perceptions shape the ability of U.S. schools to attract and retain foreign students. Addressing gun violence is not only a domestic priority, but it can also shape the United States' global educational competitiveness.

8.1 Gun Violence and Chinese Higher Education Students

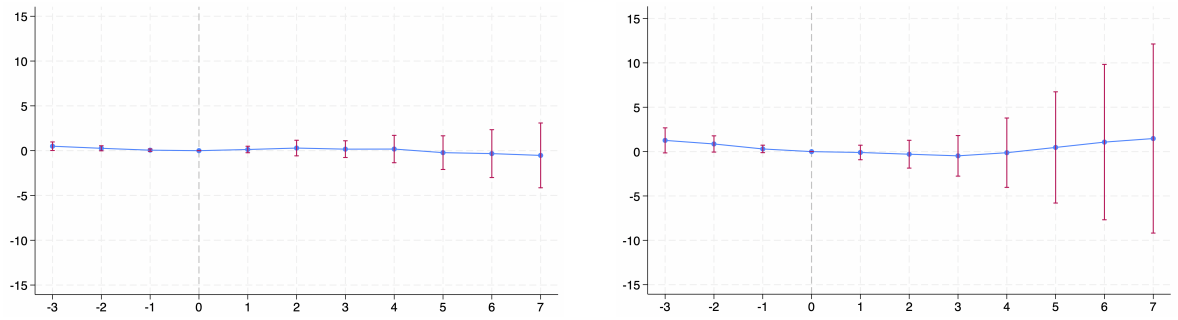
To further assess the role of parental safety concerns in K-12 international student enrollments, we examine whether gun violence similarly affects older students pursuing higher education. Unlike K-12 students, college students are more financially independent and eligible for university funding mechanisms such as grants, scholarships, or assistantships. Since younger students rely more on parental support, we expect the impact of gun violence to be more pronounced for K-12 enrollments. To test this hypothesis, we extend our analysis to Chinese international students pursuing Associate's, Bachelor's, Master's, or doctoral degrees in the United States.

As shown in Panel A of Table 6, we do not find a statistically significant average effect of shootings on Chinese enrollments at the Associate's/Bachelor's level. The ATEs are small (-0.003 to -0.004) and indistinguishable from zero. The dynamics in Panel B and Figure 6 (left panel) likewise show no systematic post–treatment decline. Several pre–treatment coefficients are positive, and post–treatment estimates are imprecise with confidence intervals overlapping zero. Thus, unlike K–12, we do not detect a robust effect for college entry. Similarly, for graduate programs, the pattern is weak. The ATEs for Master's/Ph.D. enrollment range from 0.021 to 0.023 and are statistically

[11] These estimates are computed as: [(-0.200)/1.280] and [(-0.211/1.280], where 1.280 is the average number of Chinese K–12 students in each cell.

insignificant. The event–study coefficients in Figure 6 (right panel) remain noisy with confidence intervals that generally include zero throughout the post period. Altogether, these results suggest that higher–education choices are less responsive to safety concerns —a finding consistent with the greater role for program quality, funding, and career considerations, relative to parental safety assessments, for older students.

Figure 6
Event Study Plots:
Impact of Shooting Rates on Chinese Higher-Education Enrollments



(a) Associate and Bachelor's (b) Master's and Ph.D.

Notes: Event–study coefficients ($\hat{\beta}_\tau$) with 95% confidence intervals from Eq. 1. Panel (a) uses Associate's/Bachelor's enrollment; Panel (b) uses Master's/Ph.D. enrollment (SEVIS). *Treatment*: shooting rate per 100,000 residents. Specifications match Table 6, Panel B, column (1) and (3); estimates include county and time fixed effects, and standard errors are clustered at the county level. *Sample Period:* 2006–2017. *Sources*: (1) UCR shooting rates (per 100,000); (2) SEVIS Chinese higher-education enrollments.

