NBER WORKING PAPER SERIES

HOW FAR IS TOO FAR?
NEW EVIDENCE ON ABORTION CLINIC CLOSURES, ACCESS, AND ABORTIONS

Jason M. Lindo
Caitlin Myers
Andrea Schlosser
Scott Cunningham

Working Paper 23366
http://www.nber.org/papers/w23366

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2017, Revised August 2018

An earlier version of this paper was circulated in November 2016 under the title "The effect of abortion facility closures on fertility, sexual health and human capital." An earlier version of this paper was circulated in November 2016 under the title "The effect of abortion facility closures on fertility, sexual health and human capital." We are grateful to Christine Durrance, Ted Joyce, Analisa Packham, David Slusky, and Glen Waddell for helpful comments, along with seminar participants at Middlebury College, Sam Houston University, Southern Methodist University, the University of California-Merced, University of Kansas, Victoria University, and Williams College, and participants at the Stata Texas Empirical Microeconomics Conference, 2017 Annual Conference of the Southern Economic Association, 2018 Annual Conference of the Eastern Economic Association, and 2018 NBER Health Economics meeting. Anna Cerf and Birgitta Cheng provided expert assistance in creating our maps. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 23366
April 2017, Revised August 2018
JEL No. I11,I12,J13,K23

ABSTRACT

We document the effects of abortion-clinic closures on clinic access, abortions, and births using variation generated by a law that shuttered nearly half of Texas' clinics. Increases in distance have significant effects for women initially living within 200 miles of a clinic. The largest effect is for those nearest to clinics for whom a 25-mile increase reduces abortion 10%. We also demonstrate the importance of congestion with a proxy capturing effects of closures which have little impact on distance but which reduce clinics per-capita. These effects account for 59% of the effects of clinic closures on abortion.

Jason M. Lindo
Department of Economics
Texas A&M University
4228 TAMU
College Station, TX 77843
and NBER
jlindo@econmail.tamu.edu

Caitlin Myers
Department of Economics
Middlebury College
Middlebury, VT 05753
cmyers@middlebury.edu

Andrea Schlosser
Dept of Economics
One Bear Place #98003
Waco, Texas 76798-8003
Andrea_Schlosser@baylor.edu

Scott Cunningham
Baylor University
Dept of Economics
One Bear Place #98003
Waco, Texas 76798-8003
(254) 710-4753
scott_cunningham@baylor.edu

In June of 2016, the United States Supreme Court issued its first major abortion ruling in a quarter century, striking down components of Texas HB2 that had shuttered many of the clinics in the state and threatened to close all but a handful of those that remained (*Whole Woman's Health v. Hellerstedt*, 2016a). This landmark case set a new precedent for evaluating abortion regulations against the "undue burden standard" established in *Planned Parenthood v. Casey* (1992). In particular, this 2016 decision stated that courts must "consider the burdens a law imposes on abortion access together with the benefits those laws confer" and highlighted a critical role for empirical evidence. Indeed, while little empirical evidence on the causal effects of changes in access existed at the time of this decision, a working paper version of this study (Cunningham et al. 2018) was the basis for US District Judge Baker's calculation of the cumulative burden of the Arkansas law challenged in *Planned Parenthood of Arkansas and Eastern Oklahoma v. Jegley* (2018).[1]

In this study we aim to answer several related questions. What happens if/when laws are enacted that make it more difficult for abortion clinics to operate? What happens when they cause clinics to close? And to what degree are any effects of closures caused by increases in the distance women are required to travel as opposed to increased congestion at remaining clinics?

As Supreme Court Justice Elena Kagan observed during oral arguments in Whole Woman's Health (2016b), Texas' recent history is "almost like the perfect controlled experiment" to learn the answers to these questions. When Texas HB2 required physicians at abortion clinics to have admitting privileges at a hospital within 30 miles of the facility on November 1, 2013, nearly half of the abortion clinics in Texas immediately closed (Figure 1). On average this doubled a Texas resident's distance to her nearest clinic (Figure 1), but those in some counties were affected more than others (Figure 2).[2]

In this paper, we treat Texas' experience as a case study to document the causal effects

[1] These calculations are described in detail beginning in the section "Burdens Imposed: Women Who Will Forgo an Abortion" of the preliminary injunction order issued on July 2, 2018. This injunction order is available online at https://cases.justia.com/federal/district-courts/arkansas/aredce/4:2015cv00784/102375/142/0.pdf.

[2] All measures of abortion access account for potential travel to clinics in neighboring states.

of abortion clinic access. Specifically, we leverage plausibly exogenous geographic variation in abortion clinic access to estimate the effects using difference-in-differences models. To implement this research design, we construct panel data on abortion clinic operations from 2009 through 2015 in Texas and neighboring states. We use these data to measure driving distances from each county to its nearest clinic over time. While driving distance is a common measure that has been used in prior studies as well as referenced by the Supreme Court,[3] it notably *fails* to capture potential changes in abortion access in areas where at least one clinic remains open. For example, closures in Dallas, Fort Worth, San Antonio, and Houston had trivial impacts on distances to clinics, because other nearby facilities remained open in each of these areas, but they dramatically increased the number of women each remaining clinic was expected to serve. An approach that focuses on distance alone ignores the possibility that clinic closures could influence abortion rates through increased congestion at remaining clinics. We explore this mechanism by proposing and constructing a new proxy for congestion.

Our econometric analysis indicates that travel distance has a substantial and non-linear effect on abortion rates. If the nearest clinic is 0 miles away, we estimate that a 25 mile increase in distance reduces the abortion rate by close to 10 percent. If the nearest clinic is farther away, the effect of additional increases in distance are smaller. At the point that the nearest clinic is 200 miles away, we no longer detect statistically significant reductions in abortion caused by further increases in distance. In addition to finding that even modest initial increases in distance have substantial effects on abortion rates, we find that abortion clinic closures affect abortion rates through congestion, as measured by the number of women served per clinic in a region. Indeed, our estimates suggest that these effects are larger than the effects of increased distance, accounting for 59 percent of the overall effect of reduced clinic access caused by closures in the years following HB2. We also find evidence that congestion leads to delayed abortions as measured by gestational ages at the time of abortion.

[3] See *Planned Parenthood v. Casey* (1992) and *Whole Woman's Health v. Hellerstedt* (2016a), as well as transcripts of oral arguments in *Whole Woman's Health v. Hellerstedt* (2016b) in which travel distances are repeatedly discussed.

Our results naturally raise the question: what are these women doing who would have obtained abortions if clinics had not closed? Though we cannot answer this question in a definitive manner, we do take some steps in this direction. To begin, we consider the possibility that women may be self-inducing abortions as a substitute for obtaining abortions at clinics. This analysis is motivated by substantial anecdotal evidence suggesting that some women sought to self-induce abortions using an abortafacient sold over-the-counter at Mexican pharmacies under the brand name Cytotec (Eckholm, 2013; Hellerstein, 2014). Consistent with the idea that this is an important mechanism, we find especially large effects of clinic access for Hispanic women living near the Mexican border. We also analyze birth rates and conclude that the estimated effects on abortion rates are too small relative to birth rates to be plausibly detected in an analysis of birth rates. As such, the data do not allow us to determine whether all of the "missing abortions" result in additional births or whether they are offset by other behavioral changes.

1 Background

1.1 Prior evidence on the effects of "supply-side" abortion policies

Because "supply-side policies" targeting abortion facilities are a recent phenomenon relative to "demand-side policies" governing who can obtain an abortion, they have only recently received much attention from researchers. The most closely related paper that predates our own is Quast et al. (2017), which uses a research design similar to ours to evaluate the effects of "crow flies" distance to abortion clinics on abortion rates. While timely, this earlier study used operating licenses to measure clinic operations, which does not capture circumstances in which clinics had ceased providing abortion services though they had active licenses. We account for this scenario, and find *substantially* larger effects of distance, which is consistent with their acknowledgement that measurement error is likely to bias their estimates towards zero.[4]

Given the extant literature, we believe our study is the first to provide credible estimates of the causal effects of reduced access to abortion clinics using data on actual operations, the first to estimate the effects of a measure of congestion, and the first to consider heterogeneity using proxies for access to drugs to self induce. We are also the first to argue that the magnitude of the effects on abortion are too small to be plausibly detected by an analysis of birth rates.[5]

1.2 Texas HB2 and its Aftermath

Texas HB2, which was enacted in July 2013, had two key provisions: (1) It required all abortion providers to obtain admitting privileges at a hospital located within 30 miles of the location at which an abortion was performed and (2) It required all abortion facilities to meet the standards of an ambulatory surgical center, regardless of whether they were providing surgical abortions or providing medication to induce abortions (Texas HB2, 2013). In addition to these provisions, HB2 also prohibited abortions after 20 weeks gestation and required physicians to follow FDA protocols for medication-induced abortions, which restricted the use of abortion pills to within 49 days post-fertilization and required that the medication be administered by a physician.[6]

[4] In a related descriptive study, Grossman et al. (2017) shows 2012–2014 changes in distance-to-nearest-abortion-facility are negatively correlated with abortion rates across Texas counties. Also related, Colman and Joyce (2011) estimate the reduced-form effects of Texas' 2004 Woman's Right to Know Act, which substantially increased the distance women had to travel in order to obtain abortions at or after sixteen weeks gestation in addition to requiring that women receive information about the abortion procedure and alternatives to abortion at least 24 hours before an abortion. In other related studies, Lu and Slusky (2016a) and Lu and Slusky (2016b) examine closures of "women's health clinics from a specific network of providers"—which includes both family planning and abortion clinics. Because their study uses data from an earlier time in Texas when family planning clinics—and not abortion clinics—closed en masse, their estimates likely reflect the effects of family planning clinic closures.

[5] Since we initially released our study, Fischer et al. (2017) have released an analysis that also leverages variation induced by Texas HB2. Specifically, they estimate the effects of distance using a similar research design and similarly controling for access to family planning clinics. They find similar effects of distance on abortion rates but do not consider the effects of congestion. Though they find some statistically significant effects on birth rates, we show that there is little evidence of effects overall, which is consistent with our evidence that impacts on abortion rates are too small relative to birth rates to be plausibly detected.

[6] The FDA guidelines have since been revised (March 2016) to indicate that these pills can be used up to 70 days into a pregnancy and that the second abortion pill need not be administered by a physician. In

Obtaining admitting privileges can be lengthy process, as it takes time for hospitals review a doctor's education, licensure, training, board certification, and history of malpractice. Moreover, many hospitals require admitting doctors to meet a quota of admissions. After a lawsuit, decision, and a subsequent appeal, the admitting privileges requirement took effect on November 1, 2013 (*Planned Parenthood of Greater Texas Surgical Health Services v. Abbott*, 2013) causing nearly half of Texas' abortion clinics to close.

The second major restriction of HB2, the ambulatory surgical center requirement, required clinics to meet additional size, zoning, and equipment requirements to meet the licensure standards for ambulatory surgical centers. This requirement was scheduled to take effect on September 1, 2014, 10 months after the admitting privileges requirement, and threatened most of Texas' remaining clinics.[7] After another lawsuit, decision, and a subsequent appeal the ambulatory surgical center requirement went into effect on October 2, 2014 but its enforcement was blocked two weeks later by the US Supreme Court.[8]

In June of 2016, the United States Supreme Court struck down these two provisions of Texas HB2, issuing a majority opinion that Texas had failed to demonstrate that they served a legitimate interest in regulating women's health and that they imposed an undue burden on access to abortion (*Whole Woman's Health v. Hellerstedt*, 2016a). As of July 2017, only three clinics that closed as a result of HB-2 have re-opened.[9]

In the wake of the *Whole Woman's Health v. Hellerstedt* ruling, abortion opponents have continued to focus on supply-side abortion restrictions. Many states have continued to enforce these types of laws and to pass new ones (Guttmacher Institute, 2016).[10] As such, policy

particular, it states that the second pill can be taken at a "location appropriate for the patient."

[7]At the time HB2 was passed, only 6 facilities in 4 cities—Austin, Fort Worth, Houston and San Antonio—met the standards of an ambulatory surgical center. In response to the law, Planned Parenthood opened an additional facility in Dallas in the summer of 2014 at a cost of over 6 million dollars (Martin, 2014). Two additional ambulatory surgical centers opened the following year. Both were in San Antonio, where Planned Parenthood built a new surgical facility at a cost of 6.5 million dollars (Stoeltje, 2014a) and Alamo Women's Reproductive Services relocated to a surgical facility at a cost of 3 million dollars (Garcia-Ditta, 2015).

[8]At the same time the US Supreme Court blocked enforcement of the admitting privileges requirement for the clinics in McAllen and El Paso.

[9]See information on clinic operations in Appendix A.

[10]Two days after the Supreme Court struck down HB2, Texas legislators proposed new rules requiring that abortion providers bury or cremate fetal remains. Similar laws have been proposed in Indiana and Louisiana,

considerations in the future are likely to depend on knowing what happens when abortion clinics close. The remainder of this paper focuses on answering this question, using the Texas experience as a case study.[11]

2 Data

Table 1 summarizes the variables used in our analysis: measures of abortion access, abortion rates, birth rates, and variables measuring county demographics: age and racial composition (SEER, 2016) and unemployment (BLS, 2016).

2.1 Abortion access in Texas

To evaluate the effects of Texas HB2 on abortion-clinic access, we compile a database of abortion clinic operations in Texas and adjacent states (Colorado, Louisiana, New Mexico, and Oklahoma) based on a variety of sources including licensure data maintained by the Texas DSHS, clinic websites, judicial rulings, newspaper articles, and websites tracking clinic operations maintained by both advocacy and oppositional groups.[12] We use the clinic operations database to construct two county-level measures of abortion access for each quarter: distance to the nearest abortion provider and a measure of congestion we term the "average service population."[13]

and could add substantially to the cost of an abortion (Zavis, 2017).

[11]One important part of this context is that Texas has a law requiring a 24-hour waiting period after a counseling session before an abortion can be performed. This law went into effect in 2011 and does not apply to women who live more than 100 miles from the clinic. We note that the effects of access to abortion clinics may interact with these laws in important ways that could make it difficult to extrapolate from the results of our analysis to other contexts. That said, Texas is not atypical in having such laws: 35 states have counseling requirements, 27 have waiting periods, and 24 hours is the most common waiting period (Guttmacher Institute, 2017).

[12]Appendix A contains detailed information on abortion clinic operations in Texas.

[13]Clinics are coded as "open" if they provided abortions for at least two out of three months in a given quarter. Hence, Figure 1 and the analysis that follow do not reflect the brief mass closures that occurred for two weeks in October 2014 when the surgical center requirement was enforced. The increase in average distance in the second quarter of 2014 is due to the closure of the sole clinic in Corpus Christi. For a few months, until the McAllen clinic re-opened in the third quarter of 2014, there was no abortion provider in south Texas.

Distance to the nearest provider is calculated using the Stata *georoute* module (Weber and Péclat, 2016) to estimate the travel distance from the population centroid of each county (United States Census Bureau, 2016) to the nearest operating abortion clinic, including those in the neighboring states of Colorado, Louisiana, New Mexico, and Oklahoma.

Figure 1, Panel A illustrates that the distance the average Texas woman had to travel to reach an abortion clinic increased from 21 miles in the quarter prior to HB2 to 44 miles in the quarter immediately after. The percentage of women who had to travel more than 100 miles (one-way) to reach a clinic increased from 5 to 15 percent.[14] Figure 2 describes the spatial patterns of clinic closures occurring between Quarter 2 2013 and Quarter 4 2013 when HB2's first major requirement went into effect. The central-western region of Texas exhibits the largest increases in travel distances, in many cases in excess of 100 miles. Travel distance to the nearest clinic was unchanged for women whose nearest abortion clinic was already located in a major city—Houston, Dallas, Fort Worth, San Antonio, Austin or El Paso—because at least one clinic remained open in these cities.

Ideally, we would like to measure wait times as an additional proxy for abortion access, but this is impossible because, to our knowledge, no data on wait times were collected prior to the implementation of HB2. We therefore propose an alternative measure of abortion access that captures the increasing patient loads faced by a reduced number of clinics. We call this variable the "average service population." To construct it, we first assign each county c in time period t to an "abortion service region" r according to the location of the closest city with an abortion clinic.[15] The average service population is the ratio of the population of

[14]These are population-weighted county averages using estimates of the populations of women aged 15-44 (SEER, 2016).

[15]To construct the ASP measure, we combine clinics that are in different counties but the same commuting zone. For instance, the city of Austin has abortion clinics in both Travis and Williamson counties; we use the population centroid of Travis county, the more populated of the two, to construct the Austin service region. Because they are in the same commuting zone, we additionally combine Shreveport and Bossier City, Louisiana (3 miles apart), Oklahoma City and Norman, Oklahoma (20 miles apart), Sugar Land and Houston, Texas (22 miles apart), Harlingen and McAllen, Texas (35 miles apart), and El Paso, Texas and Las Cruces, New Mexico (54 miles apart). We additionally combine Dallas and Fort Worth (33 miles apart), although they are not in the same commuting zone. The results are similar if we use a different rule, combining counties only if their population centroids are less than 25 miles apart.

women aged 15-44 in the service region to the number of clinics in the service region:

$$Average\ service\ population_{c,r,t} = \frac{\sum_{c \in r} population_{c,t}}{number\ of\ clinics_{r,t}}. \tag{1}$$

Figure 1, Panel B illustrates time trends in this measure of congestion.[16] In the immediate aftermath of HB2, the average service population rose from 150,000 to 290,000 in Texas. This occurred for two reasons: (1) As clinics closed in small cities, women had to travel to clinics that remained in larger cities, shrinking the number and expanding the sizes of service regions; and (2) As clinics closed in large cities, there were fewer providers of abortion services. Figure 3 summarizes spatial variation the *change* in the average service population between the second and fourth quarters of 2013. As was the case for the distance measure of access, there is substantial variation in how this congestion measure of access changed across Texas following HB2. The average service population did not change in eastern Texas, where only one clinic closed in the fourth quarter of 2013 (though several did close the following year). But in the Dallas-Fort Worth region, where distances had not changed, the average service population increased by 250,000. Clinic closures continued through 2014, and Figure 1 shows that the average service population continued to rise. In Dallas-Fort Worth an additional clinic closure in June 2015 increased the average service population from 380,000 to 480,000. Over the same period, TPEP (2015) reports that wait times at Dallas and Fort Worth clinics increased from 2 to 20 days.[17]

2.2 Abortion Rates in Texas

We use publicly available data on Texas abortions by county of residence (TDSHS, 2017). To produce these data, the Texas DSHS combines in-state abortions, which providers are

[16] Appendix Figure B1 shows the service regions in each quarter.

