The Effects of Restricted Abortion Access on IUDs, Contraceptive Implants, and Vasectomies: Evidence from Texas

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April 4, 2024

Abstract

Contraception and abortion both result in fertility reductions, but identifying whether or not they are substitutes remains an open question. Using administrative outpatient records from Texas, we exploit the passage of a regulation on abortion providers to identify the effects of restricted abortion access on the timing and take-up of long-acting, reversible contraceptives (LARC) and vasectomies using an event study design. We find evidence that expectations of limited abortion access significantly increase the take-up of IUDs, with no substantial evidence of an effect for the incidence of implants or vasectomies. These findings support the hypothesis that abortion and contraception are substitutes, but the lack of evidence to indicate an effect of HB2 on the incidence of vasectomies suggests that partners may not internalize the cost of abortion in their contraceptive choices.

1 Introduction

In 2022, the United States Supreme Court transferred the power to regulate abortion access to individual states in the landmark case *Dobbs v. Jackson Women's Health Organization*.

This decision ultimately ruled that the U.S. Constitution does not guarantee the right to abortion, overturning *Roe V. Wade* (1973) and *Planned Parenthood v. Casey* (1992). Prior to the ruling, thirteen states enacted "trigger" laws to ban or limit abortion immediately after the repeal of *Roe*. Many states created laws to restrict abortion access or prohibit abortion entirely in the months that followed the *Dobbs* decision. In the one hundred days following *Dobbs*, 66 abortion clinics closed across 15 states (Kirstein et al., 2022), creating substantial barriers to abortion access across the United States.

Limited access to abortion could affect fertility and sexual behavior through multiple channels. For example, reduced access to abortions may lead to increases in births, particularly for those who would have chosen abortion if the option were available. Alternatively, restricted abortion access may lead to fewer births through either decreases in sexual activity or increases in contraceptive use. Prior research finds that restricted abortion access affects birth rates (Fletcher and Venator, 2019; Guldi, 2008; Jones and Pineda-Torres, 2021; Kane and Staiger, 1996; Myers, 2021; Myers and Ladd, 2020) and sexual behavior (Colman et al., 2013; Klick et al., 2012). However, research on how changes in abortion access affects contraceptive use is limited.

In this paper, we study how restricting access to abortion affects the demand for long-acting contraceptives. In 2013, Texas implemented House Bill 2 (HB2), a regulation on abortion providers that shuttered over half of all abortion clinics in the state. This resulted in a significant change in the distance to an abortion provider for many Texas residents. We pair this variation in the distance to the nearest abortion facility with administrative outpatient records from hospitals, hospital-owned facilities, and ambulatory surgical centers (ASCs) to compare trends in the incidence of intrauterine devices (IUDs), contraceptive implants, and vasectomies.

We find that overall hospital-based long-acting reversible birth control (LARC)[1] incidence rose in Texas between 2011 and 2015, and trends peak around the introduction and passage

[1]Long-acting reversible birth control includes hormonal and non-hormonal IUDs and subdermal contraceptive implants.

of HB2. In counties that experience a greater-than-30 mile increase in their distance to an abortion provider, LARC incidence increases at a significantly higher rate around the time of the policy change. The increases in LARC within the treated counties is primarily driven by IUD insertions, the most popular long-acting contraception method in our sample.

This paper contributes to the literature on the effects of restrictive abortion policies by identifying a link between abortion restrictions and increased contraceptive use. Other research on abortion restriction finds detrimental socioeconomic and health outcomes resulting from decreased access to abortion, in addition to the aforementioned effects on fertility and sexual behavior. Previous studies find poor pregnancy-related health outcomes, decreases in college-going behavior, and decreases in future family income (Farin et al., 2021; Jones and Pineda-Torres, 2021; S. Miller et al., 2020).

We also add to the literature on contraceptive use and family planning. Much of the previous literature uses increased access to contraceptives to examine how contraceptives decreased family size and improved educational and labor market outcomes for women by giving them more control over the timing and frequency of births (Bailey, 2006, 2010; Goldin and Katz, 2002). Further, researchers find that access to contraceptives lead to a decrease in the share of children born to economically disadvantaged households and a decrease in the number of children with a low birthweight (Ananat and Hungerman, 2012). Bailey (2013) finds long-run changes in educational attainment and labor supply for children whose parents had access to contraceptives. However, much of this literature focuses specifically on one type of contraceptive: the oral contraceptive pill. Our analysis adds to this work by studying the take-up of LARC, which provides more effective protection against pregnancy. Lindo and Packham (2017) also examine LARC take-up, but their research uses expanded access to LARC rather than contracted access to abortion as their main source of variation.

Two papers measure the effect of abortion access on contraceptive choices. G. Miller and Valente (2016) consider the rapid expansion of legal abortion access in Nepal, finding evidence that abortion and contraception are substitutes. Felkey and Lybecker (2017), however, find

no effect of state abortion restrictions in the United States on the reported contraceptive method of choice among reproductive-age women. Our research therefore contributes to the understanding of the take-up of new contraceptive technologies resulting from restricted access to abortion services.

Finally, our research adds to the literature evaluating the effects of HB2 and similar legislation in Texas. Prior research shows that changes in the distance to the nearest abortion provider reduced abortion rates and increased birth rates within the state (Lindo et al., 2019). Additionally, two studies examine the relationship between Texas legislation and contraceptive use. The first finds a correlation between Texas legislation that excluded Planned Parenthood from Medicaid reimbursement and decreases in LARC and injectable contraceptive utilization among Medicaid recipients (Stevenson et al., 2016). Additionally, Fischer et al. (2018) finds no change in emergency contraceptive purchases or condom sales due to HB2.

The remainder of this paper proceeds as follows. Section two explains the history and background including a description of LARC and the policy environment that generates our source of variation. Section three describes the data and Section four presents our methods and results. Section five concludes.

2 History and Background

2.1 Long-Acting Reversible Contraception and Vasectomy

IUDs are flexible, T-shaped devices placed in the uterus by a physician. The devices prevent fertilization by decreasing sperm motility using either hormonal or non-hormonal properties, depending on the type of IUD. The non-hormonal IUDs, such as Paragard, are wrapped in copper and can protect from pregnancy up to 12 years. Hormonal IUDs, including Mirena and Kyleena, can protect from pregnancy between 3 and 8 years, depending on the product. Similarly, subdermal implants are small, flexible rods that are inserted into the upper arm.

The implants, such as Nexplanon and Implanon, are also hormonal products and are effective for up to 5 years.

Although IUDs were introduced shortly after the oral contraceptive pill, they received significant negative press following a series of studies in 1974 that linked IUDs to pelvic inflammatory disease (Sonfield, 2007). Modern IUDs were introduced in 1988 (Paragard) and 2001 (Mirena). Although take-up increased in recent years, it remains lower than the pill at 12.9 percent compared to 21.4 percent of oral contraceptive users (Guttmacher, 2022). The first contraceptive implant, Norplant, was introduced in the US in 1991 and was met with considerable demand. However, women began experiencing unpleasant side-effects such as irregular menstrual bleeding which led to discontinued use (Fraser et al., 1998) and sales were suspended in 2002 due to manufacturing concerns. Implanon was introduced to the US market in 2006 and is used by 3.1 percent of contraceptive users.

The ease of use and effectiveness of both types of LARC may make them particularly attractive to individuals facing increased barriers to abortion access. LARC are highly effective at preventing pregnancy and less than one in 1,000 individuals using an IUD or implant become pregnant with typical use. In contrast, condoms are 87 percent effective and the oral contraceptive pill is 93 percent effective at preventing pregnancy with typical use. Further, while oral contraceptives and condoms are subject to user error, both types of LARC are inserted and removed in a physician's office and therefore require very little effort on the part of the user. However, LARC insertion and removal can be painful, and users may experience side effects including irregular menstrual bleeding, spotting, and mood changes (Lindo and Packham, 2017).

Vasectomy is an outpatient, surgical procedure that can be completed under local anesthesia. This method of contraception is done by puncturing or severing the vas deferens, which is the tube that carries sperm. It is an extremely effective form of contraception, though pregnancy can occur shortly after the procedure before sperm are cleared from the reproductive tract (Schwingl and Guess, 2000). Vasectomy is not meant to be reversed,

although reversal is possible in some cases. According to Schwingl and Guess (2000), one to three in 1,000 vasectomized people will request a reversal. As with most surgical procedures, vasectomy is not without risk of complication and side effects, although these risks are small.

In addition to unattractive side effects, the cost of LARC and vasectomies can also be a barrier to access. The most recent wholesale prices for IUDs and contraceptive implants fall between $760 and $1,101, which does not include the price of insertion and visits to the healthcare provider. According to Planned Parenthood, vasectomies can cost around $1,000. However, The Affordable Care Act (ACA) included a mandate that insurance plans provide birth control, including LARC and sterilization procedures, without any out-of-pocket costs to the patient. This mandate was implemented starting in 2012, and was fully operationalized by January 2013. Bearak et al. (2016) studied out-of-pocket costs of IUDs before and after the Affordable Care Act (ACA) in 2013. The paper shows that 58 percent of women faced out-of-pocket costs in 2012, and that number dropped to 13 percent by March of 2013. Further, the authors find that the cost estimates at the 90th percentile for IUDs also declined. Women facing the 90th percentile cost prior to the ACA were expected to pay the wholesale price of the IUD, which was $844 during the time of the study. By January of 2013, the 90th percentile cost estimate was $169. Therefore, during the time period of this study, LARC-seekers were likely facing low- or no-cost for their procedures.

