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NEW EVIDENCE ON THE EFFECTS OF
MANDATORY WAITING PERIODS FOR ABORTION

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ABSTRACT

Beyond a handful of studies examining early-adopting states in the early 1990s, little is known about the causal effects of mandatory waiting periods for abortion. In this study we evaluate the effects of a Tennessee law enacted in 2015 that requires women to make an additional trip to abortion providers for state-directed counseling at least 48 hours before they can obtain an abortion. Based on our difference-in-differences approach, estimates indicate that the introduction of the mandatory waiting period caused a 62-percent increase in the share of abortions obtained during the second trimester, completely closing the pre-existing gap between Tennessee and the comparison states. Our analysis examining overall abortion rates are suggestive of reductions caused by the waiting period but these estimates are imprecise. To put these estimates into context, our back-of-the-envelope calculations indicate that Tennessee's MWP increased the monetary costs of obtaining an abortion by as much as \$929 for some women.

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1 Introduction

Currently, 27 states require women to wait 18-to-72 hours between pre-abortion consultation and the actual procedure. Fourteen of these states require women to make an additional trip to the facility so that this consultation can be done in person (Guttmacher Institute, 2019a). Proponents of mandatory waiting periods (MWP) argue that they ensure women will receive information about pregnancy and abortion and will have ample time to weigh their options before deciding to terminate a pregnancy. Others have argued that women requesting abortion are already making informed decisions without the MWP; therefore, these laws impose an unnecessary burden that has the potential to delay or prevent women from accessing abortion care (See Joyce et al., 2009). In particular, women may have difficulty making arrangements for transportation, time off work, child care, or paying for any additional costs associated with the consultation appointment.¹ In addition, requiring a separate consultation appointment for all women seeking abortion may present logistical challenges for providers thereby reducing the number of women they can serve—as a result, women may experience difficulties obtaining an appointment from their preferred provider.²

Together, these issues suggest that a MWP may cause delays for women seeking abortions because of: (i) the mandatory wait time after their first appointment; (ii) any additional wait time for appointments due to capacity constraints at facilities; (iii) and any extra time it takes them to make arrangements for another trip to a facility. Any such delays are particularly important because they can limit the types of procedures available which depend on gestational age, and because monetary costs and health risks tend to be higher

¹See Lupfer and Silber (1981); Althaus and Henshaw (1994); Karasek et al. (2016); Roberts et al. (2016); Sanders et al. (2016); White et al. (2016).

²For women requesting an abortion at the end of their first trimester, the MWP could represent an additional burden because they may be in their second trimester by the time they can get the abortion. Consequently, they might not be able to have their preferred type of abortion (Roberts et al. 2016), since medical abortion is less effective after the first trimester. They are also likely to be referred to another clinic, or to face difficulties finding an abortion provider, because fewer providers are available for women at later stages of pregnancy (Drey et al., 2006; Jones and Jerman, 2014). This would prevent them from terminating their pregnancies.

as gestational age increases.³ The same set of issues suggest that a MWP may *prevent* some women from obtaining abortions if: (i) the consultation and/or waiting period changes her beliefs or preferences; (ii) she is unable to make arrangements for an additional trip; or (iii) the delays push her beyond the maximum gestational age for an abortion. On the other hand, such effects could be mitigated if forward-looking women who know they are pregnant and know they may want an abortion begin to make arrangements more quickly in anticipation of these obstacles. It is also possible that barriers to abortion access could change other behaviors that mitigate the risk of pregnancy, such as use of contraception, but prior work has found minimal evidence of such effects (Fischer, Royer, and White 2018).

Ultimately, understanding the effects of MWPs on abortion timing and on abortion rates requires careful empirical analysis. Notably, a 2009 review of the evidence found just seven studies of the impacts of MWPs on abortion rates and/or abortion timing, and only four of these used approaches that are typically thought to be credible for identifying causal effects (Joyce et al 2009). Those four studies focused on the effects of MWPs in early adopting states through the mid-1990s. To our knowledge, no new papers estimating the causal effects of MWPs have been written since. Thus, the evidence base arguably has become dated.

More recent evidence on the effects of MWPs is particularly important because these effects may be different in today's context given the major changes in the landscape for women seeking abortion. One major change is that the number of abortion providers has declined dramatically in many states. Thus, a restriction requiring women to make a second trip to a clinic may involve more travel today than it would have in the past. Another key difference is that the nearest out-of-state provider likely would not have had a MWP for women in early-adopting states. Today it is less likely that a woman can avoid the MWP by

³The counseling visit may represent 11 percent of the actual cost of the abortion and 9 percent of the total cost of the two appointments (Roberts et al., 2016). Procedures performed after 12 weeks of pregnancy pose higher risks of medical complications and mortality than abortions performed earlier (Althaus and Henshaw, 1994; Drey et al. 2006). The type of procedure used to interrupt pregnancy depends on the stage of pregnancy. Medical abortion is most effective within the first nine weeks of gestation (UCLA Obstetrics and Gynecology), and its success rate decreases as gestational age increases (Rorbye et al., 2004). If a woman delays abortion, she becomes more likely to require a surgical abortion which can be more than twice as expensive as a medical abortion (Jones and Jerman, 2014; Roberts et al., 2016).

driving to her nearest out-of-state provider; most states have a MWP, and these states are clustered geographically (see Figure 1). These two features of the current landscape imply that many women would have to travel farther today to avoid their states' MWP laws than in years past. While these factors suggest that MWPs may have a greater impact today, it is possible that their impacts may be smaller, perhaps because of changes in access to transportation, improved information on navigating the process of obtaining an abortion, or for other reasons. Regardless, given the massive changes in the abortion landscape since the 1990s, including a surge in legislation since 2011,⁴ we believe it is important to expand on the existing base of knowledge by documenting the effects of MWPs enacted in recent years.

Towards this end, we evaluate the effect of Tennessee's MWP, which went into effect in 2015 and requires women to wait at least 48 hours after getting in-person counseling from a physician before they can obtain an abortion. With the enactment of this law, Tennessee joined its neighboring states with similar laws on the books. To evaluate causal effects, we use a difference-in-differences approach comparing changes over time for residents of Tennessee to changes over time in a set of comparison states. We focus on the share of women obtaining abortions in the second trimester of their pregnancy and on abortion rates.

Our results indicate that Tennessee's MWP caused a 62 percent increase in the share of abortions obtained in the second trimester, completely closing the pre-existing gap between women from Tennessee and women from the comparison states. We highlight the statistical significance of this estimate through permutation tests indicating that no state in the comparison group experienced such a large increase. Our estimated effects on abortion rates indicate that the MWP increased the number of second-trimester abortions by 38 percent and reduced the number of abortions overall by 6 percent. While these are our best estimates of the effects of the MWP on abortion rates, we note that they should be viewed with some caution because of limited statistical power.

Motivated by our findings indicating that Tennessee's MWP led to significant delays in

⁴States passed more abortion restrictions from 2011–2013 than in the entire previous decade (205 versus 189). See Guttmacher Institute (2014).

abortion, we additionally evaluate the monetary costs of the MWP based on a number of back-of-the-envelope calculations. We conservatively estimate that the additional consultation appointment increased women’s monetary costs by \$25–70 if we solely account for fees charged by providers, by up to \$91–136 if we additionally account for transportation costs, and by up to \$211–256 if we additionally account for costs associated with lost wages or childcare. We also estimate that a delay of one day, which can alter the procedure type and the clinics available to a woman, can increase fees by \$175 and costs of transportation, lost wages, and childcare by up to \$246. We estimate that a delay of five weeks could increase fees by \$575 and costs of transportation, lost wages, and childcare by up to \$673. In total, the mandatory waiting period could increase the monetary cost of obtaining an abortion by a total of over \$900 when accounting for fees, transportation costs, lost wages, and childcare.

2 Prior Research on MWPs

As noted earlier, to our knowledge there are just seven prior studies of the impacts of MWPs on abortion rates and/or abortion timing.⁵ The subset of these papers using commonly accepted approaches to estimating causal effects include: Joyce, Henshaw, and Skatrud (1997); Bitler and Zavodny (2001); Joyce and Kaestner (2000); and Joyce and Kaestner (2001).⁶

Bitler and Zavodny (2001) is the largest of these studies in scope, examining a wide variety of abortion restrictions and using annual abortion data for nearly all U.S. states from 1974–1997. Their estimates—based on a generalized difference-in-differences model that controls for state and year fixed effects—indicate that MWPs increase the proportion of abortions performed in the second trimester by 2.3 percentage points and increase the

⁵Other notable studies examining the impacts of MWPs have focused on abortion patients’ attitudes and experiences (Lupfer and Silber, 1981), women’s suicide attempts (Klick, 2006), child maltreatment (Bitler and Zavodny 2002, 2004) and children’s fatal injuries (Sen, 2007).

⁶Other studies lack a comparison group to evaluate how outcomes would have changed in the absence of the MWP (Althaus and Henshaw 1994); estimate effects primarily based on cross-sectional variation (Medoff, 2007); or inappropriately controls for lagged abortion rates (Meier, et al., 1996).

rate of second-trimester abortions by 41 percent. They do not find evidence of reductions in overall abortion rates. As noted in Joyce et al. (2009) the vast majority of the MWP analyzed in Bitler and Zavodny (2001) did not require an additional clinic visit. Therefore, those findings may mask more severe effects of MWPs that do require an additional clinic visit.

Consistent with this notion, causal studies of Mississippi's MWP, which went into effect in 1992 and required an additional clinic visit, have found larger effects on the proportion of abortions obtained in the second trimester and stronger evidence of reductions in abortion overall (Joyce, Henshaw and Skatrud, 1997; Joyce and Kaestner, 2000; Joyce and Kaestner, 2001). Further supporting the idea that requiring women to travel more to obtain an abortion has significant effects on abortion rates, several recent studies have demonstrated that increases in travel distance to the nearest provider significantly reduce abortion rates (Quast, Gonzalez, and Ziemba, 2017; Fischer, White, and Royer, 2018; Lindo, Myers, Schlosser, and Cunningham forthcoming).

As a whole, this body of work suggests that when they require women to make an additional trip to their provider, MWPs increase the proportion of abortions obtained in the second trimester and that they can reduce abortion rates overall. That said, this summary statement is based solely on analyses that find large effects of Mississippi's MWP (Joyce, Henshaw and Skatrud, 1997; Joyce and Kaestner 2000; Joyce and Kaestner, 2001), a study pooling together MWPs that do and do not require additional travel that finds more moderate effects (Bitler and Zavodny, 2001); and another analysis finding little evidence that South Carolina's MWP affected adolescents (Joyce and Kaestner, 2001). Further underscoring the need for additional research, these earlier causal studies do not have the same rigor that is typically expected of difference-in-differences studies conducted today. They do not demonstrate common pre-regulation trends in outcomes, and they do not use now-standard approaches to conducting statistical inference. To some degree, this raises questions about their point estimates and their statistical significance. Combined with the possibility that

MWPs may have different effects today than in years past—in addition to possibly having different effects in different places—these factors highlight the reality that more research is needed to understand the role of MWPs for abortion in the modern landscape. Our own study is by no means definitive, but it adds to the literature a rigorous evaluation of a recently enacted MWP that requires women to make an additional trip to their abortion provider.

