Local Shelter Availability and Intimate Partner Homicides

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Abstract

This paper estimates the effect of having a shelter in a small to mid-size county on intimate partner homicide rates. Results from a modern staggered difference-in-differences model exploiting county-by-year changes on the extensive margin of shelter availability suggest that, while opening a shelter where there were no shelters previously has no immediate and significant effects on intimate partner homicide rates, closing a county's only shelter may increase homicide rates among unmarried women by about 10% over the next three to five years.

Keywords: Domestic violence, crime, gender, housing

JEL Codes: H4, I3, J1, K4

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1 Introduction

The CDC estimates that about 1 in 4 women in the United States experiences intimate partner violence (IPV), including physical, sexual, or stalking violence at the hands of an intimate partner during her lifetime (Smith et al., 2018). Approximately one third of homicides with female victims are perpetrated by intimate partners, and most of these female intimate partner homicides are preceded by prior intimate parter violence (Campbell et al., 2007). Domestic violence, in addition to the trauma and physical injury it causes, is known to be associated with lower employment rates and higher rates of housing insecurity among women (Lindhorst et al., 2007, Baker et al., 2010). Infants exposed to domestic violence in utero experience higher rates of adverse birth outcomes (Currie et al., 2018) and children who witness domestic violence are at higher risk for cognitive, behavioral, and mental health problems (Stiles, 2002), which may even spill over to create adverse outcomes for their peers (Carrell and Hoekstra, 2010).

Outside of criminal justice system interventions, which focus primarily on arresting or incarcerating the offender, shelters are one of the few resources targeted towards combating domestic violence. Domestic violence hotlines often serve the function of referring callers to shelters in their local area, which may provide in-house assistance with other services such as counseling, legal advocacy, and assistance with paperwork to apply for government benefits. Despite being one of the few services commonly available to domestic violence survivors and being regarded as the bare minimum standard of care for housing-insecure families at high risk for domestic violence, little is known about shelters' effectiveness in preventing violence.[1]

In this paper, I estimate the causal effect of the availability of a temporary shelter on intimate partner homicides using a difference-in-differences design, which exploits variation from shelter openings in counties that previously had no shelters and total closures of all shelters in counties that previously had at least one shelter. Data on shelter availability

[1] Domestic violence advocates and service providers often prefer the use of the term "survivor" rather than "victim" when referring to individuals who have experienced domestic violence. I alternate between the two terms in this paper due to the use of homicide as an outcome variable.

come from the Census Bureau's County Business Patterns data, and reliably report whether a county has a shelter but do not differentiate between designated domestic violence shelters and other types of homeless shelters. The sample is limited to counties whose population is comparable to that of counties both with and without shelters, and hand-collected data for a subset of these counties show that a large proportion of shelters in these small to mid-size counties are domestic violence shelters.[2] In addition to the supplementary services they provide, domestic violence shelters are often required by law to keep their locations confidential to increase resident safety and are likely to prioritize bed space to severe domestic violence cases (Koppa, 2020, Messing et al., 2015).

Regardless, any shelter has the potential to mitigate domestic violence. Family violence is highly correlated with poverty (Harrell et al., 2014) and homeless families experience even higher rates of domestic violence than other low-income families (Wood et al., 1990). The consensus in the literature on homelessness is that homeless individuals experience higher rates of violence in general, and that many domestic violence survivors cycle in and out of homelessness throughout their lives (Diette and Ribar, 2018, O'Flaherty, 2019). Furthermore, emerging evidence shows that eviction or threat of eviction exacerbates the escalating nature of intimate partner violence and reduces the probability that domestic violence incidents are reported to law enforcement (Golestani, 2021). However, most existing work linking homelessness and domestic violence has focused on large urban areas and has therefore operated in a context where some type of emergency shelter is always available, making it difficult to study the effects of shelters directly.

For those already living with a violent partner, theory predicts that the availability of a shelter may reduce the cost of permanently leaving the abusive relationship or of creating a temporary physical separation from the abuser, which may allow for de-escalation of conflict, changes in bargaining power within the relationship, or at least a temporary reprieve from continued violence (Chanley et al., 2001, Farmer and Tiefenthaler, 1997). While many

[2] See the Appendix for details.

domestic violence survivors leave abusive relationships temporarily and eventually return, the availability of a shelter that provides a safe place to stay, often along with other services, may increase the probability of permanently leaving the relationship (Sims, 2021). Alternatively, the availability of a shelter may prevent those at risk of homelessness who are considering moving in with a violent or potentially violent partner or ex-partner from doing so.

Data on intimate partner homicides come from two sources: the FBI Uniform Crime Reporting Program's Supplementary Homicide Reports, which identify the relationship between the offender and the victim but do not have universal coverage, and the CDC's National Vital Statistics System's all-cause mortality data, which cover nearly all US counties but do not identify this relationship. I use intimate partner homicides in the UCR data and female homicides disaggregated by age and marital status as a proxy for intimate partner homicides in the NVSS data as the outcome variables because other measures of domestic violence often have embedded selection bias due to underreporting, while nearly all homicides are reported. Stigma, shame, mistrust of police, or fear of retaliation from the abuser are all unobserved factors that may influence a victim's decision of whether or not to self-select into reporting domestic assaults. If the services afforded by a shelter embolden survivors and make them more likely to report their abuse to the authorities, using reported domestic assaults as an outcome could bias any negative effects of shelters on domestic and intimate partner violence towards zero.[3]

To estimate this relationship, I use the staggered difference-in-differences estimator developed by Callaway and Sant'Anna (2020). As long as changes in intimate partner homicide rates in counties with shelter openings and closings would have been similar to those in comparison counties in the absence of those openings/closings, this strategy would identify the causal effect of shelter availability on intimate partner violence. I do not find credible evidence that opening a shelter in a county that did not previously have one has any imme-

[3] In fact, Golestani (2021) finds that the threat of eviction can decrease propensity to report domestic violence to police. If the availability of a shelter mitigates fear of homelessness, this finding would be consistent with the idea that shelters could increase the probability an assault is reported, even if they decrease the total number of assaults.

diate effect on intimate partner homicides, but I do see suggestive evidence that homicide rates for unmarried women may increase by about 10% for three to five years after a shelter closes.

This paper contributes to a growing literature on the causal effects of targeted policy interventions to combat domestic violence. Most papers in this literature have evaluated criminal justice interventions focused on convicting or incarcerating offenders, such as no-drop policies[4] (Aizer and Dal Bo, 2009), discretionary arrest policies[5] (Chin and Cunningham, 2019), sanctuary policies[6] (Amuedo-Dorantes and Deza, 2020), restrictions on gun purchases for those convicted of domestic violence misdemeanors (Raissian, 2016), or specialized domestic violence courts (Golestani et al., 2021). Koppa (2020) and Messing et al. (2015), on the other hand, evaluate a victim-focused intervention called a "lethality assessment" in which police use a series of questions to estimate a complainant's indicated risk for intimate partner homicide and find that this intervention can reduce both fatal and non-fatal future victimization. While these policy levers are important in protecting survivors who are willing to call the police, not all survivors are willing to self-report assaults to law enforcement (Ellsberg et al., 2001) and may even avoid reporting despite escalating violence due to potential eviction consequences (Golestani, 2021). The findings in this paper build on this existing body of work by evaluating a victim-focused intervention that can be administered with or without the involvement of law enforcement and criminal justice authorities.

This paper also contributes to a broader literature on the economic conditions surrounding domestic violence. Past findings indicate that domestic violence responds to the timing of food and cash assistance benefits (Hsu, 2017, Carr and Packham, 2021), the gender wage gap (Aizer, 2010), and gender-specific unemployment rates (Anderberg et al., 2016). Additionally, domestic violence 911 calls increased sharply during the COVID-19 pandemic (Leslie and Wilson, 2020, Bullinger et al., 2021), a time of heightened economic stress and

[4] No drop policies prevent a victim from requesting that domestic violence charges be dropped once they have been filed.

[5] Discretionary arrest policies allow police to arrest a perpetrator without a warrant during domestic violence calls for service.

[6] Sanctuary policies prohibit police from sharing information with immigration enforcement authorities when crimes are reported.

increased time at home with domestic partners. The paper contributes to the literature on domestic violence and economic conditions as well by evaluating the effects of an intervention that provides victims with a non-fungible and non-transferable economic resource that can help them separate from or avoid moving in with abusive partners, or temporarily remove themselves from escalating violent situations.

Lastly, another emerging literature studies the relationship between housing assistance and domestic violence, but this paper makes an important contribution by focusing on whether or not there is any local shelter available. While the HUD-funded Family Options Study finds that subsidies for permanent housing reduce intimate partner violence more than access to shelters alone (Gubits et al., 2016), it does not provide evidence on the effectiveness of shelters themselves because all cities in the study had emergency shelters.[7] The most closely related paper is a contemporaneously developed working paper by Sims (2021), which models survivors' stay/leave decision and empirically estimates the effects of existing shelters' capacity expansions on intimate partner homicides, finding no effect despite the fact that shelters are highly utilized and often face capacity constraints (see Table A-1). This paper, in concert with Sims (2021), suggests that while shelters may be economically beneficial for victims leaving abusive relationships in other ways - either by improving access to supportive service or by preventing non-lethal violence - they may not reach victims who are at the highest risk of homicide.

Section 2 describes the data sources used in the analysis, including details on how intimate partner homicide rates are constructed, the importance of correcting for outliers, and why focusing on the extensive margin is best suited to the data and question. Section 3 details the identifying assumptions required for these estimates to be considered causal, describes the staggered difference-in-differences estimator used to obtain effects of shelters on intimate partner homicide rates, and explains its advantages over the classic OLS first differences (FD) and two-way fixed effects (TWFE) estimators. Section 4 presents main results on the

[7] In fact, participants in the study were recruited from the existing clientele of emergency shelters in each city, explicitly excluding domestic violence shelters.

effect of shelters on intimate partner homicides. Section 5 discusses policy implications and possible directions for future research.

2 Data

I focus exclusively on the extensive margin: whether a county has any shelters at all. Data on shelters are available from the Census Bureau's County Business Patterns data from 1998-2016.[8] The NAICS code "624221" covers all temporary shelters, including domestic violence shelters, general homeless shelters, and youth shelters. One limitation of the data is that I cannot distinguish how many shelters in each county are domestic violence shelters. Although domestic violence shelters often provide additional services such as location confidentiality, legal and social services assistance, counseling, and comfortable accommodations for children, general homeless shelters may serve as an imperfect substitute where domestic violence shelters are not available. Hand-collected data on shelters from 2016 that appear to still be open as of 2021 suggest that, in small to mid-size counties with only one shelter, about 73% are domestic violence shelters; in those with multiple shelters, about 90% have at least one domestic violence shelter.[9] Another limitation is that the actual size of each shelter is not observed. In theory, the CBP data reports employment counts for each industry and establishment; however, in practice, the employment counts are censored to the extent that they are not useful for determining whether a shelter that opens or closes is small or large relative to other shelters in the county, or whether a county experiences a change in shelter capacity without changing the number of shelters[10]. For these reasons, the extensive margin is best suited to the context and data availability.

Many large, urban counties have multiple shelters in every year in the panel and do not provide any useful variation in shelter availability. However, limiting the sample based on

[8] See Appendix for details on the time horizon of the panel.

[9] More details on these rough estimates of shelter types are presented in Appendix Tables A-2, A-3, and A-4.