To conclude, we also assess whether Chinese–language coverage of U.S. shootings is associated with Chinese enrollments at higher education levels. Table 7 indicates a modest undergraduate response: for Associate's/Bachelor's programs, one additional mention of a state's shooting location in Chinese news is associated with about 0.38 fewer Chinese students per county–year ($p < 0.10$), roughly a 4.8% decline relative to the mean of 7.929.[12] By contrast, the corresponding estimates for Master's/Ph.D. programs (≈ -0.20) are statistically indistinguishable from zero (cols. 3–4). Overall, media salience appears to matter most at earlier stages, with the clearest sensitivity in K–12, followed by undergraduates, and no effects at the graduate level, where program

[12]Computed as $-0.384/7.929$, where 7.929 is the average number of Chinese Associate's/Bachelor's students per county–year.

quality, funding, and career considerations likely dominate.

9 Summary of Findings and Discussion

The rise of gun violence in the United States remains a pressing concern for parents, children, and the broader public. This paper highlights a previously overlooked consequence of this epidemic: its chilling effect on international student enrollments. We focus on K-12 students, whose parents are the primary decision-makers and financial sponsors of overseas education. To isolate the role of media coverage in shaping these decisions, we examine international students from China—the largest group of foreign students in the U.S.

Our findings underscore the significant impact of gun violence on K–12 international student enrollments. For Chinese K–12 students, a 10% increase in a county's shooting rate (about three additional incidents per 100,000 residents) is associated with a 3.1% decline in enrollment (event–study DiD). Robustness exercises extending the analysis to *all* international students and using school shootings as an alternative measure of violence yield results in the same direction. Importantly, there is no evidence of pre-trends, and the negative effects at K–12 emerge with a lag and persist for several years, reinforcing a causal interpretation and pointing to meaningful longer-run consequences.

Our main design is an event study that adjusts for pre-existing trends and staggered treatment timing. Yet, to address any endogeneity concerns, we also use an IV strategy: state gun laws serve as instruments for county-level shooting rates, and the findings are consistent. To support the credibility of the IV strategy, we conduct a series of identification checks, including tests of instrument strength, balance tests, and assessments of the exclusion restriction. In particular, we show that the IV estimates remain stable when sequentially introducing demographic controls in both stages of the model, suggesting that the instrument is not correlated with omitted county-level characteristics affecting enrollment. We also estimate reduced-form models showing that states with stricter gun

laws have significantly higher levels of Chinese K–12 enrollment, further validating the instrument's relevance. Overall, the convergence of evidence across approaches supports a causal interpretation of the relationship between gun violence and international student enrollment.

Beyond the direct impact of gun violence, we examine media coverage as a mechanism through which safety concerns influence enrollment. Using Chinese–language counts of U.S. shooting location mentions, we find that one additional mention in a state–year is associated with an approximately 16% decline in Chinese K–12 enrollments in that state's counties. Effects are even larger, albeit less precisely estimated, when mentions refer specifically to school shootings. Additionally, we find no statistically significant average effect for Chinese *higher–education* enrollments (Associate's/Bachelor's or Master's/Ph.D.) —a finding consistent with the notion that the enrollment of older students may be more strongly influenced by factors other than safety concerns. Overall, these findings are consistent with weaker parental involvement at older ages and, in turn, media associations having a small and statistically indistinct from zero impact on higher–education enrollments.

Summarizing, the findings highlight a critical but often overlooked consequence of gun violence: its potential to erode the U.S.'s ability to attract and retain foreign talent. Many international students who begin their education in U.S. K-12 schools continue their studies at the college and graduate levels, contributing to innovation, economic growth, and the country's global competitiveness. At a time when U.S. universities face growing competition from institutions in Canada, Europe, and China, addressing factors that further deter international enrollments is imperative. International students not only enrich the academic experience of U.S. natives but also drive research, create jobs, and fuel economic expansion through the exchange of ideas. Given the well-documented effectiveness of stricter gun control measures in reducing violence, policymakers should recognize public safety as a crucial factor in sustaining the U.S.'s role as a major destination for global talent.