2.2 Legislative Framework

In July 2013, the Texas legislature passed HB2, which significantly limited abortion access within the state. The bill was aimed at abortion providers and required that clinics meet the standards of an ambulatory surgical center, that doctors performing abortions have admitting privileges at a hospital within 30 miles of the clinic, and that individuals taking abortion-inducing medication have medical oversight. In addition, HB2 prohibited abortions 20 weeks post-fertilization.

HB2 was the final product of a highly-contentious debate regarding abortion access during

the 83rd Texas legislature. After multiple abortion bills were introduced and failed during the regular legislative session, Governor Rick Perry ordered a first special session to begin in late May 2013. During this special session, the Texas Senate introduced Senate Bill 5 (SB5), a bill containing many details of the abortion bills that failed to pass in the regular session. When SB5 failed to pass, Governor Perry instituted a second special session to begin in July. SB5 was introduced again as HB2, which passed both houses and was signed into law on July 18, 2013. Because it is essentially identical to SB5, we consider June 2013 to be the original introduction date of HB2, and this is the date of treatment for our analysis.

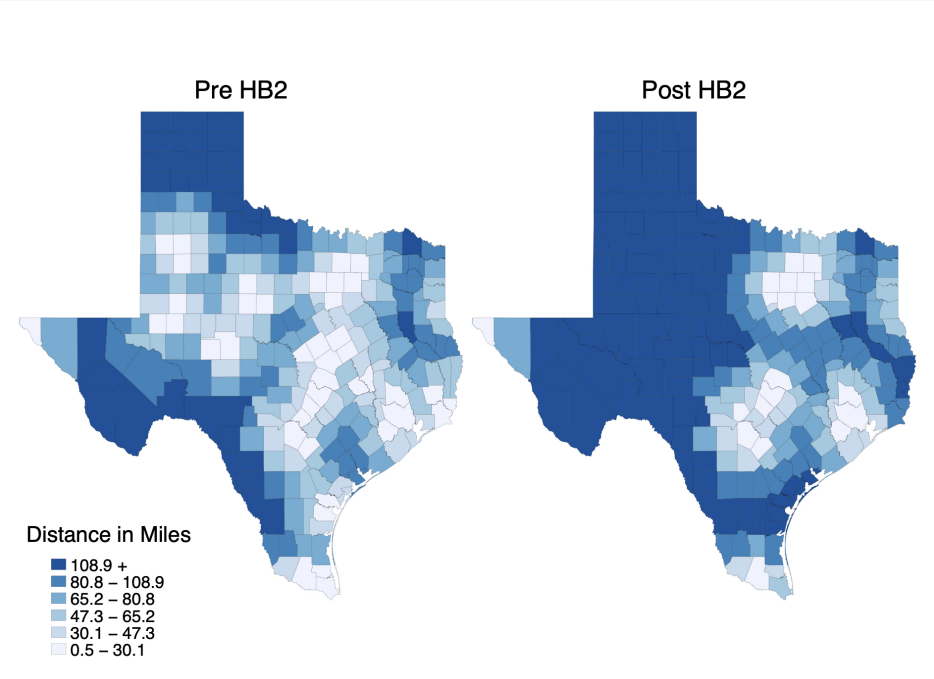
HB2 involved multiple targeted regulations on abortion providers, or TRAP laws. TRAP laws often burden clinics to the point of closure, and after HB2 went into effect, the number of abortion clinics in Texas dropped significantly. In 2011, Texas had 42 operating abortion facilities. By the end of 2014, only 17 remained. The clinic closures increased the burden of abortion access by inducing large increases in the distance that residents of Texas must travel to meet an abortion provider, as shown in Figure 1. Before HB2, a majority of Texas residents lived within 100 miles of an abortion provider, and many lived closer. After the implementation of HB2, clinic access was concentrated in the metropolitan areas, and residents of the western portion of the state were required to travel over 100 miles to access abortion care.

3 Data and Descriptive Statistics

To measure changes in the incidence of LARC and vasectomies in Texas, we use data from the 2011-2015 Texas Health Care Information Collective Outpatient Public Use Data Files (Texas Department of State Health Services, 2023). The files contain outpatient discharge data from nearly all[2] licensed hospitals, hospital-owned outpatient facilities, and ambulatory surgical centers in the state, representing 782-956 facilities in each quarter-year. We identify

[2]Exceptions include: facilities in a county with less than 35,000 residents, facilities in a non-urban county with less than 100 hospital beds, facilities that do not seek insurance payments or government reimbursement.

Figure 1: Travel Distance to an Abortion Provider in Texas



Source: Myers (2021b)

cases of IUD insertion, IUD removal with reinsertion, contraceptive implant insertion, and vasectomy procedures using relevant CPT procedure codes. Ultimately, we identify 8,379 IUD insertions/reinsertions, 3,325 contraceptive implant insertions, and 6,314 vasectomies.

Descriptive statistics in Table 1 indicate that IUD implantations make up the majority (about 72 percent) of LARC cases, which aligns with the national share of IUD users. Between 2011 and 2013, 10 percent of women who used contraception reported using an IUD and only 1 percent reported using a contraceptive implant (Kaiser Family Foundation, 2019). Further, Table 1 shows stark differences in some demographic features of LARC and vasectomy recipients in our sample. LARC recipients are generally younger, with a mean age in the range of 25 to 29, while vasectomy recipients average between 35 and 39 years old. The primary payer for LARC is overwhelmingly Medicaid, which pays for less than 1 percent of all vasectomy procedures. Instead, commercial insurance pays for the bulk of vasectomies in the data. These differences suggest that Texas residents seeking LARC and vasectomies are

quite different beyond the expected differences in gender composition. Therefore, we may expect heterogeneous responses to public policy decisions related to abortion access between these groups.

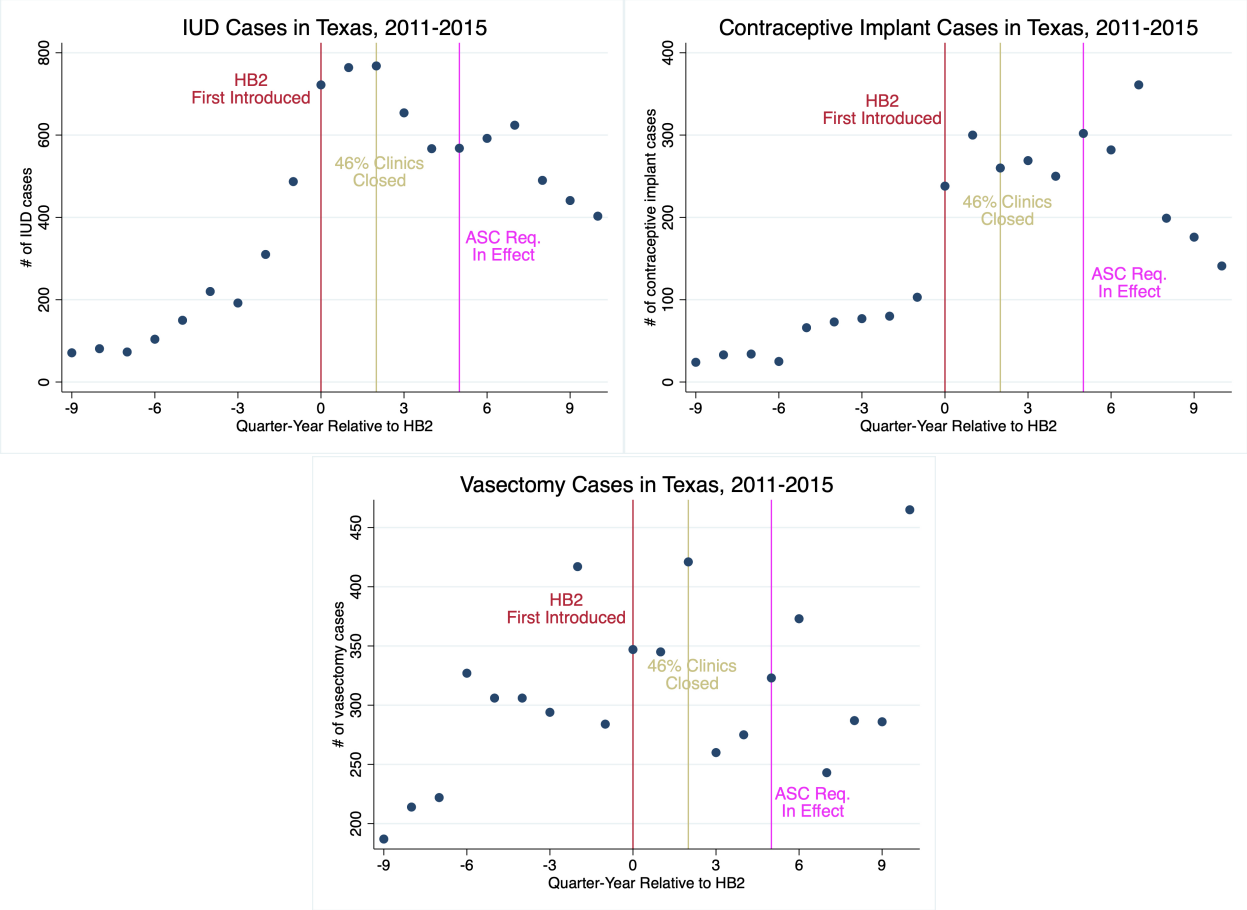
Table 1: Summary Statistics for LARC and Vasectomy Cases, 2011-2015