3 Background on Tennessee’s Mandatory Waiting Period

In May 2015, Tennessee’s Gov. Bill Haslam approved a law that required women to wait at least 48 hours after counseling with a physician before they could obtain an abortion.⁷ As a result, Tennessee joined 26 states that already had a mandatory waiting period, including all of its neighboring states.⁸ Thirteen out of these 26 states required in-person counseling, necessitating an additional trip to the clinic, like the MWP in Tennessee.⁹ Some of

⁷That 48-hour period excludes the day on which the information was provided. For the consultation appointment, the law requires physicians to inform a woman requesting an abortion on the following: 1) that according to the physician’s best judgment, the woman is pregnant; 2) the weeks elapsed from the probable time of conception of her unborn child; 3) that if more than 24 weeks have elapsed from the time of conception, the child may be capable of surviving outside the womb; 4) that abortion may constitute a major surgical procedure; 5) information on the public and private agencies and services available to assist her during pregnancy and after the birth of the child, if she decided not to have an abortion, and whether women wish to keep the child or place the child for adoption; 6) that there are risks associated with her pregnancy and childbirth, and the abortion or child delivery technique to be employed, as well as a general description of the medical instruction to be followed subsequent to the abortion or childbirth in order to ensure her safe recovery; and 7) the existence of a two-day waiting period (2010 Tennessee Code, Chapter 15, Part 2, 39-15-202).

⁸MWP laws are not recent. Since the 1970s, different states passed and signed such laws. These laws were only enforced in seven states (Kansas, Mississippi, Nebraska, North Dakota, Ohio, Pennsylvania, and Utah) out of the fifteen that signed the laws (Althaus and Henshaw, 1994). A federal court enjoined Kentucky, Massachusetts, and South Dakota enforcement of a mandatory waiting period. In Michigan and Tennessee, such requirements were enjoined by a state court. In Delaware, Idaho, and Indiana, mandatory delay legislation was on the books, but it was not enforced. South Carolina enforced a one-hour mandatory waiting period (Lupfer and Silber, 1981). Nonetheless, MWP got more attention after the 24-hour mandatory waiting period law in Mississippi in 1992; it was the fourth state (after Louisiana, Pennsylvania, and Utah) requiring women to make two separate visits to abortion facilities (Joyce et al. (2009).

⁹These states are Arizona, Arkansas, Indiana, Kentucky, Louisiana, Mississippi, Missouri, Ohio, South Dakota, Texas, Utah, Virginia, and Wisconsin. Information on state MWPs over time are based on the

Tennessee’s neighboring states had laws that required women to wait 24 hours (Arkansas, Georgia, Kentucky, Mississippi, Missouri, North Carolina, and Virginia) and one required 48 hours (Alabama). Only Alabama, North Carolina, and Georgia had MWP that did not require an additional visit to the clinic.¹⁰ Figure A in the Appendix depicts the MWPs across the United States before the enactment of Tennessee’s MWP. It demonstrates that Tennessee was one of the few states in the South where a woman could avoid a MWP on her path to obtaining an abortion.¹¹

In addition to MWPs, the states in this region (Alabama, Arkansas, Georgia, Kentucky, Mississippi, Missouri, North Carolina, and Virginia) have many other abortion regulations. For instance, all require abortions to be performed by a licensed physician, and some require second-trimester abortions to be performed in a hospital (Alabama, Kentucky, Missouri, North Carolina, Tennessee, and Virginia). All of these states prohibit abortion after 20 weeks of gestation (or the third-trimester in the case of Virginia), except in cases of life or health endangerment. All restrict public funding to abortions except in cases related to life endangerment, rape or incest, and only Kentucky and Missouri allow private insurance to cover abortion. Except for Alabama, all allow providers to refuse to perform an abortion, and all require parental consent or notice for minors (Guttmacher Institute, 2019a). Except for Georgia and Tennessee, all of these states have imposed so-called targeted regulation of abortion providers (“TRAP laws”) (Guttmacher Institute, 2019d). Therefore, the circumstances are relatively challenging for women seeking abortions—and for abortion providers—in the setting we study.¹²

Guttmacher Institute’s “Counseling and Waiting Periods for Abortion” accessed at different points in time via Wayback Machine.

¹⁰Virginia did not require in person counseling for women who lived more than 100 miles from an abortion provider.

¹¹The last changes to MWP laws in nearby states are: Alabama increased the MWP from 24 to 48 hours in 2014; Arkansas increased its MWP from 48 to 72 hours in April 2019; Georgia enacted a 24-hour mandatory period in 2012; in Kentucky a 24-hour MWP law was introduced in 1982; Mississippi imposed a 24-hour MWP in 1992; Missouri increased the MWP from 24 to 72 hours in 2014; North Carolina voted an increase from 24 to 72-hour MWP in 2015; and Virginia enacted a 24-hour abortion delay in 1997.

¹²Since 2010, the ACA has allowed states to broaden Medicaid eligibility, creating a foundation of coverage for low-income Americans with incomes up to 138 percent of the federal poverty level (FPL). With the elimination of categorical eligibility, low-income women who are not pregnant nor have children can qualify

Importantly, Tennessee did not pass or enact any other regulations during the period we study that we would expect to generate significant changes in abortion timing or rates.¹³

4 Data

In this section, we describe the process by which we collected annual data on abortions by gestational age for various states and how we ultimately arrived at the set of states used in our analysis.

Our data on abortions by gestational age come from Vital Statistics reports and abortion reports from state health departments. We were able to obtain information on the number of abortions by gestational age for 38 states. For the remaining states, the data are not available or the state does not collect this information.¹⁴

States vary in the type of abortion information they collect and release. There are four types of “abortion data” that we identified: 1) the number of “occurrences,” which represents the number of abortions obtained from providers within the state; 2) the number of abortions obtained by residents of the state from providers within the state; 3) the number of abortions

for Medicaid coverage. On December 2014, Gov. Bill Haslam announced a plan to expand the state’s Medicaid program under the ACA. However, a Senate committee voted against this proposal in February 2015. Tennessee does not provide Medicaid Family Planning Program either. Regarding its neighboring states, in 2013, Arkansas and Kentucky passed state’s expansion plans. By 2016, these were the only two bordering states that expanded Medicaid under ACA. The remaining bordering states (Alabama, Georgia, Mississippi, Missouri, North Carolina, and Virginia) did not expand Medicaid, but do offer Medicaid Family Planning Programs. See Ranji et al. (2016) and Advisory Board (2019) for more information.

¹³A federal judge blocked a 2015 law requiring abortion clinics to be regulated as ambulatory surgical centers. Laws going into effect in 2016 include one requiring written consent from the woman for any fetal tissue research or photographs of the fetus, and another requiring facilities performing more than 50 surgical abortions a year to conduct mandatory interim assessments, report on serious injuries or deaths of patients, and be subject to regular inspections during which they must show their record of the disposition of fetal tissue (Guttmacher Institute, 2019b).

¹⁴The states that release information on abortions by gestational age are: Alabama, Alaska, Arizona, Arkansas, Colorado, Delaware, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, West Virginia, and Wisconsin. Connecticut, District of Columbia, Georgia, South Carolina, and Virginia do not release information on the number of abortions by gestational age. California and Maryland do not collect information on abortions. A Wyoming law restricts the sharing of abortion data to only local, state, or national public health officials or physicians. We contacted the health departments of Massachusetts, New Hampshire, and Rhode Island, but we did not receive any answer. The information on abortions from Florida is incomplete. We had difficulty contacting New Jersey’s health department.

obtained by residents of the state from providers within the state plus the (known) number of abortions obtained by residents of the state from out-of-state providers;¹⁵ and 4) the number of occurrences plus the (known) number of abortions obtained by residents of the state from out-of-state providers. These differences can make it difficult to make comparisons across states. Furthermore, they highlight the reality that abortion information released by states may not be very informative about the abortions obtained by their residents, particularly where many women seek abortions out of state.

For our purposes, we are fortunate that the information released by Tennessee’s Department of Health reflects abortions obtained by its residents in clinics both in Tennessee and in other states. This allows us to consider how abortion has changed over time for Tennessee’s residents, including residents that choose to obtain abortions out-of-state.¹⁶ Besides Tennessee, 15 out of the 38 states with available abortion data focus on the number of abortions obtained by residents, regardless of where they are obtained. These 15 states are Alabama, Arizona, Delaware, Illinois, Minnesota, Missouri, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Texas, Utah, Washington, and Wisconsin.¹⁷

Our comparison group is comprised of all of these states, except Alabama, Delaware, and Texas. We exclude Alabama because it passed major abortion restrictions in the period before the MWP law was enacted in Tennessee.¹⁸ We also omit Delaware and Texas because of missing data in some years spanned by our analysis.

Even though Missouri and North Carolina share a border with Tennessee and could face

¹⁵States can collect information on abortions obtained by their residents in other states through information exchange agreements with those states.

¹⁶We have applied for data from Tennessee that will allow us to discern precisely which states are providing Tennessee data on the number of Tennessee residents obtaining abortions in their state in each year. We have been told that the out-of-state reports are “predominantly Alabama, Georgia, Mississippi, and Virginia, but all [InterJurisdictional Exchange] jurisdictions that choose to share ITOP data may send [Tennessee] reports subject to their privacy rules surrounding these reports.”

¹⁷Minnesota, Missouri, Nevada, New Mexico, New York, Oklahoma, Pennsylvania, Texas, Utah, and Wisconsin release information on abortions performed on residents in the state. Illinois, North Carolina, and Washington release information on abortions performed on residents both in the state and out-of-state.

¹⁸In 2013, Alabama passed a law that imposes regulations on outpatient clinics and private doctor’s offices providing surgical and medical abortions. These regulations also impose requirements on the facilities and clinics. See Guttmacher Institute (2019d) for more information. Furthermore, in April 2014 Alabama signed into law an increase in its MWP from 24 to 48 hours. See Wire.News (2018) for more information.

potential spillover effects of the law, we include them in the comparison group. Although residents of bordering states requested 23 percent of the abortions performed in Tennessee between 2010 to 2015, fewer than 2 percent of these abortions were provided to Missouri residents.¹⁹ Most of the out-of-state abortions obtained by Missouri residents were obtained in Kansas and Illinois. In the case of North Carolina, its residents requested out-of-state primarily in Virginia, Georgia, and South Carolina. Nonetheless, we present robustness checks that exclude both Missouri and North Carolina from the analysis.