[17] Consistent with the evidence provided by our measure, the number of physicians providing abortions in the state dropped from 48 to 28 in the aftermath of HB2 (TPEP, 2016). As the number of clinics and providers shrank, wait times to obtain an abortion likely increased. The Texas Policy Evaluation Project documented wait times of three weeks in some Austin, Dallas and Fort Worth clinics (TPEP, 2015) based on telephone surveys.

mandated to report, with information on out-of-state abortions it obtains via the State and Territorial Exchange of Vital Events (STEVE) system. To construct abortion rates, we use population denominators based on annual estimates of county populations by race, gender and age from SEER (2016). We use these same population data to construct demographic control variables.

These abortion rates account for interstate travel so far as the Texas DSHS is able to observe abortions to Texas residents reported via the STEVE system. Based on information we obtained from the state health departments in nearby and neighboring states, we estimate that the abortion data provided by the Texas DSHS may be missing up to 1,164 abortions obtained in these states in 2014 and 1,418 in 2015, roughly 2 percent of total abortions to Texas residents.[18] In subsequent sections we estimate that these abortions obtained in nearby states can only account for a small fraction of the observed effects. We also demonstrate our main results are robust to focusing only on counties where it is unlikely for many women to seek abortions out of state in any year.[19]

Figure 4 illustrates the change in abortion rates between 2013 and 2014, aggregating rates to the public health region to reduce visual "noise" in rates for counties with small populations. Figure 4 illustrates that abortion rates declined across the state in the year following HB2, but the reductions were most dramatic in the regions that experienced the largest reductions in abortion access. In the Rio Grande Valley and Texas Panhandle and

[18]Kansas reported collecting county of residence and participating in STEVE for the duration of our analysis. Louisiana reports similarly but only beginning in 2013, which motivates an analysis using data from 2013–2015 as a robustness check. Arkansas, Colorado, New Mexico, and Oklahoma report not participating in STEVE. However, based on data they provided to us, the number of Texas women obtaining abortions in these states in 2014 was 45 in Arkansas, 48 in Colorado, and 136 in Oklahoma. New Mexico could only provide aggregate information on abortions obtained by out-of-state residents. If we conservatively assume its entire increase in its abortions to out-of-state residents after 2012 was driven by Texas women, we estimate that 935 Texas women obtained abortions in New Mexico in 2014. The actual number is likely to be smaller because two abortion facilities in Tucson, Arizona closed during this period as well. Using the same approach for the following year, Texas' 2015 abortion counts may be missing up to 33 abortions in Arkansas, 46 in Colorado, 1,208 in New Mexico, and 131 in Oklahoma, summing to 1,418 abortions.

[19]It is important to note that it is not clear whether the ideal data would or would not include abortions obtained out of state, since it was indicated in *Whole Woman's Health v Hellerstedt* that a woman's ability to obtain an abortion in Texas was the relevant consideration for whether the Texas laws placed an undue burden on women. For this reason, our estimates focusing only on counties where it is unlikely for many women to seek abortions out of state may have the most legal relevance.

west Texas, abortion rates declined by more than 30 percent, while in the Houston and Austin areas, they declined by less than 10 percent. This visualization foreshadows the results of our difference-in-difference analysis.

2.3 Births Rates in Texas

We use restricted-use natality files provided by the National Center for Health Statistics from 2009–2015. These data consist of a record of every birth taking place in the United States over this time period. To construct county birth rates, we use population denominators based on annual estimates of county populations from SEER (2016).

3 Empirical Strategy

We estimate the effects of access to abortion clinics using a generalized difference-in-differences design, which exploits within-county variation over time while controlling for aggregate time-varying shocks. The identifying assumption underlying this approach is that changes in abortion rates for counties with small changes in access provide a good counterfactual for the changes in abortion rates that would have been observed for counties with larger changes in access if their access had changed similarly.

Given the discrete nature of abortions, and because we encounter cells with zero abortions when looking at some subgroups, we operationalize this strategy with a Poisson model.[20] In particular, our approach to estimating the effect of changes in abortion access on the abortion rate corresponds to the following equation:

$$E[AR_{ct}|\boldsymbol{access_{ct}}, \alpha_c, \theta_t, \boldsymbol{X_{ct}}] = exp(\boldsymbol{\beta access_{ct}} + \alpha_c + \theta_t + \boldsymbol{\gamma X_{ct}}) \quad (2)$$

[20] Like linear models, the Poisson model is not subject to inconsistency caused by the incidental parameters problem associated with fixed effects. While the possibility of overdispersion is the main theoretical argument that might favor alternative models, overdispersion is corrected by calculating sandwiched standard errors (Cameron and Trivedi, 2005). Moreover, the conditional fixed effects negative binomial model has been demonstrated to not be a true fixed effects model (Allison and Waterman, 2002).

where AR_{ct} is the abortion rate for residents of county c in year t; $\boldsymbol{access_{ct}}$ is a set of measures of access to abortion clinics for residents of county c in year t; α_c are county fixed effects, which control both observed and unobserved county characteristics with time-invariant effects on abortion rates; θ_t are year fixed effects, which control for time-varying factors affecting abortion rates in all Texas counties in the same manner; and $\boldsymbol{X_{ct}}$ can include time-varying measures of county demographics, unemployment, and family-planning access. Specifically, the demographic control variables include the fraction of the 15-44 female population in each each five year grouping and the fraction of each of these age groups that is non-Hispanic white, non-Hispanic black, or Hispanic (versus other race/ethnicity). Our approach to controlling for family planning follows Packham (2016) who evaluates the effects of Texas' decision to cut funding to family planning clinics by two-thirds in 2012. In particular, we control for whether a county had a publicly funded family planning clinic prior to the funding cut interacted with the time period after the funding cut occurred (post-2012).

Because Poisson models are more typically thought of as considering counts, not rates, we note that this model can be expressed alternatively as estimating the natural log of the expected count of abortions while controlling for the natural log of the relevant population and constraining its coefficient to be equal to one. All of the standard-error estimates we report allow errors to be correlated within counties over time.[21]

As described in Section 2, our measures of abortion clinic access includes distance to the nearest clinic (from the county population-weighted centroid) and the "average service population," which measures the number of people each clinic is expected to serve in each "service region."[22] To separately identify the effects of these two measures of access, there must be independent variation. As we noted in Section 2, such variation is expected because closures in areas where some clinics remained open increase congestion without affecting

[21] We have also examined standard-error estimates that instead cluster on initial abortion service regions—they are typically very similar or smaller than those that we report.

[22] These data are constructed quarterly; however we use the annual average in our analysis of abortion data, which is not available quarterly. When we examine quarterly birth data, we use the quarterly measures of access to correspond to quarterly birth rate data.

distance-to-nearest-clinic whereas closures in areas where no clinics remained open increase both congestion and distance-to-nearest-clinic. This is evident from a comparison of figures 2 and 3, which depicted changes in the two measures across different Texas counties.[23] We additionally estimate models with quadratic specifications of these measures of access. These models allow us to provide answers to the questions: Over what ranges do distance and congestion influence abortion rates? And how big are the effects for different starting points?

4 Results

4.1 Establishing the Validity of the Research Design

The primary goal of our paper is to estimate of the *causal* effects of abortion-clinic access on abortions provided by US medical professionals. The identifying assumption underlying our differences-in-difference strategy is the changes in abortion rates for counties with small changes in access provide a good counterfactual for the changes in abortion rates that would have been observed for counties with larger changes in access if their access had changed similarly.

To assess the identifying assumption, we focus on the distance measure of access, we plot data over time for each of four groups categorized according to their changes in distance-to-nearest-clinic between the second quarter of 2013 (before HB2) and the fourth quarters of 2013 (after HB2). One group consists of counties with no increase in distance-to-nearest-clinic over this time period. The other three groups of counties are in terciles based on the amount that their distance-to-nearest-clinic increased over the same period. Panel A of Figure 5, shows that the average distance-to-nearest-clinic was flat for all four groups of counties prior to 2013. This implies we can use pre-2013 years to evaluate the credibility of the common

[23] We also illustrate this point in Appendix Figure B2, which plots county-level changes in the average service population against county-level changes in distance-to-nearest-clinic. There is a positive relationship between changes to these measures of abortion-clinic access but the relationship is not strong and there is substantial independent variation.

trends assumption. Panels B and C of Figure 5 show similar plots for log of the abortion and birth rates.From 2009 to 2012, log abortion rates were changing very similarly for counties that would subsequently experience a major increase in distance-to-nearest-clinic and counties that would subsequently experience smaller (or no) increases. Panel C similar evidence of common pre-HB2 trends in birth rates. Overall, Figure 5 provides empirical support for our identifying assumption—that these common trends would have continued into subsequent years in the absence of differential changes in abortion clinic access.

In addition to providing support for the validity of our identification strategy, Figure 5 also provides some visual evidence of the effects of distance on abortion and birth rates. In particular, counties experiencing the greatest increase in distance exhibit correspondingly greater decreases in abortion rates. Some readers may also note that distances decreased somewhat for the top two terciles between 2014 and 2015 and also that that there is a corresponding "rebound" in the abortion rate. This could be taken as further evidence that abortion rates respond to changes in distance to clinics. That said, the magnitude of the rebound in abortion rates is such that it could reflect that the effects of the earlier, larger, increases in distance are short lived. We explore this possibility in sensitivity checks for our main results.[24] Figure 5 shows no evidence of an increase in births corresponding to the decrease in abortions, which we discuss in greater detail below.[25]

[24]We have also investigated the counties underlying this variation in greater detail. Prior to HB2, four cities in South Texas had licensed abortion clinics: San Antonio, Corpus Christi, McAllen, and Harlingen. The clinics in McAllen and Harlingen both closed on November 1, 2013 when the admitting privileges requirement went into effect, causing Corpus Christi—which is about 150 miles away from both locations—to become the nearest option for many women. The associated county-level abortion rates fell by 64 percent for McAllen and by 56 percent for Harlingen between 2012 and 2014. In June of 2014, the sole provider of abortion services in Corpus Christi—who commuted there from San Antonio to provide abortion services two days a month—retired due to health reasons (Meyer, 2013; Stoeltje, 2014b). As a result, San Antonio became the closest abortion destination for women in McAllen, Harlingen and Corpus for three months, until September 2014 when the Fifth Circuit Court of Appeals carved out an exemption from the admitting-privileges requirement for the McAllen clinic, allowing it to re-open in September. When the McAllen clinic re-opened, abortion rates in McAllen and nearby Harlingen increased. Meanwhile, in Corpus Christi, where the part-time clinic had closed, abortion rates fell by 12 percent.

[25]Figures B3 and B4 in the appendix show common trends in abortion and birth rates for different subgroups of women. Figure B5 shows similar plots for county demographics (race, ethnicity, age), the unemployment rate, and the number of family planning clinics. Figure B6 plots more-disaggregated trends in outcomes prior to the enactment of HB2.

4.2 The Causal Effects of Distance and Congestion

Having provided evidence to support the key identifying assumption underlying our difference-in-differences research design, we now present estimates of the causal effects of access to abortion clinics that are based on this research design. Table 2 reports the main results from our difference-in-differences analysis.[26] Columns 1 through 5 show the results based on different combinations of measures of abortion clinic access, including linear and quadratic specifications in our variables capturing distance and congestion. Column 5 shows the results from a specification considers these measures simultaneously while Column 6 is similar but also controls for a rich set of demographic, economic, and family planning control variables.

The results of the linear specifications in Table 2 (Columns 1 and 3) suggests that both distance and congestion affect abortion rates, with a 25 mile increase in travel distance reducing abortions by 5 percent and a 100,000 woman/clinic increase in average service population reducing abortions by 2 percent, on average. The results of the non-linear specifications suggest that these average effects mask substantial nonlinearities (Columns 2, 4, and 5). The estimates are not sensitive to controls for demographics, unemployment, and family-planning access (Column 6).[27]

For ease of interpretation, Figure 6 provides a graphical representation of the effects implied by the estimates reported in Column 6 of Table 2. Panel A illustrates that a 25-mile increase in distance to the nearest clinic is estimated to reduce abortions by 0–10 percent depending on the initial distance. If the nearest clinic is 0 miles away, a 25-mile increase in distance is estimated to reduce the abortion rate approximately 10 percent, implying that modest initial increases in distance have substantial effects on abortion rates. The effects of increases in distance are smaller when the nearest clinic is initially more distant: if the nearest

[26] Note that percent effects from the Poisson model are calculated as $(e^{\beta} - 1) \times 100\%$.

[27] Appendix tables C1 through C5 show the results of several sensitivity tests. We present results using geodesic ("as the crow flies") distance, using travel time, using an Inverse Hyperbolic Sine Transformation, using alternative approaches to controlling for access to family planning, and excluding various regions or years from the analysis. All of these specifications support the conclusions we reach based on the main analysis.

clinic is already 200 miles away, a 25-mile increase does not have a statistically significant effect on the abortion rate. Intuitively, once the nearest clinic is already quite distant, further increases in distant have little additional effect.

The effects of our measure of congestion (Panel B of Figure 6) are less precise but also indicate nonlinear effects. Beginning from a base of 50,000 women per clinic, which is roughly the minimum of the average service population measure we observe in Texas during this period, a 100,000 woman increase in average service population is estimated to have no discernible effect on abortion rates.[28] Our estimates indicate that a 100,000 woman increase in average service population from a base of 200,000 reduces abortion rates 5 percent, and the same increase from a base of 300,000 reduces abortion rates 9 percent. These are well within the magnitudes of change experienced in Texas.[29]

Based on these estimates, if access to abortion clinics had remained at pre-HB2 levels, Texas women would have had 119,730 legal abortions in 2014–2015 rather than the 107,830 observed in the abortion surveillance data. This represents an estimated reduction of 11,900 abortions due to HB2 in these two years after which it was enacted.[30] We estimate that 41 percent of this two-year reduction was due to increased driving distances, and 59 percent was due to increased congestion.[31]

[28]This may be because the available providers have capacity to meet increased demand at these low measures of congestion, but by the time average service populations reach 200,000 additional increases in congestion begin affect abortion rates.

[29]For the state of Texas as a whole, the "average service population" increased from 150,000 to 290,000 immediately following HB2, and then continued to rise, reaching an average of 330,000 in 2015 (Figure 1).

[30]This estimate is based on our measures of abortion-clinic access in 2012 and the results of the estimated model in Table 2, Column 6. We note that the total number of abortions in Texas fell by more than this number over this time period, which is not surprising in light of the long-run decline observed across the United States. Our estimates abstract away from any nationwide or statewide changes abortion to focus on the changes caused by differential changes in clinic access, as measured by driving distance and average service populations.

[31]Appendix Figures D1 and D2 show that we usually do not find statistically significant differences in the estimated effects of access on abortion rates by age, race, or ethnicity. However, the point estimates suggest that the effects of distance may be larger for Hispanic than non-Hispanic women, a possibility that we explore in more detail in Section 4.4.

4.3 Addressing Interstate Travel

As discussed in Section 2.2, abortion surveillance practices vary in neighboring states. Summing up abortions to Texas residents in states not participating in STEVE, we estimated that the 53,882 abortions to Texas residents reported in 2014 by the Texas DSHS (2017) may be missing up to 1,164 abortions in Arkansas, Colorado, Oklahoma, and New Mexico. Similarly, the 54,310 abortions reported in 2015 may be missing up to 1,418 abortions obtained in neighboring states.

Might these abortions obtained in other states explain our results? In the previous section we estimated that Texas HB2 reduced the number of abortions by 11,900 over 2014 and 2015 (and by a smaller number in 2013 which was only partially affected by closures). This estimated effect is far in excess of the 2,582 abortions we are potentially missing in nearby states during this two year period, but we do note that they could account for as much as 20 percent of the estimated reduction. That said, we have confirmed that our main results are robust to the exclusion of counties where such travel is likely, which indicates that our main results are unlikely to suffer from bias due to unmeasured abortions obtained in nearby states.[32]

4.4 Heterogeneity by Ethnicity and Distance to Mexico

Anecdotal evidences suggests that as access to abortion clinics decreased in Texas, some women sought to self-induce abortions by using Cytotec, a drug that is sold over-the-counter at Mexican pharmacies for the treatment of ulcers (Eckholm, 2013; Hellerstein, 2014). Cytotec is a brand name for Misoprostol, a drug that induces uterine contractions. This drug is the second in a two-part drug combination that is the FDA protocol for medical abortions. Taken alone in the first trimester, Misoprostol is successful at inducing an abortion about 90 percent of the time, with decreasing efficacy as the pregnancy progresses (von Hertzen et al., 2007). The prescribing information for Cytotec reports that it can cause incomplete abortion and

[32]These results of this robustness check are shown in columns 2-3 of Table C5 in the appendix.

that it increases the risk of congenital anomalies (skull defects, cranial nerve palsies, facial malformations, and limb defects) for pregnancies that continue after the drug is taken.[33]

In 2008-2009, 1.2 percent of patients at abortion clinics reported that they had used Misoprostol on their own to self-induce abortion at some point in the past (Jones, 2011). Rates may be higher in Texas because women can more easily travel to Mexico to obtain the drug. In 2012, prior to the enactment of HB2, 7 percent of Texas abortion patients reported that they had tried to "do something" on their own to end the pregnancy (Grossman et al., 2014). In 2014, the Texas Policy Evaluation Project surveyed 779 Texas women; 2 percent reported attempting to self-induce an abortion and 22 percent reported knowing someone else who had done so (TPEP, 2015b). Based on this finding, the authors estimate that 2 to 4 percent of Texas women aged 18-49 may have attempted to self-induce an abortion, and that rates are higher for Hispanic women living in counties bordering Mexico.