10 Acknowledgements

We thank Gaurav Khanna, Todd Sorensen, and José Bucheli for guidance and support. For helpful comments, we thank Zilin Dong, Rowena Gray, SooYeon Kim, Esra Köse, Steven Seltzer, Ana Tur-Prats, and Greg Wright, and participants at the All-California Labor Economics Conference (ACLEC) and at the Association for Public Policy Analysis and Management (APPAM) annual conference. We also appreciate technical assistance from the developers of Clément's packages.

Table 1
Dynamic DiD Estimates:
Effect of Shooting Rates on K-12 Chinese Enrollments

Panel A: Average Total Effect

	(1)	(2)	Observation	Switchers
ATE	-0.013**	-0.014**	12,161	3,647
	(0.006)	(0.006)		
Demographic Controls	✓			
Mean	1.280	1.280		

Panel B: Dynamic Event Study

	(1)	(2)	Observation	Switchers
Before:				
t = -1	0.013	0.028	3,715	298
	(0.017)	(0.018)		
t = -2	-0.019	-0.002	2,517	169
	(0.028)	(0.031)		
t = -3	-0.013	0.017	1,575	93
	(0.053)	(0.058)		
After:				
t = 1	-0.018	-0.016	5,022	521
	(0.018)	(0.016)		
t = 2	-0.046**	-0.045**	4,697	521
	(0.021)	(0.020)		
t = 3	-0.055*	-0.065*	4,478	521
	(0.034)	(0.037)		
t = 4	-0.117**	-0.130**	4,318	521
	(0.051)	(0.057)		
t = 5	-0.187**	-0.201**	4,196	521
	(0.087)	(0.094)		
t = 6	-0.307**	-0.317**	4,087	521
	(0.140)	(0.148)		
t = 7	-0.445**	-0.454**	3,758	521
	(0.206)	(0.215)		
Demographic Controls	✓			
Mean	1.280	1.280		

Notes: Estimates follow Eq. 1 using the `did_multiplegt_dyn` framework for staggered, continuous treatments (de Chaisemartin et al., 2023). *Outcome*: number of Chinese K–12 students per county–year. *Treatment*: shooting rate per 100,000 residents. Estimates include county and time fixed effects. Demographic controls: county share Asian, poverty rate, and unemployment rate (all county–year). Standard errors (in parentheses) are clustered at the county level.
Panel A: Average treatment effect (ATE); coefficients are effects per one additional shooting per 100,000. *Panel B*: Event–study coefficients ($\hat{\beta}_\tau$) with 95% confidence intervals. Event-study estimates for Panel B, column (1) appear in Figure 2. *Sample Period:* 2006–2017. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2
IV Regression Results:
Shooting Rates and K-12 Chinese Enrollments

Panel A: Second Stage Results				
			1-Year Lag	
K-12 Chinese Students Enrollment	(1)	(2)	(3)	(4)
Shooting Rate	-0.175**	-0.183**	-0.183**	-0.183**
	(0.073)	(0.077)	(0.083)	(0.086)
County-Year FE	✓	✓	✓	✓
Demographic Controls	✓		✓	
Observation	18,780	18,780	18,780	18,780
Number of Clusters (County)	3,131	3,131	3,131	3,131
Mean	2.312	2.312	1.768	1.768

Panel B: First Stage Results		
Shooting Rate	(1)	(2)
Gun Law Grade	-3.660***	-3.541***
	(1.055)	(1.062)
County-Year FE	✓	✓
Demographic Controls	✓	
Mean	30.165	30.165
Kleibergen-Paap LM stat fo underid.		
χ^2	13.03	11.99
p-value	0.000	0.001
Kleibergen-Paap Wald F-stat for weak IVs	12.04	11.06