We evaluate the effects of MWP on three outcomes: the percent of abortions obtained in the second trimester; the second trimester abortion rate, constructed as the number of second-trimester abortions per 1,000 women aged 15-44; and the overall abortion rate, constructed as the total number of abortions per 1,000 women aged 15-44.²⁰

Table 1 shows the means for each of these variables for Tennessee and the comparison states for the pre-intervention period (2010–2014) and the post-intervention period (2015–2016). For Tennessee residents in 2010–2014, 6.6 percent of abortions were obtained in the second trimester. This number rose to 9.4 percent in 2015-2016, during which the MWP was in effect for part of 2015. In the comparison states, the share of abortions obtained in the second trimester fell slightly, from 11.7 to 11.0 over the same period.

The second-trimester abortion rate increased from 0.6 percent in 2010-2014 to 0.7 in 2015-2016 in Tennessee, and it decreased slightly from 1.3 to 1.1 percent in the comparison states. The overall abortion rate decreased for Tennessee and in the comparison states from 2010-2014 to 2015-2016. In Tennessee, it dropped from 8.9 to 7.2 percent, versus dropping from 10.9 to 9.7 percent in the comparison states. In general, these summary statistics indicate

¹⁹From 2010 to 2015, the percentage of abortions requested in Tennessee by residents of other states were: 50.8 percent by Mississippi residents, 26.6 percent by Kentucky residents, 17.1 percent by Arkansas residents, 2.7 percent by Alabama residents, 1.4 percent by Missouri residents, 1.1 percent by Georgia residents, and 0.3 percent by Virginia residents.

²⁰Due to differences in what is reported by each state, we are unable to use exactly the same definition of “second trimester” for all states. We do, however, use a consistent definition for each state over time. We define second trimester abortions as abortions at: 13+ weeks gestation for Tennessee, Minnesota, Missouri, New York, North Carolina, Oklahoma, Pennsylvania, Utah, Washington, and Wisconsin; 12+ weeks gestation for Arizona and Illinois; and 14+ weeks gestation for New Mexico.

that the most substantial change occurred in the percent of second-trimester abortions in Tennessee.

In the lower panel of Table 1, we also report means for the control variables we use in our analysis. These variables include the percentage of women aged 15-44 in five-year age groups (15-19, 20-24, 25-29, 30-34, 35-39, and 40-44); the percent of these women who are black, Hispanic and non-Hispanic white; and the unemployment rate. Their means indicate that either these variables do not change very much over time, or they changed similarly for Tennessee and the comparison states.

5 Empirical Strategy

We examine the effects of Tennessee’s MWP on abortion timing and abortion rates using a difference-in-differences approach, which exploits within-state variation over time while controlling for aggregate time-varying shocks. The identifying assumption underlying this approach is that changes in abortion outcomes observed in the comparison states over time provides a good counterfactual for the changes that would have been observed in Tennessee if it did not implement the MWP.

Our estimating equation is as follows:

$$y_{s,t} = \alpha_s + \gamma_t + \beta TN15_{s,t} + \theta TN16_{s,t} + \eta X_{s,t} + \epsilon_{s,t} \quad (1)$$

where $y_{s,t}$ represents an outcome for residents of state s in year t ; α_s are state fixed effects, which control for observed and unobserved state characteristics with time-invariant effects on the outcome; γ_t are year fixed effects, which control for time-varying factors affecting the outcomes in all the states in the same manner; $TN15_{s,t}$ and $TN16_{s,t}$ are indicator variables for Tennessee in 2015 and 2016, respectively; $X_{s,t}$ can include time-varying characteristics of states, including measures of demographics and economic conditions; and $\epsilon_{s,t}$ is the error term.

The primary parameter of interest is θ , which captures the effects on residents of Tennessee in 2016—the first (and only) year in the data in which Tennessee’s MWP was fully in effect. The parameter β captures the impact for 2015, in which Tennessee’s MWP went into effect midway through the year.

Typically, using a differences-in-differences approach, there are many clusters and the researcher will want to estimate cluster-robust standard errors (Bertrand et al., 2004; Roodman et al., 2019). In our case, Tennessee is the only treated cluster. This is relevant because t -tests based on cluster-robust standard errors tend to over-reject severely when the number of clusters is small (MacKinnon and Webb, 2016; MacKinnon and Webb, 2018). For these reasons, we rule out the possibility of making the correct inference based on cluster-robust standard errors. Wild-bootstrap provides an alternative when conventional inference methods are unreliable because large-sample assumptions do not hold. However, in difference-in-differences models with few treated clusters, the unrestricted wild bootstrap over rejects, while the restricted one under rejects (Roodman et al., 2019).

For these reasons, we conduct randomization inference to assess the statistical significance of our estimates. This allows us to conduct exact inference without relying on large-sample approximations and without making assumptions about the distributions of the error terms. We do so based on the distribution of possible treatment effect estimates based on applying a modified version of Eq. (1) to estimate “effects” for each state on-by-one. We follow the definition of the p -value provided in Young (2018), which allows the p -value to be uniformly distributed, and which offers an exact test with a rejection probability equal to the nominal level of the test.²¹ Since this definition has a random component from a uniform distribution, we report the bounds of each p -value based on the bounds of the support of the uniform

²¹The definition is as follows:

$$p - value = \frac{1}{M} \sum_{S=1}^M I_S(> T_E) + U * \frac{1}{M} \sum_{S=1}^M I_S(= T_E) \quad (2)$$

where T_S are equally probable potential treatment allocations, T_E is the true treatment effect, M is the total number of potential treatment allocations, $I_S(> T_E)$ is an indicator function for $T_S > T_E$, $I_S(= T_E)$ is an indicator function for $T_S = T_E$, and U is a random variable drawn from uniform distribution (0,1).

distribution.

6 Results

6.1 Graphical Evidence

This study aims to estimate the causal effects of Tennessee’s MWP on abortion timing and abortion rates. Our empirical approach relies on the identifying assumption that the changes in these outcomes observed in the comparison states provide a good counterfactual for the changes that would have been observed in Tennessee if it did not enact its MWP.

To assess the plausibility of this assumption, Figure 3 compares the percent of abortions obtained in the second trimester for residents of Tennessee and for residents of the comparison states from 2010–2016. This graph shows that this percentage was quite stable in both Tennessee and in the comparison states from 2010–2014. In other words, they exhibited parallel trends in the lead up to Tennessee’s policy change. This provides support for our assumption that they would have continued to exhibit parallel trends through 2016 in the absence of Tennessee’s MWP.

Figure 3 also shows some initial evidence of the effect of Tennessee’s MWP, which we subsequently confirm in our regression analysis. In particular, it shows that the percentage of abortions obtained in the second trimester maintained its level of nearly 12 percent through 2016 for the comparison states. In stark contrast, in Tennessee it grew from 6-7 percent from 2010–2014 to almost 8 percent in 2015 before increasing to nearly 12 percent in 2016. Thus, after several years in which its percentage was roughly half of the comparison states, Tennessee converged to the level as the comparison states one year after it implemented a MWP.

Figures 4 through 5 are similar but focus on the second-trimester abortion rate and the overall abortion rate, respectively. These figures also provide support for the common trends assumption, as they demonstrate parallel trends from 2000–2014. They also provide some

evidence that Tennessee’s MWP increased second-trimester abortions, but less clear evidence of effects on abortions overall (the majority of which are first-trimester abortions).

6.2 Causal Effects of the Mandatory Waiting Period Law

Table 2 presents the main results of our difference-in-differences analysis. Columns 1 through 3 show our estimates of the effect of the MWP on the percent of second-trimester abortions: Column 1 shows the results from our baseline model with state fixed effects and year fixed effects; Column 2 shows estimates that adjust for changes in state demographics; and Column 3 shows estimates that additionally adjust for changes states’ economic conditions (the unemployment rate). The subsequent columns of Table 2 are organized similarly but show our estimated effects on the log of the second-trimester abortion rate (in columns 4–6) and the log of the overall abortion rate (in columns 7–9).

Like the graphical evidence presented in the previous section, our regression-based estimates also indicate that the Tennessee’s MWP increased the percent of abortions obtained in the second trimester by its residents. The estimated effect for 2015, which was partially affected, is positive but not statistically significant. The estimated effect for 2016 is larger and statistically significant, indicating that the MWP increased the share of Tennessee’s residents obtaining an abortion in the second trimester by 4.1 percentage points (Column 3), which represents a 62-percent increase over its 2014 level (6.7 percent). Figure 6, which shows the distribution of treatment effects that are possible with different permutations of the treatment variable across states, demonstrate that no other permutation yields such a large effect.

Our regression-based estimates of the effect on number of second-trimester abortions per 1,000 women are large and positive for 2016. They indicate the MWP increased this abortion rate by 37 percent.²² However, we note that a lack of statistical power means this estimate is not statistically significant at conventional levels. Similarly, our estimated effects

²²Percent effects are calculated as $100 \times (e^{\text{estimate}} - 1)$.

on the overall abortion rate is indicative of economically significant *reductions* in abortions caused by the MWP, but these estimates are not statistically significant at conventional levels. Results from our randomization inference for these outcomes are shown in figures 7 and 8.

As we explained in section 4, our comparison group includes two states that border Tennessee which may also have been affected by its MWP: Missouri and North Carolina. Another reason Missouri and North Carolina may not provide a good counterfactual for Tennessee is that they tripled their MWPs from 24 to 72 hours, in 2014 and 2015, respectively.²³ Out of concern for the possibility that these issues might compromise the validity of our research design, in Table 3 we show results that exclude Missouri and North Carolina from our analysis. These results provide even stronger evidence of effects of Tennessee’s MWP on the percent of abortions its residents obtained in the second trimester. The point estimates indicate a 2.0 percentage point effect in 2015 and a 5.3 percentage effect in 2016 when the MWP was in effect for the entire year. These estimates also provide somewhat stronger evidence that the MWP increased the number of second trimester abortions per 1,000 women, by 10 percent and 69 percent in 2015 and 2016, respectively. The estimated effects on the overall abortion rate, however, are more muted in this analysis.

7 Monetary Costs of the MWP

Previous studies have reported on women’s perceptions about and experiences with MWPs based on surveys. In these surveys, women reported problems associated with transportation, employment, school, and childcare (Lupfer and Silber, 1981; Karasek et al., 2016; Roberts et al., 2016; and Sanders et al., 2016). Notably, our estimates suggest additional monetary

²³Other potentially relevant changes in these states include: a law being struck down in North Carolina in 2014 that would have required the provider to show and describe an ultrasound image to women seeking abortions; North Carolina enacting abortion laws related to the funding to crisis pregnancy centers and regarding abortion reporting in 2015; and clinic closures in each state. Other states bordering Tennessee that increased their MWP during the period of our analysis are Alabama and Arkansas, which increased their MWPs from 24 to 48 hours in 2014 and 2015, respectively.

costs are likely to result from women being delayed from obtaining abortions.

Delayed abortions can increase monetary costs for two main reasons. First, delays can increase the cost of the procedure which typically rise with gestational age.²⁴ Second, delays can require women to travel to more distant providers, because providers vary in the types of procedures they offer and the gestational ages at which they offer them. Women's options become more limited at higher gestational ages. As a result, delays can increase transportation costs, potential lost wages, and potential childcare expenses.