[10] For details on employment censoring in the County Business Patterns data, see Eckert et al. (2020) They impute employment for county-industry cells from 1975 to 2016; however, Temporary Shelters did not have their own code under the SIC system, instead falling under code "8322"

observed treatment status throughout the panel could introduce selection bias. To mitigate these concerns, I limit the sample to counties whose populations are less than or equal to that of the largest county that begins the panel with zero shelters in 1998, the first year that the number of shelters is observed. Likewise, I drop counties smaller than the smallest county that has a shelter in 1998.

Outcome data on intimate partner homicides come from the FBI Uniform Crime Reporting Program's Supplementary Homicide Reports (Kaplan, 2021). Domestic violence is underreported and victims may self-select into reporting based on unobserved factors such as cultural values, religious beliefs, trust in police, or fear of retaliation from the abuser; using intimate partner homicides as an outcome measure mitigates this potential selection bias, since virtually all homicides are reported to the authorities. The Supplementary Homicide Reports have the unique advantage of reporting the relationship between the victim and the offender(s), allowing the direct identification of domestic violence and intimate partner homicides. This relationship, however, is only reported for the first victim listed. Because most domestic violence homicides are intimate partner homicides, I focus on homicides where any offender is a current or former intimate partner of the victim. However, I also report results for female homicide rates overall to check that results are unaffected by any changes in homicide clearance rates or the ability of police to correctly categorize the relationship between the victim and the offender.

Although they provide detailed information about each individual homicide, the UCR Supplementary Homicide Reports are a voluntary program for police agencies. While most agencies participate in the Uniform Crime Reports at some point during the analysis period from 1998 to 2016, many report to the UCR inconsistently. Because the Supplementary Homicide Reports are incident-level data, it is not possible to directly distinguish between no homicides and no reporting. However, since the Supplementary Homicide Reports are part of the broader Uniform Crime Reporting program, I assume an agency reports to the

which covers Individual and Family social services more generally, so they are excluded from this imputed dataset.

Supplementary Homicide Reports in a given year if it appears in the other UCR datasets in every month of the year, since there are probably no true zeroes on all other types of crime in the UCR. The sample is limited to a balanced panel of agencies that report to the UCR consistently from 1998-2016, and because most consistently reporting agencies are local police departments, other types of agencies are dropped.[11] This means that in most cases, the population served by the reporting police agency is that of a single city.

Because homicides are a rare outcome in general and many agencies in small and mid-size counties do not participate in the UCR consistently, statistical power is limited using the Supplementary Homicide Reports data. To mitigate this concern, I also construct female homicide rates during the CDC's NVSS all-cause mortality data. While this data does not identify the relationship between the victim and the offender, it covers nearly all homicides that occur in the United States. Because a large proportion of intimate partner homicides have victims who are women, and a large proportion of female homicide victims are killed by their partners, I estimate effects on female homicides in the hopes of picking up any effect on intimate partner homicides.

Figure 1 shows the distribution of victim age for intimate partner homicides versus other homicides in the UCR data, and indicates that homicides of younger women are disproportionately likely to be intimate partner homicides, so I also construct homicide rates for women ages 18-50. Lastly, I disaggregate female homicide rates by marital status in case effects vary for married and unmarried women due to differences in the ease of leaving an abusive relationship.

I construct overall intimate partner homicide rates, gender-specific intimate partner homicide rates, and other homicide rates as $HomRate_{at} = \frac{Homicides_{at}}{(\frac{Population_{at}}{100{,}000})}$, using the total population served by the reporting police agency (UCR data) or the total population of the county (NVSS data) regardless of whether the rate is gender-specific[12].

[11] Other types of agencies include, for example, university police departments and county sheriff's departments. Very few of these types of agencies would have been included in the balanced panel, and the populations they serve may have overlapped with those of local police departments in the panel.

[12] This means that all homicide rates use the same denominator such that $TotalIPVHomRate_{at} = FemaleIPVHomRate_{at} +$

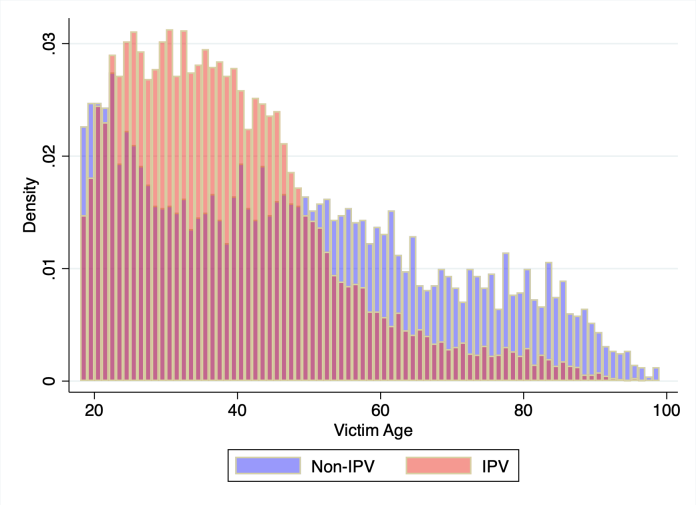


Figure 1: Age Distribution: Female Homicide Rates by Perpetrator

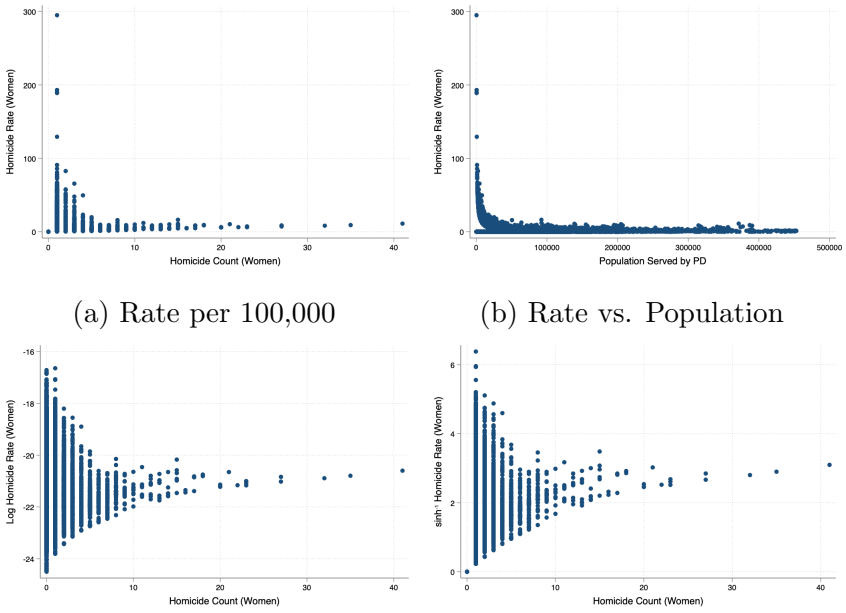
Notes: Intimate partner (IPV) homicides are any homicide perpetrated by a current or former spouse or dating partner. Non-IPV homicides are those where the relationship between the victim and the perpetrator is known to police and is someone other than an intimate partner. Homicides where the perpetrator is unknown are excluded. Sample includes female homicides reported by police departments included in the UCR Openings Sample (see Appendix Table A-5) or the UCR Closings Sample (see Appendix Table A-9) from 1993-2016.

Although the number of shelters and most control variables are observed at the county level, homicides in the UCR data are observed at the reporting agency level, so the unit of observation will be the agency-year for the UCR analysis and county-year for the NVSS analysis. [13] Identifying the effect using within-agency variation controls for variation in policing and police data reporting behavior between agencies within the same county, such as that arising from agencies that have different rates of identifying an offender in the Supplementary Homicide Reports.

Because homicides are a rare outcome, homicide rates for small police departments or small counties are prone to outliers produced primarily by variation in the denominator. Figure 2 shows different functional forms to illustrate this problem in the UCR data and Figure 3 demonstrates this in the NVSS data, with panels (a) and (b) showing that very high homicide rates come primarily from very small counties experiencing a few homicides. To deal with this type of concern while also accounting for population, the $log(\frac{homicides+1}{Population/100{,}000})$ transformation might be suggested; however, panel (c) demonstrates that this transforma-

$MaleIPVHomRate_{at}$, etc.

[13] Additional county-level controls come from SEER county-level population estimates and Local Area Unemployment Statistics.



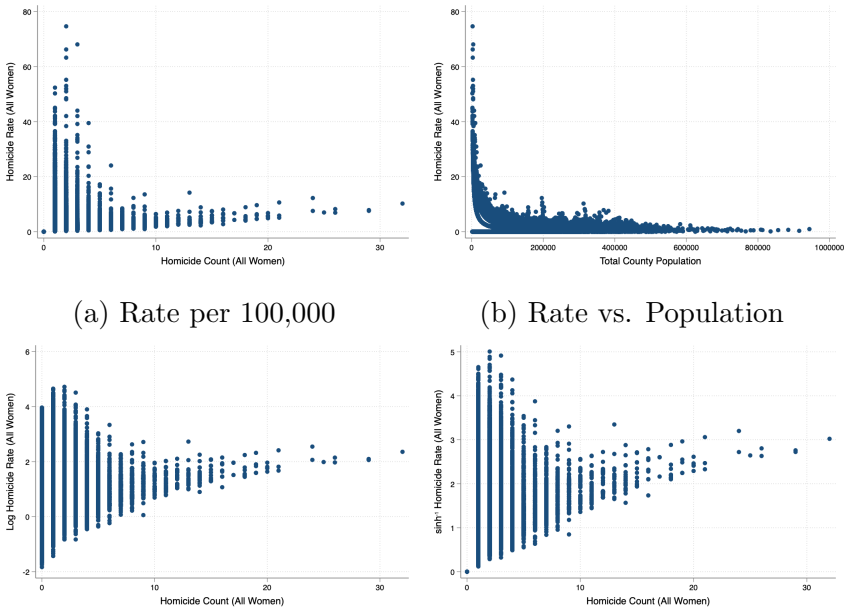
(a) Rate per 100,000 (b) Rate vs. Population

(c) Log Rate (d) $\sinh^{-1}$ Rate

Figure 2: Functional Forms: Homicide Rates, All Women, UCR Data

Notes: Sample includes female homicides reported by police departments included in the UCR Openings Sample (see Appendix Table A-5) or the UCR Closings Sample (see Appendix Table A-9) from 1993-2016.

tion would produce artificial variation in log homicide rates across observations with zero homicides. Panel (d) shows that the inverse hyperbolic sine transformation of the homicide rate accomplishes a similar effect without creating this artificial variation. For this reason, $sinh^{-1}(HomicideRate)$ will be the main outcome specification with other functional forms reported in the appendix. Section 3 details further how separate samples are constructed to measure the effects of shelter openings and shelter closings in a way that is congruous with the assumptions of the staggered difference-in-differences estimator; summary statistics are reported for the openings samples in Tables A-5 through A-8 and for the closings samples in Tables A-9 through A-12. Population for these homicide rates comes from SEER population estimates.



(a) Rate per 100,000 (b) Rate vs. Population

(c) Log Rate (d) $\sinh^{-1}$ Rate

Figure 3: Functional Forms: Homicide Rates, All Women, NVSS Data

Notes: Sample includes female homicides reported by the CDC in counties included in the NVSS Openings Sample (see Appendix Table A-7) or the NVSS Closings Sample (see Appendix Table A-11) from 1993-2016.