Notes: Estimates follow Eq. 2 and Eq. 3. *Outcome*: the number of Chinese K–12 students per county–year (SEVIS). *Treatment*: shooting rate per 100,000 residents(UCR). Estimates include county and time fixed effects, and county-specific linear trends. Demographic controls: county share Asian, poverty rate, and unemployment rate (all county–year). Standard errors (in parentheses) are clustered at the county level. Kleibergen–Paap LM tests underidentification; Kleibergen–Paap Wald F tests weak instruments. In Panel B, *Gun Law Grade* is a state-level binary (1 = more restrictive; 0 = more permissive) from the Giffords Law Center, mapped to counties; it serves as the instrument for the shooting rate. *Sample Period:* 2012–2017. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3
Dynamic DiD Estimates:
Effect of Shooting Rates on K-12 International Enrollments

Panel A: Average Total Effect				
	(1)	(2)	Observation	Switchers
ATE	-0.023**	-0.024**	12,161	3,647
	(0.010)	(0.010)		
Demographic Controls	✓			
Mean	4.088	4.088		
Panel B: Dynamic Event Study				
	(1)	(2)	Observation	Switchers
Before:				
t = -1	0.049	0.066	3,715	298
	(0.056)	(0.057)		
t = -2	0.078	0.101	2,517	169
	(0.121)	(0.124)		
t = -3	-0.124	-0.088	1,575	93
	(0.104)	(0.108)		
After:				
t = 1	-0.140***	-0.136***	5,022	521
	(0.049)	(0.047)		
t = 2	-0.165***	-0.164***	4,697	521
	(0.057)	(0.056)		
t = 3	-0.138*	-0.152**	4,478	521
	(0.072)	(0.075)		
t = 4	-0.205**	-0.219**	4,318	521
	(0.094)	(0.099)		
t = 5	-0.343**	-0.355**	4,196	521
	(0.158)	(0.164)		
t = 6	-0.450*	-0.455*	4,087	521
	(0.230)	(0.236)		
t = 7	-0.634**	-0.636**	3,758	521
	(0.313)	(0.321)		
Demographic Controls	✓			
Mean	4.088	4.088		

Notes: Estimates follow Eq. 1 using the `did_multiplegt_dyn` framework for staggered, continuous treatments (de Chaisemartin et al., 2023). *Outcome*: emphall international K–12 students per county–year(SEVIS). *Treatment*: shooting rate per 100,000 residents(UCR). Estimates include county and time fixed effects. Demographic controls: county share Asian, poverty rate, and unemployment rate (all county–year). Standard errors (in parentheses) are clustered at the county level. *Sample Period:* 2006–2017.
Panel A: Average treatment effect (ATE); coefficients are effects per one additional shooting per 100,000. *Panel B*: Event–study coefficients ($\hat{\beta}_\tau$) with 95% confidence intervals. Event-study estimates for Panel B, column (1) appear in Figure 4. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4
Dynamic DiD Estimates:
Effect of K-12 School Shootings on Chinese Enrollments

Panel A: Average Total Effect

	(1)	(2)	Observation	Switchers
ATE	-2.143**	-1.183	8,094	4,186
	(0.984)	(0.791)		
Demographic Controls	✓			
Mean	1.280	1.280		

Panel B: Dynamic Event Study

	(1)	(2)	Observation	Switchers
Before:				
t = -1	0.080	0.033	2,514	482
	(0.054)	(0.030)		
t = -2	-0.137	0.062	1,372	273
	(0.135)	(0.046)		
t = -3	-0.110	0.101	540	109
	(0.267)	(0.102)		
After:				
t = 1	-0.171	0.029	3,529	598
	(0.116)	(0.029)		
t = 2	-0.467**	-0.088**	2,908	598
	(0.227)	(0.054)		
t = 3	-0.582*	-0.101	2,381	598
	(0.307)	(0.109)		
t = 4	-0.660*	-0.169	2,018	598
	(0.359)	(0.193)		
t = 5	-0.949**	-0.520	1,761	598
	(0.489)	(0.386)		
t = 6	-1.601***	-1.269**	1,450	598
	(0.647)	(0.721)		
t = 7	-1.898**	-1.375**	1,277	598
	(0.857)	(0.886)		
Demographic Controls	✓			
Mean	1.280	1.280		