To gain a better sense of the additional monetary costs faced by women seeking abortions under Tennessee's MWP, we have done several back-of-the-envelope calculations that take into account costs associated with the additional consultation appointment and the costs associated with being delayed from obtaining an abortion. The cost of the additional appointment involves the cost of the appointment itself, the cost of transportation to the appointment, lost wages for women who have to take time off of work, and childcare expenses for women who require such care. We consider delays from one to five weeks. The cost of the delay includes any additional cost of the procedure and, if the delay requires travel to a more-distant provider, additional transportation costs and lost wages and childcare expenses for women for whom these costs are relevant. It is worth mentioning these calculations are not welfare costs, we are providing information on the potential financial costs women would face due to the MWP.

7.1 Additional costs ignoring costs of delays

To begin, we focus on the costs that would be expected for a woman who is not delayed from obtaining an abortion. For such a woman, the additional costs consist solely of the additional costs associated with the mandatory counseling appointment.

We estimate the additional amount that clients had to pay to providers based on the change in the cost of obtaining an abortion—inclusive of all appointments—between July

²⁴Figure B in the Appendix shows the costs of obtaining an abortion at a clinic in Tennessee in October 2015, a few months after the MWP law passed.

2015 and October 2015. In particular, the fees for obtaining an abortion—inclusive of all appointments—rose by \$25–70 between July 2015 and October 2015.²⁵ We use this range as a conservative estimate of the additional fees resulting from the MWP, though we note that providers charged \$180–275 for consultation appointments after the MWP was enacted, followed by additional fees at the time of the procedure which would vary depending on the procedure type and the gestational age.

We estimate transportation costs as a function of where a woman lives and the gestational age for which she is seeking an abortion. These jointly determine the nearest provider that could provide a woman with abortion care and the travel time required to reach this provider using the provider-search tool from Goldenberg et al. (2017), which provides calculations for women living in Tennessee’s 12 largest cities.²⁶ Because a more-limited set of clinics provide care to women seeking abortions at higher gestational ages, women seeking abortions at such gestational ages often have to travel farther to reach their nearest provider. Thus, the transportation costs are comparatively large for women living relatively far from clinics (e.g., women in rural areas) and for women seeking abortions at higher gestational ages. Notably, there are some women in Tennessee who have to travel three hours roundtrip to reach their nearest provider regardless of gestational age at which they are seeking an abortion (e.g., those residing in Chattanooga). We calculate a maximum of 6 hours of travel required for Tennessee residents seeking an abortion at different gestational ages (e.g., women in Knoxville or Jackson seeking an abortion at 20 weeks, women in Johnson City or Kingport seeking an abortion at 16 weeks). As such, we estimate that the additional transportation costs could be up to \$66, based on the cost of gas for a woman who needs to travel an

²⁵The information on abortion prices is from Knoxville Center for Reproductive Health, one of the six clinics currently providing abortion services in Tennessee. We used Wayback Machine to obtain information on the prices women faced in 2015.

²⁶Goldenberg et al. (2017) was published in September 2017. Therefore, we expect the estimations on travel distance to reflect the abortion landscape as of that date. The tool provides information for cities as small as approximately 50,000. Specifically, it provides information for the following 12 cities in Tennessee, ordered by population: Nashville, Memphis, Knoxville, Chattanooga, Clarksville, Murfreesboro, Franklin, Jackson, Johnson City, Bartlett, Hendersonville, and Kingsport.

additional 6 hours roundtrip for the counseling appointment.²⁷ Naturally, women without access to a car may incur additional costs.

We estimate costs associated with lost wages and/or childcare for women who have to take time off work similarly, based on the amount of time it is expected to take for a woman to reach the nearest provider that can serve her, and additionally factor in the amount of time that the appointment takes itself which can take 3–6 hours.²⁸ Given the possibility of driving up to 6 hours and a total appointment time of up to 6 hours, women could lose up to 12 hours of wages or could have to pay for up to 12 hours of childcare in order to attend the consultation appointment. At Tennessee’s minimum wage, which has remained at 7.25 per hour since 2015, 12 hours of lost wages would amount to \$87. At a cost of \$10 per hour for a babysitter, 12 hours of childcare would amount to \$120.²⁹

Given the calculations described above, we conservatively estimate that costs associated with the consultation appointment range from \$25–70 if we focus solely on the fees required by providers. Additionally accounting for transportation costs and the fact that some women will have to travel 6 hours to reach the nearest provider who can serve them, the costs range from \$91–136. Additionally accounting for costs associated with lost wages or childcare brings the range from \$211–256.

7.2 Additional costs accounting for delays

Though our empirical analysis indicates that the MWP delayed women from obtaining abortions, it does not tell us precisely how long the delays typically were. For this reason, in this

²⁷We assume a gas costs \$2.75 per gallon, and woman drives to a clinic at 60 miles per hour on average in a vehicle with a fuel efficiency of 30 miles per gallon.

²⁸This range of times is based on the Knoxville Center for Reproductive Health’s website: <https://kcrh.com/frequently-asked-questions/>. It states “with new laws and restrictions in place and a required 48 hour waiting period, two visits are now required. You can expect to be at the center for 3-6 hours for each visit. The first visit will include medical history, ultrasound, lab, informed consent, video and educational materials to review as well as individual counseling sessions. The second visit will include the procedure itself, whether aspiration or medical, and recovery time for aspiration patients. So there are a lot of ‘other’ time-consuming parts of your visit here. We strive to give you the individual attention you deserve, but remember on busy days, there are many other women needing all these services too.”

²⁹According to Guttmacher Institute (2018), as of 2014, 59% of women who got an abortion in the U.S. had one or more children.

section we provide estimates of the costs of delays ranging from one day to five weeks.

Based on the fees charged for different abortion procedures at different gestational ages, a one-day delay can increase the fees by up to \$175; a two-week delay can increase the cost of the procedure by up to \$275, a three-week delay can increase the cost of the procedure by up to \$425; a four-week delay can increase the cost of the procedure by up to \$525; and five-week delay can increase the cost of the procedure by up to \$575.³⁰

As we highlighted earlier, delays can also reduce the set of clinics from which a woman is able to obtain care, because clinics vary in the types of procedures they offer and the gestational ages at which they offer them. As such, delays can increase travel time and also costs associated with transportation, lost wages, and childcare. Based on information from the same provider search tool described earlier, we estimate that a one-day delay could increase travel time by up to five hours. Making the same conservative assumptions as we have previously, we estimate that such a delay could increase transportation costs by up to \$21; lost wages by up to \$36.25; and childcare costs by \$50. We estimate that a five week delay could increase travel time by up to six hours. Such a delay could increase transportation costs by up to \$38; lost wages by up to \$43.5; and childcare costs by \$60.

As a whole, these calculations indicate that a one-day delay could increase a woman's cost by \$175 based on the cost of the procedure alone. If the delay restricts the clinics at which a woman can obtain abortion care, her additional costs could rise by up to \$196 (175+21) accounting for additional transportation costs and her additional costs could rise by up to \$232.5 (175 + 21 + 36.5) accounting for additional transportation costs and lost wages or by \$246 (175+21+50) accounting for transportation costs and childcare. Our calculations indicate that a five-week delay could increase a woman's cost by \$575 based on the cost of the procedure alone, by \$613 (575 + 38) accounting for additional transportation costs, by \$656.5 (575+38+43.5) when also accounting for additional lost wages, and by \$673 (575+38+60) when accounting for childcare expenses instead of lost wages.

³⁰These costs are based on the fee schedule from Knoxville Center for Reproductive Health as of October 1st, 2015 which is shown in Figure B in the Appendix.

The total costs of the MWP would be a combination of the additional costs associated with the counseling appointment and the costs of the delay. According to our calculations the total cost of the MWP would be up to \$645 based on the cost of the procedure alone. If we account for transportation costs, this could rise to \$749, by up to \$912.5 also accounting for lost wages, and by up to \$929 if accounting for childcare expenses and not lost wages.

7.3 Costs in Context

To put our cost calculations in context, it is important to note that the majority of abortion patients are low income, and even in the absence of the waiting period or other restrictions, many women incur financial hardship to obtain an abortion (Karasek et al., 2016). A family of three at the federal poverty line in 2014 had a monthly income of \$1,649. As such, the *additional* financial costs for a woman to obtain an abortion caused by Tennessee’s MWP *over and above prior costs* can amount to a very large share of women’s monthly income.

8 Conclusions

In this study, we provide the first estimates of the effects of a MWP for abortion since studies evaluating the effects of states adopting such policies in the early 1990s. Consistent with rigorous research on Mississippi’s MWP (Joyce et al. 1997, Joyce and Kaestner, 2000), which also required an additional trip to the provider for an in-person consultation before the waiting period began, we find significant effects on the share of abortions obtained in the second trimester and we also find evidence suggesting that MWP reduced the overall abortion rate. Relative to this earlier work, our point estimates indicate somewhat larger effects on the percent of abortions obtained in the second semester and somewhat smaller effects on the overall abortion rate.

These findings are consistent with a number of recent studies documenting causal effects of barriers to accessing reproductive health care. In particular, they are consistent with

research on the effects of physical attacks on abortion providers (Jacobson and Royer 2011) and with several recent studies showing that increases in the distance women have to travel to reach their nearest abortion provider cause significant reductions in abortion rates (Quast, Gonzalez, and Ziemba 2017; Fischer, White, and Royer 2018; Lindo, Myers, Schlosser, and Cunningham forthcoming). Other studies have found significant effects of the distance that women have to travel to reach family planning clinics on birth rates (Lu and Slusky 2019; Fischer, White, and Royer 2018; Kelly, Lindo, and Packham 2019). Recent studies have also demonstrated that parental involvement laws can have significant effects on abortion rates among minors (Joyce and Kaestner 2019).

As more data become available and as the landscape for reproductive health care continues to change at a rapid rate, it will be important for researchers to continue to evaluate important policy changes. With regards to Tennessee's MWP, future research could examine whether the effects persist into subsequent years, whether they extend to residents in neighboring states, whether they lead to any measurable impacts on birth rates, and whether they affect other outcomes for women and their families. For MWPs more broadly, future research could examine the effects in other states, the effects of changes in the duration that women are required to wait, and the margins of adjustment that are available to providers who might struggle to cope with the the requirement that they have an additional appointment for each patient.

