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ABSTRACT

At the beginning of the COVID-19 pandemic, 13 states used elective procedure bans to explicitly restrict access to surgical abortions and an additional 20 states banned all elective procedures, without reference to abortion. In this paper, we study the effects of these state-level bans on visits to abortion clinics. Using a balanced panel of 757 abortion clinics, we find that clinics in states banning elective procedures experienced an 18% reduction in visits, and surgical abortion bans led to a further 9% reduction, entirely from fewer visits to clinics that provided surgical abortions. These restrictions resulted in approximately 18,000 fewer abortions in 2020 compared to 2019, leading to 8400 additional births. The effects of these bans on mobility were not confined to traditionally "red" states but also affected mobility to clinics in "blue" states.

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Introduction

By the end of 2023, COVID-19 had caused over one million deaths, 6.6 million hospitalizations, and infected more than seven out of eight Americans. Early in the pandemic, health authorities, governors, and other local leaders were concerned that there were shortages of key healthcare resources such as masks, gloves, and gowns that would increase the risk of disease transmission to healthcare providers. To reduce demand for these resources, political leaders in forty-two states sought to reduce interpersonal interactions that contribute to the spread of the virus through measures to encourage or mandate that residents stay home. Amid these challenges, political leaders implemented restrictions on various medical procedures, including elective surgeries, with some states explicitly targeting surgical abortions. These states classified surgical abortions as prohibited elective procedures, arguing they could be deferred until after the pandemic, despite the time-sensitive nature of pregnancy progression.[1]

In this paper, we empirically evaluate the impact of elective procedure and surgical abortion bans on mobility to abortion clinics in the United States. We use two primary data sources. First, we use lists of abortion providers across the United States to identify geographic areas of interest and characteristics of those areas—particularly if a given location offered surgical abortions. Second, we use daily, device-level cellular location data from February to May for 2019 and 2020,[2] from which we construct estimates of visitors near abortion providers. These data are

[1] The pandemic also resulted in the federal government lifting the requirement for an in-person visit for medication abortions. A federal judge suspended the requirement in July 2020, the Supreme Court reinstated it in January 2021, and the FDA permanently lifted the requirement in December 2021. These changes to medication abortion post-date the time period we study. See https://apnews.com/article/public-health-mo-state-wire-in-state-wire-ar-state-wire-id-state-wire-819bdff2b93b4b305bc6d1037aa8c5de, https://apnews.com/article/joe-biden-donald-trump-public-health-abortion-coronavirus-pandemic-0503c3e801b86de3a0a9d3e86dc88ae7, and https://apnews.com/article/coronavirus-pandemic-abortion-health-medication-a6634601a37fb048aecdd9f030e0863a.

[2] Due to data limitations, we are unfortunately unable to quantify time spent engaged in sexual relations using the American Time Use Survey (ATUS) per Barreca, Deschenes, and Guldi (2018) and Grossman and Slusky (2019) (which used variables for "having sex, private activity (unspecified), making out, personal activity (unspecified), cuddling partner in bed, spouse gave me a massage"). As described at https://www.bls.gov/covid19/effects-of-covid-

similar to other mobility datasets and are representative of mobility patterns in the population (Couture et al, 2022).

Using two-way fixed-effect Poisson regressions, we analyzed the impact of these policies on abortion clinic visit volumes and subsequent birth rates. In our full sample of 757 abortion clinics, we find that surgical abortion bans resulted in a 9 percent drop in visitors. Stratifying into those clinics that do, and do not, conduct surgical abortions demonstrated that the effect was confined to the 489 abortion clinics in our sample that conduct surgical abortions. Among the subset of clinics that provide surgical abortions, elective procedure bans lead to a 10.8 percent reduction in visitors, with surgical abortion bans resulting in an additional 7.4 percent reduction in visitors to surgical abortion clinics. We find no relationship between elective procedure or surgical abortion bans and mobility to clinics that only provide medication abortion. At the state-level, surgical abortion bans reduced the total number of visits to abortion clinics by 8.4 percent, primarily from in-state visitors.

We also explored the effect of these restrictions on births, using state-by-month data from the CDC. We find that surgical abortion bans during the first trimester led to a seventeen percent increase in the number of births, while for second trimester exposure, surgical abortion bans increased births by nine percent. On the other hand, elective procedure bans during the second trimester are associated with a seven percent reduction in births. The mechanism by which elective procedure bans affected birth rates is beyond the scope of this paper but could include changes in

19-pandemic-on-employment-and-unemployment-statistics.htm#ATUS, "Data collection was suspended when the call center in which ATUS interviewers operate to collect the ATUS data was closed on March 19, 2020. Data collection resumed, at a reduced capacity, on May 11, 2020."

We are also unable to use the new Census Household Pulse Survey, designed specifically to measure the social and economic impact of the COVID-19 pandemic, as the questionnaires for the relevant months did not contain questions about sexual activity, fertility, reproduction, or contraception. See https://www2.census.gov/programs-surveys/demo/technical-documentation/hhp/household-pulse-survey-questionnaire-week1-5.pdf from https://www.census.gov/programs-surveys/household-pulse-survey/technical-documentation.html#phase1.

use of fertility treatments or changes in sexual practices.

We quantify the approximate impact of these restrictions on abortions on the numbers of abortions and births in 2020. Assuming that changes in mobility are proportional to changes in abortions, we estimate that elective procedure bans were associated with 10,000 fewer abortions in the United States in 2020. More targeted surgical abortion bans were associated with 600 fewer abortions but affected a smaller share of the population for a shorter duration than elective procedure bans. Overall abortions could still increase, following recent trends nationally, but the effect of the elective procedure and surgical abortion bans uniformly reduced the number of abortions in those states where these policies were in force. Extrapolating to the total number of births in the United States, we estimate that surgical abortion bans lead to an additional 8,400 births in 2020.

Background

In response to the COVID-19 pandemic, many states enacted restrictions on medical procedures to conserve personal protective equipment and minimize interpersonal contact. The Centers for Medicare and Medicaid Services, which directs the Medicare program, also advised healthcare providers to defer elective, non-essential procedures when possible.[3] Ultimately, 33 states banned elective medical procedures and 13 of these states included surgical abortion in these bans, despite its time-sensitive nature (Figure 1). Baird and Millar (2020) expressed a concern that the pandemic exacerbated the recent trends restricting abortion access in the United States. Many of the states with the strictest pre-pandemic abortion laws also imposed restrictions during the

[3] https://www.cms.gov/newsroom/press-releases/cms-releases-recommendations-adult-elective-surgeries-non-essential-medical-surgical-and-dental

pandemic. Similarly, Robinson et al. (2020), noted that abortions cannot be delayed, writing that "Contraception and abortion care remain essential, and we need to work at the local, state, and federal levels on policies that preserve access to these critical services." Others echoed these concerns (Todd-Gher and Shah 2020; Tran et al, 2020; Donley et al. 2020).

Although the causal relationship between policy decisions and abortions during the pandemic remains unclear, survey data provide some insights. Around one-third of women reported having delayed or canceled reproductive health appointments during the pandemic (Guttmacher 2020). A separate survey of South African clinics documented decreases in both contraceptive implant application and abortion care (Adelekan et al. 2020).

The temporary pandemic-related abortion restrictions exist in the context of other permanent restrictions, including gestational age limits, mandatory waiting periods, multiple visit requirements, detailed building codes, and admitting privileges requirements. While existing research has extensively examined targeted regulations of abortion providers (TRAPs) (e.g., Slusky and Lu 2016; Packham 2017; Slusky 2017; Lu and Slusky 2019; Fischer, Royer, and White 2018; Venator and Fletcher 2019; Lindo and Pineda-Torres 2019; Myers and Ladd 2020; Lindo, Myers, Schlosser, and Cunningham 2020), no nationwide study has yet evaluated the impact of COVID-19-specific abortion restrictions in the United States, despite their significant implications. However, other countries have been studied; for example, stay-at-home orders were related to a significant decrease in abortions in Mexico City (Marquez-Padilla and Saavedra, 2020), though those countries did not have abortion-specific restrictions related to COVID-19.

More broadly, non-COVID healthcare utilization dropped by as much as 40 percent during the spring of 2020 (Ziedan, Simon, and Wing 2020), not all of which can be attributed to state policies on elective healthcare. The non-policy-related reduction in healthcare utilization indicates

a decrease in demand for healthcare due to the pandemic. It is plausible to expect that reproductive healthcare, such as abortion, could experience a similar decrease in demand. Still, we lack a nationwide examination of the impact of the pandemic and related restrictions on abortion care.

Data

Provider-level data

We acquired device-level mobility data across the United States[4] for the period of interest (February through May of 2019 and 2020). The vendor does not disclose the specific apps contributing to the dataset but described them as weather, shopping, and sports apps that commonly use location services. These data included encrypted device identifiers, the latitude and longitude of the centroid of a cluster of GPS pings from each phone, the number of pings in the cluster, timestamps for the first and last ping in the cluster, and an assignment to either "Traveling" or "Area Dwell" behavioral categories. We identified a subset of devices that pinged at least 24 times in a day for 45 days in a 60-day window, in order to ensure that devices in our sample persisted for a sufficient period of time. Appendix Figure 1 plots the number of devices seen by day, which ranged from nine million to almost 20 million devices on any given day. We then selected GPS clusters that corresponded to "Area Dwell" behavior with a minimum duration of fifteen minutes. For each cluster, we then assigned geohash-7 codes to the centroid, which restricts our spatial resolution to roughly +/- 75 meters in each direction. For each device, we assigned a home location based on the grid square at which a device spent the most time between 9PM and

[4] Our vendor requested not to be identified.

6AM in the preceding six weeks.[5]

We collected the names and street addresses of abortion clinics listed on several publicly available online aggregators: Planned Parenthood, NARAL, the ANSIRH Abortion Facility Database, and Abortion Clinics Online.[6] We geocoded the street addresses of the clinics in our data using the Bing Maps geocoding service. Figure 1 plots the approximate locations of clinics in our sample and identifies those that provide surgical abortions and those that do not. To address the imprecision of geocodes, we assigned each clinic to a building footprint using Microsoft's US Building Footprints database (see Appendix Figure 2 for an illustration of this problem using the office locations of the first and last authors). We then constructed building envelopes using the geohash-7 grid squares containing each building, which facilitated subsequent merges with our mobility data.

We merged mobility data to building envelopes using geohash 7 codes and calculated key metrics, including the number of unique visitors, median visit duration, and median distance from visitors' home locations. For convenience we refer to these building envelopes as clinics below.

The size of our panel of devices evolves as individuals install and remove apps from their phones and because immobile devices do not provide GPS pings. To address the evolving number of devices in the sample (as shown in Appendix Figure 1), we assume that the devices in the sample in a state on any given day constitute a random sample of people in that state. As a result, we scale our device-based metrics by the ratio of state population (from the 2020 Census count) to the number of devices observed on that day. For the same reason—because of the evolving size of the

[5] This project was approved by the Institutional Review Board at the University of North Carolina at Greensboro (IRB FY22-664).

[6] https://www.plannedparenthood.org/abortion-access, https://prochoice.org/patients/find-a-provider/, https://www.ansirh.org/abortion-facility-database, https://www.abortionclinics.com/

panel—we weight our regression models, described below, by the number of devices seen in a state on a given day (Solon et al. 2015).

We can use our data to proxy for visits to abortion clinics, assuming that the population of smartphone users who visit abortion providers is comparable to the population of users of abortion providers. If this assumption is correct, then the number of visits we observe in the cellular data should be proportional to the number of visits to the clinic. This is the best we can do without individual-level data on clinic visits, which few researchers have been able to access.

We validated our data as a measure of foot traffic to abortion clinics by comparing total visits to the clinics in our sample with Guttmacher Institute data from 2019 and 2020, as shown in Appendix Table 1. Some states had idiosyncratic device counts, notably the abortion clinic location in Wyoming mapped to a major hospital, as a result visits there are substantially greater than one might expect given the number of abortions in Wyoming. To validate our data, we regressed log abortions on log visitors, expecting a coefficient near 1 if the mobility data reasonably proxy abortion rate. When we run this regression using 2019 data from the Guttmacher institute, we get a point of estimate 0.827 with a standard error of 0.099; 2020 data paint a similar picture with a coefficient of 0.928 and a standard error of 0.148. Results using CDC reported data from 2019 are smaller, around 0.65 to 0.66. These regressions results are reported in Appendix Table 2. We also present these results graphically in Appendix Figure 3 which shows date for 2019 and 2020 from the Guttmacher Institute in panel A and 2019 data from the CDC in panel B. The points lie along the 45-degree reference line, indicating that the sums of visits are similar to the Guttmacher state data points.

Ethical and Privacy Considerations

Analyzing reproductive healthcare using mobility data raises important ethical and privacy

concern. We adopted the gridding approach to the building footprints and movement data as one, of several, steps to protect the privacy of device owners in our data. Gridding introduces uncertainty, making it impossible to pinpoint which buildings a device visited within an envelope. Furthermore, we cannot discern the reasons for a device to enter the envelope of one of these buildings. Finally, it is possible that some of the visitors we observe are visiting crisis pregnancy centers, which often choose to locate close to abortion providers.

Policy Data

We gathered data on elective procedure and surgical abortion bans from the COVID State Policy Database (Raifman et al. 2020) and the Kaiser Family Foundation (Sobel et al. 2020).[7] Appendix Figure 4 plots the number of days between pairs of state-level policies. Among the 32 states with both a stay-at-home order and an elective procedure ban, half of the states implemented the stay-at-home order at least five days before the elective procedure ban took effect. In the thirteen states with a surgical abortion ban, half implemented the surgical abortion ban at least three days after the elective procedure ban. We obtained data on county-level stay-at-home orders from NACO, which we assigned based on the county containing each clinic.

Elective procedure bans varied; some explicitly allowed surgical abortions under certain circumstances, while others explicitly prohibited them. In addition, some state abortion bans were restrained or enjoined by federal courts, with several bans following complex legal paths. Arkansas' initial regulation banning surgical abortions (effective April 3), for example, was enjoined ten days later, but that injunction was later lifted. Subsequently, Arkansas relaxed the ban by requiring women to have a negative COVID-19 test within the immediate 48 (April 27), 72

[7] Please see Appendix Table 1 and Appendix Table 2 for list of implementation dates for each state policy.