3 Methodology

This paper employs a difference-in-differences research design, exploiting variation that comes from counties that previously had no shelters opening their first shelter and counties that previously had at least one shelter closing their last shelter. The fundamental comparisons of interest in this design are 1) changes in intimate partner homicide rates in counties with a shelter opening versus those that continue to have no shelters and 2) changes in intimate partner homicide rates in counties with a total closure of all shelters versus those that continue to have at least one shelter. For estimates arising from these comparisons to yield the causal effect of shelter availability on intimate partner homicides, I must assume that trends in intimate partner homicides in counties with and without shelter openings and closings would have been similar in the absence of those changes. On the whole, pre-trends in most event studies appear to be noisy but similar in counties with shelter openings to those in counties with no openings or no openings yet; this suggests that, for the equal counterfactual trends assumption to be violated, some other shock would have had to systematically

change the trends in intimate partner homicide rates in counties with shelter openings and not in those without, or vice versa.

Recently, a growing literature has documented the heterogeneity bias and weighting problems present in the two-way fixed effects (TWFE) and first differences (FD) estimators commonly used in difference-in-differences designs with more than two time periods. This paper uses a modern difference-in-differences estimators developed by Callaway and Sant'Anna (2020) to mitigate these concerns. Importantly, this estimator allows for overall aggregations that pool all years after a shelter opens or closes - which would be most likely to pick up any effects on a rare outcome like homicides, and would allow time for the survivor to have left an abusive relationship before the violence would have escalated to the level of a homicide - but also allows for event studies and decomposition of effects by year of shelter opening/closing. However, it assumes that once a county is treated it remains treated, and it does not allow for multiple treatments.

I construct two main samples: an openings sample comparing each county's "first shelter opening" (going from zero shelters to at least one shelter) to the group of counties that never have a shelter throughout the period, and a closings sample that compares each county's "first shelter closing" (going from at least one shelter to no shelters) to counties that always have a shelter throughout the period. The main analysis uses only these never-treated counties as the comparison group so that that the size and composition of the comparison group does not change throughout the panel, but results are similar when including not-yet-treated counties. To maximize statistical power, a county's first opening or closing is included regardless of other changes in treatment status and years where treatment status is contaminated are dropped. For example, a county that starts with zero shelters, opens a shelter in 2001, and closes that shelter in 2008 would be included in the openings sample from the beginning of the pre-period in 1993 until 2007, the last year before the shelter closes, in order to estimate the effect of the opening in 2001. It would be included in the closings sample from 2001, the first year it has a shelter, until the end of the panel, to estimate the

effect of the closing in 2008.

One might think that using only the not-yet-treated counties as the comparison group may be appropriate, as they all selected into opening/closing a shelter at some point; however, this would result in a very small comparison group at the end of the panel, severely limiting statistical power.

The Callaway and Sant'Anna (2020) estimator estimates group-specific average treatment effects on the treated, denoted as $ATT_{g,t}$ for groups of counties treated in year g, estimated in year t. These group-time average treatment effects are numerically identified by taking the difference between the treatment and comparison counties before and after the shelter opening/closing via long differences in all periods after the treatment occurs relative to the period immediately before ($t = g - 1$).

I aggregate all of the $ATT_{g,t}$ obtained by the Callaway and Sant'Anna (2020) estimator in two ways: in a balanced event study showing the evolution of dynamic effects over time among groups treated for at least 5 periods before the end of the panel, and in a simple summary parameter that gives a point estimate for the overall effect. The event study aggregation takes the estimated $ATT_{g,t}$ for each group treated in year g measured in year t and aggregates them such that the time-specific effect e periods after the treatment, $\theta_{es}(e)$, is:

$$\theta_{ES}(e) = \sum_{g:g+5\leq 2016} \frac{N(g,t) : G = g}{N(g,t)} ATT_{g,t=g+e} \tag{1}$$

where $N(g,t)$ is the number of group-time pairs for which there is an estimated $ATT_{g,t}$.

The overall treatment effect parameter θ_O is merely a group-size-weighted average of the group effects ATT_g, which are themselves simple averages of the group-time effects $ATT_{g,t}$:

$$\theta_O = \sum_{g=1999}^{2016} \frac{N(a : G = g)}{N(a)} \sum_{t=1999}^{2016} \frac{1}{N(t)} ATT_{g,t} \tag{2}$$

where $N(t)$ is the number of time periods for which there are estimated $ATT_{g,t}$ and $N(a)$

is the number of units (in this case, reporting police agencies in the UCR or counties in the NVSS).

4 Results

Overall, results suggest no statistically significant effects of shelter openings on intimate partner homicide rates as measured in the UCR Supplementary Homicide Reports or female homicide rates as measured in the NVSS. However, using the NVSS data, there is some evidence that shelter closings may increase homicide rates for unmarried women in the 3-5 years immediately after the shelter has closed. As long as homicide trends in counties with shelter openings or closings would have otherwise been similar to those whose shelter status remained constant, these estimates are causal effects of the effect of shelter openings or closings on homicide rates.

4.1 Main Results: Openings

Table 1 presents the effect of shelter openings on homicide rates as measured in the UCR data. Columns 1 and 3 focus on overall intimate partner homicide rates and the rate of intimate partner homicide rates with female victims, with point estimates suggesting a 3.3% and 4.6% reductions, but neither estimate is statistically significant and both reverse in sign when weighted by the population served by the reporting police department (see Columns 2 and 4), suggesting no effect overall. Results are similar for overall female homicide rates in Columns 5 and 6. Appendix Table B-1 shows analogous results using raw homicide rates as the outcome, but recall from Figure 2 that this functional form is prone to very large outliers due to small denominators. Column 3 suggests a marginally significant reduction in female intimate partner homicide rates after a shelter opens, but this result is not robust to weighting by population, suggesting that large outliers from homicides in small jurisdictions are probably quite influential in producing this estimate. Similarly, Appendix Table B-2

presents results from a log transformation in which the log homicide rate is constructed as $log(\frac{Homicides+1}{Population/100{,}000})$. Column 3 suggests a marginally significant reduction in intimate partner homicide rates of about 2.3% after a shelter opens, but if this estimate were unaffected by false variation in counties with zero homicides (see Figure 2), it should be robust to weighting by population and/or to the inverse hyperbolic sine transformation. It is not statistically different from the main estimate using the inverse hyperbolic sine of the homicide rate, but the sign reverses when weighted by population.

Table 1: Staggered Openings vs. Never Opened, $\sinh^{-1}$ Homicide Rates, UCR Data

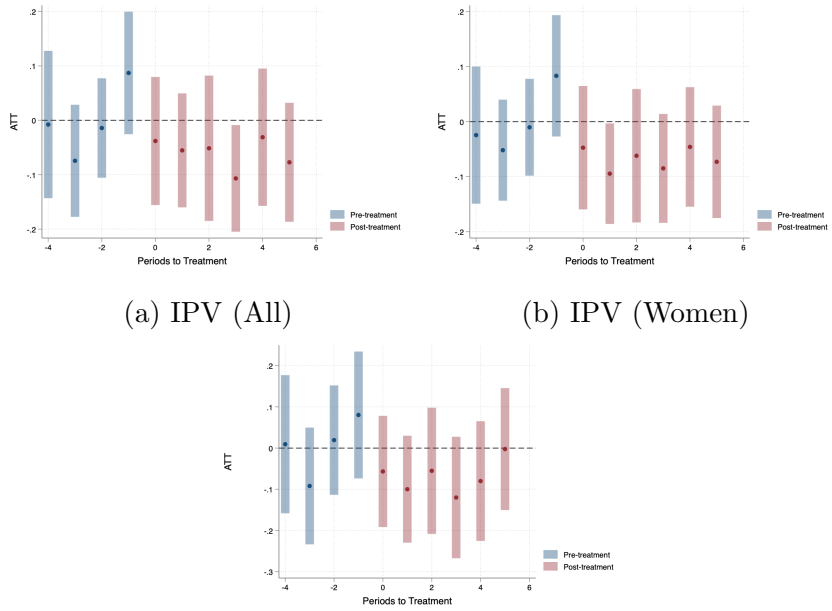
	(1)	(2)	(3)	(4)	(5)	(6)
	IPV (All Victims)	IPV (All Victims)	IPV (Women)	IPV (Women)	All Women	All Women
ATT	-0.0335	0.0165	-0.0456	0.0200	-0.0236	0.0411
	(0.0389)	(0.0579)	(0.0364)	(0.0512)	(0.0514)	(0.0765)
Weighted by Pop.	No	Yes	No	Yes	No	Yes

Standard errors in parentheses, clustered at county level

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

Figure 4 shows balanced event study aggregations with the treatment group sample limited to counties that are observed for at least 5 years before the shelter opening and at least 5 years after. Results show statistically significant reductions in the third year after the shelter opens in Panel A (all intimate partner homicides) and female intimate partner homicides in the first year after the shelter opens in Panel B (female intimate partner homicides), both about 10% decreases relative to the year before the shelter opened. However, pre-trends are noisy and there is a slight increase in homicides in this reference year, so these individual event study coefficients should be interpreted with caution. Unbalanced event studies for the full openings sample (used for the estimates in Table 1) and pooled aggregations with event-balanced openings samples are presented in Figure B-1 and Tables B-3, B-4, and B-5, all suggesting no overall effect on intimate partner homicide rates in the 2-5 years following a shelter opening.



(a) IPV (All)

(b) IPV (Women)

(c) All Women

Figure 4: Balanced Event Studies, Shelter Openings: $\sinh^{-1}$ Homicide Rates, UCR Data

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least 5 of "clean" comparison years with no shelters prior to the shelter opening and at least 5 "clean" treated years in which the shelter remains open afterwards. Years outside the [-5,5] event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate.

Results using the UCR data of course suffer from limited statistical power due to the fact that many police departments do not participate consistently in the program and therefore cannot be included in the panel. As noted in the summary statistics in Tables A-5 and A-7 in the Appendix, there are only 644 counties (1,013 police departments) in the openings sample using the UCR data compared to the 2,083 counties in the openings sample using the NVSS data. Table 2 presents results from this larger sample, focusing on female homicide rates in the NVSS data, since the summary statistics in Table A-5 would suggest that about 71% of intimate partner homicides in the UCR openings sample have female victims.