References

- Alabama Bill Amending Woman's Right to Know Act to Increase Waiting Period (HB 489). (2018, Jan 5). *Rewire.News*. Retrieved from <https://rewire.news/legislative-tracker/law/alabama-bill-amending-womans-right-to-know-act-to-increase-waiting-period-hb-489/>
- Althaus, F. A., & Henshaw, S. K. (1994). The effects of mandatory delay laws on abortion patients and providers. *Perspectives on Sexual and Reproductive Health*, 26(5), 228.
- Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates?. *The Quarterly Journal of Economics*, 119(1), 249-275.
- Bitler, M., & Zavodny, M. (2001). The effect of abortion restrictions on the timing of abortions. *Journal of Health Economics*, 20(6), 1011-1032.
- Bitler, M., & Zavodny, M. (2002). Child abuse and abortion availability. *American Economic Review*, 92(2), 363-367.
- Bitler, M. P., & Zavodny, M. (2004). Child maltreatment, abortion availability, and economic conditions. *Review of Economics of the Household*, 2(2), 119-141.
- Drey, E. A., Foster, D. G., Jackson, R. A., Lee, S. J., Cardenas, L. H., & Darney, P. D. (2006). Risk factors associated with presenting for abortion in the second trimester. *Obstetrics & Gynecology*, 107(1), 128-135.
- Fausset, R. (2014, October 24). Abortion Capital of Bible Belt? Tennessee Vote Tests That Idea. *The New York Times*, Retrieved from <https://www.nytimes.com/2014/10/25/us/abortion-capital-of-bible-belt-tennessee-vote-tests-that-idea.html>
- Ferman, B., & Pinto, C. (2015). Inference in differences-in-differences with few treated groups and heteroskedasticity. *Review of Economics and Statistics*.
- Fischer, S., Royer, H., & White, C. (2018). The impacts of reduced access to abortion and family planning services on abortions, births, and contraceptive purchases. *Journal of Public*

Economics, 167, 43-68.

Goldenberg, R., Thomas, A., Ralph, C. (September 2017). How far is too far? An analysis of driving times to abortion clinics in the US.

Retrieved from <https://pudding.cool/2017/09/clinics/>

Grossman, D., White, K., Hopkins, K., & Potter, J. E. (2017). Change in distance to nearest facility and abortion in Texas, 2012 to 2014. *Jama*, 317(4), 437-439.

Guttmacher Institute. (2014). Laws Affecting Reproductive Health and Rights: 2013 State Policy Review. Retrieved from <https://www.guttmacher.org/laws-affecting-reproductive-health-and-rights-2013-state-policy-review>

Guttmacher Institute. (2018, May 1). State Facts About Abortion: Tennessee. Retrieved from <https://www.guttmacher.org/fact-sheet/state-facts-about-abortion-tennessee>

Guttmacher Institute. (2019a, February 1). An Overview of Abortion Laws. Retrieved from <https://www.guttmacher.org/state-policy/explore/overview-abortion-laws>

Guttmacher Institute. (2019b, February 1). Counseling and Waiting Periods for Abortion. Retrieved from <https://www.guttmacher.org/state-policy/explore/counseling-and-waiting-periods-abortion>

Guttmacher Institute. (2019c, February 1). State Policy Updates. Retrieved from <https://www.guttmacher.org/state-policy>

Guttmacher Institute. (2019d, February 1). Targeted Regulation of Abortion Providers. Retrieved from

<https://www.guttmacher.org/state-policy/explore/targeted-regulation-abortion-providers>

Jacobson, M. & Royer, H. (2011). Aftershocks: The Impact of Clinic Violence on Abortion Services. *American Economic Journal: Applied Economics*, 3(1), 189-223.

Jones, R. K., & Jerman, J. (2014). Abortion incidence and service availability in the United

- States, 2011. *Perspectives on sexual and reproductive health*, 46(1), 3-14.
- Joyce, T., Henshaw, S. K., & Skatrud, J. D. (1997). The impact of Mississippi's mandatory delay law on abortions and births. *JAMA*, 278(8), 653-658.
- Joyce, T., & Kaestner, R. (2000). The impact of Mississippi's mandatory delay law on the timing of abortion. *Family Planning Perspectives*, 4-13.
- Joyce, T., & Kaestner, R. (2001). The impact of mandatory waiting periods and parental consent laws on the timing of abortion and state of occurrence among adolescents in Mississippi and South Carolina. *Journal of Policy Analysis and Management: The Journal of the Association for Public Policy Analysis and Management*, 20(2), 263-282.
- Joyce, T., Kaestner, R., & Ward, J. (2019). The Impact of Parental Involvement Laws on Minor Abortion. *NBER Working Paper No. 25758*.
- Joyce, T. J., Henshaw, S. K., Dennis, A., Finer, L. B., & Blanchard, K. (2009). The impact of state mandatory counseling and waiting period laws on abortion: A literature review. New York: Guttmacher Institute.
- Karasek, D., Roberts, S. C., & Weitz, T. A. (2016). Abortion patients' experience and perceptions of waiting periods: Survey evidence before Arizona's two-visit 24-hour mandatory waiting period law. *Women's Health Issues*, 26(1), 60-66.
- Kelly, A., Lindo, J. M., & Packham, A. (2019). The Power of the IUD: Effects of Expanding Access to Contraception Through Title X Clinics. *NBER Working Paper No. 25656*.
- Klick, J. (2006). Mandatory waiting periods for abortions and female mental health. *Health Matrix*, 16, 183.
- Lindo, J. M., Myers, C., Schlosser, A., & Cunningham, S. (forthcoming). How far is too far? New evidence on abortion clinic closures, access, and abortions. *Journal of Human Resources*.

- Lu, Y, J. M. and & Slusky, D.. (2019). The Impact of Women's Health Clinic Closures on Fertility. *American Journal of Health Economics*, 5(3): 334-359.
- Lupfer, M., & Silber, B. G. (1981). How patients view mandatory waiting periods for abortion. *Family planning perspectives*, 13(2), 75-79.
- MacKinnon, J. G., & Webb, M. D. (2016). Difference-in-differences inference with few treated clusters (No. 1355). Queen's Economics Department Working Paper.
- MacKinnon, J. G., & Webb, M. D. (2017). Pitfalls when estimating treatment effects using clustered data (No. 1387). Queen's Economics Department Working Paper.
- MacKinnon, J. G., & Webb, M. D. (2018). The wild bootstrap for few (treated) clusters. *The Econometrics Journal*, 21(2), 114-135.
- Medical Versus Surgical Abortion. *UCLA Obstetrics and Gynecology*. Retrieved from <http://obgyn.ucla.edu/medical-versus-surgical-abortion>
- Medoff, M. H. (2007). Price, restrictions and abortion demand. *Journal of Family and Economic Issues*, 28(4), 583-599.
- Meier, K. J., Haider-Markel, D. P., Stanislawski, A. J., & McFarlane, D. R. (1996). The impact of state-level restrictions on abortion. *Demography*, 33(3), 307-312.
- Quast, T., Gonzalez, F., & Ziemba, R. (2017). Abortion facility closings and abortion rates in Texas. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, 54, 0046958017700944.
- Ranji, U., Bair, Y., & Salganicoff, A. (2016). Medicaid and family planning: Background and implications of the ACA. *Kaiser Family Foundation*: Menlo Park, CA. Retrieved from <https://www.kff.org/report-section/medicaid-and-family-planning-the-aca-medicaid-expansion-and-family-planning/>
- Roberts, S. C., Turok, D. K., Belusa, E., Combellick, S., & Upadhyay, U. D. (2016). Utah's

72-Hour Waiting Period for Abortion: Experiences Among a Clinic-Based Sample of Women. *Perspectives on Sexual and Reproductive Health*, 48(4), 179-187.

Roodman, D., Nielsen, M. O., MacKinnon, J. G., & Webb, M. D. (2019). Fast and wild: Bootstrap inference in Stata using boottest. *The Stata Journal*, 19(1), 4-60.

Rorbye, C., Norgaard, M., & Nilas, L. (2004). Medical versus surgical abortion efficacy, complications and leave of absence compared in a partly randomized study. *Contraception*, 70(5), 393-399.

Sanders, J. N., Conway, H., Jacobson, J., Torres, L., & Turok, D. K. (2016). The longest wait: Examining the impact of Utah's 72-hour waiting period for abortion. *Women's health issues*, 26(5), 483-487.

Sen, B. (2007). State abortion restrictions and child fatal-injury: An exploratory study. *Southern Economic Journal*, 553-574.

Tennessee Code (2010). Title 39 Criminal Offenses. Chapter 15 Offenses Against the Family. Part 2 Abortion. 39-15-202 Consent of pregnant woman required prior to abortion. Information provided by doctor. Waiting period. Penalty for violation. Requirements inapplicable in certain cases.

Tennessee Supreme Court strikes laws restricting abortion. (2000, September 15). *The American Civil Liberties Union*, Retrieved from <https://www.aclu.org/news/tennessee-supreme-court-strikes-laws-restricting-abortions>

Wadhvani, A. (2014, September 28). TN abortion rights at crossroads. *Tennessean*, Retrieved from: <https://www.tennessean.com/story/news/politics/2014/09/28/tn-abortion-rights-crossroads/16377945/>

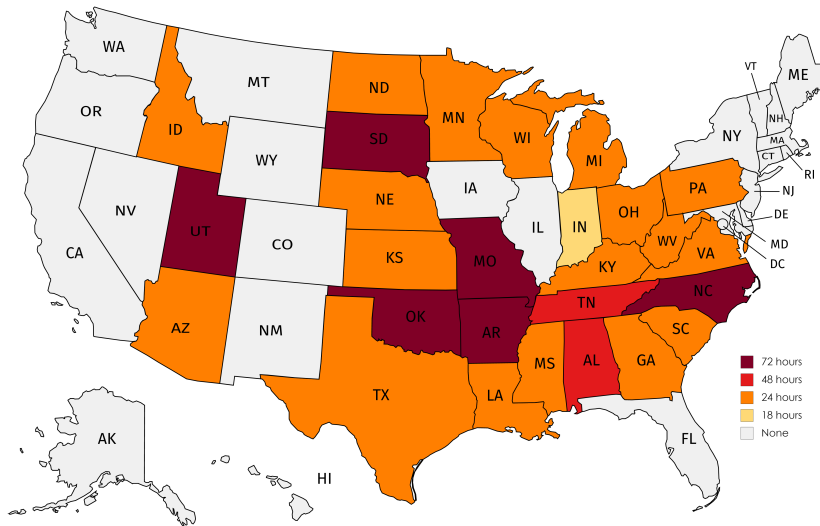
Where the states stand on Medicaid expansion. (2019, April 1). *Advisory Board*, Retrieved from <https://www.advisory.com/daily-briefing/resources/primers/medicaidmap>

White, K., Grossman, D., & Turan, J. M. (2016). Experiences accessing abortion care in Alabama among women traveling for services. *Women's Health Issues*, 26(3), 298-304.