Ideally, we would be able to evaluate the effects of abortion-clinic access on self-induced abortions as well those that are provided at clinics in order to measure the degree to which women substitute the former for the latter. However, these self-induced abortions take place out of sight of public health authorities tracking legal abortions in licensed facilities, which makes a rigorous analysis along these lines impossible. Instead, we examine whether the effects on abortions provided by US medical professionals are relatively large among Hispanic women and women who live close to the Mexican border, as we anticipate that such women would have better access to Cytotec than the average woman.[34]

To implement this analysis, we estimate a modified version of our richest model examining abortion rates (Column 6 of Table 2) by interacting the abortion-clinic-access variables with in indicator that a given county is less than 100 miles from the nearest border crossing.[35] We

[33]The prescribing information can be found on the U.S. FDA website: http://www.accessdata.fda.gov/drugsatfda_docs/label/2002/19268slr037.pdf.

[34]Survey evidence suggests self-induction rates may be greater for this population (TPEP, 2015b).

[35]We obtained the geographic coordinates of U.S./Mexico border crossings from the Texas Department of Transportation (TXDOT, 2017), limiting the analysis to crossings that can be accessed by pedestrians or private vehicles. We then calculated the travel distance from the population centroid of each county to the geographic coordinates of the nearest border crossing.

estimate these models separately for abortions to Hispanic and non-Hispanic women.

Figure 7 plots the estimated effects of changes in distance to the nearest abortion clinic, allowing for heterogeneous results by ethnicity and distance to the Mexican border. Panel A presents these estimated effects of travel distance, while panel B presents the estimated effects of average service population. For women living more than 100 miles from the border (depicted in blue), the estimated effects of changing access are similar for Hispanic and non-Hispanic women. They also are similar to the results for the full sample presented in Figure 6. For women living less than 100 miles from the Mexican border, the picture is different. The estimated effects for counties that are within 100 miles of the border tend to be quite imprecise,[36] but they suggest that decreasing access to abortion providers had larger effects closer to the border, and that this is particularly true for Hispanic women. From a base of 0 miles, a 25 mile increase in travel distance to the nearest abortion clinic is estimated to decrease abortions by 11 percent for a Hispanic woman living near Mexico, but by 3 percent for a Hispanic woman living farther away. We do not observe evidence of similar heterogeneity for non-Hispanic women, for whom changes in travel distance are estimated to reduce abortions at similar rates regardless of distance to the border.

As a whole, the results in Figure 7 provide empirical support to the anecdotal and survey evidence that substitution to self-induced abortion may have been common, especially in areas close to Mexico. That said, we acknowledge that they are imprecise given the small numbers of border counties, and that other differences could explain the patterns of heterogeneous effects. One especially notable difference is that Hispanic women and those in counties near the Mexican border tend to have relatively high poverty rates.

[36] The lack of precision is a product of the small sample sizes. Twenty-six out of 254 Texas counties are classified as less than 100 miles from the nearest border crossing, and these counties are predominantly Hispanic. Due to the larger confidence intervals, we also substantially increase the range of the y-axes and restrict the domain of the distance results relative to what we showed in Figure 6.

4.5 Effects on Abortions by Gestational Age

Thus far we have found evidence that increasing distance and congestion both cause reductions in observed abortions. It is also possible that these factors may delay abortions because of increased wait times, or because it takes additional time for women to make plans and assemble the resources required for longer trips. To empirically assess whether reduced access increases delay, we obtained county-level abortion counts from the Texas DSHS for three gestational age groupings: less than 7 weeks gestation, 7 to 12 weeks gestation, and greater than 12 weeks gestation. An important caveat to this analysis is that the Texas DSHS suppresses abortion counts by gestational age in cells where the count is between 1 and 9 abortions, the importance of which we examine in a sensitivity analysis.[37]

Figure 8 shows the estimated effects on the abortion rate for abortions at these different gestational ages, based on the model with the full set of access variables and control variables.[38] The results suggest that, holding congestion constant, increased travel distances reduce abortions in all of the gestational age categories rather than causing delays. The estimated effects of congestion, in contrast, suggest that increased congestion at abortion facilities causes delays in abortions. From an initial level of 300,000, a 100,000 woman increase in average service population is predicted to reduce abortions prior to 7 weeks by 25 percent, has no statistically significant effect on abortions at 7 to 12 weeks, and increases second trimester abortions by 14 percent. This suggests that increasing congestion shifted the distribution of gestational age to the right.

We come to similar conclusions if we instead evaluate the share of abortions in each gestational age group using weighted least squares, and if we evaluate a balanced panel of

[37]Whereas the sample size for all specifications in Table 2 showing estimated effects for total abortions is 1,775, the sample size is 552 when evaluating abortions at less than 7 weeks gestation, 611 when evaluating abortions at 7 to 12 weeks gestation, and 321 when evaluating abortions at more than 12 weeks gestation. We also note that the Texas DSHS switched from reporting abortions by gestational age to reporting abortions by post-fertilization age in 2014. To make the data series comparable, we adjust the categories using a 2 week difference.

[38]We illustrate marginal effects over the domain of travel distances and average service population observed in this more limited and urban sample.

counties for which abortions by gestational age are never suppressed.[39]

4.6 Do the Effects on Abortions Show Up in Birth Rates?

This question naturally arises from the preceding set of results. In a mechanical sense, one might expect fewer abortions to lead to more births. However, reductions in abortions provided by medical professionals could be offset by increases in self-induced abortions. Moreover, reduced access to abortion clinics could lead to changes in sexual behavior and contraceptive use, which could also offset impacts on abortion. These are reasons to believe that the full reduction in observed abortions may not be reflected in an increase in birth rates.

To get a sense of largest magnitudes that we might expect from an analysis of birth rates, in Figure 9 we plot the estimated effects that we would expect solely from the estimated effects on abortions for each county-year based on the estimates reported in Table 2 (Panel B, Column 6) and using a similar model applied to quarterly birth rate data for each county.[40] Specifically, the green-dashed line shows the estimated effect on birth rates that we would obtain if all of the "missing abortions" caused by reductions in access since 2012 were to show up as births two quarters later. These estimates indicate that at a maximum, we might expect to estimate effects of increases in distance (25 miles) ranging from 0.0–0.8 percent depending on its initial value. And at a maximum, we might expect to estimate effects of increases in the average service population (100,000 women) ranging from -0.3–1.0 percent depending on its initial value.

The solid line in Figure 9 shows the effects we estimate when we evaluate the effects on observed birth rates. The estimated effects of changes in distance are typically smaller than we would expect based solely on our estimated effects on abortions, suggesting that the full reduction in observed abortions is not reflected in an increase in birth rates which is consistent with the mechanisms described above. We also note that the confidence intervals

[39]The results of these analyses are shown in Figure D3.

[40]We assume that the effects on abortion are the same for each quarter in any given year.

associated with these estimated effects also always include zero. As such, we are unable to rule out that none of abortions that prevented by increases in distance lead to births. It is also important to note that the size of these confidence intervals are sufficiently large that we would be unable to rule out significant effects on birth rates even if the full reduction in observed abortions was reflected in higher birth rates.[41,42]

The estimated effects of increases congestion on birth rates are not statistically significant on average. Somewhat surprisingly, however, the pattern of point estimates starts out as positive (and statistically significant) for increases from low initial levels and then becomes negative, which is the opposite of what we would expect based on the estimated effects on abortions obtained from US medical professionals. This could suggest that there are some behavioral responses to increases in congestion from low initial levels that are strong enough to more than offset the effects of abortions obtained from US medical professionals. However, we are hesitant to read too much into this unexpected evidence of nonlinearity when the average effect is zero. We view research on the effects of abortion-clinic congestion on birth rates as an important area for future research.

5 Discussion and Conclusion

The results of our empirical analysis demonstrate that regulation-induced reductions in access to abortion clinics can have sizable effects. For women living within 200 miles of an abortion clinic, we document substantial and statistically significant effects of increasing distance to

[41]To see this point, consider having such large confidence intervals around the hypothetical estimates shown in the green-dashed line. The intervals would typically include zero.

[42]In appendix figures D4 to D7 we show that there is typically little evidence of effects of increases in distance on birth rates for various subgroups of women, except for subgroups where we do not have the ability to control appropriately for the number of women in the subgroup (married women and women having already had a child). Notably, Figure C5 shows that there is even weaker evidence any effect of increasing distance on birth rates for Hispanics birth rates than there is for non-Hispanic white birth rates, which is interesting in light of stronger impacts on Hispanic abortion rates than non-Hispanic white abortion rates. In addition, despite estimating that the effects of travel distance on abortion are greatest for older women whereas the estimated effects of congestion on abortion are greatest for younger women (Figure C1), we see little evidence of any such heterogeneity when we analyze the effects on birth rates by age group (Figure C4). We interpret these findings as further evidence that impacts on abortion are difficult to capture by examining birth rates.

abortion providers. The finding that even small initial increases in distance have significant effects is notable in light of previous Supreme Court opinions suggesting that travel up to 150 miles not be considered an undue burden.[43] Moreover, our estimates also indicate that increased travel distances is not the only burden imposed by clinic closures. Indeed, our results indicate that the effects of congestion, as measured by clinics-per-capita in a service region, can plays an even larger role. The effects operating through this channel account for 59 percent of the overall effect of reduced clinic access caused by closures following Texas HB2.[44] We also find that impacts through this channel shift the gestational age distribution (at the time of abortion) to the right, which is consistent with the impacts on congestion causing delays.

Based on our estimated models, if access to abortion clinics had remained at pre-HB2 levels, Texas women would have had nearly 12,000 more abortions in 2014-2015 than were actually observed.[45] We hope that future research can address what explains these "missing" abortions. It is possible that they can be explained by more women giving birth, though our analysis of birth rates suggests that birth rate data alone are insufficient to detect the small effects implied by our estimated effects on abortion. It is also possible that some women responded to the reduction in access to abortion facilities by decreasing risky sexual behaviors and, as a result, unintended pregnancies. And though there is anecdotal evidence suggesting that some Texas women did resort to "do-it-yourself abortions" (Hellerstein, 2014; TPEP, 2015b), data limitations will likely make it difficult to investigate this sort of behavior in any systematic fashion. However, our findings do suggest that the demand for legal abortions is particularly elastic among Hispanics and near the Mexican border, which is consistent with this anecdotal evidence.

[43]See Justice Alito's dissenting opinion in *Whole Woman's Health v. Hellerstedt* (2016a), with reference to *Planned Parenthood v. Casey* (1992).

[44]This estimate is based on our measures of abortion-clinic access in 2012, the results shown Column 6 of Table 2, and the realized outcomes for each county in 2013–2015.

[45]This number excludes effects for 2013 which was partially affected. See Section 5.2 for a discussion of this calculation.

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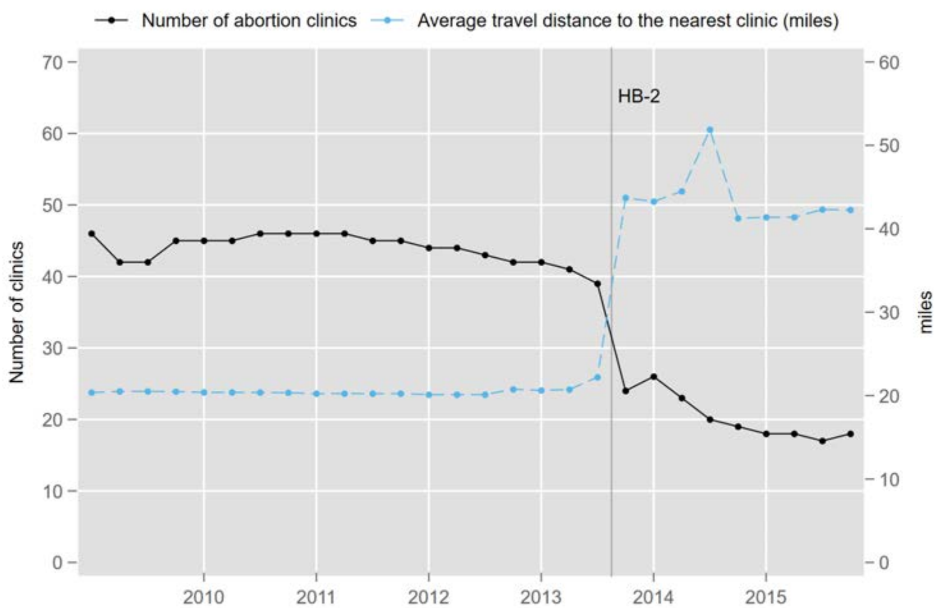
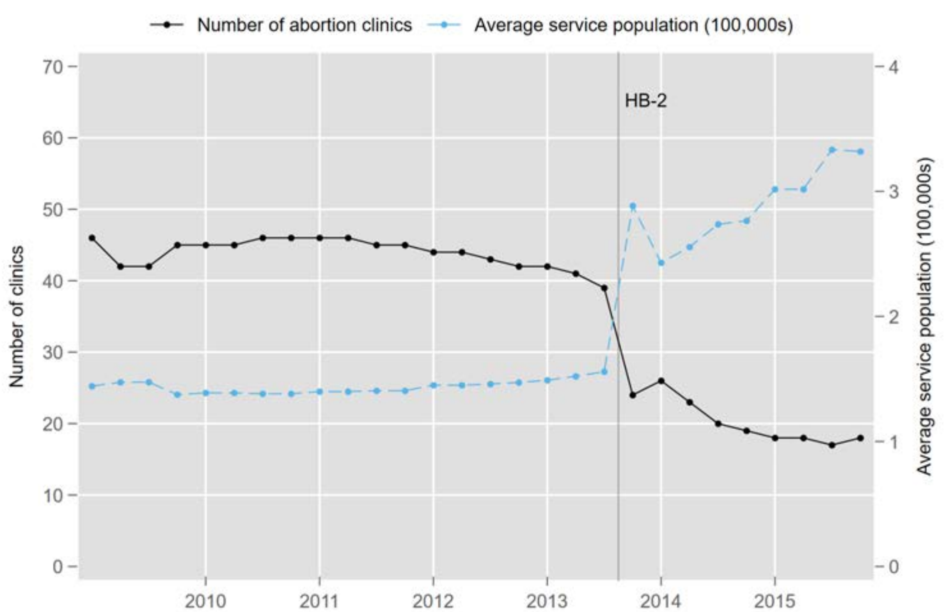
Figure 1
Abortion Clinics and Abortion Clinic Access, Texas 2009-2015

Panel A: Residents' Average Distance to Abortion Clinics



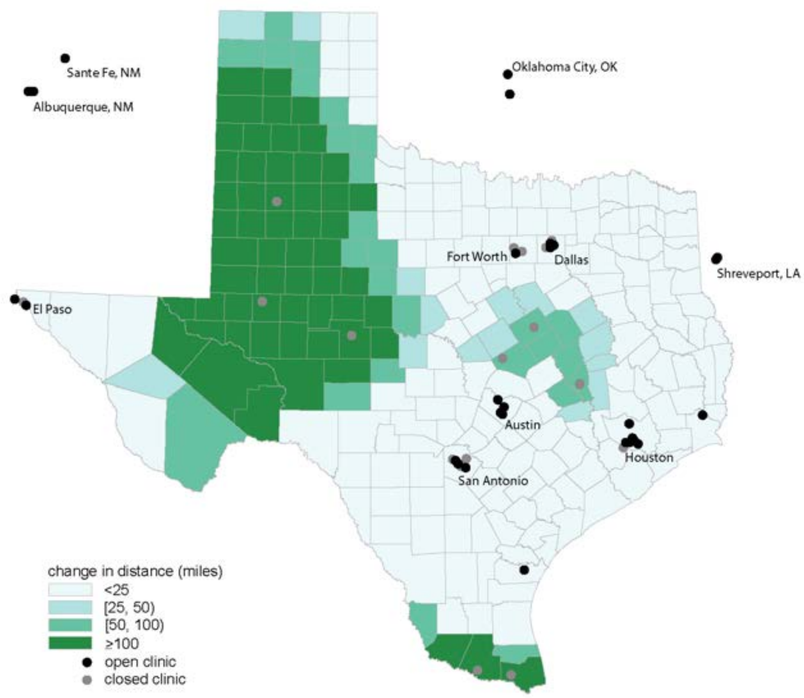
Panel B: Average Service Population



Notes: Distances are population-weighted average travel distances from county population centroids to the geographic coordinates of the nearest open abortion facility. Facility operations are measured quarterly, and a facility is considered "open" if it provided surgical or medical abortions for at least half of a given quarter. Sources: The clinic operations data were compiled by the authors, annual county-level population estimates were obtained from SEER (2016), and geographic coordinates of county population centroids were obtained from the United States Census Bureau (2016).