Results in Columns 1-2 suggest no statistically significant effect on female homicide results overall, and in Columns 3-4, no effect on homicides of women under 50, the age group in which homicides are most likely to be perpetrated by intimate partners (see Figure 1). The 95% confidence intervals on these estimtates would rule out effects larger than about 9% in either direction for this age group. In case these estimates are masking heterogeneity by

Table 2: Staggered Openings vs. Never Opened, $\sinh^{-1}$ Homicide Rates, NVSS Data

	(1) All Women	(2) All Women	(3) Age 18-50	(4) Age 18-50	(5) Married	(6) Married	(7) Unmarried	(8) Unmarried
ATT	-0.0178	0.000389	-0.00364	0.00980	-0.0320	-0.0511	0.00234	0.0363
	(0.0411)	(0.0457)	(0.0358)	(0.0410)	(0.0301)	(0.0317)	(0.0339)	(0.0406)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

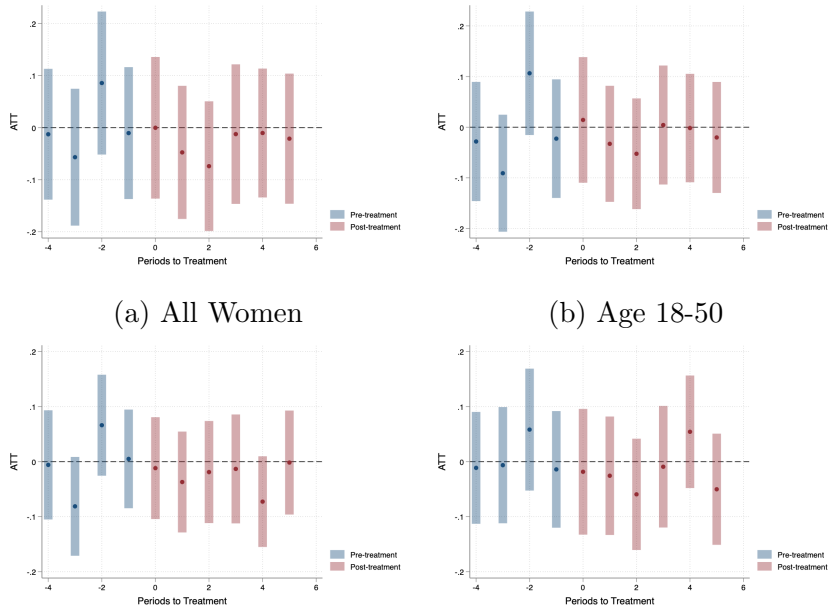
Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, 6, and 8 are the county population.

marital status at time of death, Columns 5-8 present estimated effects on homicide rates for married women and unmarried women, respectively.[14] There is no evidence of statistically significant effects on either group. Appendix Table B-6 presents analogous results with homicide rates as the outcome, again with no evidence of any statistically significant effect. Table B-7 shows results using log homicide rates; results are similar to those in the UCR data in that the estimates in Columns 5 and 6 would suggest 5% and 9% decreases in homicide rates for married women after a shelter opens, but may be a spurious result of false variation across county-year observations with zero homicides (see Figure 3). Although these point estimates are not statistically different from the main results in Columns 5-6 of Table 2 using the inverse hyperbolic sine transformation, they should still be interpreted with caution given the inherent issues with this functional form.

Figure 5 presents balanced event studies using only shelter openings for which the county is observed, with no extensive-margin changes in shelter status, for at least 5 years before the shelter opening and 5 years after. There is little evidence of any effect of shelter openings on homicide rates for any group. Similarly, Appendix Tables B-8, B-9, B-10, and B-11 present pooled event-balanced aggregations, and Appendix Figure B-2 presents unbalanced event studies for the full sample used in Table 2, all suggesting no effect.

Overall, the totality of the results from both the UCR and NVSS data suggest that shelter openings have no significant effect on intimate partner homicides. Importantly, however, we

[14]The "unmarried women" group pools never married, divorced, and widowed women.



(a) All Women (b) Age 18-50

(c) Married (d) Unmarried

Figure 5: Balanced Event Studies, Shelter Openings: $\sinh^{-1}$ Homicide Rates, NVSS Data

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least 5 "clean" comparison years with no shelters prior to the shelter opening and at least 5 "clean" treated years in which the shelter remains open afterwards. Years outside the [-5,5] event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate.

should not necessarily expect effects of openings and closings to be symmetric; homicide risk may vary throughout the course of an abusive relationship, and if victims use shelters on and off over a long period, effects of closings could easily be more immediate than effects of openings. Furthermore, the opening and closing effects are estimated on different samples of counties.

4.2 Main Results: Closings

Table 3 presents estimates of the effect of shelter closings on homicide rates as measured in the UCR data. Estimates suggest no effect of shelter closings on overall intimate partner homicide rates (Columns 1-2), intimate partner homicide rates with female victims (Columns 3-4), or homicide rates with female victims overall (Columns (5-6). Estimates suggest no statistically significant effects. Similarly, Appendix Tables B-12 and B-13 show analogous results using raw homicide rates and log homicide rates, finding no evidence of an effect.

Table 3: Staggered Closings vs. Never Closed, $\sinh^{-1}$ Homicide Rates, UCR Data

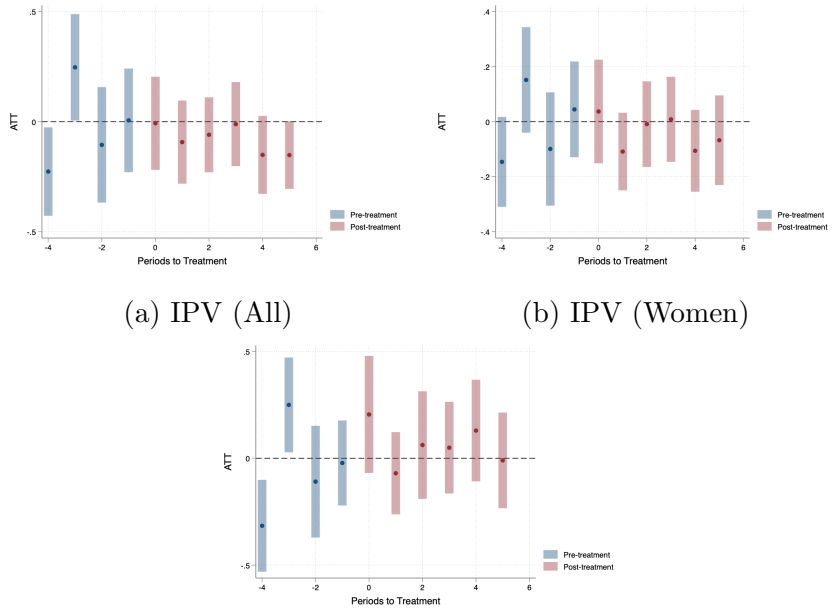
	(1) IPV (All Victims)	(2) IPV (All Victims)	(3) IPV (Women)	(4) IPV (Women)	(5) All Women	(6) All Women
ATT	-0.0373	-0.0700	-0.0433	-0.0576	-0.0368	0.00474
	(0.0358)	(0.0541)	(0.0334)	(0.0495)	(0.0634)	(0.0612)
Weighted by Pop.	No	Yes	No	Yes	No	Yes

Standard errors in parentheses, clustered at county level

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

Furthermore, balanced event studies in Figure 6 show that pre-trends across counties with shelter closings and counties with no change in shelter status may be significantly different prior to the shelter closing. Additionally, unbalanced event studies in Figure B-3in the Appendix show that any marginally significant effect of shelter closings in this sample appears around 10 years after the shelter closes, suggesting that it may be driven by some other unobserved change in the intervening time period. Overall, given the potential violations of the equal counterfactual trends assumption, closing effects estimated using the UCR data may not be informative.



(a) IPV (All)

(b) IPV (Women)

(c) All Women

Figure 6: Balanced Event Studies, Shelter Closings: $\sinh^{-1}$ Homicide Rates, UCR Data

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016 and are observed with at least 5 "clean" comparison years with a shelters prior to the shelter closing and at least 5 "clean" treated years in which the shelter remains closed with no new shelter opening afterwards. Years outside the [-5,5] event window are dropped. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate.

Appendix Tables A-9 and A-11 report that the closings sample in the UCR data contains 645 counties (1579 reporting police departments), while the closings sample in the NVSS data contains 1,144 counties. As in the openings sample, the majority of intimate partner homicides in the UCR closings sample (77%) have female victims, suggesting that it is reasonable to focus on female homicide rates in the NVSS sample where no information about the perpetrator is available. Table 4 presents estimates of the effect of shelter closings on female homicide rates in the NVSS data, again suggesting no effect. Results for raw homicide rates and log homicide rates are presented in Table B-14 in the Appendix. Columns 3 and 7 suggest increases in homicide rates for women ages 18-50 and for unmarried women after a shelter closes, but neither is robust to weighting by population, suggesting that outliers may be overly influential. Similarly, results using log homicide rates are presented in Appendix Table B-15, suggesting about a 3.6% increase in homicide rates for women ages 18-50 after a shelter closing; neither the population-weighted estimate in Column 4 nor the main estimate

in Column 3 of Table 4 using the inverse hyperbolic sine transformation are statistically different from this estimate, but neither are statistically significant, suggesting that this finding may rely too heavily on false variation across observations with zero homicides, similar to the openings result for married women.

Table 4: Staggered Closings vs. Never Closed - $\sinh^{-1}$ Homicide Rates, NVSS Data

	(1) All Women	(2) All Women	(3) Age 18-50	(4) Age 18-50	(5) Married	(6) Married	(7) Unmarried	(8) Unmarried
ATT	0.0462	0.0107	0.0614	0.0112	-0.0121	-0.0165	0.0398	-0.00170
	(0.0454)	(0.0484)	(0.0402)	(0.0470)	(0.0354)	(0.0381)	(0.0355)	(0.0383)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

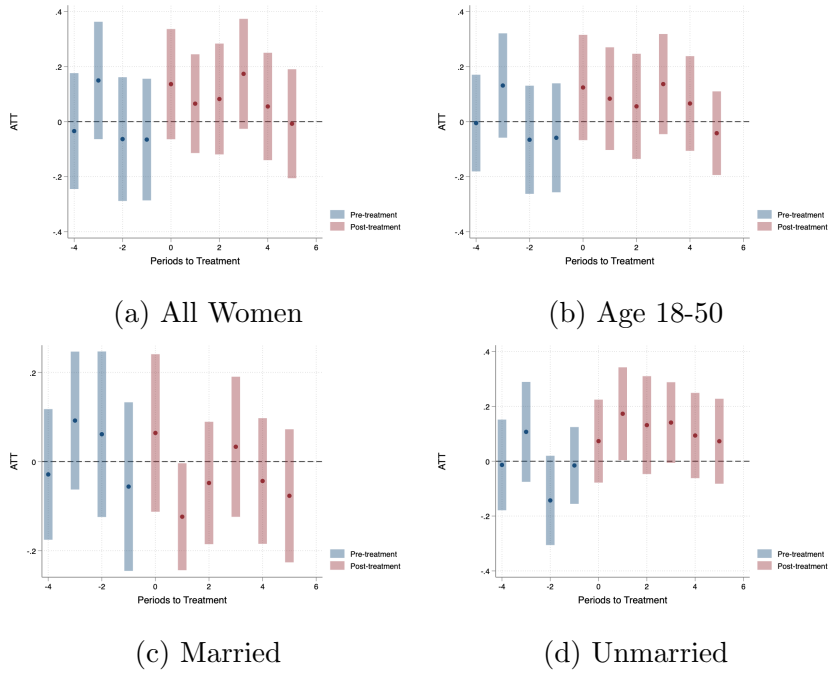
Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, 6, and 8 are the county population.

Figure 7 shows balanced event study aggregations for shelter closings in the NVSS sample that are observed with no other changes in shelter status for 5 years before and 5 years after the shelter closing. Unlike in the UCR, pre-trends in the treated counties and comparison counties appear similar prior to the shelter closings. For all groups except married women, the pattern in the event study coefficients appears suggestive of an increase in intimate partner homicides after the shelter closes, but most estimates are not statistically significant. Appendix Tables B-16 and B-17 present aggregations of event-balanced closings showing that, for overall female homicide rates and homicide rates for women ages 18-50, these coefficients are not jointly significant either. Panel C would suggest a (counterintuitive) statistically significant reduction in homicide rates for married women one year after a shelter closes, but there is no persistent pattern in the point estimates and Appendix Table B-18 shows no overall effect in any balanced sample, so this is likely spurious. Panel D shows that, for unmarried women, there appears to be a nearly 20% statistically significant increase in homicide rates one year after the shelter closes; this is consistent with the overall pattern of the post-closing event study coefficients for this group, all of which are positive.