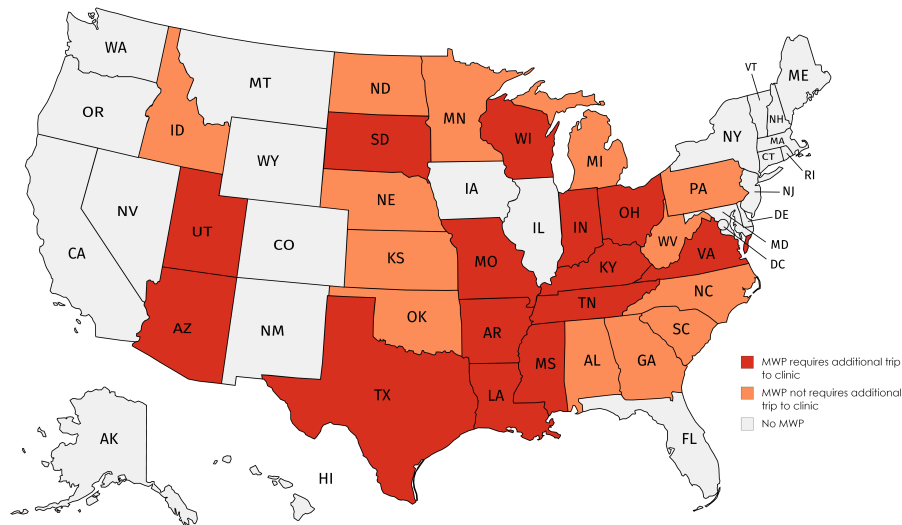
Young, A. (2018). Channeling fisher: Randomization tests and the statistical insignificance of seemingly significant experimental results. *The Quarterly Journal of Economics*, 134(2), 557-598.

Figure 1
Mandatory waiting periods for abortion, 2019

Panel A: Mandatory waiting period length



Panel B: Mandatory waiting periods requiring an additional trip to provider



Source: The map shows the mandatory waiting period in each state as of August 19th, 2019. The map was created by the authors using information on *Counseling and Waiting Periods for Abortion* from the Guttmacher Institute.

Figure 2
Tennessee and comparison states

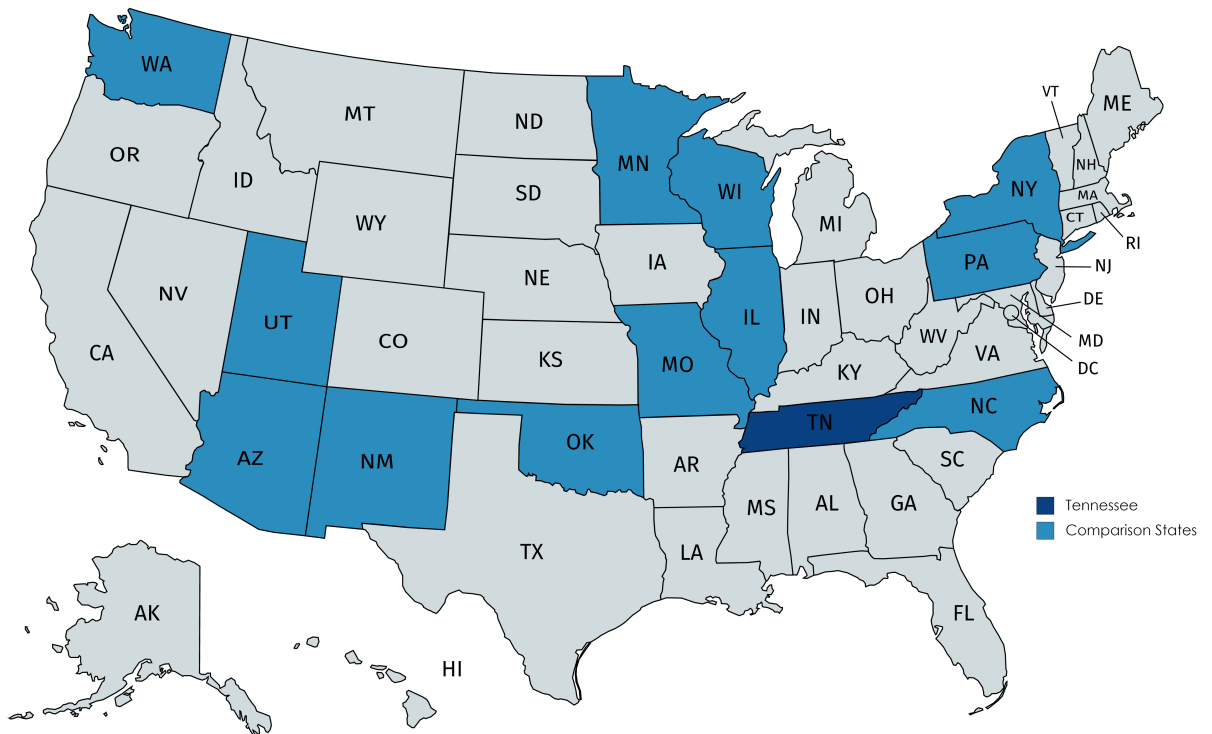
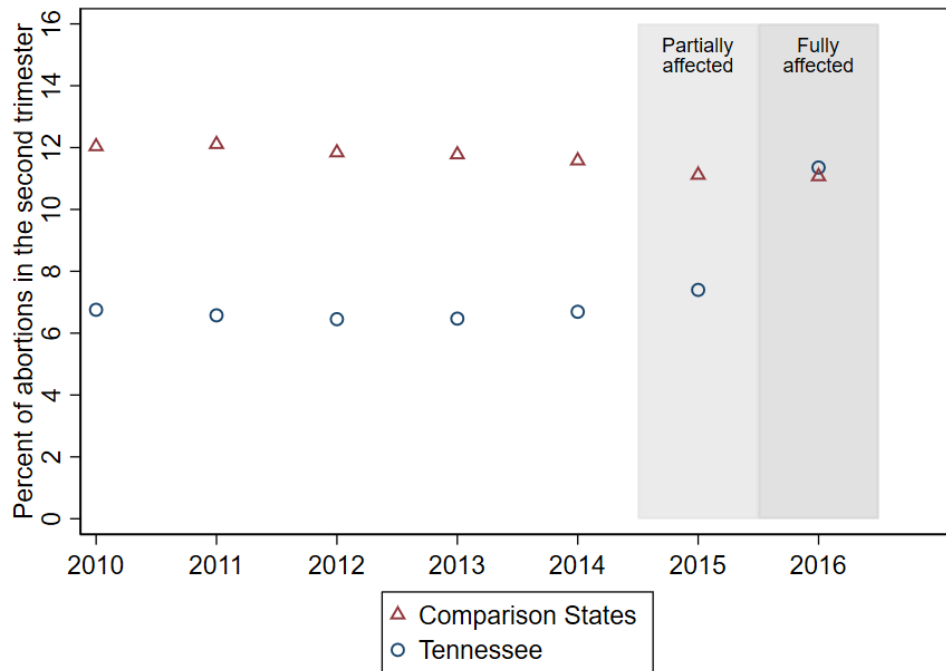
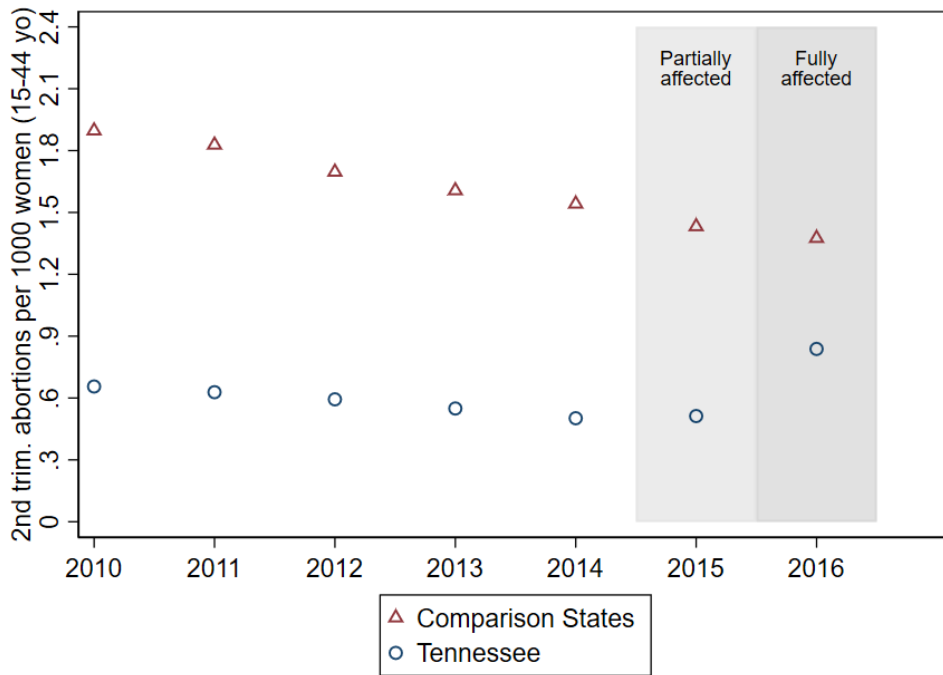


Figure 3
 Percent of abortions obtained in the second trimester



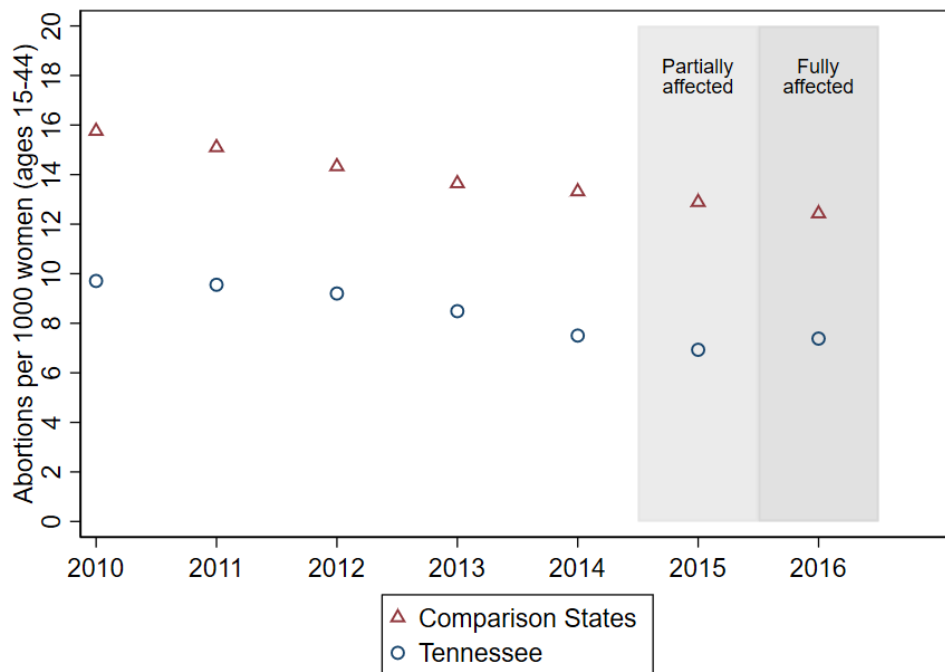
Notes: The percent of abortions in the second trimester is calculated for residents of each state as the percent of the abortions obtained after 12 weeks of gestation. The comparison states are Arizona, Illinois, Minnesota, Missouri, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Utah, Washington, and Wisconsin. For the set of comparison states, we report the average weighted by the number of abortions obtained in the state. Sources: Number of abortions by gestational age were collected from states health departments by the authors.