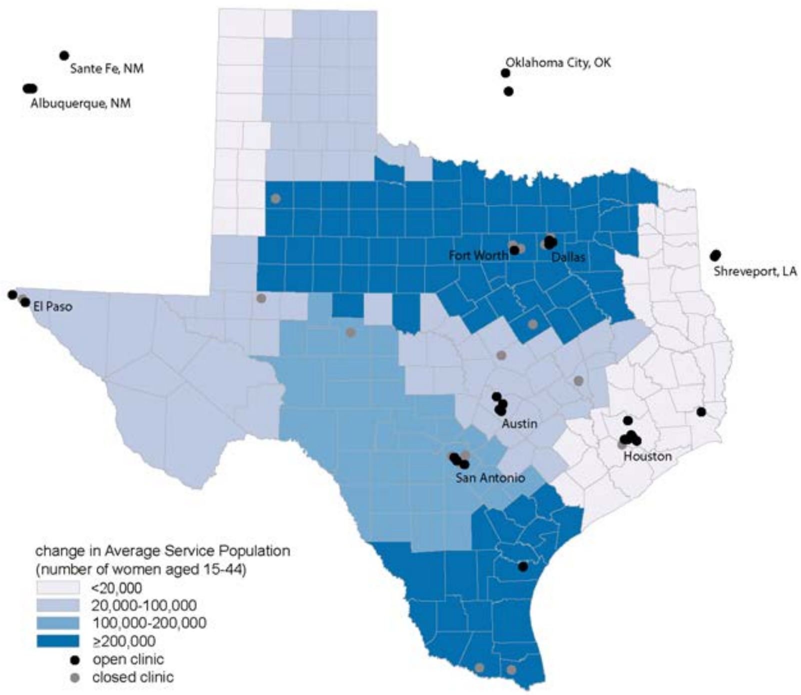
Figure 2

Change in distance to the nearest abortion clinic, Q2 2013 to Q4 2013



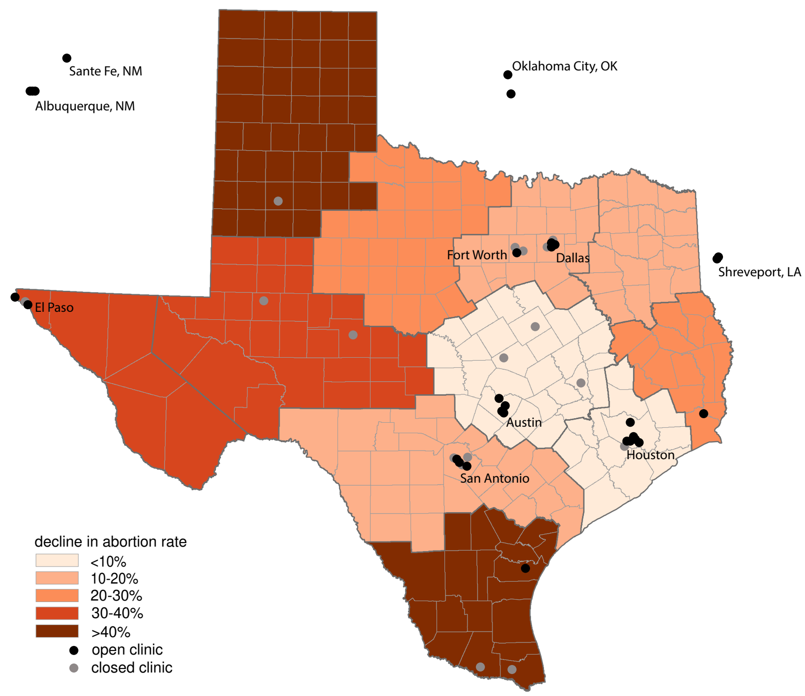
Notes: County-level change in the average distances to the nearest open abortion facility measured in Quarter 2 2013 and Quarter 4 2013. Distances are the estimated travel distances from county population centroids to the geographic coordinates of the nearest open abortion facility. A facility is considered "open" if it provided surgical or medical abortions for at least 2 months in a given quarter. Sources: The clinic operations data were compiled by the authors, annual county-level population estimates were obtained from SEER (2016), and geographic coordinates of county population centroids were obtained from the United States Census Bureau (2016).

Figure 3
Change in *Average Service Population*, Q2 2013 to Q4 2013



Notes: County-level change in the average service population in Quarter 2 2013 and Quarter 4 2013. The average service population associated with a county in a given year is based on the population (women aged 15-44) and the number of clinics in its abortion service region in that year. Service regions are defined annually by spatial proximity to the nearest city with an abortion clinic. Sources: The clinic operations data were compiled by the authors, annual county-level population estimates were obtained from SEER (2016), and geographic coordinates of county population centroids were obtained from the United States Census Bureau (2016).

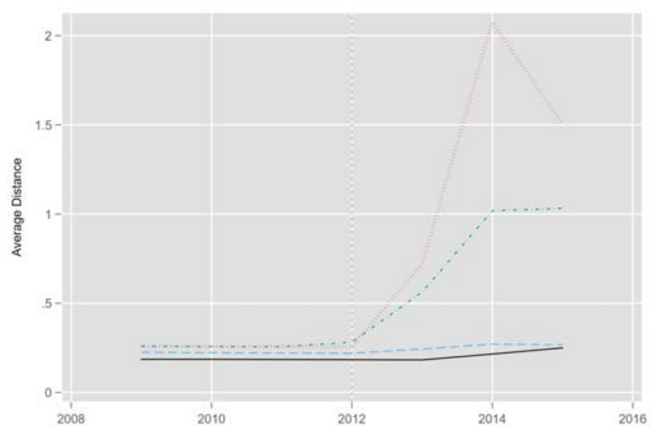
Figure 4
Percent change in abortion rates by public health region, 2013 to 2014



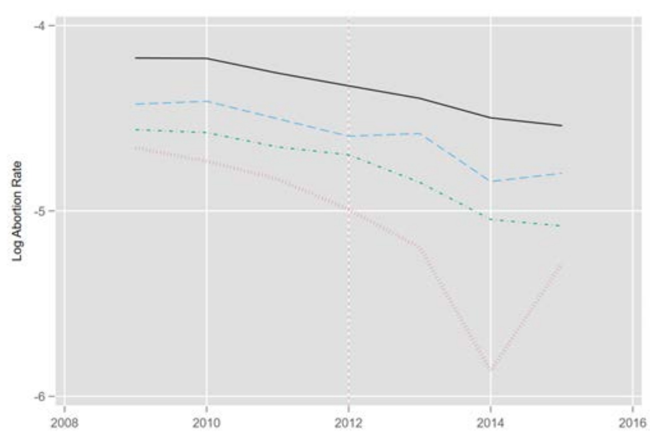
Notes: Percent change in abortions per 1,000 women aged 15-44, calculated for each of Texas' 11 Public Health Regions. Clinics are coded as open or closed based on their status in the second quarter of 2014.

Figure 5
Trends in distance, abortions, and births across treatment intensity groups, where treatment intensity is the change in distance between Q2 2013 and Q4 2013

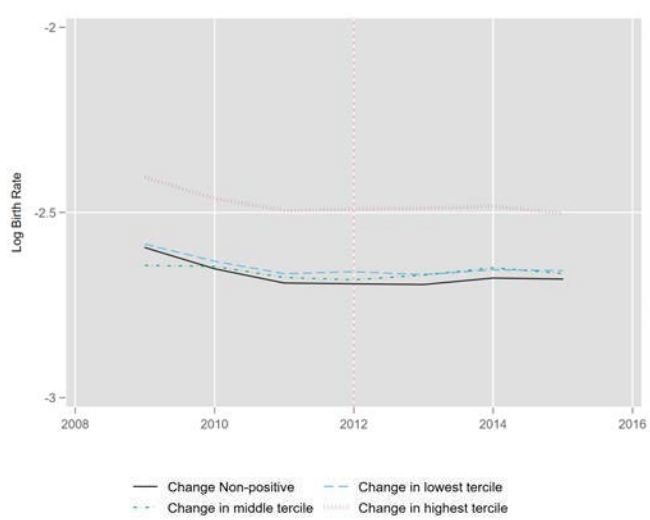
Panel A: Distance to nearest clinic



Panel B: Log abortion rate



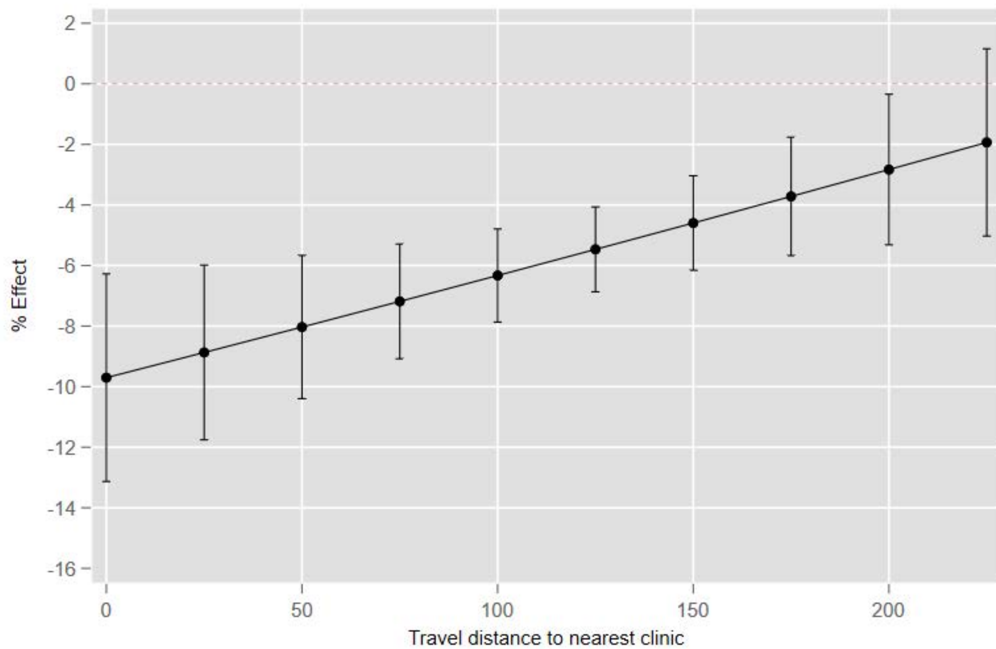
Panel C: Log birth rate



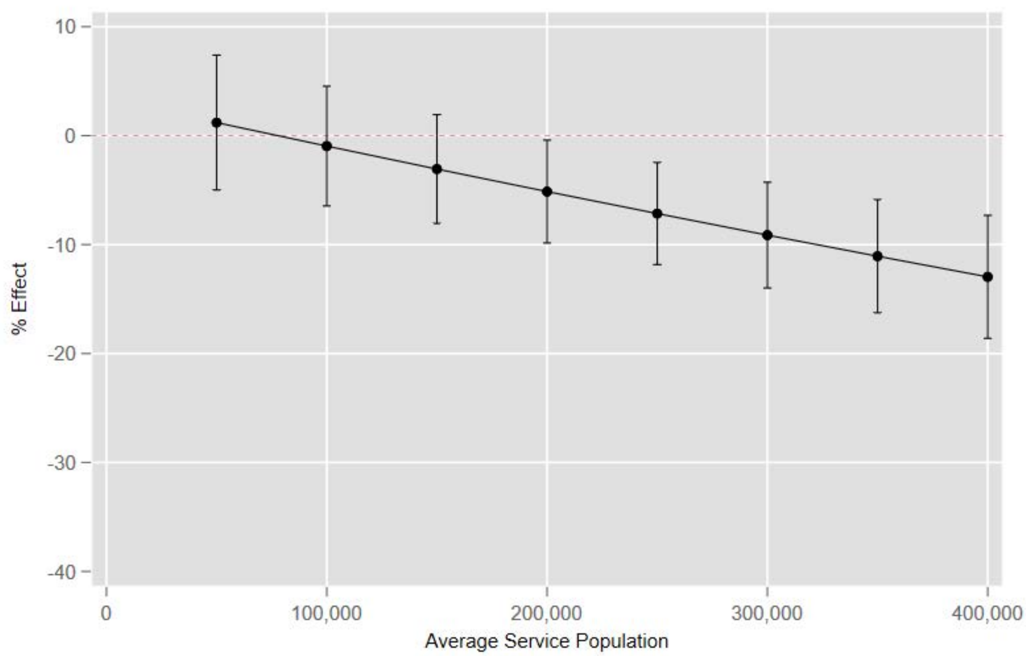
Notes: The vertical line highlights the final year of data before HB2 was enacted.

Figure 6
Estimated percent effects of decreasing access on abortion rates

Panel A: Effect of 25 mile increase in distance by starting level



Panel B: Effect of 100,000 woman increase in average service population by starting level

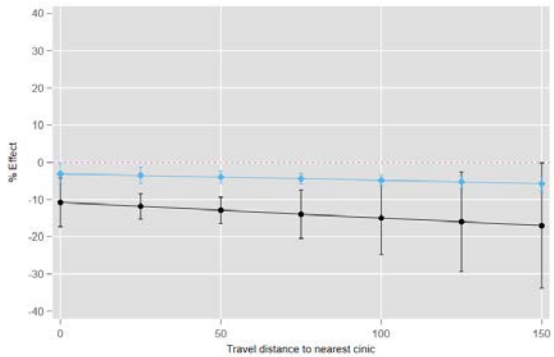


Notes: Plot of estimated average percent effects and 95 percent confidence intervals based on results in Column 6 of Table 2.

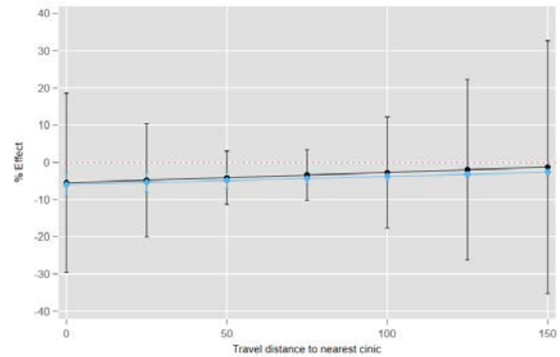
Figure 7
Heterogeneous effects of abortion access by distance to the Mexican border and ethnicity

Panel A: Effect of 25 mile increase in distance by starting level

Hispanic women

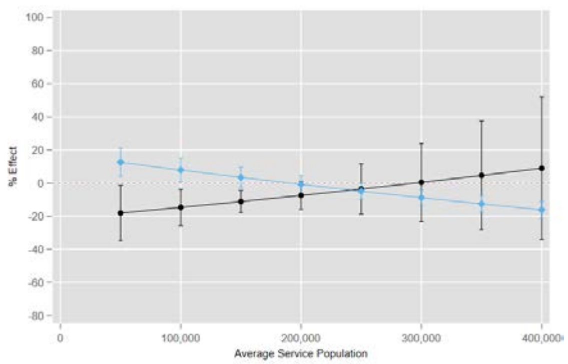


non-Hispanic women

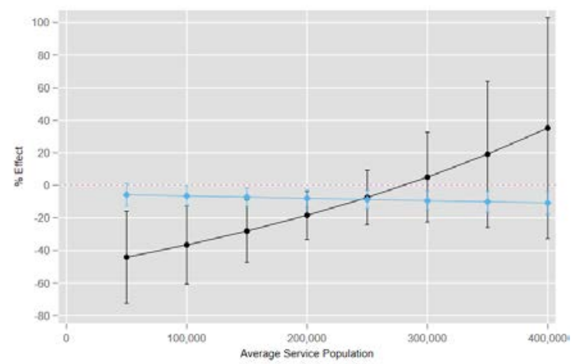


Panel B: Effect of 100,000 woman increase in average service population by starting level