(May 18), or 120 hours (July 6) before a surgical abortion could be performed. The state lifted the regulation in its entirety on August 1. Oklahoma's abortion ban also followed a complex procedural path, with a statewide temporary restraining order on April 6 preventing the state from enforcing its ban prior to the ban being enjoined on April 21.

Several states listed exceptions to these bans; for example, in Iowa, abortions were permitted if delaying an abortion until the relevant executive order had expired would mean a pregnancy exceeded Iowa's existing gestational age limit (Mehaffey 2020). Similarly, a federal judge ruled that abortion providers could determine a surgical abortion necessary on an individual basis, including cases where the procedure would push the pregnancy past viability (Borchardt 2020.)

States varied in how strictly they enforced surgical abortion bans. In Iowa, for example, enforcement was relatively lax. Texas, on the other hand, went as far as including medication abortion in its elective procedure restrictions (Najmabadi 2020.) Although Indiana's governor stated in a press conference that surgical abortions should not continue unless medically necessary for maternal health, providers in Indiana indicated to a newspaper that they did not stop providing abortions and had not faced interference from the state (Cook and Sikitch 2020).[8] The ACLU of Alaska made similar comments regarding their state's de jure abortion ban (Carter 2020.) Meanwhile, Louisiana's attorney general attempted to inspect a Shreveport abortion clinic to determine if they had performed non-medically necessary abortions (Westwood 2020.)

Additionally, while other states enacted de jure bans on abortion by classifying it as an elective surgery, South Dakota's travel quarantine guidelines resulted in a de facto abortion ban

[8] We coded Indiana as not having a surgical abortion ban, despite the Governor's statement, since there does not appear to have been any official effort to ban surgical abortions.

because medical providers could not come to the state's sole clinic to perform abortions (McCammon 2020).

At least two states attempted or discussed surgical abortion bans that never came to fruition. Kentucky's state legislature passed a bill that would have restricted abortion as part of the pandemic response, but it was vetoed by Governor Andy Beshear (Sobel et al. 2020.) Utah's legislature discussed a surgical abortion ban, but the measure never came to a vote (Keating et al. 2020.) Therefore, neither of these states are included in our count of those that banned surgical abortion at some point during the pandemic.

We did not attempt to index differences in surgical abortion policy for our analysis, but it is important to note that these restrictions were not consistent from state to state. We coded our two dummy variables to turn on the day a state enacted an order banning elective procedures (and surgical abortion, when it was included in these orders.) These variables turned back off when the relevant order expired or was halted by a court decision. If the court order was appealed and overturned, the variable turned back on. Although we found several instances of court orders requiring abortions be allowed to continue, we did not find information about this occurring for general elective procedure bans. Therefore, the indicator for surgical abortion bans turned on and off intermittently for some states whereas the indicator for elective surgery bans turned on and then off once per state.

Finally, we used data from Johns Hopkins University (Center for Systems Science and Engineering 2020) for the count of COVID-19 cases in each county.

Methods

Using a balanced panel of abortion clinics, we estimated fixed effect Poisson regressions

to examine the impact of state policies on visits to abortion clinics during the pandemic.

$$ClinicVisits_{csdwy} = f\begin{pmatrix} ElectiveProcedureBan_{sdwy} + SurgicalAbortionBan_{sdwy} \\ StayHome_{sdwy} + \beta year_y + \mathbf{X}_{csdwy} + \mathbf{clinic}_c + \mathbf{dayweek}_{dw} + \varepsilon_{cst} \end{pmatrix}$$

Where *ClinicVisits* is the volume of clinic visits for clinic *c* in state *s* on day *d* (e.g., Monday) of week *w* (e.g., week 10 of the year) and year *y* (e.g., 2020) after rescaling to account for day-to-day variation in the number of devices in the sample for a given state. We weighted our regressions by the number of devices seen in the state on each day so that our estimates correspond to the national effect.[9]

We created two dummy variables for state restrictions on elective medical procedures. One dummy (*ElectiveProcedureBan*) indicated if a state restricted elective medical procedures in general, while the second (*SurgicalAbortionBan*) indicated if a state defined surgical abortions as an elective procedure that ought to be canceled or postponed.[10] To our knowledge, there were no instances of a state banning surgical abortion without banning elective medical procedures in general. We also included a third indicator (*StayHome*) for a state or county implementing a stay-at-home order to capture efforts to discourage all movement, rather than more targeted efforts to reduce the demand for healthcare resources.[11]

In **X**, we also incorporated a control for public holidays such as Memorial Day and

[9] We can explain over 99.4% of the variability in the number of devices seen per day using state and date fixed effects.

[10] Many clinics that provide abortions provide a wide array of other services as well, only some of which were not considered elective. Additionally, several states even explicitly indicated in their elective procedure ban orders that they did not apply to family planning services. For example, "Nothing in the order shall be construed to limit access to the full range of family planning services and procedures, including terminations of pregnancies, whether in a hospital, ambulatory surgery center, physician office, or other location." (New Jersey), "The order's prohibition on non-essential healthcare services, procedures, and surgeries is not meant to apply to:...The full suite of family planning services." (New Mexico), "The order does not apply to the full suite of family planning services and procedures." (Virginia), or "The prohibition does not apply to the full suite of family planning services and procedures." (Washington). See https://www.ama-assn.org/system/files/2020-06/state-elective-procedure-chart.pdf

[11] Please see Appendix Table 3 for a list of the dates of state-at-home orders and non-essential service closures.

President's Day, allowing us to control for decreased traffic on those clinic-dates, and the monthly unemployment rate in the county. The final controls had to do with the incidence of COVID-19 in the county each clinic is located in. We tested several COVID-19-related parameters, including the raw number of cumulative cases, new cases on a given clinic-date, cumulative cases per 100 thousand, and new cases per 100 thousand on a given clinic-date. [12]

We also controlled for clinic fixed effects (**clinic**) and day of the week-week fixed effects (**dayweek**), e.g. Thursday of week 14. Controlling for day of the week-by-week fixed effects allow us to compare days in 2020 to comparable days in 2019. We only used weekday visits in our analysis, so this gave us 85 day-of-the-week-by-week groups (e.g., Monday of week 11). Our time period encompassed epidemiological weeks 6 through 22, which is roughly February through May. We chose this time period because it reflected the first phase of the COVID-19 pandemic. Finally, robust standard errors were clustered at the state level.

Code and data availability

Source code for data cleaning and analysis are available at https://github.com/andersen-hecon/Andersen_Bryan_Slusky_Abortion_Covid/. The underlying mobility data cannot be shared publicly. The ANSIRH location database can be requested from https://www.ansirh.org/abortion-facility-database. All other datasets can be downloaded directly from the links in the references section.

Results

Our sample included 757 clinics located in the entire U.S. (see Figure 1).[13] 489 clinics

[12] In Appendix Figure 2, we show that there isn't a clear relationship between rising COVID cases and the restrictiveness types of policies we're considering.

[13] South Dakota did not explicitly restrict surgical abortion in the same manner as other states whose policies we analyze. However, due to a combination of factors, abortion services were unavailable in the state of South Dakota

provided surgical abortion services (triangles) and 268 only provided medication abortions (circles). One clinic was excluded because it reported no visitors after we applied our weekday sample restriction.

Table 1 shows our summary statistics. We have 128,690 clinic-day observations, representing 757 clinics over 85 weekdays in each of two years. Of those observations, 16% (32% of the 2020 days) are from when an elective procedure ban was in effect, and 1% (2% in 2020) are from when an explicit surgical abortion ban was also in effect. Because surgical abortion bans were typically short-lived and implemented in states with few abortion clinics, there are relatively few observations under these bans. Comparing all clinics to those provides surgical abortion services indicates few substantive differences in means.

The top panel of figure 2 plots the raw daily difference in visit counts between 2020 and 2019. There is a notable decline in visits beginning around March 16, 2020, when many states announced states of emergency and began to take steps to contain the pandemic and reduce mobility. On March 13, President Trump declared a nationwide state of emergency, following by the first elective procedure ban in Indiana on March 16, the first elective procedure ban that explicitly included surgical abortions in Ohio on March 17-18, and the first stay-at-home order in California on March 19. The bottom panel of figure 3 plots the number of clinics (out of our 757 clinic sample) that were affected by these policies over time. By the end of April, most states had ceased enforcing surgical abortion bans coinciding with the end of some of the more substantial elective procedure bans. Dates for the starts and stops of each policy are presented in Appendix Tables 3-5.

for several months during the pandemic. Prior to the onset of COVID-19, the state's sole abortion provider relied on flying out-of-state doctors in on a regular basis to provide services. This was not feasible for the majority of 2020; therefore, abortion was not available in the state beginning in March 2020 and extending into that autumn. Instead, the clinic referred patients to neighboring states such as Nebraska.

Our event study (Figure 3) shows a steep drop-off in clinic visits, of all types, after stay-at-home orders (top) went into effect, although there is a smaller decline starting the week before the policy took effect. Elective procedure bans (middle) reduced mobility to surgical abortion clinics (right column), with a slight decrease the week prior to the policy. Surgical abortion bans are also associated with a statistically significant decline in mobility to surgical abortion clinics in the first seven days of implementation. Across all policies and clinic types there is no evidence of a pre-trend except, possibly, the week before a policy was implemented.

Table 2 presents our main clinic-level regression results using daily visitor volume as the dependent variable. The dummy variable for 2020 was not statistically significant in any specification, indicating no unexplained reductions in visitor volumes attributable to the pandemic beyond those accounted for by our other variables. We also find higher unemployment correlated with reductions in mobility, reflecting the decline in mobility and increase in unemployment in April 2020.

Elective procedure bans were associated with fewer visitors to abortion clinics, except in models that also included controls for stay-at-home orders. This may reflect the sequencing of these policies since most elective procedure bans post-dated stay at home orders (Appendix Figure 5). For example, when we control for COVID-19 incidence using incident cases (column 2), we find that elective procedure bans reduced visits to abortion clinics by a statistically significant 13.3 percent. Once we add controls for stay at home orders (column 3), elective procedure bans are associated with a non-significant 7.5 percent reduction in mobility. Stay at home orders, on the other hand, resulted in a 21.1 percent decline in mobility. Results using cumulative COVID-19 cases are similar (columns 4 and 5).

Surgical abortion bans were only associated with statistically significant reductions in

visitors in the model that included stay-at-home orders and controlled for incident COVID-19 cases (column 3), implying a 9.0 percent reduction in visitors associated with a surgical abortion ban.

The results demonstrate that abortion clinic visits did not decline between 2019 and 2020, but broad sub-federal policies reduced abortion clinic visits and specific surgical abortion bans had a mixed effect on visitors and was only statistically significant in models that control for stay-at-home orders.

Table 3 stratifies our sample into surgical abortion clinics and medication only clinics. Columns (1) and (4) demonstrate that elective procedure and surgical abortion bans only affected mobility to surgical abortion clinics and had no effect on mobility to clinics that only provided medication abortions. Mobility to surgical abortion clinics fell by 10.8 percent following an elective procedure ban and an additional 7.4 percent after a surgical abortion ban. The effect of stay-at-home orders was consistent for both clinic types, with a 21.7 (surgical) and 19.5 (medication only) percent reduction in mobility. Furthermore, mobility to surgical abortion clinics declined in 2020, compared to 2019, while mobility to medication-only clinics increased in 2020. Following a surgical abortion ban, the median visitor to a surgical abortion clinic lived 19.8 percent closer than before, while after an elective procedure ban the median visit duration rose by 17.8 percent. The change in median distance, combined with changes in volume, indicates that the marginal visitors travel further to get to these clinics and these visits were typically shorter in duration. In contract, there were no statistically significance changes in distance traveled or visit duration for medication-only clinics due to these policies. Based on these results, we focus on surgical abortion clinics only in what follows.

We conduct a similar exercise at the state level (Table 4), which demonstrates similar

reductions in clinic visitors due to elective procedure bans and surgical abortion bans. Using the state-level data, we also look at the number of visitors who are from the same state, out-of-state, or who left the state based on the home location of the device. We also decompose visitors to a clinic in a state into visitors from the same state and visitors from other states. In all cases the policy variables are assigned by the state of the clinic. We find 8.9 and 8.3 percentage point reductions in same-state visitors due to elective procedure bans and surgical abortion bans, respectively. Surprisingly, in states that implemented an elective procedure ban, we find a 11.4 percent increase in the number of people from outside the state traveling to abortion clinics within the state, indicating an increase in cross-border movement due to elective procedure bans. We do not find a statistically significant effect of surgical abortion bans on visitors from out of state, though perhaps we lack the statistical power to estimate such an effect precisely given that these estimates are very imprecise.

To determine whether state policies cause residents to travel to a clinic out of state (column 4), we now reframe the analysis to look at the subset of clinic visitors from a particular state who went to a clinic out of state (regardless of which state that clinic was in). The resulting analysis, which is done at the level of the state an individual resides in, demonstrates that there was no statistically significant change in mobility out of the state following a surgical abortion ban in the state of residence.

Table 5 stratifies our sample by clinics in states categorized as hostile to abortion versus states not hostile to abortion.[14] Panel A includes a surgical abortion ban indicator, while panels B and C exclude it since only one state among those that were not hostile to abortion had a surgical

[14] https://www.guttmacher.org/sites/default/files/article_files/attachments/hostile_supportive_states_updated_12-30-2020_as_of_date.pdf.

abortion ban. Our results in Panel A indicate that elective procedure and surgical abortion bans had no effect on visitors in these states, but the median visitor was 23.5 percent closer after a surgical abortion ban and the median visit was 16.6 percent longer. Results in Panel B are similar, although the surgical abortion results now load onto the elective procedure ban instead. Panel C demonstrates that there was a large 15.7 percent reduction in visitors to surgical abortion clinics in states that are supportive of abortion after an elective procedure ban.

Effects on Births

State policies that restrict access to abortion would be expected to result in an increase in births later in the year. We assess this possibility using monthly birth data from CDC Wonder for 2019-2020. We assign conception months assuming a nine-month gestation for each birth and compute the average of our key variables for the first, second, and third trimester of gestation. Table 6 demonstrates that there was no significant reduction in births associated with the COVID-19 pandemic than expected based on prior years. Surgical abortion bans that occur in what would have been the first trimester of pregnancy increased the number of births by almost 17 percent, which is comparable to, but larger than, our estimated decrease in mobility to abortion clinics in Table 2. Our estimate of the effect of the pandemic differs from Bailey et al. (2022) since we cannot exclude foreign-born women from our data. We simulated the effect of these restrictions on the number of births in 2020 and find that surgical abortion bans lead to an additional 8,400 births in the United States.