Table 5 shows estimates of the effect of shelter closings in various event-balanced samples



(a) All Women (b) Age 18-50

(c) Married (d) Unmarried

Figure 7: Balanced Event Studies, Shelter Closings: $\sinh^{-1}$ Homicide Rates, NVSS Data

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016 and are observed with at least 5 "clean" comparison years with a shelters prior to the shelter closing and at least 5 "clean" treated years in which the shelter remains closed with no new shelter opening afterwards. Years outside the [-5,5] event window are dropped. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate.

Table 5: Staggered Closings vs. Never Closed, Event Balanced, $\sinh^{-1}$ Homicide Rates (Unmarried Women), NVSS Data

	(1) Balanced [-2,2]	(2) Balanced [-2,2]	(3) Balanced [-3,3]	(4) Balanced [-3,3]	(5) Balanced [-4,4]	(6) Balanced [-4,4]	(7) Balanced [-5,5]	(8) Balanced [-5,5]
ATT	0.0646	0.0279	0.104*	0.0689	0.0820^{+}	0.00351	0.114*	0.0660
	(0.0431)	(0.0499)	(0.0420)	(0.0516)	(0.0465)	(0.0554)	(0.0572)	(0.0660)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016 and are observed with at least the required number of "clean" comparison years with a shelters prior to the shelter closing and at least the required number of "clean" treated years in which the shelter remains closed with no new shelter opening afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate.

on homicide rates for unmarried women. Column 3 suggests, on average, a statistically significant 10% increase in homicide rates for unmarried women from the year a shelter closes to three years after closing. Extending the horizon to four and five years after closing, Columns 5 and 7 would suggest a marginally significant 8% increase and statistically significant 11% increase, respectively. All of these estimates are smaller and not significant after weighting by population (Columns 4, 6, and 8) but none are statistically different from the un-weighted estimates. Comparing these estimates to the 2-year horizon in Column 1 and the main estimate in Column 7 of Table 4, they are not statistically different but are about 50% larger in magnitude, suggesting that any effect of a shelter closing may fade over time. Still, these estimates provide suggestive evidence that closing a shelter may be extremely risky and have serious consequences for victims who may have relied on the shelter in the past.

This heterogeneity by marital status provides suggestive evidence that the effect of shelter closings is likely driven by intimate partner homicides rather than homicides by other perpetrators. Furthermore, it suggests that shelters may be more beneficial to unmarried women than to married women, perhaps due to fewer legal barriers to leaving a non-marital abusive relationship. This would be consistent with existing work finding that the expansion of access to no-fault divorce decreased domestic violence Stevenson and Wolfers (2006).

4.3 Robustness

The overall null findings are robust to the use of both the never-treated and not-yet-treated counties in the comparison group. Balanced event studies are not shown for these results, as there is constant compositional change in the comparison group.

Tables 6 and 7 show results for openings in the UCR and NVSS data, respectively. All point estimates are small, statistically insignificant, and similar to the main estimates.

Tables 8 and 9 show results for closings in the UCR and NVSS data, respectively. Recall that pre-trends in the UCR data suggested a potential violation of the parallel trends assumption, so results in Table 8 should be interpreted with caution. Regardless, neither

Table 6: Staggered Openings vs. Never Opened and Not Yet Opened, $\sinh^{-1}$ Homicide Rates, UCR Data

	(1) IPV (All Victims)	(2) IPV (All Victims)	(3) IPV (Women)	(4) IPV (Women)	(5) All Women	(6) All Women
ATT	-0.0294	0.0228	-0.0456	0.0223	-0.0290	0.0343
	(0.0389)	(0.0578)	(0.0366)	(0.0516)	(0.0519)	(0.0759)
Weighted by Pop.	No	Yes	No	Yes	No	Yes

Standard errors in parentheses, clustered at county level

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016, as well as all counties from the treatment group that have not yet opened their shelter. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

Table 7: Staggered Openings vs. Never Opened and Not Yet Opened, $\sinh^{-1}$ Homicide Rates, NVSS Data

	(1) All Women	(2) All Women	(3) Age 18-50	(4) Age 18-50	(5) Married	(6) Married	(7) Unmarried	(8) Unmarried
ATT	-0.0177	0.00340	-0.00359	0.0139	-0.0311	-0.0488	0.00205	0.0379
	(0.0413)	(0.0459)	(0.0360)	(0.0412)	(0.0303)	(0.0320)	(0.0341)	(0.0408)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016, as well as counties from the treatment group that have not yet opened their shelter. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, 6, and 8 are the county population.

sample suggests a statistically significant effect. Importantly, the point estimate in Column 7 of Table 9, though not statistically significant, is equivalent to a 3.87% increase in homicide rates for unmarried women; comparing this with the main estimate of 3.98% in Column 7 of Table 4, it is nearly identical. This suggests that the inclusion of counties whose shelters have not yet closed in the comparison group would be unlikely to change the estimated effects of shelter closings on homicide rates for unmarried women over shorter time horizons reported in Table 5.

Table 8: Staggered Closings vs. Never Closed and Not Yet Closed, $\sinh^{-1}$ Homicide Rates, UCR Data

	(1) IPV (All Victims)	(2) IPV (All Victims)	(3) IPV (Women)	(4) IPV (Women)	(5) All Women	(6) All Women
ATT	-0.0366	-0.0686	-0.0428	-0.0567	-0.0378	0.00382
	(0.0361)	(0.0544)	(0.0337)	(0.0497)	(0.0637)	(0.0612)
Weighted by Pop.	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that always have a shelter from 1998-2016 and counties in the treatment group that have not yet closed their shelter. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

Table 9: Staggered Closings vs. Never Closed and Not Yet Closed, $\sinh^{-1}$ Homicide Rates, NVSS Data

	(1) All Women	(2) All Women	(3) Age 18-50	(4) Age 18-50	(5) Married	(6) Married	(7) Unmarried	(8) Unmarried
ATT	0.0456	0.0103	0.0622	0.0106	-0.0120	-0.0171	0.0387	-0.00192
	(0.0456)	(0.0485)	(0.0405)	(0.0472)	(0.0357)	(0.0382)	(0.0357)	(0.0385)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that never have a shelter from 1998-2016 and all counties in the treatment group that have not yet closed their shelter. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, 6, and 8 are the county population.

5 Conclusion

Overall, results suggest no immediate effect of opening a shelter on intimate partner homicides, but potentially detrimental effects of closing one, with homicide rates for unmarried

women increasing by about 10% for three to five years following the closing of a county's only shelter. In attempting to reconcile these findings recall that the opening and closing effects are estimated on different samples; summary statistics suggest that counties in the closings sample are on average much larger by population. Furthermore, it is well-documented that many victims of intimate partner violence leave and return to abusive partners several times before leaving permanently, and that the time of separation is often the period where victims are at the highest risk of homicide DeRiviere (2008). For this reason, the effects of a shelter opening may be slower to materialize and therefore harder to detect, especially in small counties where homicides are relatively rare. By contrast, if victims who routinely leave their abusive partners during times of high conflict and escalating violence and later return have come to regularly rely on a local shelter, effects may be immediate once it is no longer available.

This finding has important policy implications. Because most shelters are local non-profit organizations relying on several disparate funding sources - both public sources at the local, state, and federal levels and private donations - fluctuations in various political and economic conditions could create financial instability leading to a closure. Shelters are a unique intervention in the suite of policies that affect domestic violence. We know that housing-insecure populations are at high risk for domestic violence, and that domestic violence responds to the broader economic and policy environment and to targeted interventions by law enforcement for those who are willing to self-report. Even survivors who do report are often referred by police to shelters if the abuser is not arrested or is likely to be released on bond and have the ability to engage in retaliatory violence. Overall, the results presented here suggest that, due to the close link between domestic violence and homelessness, shelters may be an important piece in the toolkit available to policymakers to combat domestic violence. Furthermore, because homicide is the most rare and severe form of domestic violence, future work should explore the effect of shelters on non-lethal forms of domestic violence and additional long-term outcomes for victims.

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Appendix A: Extended Data Description

Table A-1: NNEDV One Day in Time Census by State/Year 2008-2017

	Mean	Std. Dev.	Min	Max	N
Total calls per program	11.64	5.04	1	27.90	492
Unmet requests for housing per program	3.55	3.44	0	35.83	492
Total unmet requests for services per program	5.62	4.42	0	37.17	492
Number of people sheltered per program	20.53	10.09	3	54.33	492

NNEDV "One Day in Time" census occurs each year in September and reports state totals as well as the number of participating programs in each state. The level of observation is the state-year.

Table A-2: Counties with One Shelter in 2016

	Mean	Std. Dev.	N	Min	Max
Any shelters still open as of 2021	0.97	0.16	320	0	1
Number of shelters still open as of 2021	3.00	2.10	320	0	16

Table A-3 shows descriptive statistics for the types of shelters in each county that had one shelter in 2016 and one shelter in 2021. 73% of these shelters are domestic violence shelters, and an additional 6% are family shelters. These data suggest that when a small or mid-size county has a single shelter, it is often a domestic violence shelter.

Table A-3: Counties with One Shelter in 2016 and One Shelter in 2021

	Mean	Std. Dev.	N	Min	Max
DV Shelter	0.73	0.45	63	0	1
Women's Shelter	0.00	0.00	63	0	0
Family Shelter	0.06	0.25	63	0	1
Homeless Shelter	0.16	0.37	63	0	1
Men's Shelter	0.03	0.18	63	0	1
Other Specialized Shelter	0.00	0.00	63	0	0
DV, Women's, or Family Shelter	0.79	0.41	63	0	1

Table A-4 shows descriptive statistics for the types of shelters in counties that had one shelter in 2016 and at least one shelter in 2021. 62% of these shelters are either domestic violence shelters, women's shelters, or family shelters, and are therefore likely to serve domestic violence survivors. 95% of these counties have at least one of these three types of

shelters, and 90% of these counties have a domestic violence shelter. This means, that, when measuring whether a small to mid-size county has a shelter, I am likely measuring (with some error) whether it has a shelter that serves clients experiencing domestic violence.

Table A-4: Counties with One Shelter in 2016 and At Least One Shelter in 2021

	Mean	Std. Dev.	N	Min	Max
Any DV Shelter	0.90	0.30	312	0	1
Proportion DV Shelters	0.46	0.30	312	0	1
Any Women's Shelter	0.16	0.37	312	0	1
Proportion Women's Shelters	0.04	0.11	312	0	0
Any Family Shelter	0.32	0.47	312	0	1
Proportion Family Shelters	0.12	0.20	312	0	1
Any General Homeless Shelters	0.69	0.46	312	0	1
Proportion General Homeless Shelters	0.34	0.27	312	0	1
Any DV, Women's or Family Shelters	0.95	0.21	312	0	1
Proportion DV, Women's or Family Shelters	0.62	0.29	312	0	1

Table A-5: Summary Statistics, Openings Sample, UCR Data

	mean	sd	count	min	max
IPV Homicide Rate (All)	.6156144	4.339002	21469	0	193.4236
$\sinh^{-1}$ IPV Homicide Rate (All)	.1417515	.6391007	21469	0	5.958036
IPV Homicide Rate (Women)	.43941	3.460804	21469	0	193.0502
$\sinh^{-1}$ IPV Homicide Rate (Women)	.1079795	.5536655	21469	0	5.956104
Homicide Rate (Women)	1.112018	5.688738	21469	0	294.9853
$\sinh^{-1}$ Homicide Rate (Women)	.2524402	.8452681	21469	0	6.380075
Population Served by PD	10411.63	19370.36	21469	293	449968
(sum) population	75442.93	110900.1	21469	3840	744160
Any Shelter in County	.1889701	.391494	21469	0	1

N Counties: 644

N Agencies: 1013

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, dropping any years prior to the shelter opening in which the county used to have a shelter and any years after the shelter opening in which the county eventually closes the shelter and has no shelters. Comparison group includes all counties that never have a shelter from 1998-2016. Includes all police departments in these counties that consistently participate in the UCR from 1993-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate.