	LARC		Vasectomy	
Variable	Mean	N	Mean	N
Age (year category)	25-29	11696	35-39	6314
Race (%)		11696		6309
White	50.44		57.30	
Black	15.02		4.99	
AAPI	2.59		0.87	
American Indian	0.17		0.17	
Other	31.78		36.63	
Ethnicity (%)		11690		6290
Hispanic	39.85		17.74	
Non-Hispanic	60.15		82.26	
Length of Service (days)	1.31	11015	1.37	6243
First Payment Source (%)		11690		6290
Medicaid	33.24		0.52	
Charity, Indigent, Unknown	22.70		5.78	
Health Maintenance Org	11.95		8.82	
Commercial Insurance	9.49		37.86	
Blue Cross/Blue Shield	8.57		17.54	
PPO	7.09		23.13	
Other	6.96		6.35	
Gender (%)		11659		6304
Female	99.98		0.11	
Male	0.02		99.89	
LARC Type		11696		
IUD	71.64			
Implant	28.43			
IUD + Implant	0.07			

Figure 2 demonstrates how the incidence of LARC and vasectomies evolved over the study period. The raw trends in IUD and contraceptive implant cases experience a sharp increase in incidence that coincides with the original introduction of HB2 in June 2013. In the time leading up to the introduction of HB2, the number of IUD insertions increased from around 200 to nearly 800 per quarter and contraceptive implant insertions increased

from around 100 to 300 per quarter. A more modest increase in IUDs and implants occurred following enforcement of the ambulatory surgical center requirement in September 2014.

Figure 2: Trends in LARC and Vasectomies



After the policy changes, the incidence of IUDs and implants declines back toward pre-treatment levels. This is consistent with the hypothesis that people respond to new information about the availability of abortion when making contraceptive choices. Given the durability of LARC, we would not necessarily expect the changes in the incidence of LARC to persist continuously over time.

Trends in the incidence of vasectomy are relatively noisy, which appear to be driven by strong seasonal effects; the number of vasectomies is much higher in the final quarter of each year. Seasonality in vasectomy procedures is well known and is likely because vasectomy procedures require recovery time away from work. For example, Ostrowski et al. (2018) finds

peaks in vasectomy procedures at the end of the year when patients have met their insurance deductibles and may have time away from work. Even outside of the seasonal effects, it does not appear that these trends are strongly correlated with the timing of abortion legislation.

To determine a measure of treatment from HB2, we use a panel describing the distance to the nearest abortion provider from Myers (2021). Myers (2021) calculates the travel distance (in miles) from the county population centroid to the nearest abortion providing facility in each month from 2009 to 2021. We average these distances across quarter-years and then match the aggregated distance measures to our outcome data for Texas counties from quarter one of 2011 to quarter four of 2015.

Figure 3: Trends in LARC and Vasectomies by Treatment Status

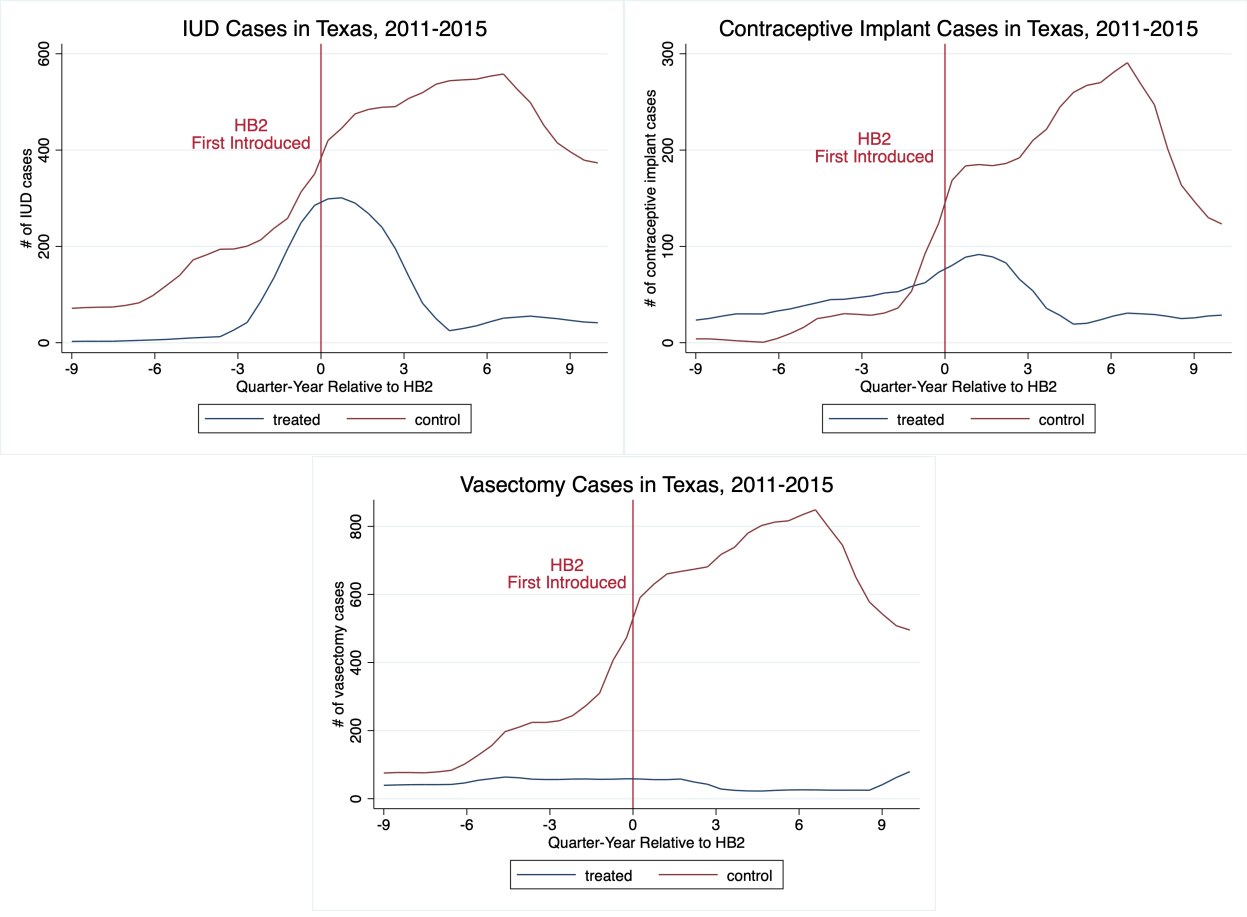


Figure 3 plots raw trends in IUDs, implants, and vasectomies over time by treatment status. We define a county as treated when the distance to an abortion provider increases by

more than thirty (> 30) miles following HB2. Counties that do not experience a > 30 mile increase in the distance to an abortion provider are included in the control. This definition of treatment results in 117 treated counties and 137 control counties. The spatial relationship between treated and untreated counties is shown in more detail in Appendix A.3.

Figure 3 indicates that the incidence of LARC and vasectomies rose substantially during the study period in control counties. This may be indicative of general trends in contraceptive behavior within Texas and could also be associated with the policy change. If people respond to *expectations* of limited abortion access, they may substitute toward long-acting forms of contraception even if they do not experience the loss of an abortion provider as a result of the TRAP law. Though this behavior may potentially bias our estimates, it attenuates our treatment effects toward zero, resulting in more conservative estimates of the effect of HB2 on contraceptive behavior in treated counties.

Treated counties experience a sharper increase in the number of IUD insertions leading up to the time of the policy change. The trend peaks in the first few months following the introduction and passage of HB2 and then declines back to pre-treatment levels roughly one year after. Contraceptive implant insertions also increase in treated counties around the time of the policy change, but at a lower rate than in the control group. This may suggest that individuals responding to the policy change are more likely to seek an IUD rather than a contraceptive implant. Interestingly, the incidence of vasectomy is stable and near zero in treated counties across the study period, even though the rate of vasectomies steadily increases in control counties. Because vasectomies do not appear to be a common method of contraception in treated counties, the policy change may not be effective at influencing behavior on this margin.