Robustness Checks

We implement checks from the two-way fixed effects literature, given that our time-

staggered treatment (e.g., Sun and Abraham 202l; Goodman-Bacon 2021; Callaway and Sant'Anna 2021). Because these methods have not yet been extended to non-linear models, we estimate log-linear OLS regression models. Appendix Table 6 presents our main results estimated in a conventional log-linear or inverse hyperbolic sine two-way fixed effects framework. Conventional log-linear and inverse hyperbolic sine models (Appendix Table 6) yield qualitatively similar findings to out Poisson models (Table 3) for elective procedure bans and stay-at-home orders, although the magnitudes are larger with visitors and the median distance traveled. However, for surgical abortion bans we find no effect using log-linear models for visitors and comparable effects of median distance and median visit duration. Differences between log-linear and Poisson models are to be expected since they estimate geometric versus arithmetic means. We are more concerned with the comparison of the log-linear and inverse hyperbolic sine models to versions of those models that control for staggered rollout. Appendix Table 7 shows our results using the Sun and Abraham interaction-weighted estimator, which gives estimates that are robust to bias from the staggered rollout of these policies. These results indicate that elective procedure bans reduced visitors by 17.8 to 18.9 percent and surgical abortion bans reduced visitors by 16.2 to 16.9 percent—notably these estimates suggest that differential timing results in an underestimate of the effect of surgical abortion bans, but (taking into sampling error) no bias in our estimates for elective procedure bans.

One issue with our sample is that the policies we are studying turn on and off, potentially introducing bias into our results. We adopt three approached to assess the significance of this fact for our results in Appendix Table 8. First, we use a shorter follow-up period so that this "off-period" is less likely to bias our results. This approach produces similar results to our main analysis, although our estimate for the effect of surgical abortion bans is sufficiently noisy to be

non-significant. Second, we drop clinics after the first policy (stay at home order, elective procedure ban, and surgical abortion ban) is reversed so that for each clinic these policies are absorbing states. Results in this model (column 3) are similar to our main and shorter follow-up models. Third, we introduce post-period indicators for each policy so that each policy and post-policy indicator is an absorbing state. These results demonstrate that both elective procedure bans and surgical abortion bans significantly decreased the number of visitors to abortion clinics by between 9.3 and 10.9 percent. There was no lingering effect of elective procedure ban on mobility after the policy was lifted, but that was not the case for surgical abortion bans, for which lifting that policy resulted in a 4.4 percent increase in mobility, compared to the 10.9 percent reduction from baseline.

We then repeat our analysis using a variety of alternative specifications and stratifications. First, given the large number of zeros values for our dependent variable (as shown in Appendix Figure 4), we include a zero-inflated Poisson model (Appendix Table 9) and a negative binomial model (Appendix Table 10), both of which produce consistent results.

Second, we stratify our regressions by state policies on contraceptive dispensing, estimating separate models for states where a pharmacist must dispense contraceptives (columns 1-3 of Appendix Table 11) and those states where a pharmacist can refuse for reasons of conscience (columns 4-6 of Appendix Table 11)[15]. Surgical abortion reduced visitors to abortion clinics by 7.6 percent in states where pharmacists must dispense contraceptives, but a 21.2 percent reduction in states where pharmacists may refuse to dispense contraceptives.

In Appendix Table 12 we use separate week and day of week fixed effects. Overall, we find consistent results that both elective procedure bans and surgical abortion bans reduced

[15] https://www.guttmacher.org/state-policy/explore/refusing-provide-health-services

abortion clinic visits. Appendix Table 13 presents results for unweighted models, which continue to demonstrate similar results as our main results, although the effect of elective procedure bans is no longer statistically significant. Appendix Table 14 presents results from models that weight observations using the device count in a state on the same week and day of week in 2019, which yields comparable estimates to our main results.

We also explore the robustness of our results to differential time trends (Appendix Table 15). These results demonstrate that our results are robust to including unit or state-level time trends, including clinic-by-week-by-day fixed effects (so that identification is from within clinic differences between the same dates in 2020 and 2019).

Finally, some clinics were collocated with hospitals, as we noted earlier when discussing the larger than expected number of visits in Wyoming relative to the number of abortions in the state. We identified seventeen abortion clinics that provide surgical abortions and are collocated with hospitals and repeated our analysis excluding those hospitals (Appendix Table 16). We find when we restrict the sample in this way that the effect of elective procedure bans is larger in magnitude and more precisely estimated (with greater statistical significance), whereas the effect of surgical abortion bans is attenuated. However, the total effect those of two policies (i.e., the sum of the coefficients) remains roughly consistent with our baseline results. (Recall that all states with surgical abortion bans also had elective procedure bans). We interpret these findings as indicating that our results are robust to excluding hospital-based clinics, but that the breakdown of the effects between elective and surgical bans may be affected.

Discussion

The CDC has reported an increase in abortions in the past two years, so in the absence of

a pandemic it would be expected that more abortions would take place in 2020 than in 2019. Using the most recent data, we estimate how many abortions did not occur due to the pandemic and related policies. As of June 2022, the most recent data available on abortions per state per year is the Guttmacher Institute's report for 2020. Guttmacher reported that 916,490 abortions took place in the United States in 2019, a 6.3 percent increase from 863,320 in 2017.

Using the regression coefficients from Table 3, Column (1) and Guttmacher data on state abortion rates in 2017 and 2019, we estimate the impact of the pandemic and related state policies at the state level and sum to the national effect. We are making a strong assumption here that the decrease in abortion is the same relative percentage decrease as the decrease in clinic visits. Without more granular individual level data on clinic visits or specific data on abortion rates we are not able to increase the precision of this estimate.

Our time period was 4 months, so these effects would impact about a third of the year. For the United States as a whole, in a non-pandemic scenario with a consistent rate of increase year to year, assuming the (state-specific) trend from the prior two years continue, we would have expected about 950,055 abortions in 2020 (a 3.7 percent increase from 2019), based on state-specific growth rates from 2017 to 2019. However, in our regression there was a 2.1% percent decrease from 2019 to 2020 during the 4-month time period. Therefore, we would assume about 910,150 (916,490 times a third of a 4.3 percent decrease) abortions would take place in the United States in 2020, which is about a 4.2 percent (comparing 950,055 and 910,150) decrease from the pre-pandemic trend.

However, elective procedure bans were also responsible for significant decreases in clinic visits according to our regression. Therefore, states with this policy would see an even larger decrease in abortions. For example, Pennsylvania banned elective procedures for about 5 weeks

(Raifman et al. 2020), or about 10 percent of the year. Since there were 31,250 abortions in Pennsylvania in 2019, virtually flat from 2017, in the non-pandemic scenario outlined above we might expect around 31,245 abortions in 2020. With the impact of the pandemic and elective procedure ban causing additional decreases, we would expect around 30,660 abortions (31,250 times a third of a 2.1 percent decrease and a tenth of an 10.8 percent decrease) to take place in Pennsylvania in 2020, a 1.9 percent decrease (comparing 30,660 and 31,245) from the non-pandemic scenario. Repeating this process for each state, we estimate that elective procedure bans reduced the number of abortions in 2020 by 5.3% (to 899,580) while surgical bans resulted in an additional 800 fewer abortions in 2020. Appendix Table 17 presents our estimated change in abortions for each state using the estimates from Table 2 and state-specific growth-rates to predict the baseline 2020 abortion count. These results demonstrate that there was significant heterogeneity in the impact of the pandemic on abortion visits reflecting, in part, differences in underlying trends across states (e.g. Missouri versus Connecticut).

These estimates assume that the reduction in visits was spread proportionally across visits for abortions and visits for other services. This is a reasonable assumption because more targeted surgical abortion bans had no effect on the number of visits to all abortion clinics. If reductions in visits were disproportionally arising from visits for non-abortion services, so that the number of abortion visits remained constant, then a targeted surgical abortion ban should be effective at reducing visits to clinics that do not offer surgical abortions. This strategy differs from the Mexico City study; due to the public provision of abortions in Mexico City there is more explicit data dealing with the number of abortions provided in any given timeframe. Furthermore, the Mexico City data is complemented with analysis of the government's pregnancy helpline. This indicated an increase in unwanted pregnancies, so the decrease in abortions cannot be attributed to a decrease

in pregnancies overall at least in Mexico (Marquez-Padilla and Saavedra, 2020.)

Most states which explicitly banned surgical abortions had restrictive abortion environments prior to the pandemic. NARAL characterizes each of the surgical abortion ban states except for Alaska, Iowa and West Virginia[16] as having severely restricted access, the most restrictive environment possible according to their scale (NARAL 2020.) In contrast, the other elective procedure ban states have grades across the spectrum, with a median environment of some access. Across all 50 states the median environment is restricted access. Guttmacher also grades states; their metric ranges from very hostile to very supportive. Again, all the surgical abortion ban states are characterized as hostile or very hostile with the exceptions of Alaska and Iowa[17] (Nash 2019.) Similar to the NARAL scale, the other elective procedure ban states have a median characterization of middle ground. The median characterization of all 50 states is leans hostile.

Many clinics in our sample were Planned Parenthood health centers. Planned Parenthood claims that abortion accounts for only 3 percent of the services provided at their clinics (Planned Parenthood 2014.) Although the true proportion of Planned Parenthood's services constituted by abortion has been a source of controversy (Ye Hee Lee 2015), the 3 percent figure does have validity by at least one measure. The organization's 2013-14 annual report shows that abortion services made up 327,653 of 10.6 million services provided (though a patient may receive multiple services in one visit[18]), which is about 3.1 percent (Planned Parenthood 2014.) In 2018-19, the proportion was 4 percent (Planned Parenthood 2019.) This statistic could explain why elective procedure bans (which would impact other Planned Parenthood services such as contraception or

[16] NARAL characterizes Alaska as having protected access, Iowa as having some access and West Virginia as having restricted access.

[17] On the Guttmacher scale, Alaska is characterized as leans supportive and Iowa is characterized as leans hostile.

[18] See https://www.washingtonpost.com/news/fact-checker/wp/2015/08/12/for-planned-parenthood-abortion-stats-3-percent-and-94-percent-are-both-misleading/.

STD testing) had a steep impact on clinic visits while targeting surgical abortion specifically did not have a significant impact.

Another factor contributing to the decrease in clinic visits is the increase in telemedicine services throughout the pandemic. Among independent abortion providers, 20 percent reported implementation of "quick pick up" for medication abortion prescriptions, and over 40 percent reported forgoing pre-abortion tests such as for Rh negativity; 71 percent reported moving follow-up appointments to telehealth (Upadhyay et al. 2020). These shifts may mean that we are overestimating the reduction in abortions since changes in follow-up appointment modalities and pre-testing would also appear as a reduction in visits. However, during the period that we study there were no changes in overall access to medication abortion: FDA regulations require that women pick up mifepristone in-person and this requirement was only enjoined by a Maryland court on July 13th 2020 (after our study period) and that injunction was stayed by the Supreme Court on January 12th 2021.

Conclusion

In this paper, we estimate the effects of a new Targeted Restriction of Abortion Providers (TRAP): prohibiting surgical abortions as elective surgery during a global pandemic. Our hypothesis was that these restrictions, like many other TRAP laws and policies, would reduce the volume of abortion services.

We found that this was the case. In our preferred specification that includes controls for stay-at-home orders, the overall volume of visits to surgical abortion clinics decreased significantly in 2020 compared to 2019, and states that banned elective surgical procedures saw an additional 10.8 percent decrease in visits, states that also explicitly banned surgical abortions saw an

additional 7.4 percent decrease, with stay-at-home orders leading to an additional 21.7 percent drop. Out-migration in response to surgical abortion bans is also consistent with our hypothesis that these bans were effective at reducing the supply of surgical abortions during the early phase of the COVID-19 pandemic.

Finally, our results are still salient considering the Supreme Court decision overturning Roe v. Wade[19] and ongoing litigation on the scope of the Emergency Medical Treatment and Labor Act with respect to medically necessary abortions. As we show above, elective procedure bans reduce abortion reduce abortion clinic visits in both states hostile to abortion and supportive of abortion. This suggests that broad policies restricting elective health care even in states supportive of abortion can reduce abortion access. These states may need to take stronger action to prevent these unintended consequences, such as explicitly excluding abortions from these broad elective healthcare bans or increasing funding and outreach for abortions.