Table A-6: Summary Statistics, Openings Sample, UCR Data, Outcomes Weighted by Population

	mean	sd	count	min	max
IPV Homicide Rate (All)	.6044006	2.455724	21469	0	193.4236
$\sinh^{-1}$ IPV Homicide Rate (All)	.2693764	.6817893	21469	0	5.958036
IPV Homicide Rate (Women)	.4590045	2.060153	21469	0	193.0502
$\sinh^{-1}$ IPV Homicide Rate (Women)	.2114205	.6044278	21469	0	5.956104
Homicide Rate (Women)	1.119327	3.33412	21469	0	294.9853
$\sinh^{-1}$ Homicide Rate (Women)	.4670323	.886397	21469	0	6.380075

N Counties: 644

N Agencies: 1013

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, dropping any years prior to the shelter opening in which the county used to have a shelter and any years after the shelter opening in which the county eventually closes the shelter and has no shelters. Comparison group includes all counties that never have a shelter from 1998-2016. Includes all police departments in these counties that consistently participate in the UCR from 1993-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights are the size of the population served by the reporting police department.

Table A-7: Summary Statistics: Openings Sample, NVSS Data

	mean	sd	count	min	max
Homicide Rate (All Women)	1.07	3.15	46623	0	74.6
Homicide Rate (Women 18-50)	0.76	2.61	46623	0	74.6
Homicide Rate (Married Women)	0.43	1.95	46623	0	74.6
Homicide Rate (Unmarried Women)	0.62	2.36	46623	0	66.2
$\sinh^{-1}$ Homicide Rate (All Women)	0.42	0.90	46623	0	5.0
$\sinh^{-1}$ Homicide Rate (Women 18-50)	0.31	0.78	46623	0	5.0
$\sinh^{-1}$ Homicide Rate (Married Women)	0.19	0.61	46623	0	5.0
$\sinh^{-1}$ Homicide Rate (Unmarried Women)	0.26	0.72	46623	0	4.9
Total County Population	28277.70	38688.51	46623	1899	744160.0
Any Shelters in County	0.10	0.30	46623	0	1.0

N Counties: 2083

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, dropping any years prior to the shelter opening in which the county used to have a shelter and any years after the shelter opening in which the county eventually closes the shelter and has no shelters. Comparison group includes all counties that never have a shelter from 1998-2016.

Table A-8: Summary Statistics: Openings Sample, NVSS Data, Outcomes Weighted by Population

	mean	sd	count	min	max
Homicide Rate (All Women)	1.01	2.10	46623	0	74.6
Homicide Rate (Women 18-50)	0.73	1.75	46623	0	74.6
Homicide Rate (Married Women)	0.41	1.27	46623	0	74.6
Homicide Rate (Unmarried Women)	0.59	1.58	46623	0	66.2
$\sinh^{-1}$ Homicide Rate (All Women)	0.55	0.83	46623	0	5.0
$\sinh^{-1}$ Homicide Rate (Women 18-50)	0.42	0.73	46623	0	5.0
$\sinh^{-1}$ Homicide Rate (Married Women)	0.25	0.57	46623	0	5.0
$\sinh^{-1}$ Homicide Rate (Unmarried Women)	0.34	0.67	46623	0	4.9

N Counties: 2083

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, dropping any years prior to the shelter opening in which the county used to have a shelter and any years after the shelter opening in which the county eventually closes the shelter and has no shelters. Comparison group includes all counties that never have a shelter from 1998-2016. Weights are the county population.

Table A-9: Summary Statistics: Closings Sample, UCR Data

	mean	sd	count	min	max
IPV Homicide Rate (All)	.5055747	2.652938	34702	0	129.3661
$\sinh^{-1}$ IPV Homicide Rate (All)	.1895825	.6267659	34702	0	5.555809
IPV Homicide Rate (Women)	.3908973	2.355169	34702	0	129.3661
$\sinh^{-1}$ IPV Homicide Rate (Women)	.1482823	.5547753	34702	0	5.555809
Homicide Rate (Women)	.9493403	3.612681	34702	0	129.3661
$\sinh^{-1}$ Homicide Rate (Women)	.3391342	.8347491	34702	0	5.555809
Population Served by PD	25565.8	43680.81	34702	182	453017
(sum) population	190316	137607.3	34702	3767	943742
Any Shelter in County	.9456515	.2267073	34702	0	1

N Counties: 645

N Agencies: 1579

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that always have a shelter from 1998-2016.

Table A-10: Summary Statistics: Closings Sample, UCR Data, Outcomes Weighted by Population

	mean	sd	count	min	max
IPV Homicide Rate (All)	.5923233	1.476553	34702	0	129.3661
$\sinh^{-1}$ IPV Homicide Rate (All)	.3798694	.6375418	34702	0	5.555809
IPV Homicide Rate (Women)	.4388039	1.268859	34702	0	129.3661
$\sinh^{-1}$ IPV Homicide Rate (Women)	.2912835	.555011	34702	0	5.555809
Homicide Rate (Women)	1.263097	2.244384	34702	0	129.3661
$\sinh^{-1}$ Homicide Rate (Women)	.6999303	.8695163	34702	0	5.555809

N Counties: 645

N Agencies: 1579

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that always have a shelter from 1998-2016. Weights are the size of the population served by the reporting police department.

Table A-11: Summary Statistics: Closings Sample

	mean	sd	count	min	max
Homicide Rate (All Women)	1.06	1.83	23292	0	44.0
Homicide Rate (Women 18-50)	0.78	1.50	23292	0	25.1
Homicide Rate (Married Women)	0.41	1.08	23292	0	24.7
Homicide Rate (Unmarried Women)	0.64	1.40	23292	0	44.0
$\sinh^{-1}$ Homicide Rate (All Women)	0.64	0.79	23292	0	4.5
$\sinh^{-1}$ Homicide Rate (Women 18-50)	0.49	0.71	23292	0	3.9
$\sinh^{-1}$ Homicide Rate (Married Women)	0.28	0.54	23292	0	3.9
$\sinh^{-1}$ Homicide Rate (Unmarried Women)	0.42	0.66	23292	0	4.5
Total County Population	108022.93	110573.64	23292	2622	943742.0
Any Shelters in County	0.88	0.33	23292	0	1.0

N Counties: 1144

Table A-12: Summary Statistics: Closings Sample, Outcomes Weighted by Population

	mean	sd	count	min	max
Homicide Rate (All Women)	1.08	1.27	23292	0	44.0
Homicide Rate (Women 18-50)	0.81	1.07	23292	0	25.1
Homicide Rate (Married Women)	0.38	0.66	23292	0	24.7
Homicide Rate (Unmarried Women)	0.69	0.97	23292	0	44.0
$\sinh^{-1}$ Homicide Rate (All Women)	0.76	0.66	23292	0	4.5
$\sinh^{-1}$ Homicide Rate (Women 18-50)	0.60	0.61	23292	0	3.9
$\sinh^{-1}$ Homicide Rate (Married Women)	0.32	0.44	23292	0	3.9
$\sinh^{-1}$ Homicide Rate (Unmarried Women)	0.52	0.58	23292	0	4.5

N Counties: 1144

Appendix B: Additional Results

2.1 Openings

Table B-1: Staggered Openings vs. Never Opened Only, Homicide Rates, UCR Data

	(1) IPV (All Victims)	(2) IPV (All Victims)	(3) IPV (Women)	(4) IPV (Women)	(5) All Women	(6) All Women
ATT	-0.228	-0.0142	-0.317^{+}	-0.0238	-0.157	0.153
	(0.204)	(0.113)	(0.180)	(0.103)	(0.307)	(0.162)
Weighted by Pop.	No	Yes	No	Yes	No	Yes

Standard errors in parentheses, clustered at county level

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are number of homicides per 100,000 people served by the reporting police department per year. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

Table B-2: Staggered Openings vs. Never Opened Only, Log Homicide Rates, UCR Data

	(1) IPV (All Victims)	(2) IPV (All Victims)	(3) IPV (Women)	(4) IPV (Women)	(5) All Women	(6) All Women
ATT	-0.0214	0.0150	-0.0232^{+}	0.0255	-0.0142	0.0312
	(0.0132)	(0.0412)	(0.0129)	(0.0416)	(0.0163)	(0.0584)
Weighted by Pop.	No	Yes	No	Yes	No	Yes

Standard errors in parentheses, clustered at county level

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are constructed as $log(\frac{Homicides+1}{Population/100{,}000})$, and can be interpreted as percentage changes in the homicide rate per 100,000 people served by the reporting police department per year. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

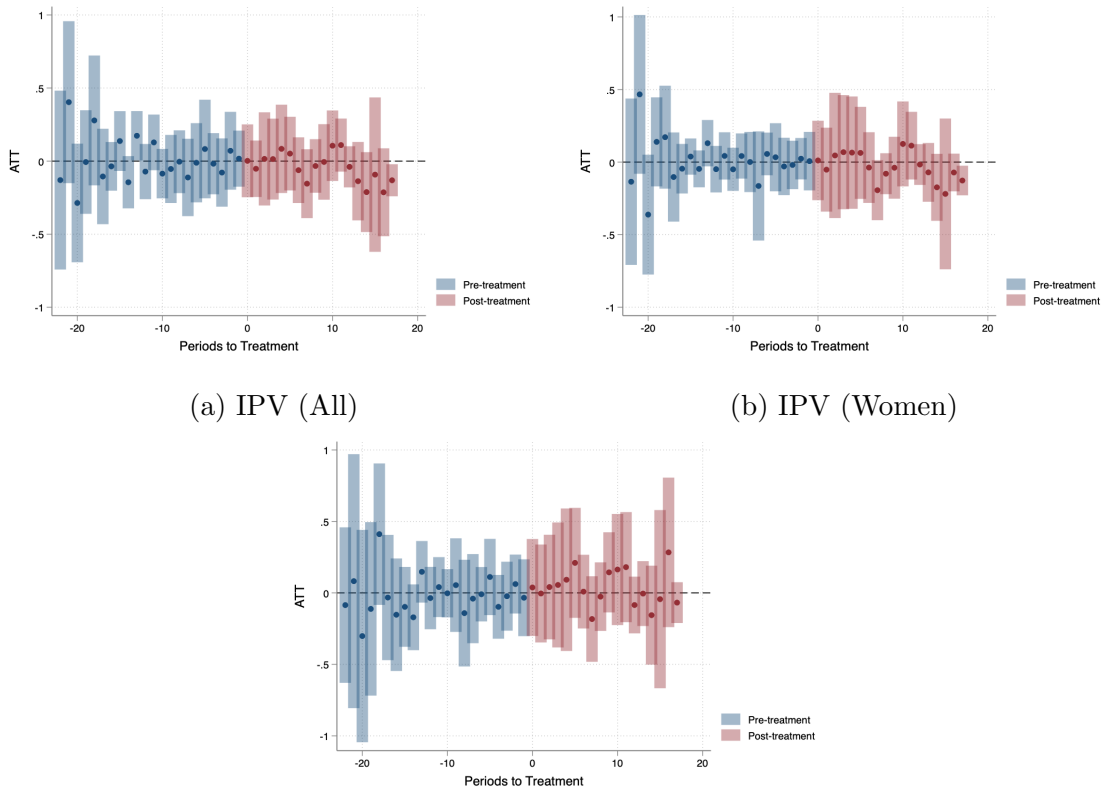
Table B-3: Staggered Openings vs. Never Opened, $\sinh^{-1}$ IPV Homicide Rates (All), UCR Data

	(1) Balanced [-2,2]	(2) Balanced [-2,2]	(3) Balanced [-3,3]	(4) Balanced [-3,3]	(5) Balanced [-4,4]	(6) Balanced [-4,4]	(7) Balanced [-5,5]	(8) Balanced [-5,5]
ATT	-0.0571	-0.0657	-0.0548	-0.0463	-0.0432	-0.0267	-0.0599	-0.0192
	(0.0462)	(0.0592)	(0.0440)	(0.0568)	(0.0468)	(0.0585)	(0.0494)	(0.0617)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses, clustered at county level

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least the required number of consecutive "clean" comparison years with no shelters prior to the shelter opening and at least the required number of consecutive "clean" treated years in which the shelter remains open afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.