Table 2 offers descriptive statistics of the responding population, which are individuals in counties that experience a > 30 mile increase in the distance to the nearest abortion provider. Overall, this group is similar in age to the full sample of recipients, but includes a larger share of white individuals and a smaller share of Black and Hispanic individuals

Table 2: Features of the Treatment Group During Response Periods (2012Q4-2014Q1)

Variable	Mean	N
Age (year category)	25-29	1508
Race (%)		1508
White	63.53	
Black	13.40	
AAPI	1.06	
American Indian	0.13	
Other	21.88	
Ethnicity (%)		1507
Hispanic	10.55	
Non-Hispanic	89.45	
Length of Service (days)	1.08	1193
First Payment Source (%)		1508
Medicaid	6.10	
Charity, Indigent, Unknown	0.93	
Health Maintenance Org	31.50	
Commercial Insurance	21.62	
Blue Cross/Blue Shield	25.99	
PPO	0.53	
Other	13.33	
Gender (%)		1507
Female	100	
Male	0	
LARC Type		1508
IUD	75.20	
Implant	24.53	
IUD + Implant	0.27	

than the full sample. Further, the responding sample of individuals are more likely to use private insurance providers, such as a health maintenance organization (HMO) or a commercial insurance provider, than the full population. This group is also less likely to use Medicaid or charitable services. This difference in primary payment source suggests that the responding population is likely wealthier than the general population. Finally, as expected, the responding population is more likely to choose an IUD over a contraceptive implant relative to the full sample. We do not find differences in county-level statistics to be substantially different between treated and untreated counties. Summary statistics for

treated and untreated counties are presented in Appendix A.4.

4 Methods and Results

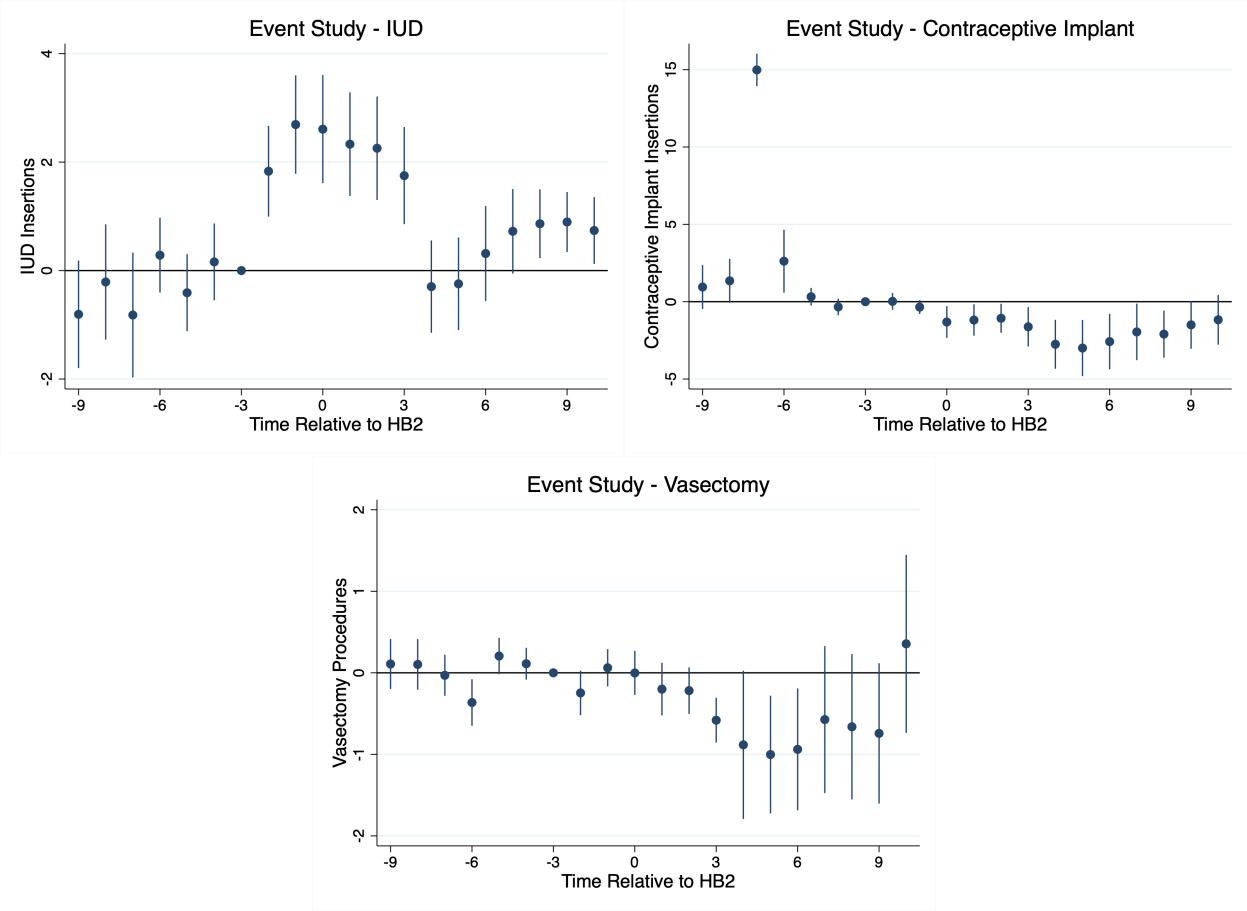
We rely on an event-study design to estimate the effects of restrictive abortion policies on LARC and vasectomy take-up. Contentious policy proposals, such as those governing access to abortion, often receive media attention before formal bills are debated in legislative houses. Forward-looking agents may use their perception of expected future abortion access in their contraceptive decisions. The dynamic specification in Equation (1) permits the observation of these anticipation effects. Because the data contain discrete counts of LARC and vasectomy incidence occasionally equal to zero, we employ a Poisson model that takes the form:

$$[E[Y_{ct}|\alpha_c, \delta_t, \beta x_{ct}, \Sigma_{k=-9}^{9}\lambda_k 1(t=k)] = exp(\alpha_c + \delta_t + \beta x_{ct} + \Sigma_{k=-9}^{9}\lambda_k 1(t=k))] \qquad (1)$$

where Y_{ct} is the number of IUDs, contraceptive implants, or vasectomies in county c at quarter-year t, α_c and δ_t are county and quarter-year fixed effects respectively. Here, k indexes the coefficients λ according to the time relative to the original introduction of HB2 as Senate Bill 5 in the second quarter of 2013. We include controls x_{ct} for the total number of outpatient discharge records for county c in quarter-year t to account for changing overall healthcare utilization across counties over time.

Figure 4 presents the Poisson event-study plots of λ_k for each contraceptive method along with the 90 percent confidence intervals. For IUD insertions, the event plot reveals that trends are parallel between treatment and control counties leading up to three quarters prior to the introduction of HB2. In the two quarters leading up to HB2, IUD insertions increased significantly in treated counties. Notably, this time of anticipation effects occurs immediately following the 2012 state elections in Texas and during the 83rd legislative session, where multiple restrictive abortion bills are introduced that ultimately fail. At this time, news

Figure 4: Poisson Event Studies



articles circulated around Texas detailing the strong anti-abortion stance of the legislature and the governor, which may contribute to the increases in IUDs prior to the introduction of HB2. Treated counties have a higher rate of IUD insertion until one year following the policy change, at which point trends return to close to pre-treatment levels. Ultimately, IUD insertions increase by an average of 0.616[3] cases per county-quarter immediately surrounding the introduction of the policy change. This value is small in magnitude but meaningful. The mean number of IUD insertions in the entire outpatient data is 1.59 per county-quarter. Among counties with any IUD insertion, the mean is 9.62 insertions per quarter. These results are robust to including county-level control variables, including poverty rate, annual household income, and demographics, which we include in Appendix A.4.

[3]This value comes from transformation of the Poisson model coefficients where $log(Y_k|policy) - log(Y_k|nopolicy) = \lambda_k$.

Results in Figure 4 for contraceptive implants and vasectomies do not indicate the same changes in contraception behavior. For contraceptive implants, the parallel trend assumption may be in question due to the large outlier in the Poisson coefficient λ in late 2011, and the coefficients are roughly zero otherwise throughout the study period. In the event plot for vasectomies, trends are parallel leading up to the time of the policy, but there is not strong evidence of an effect for treated counties after the introduction of HB2. The results do indicate a small negative effect in 2014, and this may be explained by the stable trend in vasectomies in treated counties compared to the general increase among the control group in Figure 3.

One limitation of our data is that we can only see LARC insertions and vasectomies in hospital-based outpatient and ASC settings. Therefore, we are concerned that the observed trends are mechanically driven by changes in reproductive healthcare in Texas during this time period. In 2012, Texas made changes to its Women's Health Program (WHP) to exclude sexual health clinics that are affiliated with or make referrals to abortion providers from receiving Medicaid reimbursement. At the same time, Texas dramatically cut its funding for family planning clinics, resulting in the closure of 25 percent of family planning clinics in the state in 2012 (**<empty citation>**). Lastly, many abortion clinics that also provide family planning services may have been closed due to the implementation of HB2 in mid-2013. All three policies could cause people to switch from care in independent clinics toward hospital-owned facilities, resulting in a false conclusion that take-up of these contraceptive methods increased in the state overall. We make efforts to explore the possibility that these mechanisms confound our estimates. First, we repeat the estimation for IUD insertions while only considering non-Medicaid cases. We then consider the effect on visits to a gynecologist visits. Additional tests are included in the Appendix.