[19] https://www.supremecourt.gov/opinions/21pdf/19-1392_6j37.pdf

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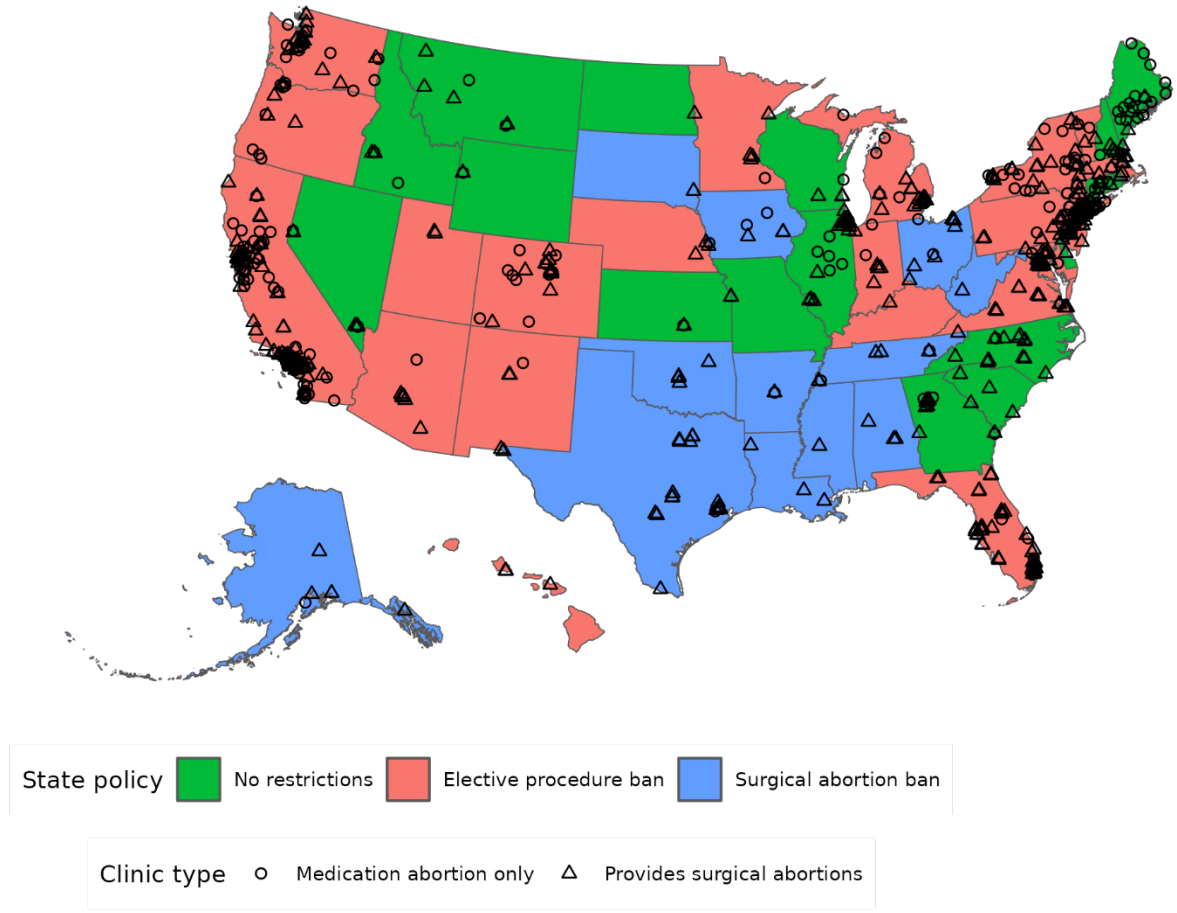
Figure 1: Procedure restrictions and clinic locations in the United States

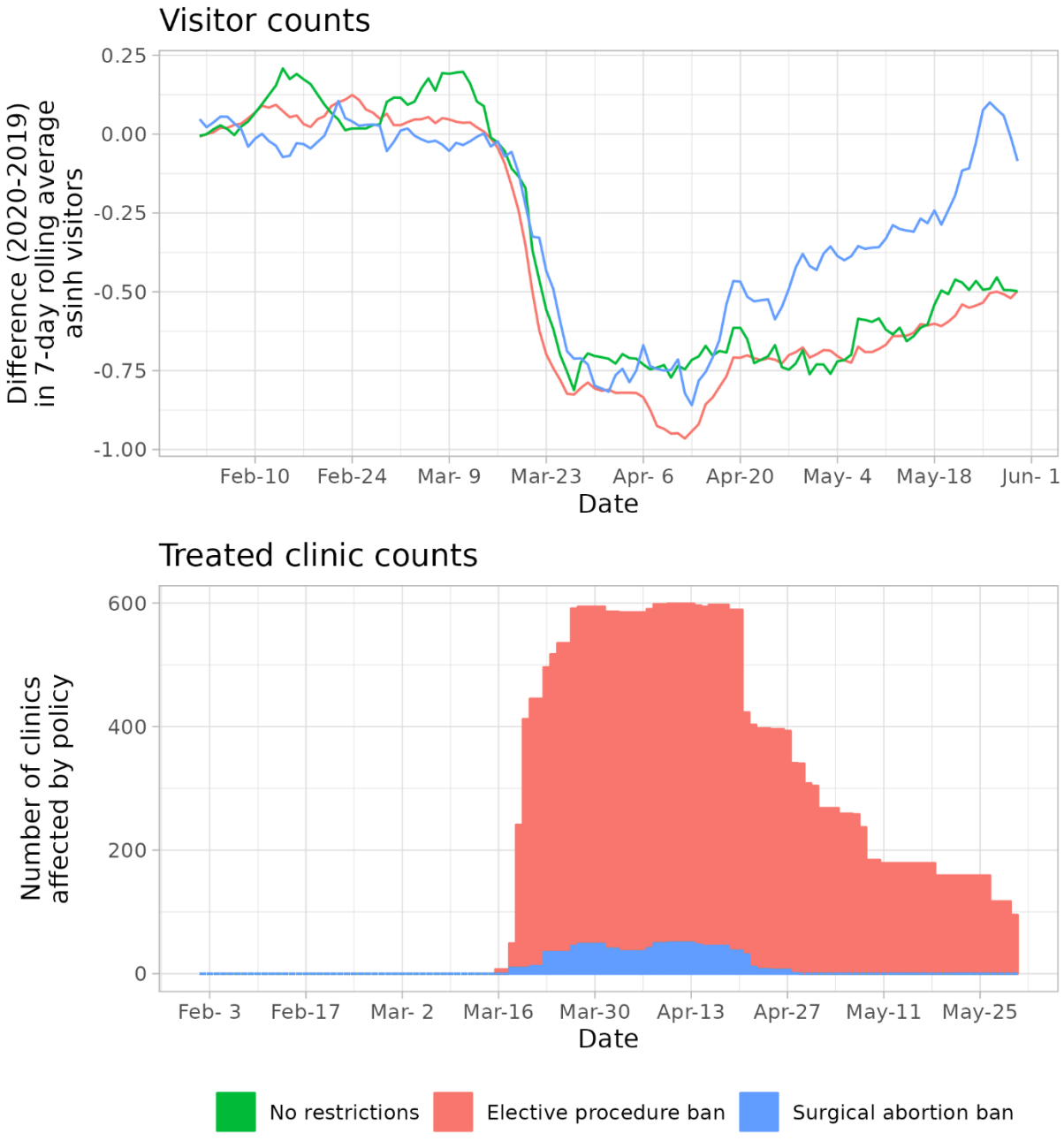


Notes: Dots/triangles indicate clinics included in the panel; clinics that we could not geocode are not included.

Table 1: Summary Statistics

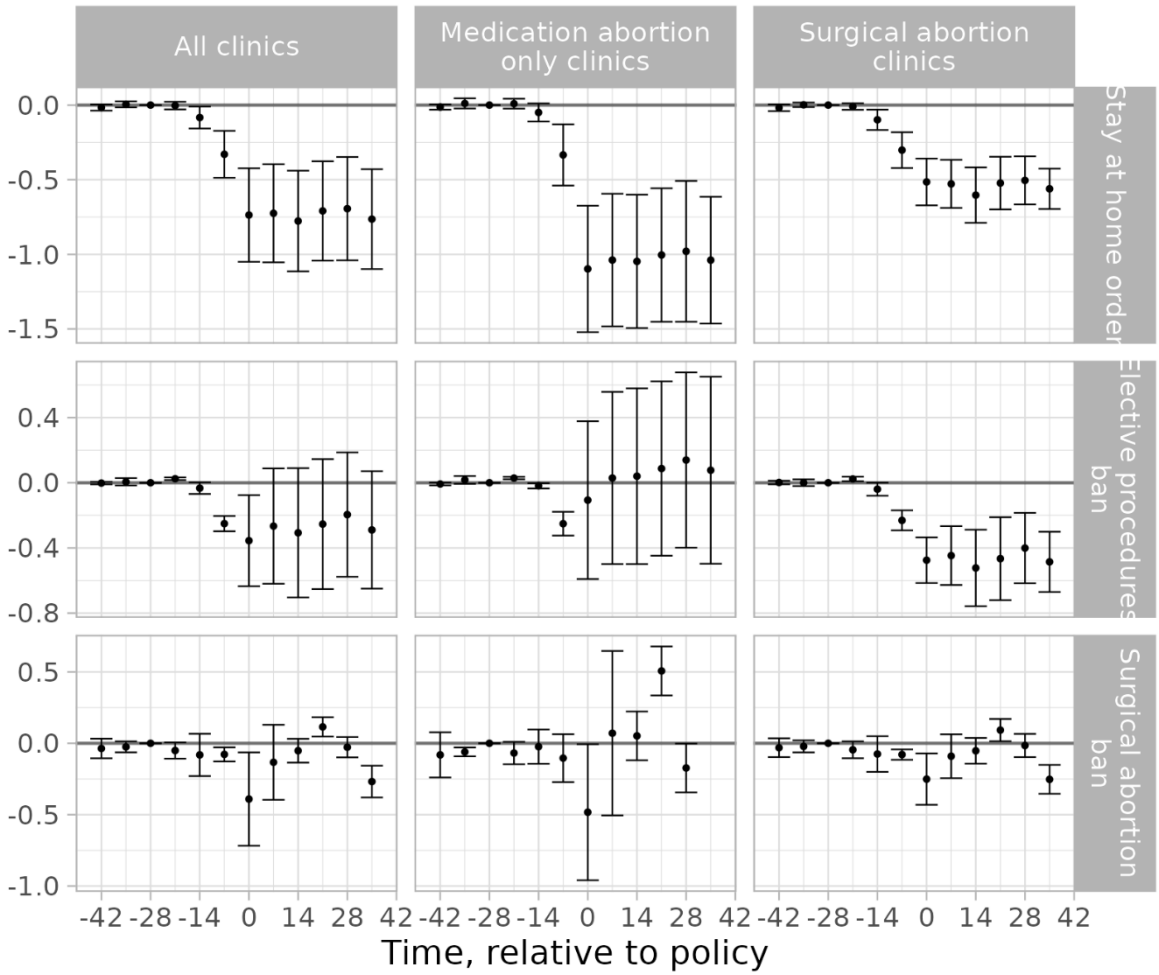
	All				Provides surgical abortions			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
County population	1761210	2604103	0	10039107	1653810	2326662	0	10039107
Cumulative Cases per 100k	117.91	382.76	0.00	4029.60	124.68	388.65	0.00	3455.17
New Cases per 100k	20.56	63.04	0.00	979.78	21.73	63.79	0.00	796.63
Holiday	0.03	0.17	0.00	1.00	0.03	0.17	0.00	1.00
Surgical abortion ban	0.01	0.09	0.00	1.00	0.01	0.10	0.00	1.00
Elective procedure ban	0.16	0.37	0.00	1.00	0.16	0.37	0.00	1.00
Year 2020	0.50	0.50	0.00	1.00	0.50	0.50	0.00	1.00
Unemployment rate	7.16	5.40	1.40	34.00	7.07	5.41	1.40	34.00

Figure 2: Raw Differences in Abortion Clinic Visits (2020 visits minus 2019 visits)



Notes: States with no restrictions (green) include Connecticut, Delaware, Washington D.C., Georgia, Idaho, Illinois, Kansas, Maine, Missouri, Montana, Nevada, New Hampshire, North Carolina, North Dakota, Rhode Island, South Carolina, and Wisconsin. States restricting elective procedures (red) include Arizona, California, Colorado, Florida, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Utah, Vermont, Virginia, and Washington. States restricting elective procedures and surgical abortion (blue) include Alabama, Alaska, Arkansas, Iowa, Louisiana, Mississippi, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, and West Virginia, and Wyoming.

Figure 3: Elective Procedure Ban Event Study



Notes: Points are coefficients on time (measured in weeks), relative to policy implementation, from a Poisson fixed effects regression of daily visitors that includes clinic and week-by-day-of-week fixed effects and controls for the other two policies in each row. Clinics are dropped from the sample at the end of any policy. 95% confidence intervals based on standard errors clustered on state. Observations weighted by the number of devices seen in the state on each day.

Table 2: Daily Visitors Regression Results

	Daily Visitors	Daily Visitors	Daily Visitors	Daily Visitors	Daily Visitors
2020	0.001	0.001	0.002	-0.001	-0.001
	(0.018)	(0.016)	(0.012)	(0.015)	(0.010)
Elective procedures ban	-0.181***	-0.133**	-0.075	-0.171**	-0.096
	(0.058)	(0.057)	(0.064)	(0.068)	(0.061)
Surgical abortion ban	0.016	-0.058	-0.090**	-0.000	-0.057
	(0.057)	(0.042)	(0.037)	(0.077)	(0.056)
Stay at home / Non-essential			-0.211***		-0.236***
			(0.054)		(0.054)
Holiday	-0.085***	-0.079***	-0.086***	-0.085***	-0.090***
	(0.009)	(0.008)	(0.007)	(0.009)	(0.007)
New cases per 100,000		-0.001***	-0.001***		
		(0.000)	(0.000)		
COVID-19 cases per 100,000				-0.000	-0.000
				(0.000)	(0.000)
Unemployment rate	-0.036***	-0.033***	-0.021***	-0.035***	-0.021***
	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)
N	128,605	128,605	128,605	128,605	128,605
Squared correlation	0.946	0.948	0.95	0.946	0.949
# clinics	757	757	757	757	757
# week-by-day	85	85	85	85	85
# states	51	51	51	51	51
Joint significance of unemployment and 2020	<0.001	<0.001	0.004	<0.001	0.011
Significance of sum of elective and surgical bans	0.008	0.001	0.015	0.006	0.043

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and clinic fixed effects are included in all models.

Table 3: Clinic level metrics of visitors

	Surgical abortion clinics			Medication only clinics		
	Daily visitors	Distance from home	Median visit duration	Daily visitors	Distance from home	Median visit duration
2020	-0.021**	0.058	0.005	0.054***	0.067	0.067*
	(0.008)	(0.084)	(0.046)	(0.010)	(0.073)	(0.038)
Elective procedures ban	-0.108**	-0.060	0.178**	-0.023	0.025	0.066
	(0.043)	(0.091)	(0.078)	(0.121)	(0.088)	(0.079)
Surgical abortion ban	-0.074**	-0.198***	0.088	-0.020	0.017	0.244
	(0.029)	(0.057)	(0.059)	(0.134)	(0.102)	(0.243)
Stay at home / Non-essential	-0.217***	0.041	-0.002	-0.195***	0.205	-0.068
	(0.070)	(0.075)	(0.049)	(0.030)	(0.224)	(0.074)
Holiday	-0.095***	-0.408**	0.049	-0.064***	-0.069	-0.097*
	(0.010)	(0.156)	(0.090)	(0.007)	(0.081)	(0.055)
New cases per 100,000	-0.001***	0.000	0.000	-0.001*	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Unemployment rate	-0.018**	0.007	0.015***	-0.028***	-0.007	0.030***
	(0.007)	(0.009)	(0.005)	(0.010)	(0.016)	(0.008)
N	83,045	78,700	78,700	45,560	42,564	42,564
Squared correlation	0.958	0.107	0.383	0.907	0.083	0.454
# clinics	489	489	489	268	268	268
# week-by-day	85	85	85	85	85	85
# states	51	51	51	35	35	35
Joint significance of unemployment and 2020	<0.001	0.317	0.013	<0.001	0.607	<0.001
Significance of sum of elective and surgical bans	0.002	<0.001	<0.001	0.79	0.684	0.12

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and clinic fixed effects are included in all models.