Hispanic women

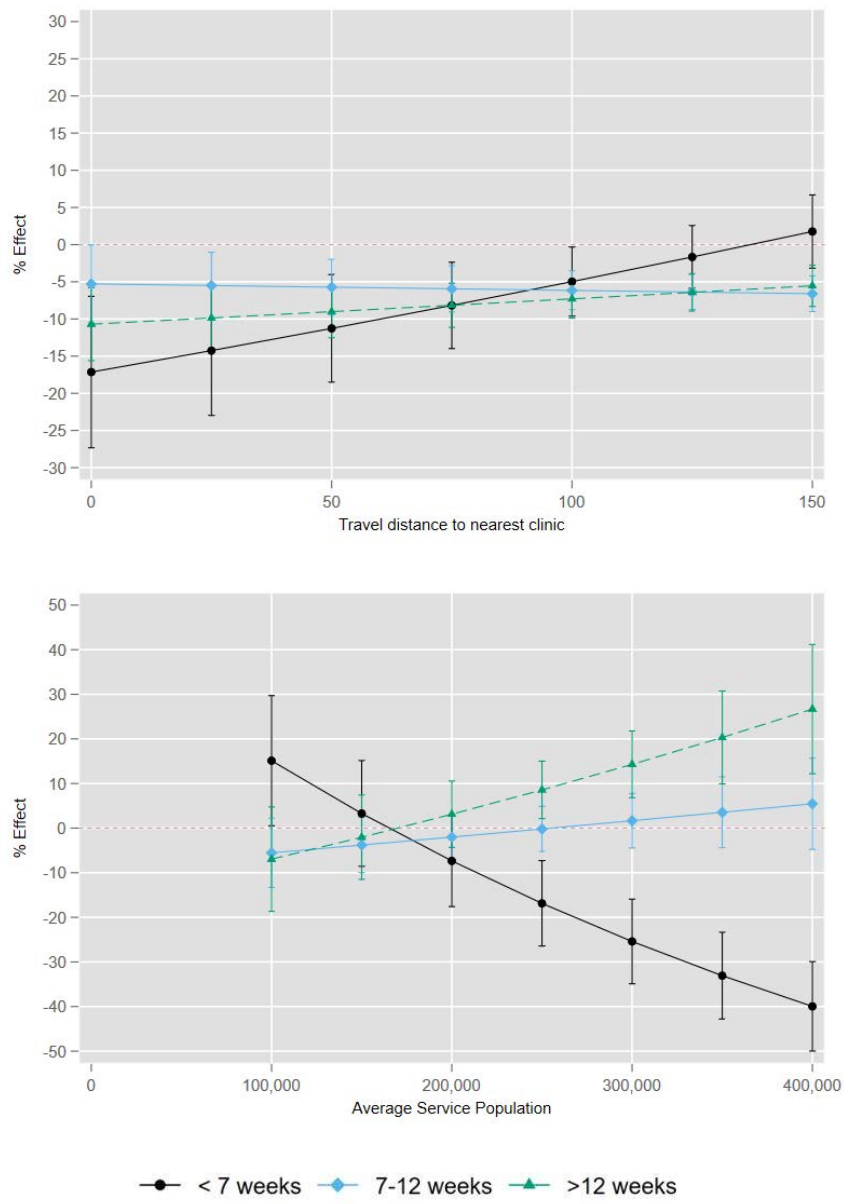


non-Hispanic women



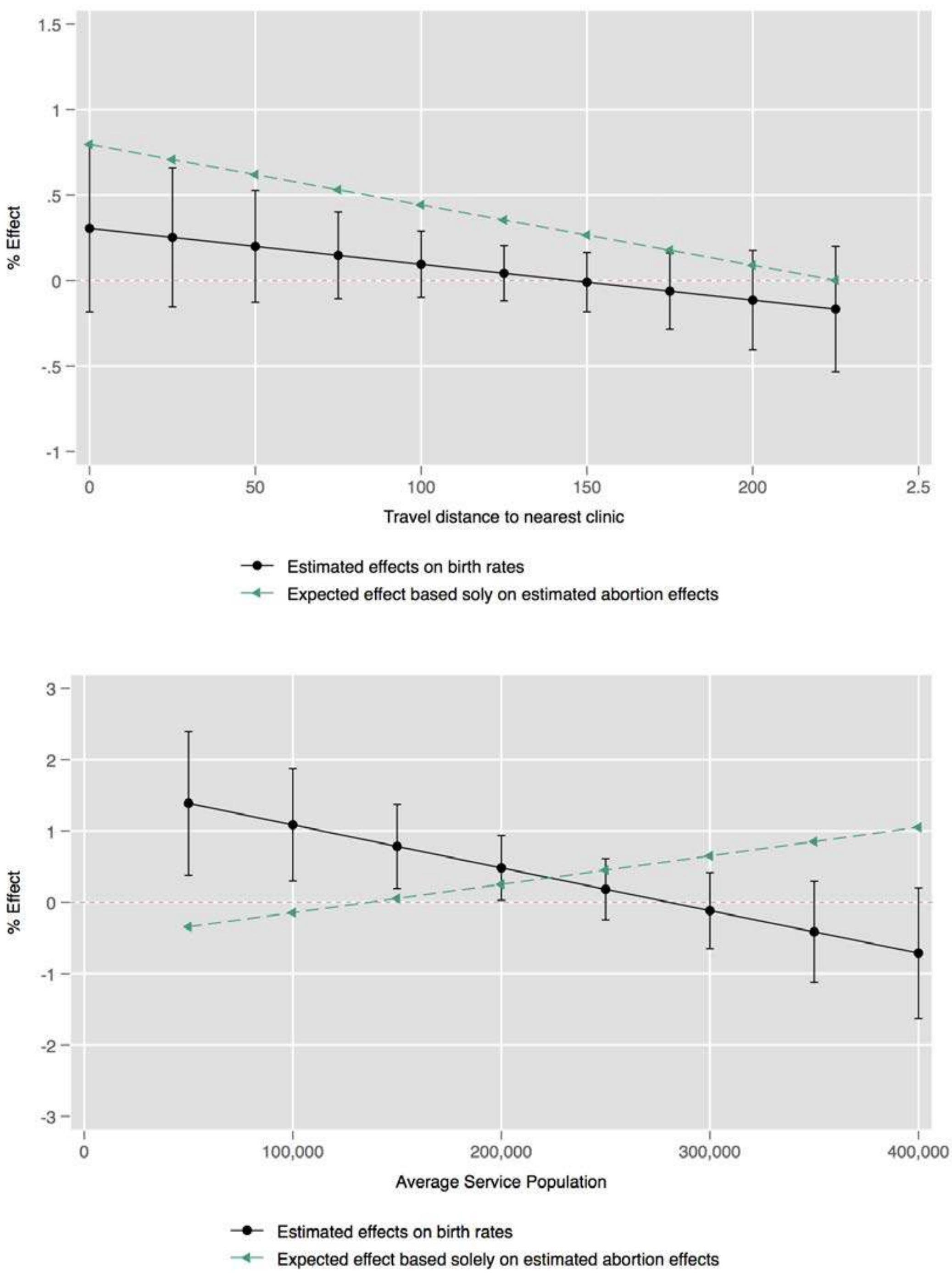
Notes: Plot of estimated average percent effects and 95 percent confidence intervals. Specification corresponds to that in Column 6 of Table 2, with the addition of interaction terms between an indicator that a county is less than 100 miles from the Mexican border and the measures of abortion access. Models are estimated separately for Hispanic and non-Hispanic women.

Figure 8
Estimated effects of abortion access on abortions by gestational age



Notes: Plot of estimated average percent effects and 95 percent confidence intervals based on results in Table **??**. Results are estimated percent effects on abortions per capita estimated for a subset of higher-population counties for which this information is available. Effects are plotted over the ranges of travel distance and average service population observed in the sample.

Figure 9
Estimated effects on birth rates



Notes: Estimates use quarterly clinic access measures, quarterly birth rate data constructed from 2009–2015 restricted-use natality files provided by the National Center for Health Statistics, and population data from SEER. The estimated effects on the birth rate are based on a Poisson model, controlling for county fixed effects; quarter-by-year fixed effects; the fraction of the female age 15-44 population population in each age group (15–19, 20–24, 25–29, 30–34, 35–39, omitting 40-44); the fraction within each age group in that is non-Hispanic black, Hispanic, and non-Hispanic non-white/black; the unemployment rate; and family planning access.

Table 1
Summary Statistics

Variable	2009 to 2015 mean	2009 to 2015 s.d.	2012 mean	2012 s.d.	2014 mean	2014 s.d.
Abortion rate (per 1,000 women)						
Total†	11.68	5.05	11.78	4.98	9.46	4.32
Age 15 to 19	7.21	3.49	6.58	2.81	5.72	2.64
Age 20 to 29	20.22	8.64	20.35	8.34	16.36	7.44
Age 30 to 39	9.33	4.11	9.70	4.29	7.70	3.57
Age 40 plus	2.78	1.48	3.02	1.60	2.03	1.08
White	8.71	3.62	8.84	3.66	7.09	2.78
Black	22.68	10.36	22.65	11.86	19.32	6.50
Hispanic	10.71	4.65	10.78	4.29	8.28	4.29
Other	14.46	8.03	14.94	7.30	11.56	5.43
$<$ 7 weeks gestation†	5.45	2.53	5.84	2.32	3.31	1.56
7-12 weeks gestation†	5.84	2.57	5.66	2.60	5.46	2.27
$>$ 12 weeks gestation†	1.03	0.46	0.98	0.46	1.12	0.47
Birth rate (per 1,000 women)						
Total†	71.11	9.74	69.65	9.38	70.60	9.33
Age 15 to 19	44.86	16.98	44.34	15.52	37.74	13.94
Age 20 to 29	111.74	24.12	108.95	23.38	109.90	23.60
Age 30 to 39	71.74	10.58	70.73	9.84	75.30	9.97
Age 40 to 44	10.08	2.85	9.98	2.74	10.29	2.93
White	62.41	8.89	61.74	9.12	63.64	9.12
Black	63.99	10.06	62.30	9.61	64.33	10.32
Hispanic	83.01	11.12	80.44	9.87	80.17	10.00
Other	62.06	11.41	63.51	12.35	63.14	10.36
1st birth†	23.42	3.23	22.99	2.97	23.03	3.19
2nd birth†	47.65	7.46	46.62	7.04	47.52	7.37
Married†	41.21	5.53	40.33	5.26	41.15	5.16
Unmarried†	29.91	8.60	29.32	8.36	29.45	8.46
Measures of abortion access						
Distance (100s of miles)	0.28	0.48	0.20	0.33	0.45	0.70
Average Service Population (100,000s)	1.92	0.92	1.46	0.49	2.62	0.66
Race						
White	40.04	19.02	40.05	19.04	39.20	18.65
Black	13.05	8.39	13.02	8.38	13.19	8.37
Hispanic	41.35	21.44	41.40	21.46	41.73	21.17
Other	5.56	3.93	5.53	3.89	5.88	4.14
Age distribution						
15 to 19	16.72	2.01	16.60	1.96	16.41	1.94
20 to 29	34.03	3.90	34.08	4.03	34.20	3.72
30 to 39	33.10	2.73	32.97	2.71	33.15	2.61
40 to 44	16.15	1.90	16.34	1.94	16.25	1.88
Economic conditions						
Unemployment rate	6.59	1.86	6.77	1.41	5.17	1.22

Notes: Population-weighted summary statistics calculated for Texas counties (n=254) for the pooled sample period (2009-2015) and individually for 2012 (the year prior to HB-2) and 2014 (the year after HB-2). Abortion counts by gestational age are suppressed in counties with fewer than 10 abortions in a gestational age category. Sources: Authors' compilation of clinic operations, annual county-level population estimates from SEER (2016), abortions by county of residence from the Texas DSHS (2017), geographic coordinates of county population centroids from the United States Census Bureau (2016), and unemployment rates from the BLS (2016). † indicates that rate is calculated using population of women aged 15-44 as denominator. All other rates are calculated using population of women in the indicator racial, ethnic, or age group as denominator.

Table 2
Estimated Effects of Distance to an Abortion Clinic on Abortion Rates

	(1)	(2)	(3)	(4)	(5)	(6)
Distance (100s miles)	-0.216***	-0.405***			-0.354***	-0.427***
	(0.052)	(0.117)			(0.091)	(0.084)
Distance^2 (100s miles)		0.077**			0.060*	0.073***
		(0.036)			(0.031)	(0.028)
Average Service Population (100,000s)			-0.081*	0.031	0.029	0.055
			(0.046)	(0.048)	(0.040)	(0.039)
$\text{Average Service Population}^2$				-0.020***	-0.017***	-0.022***
				(0.006)	(0.005)	(0.006)
County FE and year FE	yes	yes	yes	yes	yes	yes
Time-varying county control variables	no	no	no	no	no	yes

Notes: Estimates are based on a Poisson model evaluating expected abortion rates among women aged 15 to 44 using county-level data for all 254 Texas counties from 2009–2015. Time-varying county control variables include demographic control variables (the fraction of the 15-44 female population in each each five year grouping and the fraction of each of these age groups that is non-Hispanic white, non-Hispanic black, or Hispanic versus other race/ethnicity); family planning control variables as described in the text, and the county unemployment rate. Standard errors (in parentheses) allow errors to be correlated within counties over time.
*, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

APPENDIX A: Abortion clinic operations in Texas and neighboring states, January 2009 through May 2017

Clinic	City	State	Dates providing abortion services
Texas			
Planned Parenthood Choice	Abilene	TX	<2009-11/6/2012
Austin Womens Health Center (Brookside)	Austin	TX	<2009-present
International Health Care Solution	Austin	TX	<2009-8/31/2014
Planned Parenthood South Austin Clinic	Austin	TX	<2009-present
Whole Woman's Health Austin	Austin	TX	<2009-7/14/2014; 4/30/17-present
Whole Woman's Health Beaumont	Beaumont	TX	<2009-3/19/2014
Planned Parenthood Center for Choice (Bryan)	Bryan	TX	<2009-8/1/2013
Coastal Birth Control Center	Corpus Christi	TX	<2009-6/6/2014
Fairmount Center	Dallas	TX	<2009-9/30/2009
North Park Medical Group/AAA Healthcare Systems	Dallas	TX	<2009-11/1/2013; 2/15/17-present
Planned Parenthood Dallas/South Dallas Surgical Health Services Center	Dallas	TX	7/1/2014-present
Planned Parenthood of Greater Texas Surgical Health Services	Dallas	TX	<2009-6/30/2014
Routh St. Women's Clinic	Dallas	TX	<2009-6/13/2015
Southwestern Women's Surgery Center	Dallas	TX	9/2009-present
The Women's Center (Abortion Advantage)	Dallas	TX	<2009-11/1/2013; 1/1/2014-12/23/2014
Hilltop Women's Reproductive Center (Abortion Advisers Agency)	El Paso	TX	<2009-present

Continued on next page

Clinic	City	State	Dates providing abortion services
Reproductive Services	El Paso	TX	<2009-11/1/2013; 1/15/2014-4/11/2014; 9/24/2015-present
Planned Parenthood of Greater Texas Star Clinic/Southwest Fort Worth Health Center	Fort Worth	TX	7/1/2013-11/1/2013; 1/13/2014-present
West Side Clinic	Fort Worth	TX	<2009-11/1/2013
Whole Woman's Health Ft. Worth	Fort Worth	TX	<2009-11/1/2013; 12/6/2013-present
Planned Parenthood of Greater Texas Henderson Clinic	Forth Worth	TX	<2009-6/30/2013
Harlingen Reproductive	Harlingen	TX	<2009-11/1/2013
A Affordable Women's Medical Center	Houston	TX	<2009-2/14/2014
AAA Concerned Women's Center (Abortion Hotline)	Houston	TX	<2009-10/6/2014
Aalto Women's Center	Houston	TX	<2009-3/13/2014
Aaron women's center/Women's Pavilion	Houston	TX	<2009-8/7/2014
Crescent City Women's Center	Houston	TX	<2009-12/30/2011
Houston Women's Clinic	Houston	TX	<2009-present
Planned Parenthood Center for Choice (Gulf Freeway)	Houston	TX	11/1/2010-present
Planned Parenthood of Southest Texas	Houston	TX	<2009-10/31/2010
Suburban Women's Clinic (Medical Center) of NW Houston	Houston	TX	<2009-present
Suburban Women's Clinic of SW Houston	Houston	TX	<2009-present
Texas Ambulatory Surgery Center	Houston	TX	<2009-present
Women's Center of Houston	Houston	TX	10/4/2013-present

Continued on next page

Clinic	City	State	Dates providing abortion services
Killeen Women's Health Center	Killeen	TX	<2009-11/1/2013
Planned Parenthood Women's Health Center	Lubbock	TX	<2009-11/1/2013
Whole Woman's Health- McAllen	McAllen	TX	<2009-11/1/2013; 9/6/2014-present
Planned Parenthood Choice	Midland	TX	<2009-8/30/2013
Planned Parenthood Choice	San Angelo	TX	<2009-8/30/2013
A Woman's Choice Quality Health Center	San Antonio	TX	<2009-6/15/2011
Alamo Women's Clinic/ Alamo Women's Reproductive Services Clinic	San Antonio	TX	6/1/2015-present
Alamo Women's Reproductive Services Clinic	San Antonio	TX	<2009-5/31/2015
All Women's Medical Center	San Antonio	TX	<2009-8/6/2013
New Women's Clinic	San Antonio	TX	<2009-11/1/13
Planned Parenthood Babcock Sexual Healthcare	San Antonio	TX	<2009-5/30/2015
Planned Parenthood Bandera Clinic	San Antonio	TX	<2009-4/14/2009; 11/16/2009-11/1/2013
Planned Parenthood Medical Center	San Antonio	TX	6/1/2015-present
Planned Parenthood Northeast Clinic	San Antonio	TX	<2009-4/14/2009; 11/16/2009-11/1/2013
Planned Parenthood Southeast Clinic	San Antonio	TX	<2009-4/14/2009
Planned Parenthood Marbach Clinic	San Antonio	TX	<2009-4/14/2009
Reproductive Services	San Antonio	TX	<2009-7/7/2012
Whole Woman's Health San Antonio	San Antonio	TX	8/2/2010-present
Planned Parenthood Center for Choice	Stafford	TX	<2009-11/1/2013
KNS Medical PLLC INC	Sugar Land	TX	<2009-3/27/2013

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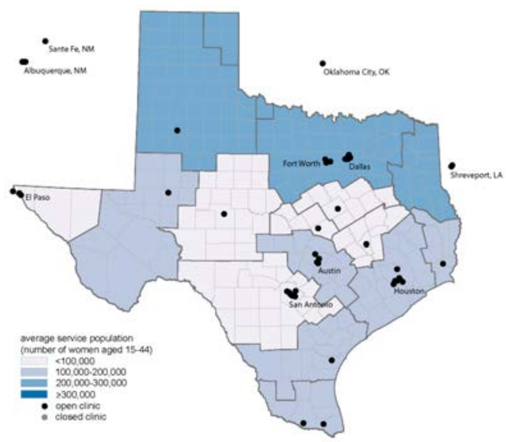
Clinic	City	State	Dates providing abortion services
Planned Parenthood of Central Texas	Waco	TX	1/1/2012-8/31/2013; 5/2/2017-present
Planned Parenthood Waco	Waco	TX	<2009-12/31/2011
Neighboring states*			
Alamosa Planned Parenthood	Alamosa	CO	2009-present
Bossier City Medical Suite	Bossier City	LA	<2009-4/15/2017
Hope Medical Group for Women	Shreveport	LA	<2009-present
Planned Parenthood Albuquerque Surgical Center	Albuquerque	NM	<2009-present
Southwestern Women's Options	Albuquerque	NM	1/2009-present
University of New Mexico Center for Reproductive Health	Albuquerque	NM	<2009-3/25/2014
University of New Mexico Center for Reproductive Health	Albuquerque	NM	4/1/2014-present
Whole Woman's Health	Las Cruces	NM	9/15/2014-present
Planned Parenthood Santa Fe Health Center	Santa Fe	NM	<2009-present
Hilltop Women's Reproductive Clinic	Santa Teresa	NM	<2009-present
Abortion Surgery Center	Norman	OK	<2009-present
Outpatient Services for Women	Oklahoma City	OK	<2009-12/9/2014
Planned Parenthood Great Plains	Oklahoma City	11/15/2016- present	
Trust Women South Wind Women's Center	Oklahoma City	OK	9/15/2016-present

Author-constructed panel of abortion clinic operations in Texas and neighboring states. Clinics are identified based on licensure data from the Texas DSHS. To identify dates of operation, we use licensure dates supplemented with accounts of clinic operations in the judicial record, news reports and on websites including Fund Texas Choice. A clinic in a neighboring state is listed only if it is the closest destination for at least one Texas county in one quarter in our dataset. "Present" is as of May 4, 2017.