(a) IPV (All)

(b) IPV (Women)

(c) All Women

Figure B-1: Unbalanced Event Studies, Shelter Openings: $\sinh^{-1}$ Homicide Rates, UCR Data

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, dropping any years prior to the shelter opening in which the county used to have a shelter and any years after the shelter opening in which the county eventually closes the shelter and has no shelters. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate.

Table B-4: Staggered Openings vs. Never Opened, $\sinh^{-1}$ IPV Homicide Rates (Women), UCR Data

	(1) Balanced [-2,2]	(2) Balanced [-2,2]	(3) Balanced [-3,3]	(4) Balanced [-3,3]	(5) Balanced [-4,4]	(6) Balanced [-4,4]	(7) Balanced [-5,5]	(8) Balanced [-5,5]
ATT	-0.0691	-0.0409	-0.0578	-0.00895	-0.0527	0.0103	-0.0679	0.000619
	(0.0433)	(0.0576)	(0.0416)	(0.0538)	(0.0441)	(0.0563)	(0.0464)	(0.0633)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses, clustered at county level

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least the required number of consecutive "clean" comparison years with no shelters prior to the shelter opening and at least the required number of consecutive "clean" treated years in which the shelter remains open afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

Table B-5: Staggered Openings vs. Never Opened, $\sinh^{-1}$ Homicide Rates (All Women), UCR Data

	(1) Balanced [-2,2]	(2) Balanced [-2,2]	(3) Balanced [-3,3]	(4) Balanced [-3,3]	(5) Balanced [-4,4]	(6) Balanced [-4,4]	(7) Balanced [-5,5]	(8) Balanced [-5,5]
ATT	-0.0699	-0.121^{+}	-0.0647	-0.0861	-0.0651	-0.0771	-0.0690	-0.0626
	(0.0531)	(0.0692)	(0.0528)	(0.0659)	(0.0549)	(0.0661)	(0.0585)	(0.0689)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses, clustered at county level

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least the required number of consecutive "clean" comparison years with no shelters prior to the shelter opening and at least the required number of consecutive "clean" treated years in which the shelter remains open afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

Table B-6: Staggered Openings vs. Never Opened, Homicide Rates, NVSS Data

	(1) All Women	(2) All Women	(3) Age 18-50	(4) Age 18-50	(5) Married	(6) Married	(7) Unmarried	(8) Unmarried
ATT	-0.0360	0.0230	0.0149	0.0498	-0.0341	-0.0457	-0.00306	0.0581
	(0.0969)	(0.0759)	(0.0816)	(0.0629)	(0.0615)	(0.0443)	(0.0755)	(0.0579)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are number of homicides per 100,000 county residents per year. Weights in columns 2, 4, 6, and 8 are the county population.

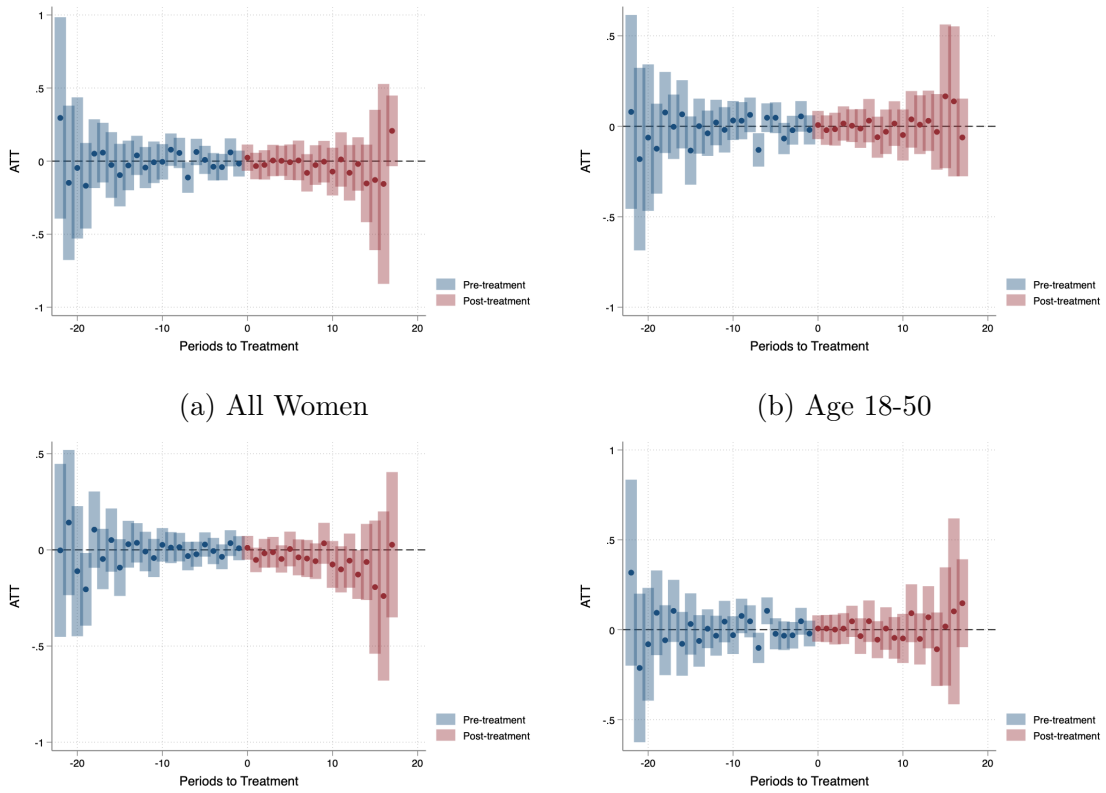
Table B-7: Staggered Openings vs. Never Opened, Log Homicide Rates, NVSS Data

	(1) All Women	(2) All Women	(3) Age 18-50	(4) Age 18-50	(5) Married	(6) Married	(7) Unmarried	(8) Unmarried
ATT	-0.0303	-0.00812	-0.0268	-0.0110	-0.0507**	-0.0870*	-0.0135	0.0377
	(0.0223)	(0.0474)	(0.0196)	(0.0448)	(0.0170)	(0.0386)	(0.0189)	(0.0498)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are constructed as $log(\frac{Homicides+1}{Population/100{,}000})$, and can be interpreted as percentage changes in the homicide rate per 100,000 county residents per year. Weights in columns 2, 4, 6, and 8 are the county population.



(a) All Women

(b) Age 18-50

(c) Married

(d) Unmarried

Figure B-2: Unbalanced Event Studies, Shelter Openings: $\sinh^{-1}$ Homicide Rates, NVSS Data

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016, including all consecutive years prior to the shelter opening in which the county has no shelters and all consecutive years after the shelter opening in which the shelter remains open. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate.

Table B-8: Staggered Openings vs. Never Opened, Event Balanced, $\sinh^{-1}$ Homicide Rates (All Women), NVSS Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Balanced [-2,2]	Balanced [-2,2]	Balanced [-3,3]	Balanced [-3,3]	Balanced [-4,4]	Balanced [-4,4]	Balanced [-5,5]	Balanced [-5,5]
ATT	-0.0167	-0.0195	-0.00933	-0.0184	-0.00585	-0.00623	-0.0277	-0.0148
	(0.0442)	(0.0439)	(0.0457)	(0.0449)	(0.0456)	(0.0463)	(0.0509)	(0.0508)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least the required number of consecutive "clean" comparison years with no shelters prior to the shelter opening and at least the required number of consecutive "clean" treated years in which the shelter remains open afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, 6, and 8 are the county population.

Table B-9: Staggered Openings vs. Never Opened, Event Balanced, sinh $^{-1}$ Homicide Rates (Women Age 18-50), NVSS Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Balanced [-2,2]	Balanced [-2,2]	Balanced [-3,3]	Balanced [-3,3]	Balanced [-4,4]	Balanced [-4,4]	Balanced [-5,5]	Balanced [-5,5]
ATT	-0.000331	-0.00864	-0.00340	-0.0207	-0.00442	-0.00791	-0.0148	-0.00906
	(0.0397)	(0.0404)	(0.0405)	(0.0410)	(0.0402)	(0.0419)	(0.0446)	(0.0452)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least the required number of consecutive "clean" comparison years with no shelters prior to the shelter opening and at least the required number of consecutive "clean" treated years in which the shelter remains open afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, 6, and 8 are the county population.

Table B-10: Staggered Openings vs. Never Opened, Event Balanced, sinh^{-1} Homicide Rates (Married Women), NVSS Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Balanced [-2,2]	Balanced [-2,2]	Balanced [-3,3]	Balanced [-3,3]	Balanced [-4,4]	Balanced [-4,4]	Balanced [-5,5]	Balanced [-5,5]
ATT	-0.0236	-0.0282	-0.0126	-0.0234	-0.0174	-0.0281	-0.0259	-0.0286
	(0.0321)	(0.0326)	(0.0329)	(0.0326)	(0.0328)	(0.0331)	(0.0366)	(0.0353)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least the required number of consecutive "clean" comparison years with no shelters prior to the shelter opening and at least the required number of consecutive "clean" treated years in which the shelter remains open afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, 6, and 8 are the county population.

Table B-11: Staggered Openings vs. Never Opened, Event Balanced, sinh^{-1} Homicide Rates (Unmarried Women), NVSS Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Balanced [-2,2]	Balanced [-2,2]	Balanced [-3,3]	Balanced [-3,3]	Balanced [-4,4]	Balanced [-4,4]	Balanced [-5,5]	Balanced [-5,5]
ATT	0.00113	-0.00273	-0.00360	-0.00474	-0.00171	0.00918	-0.0181	-0.00242
	(0.0367)	(0.0378)	(0.0377)	(0.0393)	(0.0381)	(0.0406)	(0.0427)	(0.0440)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that open a shelter between 1998 and 2016 and are observed with at least the required number of consecutive "clean" comparison years with no shelters prior to the shelter opening and at least the required number of consecutive "clean" treated years in which the shelter remains open afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate. Weights in columns 2, 4, 6, and 8 are the county population.