Table 4: State level metrics of visitors

	Visitors	Same state visitors	Out-of-state visitors	Left state visitors
2020	0.010	0.011	-0.001	-0.004
	(0.009)	(0.009)	(0.024)	(0.045)
Elective procedures ban	-0.085*	-0.089**	0.114*	0.111
	(0.045)	(0.042)	(0.067)	(0.091)
Surgical abortion ban	-0.084**	-0.083**	-0.262	-0.237
	(0.037)	(0.038)	(0.146)	(0.160)
Stay at home / Non-essential	-0.115	-0.107	-0.308***	-0.279*
	(0.077)	(0.074)	(0.053)	(0.128)
Holiday	-0.084***	-0.084***	-0.111***	-0.166**
	(0.011)	(0.012)	(0.023)	(0.059)
New cases per 100,000	-0.001**	-0.001**	0.001	0.003**
	(0.000)	(0.000)	(0.001)	(0.001)
Unemployment rate	-0.034***	-0.033***	-0.074***	-0.112***
	(0.005)	(0.005)	(0.016)	(0.029)
N	8,670	8,670	8,670	8,670
Squared correlation	0.996	0.996	0.977	0.945
# week-by-day	85	85	85	85
# states	51	51	51	51
Joint significance of unemployment and 2020	<0.001	<0.001	<0.001	0.001
Significance of sum of elective and surgical bans	0.008	0.004	0.312	0.408

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models. Sample restricted to data from clinics that provide surgical abortions.

Table 5: Estimates from clinic-level models stratifying by state hostility to abortion

	Daily visitors	Distance from home	Median visit duration
Panel A: Hostile to Abortion			
2020	-0.021*	-0.015	0.052
	(0.012)	(0.072)	(0.082)
Elective procedures ban	0.002	0.055	0.121*
	(0.055)	(0.107)	(0.068)
Surgical abortion ban	-0.016	-0.235***	0.166***
	(0.072)	(0.065)	(0.061)
Stay at home / Non-essential	-0.178*	-0.003	0.064
	(0.084)	(0.088)	(0.051)
Holiday	-0.115***	-0.561***	-0.063
	(0.024)	(0.116)	(0.123)
New cases per 100,000	-0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)
Unemployment rate	-0.039***	0.004	0.006
	(0.013)	(0.013)	(0.007)
N	34,680	32,477	32,477
Squared correlation	0.966	0.16	0.369
# clinics	204	204	204
# week-by-day	85	85	85
# states	31	31	31
Joint significance of unemployment and 2020	<0.001	0.963	0.516
Significance of sum of elective and surgical bans	0.906	0.006	<0.001
Panel B: Hostile to abortion (excludes surgical ban indicator)			
2020	-0.021*	-0.016	0.056
	(0.012)	(0.074)	(0.086)
Elective procedures ban	0.000	-0.023	0.177***
	(0.061)	(0.112)	(0.056)
Stay at home / Non-essential	-0.178*	0.004	0.061
	(0.086)	(0.085)	(0.052)
Holiday	-0.115***	-0.560***	-0.065
	(0.024)	(0.115)	(0.124)
New cases per 100,000	-0.002	0.001	0.000
	(0.001)	(0.001)	(0.001)
Unemployment rate	-0.039***	0.003	0.006
	(0.013)	(0.013)	(0.007)
N	34,680	32,477	32,477
Squared correlation	0.966	0.159	0.37
# clinics	204	204	204
# week-by-day	85	85	85
# states	31	31	31
Joint significance of unemployment and 2020	<0.001	0.973	0.522

Panel C: Supportive of abortion			
2020	-0.008	0.203*	-0.029
	(0.010)	(0.130)	(0.029)
Elective procedures ban	-0.157***	-0.135	0.242***
	(0.041)	(0.097)	(0.100)
Stay at home / Non-essential	-0.231***	-0.094	-0.118***
	(0.066)	(0.109)	(0.042)
Holiday	-0.089***	0.059**	0.158***
	(0.009)	(0.030)	(0.050)
New cases per 100,000	-0.001**	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.011	0.014	0.025***
	(0.007)	(0.013)	(0.003)
N	47,515	45,373	45,373
Squared correlation	0.958	0.064	0.395
# clinics	280	280	280
# week-by-day	85	85	85
# states	19	19	19
Joint significance of unemployment and 2020	<0.001	0.021	<0.001

Notes: Coefficients are average marginal effects. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and clinic fixed effects are included in all models. Note that in Panel C we omit the variable for whether a state had a surgical abortion ban as state supportive of abortion overall did not have those bans. We also do so in Panel B by comparison. Sample restricted to clinics that provide surgical abortions.

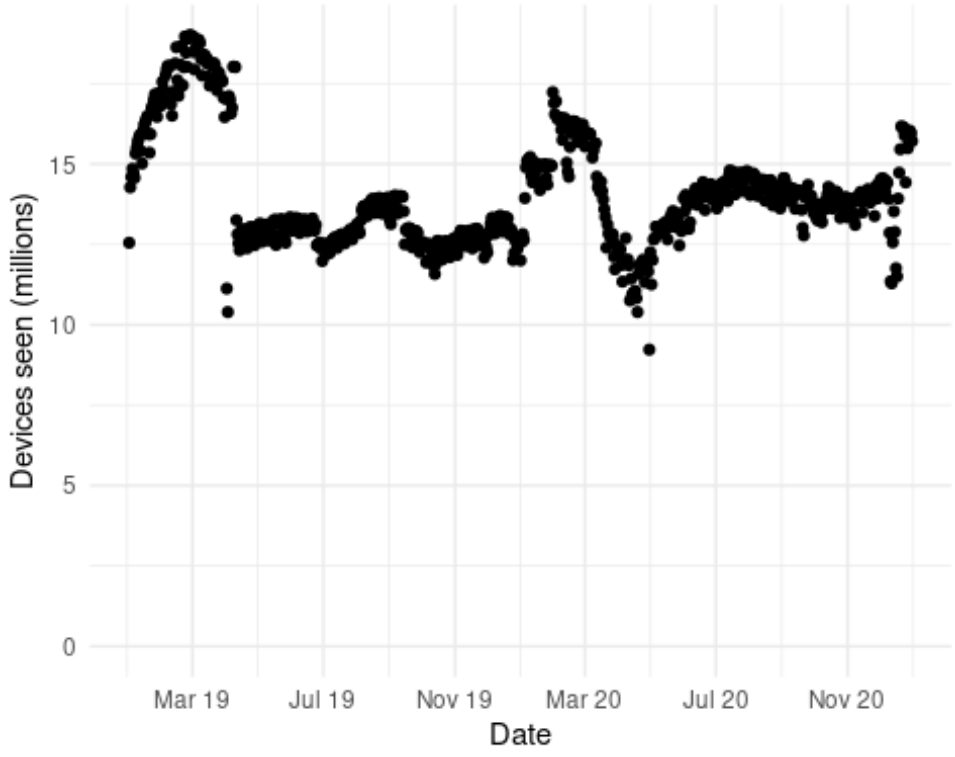
Table 6: Effect of state abortion restrictions on births

	First trimester	Second trimester	Third trimester
2020	-0.014	0.009	-0.019
	(0.019)	(0.028)	(0.013)
Elective procedure ban	-0.009	-0.069**	0.012
	(0.031)	(0.024)	(0.023)
Surgical abortion ban	0.168***	0.087***	-0.063*
	(0.036)	(0.014)	(0.026)
Average weekly COVID-19	0.0005**	0.0005*	-0.0008***
incidence	(0.0002)	(0.0003)	(0.0002)
Stay at home order	-0.037***	0.013	-0.006
	(0.008)	(0.011)	(0.006)
Unemployment rate	-0.004***	0.0004	-0.002
	(0.001)	(0.002)	(0.002)
Joint significance of Year 2020 and unemployment rate	0.004	0.943	0.317
N		1504	
Squared correlation		0.999	
Number of states		47	

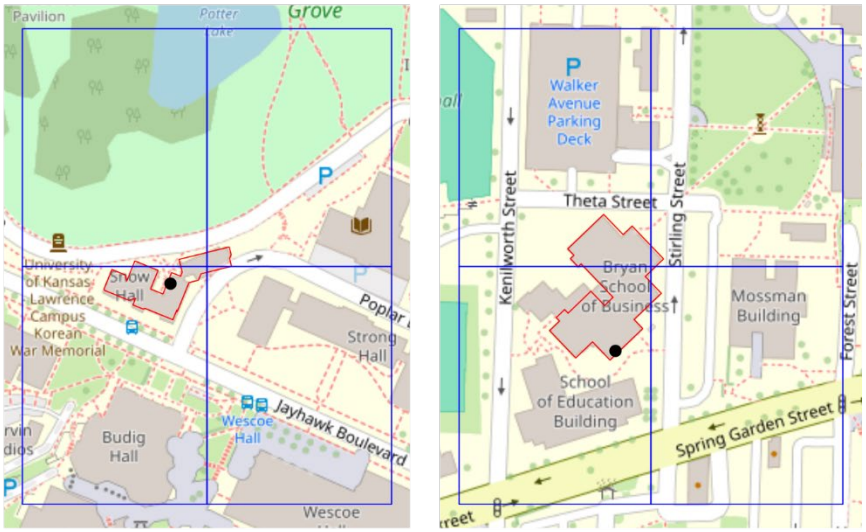
Notes: Coefficients are average marginal effects from a single regression model. Standard errors clustered at the state level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Month and state fixed effects are included in all models.

Online Appendix (not for publication)

Appendix Figure 1: Number of Devices Seen by Day

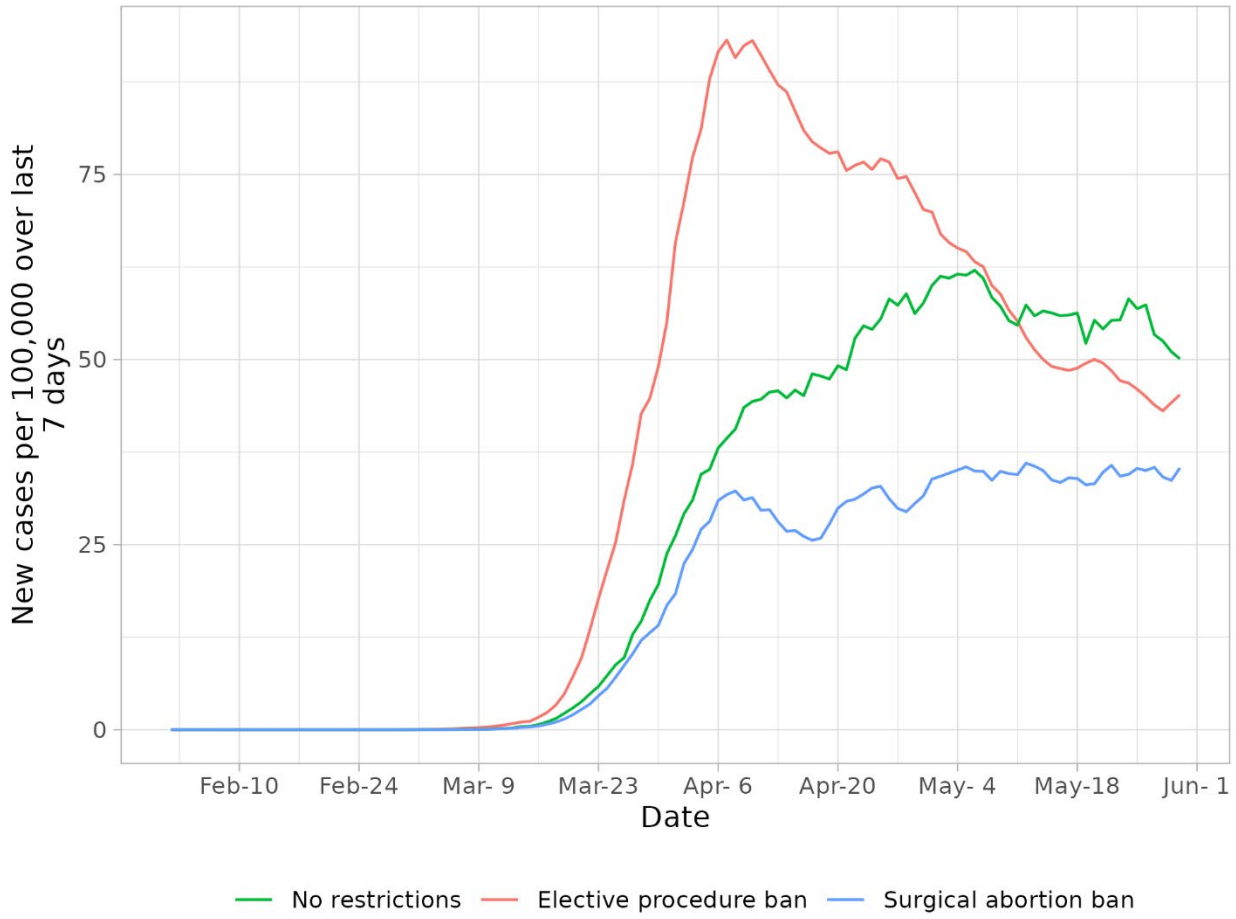


Appendix Figure 2: Location and Building Footprints for the Authors



Notes: Blue rectangles are geohash 7 grid squares, the red outline is the building footprint containing the black dot, which is the geocoded street address of the building. Base map tiles are from OpenStreetMap.