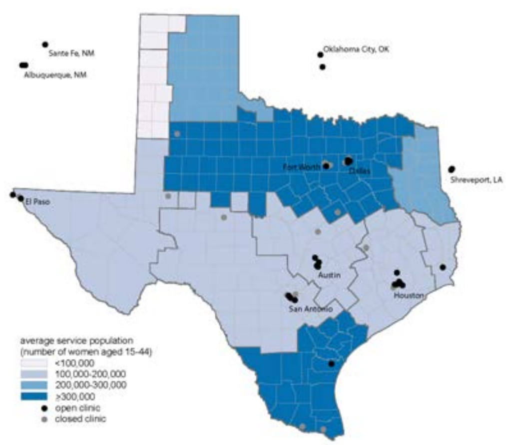
APPENDIX B: ADDITIONAL FIGURES ILLUSTRATING VARIATION AND SUPPORTING THE VALIDITY RESEARCH DESIGN

Figure B1
Service Regions and Average Service Populations, Q2 2013 and Q4 2013

Panel A: Q2 2013

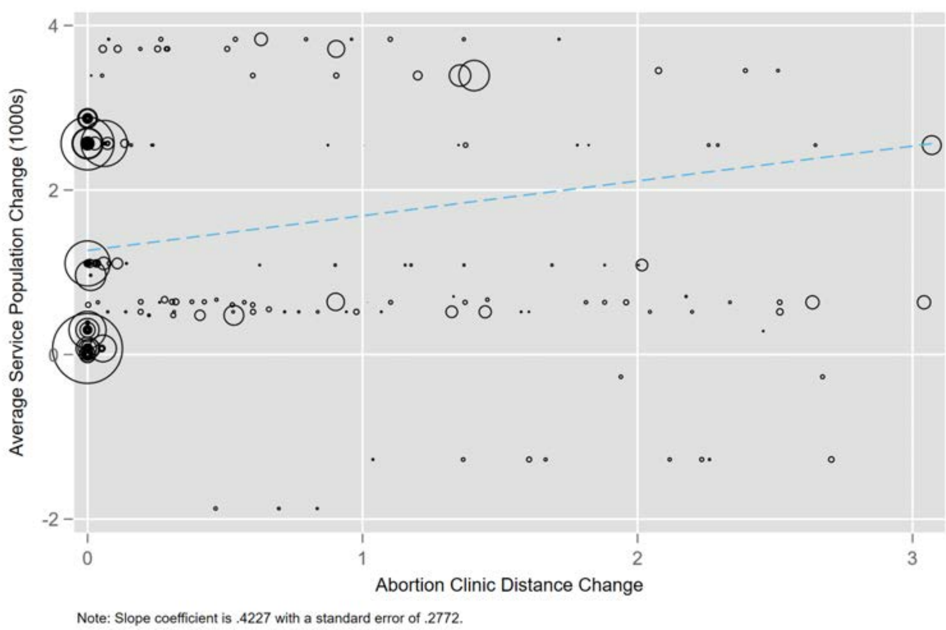


Panel B: Q4 2013



Notes: Service regions are defined annually by spatial proximity to the nearest city with an abortion clinic. These are delineated by heavy boundary lines. The Average Service Population is the total population of women aged 15 to 44 divided by the number of clinics in each service region.

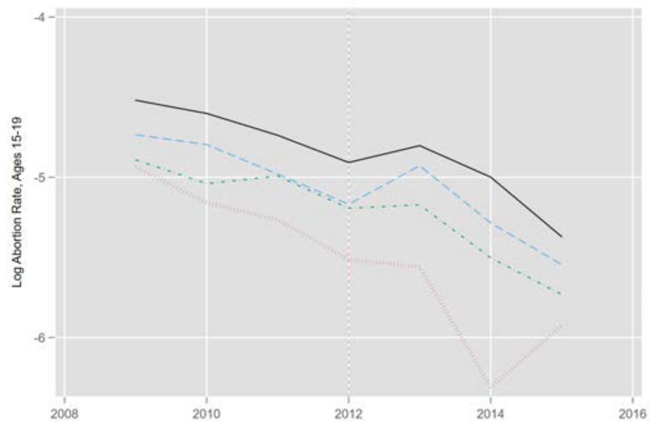
Figure B2
(Appendix) Independent Variation in Average Service Population Measure of Access to Abortion



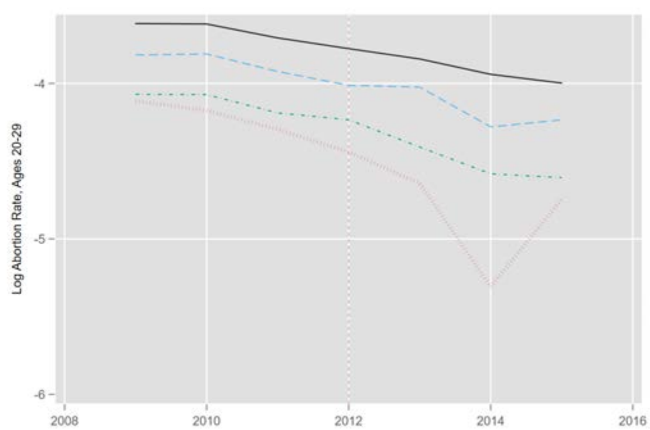
Notes: Population-weighted linear regression of the change in average service population on the change in distance to the nearest abortion provider. Changes are calculated between Q2 2013 to Q4 2013. See previous figures for additional definitions and sources.

Figure B3
(Appendix) Trends in abortion rates *by age* across treatment intensity groups,
where treatment intensity is the change in distance to nearest clinic Q2 2013 to Q4 2013

Panel A: Age 15-19



Panel B: Age 20-29



Panel C: Age 30-39

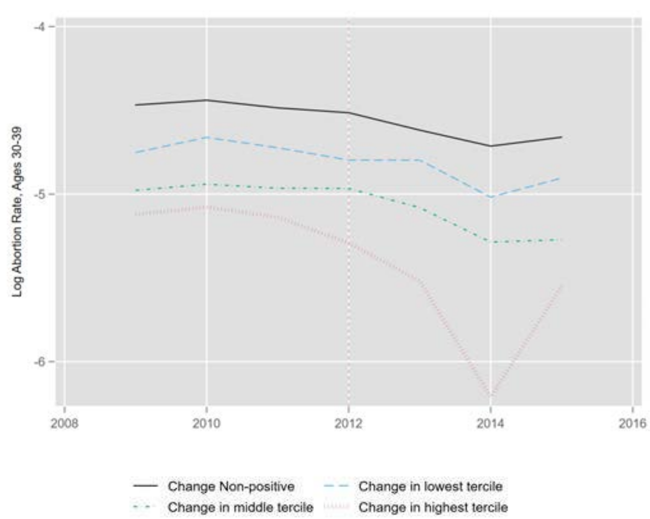


Figure B4

(Appendix) Trends in birth rates *by age* across treatment intensity groups, where treatment intensity is the change in distance to nearest clinic Q2 2013 to Q4 2013

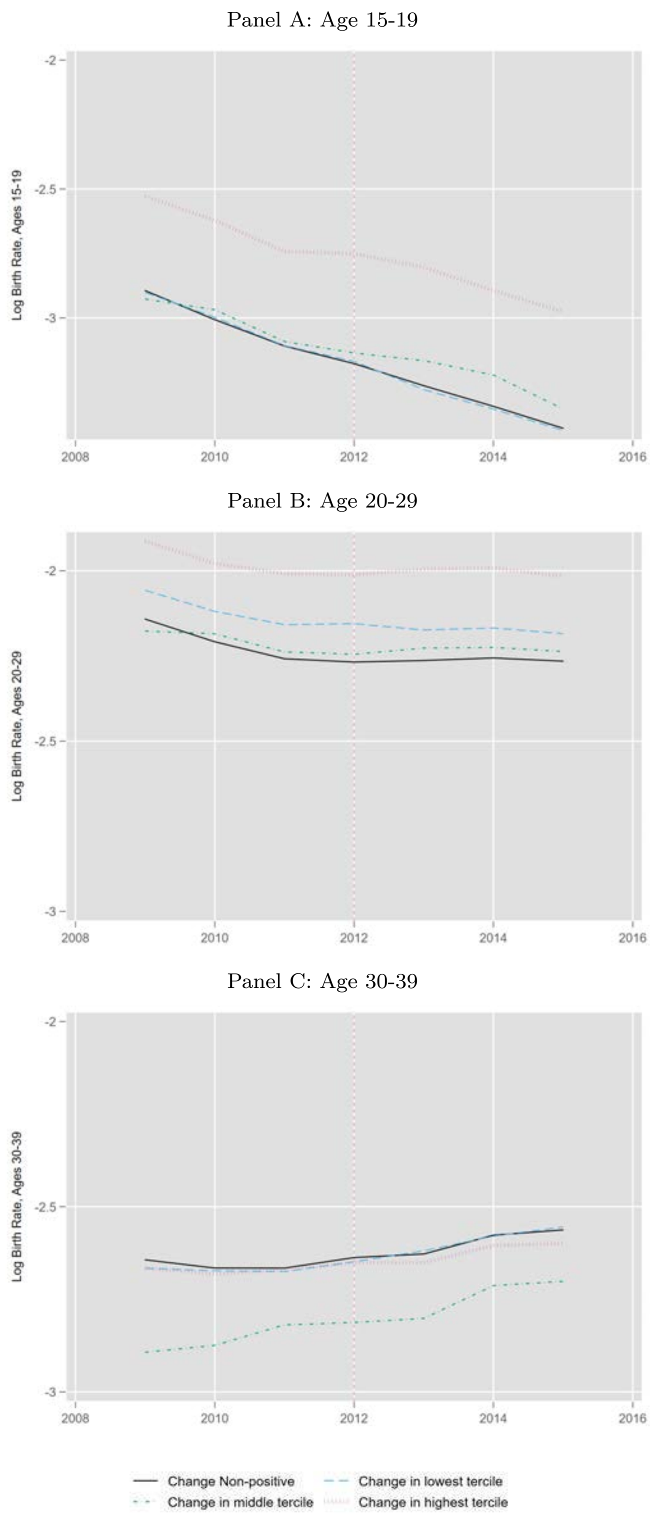
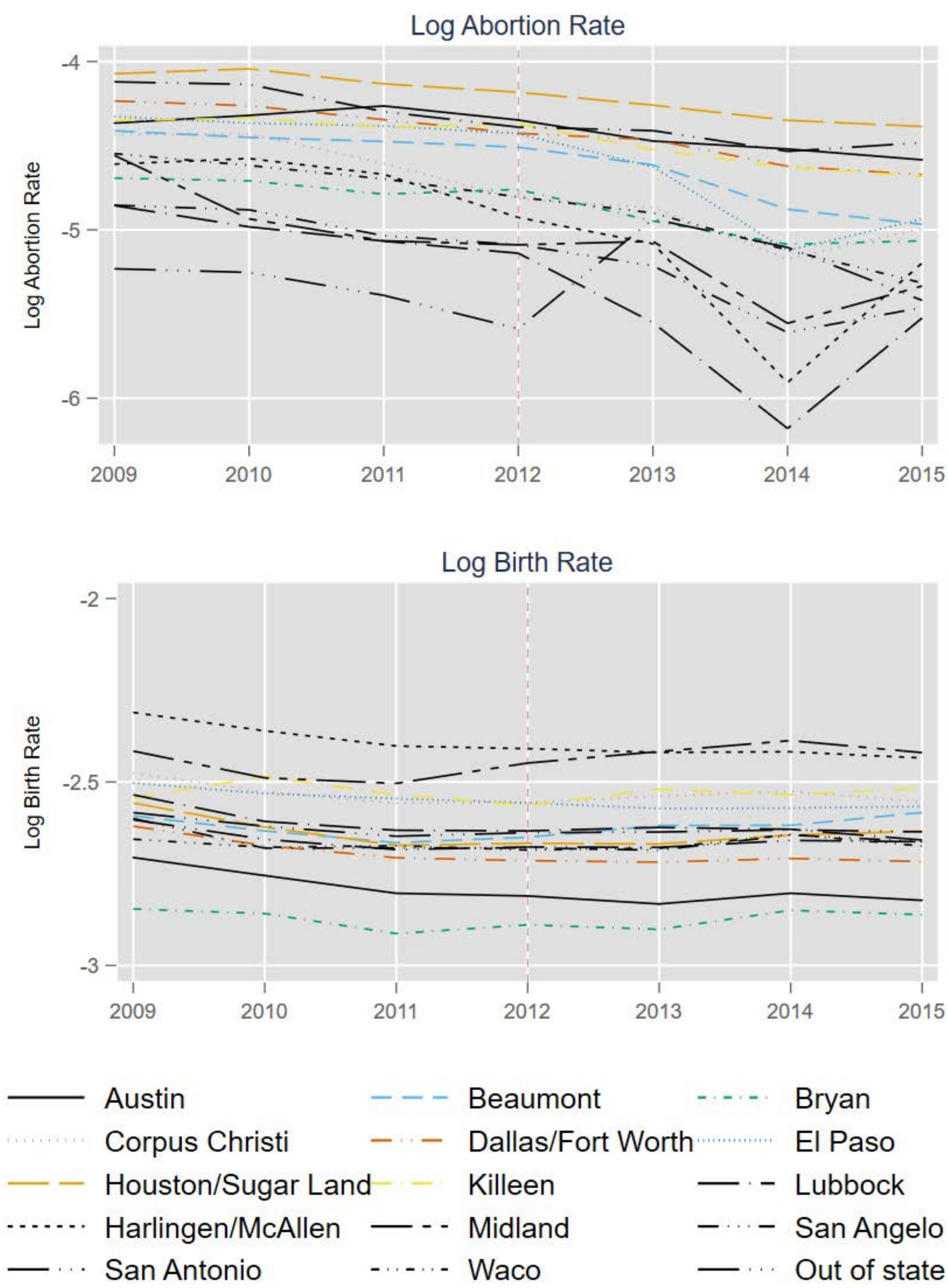


Figure B5
(Appendix) Trends in covariates across treatment intensity groups,
where treatment intensity is the change in distance to nearest clinic Q2 2013 to Q4 2013

Figure B6
(Appendix) Trends in abortion and birth rates across service regions



Notes: Counties are grouped into service regions using the Quarter 2 2013 service region map (See Panel A of Figure B1). The vertical line highlights the final year of data before HB2 was enacted. Note that we combine the Oklahoma City/Norman, Oklahoma and Shreveport/Bossier City, Louisiana service regions into a single "out of state" region for the purposes of this figure, because the Oklahoma service region only includes 3 rural counties with small populations yielding noisy estimates.

APPENDIX C: RESULTS OF SENSITIVITY ANALYSES

This appendix shows the results of several additional robustness checks for the main results in Table 2. Table C1 reports an alternative set of estimates using geodesic ("as the crow flies") distances rather than travel distances and Table C2 reports results using estimated travel times. The results are substantively the same regardless of which of these three measures of access one chooses. Table C3 presents alternative estimates of the results in Table 2, using an alternative to the Poisson model to evaluate log abortion rates. Specifically, this table presents weighted least squares estimates applied to a measure of log abortion rates constructed using the inverse hyperbolic sine function, where the weights are the population of females aged 15-44. Suppressing subscripts, the outcome variable we use in this analysis is $ln(\frac{abortions+\sqrt{abortions^2+1}}{population})$ which has the advantage of being defined even when zero births are observed. The estimates reported in Appendix Table C3 are similar to those reported in columns 1 and 3 of Table 2, in both magnitude in magnitude and statistical significance. The results for the quadratic models prove somewhat smaller and much less precise using this specification. In Table C4 we show our main results are robust to alternative approaches to controlling for access to family planning.

In columns 2 and 3 of Table C5 we conduct tests that confirm our main results are not subject to any significant bias driven by unmeasured abortions obtained in nearby states. In our first test, we eliminate the entire Texas Panhandle region from the sample because this region includes counties for which New Mexico or Oklahoma abortion clinics were the nearest abortion destination in the later years in the sample. More specifically, we identify the Panhandle as counties in Texas Public Health Region 1 as defined by the Texas DSHS. Our second test eliminates all counties in Texas for which an out-of-state clinic is ever the closest destination for an abortion during the study period. This rule causes us to eliminate 56 out of Texas' 254 counties, all of them in the Panhandle region and Northeastern Texas. Because these counties are primarily rural, they account for only 5.4 percent of the population of women of childbearing age. The resulting estimates are quite similar to our main results.

We also consider estimates that rely on different time windows for the analysis. We do so with three main objectives. First, we want to verify that our estimates are robust to focusing on a narrower window of time around around HB2's enactment. Our main results use data from 2009–2015, and thus use variation in access generated by closures induced by HB2 in addition variation in access generated to closures (and openings) taking place at other times. We would be less confident in the validity of these estimates if they are not robust to an approach that restricts the degree to which the latter source of variation contributes to the estimates. Our second objective is to consider the robustness of the estimates to using years in which we consistently have data on abortions occurring in Louisiana, which are included beginning in 2013. Our third and final objective is to examine whether the estimates differ if we focus on "later post-HB2 years" in order to speak to whether the immediate and longer-run effects differ.

The results of these analyses are shown in Columns 4-6 of Table C5. Column 4 reports estimates that use data from 2012 to 2014, demonstrating that the results are similar when the models are estimated with a narrower time window around the enactment of HB2. Column 5 reports estimates based on data from 2012 and 2015, omitting the year most clinics closed and the subsequent year. The estimates in each of these columns continue to indicate significant effects of increasing distance and the average service population. That said, the estimates are smaller in magnitude when 2015 is the only fully post-HB2 year included in the analysis, which does suggest that the immediate effects of decreased access may be larger than the effects after a period of time, as individuals and clinics learn and make adjustments. Finally, Column 6 reports estimates that solely use data from 2013 through 2015, which corresponds to the set of years in which abortions taking place in Louisiana are reported in the data. The variation across these three years is driven in part by the fact that 2013 is only partially affected by the closures precipitated by HB2 and also in part by subsequent clinic openings. The estimated effects of distance based on this variation are again somewhat attenuated, but continue to point to similar conclusions as the main results.