Figure 4
 Abortions in the second trimester per 1,000 women aged 15-44



Notes: The number of abortions in the second trimester per 1,000 women (ages 15-44) is calculated for residents as the number of abortions obtained after 12 weeks of gestation per 1,000 women (ages 15-44) in each state. The comparison states are Arizona, Illinois, Minnesota, Missouri, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Utah, Washington, and Wisconsin. For the set of comparison states, we report the average weighted by the total number of women (ages 15-44) in the state. Sources: Number of abortions by gestational age were collected from states health departments by the authors. Annual state-level population estimates were obtained from United States Census Bureau (2017).

Figure 5
 Abortions per 1,000 women aged 15-44

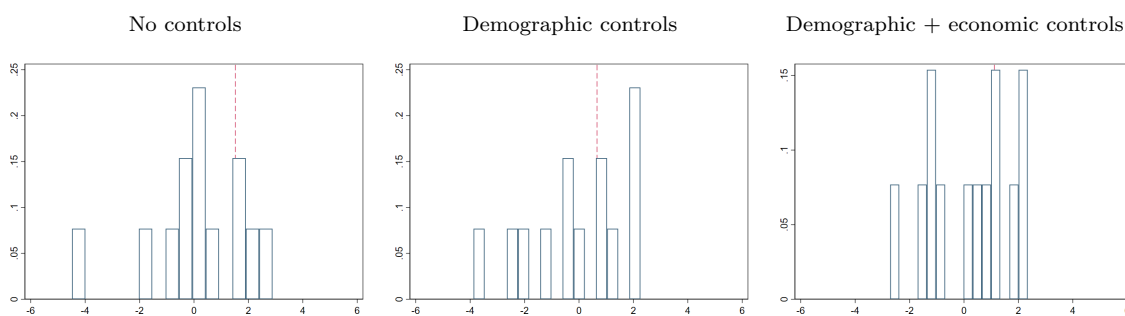


Notes: The number of abortions per 1,000 women (ages 15-44) is calculated for residents of each state. The comparison states are Arizona, Illinois, Minnesota, Missouri, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Utah, Washington, and Wisconsin. For the set of comparison states, we report the average weighted by the total number of women 15-44 years old in the state. Sources: Number of abortions by gestational age were collected from states health departments by the authors. Annual state-level population estimates were obtained from United States Census Bureau (2017).

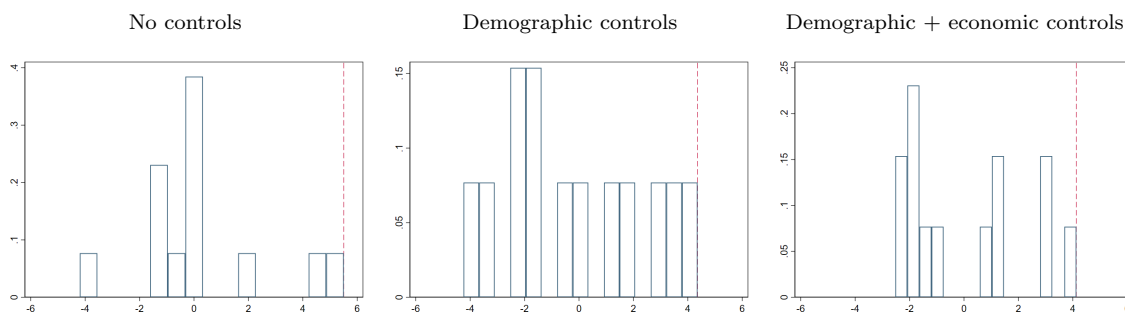
Figure 6

Distribution of estimated coefficients from randomization inference for the effects of MWP on the percent of abortions in the second trimester

Panel A: Estimated effects for the effect in 2015



Panel B: Estimated effects for the effect in 2016

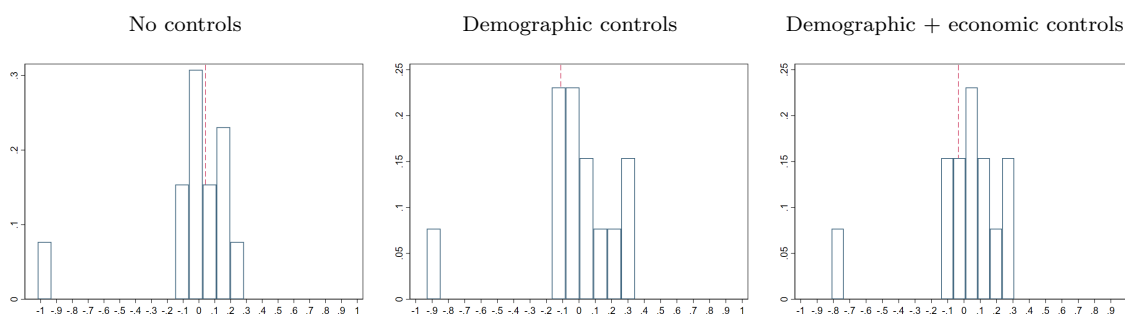


Note: The estimated coefficients were obtained using randomization inference. The percent of abortions in the second trimester is calculated for residents of each state as the percent of abortions obtained after 12 weeks of gestation to the total number of abortions. The first column shows estimated effects from the baseline model that does not include controls. The second column shows estimated effects from the model that includes demographic controls. The third column shows estimated effects from the model that includes demographic controls and the unemployment rate. The vertical line indicates the location in the distributions of simulated treatment effects of the true treatment effects shown in Table 2. Sources: Number of abortions by gestational age were collected from states' health departments by the authors. Annual state-level population estimates were obtained from the United States Census Bureau (2017). The unemployment rate was obtained from the Bureau of Labor Statistics (2016).

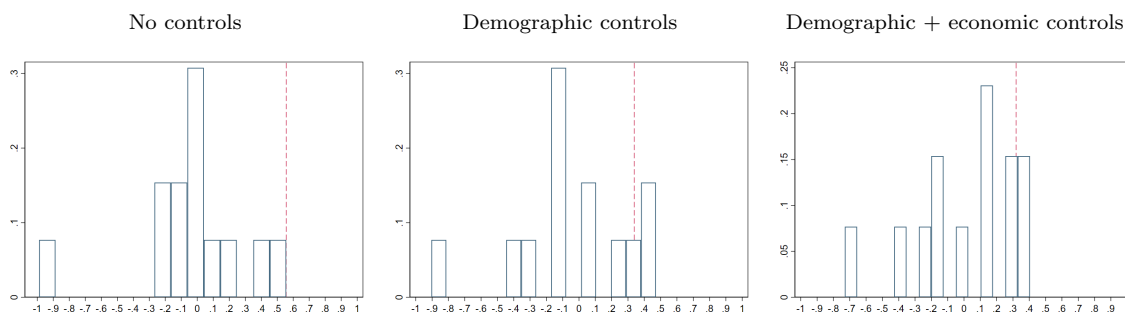
Figure 7

Distribution of estimated coefficients from randomization inference for the effects of MWP on the number of abortions in the second trimester per 1,000 women aged 15-44

Panel A: Estimated effects for the effect in 2015



Panel B: Estimated effects for the effect in 2016

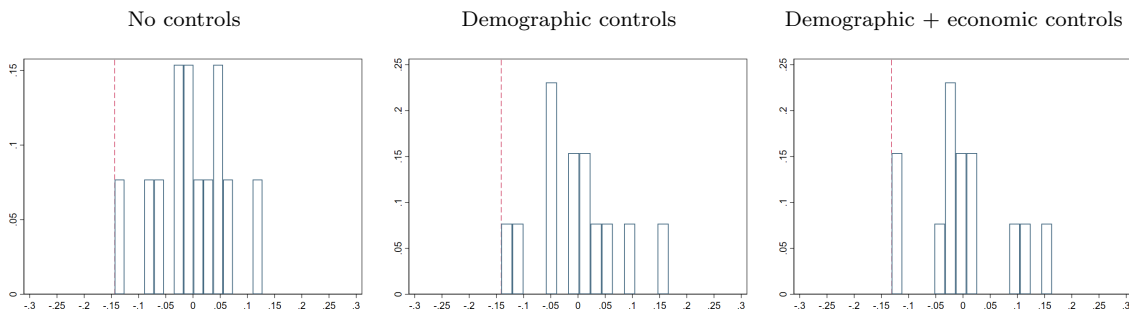


Note: The estimated coefficients were obtained using randomization inference. The number of abortions in the second trimester per 1,000 women (ages 15-44) is calculated for residents as the number of abortions obtained after 12 weeks of gestation per 1,000 women (ages 15-44) of each state. The first column shows estimated effects from the baseline model that does not include controls. The second column shows estimated effects from the model that includes demographic controls. The third column shows estimated effects from the model that includes demographic controls and the unemployment rate. The vertical line indicates the location in the distributions of simulated treatment effects of the true treatment effects shown in Table 2. Sources: Number of abortions by gestational age were collected from states' health departments by the authors. Annual state-level population estimates were obtained from the United States Census Bureau (2017). The unemployment rate was obtained from the Bureau of Labor Statistics (2016).

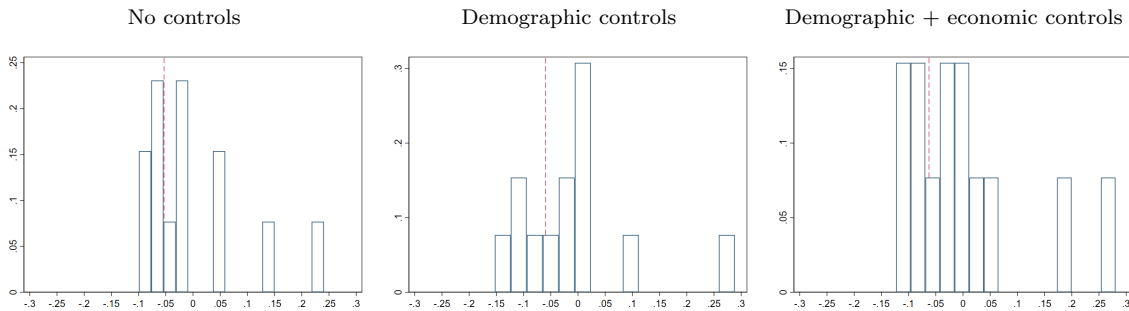
Figure 8

Distribution of estimated coefficients from randomization inference for the effects of MWP on the number of abortions per 1,000 women aged 15-44

Panel A: Estimated effects for the effect in 2015



Panel B: Estimated effects for the effect in 2016



Note: The estimated coefficients were obtained using randomization inference. The number of abortions per 1,000 women (ages 15-44) is calculated for residents as the number of abortions per 1,000 women (ages 15-44) of each state. The first column shows estimated effects from the baseline model that does not include controls. The second column shows estimated effects from the model that includes demographic controls. The third column shows estimated effects from the model that includes demographic controls and the unemployment rate. The vertical line indicates the location in the distributions of simulated treatment effects of the true treatment effects shown in Table 2. Sources: Number of abortions by gestational age were collected from states' health departments by the authors. Annual state-level population estimates were obtained from the United States Census Bureau (2017). The unemployment rate was obtained from the Bureau of Labor Statistics (2016).