2.2 Closings

Table B-12: Staggered Closings vs. Never Closed, Homicide Rates, UCR Data

	(1) IPV (All Victims)	(2) IPV (All Victims)	(3) IPV (Women)	(4) IPV (Women)	(5) All Women	(6) All Women
ATT	-0.0104	-0.132	-0.0712	-0.126	-0.0899	0.0231
	(0.141)	(0.104)	(0.135)	(0.0938)	(0.339)	(0.155)
Weighted by Pop.	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are number of homicides per 100,000 people served by the reporting police department per year. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.

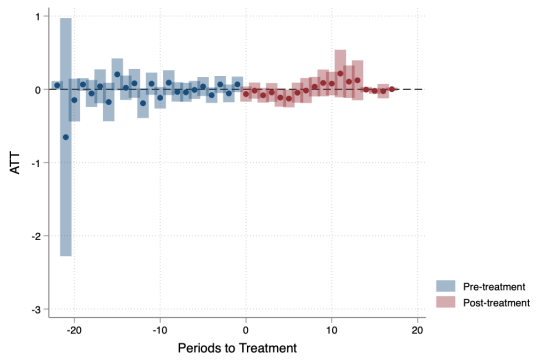
Table B-13: Staggered Closings vs. Never Closed, Log Homicide Rates, UCR Data

	(1) IPV (All Victims)	(2) IPV (All Victims)	(3) IPV (Women)	(4) IPV (Women)	(5) All Women	(6) All Women
ATT	0.00568	-0.0100	0.00637	-0.0106	0.0166	0.0118
	(0.0158)	(0.0411)	(0.0151)	(0.0441)	(0.0153)	(0.0421)
Weighted by Pop.	No	Yes	No	Yes	No	Yes

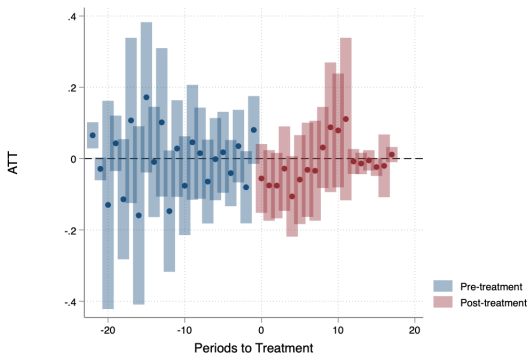
Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

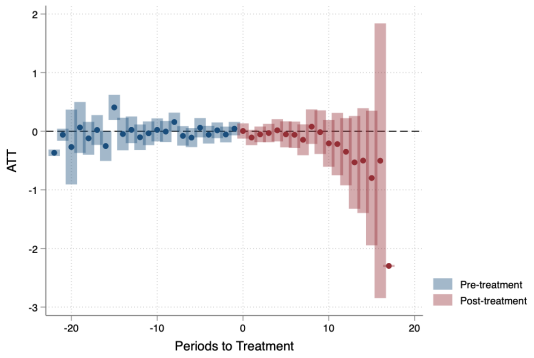
Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are constructed as $log(\frac{Homicides+1}{Population/100{,}000})$, and can be interpreted as percentage changes in the homicide rate per 100,000 people served by the reporting police department per year. Weights in columns 2, 4, and 6 are the size of the population served by the reporting police department.



(a) IPV (All)



(b) IPV (Women)



(c) All Women

Figure B-3: Unbalanced Event Studies, Shelter Closings: $\sinh^{-1}$ Homicide Rates, UCR Data

Notes: Data sources are BLS County Business patterns data from 1998-2016 and UCR Supplementary Homicide reports from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 people served by the reporting police agency per year, and can be interpreted as percentage changes in the per capita homicide rate.

Table B-14: Staggered Closings vs. Never Closed - Homicide Rates, NVSS Data

	(1) All Women	(2) All Women	(3) Age 18-50	(4) Age 18-50	(5) Married	(6) Married	(7) Unmarried	(8) Unmarried
ATT	0.119	-0.0125	0.171^{+}	-0.00201	-0.0398	-0.0463	0.147*	0.0191
	(0.108)	(0.0904)	(0.0893)	(0.0825)	(0.0872)	(0.0619)	(0.0725)	(0.0599)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are number of homicides per 100,000 county residents per year. Weights in columns 2, 4, 6, and 8 are the county population.

Table B-15: Staggered Closings vs. Never Closed - Log Homicide Rates, NVSS Data

	(1) All Women	(2) All Women	(3) Age 18-50	(4) Age 18-50	(5) Married	(6) Married	(7) Unmarried	(8) Unmarried
ATT	0.0246	0.0170	0.0361^{+}	0.0273	0.0194	0.0412	0.0190	-0.0134
	(0.0200)	(0.0388)	(0.0185)	(0.0384)	(0.0155)	(0.0363)	(0.0162)	(0.0297)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are constructed as $log(\frac{Homicides+1}{Population/100{,}000})$, and can be interpreted as percentage changes in the homicide rate per 100,000 county residents per year. Weights in columns 2, 4, 6, and 8 are the county population.

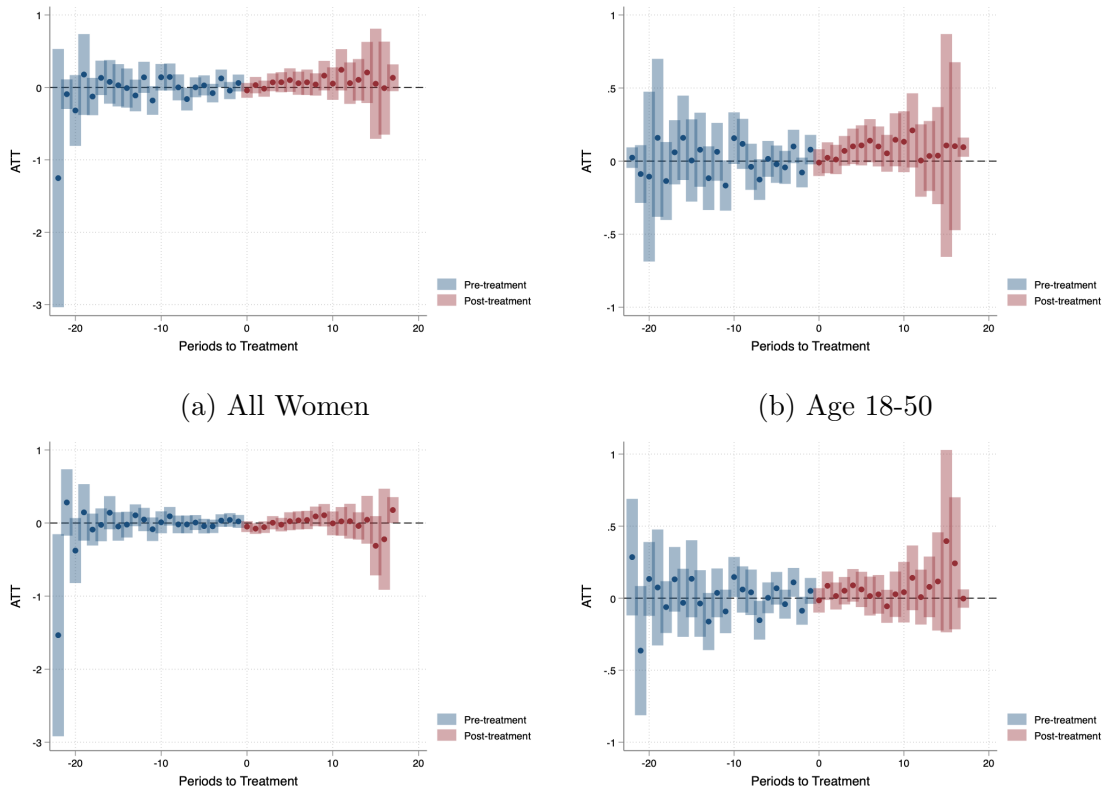
Table B-16: Staggered Closings vs. Never Closed, Event Balanced, $\sinh^{-1}$ Homicide Rates (All Women), NVSS Data

	(1) Balanced [-2,2]	(2) Balanced [-2,2]	(3) Balanced [-3,3]	(4) Balanced [-3,3]	(5) Balanced [-4,4]	(6) Balanced [-4,4]	(7) Balanced [-5,5]	(8) Balanced [-5,5]
ATT	0.0303	0.00657	0.0731	0.0503	0.0490	-0.0259	0.0841	0.0564
	(0.0502)	(0.0682)	(0.0524)	(0.0735)	(0.0596)	(0.0751)	(0.0728)	(0.0819)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016 and are observed with at least the required number of "clean" comparison years with a shelters prior to the shelter closing and at least the required number of "clean" treated years in which the shelter remains closed with no new shelter opening afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate.



(a) All Women

(b) Age 18-50

(c) Married

(d) Unmarried

Figure B-4: Unbalanced Event Studies, Shelter Closings: $\sinh^{-1}$ Homicide Rates, NVSS Data

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016, including all consecutive years prior to the shelter closing in which the county had at least one shelter and all consecutive years after the shelter closing in which the shelter remains closed without opening any new shelters. Comparison group includes all counties that never have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate.

Table B-17: Staggered Closings vs. Never Closed, Event Balanced, $\sinh^{-1}$ Homicide Rates (Women Age 18-50), NVSS Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Balanced [-2,2]	Balanced [-2,2]	Balanced [-3,3]	Balanced [-3,3]	Balanced [-4,4]	Balanced [-4,4]	Balanced [-5,5]	Balanced [-5,5]
ATT	0.00808	-0.0199	0.0468	0.00609	0.0457	-0.0433	0.0706	0.00983
	(0.0494)	(0.0645)	(0.0506)	(0.0670)	(0.0571)	(0.0711)	(0.0673)	(0.0800)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016 and are observed with at least the required number of "clean" comparison years with a shelters prior to the shelter closing and at least the required number of "clean" treated years in which the shelter remains closed with no new shelter opening afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate.

Table B-18: Staggered Closings vs. Never Closed, Event Balanced, $\sinh^{-1}$ Homicide Rates (Married Women), NVSS Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Balanced [-2,2]	Balanced [-2,2]	Balanced [-3,3]	Balanced [-3,3]	Balanced [-4,4]	Balanced [-4,4]	Balanced [-5,5]	Balanced [-5,5]
ATT	-0.0482	-0.0531	-0.0424	-0.0443	-0.0473	-0.0717	-0.0325	-0.0274
	(0.0365)	(0.0527)	(0.0414)	(0.0608)	(0.0462)	(0.0677)	(0.0600)	(0.0611)
Weighted by Pop.	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Data sources are BLS County Business Patterns data from 1998-2016, CDC NVSS mortality data from 1993-2016, and SEER County Population Estimates from 1993-2016. Treatment group includes counties that close a shelter between 1998 and 2016 and are observed with at least the required number of "clean" comparison years with a shelters prior to the shelter closing and at least the required number of "clean" treated years in which the shelter remains closed with no new shelter opening afterwards. Years outside the reported event window are dropped. Comparison group includes all counties that always have a shelter from 1998-2016. All outcomes are the inverse hyperbolic sine of the number of homicides per 100,000 county residents per year, and can be interpreted as percentage changes in the per capita homicide rate.