Table C1
(Appendix) Sensitivity of Table 2 Results to using Geodesic Distance
Estimated Effects of Distance to an Abortion Clinic on Abortion Rates

	(1)	(2)	(3)	(4)	(5)	(6)
Distance (100s miles)	-0.255***	-0.470***			-0.411***	-0.495***
	(0.061)	(0.138)			(0.108)	(0.101)
$Distance^2$ (100s miles)		0.103**			0.080*	0.099**
		(0.050)			(0.044)	(0.041)
Average Service Population (100,000s)			-0.081*	0.031	0.030	0.055
			(0.046)	(0.048)	(0.039)	(0.038)
Average Service $Population^2$				-0.020***	-0.017***	-0.021***
				(0.006)	(0.005)	(0.006)
County FE and year FE	yes	yes	yes	yes	yes	yes
Time-varying county control variables	no	no	no	no	no	yes

Notes: Re-estimation of Table 2 using estimated geodesic distance rather than travel distance. See notes to Table 2. *, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

Table C2
(Appendix) Sensitivity of Table 2 Results to using Travel Time
Estimated Effects of Travel Time to an Abortion Clinic on Abortion Rates

	(1)	(2)	(3)	(4)	(5)	(6)
Travel time (hours)	-0.147***	-0.261***			-0.226***	-0.271***
	(0.034)	(0.075)			(0.059)	(0.052)
$Time^2$ (hours)		0.030**			0.023*	0.028**
		(0.015)			(0.013)	(0.012)
Average Service Population (100,000s)			-0.081*	0.031	0.027	0.051
			(0.046)	(0.048)	(0.040)	(0.039)
Average Service $Population^2$				-0.020***	-0.016***	-0.021***
				(0.006)	(0.005)	(0.006)
County FE and year FE	yes	yes	yes	yes	yes	yes
Time-varying county control variables	no	no	no	no	no	yes

Notes: Re-estimation of Table 2 using estimated travel time rather than travel distance. See notes to Table 2. *, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

Table C3

(Appendix) Sensitivity of Table 2 Results to using Inverse Hyperbolic Sine Transformation

Estimated Effects of Distance to an Abortion Clinic on Abortion Rates

	(1)	(2)	(3)	(4)	(5)	(6)
Distance (100s miles)	-0.259***	-0.101			-0.088	-0.114
	(0.051)	(0.136)			(0.113)	(0.116)
Distance^2 (100s miles)		-0.050			-0.053	-0.044
		(0.042)			(0.038)	(0.037)
Average Service Population (100,000s)			-0.057	0.215***	0.144*	0.130*
			(0.036)	(0.082)	(0.077)	(0.073)
Average Service Population^2				-0.059***	-0.048***	-0.046***
				(0.014)	(0.013)	(0.013)
County FE and year FE	yes	yes	yes	yes	yes	yes
Time-varying county control variables	no	no	no	no	no	yes

Notes: Re-estimation of Table 2 applying weighted least squares to a measure of log abortion rates constructed using a hyperbolic sine transformation such that the outcome is $ln(\frac{count+\sqrt{count^2+1}}{population})$. See notes to Table 2. *, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

Table C4

(Appendix) Sensitivity of Table 2 Results to alternate Family Planning Controls

Estimated Effects of Distance to an Abortion Clinic on Abortion Rates

	(1)	(2)	(3)	(4)
Distance (100s miles)	-0.427***	-0.425***	-0.435***	-0.426***
	(0.084)	(0.084)	(0.085)	(0.083)
Distance^2 (100s miles)	0.073***	0.074***	0.077***	0.075***
	(0.028)	(0.028)	(0.029)	(0.028)
Average Service Population (100,000s)	0.055	0.044	0.057	0.053
	(0.039)	(0.039)	(0.041)	(0.039)
Average Service Population^2	-0.022***	-0.020***	-0.021***	-0.021***
	(0.006)	(0.007)	(0.006)	(0.006)
1(family planning clinic in county in 2010) × 1(post-2011)	yes	no	no	no
1(family planning clinic in county)	no	yes	no	no
# of family planning clinics	no	no	yes	no
# of family planning clinics per capita	no	no	no	yes

Notes: Re-estimation of Table 2, Column 5 using alternative controls for access to publicly-funded family-planning clinics. All columns control for county fixed effects, year fixed effects, demographics, and the unemployment rate. See notes to Table 2. *, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

Table C5
(Appendix) Sensitivity Analysis to Years and Regions Included

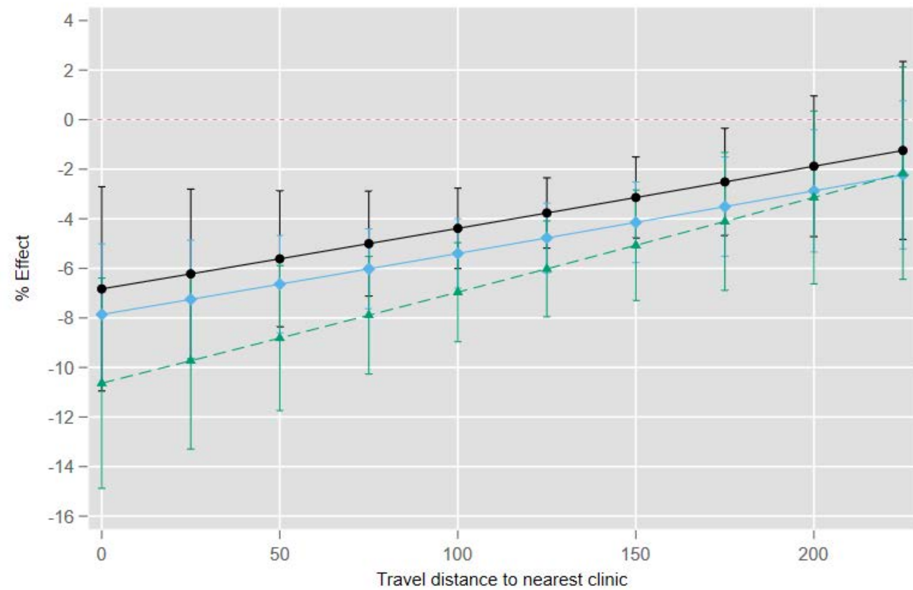
		Counties excluded		Years included		
	Full Sample	Panhandle	Out-of-State Travel	2012–2014	2012, 2015	2013–2015
	(1)	(2)	(3)	(4)	(5)	(6)
Distance (100s miles)	-0.427***	-0.470***	-0.460***	-0.307***	-0.248***	-0.379**
	(0.084)	(0.082)	(0.087)	(0.119)	(0.079)	(0.150)
Distance^2 (100s miles)	0.073***	0.094***	0.096***	0.009	0.040	0.062
	(0.028)	(0.025)	(0.026)	(0.043)	(0.026)	(0.041)
Average Service Population (100,000s)	0.055	0.033	0.077**	0.146**	0.057	-0.002
	(0.039)	(0.043)	(0.037)	(0.071)	(0.062)	(0.065)
Average Service Population^2	-0.022***	-0.018***	-0.022***	-0.036**	-0.019**	-0.012
	(0.006)	(0.006)	(0.005)	(0.014)	(0.008)	(0.010)
County FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Demographic Controls	yes	yes	yes	yes	yes	yes
Unemployment Rate	yes	yes	yes	yes	yes	yes
Family Planning Access Controls	yes	yes	yes	yes	yes	yes

Notes: Re-estimation of Table 2,Column 5 using alternative sample limitations. In this table, Column 2 excludes the Texas panhandle region, Column 3 excludes all counties are those for which an out-of-state abortion clinic is ever the nearest abortion destination, and Column 4 excludes counties that were in the Austin service region in Q2 2013. All columns control for county fixed effects, year fixed effects, demographics, and the unemployment rate. See notes to Table 2. *, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

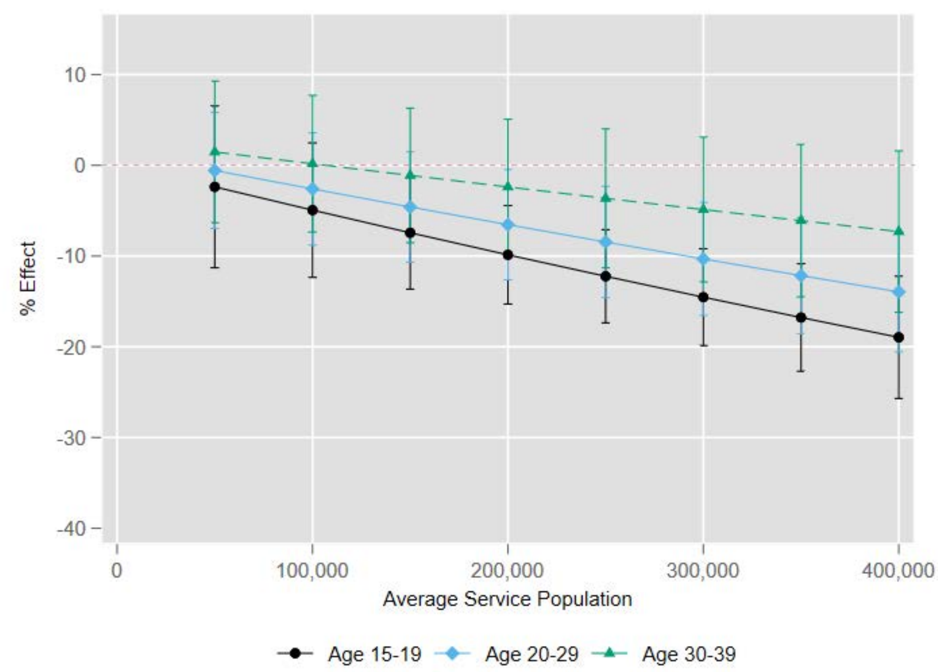
APPENDIX D: ESTIMATED EFFECTS FOR DIFFERENT SUBGROUPS

Figure D1
(Appendix) Estimated percent effect of decreasing access on abortion rates
By Age Group

Panel A: Effect of 25 mile increase in distance from different initial distances



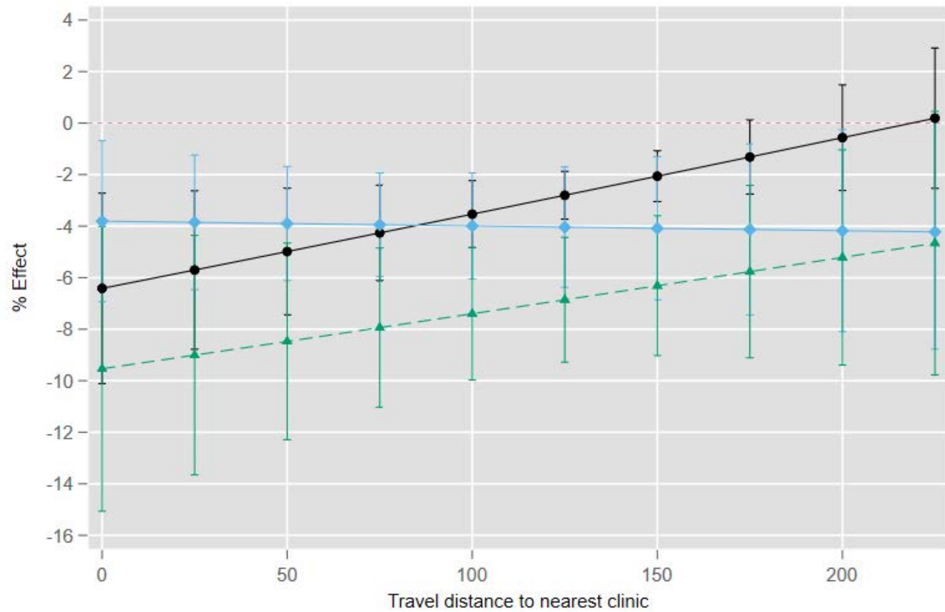
Panel B: Effect of 100,000 woman increase in average service population by starting level



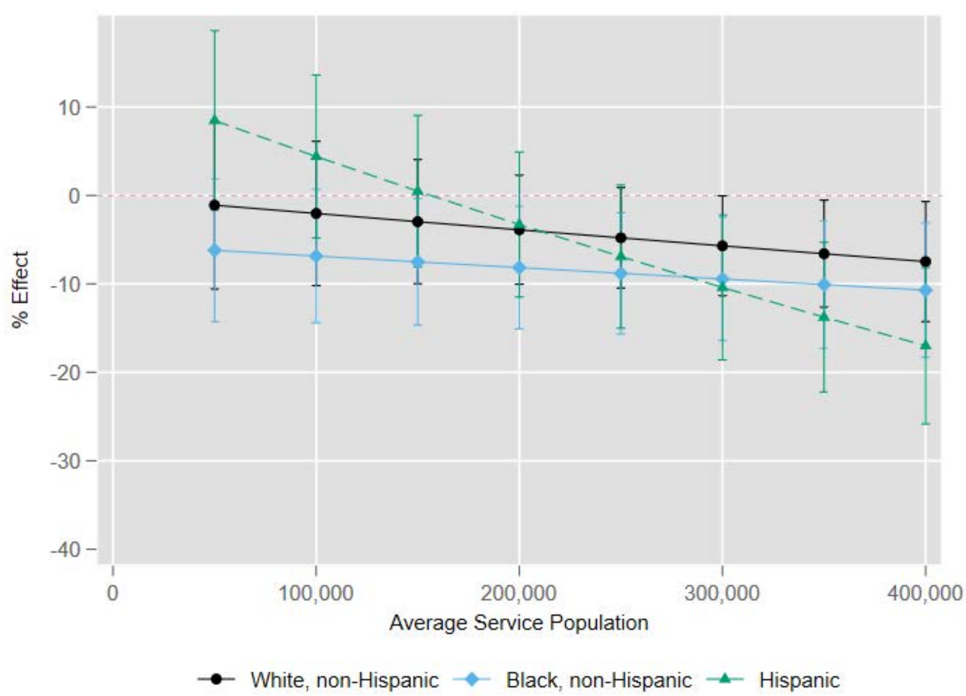
Notes: Plot of estimated average percent effects and 95 percent confidence intervals. Specification corresponds to that in Column 6 of Table 2, estimated separately by age group.

Figure D2
(Appendix) Estimated percent effect of decreasing access on abortion rates
By Race and Ethnicity

Panel A: Effect of 25 mile increase in distance from different initial distances



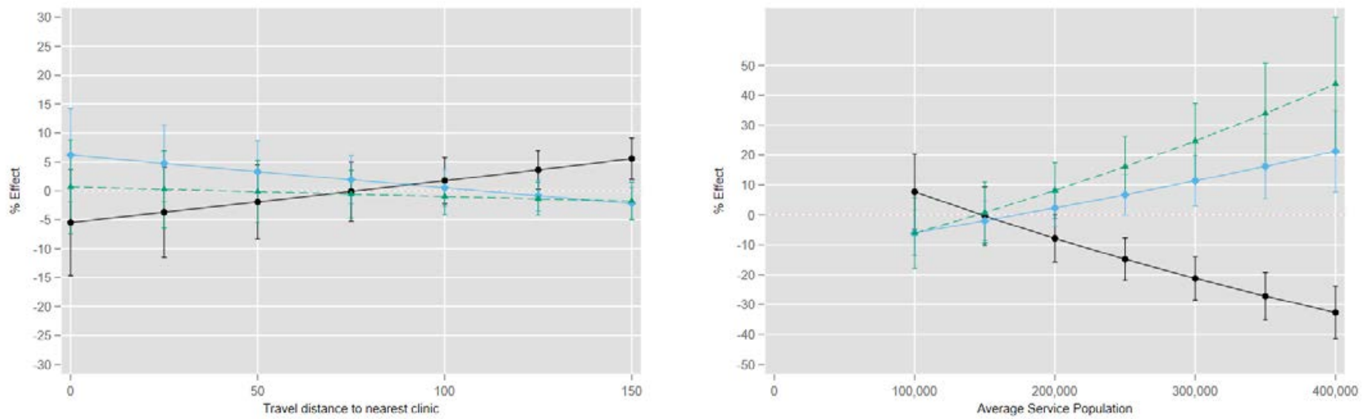
Panel B: Effect of 100,000 woman increase in average service population by starting level



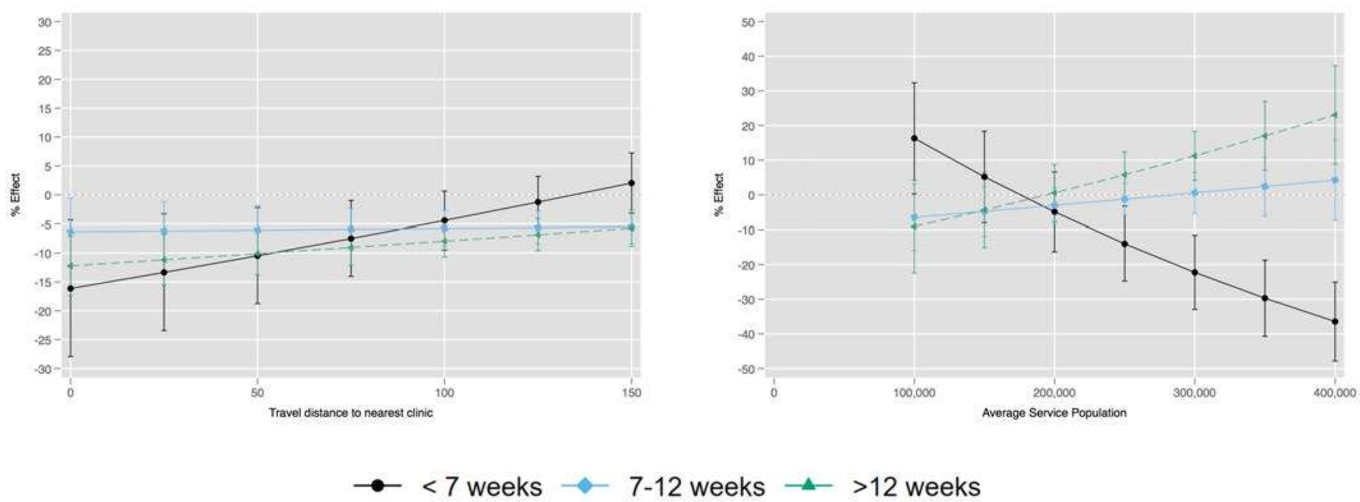
Notes: Plot of estimated average percent effects and 95 percent confidence intervals. Specification corresponds to that in Column 6 of Table 2, estimated separately by age group.