4.1 Response Counties

Critics of abortion restrictions note that the burden of these policies fall unequally on vulnerable populations, potentially furthering societal inequities (see Fuentes (2023)). We therefore provide some descriptive statistics about the responding population to understand how responders differ from LARC users as a whole. Table 3 shows summary statistics for LARC users throughout Texas (Columns (A)) and LARC users in the treatment group (Columns (B)). The treated group are more likely to be non-Hispanic, white and are also more likely to pay with commercial health insurance than LARC users more generally. This suggests that individuals who respond to changes to restrictive abortion policies by using LARC may be substantially different than LARC users more broadly.

Next, we include a geospatial analysis to understand where responders were located. The heat map below describes the 2011-2013 change in the rate of LARC insertion (per 10,000 resident females) in counties that are treated by HB2. The largest changes in the rate of LARC insertion following HB2 occur in counties surrounding the metro areas of Waco and Houston, as well as in some of the more densely populated areas of West Texas, Amarillo and Lubbock. Thus, the populations responding to the expected change in abortion access are concentrated in suburban counties, rather than in rural areas of the state. In particular, counties that respond the most are often around the locations of specific clinic closures following HB2. The dark red cluster in the center of the state represent counties in the immediate vicinity of the closure of Planned Parenthood clinics in Waco and Abilene and a women's health clinic in Killeen. There are also pockets of heavy-responding counties near clinic closures in Beaumont, McAllen, and Corpus Christi.

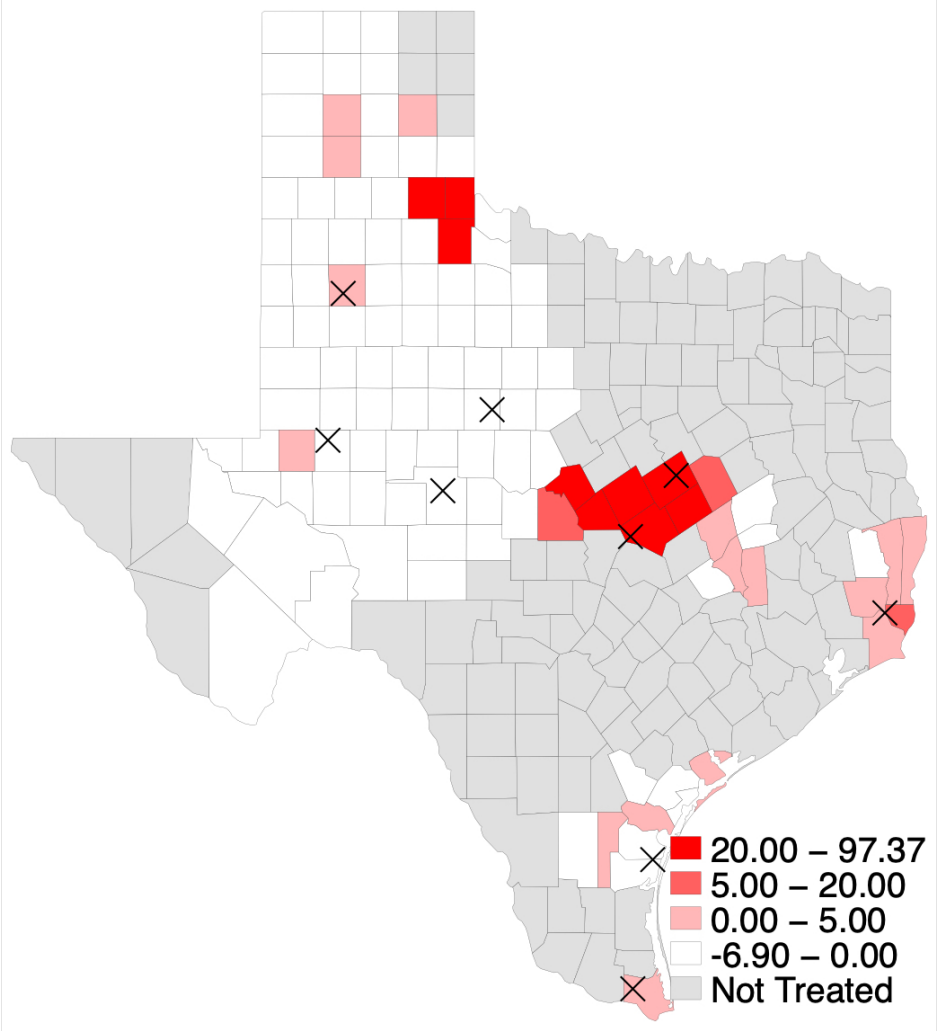
The differences in responding and non-responding populations reflect known disparities in women's health, which is an area of concern for the American College of Obstetrics and Gynecology (American College of Obstetricians and Gynecologists, 2024). Sutton et al. (2021) discuss persistent inequities and disparities among racial and ethnic minorities, potentially driven by implicit bias by healthcare workers, patient mistrust of the healthcare

Table 3: Summary Statistics for Overall LARC Cases and Treatment Group

Variable	LARC (A)		Treatment Group (B)	
	Mean	N	Mean	N
Age (year category)	25-39	11696	25-29	1508
Race (%)		11696		1508
White	50.44		63.53	
Black	15.02		13.40	
AAPI	2.59		1.06	
American Indian	0.17		0.13	
Other	31.78		21.88	
Ethnicity (%)		11690		1507
Hispanic	39.85		10.55	
Non-Hispanic	60.15		89.45	
Length of Service (days)	1.31	11015	1.08	1193
First Payment Source (%)		11690		1508
Medicaid	33.24		6.10	
Charity, Indigent, Unknown	22.70		0.93	
Health Maintenance Org	11.95		31.50	
Commercial Insurance	9.49		21.62	
Blue Cross/Blue Shield	8.57		25.99	
PPO	7.09		0.53	
Other	6.96		13.33	
Gender (%)		11659		1507
Female	99.98		100	
Male	0.02		0	
LARC Type		11696		1508
IUD	71.64		75.20	
Implant	28.43		24.53	
IUD + Implant	0.07		0.27	

system, differential access to health insurance, high upfront costs of contraceptive care, and other barriers to access. Disentangling the mechanisms driving the differences in LARC take-up post-HB2 is an area for future research, and descriptive analysis suggests that there is variation in LARC take-up that may deepen disparities in women's health.

Figure 5: Travel Distance to an Abortion Provider in Texas



Source: Texas Tribune, 2016

4.2 Medicaid Recipients

The decision to exclude family planning clinics from receiving reimbursement from the WHP and the budget cuts that led to dramatic family planning clinic shut downs could drive Medicaid recipients from independent family planning clinics, such as Planned Parenthood affiliates, toward hospital-based outpatient facilities. If this facility shift occurs primarily in our group of counties treated by HB2, it would result in increases in LARC in our data that we falsely attribute to restricted abortion access. Fischer et al. (2018) show that there is little correlation between increased distance to an abortion provider following HB2 and

restricted access to publicly funded family planning clinics after the change to the WHP. So, we do not expect that the effects we observe in Figure 4 are heavily driven by funding restrictions. To be sure, we repeat the event study analysis for IUD insertions in Equation (1) excluding Medicaid recipients from our sample.