Notes: Estimates follow Eq. 1 using the `did_multiplegt_dyn` framework for staggered, continuous treatments (de Chaisemartin et al., 2023). *Outcome*: Chinese K–12 students per county–year(SEVIS). *Treatment*: K–12 school shooting incidents(CHDS). Estimates include county and time fixed effects. Demographic controls: county share Asian, poverty rate, and unemployment rate (all county–year). Standard errors (in parentheses) are clustered at the county level.
Panel A: Average treatment effect (ATE); coefficients are effects per one additional shooting per 100,000. *Panel B*: Event–study coefficients ($\hat{\beta}_\tau$) with 95% confidence intervals. Event-study estimates for Panel B, column (1) appear in Figure 5. *Sample Period:* 2006–2017. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5
News Coverage of U.S. Shootings and School Shootings: Effect on K-12 Chinese Enrollments

K-12 Chinese Student Enrollment	(1)	(2)
News Freq. of Shooting Location	-0.200***	-0.211***
	(0.053)	(0.055)
County-Year FE	✓	✓
Demographic Controls	✓	
Observation	37,543	37,543
Number of Cluster (County)	3,133	3,133
Mean	1.280	1.280

Notes: *Outcome*: Chinese K–12 students per county–year(SEVIS). *Treatment*: News Frequency of Shooting Location measures the number of times a U.S. state is mentioned in Chinese news reports about shootings each year(CCTV). Estimates include county and time fixed effects, and county-specific linear trends. Demographic controls: county share Asian, poverty rate, unemployment rate and population (all county–year). Standard errors (in parentheses) are clustered at the county level. *Sample Period:* 2006–2017. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6

Dynamic DiD Estimates:
Effect of Shooting Rates on Chinese Higher Education Enrollments

Panel A: Average Total Effect

	Associate and Bachelor's		Master's and Doctorate			
	(1)	(2)	(3)	(4)	Observation	Switchers
ATE	-0.003	-0.004	0.023	0.021	12,161	3,647
	(0.066)	(0.066)	(0.195)	(0.196)		
Demographic Controls	✓		✓			
Mean	7.93	7.93	10.55	10.55		

Panel B: Dynamic Event Study

	Associate and Bachelor's		Master's and Doctorate			
	(1)	(2)	(3)	(4)	Observation	Switchers
Before:						
t = -1	0.057	0.101	0.301	0.366	3,715	298
	(0.067)	(0.082)	(0.215)	(0.242)		
t = -2	0.264*	0.315*	0.861*	0.929*	2,517	169
	(0.143)	(0.169)	(0.467)	(0.501)		
t = -3	0.495**	0.574**	1.265*	1.382*	1,575	93
	(0.243)	(0.285)	(0.720)	(0.778)		
After:						
t = 1	0.130	0.150	-0.099	-0.071	5,022	521
	(0.185)	(0.182)	(0.418)	(0.413)		
t = 2	0.291	0.311	-0.294	-0.265	4,697	521
	(0.444)	(0.444)	(0.800)	(0.796)		
t = 3	0.169	0.160	-0.478	-0.480	4,478	521
	(0.476)	(0.486)	(1.166)	(1.173)		
t = 4	0.179	0.162	-0.124	-0.148	4,318	521
	(0.779)	(0.794)	(1.994)	(2.010)		
t = 5	-0.222	-0.237	0.470	0.430	4,196	521
	(0.959)	(0.977)	(3.198)	(3.220)		
t = 6	-0.330	-0.340	1.071	1.027	4,087	521
	(1.362)	(1.381)	(4.467)	(4.493)		
t = 7	-0.529	-0.536	1.472	1.416	3,758	521
	(1.844)	(1.864)	(5.437)	(5.466)		
Demographic Controls	✓		✓			
Mean	7.93	7.93	10.55	10.55		