Figure D3
(Appendix) Additional results on effects by gestational age

Panel A: Effects on Share of Abortions in Each Category (Weighted Least Squares)



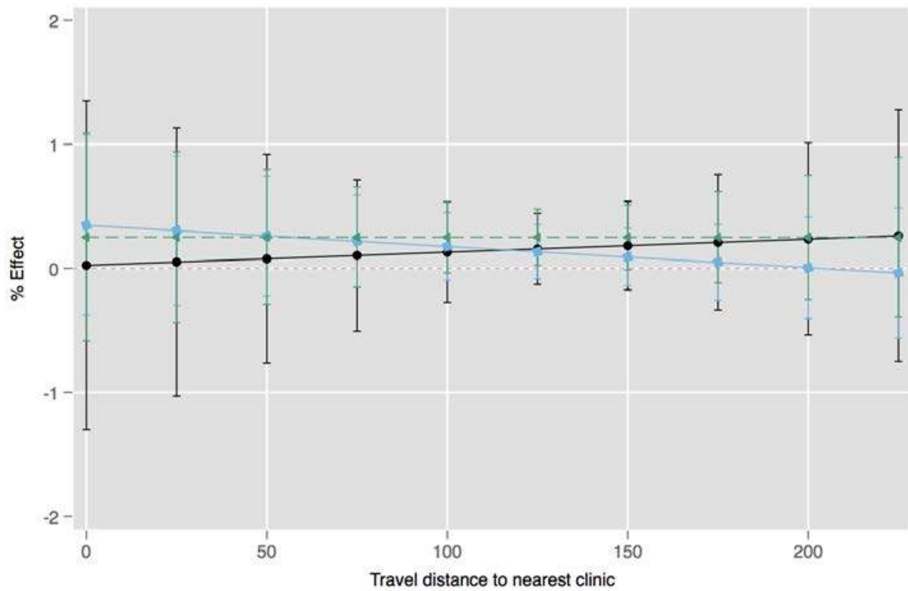
Panel B: Effects on Abortions in Each Category (Balanced Panel)



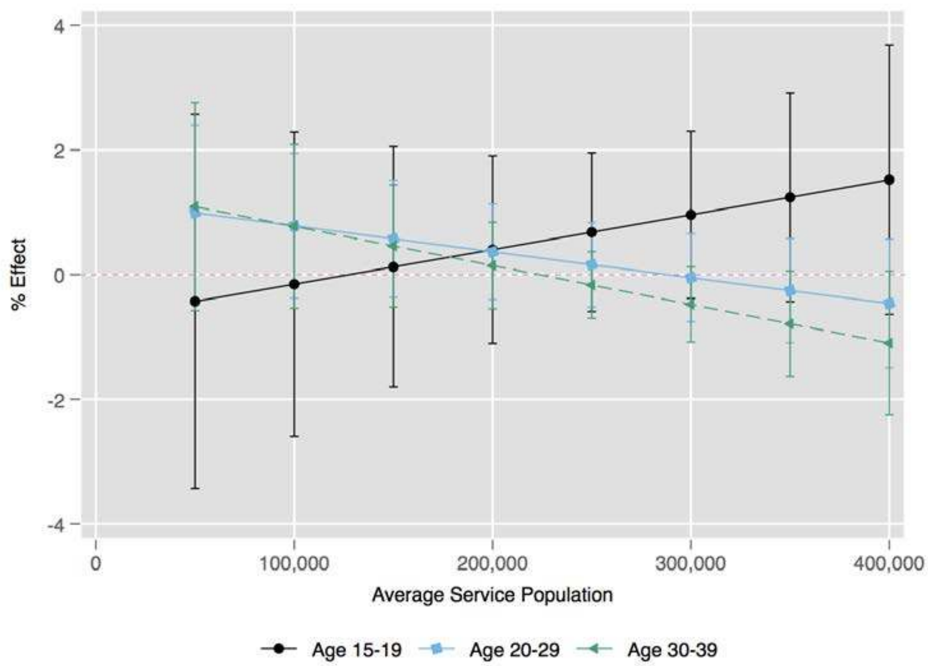
Notes: Plot of estimated average percent effects and 95 percent confidence intervals for alternative specifications of Figure 8. Panel A results are estimated percent effects on abortions per the ration of abortions by gestational age to total abortions. Panel B results are estimated percent effects on abortions per capita, estimated for a balanced sample of 36 counties without any suppressed counts of abortions by gestational age.

Figure D4
(Appendix) Estimated percent effect of decreasing access on birth rates
By age group

Panel A: Effect of 25 mile increase in distance from different initial distances



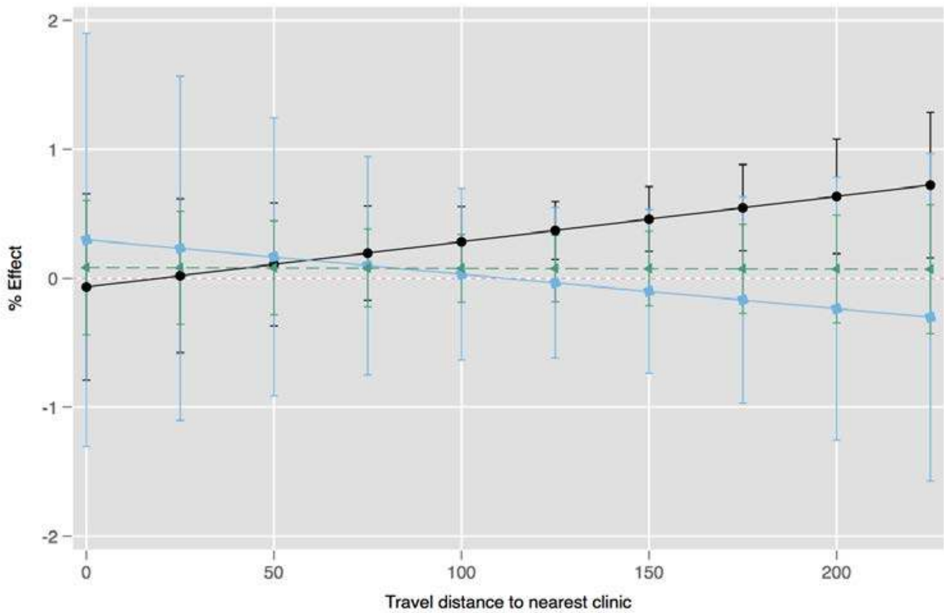
Panel B: Effect of 100,000 woman increase in average service population by starting level



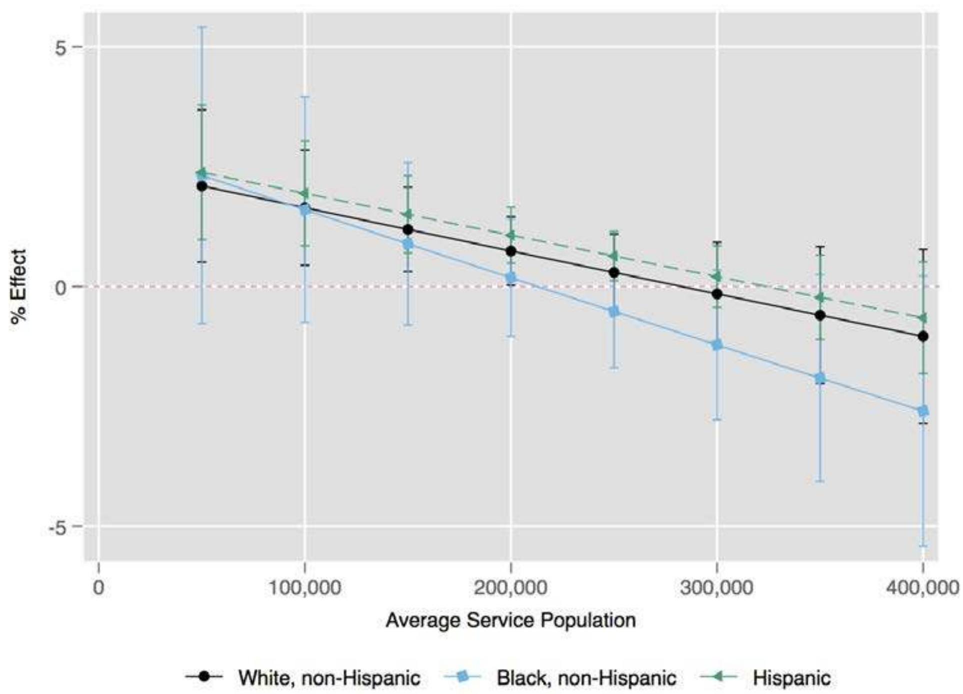
Notes: Plot of estimated average percent effects and 95 percent confidence intervals by age group. The specification is identical to that used to estimated average percent effects on all births in Figure 9, but is estimated separately by age group.

Figure D5
(Appendix) Estimated percent effect of decreasing access on abortion rates
By race and ethnicity

Panel A: Effect of 25 mile increase in distance from different initial distances



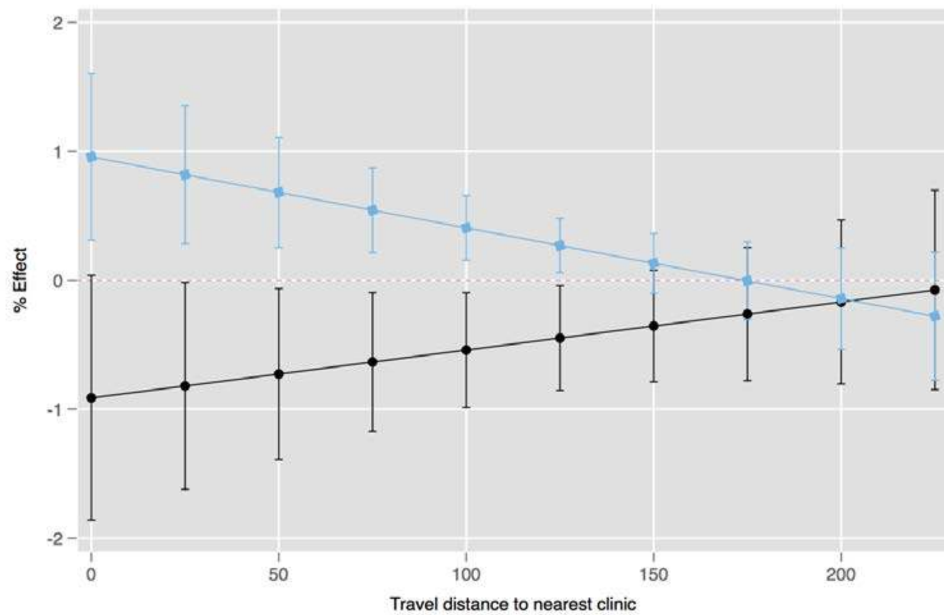
Panel B: Effect of 100,000 woman increase in average service population by starting level



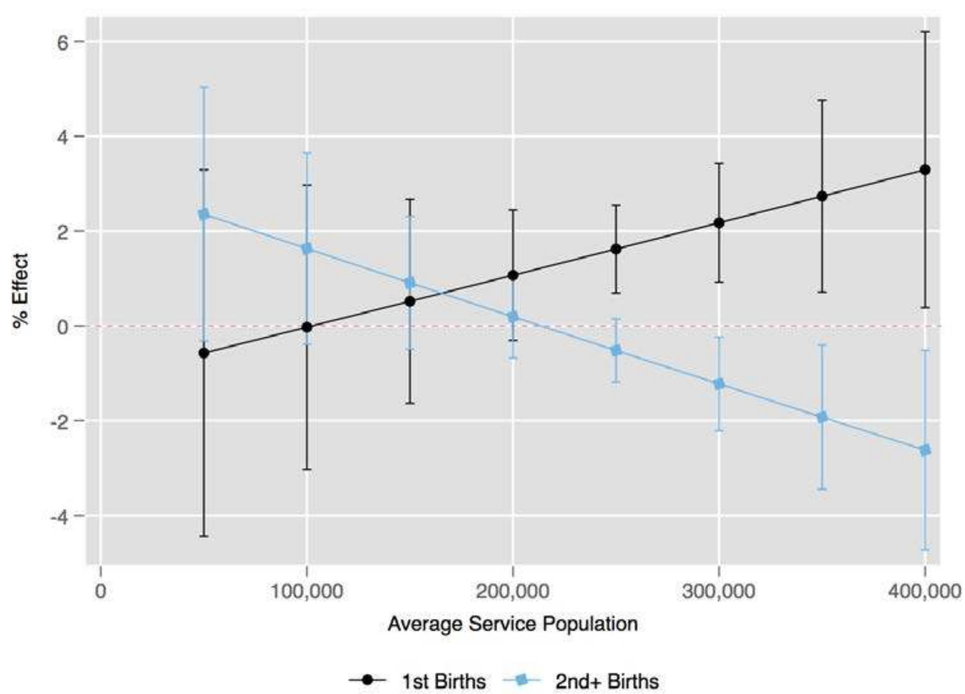
Notes: Plot of estimated average percent effects and 95 percent confidence intervals by age group. The specification is identical to that used to estimated average percent effects on all births in Figure 9, but is estimated separately by race and ethnicity.

Figure D6
(Appendix) Estimated percent effect of decreasing access on abortion rates
By birth parity

Panel A: Effect of 25 mile increase in distance from different initial distances



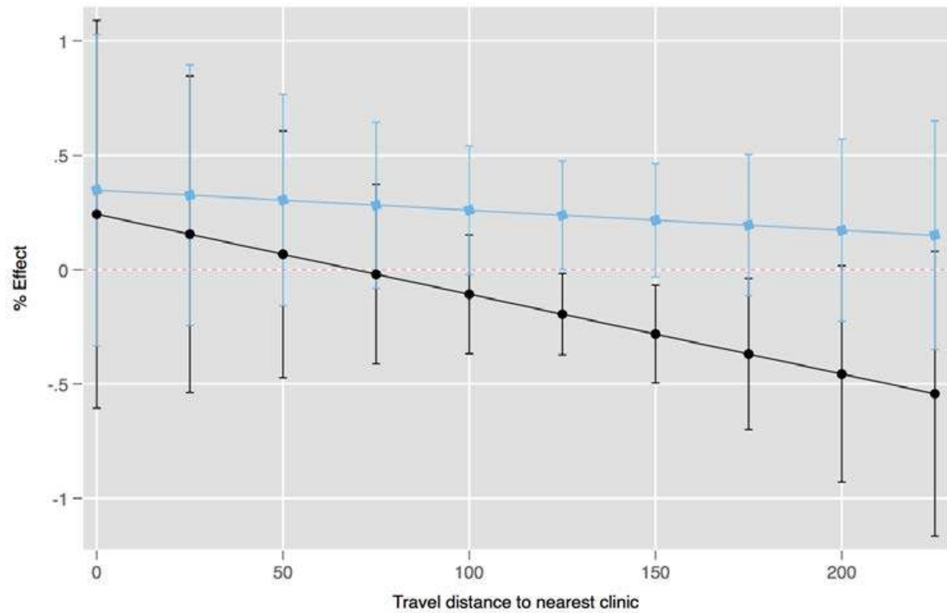
Panel B: Effect of 100,000 woman increase in average service population by starting level



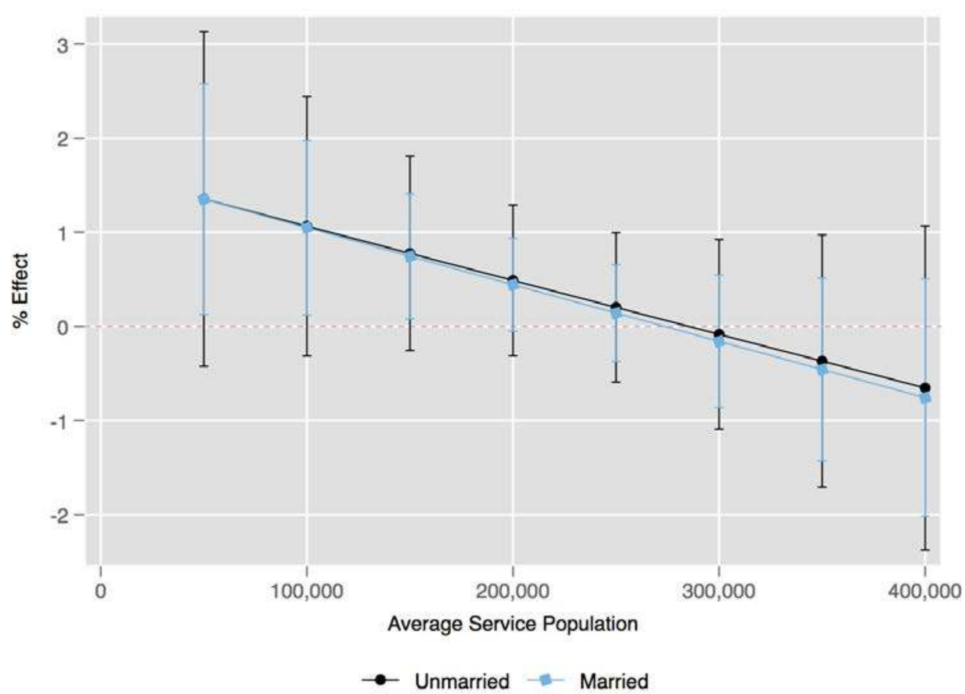
Notes: Plot of estimated average percent effects and 95 percent confidence intervals by age group. The specification is identical to that used to estimated average percent effects on all births in Figure 9, but is estimated separately by birth parity. Population denominators are the overall population of women aged 15-44.

Figure D7
(Appendix) Estimated percent effect of decreasing access on abortion rates
By marital status

Panel A: Effect of 25 mile increase in distance from different initial distances



Panel B: Effect of 100,000 woman increase in average service population by starting level



Notes: Plot of estimated average percent effects and 95 percent confidence intervals by age group. The specification is identical to that used to estimated average percent effects on all births in Figure 9, but is estimated separately by marital status. Population denominators are the overall population of women aged 15-44.