Figure 6: Trends and Event Study, Non-Medicaid IUD Insertions

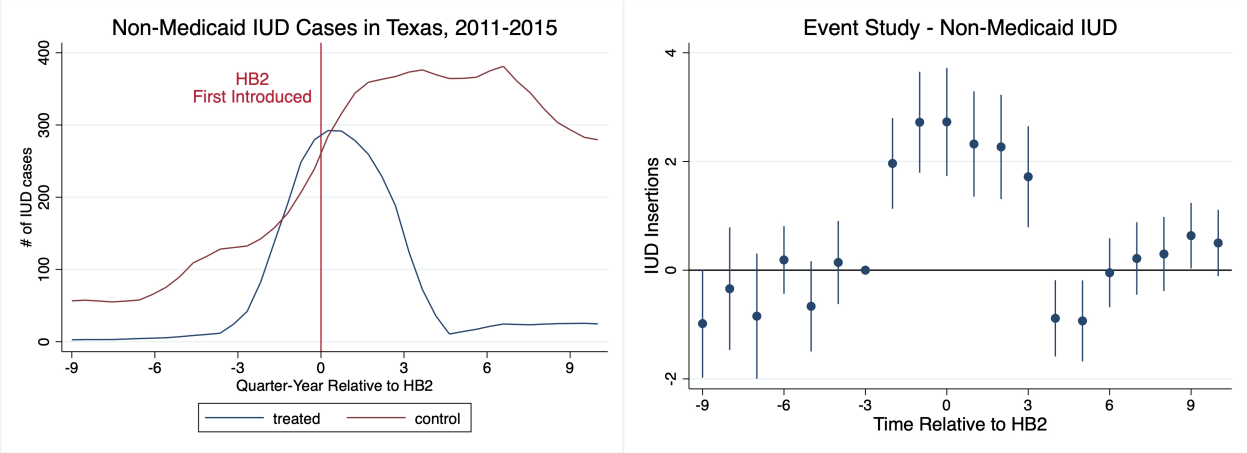


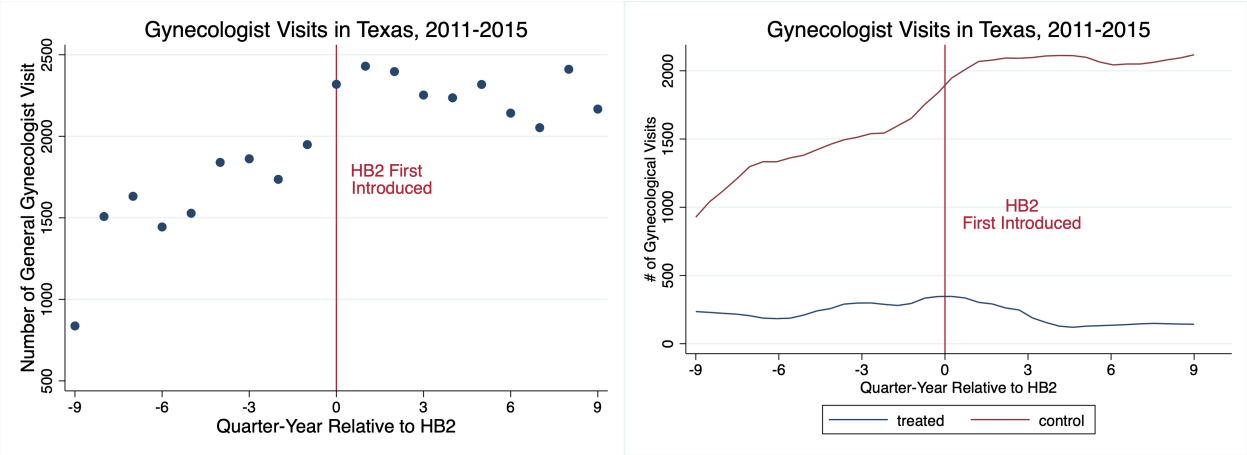
Figure 6 shows that excluding Medicaid recipients does not fundamentally shift the trends between treatment and control counties or the event plot, therefore providing evidence that Medicaid recipients are not driving changes in IUD insertion around the timing of HB2. This supports a conclusion that the changes to the Texas Women's Health Program are unlikely to cause the increases in IUD insertions we observe for counties that experience increased distance to an abortion provider following the TRAP law.

4.3 Other Services

Policies like HB2 that target abortion clinics may lead to consequences for other family planning services. When abortion clinics close, access to all other services provided by the clinic also decreases. In the Myers (2021) data describing the distance to an abortion provider, "closures" indicate facilities that shut down or simply stopped providing abortion care. Facilities that continue to operate without providing abortions would not influence the access to contraceptive care for residents of that county. On the other hand, complete facility

closures may result in a mechanical increase in LARC incidence when the population served by that facility seeks contraceptive care elsewhere. While this response is a consequence of the TRAP law, it is not necessarily related to abortion access. Therefore, this behavior may be confounding our central research question.

Figure 7: Trends in General Gynecologist Visits in Texas



We explore the possibility that people in areas experiencing facility closures shift their care to a hospital-owned facility or ASC in our data by observing trends in other reproductive health services unrelated to contraception. In Figure 7, we plot the average trend and the trends by treatment status for general gynecologist visits over the study period. If people are making a fundamental shift in their facility for care, we would expect to see corresponding increases in visits to the gynecologist after clinic closures due to HB2, concentrated in treated counties. Trends demonstrate that the overall incidence of general gynecologist visits did increase over the study period, but this increase occurs almost exclusively in the control group. Among treated counties, the incidence of gynecologist visits is stable. So, it does not appear that there is evidence to suggest that residents of counties affected by HB2 systematically shift to receive healthcare in hospital-owned and ASC facilities.

5 Conclusion

In this paper, we measure the effect of restricted abortion access in Texas on the incidence of hospital-based long-acting reversible contraception and vasectomies. For identification, we exploit the within-state geographic variation in the distance to a nearest abortion provider following the 2013 passage of House Bill 2, a TRAP law that shut down over half of all abortion clinics in Texas. We find that counties with an increase in their travel distance to an abortion provider greater than 30 miles experience an average increase of 0.616 IUD insertions per quarter around the time of the policy change. Overall, this amounts to roughly 432 additional IUD insertions during our sample period, representing 5.15 percent of total hospital-based IUD cases between 2011 and 2015. We do not find evidence that counties affected by HB2 experience increases in the take-up of contraceptive implants or vasectomies.

Our data on outpatient procedures includes only discharge records for LARC and vasectomies that occurred in a hospital-owned facility or ambulatory surgical center. As such, our results may be biased by changes in the location of care resulting from these policies. However, we do not believe this is the case and we make efforts to argue that the public policy environment in Texas did not significantly shift the location of care in the state from independent clinics toward hospital-owned facilities. Our results are robust to the exclusion of Medicaid recipients from the sample — a population that experienced reduced access to contraceptive care in publicly funded clinics after changes to the reimbursement structure for the state Women's Health Program in 2012. In addition, we do not find evidence that counties affected by the abortion clinic closures following HB2 increased the number of hospital-based general gynecologist visits, supporting a conclusion that these counties did not make large changes in their location of reproductive healthcare during the study period.

Ultimately, we find that increasing the cost of abortion through travel distance increases the demand for IUD insertions. To our knowledge, our study is the first in the United States to provide empirical evidence supporting the hypothesis that abortion and IUDs are substitutes. We also explore the potential for this substitutability to extend to vasectomies, a

long-acting contraception method used by people without the capacity to become pregnant themselves. We find that the incidence of vasectomies does not significantly increase in counties treated by the policy change, suggesting that the additional cost of abortion may not pass through to partners. However, a recent article shows that vasectomies increased by 29 percent in the three months after the *Dobbs* ruling (The Economist, 2023). The article claims that these effects are more concentrated in states with trigger laws, and Texas saw an increase in over 40 percent. Therefore, although we do not see a increases in vasectomy procedures after the HB2 policy change, this may not hold for the *Dobbs* decision.

Our study has a few key limitations. When presented with new information, people may respond to changes in their expectation of abortion access in the future, regardless of realized restrictions in access. In this way, people across the entire state of Texas may be influenced by the media surrounding abortion access during the eighty-third legislative session, and therefore defining a treatment group to only include counties affected by abortion clinic closures may be too narrow. So, we consider our treatment effects to be conservative estimates of changing contraceptive behavior. Additionally, we only measure the effects of abortion access on a subset of contraceptive options. While 65.3 percent of US reproductive-age women report using contraception, only 10.4 percent report using long-acting reversible contraception (Daniels and Abma, 2020). LARC is the third most common contraceptive method among women, behind sterilization (18.1 percent) and the pill (14 percent). More research is necessary to determine the influence of abortion access on the take-up of contraception, broadly. Finally, our study relies on variation in abortion access in a single US state. Although Texas is populous, it contains only 8.9 percent of the total US population, and results may not be generalizable to the entire country.

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A Appendix

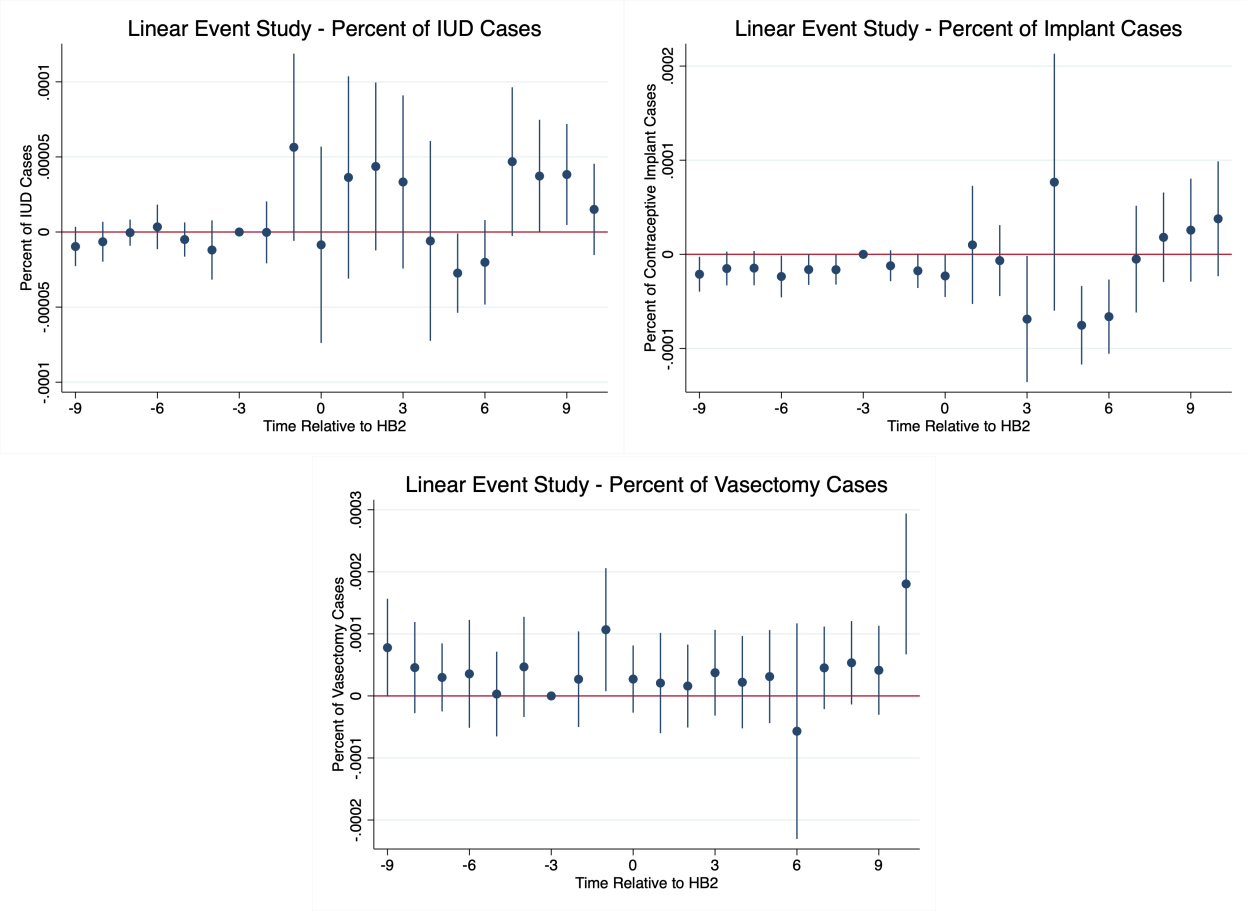
A.1 Linear Specification

We repeat our main event-study specification using a linear model, rather than a Poisson. The model takes the following form:

$$Y_{ct} = \alpha_c + \delta_t + \beta x_{ct} + \Sigma_{k=-9}^{10} \lambda_k 1(t = k) \tag{2}$$

Y_{ct} is the number of IUDs, contraceptive implants, or vasectomies in county c at quarter-year t, α_c and δ_t are county and quarter-year fixed effects respectively, and x_{ct} is the total number of outpatient discharge records for county c in quarter-year t. Again, k indexes the coefficients λ according to the time relative to the original introduction of HB2 as Senate Bill 5 in 2013 quarter 2. Figure A1 displays the results of the linear specification.

Figure A1: Linear Event Studies



A.2 Sensitivity to Treatment Definition

We test for the sensitivity of our analysis to different thresholds by looking at increases of more than 50 miles. For this analysis, we exclude counties that experience an increases between 30-49 miles. This allows us to limit the bias that would be introduced if we considered these counties as part of the control group. The results of this analysis are in Figure A2 and are consistent with the > 30 mile threshold for all three outcomes, suggesting that the results are not sensitive to an increase of > 50 miles to an abortion provider.

Figure A2: Poisson Event Study: > 50 Mile Treatment

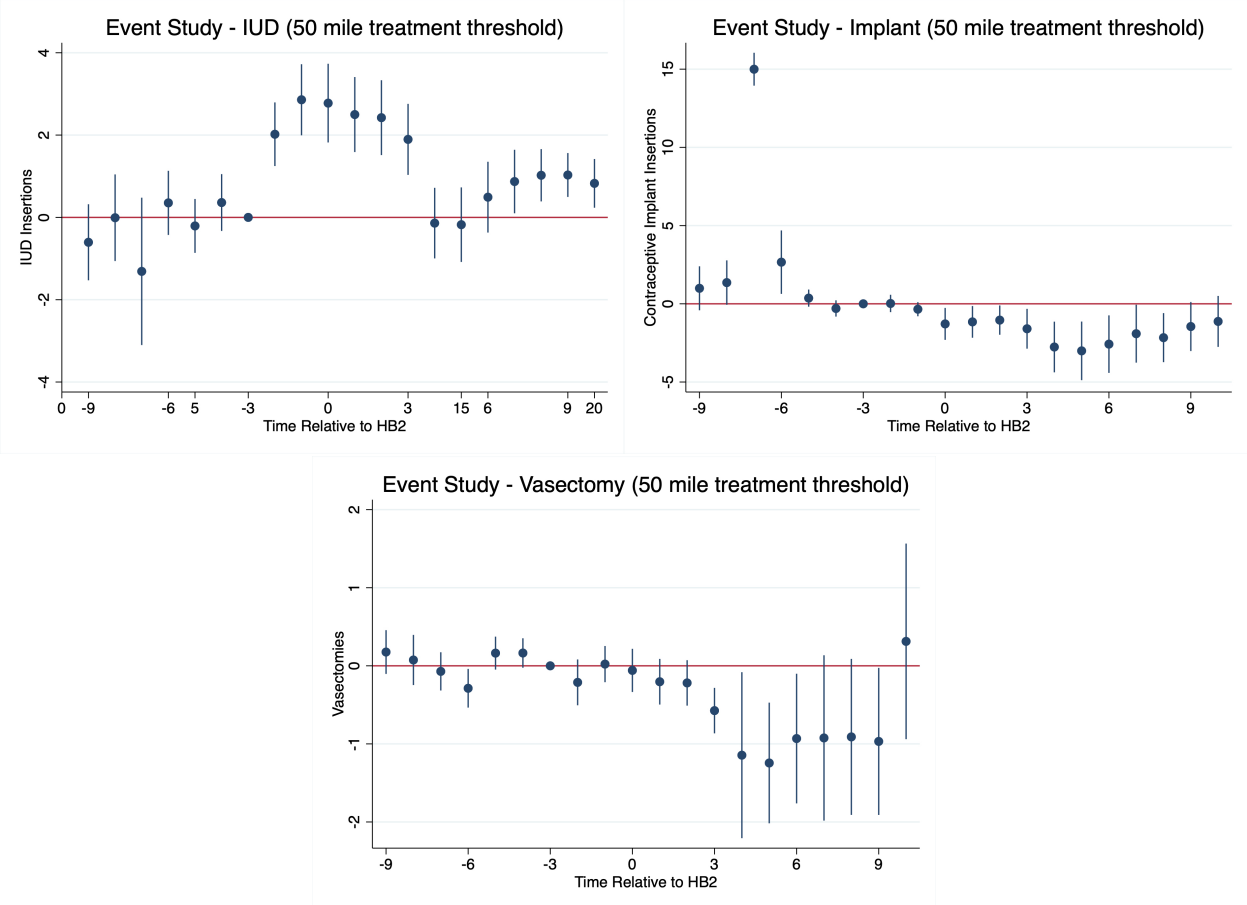
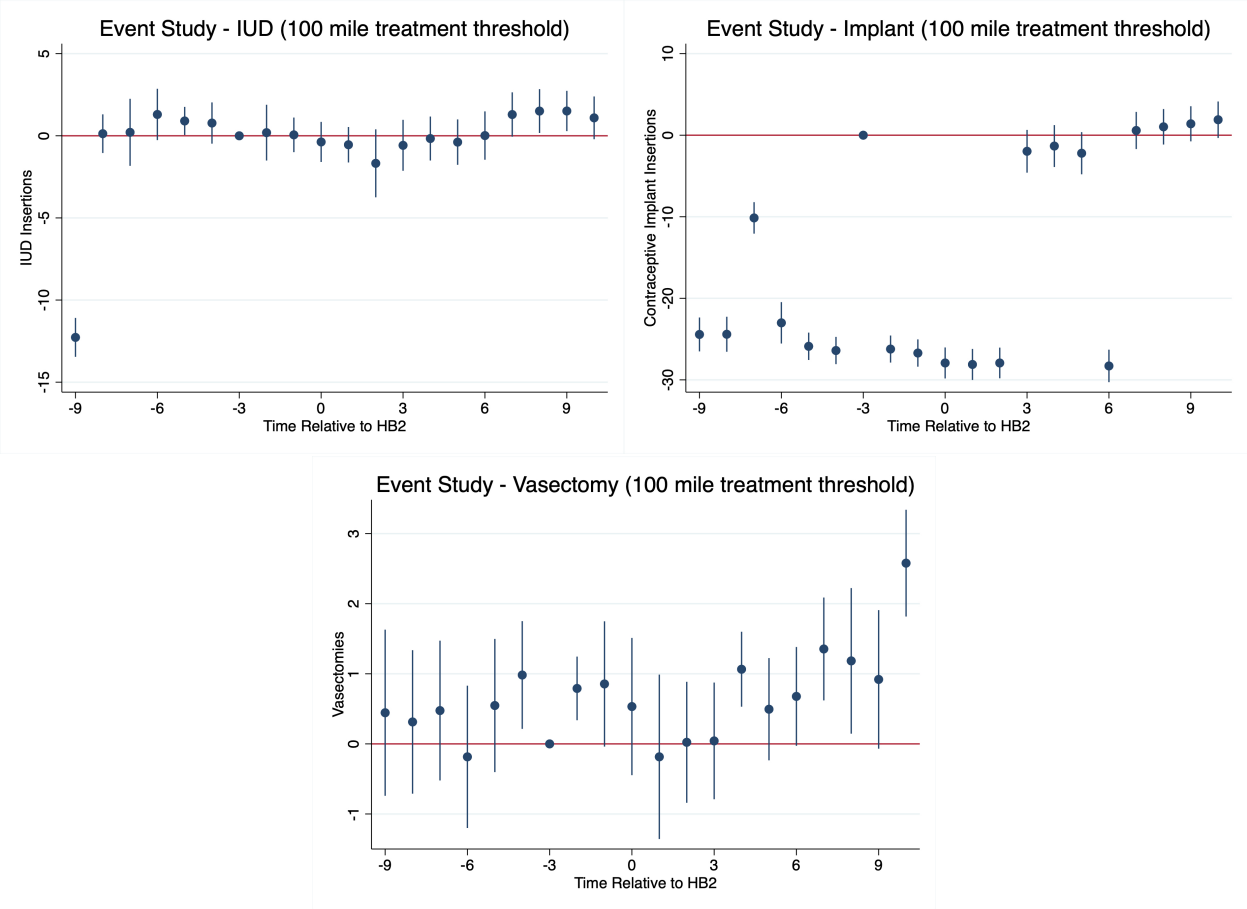


Figure A3 shows the results of an event study using an increase of > 100 miles as the threshold distance. As with the > 50 mile threshold estimation used to create Figure A2, we exclude individuals who experience an increase of 30-99 miles to the nearest abortion provider.