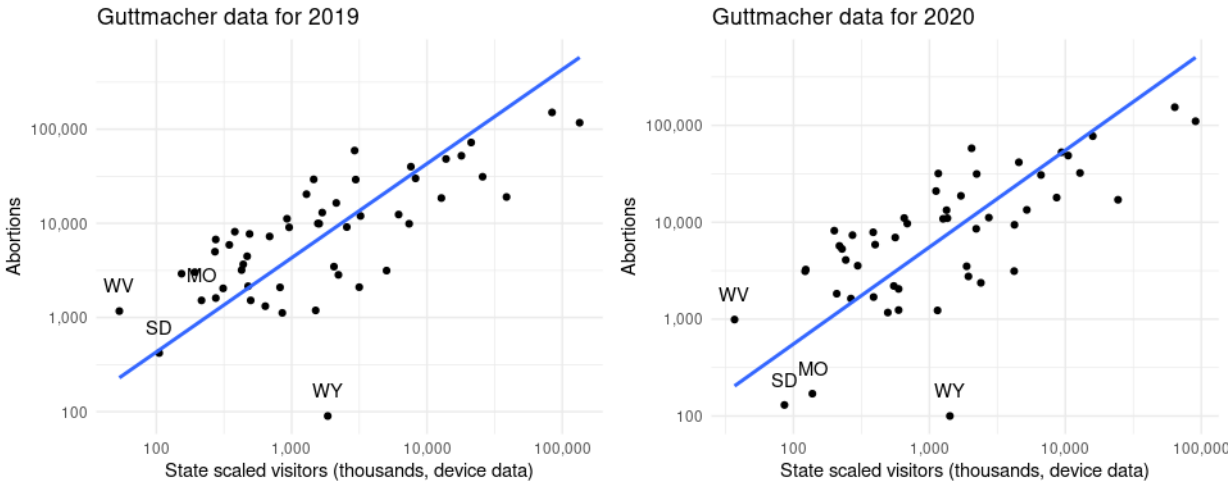
Appendix Figure 3: Covid Cases by State Policy



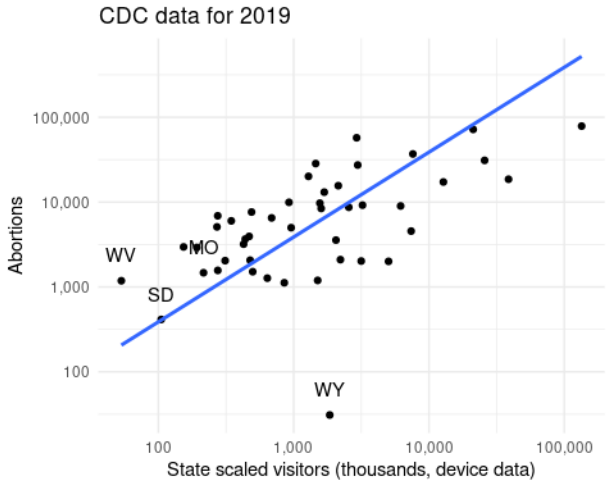
Notes: States with no restrictions (blue) include Connecticut, Delaware, Washington D.C., Georgia, Idaho, Illinois, Kansas, Maine, Missouri, Montana, Nevada, New Hampshire, North Carolina, North Dakota, Rhode Island, South Carolina, Wisconsin and Wyoming. States restricting elective procedures (red) include Arizona, California, Colorado, Florida, Hawaii, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New Mexico, New York, Pennsylvania, Utah, Vermont, Virginia, and Washington. States restricting elective procedures and surgical abortion include Alabama, Alaska, Arkansas, Indiana, Iowa, Louisiana, Mississippi, Ohio, South Dakota, Tennessee, Texas. and West Virginia.

Appendix Figure 4: Abortions per State and Clinic Visits, Full Year

Panel A: Guttmacher data

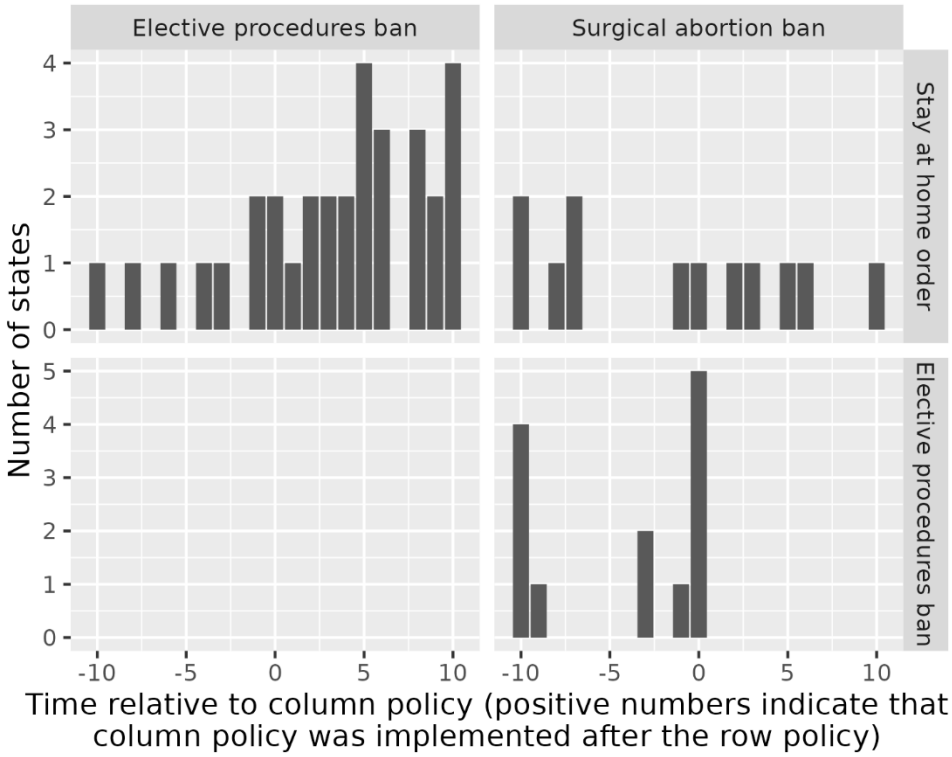


Panel B: CDC data



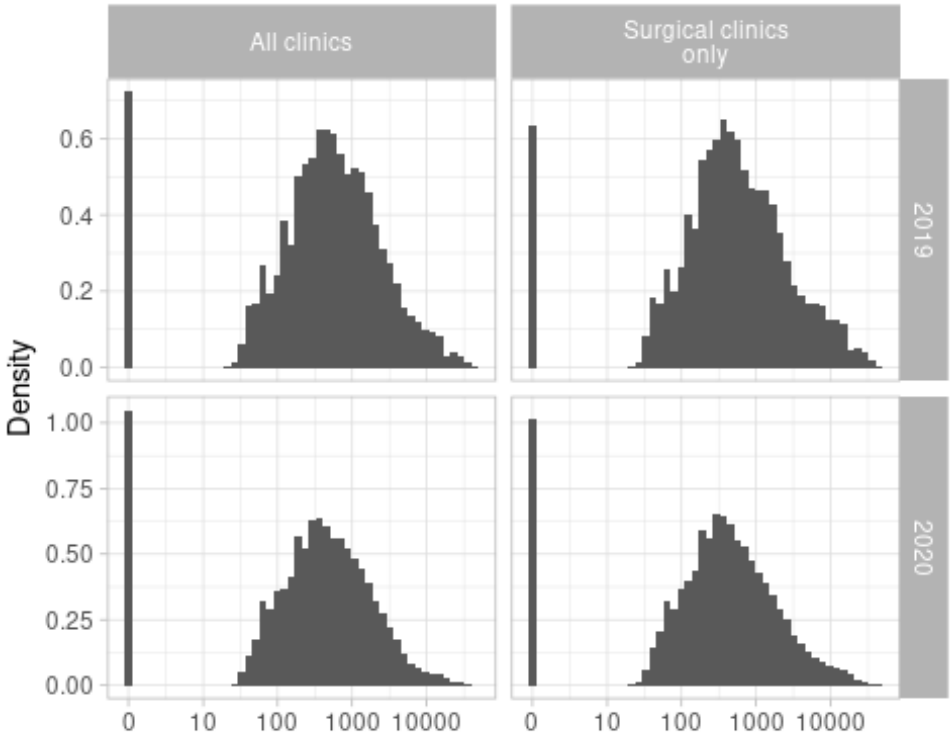
Notes: Line with slope 1 included for reference; intercept calibrated for best fit.

Appendix Figure 5: Days between policies



Note: Based on state policies. Positive values indicate that the column policy was implemented after the row policy.

Appendix Figure 6: Density of daily visitors variables in 2019 and 2020



Appendix Table 1: Sum of Abortion Clinic Visits by State

	2019 data						2020 data	
State	All (CDC)	Surg. (CDC)	Med. (CDC)	All (Gutt.)	All (Device)	Surg. (Device)	All (Gutt.)	All (Device)
Alaska	1270	960	305	1320	638707	623696	1240	593343
Alabama	6009	3910	2088	5910	346093	346093	5700	217708
Arkansas	2963	1725	1237	2920	153659	113832	3250	123115
Arizona	13097	7760	5190	13020	1683359	1341563	13320	1336317
California	–	–	–	150660	84001828	33725759	154060	63827410
Colorado	9002	3389	4939	12410	6174272	3019197	13420	5204045
Connecticut	9202	4570	4565	11990	3226905	1057120	11170	2736080
D. C.	4552	2552	2000	9900	7382760	7382760	9410	4221558
Delaware	2042	823	1182	2040	311663	311663	1830	208003
Florida	71914	34820	33780	72210	21220499	17560612	77400	15908458
Georgia	36907	18356	18549	39980	7605834	6190168	41620	4548304
Hawaii	2003	1224	776	3150	5027986	5027986	3130	4199551
Iowa	3566	1138	2404	3470	2054351	1471334	3510	1879204
Idaho	1513	878	629	1520	498108	358879	1690	388264
Illinois	–	–	–	52220	17969108	4930262	52780	9376384
Indiana	7637	4277	3359	7720	488580	298960	7880	385726
Kansas	6894	2445	4446	6740	274739	246989	8190	199660
Kentucky	3664	1818	1846	3670	438799	438799	4080	242340
Louisiana	–	–	–	8150	380276	380276	7360	271643
Massachusetts	18593	10377	7958	19050	38715205	37340206	17060	24399720
Maryland	–	–	–	30030	8233799	7049029	30750	6617920
Maine	2021	994	1023	2100	3157677	890197	2370	2390399
Michigan	27339	15675	11609	29160	2974772	1516814	31510	2225905
Minnesota	9940	6199	3737	11190	923530	803738	11060	652182
Missouri	1471	1443	15	1520	215698	215698	170	137737
Mississippi	3194	911	2283	3190	426627	426627	3560	296916
Montana	1568	652	916	1610	275025	199918	1630	264552
North Carolina	28450	14319	12435	29320	1455325	1411877	31850	1162017
North Dakota	1121	757	361	1120	852810	852810	1170	494101
Nebraska	2068	808	1258	2150	476831	476831	2200	547051
New Hampshire	–	–	–	2090	820778	658085	2050	593439
New Jersey	–	–	–	48280	13829390	4838226	48830	10481293
New Mexico	3942	1753	1735	4470	469002	248111	5880	398787
Nevada	8414	5164	3201	9920	1597661	746848	11010	1356326
New York	78587	48024	28489	117140	134292194	121305166	110360	90737948
Ohio	20102	12287	7807	20400	1286851	809557	20990	1118536
Oklahoma	4995	2415	2493	9070	958480	958480	9690	686987
Oregon	8688	4161	4521	9130	2555848	653378	8560	2208828
Pennsylvania	31018	17159	13845	31250	25773257	21382851	32270	12817746
Rhode Island	2099	1196	896	2840	2216605	2216605	2760	1935723
South Carolina	5101	1995	3100	5000	271237	271237	5300	227626
South Dakota	414	272	137	420	104981	104981	130	85803
Tennessee	9719	4758	4956	9970	1562651	1494816	10850	1260467
Texas	57275	34730	22539	59290	2920578	2722065	58030	2043454
Utah	2922	1684	1234	3030	192519	192519	3120	121809
Virginia	15601	9767	5818	16470	2136674	1781708	18740	1704919
Vermont	1195	481	708	1190	1504603	955866	1230	1147232
Washington	17262	8838	8412	18570	12781358	8595039	17980	8629134
Wisconsin	6511	4207	2165	7260	687332	469339	6960	560530
West Virginia	1183	694	489	1170	53284	53284	990	36838
Wyoming	31	0	30	90	1847886	1508783	100	1414110

Appendix Table 2: Correlation of abortion clinic visits and abortions

	Guttmacher data		CDC data	
	All abortions in 2019	All abortions in 2020	All abortion in 2019	Surgical abortions in 2019
Log abortion clinic visits (2019)	0.827***		0.666***	
	(0.099)		(0.111)	
Log abortion clinic visits (2020)		0.928***		
		(0.148)		
Log surgical abortion clinic visits (2019)				0.649***
				(0.126)
N	51	51	45	45
Squared correlation	0.497	0.485	0.325	0.196

* p < 0.1, ** p < 0.05, *** p < 0.01

Appendix Table 3: Dates of Elective Procedure Ban

	Elective procedure ban	Elective procedures resume
Alabama	3/19/2020	4/30/2020
Alaska	3/19/2020	4/20/2020
Arizona	3/21/2020	5/1/2020
Arkansas	4/3/2020	4/27/2020
California	3/19/2020	4/20/2020
Colorado	3/23/2020	4/27/2020
Connecticut	n/a	n/a
Delaware	n/a	n/a
District of Columbia	n/a	n/a
Florida	3/20/2020	5/8/2020
Georgia	n/a	n/a
Hawaii	4/16/2020	4/26/2020
Idaho	n/a	n/a
Illinois	n/a	n/a
Indiana	3/16/2020	4/27/2020
Iowa	3/27/2020	4/27/2020
Kansas	n/a	n/a
Kentucky	3/18/2020	5/6/2020
Louisiana	3/18/2020	4/27/2020
Maine	n/a	n/a
Maryland	3/24/2020	5/7/2020
Massachusetts	3/18/2020	5/18/2020
Michigan	3/21/2020	5/29/2020
Minnesota	3/23/2020	5/10/2020
Mississippi	3/19/2020	4/24/2020
Missouri	n/a	n/a
Montana	n/a	n/a
Nebraska	4/3/2020	5/4/2020
Nevada	n/a	n/a
New Hampshire	n/a	n/a
New Jersey	3/27/2020	5/26/2020
New Mexico	3/27/2020	4/30/2020
New York	3/20/2020	6/8/2020
North Carolina	n/a	n/a
North Dakota	n/a	n/a
Ohio	3/18/2020	5/1/2020
Oklahoma	3/24/2020	4/24/2020
Oregon	3/18/2020	5/1/2020
Pennsylvania	3/20/2020	4/27/2020
Rhode Island	n/a	n/a
South Carolina	n/a	n/a
South Dakota	3/23/2020	4/28/2020
Tennessee	3/24/2020	5/1/2020
Texas	3/22/2020	4/21/2020
Utah	3/25/2020	4/22/2020
Vermont	3/20/2020	5/4/2020
Virginia	3/25/2020	5/1/2020
Washington	3/19/2020	4/29/2020
West Virginia	4/1/2020	4/20/2020
Wisconsin	n/a	n/a
Wyoming	n/a	n/a

Appendix Table 4: Dates of Surgical Abortion Ban

State	Ban began	Ban ended	Notes
Alabama	3/28/2020	4/12/2020	Enjoined
Alaska	4/7/2020	5/4/2020	Procedures were allowed to resume
Arkansas	1: 4/3/2020 2: 4/22/2020	1: 4/13/2020 2: 5/18/2020	Initial ban was enjoined, but the injunction was then lifted. Arkansas required a negative COVID-test within 72 hours before allowing an abortion.
Iowa	3/27/2020	4/1/2020	ACLU and state settled out of court
Louisiana	3/21/2020	5/1/2020	Clinics settled with state
Mississippi	4/10/2020	5/11/2020	Executive order expired
Ohio	3/17/2020	3/30/2020	Ended by temporary restraining order, affirmed on 4/6, permanently enjoined on 4/23.
Oklahoma	3/27/2020	4/6/2020	Temporary stay allowed some abortions before preliminary injunction on 4/21.
South Dakota	3/13/2020	10/01/2020	Effective ban because abortion services were provided by out-of-state physicians
Tennessee	4/8/2020	4/17/2020	Federal court blocked the ban
Texas	3/23/2020	4/22/2020	TRO from district court on 3/30, stayed by circuit court on 3/31, second TRO on 4/9, stayed on 4/10.
West Virginia	4/1/2020	4/30/2020	

Notes: In some cases, state bans were temporarily halted by court order and then reinstated after appeal. The first and second periods of these bans are noted by 1: M/DD/YYYY 2: M/DD/YYYY.