Notes: Estimates follow Eq. 1 using the `did_multiplegt_dyn` framework for staggered, continuous treatments (de Chaisemartin et al., 2023). *Outcome*: Chinese higher-education students per county–year(SEVIS). *Treatment*: shooting rate per 100,000 residents(UCR). Estimates include county and time fixed effects. Demographic controls: county share Asian, poverty rate, and unemployment rate (all county–year). Standard errors (in parentheses) are clustered at the county level. *Sample Period:* 2006–2017.
Panel A: Average treatment effect (ATE); coefficients are effects per one additional shooting per 100,000. *Panel B*: Event–study coefficients ($\hat{\beta}_\tau$) with 95% confidence intervals. Event-study estimates for Panel B, column (1) appear in Figure 6. *Sample Period:* 2006-2017 *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7

News Coverage of U.S. Shootings:
Effect on Chinese Higher-Education Enrollments

	Associate and Bachelor's		Master's and Doctorate	
Chinese Student Enrollment	(1)	(2)	(3)	(4)
News Freq. of Shooting Location	-0.384*	-0.378*	-0.197	-0.195
	(0.201)	(0.199)	(0.271)	(0.273)
County-Year FE	✓	✓	✓	✓
Demographic Controls	✓		✓	
Observation	37,543	37,543	37,543	37,543
Number of Cluster (County)	3,133	3,133	3,133	3,133
Mean	7.929	7.929	10.552	10.552

Notes: *Outcome*: Chinese higher-education enrollment per county–year (SEVIS). *Treatment*: News Frequency of Shooting Location measures the number of times a U.S. state is mentioned in Chinese news reports about shootings each year(CCTV). Estimates include county and time fixed effects, and county-specific linear trends. Demographic controls: county share Asian, poverty rate, and unemployment rate (all county–year). Standard errors (in parentheses) are clustered at the county level. *Sample Period:* 2006–2017. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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Appendices

A Tables

Table A1
Top Sending Countries and Receiving States
of K-12 International Students, 2006-2017

	Number of Enrollment	Percentage
Sending Countries		
China	58,692	29.4%
South Korea	31,390	15.7%
Mexico	18,986	9.5%
Germany	10,724	5.4%
Vietnam	7,131	3.6%
Brazil	6,491	3.2%
Japan	6,196	3.1%
Spain	5,837	2.9%
Canada	5,336	2.7%
Italy	2,933	1.5%
Other	46,160	23.1%
Receiving States		
California	33,995	17.0%
Florida	16,565	8.3%
New York	14,701	7.4%
Massachusetts	12,866	6.4%
Texas	10,616	5.3%
Pennsylvania	9,921	5.0%
Connecticut	7,771	3.9%
Michigan	5,773	2.9%
New Jersey	5,446	2.7%
Virginia	5,312	2.7%
Other	76,910	38.5%
Total	**199,876**	**100%**

Notes: This table presents the distribution of K-12 international students from the top 10 sending countries to the top 10 U.S. destination states between 2006 and 2017, covering a total of 232 countries. Chinese students account for approximately 30% of all international enrollments.

Table A2
Descriptive Statistics, 2006-2017

	Mean	SD	Observation
Main outcome (Enrollments)			
K-12 Chinese Students	1.280	(11.265)	37,543
K-12 International Students (All Countries)	4.088	(22.585)	37,543
Associate and Bachelor Chinese Students	7.929	(72.027)	37,543
Master and Doctoral Chinese Students	10.552	(100.497)	37,543
Key Independent Variable			
Shoot Rate per 100,000 pop.	28.236	(65.720)	37,543
K-12 School Shootings	1.037	(1.554)	37,543
Demographic Controls			
Asian(%)	1.506	(3.352)	37,543
Below Federal-Poverty-Level Rate(%)	15.577	(5.969)	37,543
Unemployment Rate(%)	6.617	(2.921)	37,543
Population	98671.4	(317736.9)	37,543
Mechanism (News Frequency of Location)			
U.S. Shooting	0.435	(1.086)	37,543

Notes: All variables are measured at the county level. The shooting rate per 100,000 population is calculated as the number of shooting events divided by the local population, multiplied by 100,000, by county and year.