Figure A3: Poisson Event Study: $>$ 100 Mile Treatment



The event plots are quite different under the 100 mile threshold, and are much noisier. Of note, 86 percent of our response group come from just three suburban counties around Waco. When we limit our analysis to just those counties who experience $>$ 100 mile increase, we drop these suburban counties from the analysis. On the other hand, LARC activity is rare in counties that experience the $>$ 100 mile increase in distance. For example, the average number of LARC insertions is 1.08 per county-quarter, but when we limit to only counties experiencing a $>$ 100 mile increase in distance from an abortion provider, the average number of LARC insertions is 0.13 per county-quarter. This could explain why the event studies for the $>$ 100 mile treatment group are quite noisy.

A.3 County Controls

In this section, we include information on county controls used as a robustness check. Table A1 presents county-population-level summary statistics for treated and untreated counties. As explained in Section 4, counties are treated if the distance to an abortion provider increased more than 30 miles following HB2.

Treated counties have smaller average populations than untreated counties, along with a slightly higher proportion of residents who identify as white or Hispanic, and a slightly lower proportion of residents who identify as Black. The proportion of the total population that is within the age range of 20-49 is similar between both types of counties. Finally, treated counties have a lower unemployment rate and median household income, but higher income per capita.

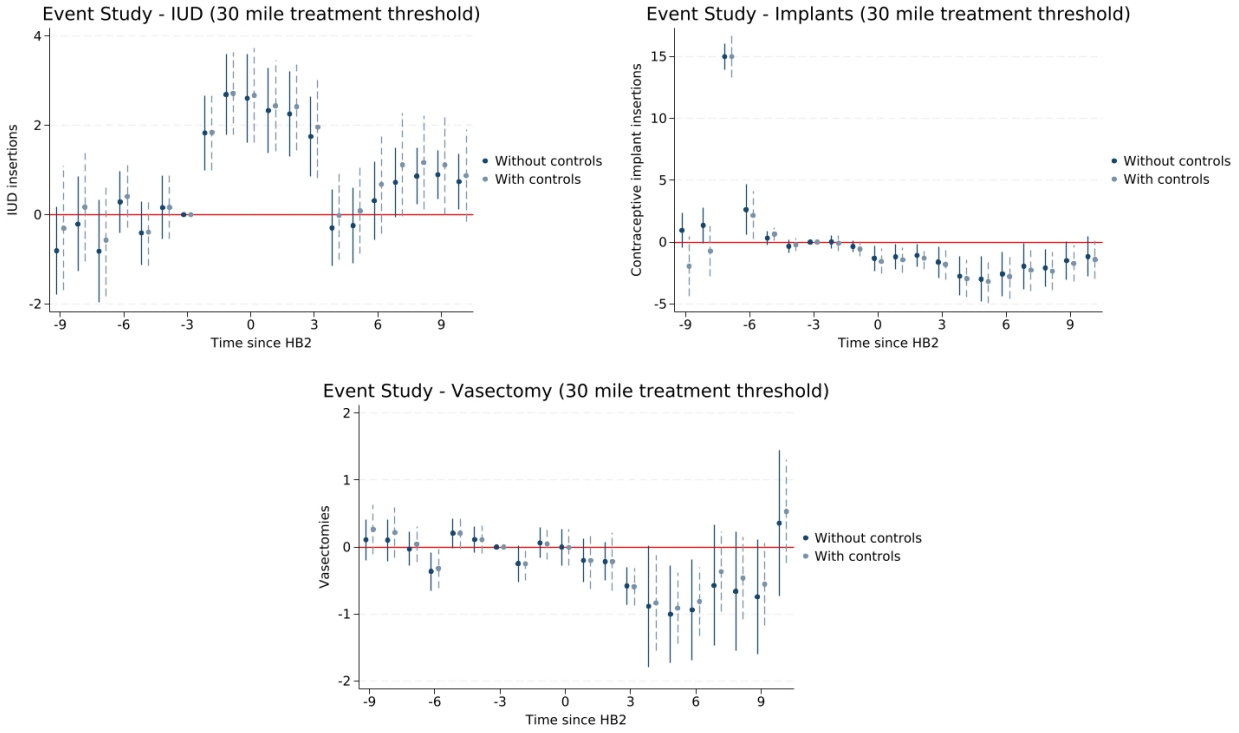
Table A1: Summary Statistics for Treated and Untreated Counties

Variable	Treated		Untreated	
	Mean	N	Mean	N
Total Population	36,479.74	2,338	163,756.35	2,740
Race %				
White	92.11		89.81	
Black	6.27		8.25	
Hispanic	36.14		31.68	
Gender (% of Total Population)				
Female 20-29	5.67		5.79	
Female 30-39	5.49		5.65	
Female 40-49	5.71		6.09	
Male 20-29	7.29		6.53	
Male 30-39	6.46		5.94	
Male 40-49	6.22		6.21	
Employment and Income				
Unemployment Rate	5.43		6.19	
Poverty Rate	17.79		17.74	
Per capita Personal Income	41,741.37		39,697.25	
Median Household Income	44,628.00		47,148.09	

The primary specification is robust to including county controls. In the figure below, we include the estimation from Figure 4 but superimpose the same estimation including county

controls from Table A2. The original estimates are in blue; the specification including county controls are in red. The estimates maintain the same trend and statistical significance, but do become less precise. While not shown, this holds true when the treatment is defined at 50 miles and at 100 miles.

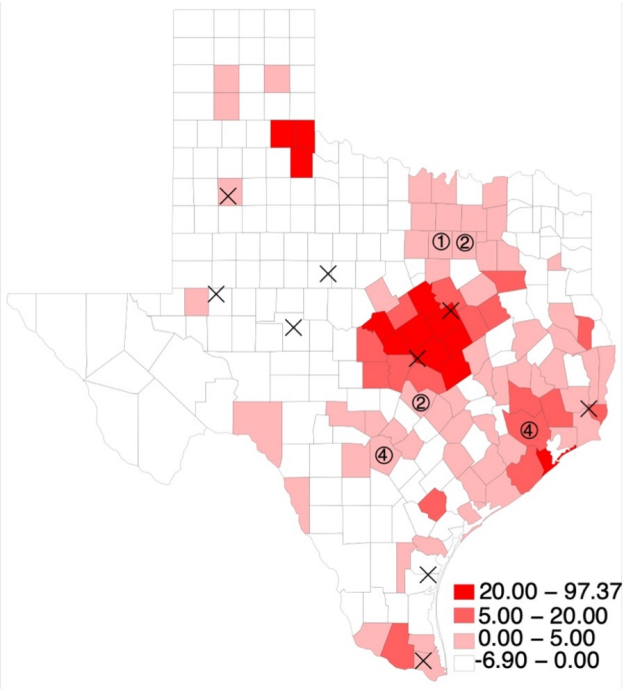
Figure A4: Poisson Event Study: $>$ 30 Mile Treatment



A.4 Congestion Effects

An increase in demand for contraceptive services might lead to congestion effects, which may potential bias our results (CITES HERE). To determine the severity of congestion effects, Figure A5 is a heat map similar to Figure 5, but includes all counties, not just counties in the treatment group. The X's on Figure A5 are counties that lose all abortion providers, while the circles represent counties that lose some (but not all) providers. The number in the center of the circle indicates the number of clinics that closed following HB2.

Figure A5: Changes in the Rate of LARC Insertion, 2011-2013 (All Counties)



Note: the heat map describes the change in the rate of LARC insertion (per 10,000 resident females of reproductive age) in Texas counties. On the map, an "X" denotes a county that experiences a closure of all abortion clinics following HB2, while a circle denotes a county that looses some (but not all) of its abortion providers. The number in the circle indicates the number of clinics that closed following HB2.

Figure A5 suggests that residents of metro areas that lost some, but not all, abortion providers moderately increase their take-up of LARC. These individuals do not experience changes in travel distance since not all providers closed. For example, there are small increases in the incidence of LARC in Dallas-Fort, Austin, and San Antonio, and slightly larger increase in LARC incidence in Houston. Ultimately, however, the largest changes in LARC take-up occur in counties immediately surrounding the total closure of abortion facilities, such as Waco and Killeen. Therefore, while some congestion effects may be present, they do not appear to be as large as the effects of increasing the travel distance to an abortion provider.