Appendix Table 5: Stay-At-Home Orders and Non-Essential Service Closures

State	Stay-At-Home Start	Stay-At-Home End	Non Essential Close	Non Essential Open
Alabama	4/4/2020	4/30/2020	3/28/2020	4/30/2020
Alaska	3/28/2020	4/24/2020	3/24/2020	4/24/2020
Arizona	3/31/2020	5/16/2020	3/31/2020	5/8/2020
Arkansas	n/a	n/a	4/6/2020	5/4/2020
California	3/19/2020	Ongoing	3/19/2020	5/8/2020
Colorado	3/26/2020	4/27/2020	3/19/2020	5/1/2020
Connecticut	3/23/2020	5/20/2020	3/23/2020	5/20/2020
Delaware	3/24/2020	6/1/2020	3/24/2020	5/8/2020
District of Columbia	4/1/2020	5/29/2020	3/25/2020	5/29/2020
Florida	4/3/2020	5/18/2020	4/3/2020	5/18/2020
Georgia	4/3/2020	5/1/2020	4/3/2020	5/1/2020
Hawaii	3/25/2020	5/31/2020	3/25/2020	5/7/2020
Idaho	3/25/2020	5/1/2020	3/25/2020	5/1/2020
Illinois	3/21/2020	5/29/2020	3/21/2020	5/29/2020
Indiana	3/25/2020	5/18/2020	3/25/2020	5/18/2020
Iowa	n/a	n/a	3/26/2020	5/15/2020
Kansas	3/30/2020	5/4/2020	3/30/2020	5/4/2020
Kentucky	3/26/2020	Ongoing	3/26/2020	5/11/2020
Louisiana	3/23/2020	5/15/2020	3/23/2020	5/1/2020
Maine	4/2/2020	5/31/2020	3/25/2020	5/1/2020
Maryland	3/30/2020	5/15/2020	3/23/2020	5/15/2020
Massachusetts	3/24/2020	5/18/2020	3/24/2020	5/18/2020
Michigan	3/24/2020	6/1/2020	3/24/2020	5/26/2020
Minnesota	3/28/2020	5/18/2020	3/28/2020	4/27/2020
Mississippi	4/3/2020	4/27/2020	4/3/2020	4/27/2020
Missouri	4/6/2020	5/4/2020	4/3/2020	5/4/2020
Montana	3/28/2020	4/26/2020	3/28/2020	4/27/2020
Nebraska	n/a	n/a	4/9/2020	6/1/2020
Nevada	3/31/2020	5/9/2020	3/21/2020	5/9/2020
New Hampshire	3/28/2020	6/16/2020	3/28/2020	5/11/2020
New Jersey	3/21/2020	6/9/2020	3/21/2020	5/18/2020
New Mexico	3/24/2020	Ongoing	3/24/2020	5/16/2020
New York	3/22/2020	6/27/2020	3/22/2020	6/8/2020
North Carolina	3/30/2020	5/22/2020	3/30/2020	5/8/2020
North Dakota	n/a	n/a	3/20/2020	5/1/2020
Ohio	3/24/2020	5/20/2020	3/24/2020	5/4/2020
Oklahoma	4/1/2020	5/15/2020	4/1/2020	4/24/2020
Oregon	3/23/2020	6/19/2020	3/23/2020	5/15/2020
Pennsylvania	4/1/2020	6/5/2020	3/21/2020	6/5/2020
Rhode Island	3/28/2020	5/9/2020	3/30/2020	5/9/2020
South Carolina	4/7/2020	5/4/2020	4/1/2020	4/20/2020
South Dakota	n/a	n/a	n/a	n/a
Tennessee	4/2/2020	4/29/2020	4/1/2020	4/27/2020
Texas	4/2/2020	5/1/2020	4/2/2020	5/1/2020
Utah	n/a	n/a	3/27/2020	5/1/2020
Vermont	3/24/2020	5/15/2020	3/25/2020	4/27/2020
Virginia	3/30/2020	5/29/2020	3/25/2020	5/29/2020
Washington	3/23/2020	6/1/2020	3/25/2020	6/1/2020
West Virginia	3/24/2020	5/5/2020	3/24/2020	5/4/2020
Wisconsin	3/25/2020	5/13/2020	3/25/2020	5/11/2020
Wyoming	n/a	n/a	3/19/2020	5/1/2020

Appendix Table 6: Log-linear Estimates of the Effect of Elective Procedure Bans

	Asinh			Log(1+)		
	Visitors	Median distance	Median duration	Visitors	Median distance	Median duration
2020	−0.022	0.054	−0.093***	−0.018	0.052	−0.093***
	(0.019)	(0.053)	(0.026)	(0.018)	(0.050)	(0.026)
Elective procedures ban	−0.210***	−0.124***	0.132*	−0.200***	−0.120***	0.132*
	(0.069)	(0.042)	(0.073)	(0.067)	(0.039)	(0.073)
Surgical abortion ban	−0.008	−0.205***	0.042	−0.007	−0.203***	0.042
	(0.049)	(0.057)	(0.049)	(0.045)	(0.055)	(0.049)
Stay at home / Non-essential	−0.251***	0.032	−0.100	−0.237***	0.032	−0.100
	(0.046)	(0.052)	(0.062)	(0.043)	(0.049)	(0.062)
Holiday	−0.082	0.004	0.050	−0.079	0.002	0.050
	(0.065)	(0.039)	(0.051)	(0.060)	(0.036)	(0.051)
New cases per 100,000	−0.000*	0.000	0.000**	−0.000**	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate	−0.018**	−0.007	0.004	−0.018**	−0.007	0.004
	(0.007)	(0.007)	(0.005)	(0.007)	(0.006)	(0.005)
N	69,086	65,613	65,613	69,086	65,613	65,613
Squared correlation	0.756	0.45	0.53	0.782	0.458	0.53
# clinics	489	488	488	489	488	488
# week-by-day	85	85	85	85	85	85
# states	51	51	51	51	51	51
Joint significance of unemployment and 2020	0.031	0.2	0.003	0.026	0.203	0.003
Significance of sum of elective and surgical bans	0.006	<0.001	0.003	0.006	<0.001	0.003

Notes: Results are point estimates from log-linear models estimated via OLS. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and clinic fixed effects are included in all models.

Appendix Table 7: Sun and Abraham Estimates of the Effect of Elective Procedure and Surgical Abortion Bans

	Asinh			Log(1+)		
	Visitors	Median distance	Median duration	Visitors	Median distance	Median duration
2020	-0.052	-0.316***	0.724***	-0.046	-0.274*	0.186
	(0.032)	(0.093)	(0.303)	(0.031)	(0.120)	(0.282)
Elective procedures ban	-0.186*	-0.103	0.130	-0.176*	-0.100	0.130
	(0.099)	(0.072)	(0.100)	(0.094)	(0.069)	(0.111)
Surgical abortion ban	-0.205***	-0.339***	0.036	-0.195***	-0.329***	0.036
	(0.056)	(0.078)	(0.138)	(0.052)	(0.074)	(0.148)
Stay at home / Non-essential	-0.293***	-0.014	-0.090	-0.278***	-0.012	-0.090
	(0.045)	(0.064)	(0.086)	(0.041)	(0.062)	(0.088)
Holiday	-0.035	-0.017	0.049	-0.034	-0.017	0.049
	(0.083)	(0.038)	(0.066)	(0.076)	(0.034)	(0.066)
New cases per 100,000	-0.000	0.000**	0.000*	-0.000	0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.015*	-0.012*	0.006	-0.014*	-0.011*	0.006
	(0.008)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)
N	69,086	65,613	65,613	69,086	65,613	65,613
Squared correlation	0.758	0.453	0.533	0.783	0.461	0.533
# clinics	489	488	488	489	488	488
# week-by-day	85	85	85	85	85	85
# states	51	51	51	51	51	51
Joint significance of unemployment and 2020	0.151	0.017	0.005	0.14	0.082	0.626

Notes: Results are point estimates from log-linear and inverse hyperbolic sine models estimated via OLS. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and clinic fixed effects are included in all models. Sample restricted to surgical abortion clinics only.

Appendix Table 8: Shorter follow-up, censoring, and post-policy dummies

	Baseline	Follow through April	Censor after first policy reversal	Include post-policy indicators
Elective procedures ban	-0.108**	-0.167***	−0.187**	−0.093***
	(0.043)	(0.054)	(0.078)	(0.029)
Surgical abortion ban	-0.074**	-0.074	−0.077	−0.109***
	(0.029)	(0.062)	(0.055)	(0.027)
Stay at home / Non-essential	-0.217***	-0.230***	−0.225***	−0.174**
	(0.070)	(0.033)	(0.043)	(0.064)
After policy:				
Elective procedures ban				0.103*
				(0.062)
Surgical abortion ban				0.044**
				(0.022)
Stay at home / Non-essential				0.290**
				(0.129)
N	83,045	62,464	67,426	83,045
Squared correlation	0.958	0.965	0.962	0.958
# clinics	489	488	488	489
# week-by-day	85	64	85	85
# states	51	51	51	51
Joint significance of unemployment and 2020	<0.001	<0.001	<0.001	<0.001
Significance of sum of elective and surgical bans	0.002	<0.001	<0.001	<0.001

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models. Sample restricted to data from clinics that provide surgical abortions.

Appendix Table 9: Zero-Inflated Poisson Models

	Any Visitors	Visitors | Any	Any In-State Visitors	In-State Visitors | Any	Any Out-of-State Visitors	Out-of-State Visitors | Any
2020	-0.009**	-0.047***	-0.011**	-0.039***	-0.042***	-0.074
	(0.004)	(0.014)	(0.004)	(0.013)	(0.009)	(0.046)
Elective procedures ban	-0.012	-0.060	-0.012	-0.075	-0.000	0.040
	(0.008)	(0.062)	(0.009)	(0.052)	(0.017)	(0.189)
Surgical abortion ban	0.014	-0.099**	0.016	-0.105**	0.009	0.647***
	(0.012)	(0.046)	(0.012)	(0.046)	(0.022)	(0.168)
Stay at home / Non-essential	-0.035***	-0.269***	-0.035***	-0.240***	-0.038**	-0.452***
	(0.009)	(0.084)	(0.009)	(0.080)	(0.015)	(0.098)
Holiday	-0.001	-0.077***	-0.005	-0.079***	0.011	-0.102***
	(0.006)	(0.010)	(0.006)	(0.010)	(0.012)	(0.020)
New cases per 100,000	0.000	-0.001**	0.000	-0.001***	-0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Unemployment rate	0.000	-0.016*	0.000	-0.016**	-0.007**	-0.026
	(0.001)	(0.008)	(0.001)	(0.007)	(0.002)	(0.022)
N	83,045	78,700	83,045	78,389	83,045	27,712
Squared correlation	0.357	0.957	0.354	0.958	0.505	0.902
# clinics	489	489	489	489	489	480
# week-by-day	85	85	85	85	85	85
# states	51	51	51	51	51	51
Joint significance of unemployment and 2020	0.046	<0.001	0.014	<0.001	<0.001	<0.001
Significance of sum of elective and surgical bans	0.911	0.043	0.791	0.016	0.615	<0.001

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models. Sample restricted to data from clinics that provide surgical abortions.

Appendix Table 10: Negative Binomial Estimates

	Visitors	Distance from home	Median visit duration
2020	-0.043**	0.032	-0.046*
	(0.021)	(0.032)	(0.023)
Elective procedures ban	-0.066**	-0.008	0.102*
	(0.032)	(0.059)	(0.056)
Surgical abortion ban	-0.080*	-0.157**	-0.054
	(0.042)	(0.069)	(0.090)
Stay at home / Non-essential	-0.164***	0.087*	0.064
	(0.033)	(0.053)	(0.046)
Holiday	-0.039	-0.065	0.094*
	(0.025)	(0.104)	(0.056)
New cases per 100,000	-0.001***	0.000	0.001***
	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.013***	-0.001	0.012***
	(0.005)	(0.006)	(0.004)
Overdispersion	9.792***	1.736***	2.061***
	(2.157)	(0.296)	(0.176)
N	83,045	78,700	78,700
Squared correlation	0.947	0.108	0.382
# clinics	489	489	489
# week-by-day	85	85	85
# states	51	51	51
Significance of sum of elective and surgical bans	0.002	0.042	0.673

Notes: Coefficients are average marginal effects. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models. Sample restricted to data from clinics that provide surgical abortions.