Table A3

Descriptive Statistics for the IV Model, 2012–2017

	Mean	SD	Observation
Main outcome (Enrollments)			
K-12 Chinese Students	2.312	(15.633)	18,780
1 Year-Lag of K-12 Chinese Students	1.768	(12.901)	18,780
Key Independent Variable			
Shoot Rate per 100,000 pop.	30.165	(72.017)	18,780
Instrument Variable			
Gun Law Grade (Binary)	0.256	(0.437)	18,780
Demographic Controls			
Asian(%)	1.649	(3.461)	18,780
Below Federal-Poverty-Level Rate(%)	15.849	(5.994)	18,780
Unemployment Rate(%)	6.133	(2.512)	18,780
Population	100723.6	(325528.7)	18,780

Notes: All variables are measured at the county level. The shooting rate per 100,000 population is calculated as the number of shooting events divided by the local population, multiplied by 100,000, by county and year.

Table A4

Balance Test on Baseline Characteristics

	Univariate	Joint
Asian(%)	-1.846	-1.811
	(1.552)	(1.543)
Below Federal-Poverty-Level Rate(%)	-0.079	-0.078
	(0.144)	(0.144)
Unemployment Rate(%)	-0.006	-0.006
	(0.005)	(0.005)
Population	0.000	0.000
	(0.000)	(0.000)
Observations	18,780	
Joint R^2	0.001	
Joint F	0.760	
Joint *p-value*	0.557	

Notes: This table reports balance test results from separate regressions of each baseline county characteristic on a binary indicator of state-level gun policy strictness (Gun Law Grade), where 1 denotes stricter laws and 0 indicates more permissive laws. All covariates match those used in the main 2SLS specification: the county-level share of Asian residents, poverty rate, and the unemployment rate. Columns (1) report univariate regressions; Column (2) includes all covariates jointly and reports an omnibus joint test. Standard errors, shown in parentheses, are clustered at the state level. *Sample Period:* 2012–2017. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5

Sensitivity of IV Estimates to Controls:
Shooting Rates and K-12 Chinese Enrollments

K-12 Chinese Students Enrollment	(1)	(2)	(3)	(4)
Shooting Rate	-0.175**	-0.178**	-0.185**	-0.183**
	(0.073)	(0.074)	(0.077)	(0.077)
Asian(%)	81.734	82.667	88.774	
	(101.430)	(103.081)	(107.461)	
Below Federal-Poverty-Level Rate(%)	-17.229	-17.591		
	(15.397)	(16.094)		
Unemployment Rate(%)	-0.078			
	(0.144)			
County-Year FE	✓	✓	✓	✓
Observations	18,780	18,780	18,780	18,780
Number of Counties	3,131	3,131	3,131	3,131
Mean	2.312	2.312	2.312	2.312

Shooting Rate	(1)	(2)	(3)	(4)
Gun Law Grade	-3.661***	-3.634***	-3.507***	-3.536***
	(1.055)	(1.048)	(1.064)	(1.063)
County-Year FE	✓	✓	✓	✓
Mean	30.165	30.165	30.165	30.165
Kleibergen-Paap LM stat for underid				
χ^2	13.026	12.999	11.788	11.992
p-value	0.000	0.000	0.001	0.001
Kleibergen-Paap Wald F-stat for weak IVs	12.041	12.030	10.854	11.058