Appendix Table 11: Heterogeneity by Contraceptive Access Laws

	Contraceptives must be dispensed			Pharmacist may refuse to dispense		
	Visitors	Distance from home	Median visit duration	Visitors	Distance from home	Median visit duration
2020	-0.018**	0.085	0.050	-0.017	0.021	-0.136***
	(0.009)	(0.122)	(0.052)	(0.012)	(0.086)	(0.047)
Elective procedures ban	-0.126**	-0.066	0.154	-0.073	-0.034	0.346***
	(0.046)	(0.123)	(0.115)	(0.072)	(0.139)	(0.043)
Surgical abortion ban	-0.076**	-0.218**	0.097	-0.212**	-0.277**	-0.399***
	(0.035)	(0.076)	(0.073)	(0.094)	(0.112)	(0.061)
Stay at home / Non-essential	-0.251***	-0.007	-0.020	-0.059	0.092	-0.009
	(0.081)	(0.069)	(0.060)	(0.054)	(0.139)	(0.078)
Holiday	-0.090***	-0.338	0.021	-0.124***	-0.535***	0.149***
	(0.010)	(0.233)	(0.110)	(0.015)	(0.119)	(0.057)
New cases per 100,000	-0.000**	-0.000	0.000	-0.003***	-0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Unemployment rate	-0.013*	0.011	0.016**	-0.032***	-0.003	0.008
	(0.007)	(0.009)	(0.007)	(0.011)	(0.015)	(0.011)
N	63,155	59,446	59,446	19,890	19,254	19,254
Squared correlation	0.957	0.074	0.391	0.921	0.187	0.357
# clinics	372	372	372	117	117	117
# week-by-day	85	85	85	85	85	85
# states	38	38	38	13	13	13
Joint significance of unemployment and 2020	0.002	0.065	0.002	0.019	0.969	0.002
Significance of sum of elective and surgical bans	<0.001	<0.001	<0.001	0.016	<0.001	0.053

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models. Sample restricted to data from clinics that provide surgical abortions.

Appendix Table 12: Separating Week and Day of Week Fixed effects

	Visitors	Distance from home	Median visit duration
2020	-0.021**	0.062	0.004
	(0.008)	(0.083)	(0.045)
Elective procedures ban	-0.112**	-0.066	0.180***
	(0.042)	(0.096)	(0.075)
Surgical abortion ban	-0.071**	-0.174***	0.087
	(0.029)	(0.051)	(0.057)
Stay at home / Non-essential	-0.215***	0.075	0.002
	(0.068)	(0.088)	(0.046)
Holiday	-0.053***	-0.132	0.052
	(0.012)	(0.110)	(0.055)
New cases per 100,000	-0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.018***	0.003	0.014***
	(0.007)	(0.010)	(0.005)
N	83,045	78,700	78,700
Squared correlation	0.954	0.107	0.383
# clinics	489	489	489
# weeks	17	17	17
# days of week	5	5	5
Joint significance of unemployment and 2020	<0.001	0.637	0.012
Significance of sum of elective and surgical bans	0.002	0.002	<0.001

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models. Sample restricted to data from clinics that provide surgical abortions.

Appendix Table 13: Unweighted regression models

	All clinics			Surgical abortion clinics		
	Visitors	Distance from home	Median visit duration	Visitors	Distance from home	Median visit duration
2020	-0.025*	0.029	0.023	-0.049***	-0.028	-0.003
	(0.013)	(0.058)	(0.037)	(0.015)	(0.070)	(0.037)
Elective procedures ban	-0.032	0.106	0.141***	-0.059	0.226	0.157***
	(0.070)	(0.126)	(0.052)	(0.061)	(0.207)	(0.061)
Surgical abortion ban	-0.107**	-0.070	0.031	-0.106**	-0.206	0.021
	(0.050)	(0.123)	(0.072)	(0.047)	(0.122)	(0.082)
Stay at home / Non-essential	-0.252***	0.094	-0.014	-0.276***	0.020	0.009
	(0.069)	(0.092)	(0.040)	(0.082)	(0.084)	(0.048)
Holiday	-0.070***	-0.192	0.049	-0.077***	-0.140	0.086
	(0.009)	(0.127)	(0.048)	(0.011)	(0.177)	(0.057)
New cases per 100,000	-0.001***	0.000	0.000*	-0.001**	0.000	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.019***	-0.016	0.019***	-0.016*	-0.010	0.016***
	(0.007)	(0.010)	(0.005)	(0.008)	(0.011)	(0.005)
N	128,605	121,264	121,264	83,045	78,700	78,700
Squared correlation	0.95	0.106	0.414	0.957	0.119	0.39
# clinics	757	757	757	489	489	489
# week-by-day	85	85	85	85	85	85
# states	51	51	51	51	51	51
Joint significance of unemployment and 2020	<0.001	0.274	<0.001	<0.001	0.62	0.004
Significance of sum of elective and surgical bans	0.085	0.847	0.013	0.035	0.883	0.03

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models.

Appendix Table 14: Regression models weighted with 2019 device counts

	All clinics			Surgical abortion clinics		
	Visitors	Distance from home	Median visit duration	Visitors	Distance from home	Median visit duration
2020	-0.004	0.061	0.016	-0.027***	0.067	0.002
	(0.013)	(0.049)	(0.032)	(0.009)	(0.086)	(0.044)
Elective procedures ban	-0.090	-0.042	0.134**	-0.123***	-0.080	0.181**
	(0.055)	(0.043)	(0.061)	(0.038)	(0.087)	(0.080)
Surgical abortion ban	-0.087**	-0.209***	0.103*	-0.073**	-0.187***	0.099*
	(0.037)	(0.041)	(0.062)	(0.032)	(0.054)	(0.055)
Stay at home / Non-essential	-0.215***	0.118	-0.003	-0.221***	0.052	0.003
	(0.049)	(0.087)	(0.045)	(0.066)	(0.077)	(0.048)
Holiday	-0.082***	-0.324	0.011	-0.091***	-0.416**	0.058
	(0.006)	(0.163)	(0.066)	(0.010)	(0.157)	(0.087)
New cases per 100,000	-0.001***	-0.000	0.000	-0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.019***	0.004	0.020***	-0.016**	0.008	0.015***
	(0.006)	(0.010)	(0.005)	(0.007)	(0.009)	(0.005)
N	128,520	121,263	121,263	82,960	78,699	78,699
Squared correlation	0.949	0.097	0.411	0.957	0.107	0.387
# clinics	756	756	756	488	488	488
# week-by-day	85	85	85	85	85	85
# states	51	51	51	51	51	51
Joint significance of unemployment and 2020	0.007	0.102	<0.001	<0.001	0.228	0.013
Significance of sum of elective and surgical bans	0.005	<0.001	<0.001	<0.001	<0.001	<0.001

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on the corresponding day in 2019. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models.

Appendix Table 15: Alternative time trends

	State-specific time trends	Unit-specific time trends	Unit-by-week-by-day fixed effects
Elective procedures ban	-0.100**	-0.096**	-0.114
	(0.042)	(0.042)	(0.065)
Surgical abortion ban	-0.064**	-0.066**	-0.084*
	(0.031)	(0.029)	(0.045)
Stay at home / Non-essential	-0.233***	-0.227***	-0.244**
	(0.065)	(0.065)	(0.098)
N	83,045	83,045	81,511
Squared correlation	0.958	0.961	0.971
# clinics	489	489	489
# week-by-day	85	85	85
# states	51	51	51
Joint significance of unemployment and 2020	<0.001	0.001	0.058
Significance of sum of elective and surgical bans	0.003	0.003	0.038

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on each day. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models. Sample restricted to data from clinics that provide surgical abortions.

Appendix Table 16: Dropping Hospital-Based Clinics (surgical abortion clinics only)

	Baseline (from Table 3)			Excluding hospital-based clinics`		
	Daily Visitors	Distance from home	Median visit duration	Daily Visitors	Distance from home	Median visit duration
2020	-0.021**	0.058	0.005	-0.019	0.058	0.004
	(0.008)	(0.084)	(0.046)	(0.012)	(0.087)	(0.048)
Elective procedures ban	-0.108**	-0.060	0.178**	-0.152***	-0.064	0.186**
	(0.043)	(0.091)	(0.078)	(0.047)	(0.095)	(0.084)
Surgical abortion ban	-0.074**	-0.198***	0.088	-0.045	-0.195***	0.091
	(0.029)	(0.057)	(0.059)	(0.050)	(0.059)	(0.061)
Stay at home / Non-essential	-0.217***	0.041	-0.002	-0.198***	0.041	-0.012
	(0.070)	(0.075)	(0.049)	(0.063)	(0.076)	(0.052)
Holiday	-0.095***	-0.408**	0.049	-0.088***	-0.418**	0.047
	(0.010)	(0.156)	(0.090)	(0.010)	(0.153)	(0.093)
New cases per 100,000	-0.001***	0.000	0.000	-0.001***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unemployment rate	-0.018**	0.007	0.015***	-0.017***	0.007	0.014***
	(0.007)	(0.009)	(0.005)	(0.006)	(0.009)	(0.005)
N	83,045	78,700	78,700	80,155	75,810	75,810
Squared correlation	0.958	0.107	0.383	0.943	0.107	0.377
# clinics	489	489	489	472	472	472
# week-by-day	85	85	85	85	85	85
# states	51	51	51	51	51	51
Joint significance of unemployment and 2020	<0.001	0.317	0.013	0.012	0.33	0.02
Significance of sum of elective and surgical bans	0.002	<0.001	<0.001	0.002	<0.001	<0.001

Notes: Coefficients are average marginal effects from Poisson regressions. Standard errors clustered at the state level in parentheses. Models are weighted by the number of devices seen in the state on the corresponding day in 2019. *** p<0.01, ** p<0.05, * p<0.1. Epidemiological week by day of week fixed effects and state fixed effects are included in all models.

Appendix Table 17: Counterfactual Estimates of Abortions in the United States

State	2019	2020 (Est.)	Pandemic		Elective ban		Surgical ban		2020 actual
			Estimate	% Δ	Estimate	% Δ	Estimate	% Δ	
National	916490	950055	910150	-4.2	899580	-5.3	898960	-5.4	930200
Alabama	5910	5812	5870	1	5790	-0.4	5770	-0.7	5700
Alaska	1320	1351	1310	-3	1300	-4	1290	-4.3	1240
Arizona	13020	13342	12930	-3.1	12760	-4.3	12760	-4.3	13320
Arkansas	2920	2789	2900	4	2880	3.2	2870	2.8	3250
California	150660	160544	149620	-6.8	148090	-7.8	148090	-7.8	154060
Colorado	12410	12420	12320	-0.8	12190	-1.9	12190	-1.9	13420
Connecticut	11990	12030	11910	-1	11910	-1	11910	-1	11170
Delaware	2040	2114	2030	-4.2	2030	-4.2	2030	-4.2	1830
D.C.	9900	13128	9830	-25.1	9830	-25.1	9830	-25.1	9410
Florida	72210	72797	71710	-1.5	70600	-3	70600	-3	77400
Georgia	39980	41940	39700	-5.3	39700	-5.3	39700	-5.3	41620
Hawaii	3150	3125	3130	0.1	3120	-0.2	3120	-0.2	3130
Idaho	1520	1650	1510	-8.5	1510	-8.5	1510	-8.5	1690
Illinois	52220	58172	51860	-10.9	51860	-10.9	51860	-10.9	52780
Indiana	7720	7725	7670	-0.8	7560	-2.1	7560	-2.1	7880
Iowa	3470	3333	3450	3.4	3410	2.3	3410	2.2	3510
Kansas	6740	6695	6690	0	6690	0	6690	0	8190
Kentucky	3670	3930	3640	-7.3	3590	-8.7	3590	-8.7	4080
Louisiana	8150	7387	8090	9.6	7990	8.2	7930	7.3	7360
Maine	2100	2131	2090	-2.1	2090	-2.1	2090	-2.1	2370
Maryland	30030	30146	29820	-1.1	29410	-2.5	29410	-2.5	30750
Massachusetts	19050	19284	18920	-1.9	18560	-3.8	18560	-3.8	17060
Michigan	29160	30514	28960	-5.1	28330	-7.1	28330	-7.1	31510
Minnesota	11190	11422	11110	-2.7	10940	-4.2	10940	-4.2	11060
Mississippi	3190	3568	3170	-11.2	3130	-12.2	3120	-12.5	3560
Missouri	1520	863	1510	74.8	1510	74.8	1510	74.8	170
Montana	1610	1625	1600	-1.6	1600	-1.6	1600	-1.6	1630
Nebraska	2150	2218	2140	-3.7	2110	-4.7	2110	-4.7	2200
Nevada	9920	10037	9850	-1.8	9850	-1.8	9850	-1.8	11010
New Hampshire	2090	2032	2080	2.1	2080	2.1	2080	2.1	2050
New Jersey	48280	48365	47950	-0.9	47040	-2.7	47040	-2.7	48830
New Mexico	4470	4397	4440	1	4390	-0.1	4390	-0.1	5880
New York	117140	123503	116330	-5.8	113750	-7.9	113750	-7.9	110360
North Carolina	29320	29230	29120	-0.4	29120	-0.4	29120	-0.4	31850
North Dakota	1120	1101	1110	1.1	1110	1.1	1110	1.1	1170
Ohio	20400	20286	20260	-0.1	19980	-1.5	19920	-1.8	20990
Oklahoma	9070	12494	9010	-27.9	8920	-28.6	8870	-29	9690
Oregon	9130	8885	9070	2	8940	0.6	8940	0.6	8560
Pennsylvania	31250	31245	31030	-0.7	30660	-1.9	30660	-1.9	32270
Rhode Island	2840	2558	2820	10.2	2820	10.2	2820	10.2	2760
South Carolina	5000	4941	4970	0.5	4970	0.5	4970	0.5	5300
South Dakota	420	385	420	8.4	410	7.1	410	6.3	130
Tennessee	9970	9035	9900	9.6	9780	8.3	9760	8	10850
Texas	59290	61314	58880	-4	58310	-4.9	57950	-5.5	58030
Utah	3030	3050	3010	-1.3	2980	-2.2	2980	-2.2	3120
Vermont	1190	1139	1180	3.8	1160	2.3	1160	2.3	1230
Virginia	16470	16112	16360	1.5	16160	0.3	16160	0.3	18740
Washington	18570	18999	18440	-2.9	18200	-4.2	18200	-4.2	17980
West Virginia	1170	1058	1160	9.8	1150	9.1	1150	8.6	990
Wisconsin	7260	7757	7210	-7.1	7210	-7.1	7210	-7.1	6960
Wyoming	90	72	90	23.9	90	23.9	90	23.9	100