Notes: In Panel A, the dependent variable is Chinese K–12 student enrollment, and the shooting rate is measured as the number of shooting events per 100,000 people, based on county-level population data for each year. Column (1) through (6) sequentially add control variables to assess the sensitivity of the IV estimates. Column (1) presents the full specification with all controls and corresponds to the baseline IV result shown in Column (1) of Table 2. All models include the fixed effects specified in Equation 3. In Panel B, *Gun Law Grade* is a binary state-level variable, where 1 indicates stricter gun laws and 0 denotes more permissive laws. Column (1) again presents the full specification with all controls and corresponds to the baseline reduced-form result shown in Column (1) of Table 2. All columns include the same set of control variables used in the corresponding second-stage regressions in Panel A, as well as the fixed effects outlined in Equation 2. The results were unaffected and are omitted here to maintain consistency with the main specification and descriptive statistics. Standard errors (in parentheses) are clustered at the county level. *Sample Period:* 2006–2017. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6

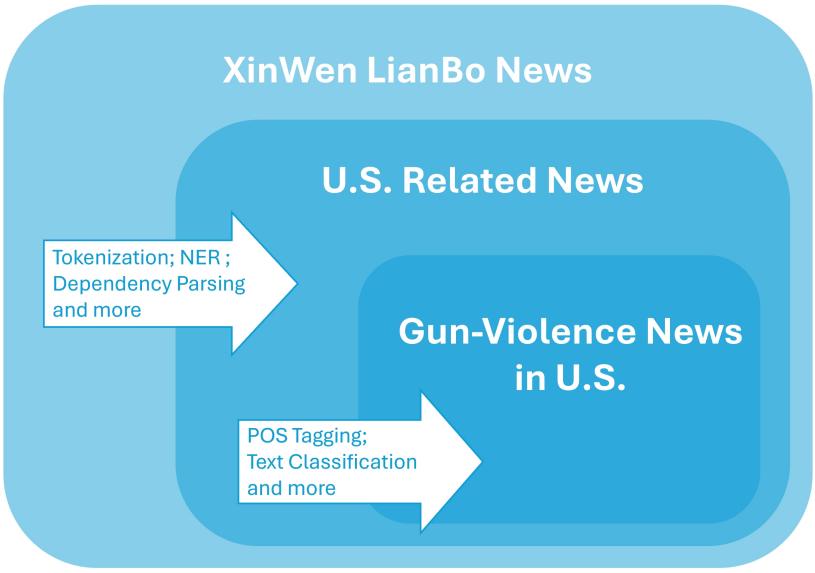
Reduced-Form Estimates:
Gun Laws and K-12 Chinese Enrollments

K-12 Chinese Students Enrollment	(1)	(2)
Gun Law Grade	0.640^{***}	0.648^{***}
	(0.271)	(0.270)
County-Year FE	✓	✓
Demographic Controls	✓	
Observation	18,780	18,780
Number of Cluster (County)	3,131	3,131
Mean	1.280	1.280

Notes: *Gun Law Grade* is a binary state-level variable, where 1 indicates states with stricter gun laws and 0 denotes states with more permissive laws. Estimates include county and time fixed effects, and county-specific linear trends. Demographic controls: county share Asian, poverty rate, and unemployment rate (all county–year). Standard errors (in parentheses) are clustered at the county level. *Sample Period:* 2012–2017. *Significance*: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B Figures

Figure B1
Structured NLP Workflow for News Text Analysis



Notes: This figure illustrates the application of NLP techniques at different stages to isolate and extract relevant U.S. gun violence news from seven years of daily 30-minute news scripts. Tokenization involves splitting text into individual words or subwords for analysis. POS Tagging identifies parts of speech (nouns, verbs, adjectives) for syntactic and semantic analysis. Named Entity Recognition (NER) extracts key entities such as names, locations, and dates. Dependency Parsing analyzes grammatical structure by mapping dependencies between words. Text Classification assigns text to predefined categories such as spam detection and news categorization.