Table 1
Summary Statistics

	Tennessee		Comparison states	
	2010-2014	2015-2016	2010-2014	2015-2016
% second-trimester abortions	6.59	9.38	11.72	11.03
Second-trimester abortion rate	0.59	0.68	1.28	1.06
Abortion rate per 1,000 women	8.89	7.16	10.86	9.67
% women 15-19 years old	16.13	15.81	16.83	16.51
% women 20-24 years old	17.47	17.32	17.68	17.55
% women 25-29 years old	16.63	17.76	17.05	17.34
% women 30-34 years old	16.50	16.62	16.73	17.10
% women 35-39 years old	16.06	16.23	15.53	16.17
% women 40-44 years old	17.21	16.27	16.18	15.34
% black women	19.74	19.81	10.34	10.52
% Hispanic women	5.40	5.81	16.74	17.54
% non-Hispanic white women	71.41	70.46	64.10	62.38
Unemployment rate	8.17	5.17	7.41	5.04

Notes: This table reports the mean of a variable for Tennessee or the comparison states in the indicated period. Tennessee's mandatory waiting period law was enacted in May 2015. The comparison states are Arizona, Illinois, Minnesota, Missouri, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Utah, Washington, and Wisconsin. % second-trimester abortions represents the number of abortions after 12 weeks of gestation to the total number of abortions. The second-trimester abortion rate is the percent of abortions in the second trimester per 1,000 women (ages 15-44). The abortion rate is the number of abortions of residents per 1,000 women (ages 15-44). The % women x - y years is the number of women x to y years old to the total number of women (ages 15-44); % black women is the number of black women (ages 15-44) to the total number of women (ages 15-44); % Hispanic women is the number of Hispanic women (ages 15-44) to the total number of women (ages 15-44); % non-Hispanic white women is the number of non-Hispanic white women (ages 15-44) to the total number of women (ages 15-44). Sources: Number of abortions by gestational age were collected from state health departments by the authors. Annual state-level population estimates were obtained from the United States Census Bureau (2017). The unemployment rate was obtained from the Bureau of Labor Statistics (2016).

Table 2
 Estimated effects of Tennessee's mandatory waiting period with p -values

	<u>% of second-trimester abortions</u>			<u>ln(second-trimester abortion rate)</u>			<u>ln(overall abortion rate)</u>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>1(TN in 2015)</i>	1.517 [0.38, 0.46]	0.662 [0.69, 0.77]	1.112 [0.62, 0.69]	0.042 [0.62, 0.69]	-0.112 [0.31, 0.38]	-0.034 [0.77, 0.85]	-0.131 [0.00, 0.08]	-0.141 [0.08, 0.15]	-0.131 [0.08, 0.15]
<i>1(TN in 2016)</i>	5.508 [0.00, 0.08]	4.359 [0.00, 0.08]	4.132 [0.00, 0.08]	0.556 [0.08, 0.15]	0.339 [0.31, 0.38]	0.319 [0.31, 0.38]	-0.063 [0.62, 0.69]	-0.060 [0.46, 0.54]	-0.063 [0.46, 0.54]
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographics	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Unemp. rate	No	No	Yes	No	No	Yes	No	No	Yes
Observations	91	91	91	91	91	91	91	91	91

Tennessee's mandatory waiting period law passed in May 2015. The control states are Arizona, Illinois, Minnesota, Missouri, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Utah, Washington, and Wisconsin. % of second-trimester abortions is the percent of all abortions of residents of each state obtained after 12 weeks of gestation. ln(second-trimester abortion rate) is the log of the number of abortions of residents after 12 weeks of gestation per 1,000 women (ages 15-44). ln(overall abortion rate) is the log of the number of abortions of residents of each state per 1,000 women (ages 15-44). *1(TN in 2015)* and *1(TN in 2016)* are indicator variables for Tennessee in 2015 and 2016, respectively. The demographic controls are the number of women by five-year age groups (15-19, 20-24,...,40-44) to the total number of women (ages 15-44); the number of Hispanic, black or non-Hispanic white women (ages 15-44) to the total number of women (ages 15-44). The annual unemployment rate is the average of the NSA monthly unemployment rate of each state. Lower and upper bounds of randomization inference two-sided p -values in brackets. See section 5 for more information about the intervals of p -values reported. Sources: Number of abortions by gestational age were collected from states health departments by the authors. Annual state-level population estimates were obtained from the United States Census Bureau (2017). The unemployment rate was obtained from the Bureau of Labor Statistics (2016).

Table 3

Estimated effects of Tennessee's mandatory waiting period with p -values, excluding Missouri and North Carolina

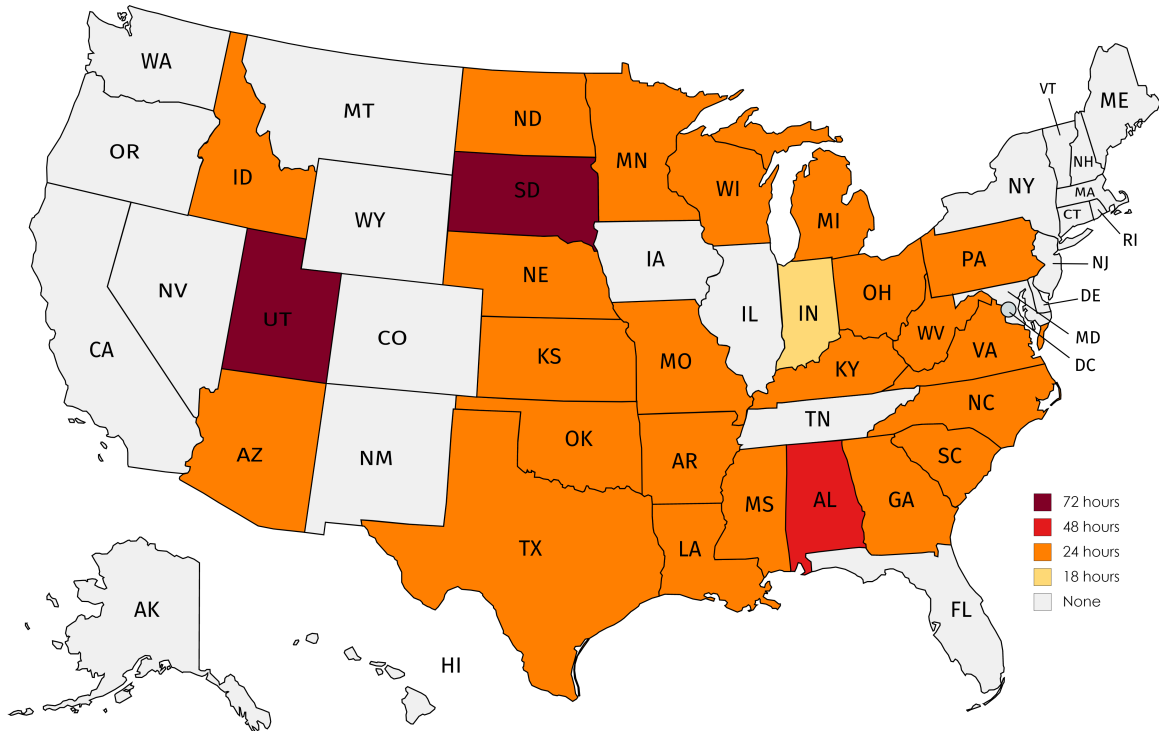
	<u>% of second-trimester abortions</u>			<u>ln(second-trimester abortion rate)</u>			<u>ln(overall abortion rate)</u>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>1(TN in 2015)</i>	1.696 [0.15, 0.23]	1.861 [0.23, 0.31]	1.971 [0.23, 0.31]	0.084 [0.38, 0.46]	0.097 [0.31, 0.38]	0.098 [0.36, 0.46]	-0.135 [0.00, 0.08]	-0.115 [0.00, 0.08]	-0.115 [0.00, 0.08]
<i>1(TN in 2016)</i>	5.780 [0.00, 0.08]	5.892 [0.00, 0.08]	5.337 [0.00, 0.08]	0.627 [0.08, 0.15]	0.625 [0.08, 0.15]	0.524 [0.08, 0.15]	-0.032 [0.54, 0.62]	-0.003 [0.69, 0.77]	-0.008 [0.69, 0.77]
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographics	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Unemp. rate	No	No	Yes	No	No	Yes	No	No	Yes
Observations	77	77	77	77	77	77	77	77	77

Tennessee's mandatory waiting period law passed in May 2015. The control states are Arizona, Illinois, Minnesota, New Mexico, New York, Oklahoma, Pennsylvania, Utah, Washington, and Wisconsin. % of second-trimester abortions is the percent of all abortions of residents of each state obtained after 12 weeks of gestation.

ln(second-trimester abortion rate) is the log of the number of abortions of residents after 12 weeks of gestation per 1,000 women (ages 15-44). ln(overall abortion rate) is the log of the number of abortions of residents of each state per 1,000 women (ages 15-44). *1(TN in 2015)* and *1(TN in 2016)* are indicator variables for Tennessee in 2015 and 2016, respectively. The demographic controls are the number of women by five-year age groups (15-19, 20-24, ..., 40-44) to the total number of women (ages 15-44); the number of Hispanic, black or non-Hispanic white women (ages 15-44) to the total number of women (ages 15-44). The annual unemployment rate is the average of the NSA monthly unemployment rate of each state. Lower and upper bounds of randomization inference two-sided p -values in brackets. See section 5 for more information about the intervals of p -values reported. Sources: Number of abortions by gestational age were collected from states health departments by the authors. Annual state-level population estimates were obtained from the United States Census Bureau (2017). The unemployment rate was obtained from the Bureau of Labor Statistics (2016).

Appendix

Figure A
Mandatory waiting period lengths, 2014



Note: The map shows the mandatory waiting period in each state at the beginning of 2014. Source: Huffington Post.

Figure B
 Abortion prices as of October 2015

Abortion Fees

Pregnancy is measured from the first day of the last normal menstrual period (not from conception) and is verified by ultrasound.


As of October 1st the fees will be:

Medical Abortion	up to 10 weeks	\$525
Surgical Abortion	6-11 weeks, 6 days	\$575
	12-12 weeks, 6 days	\$750
	13-13 weeks, 6 days	\$850
	14-14 weeks, 6 days	\$1000
	**15-16 weeks, 3 days	\$1,100
Twin Pregnancy	13-15 weeks	\$1,050

** Limited scheduling based on physician availability.

Abortion Fees Include:
 The abortion procedure, lab work, ultrasound, counseling, medications given at the Center, take home medications, and the follow-up exam three to four weeks later.

Due to the 48 hour waiting period and imposed two clinic visits, the fee is split into two payments. The first visit is \$180; the second visit is the remaining fee based on the gestational age at the time of the second visit. Full payment at the first visit is an option, if preferred.



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Note: This information was obtained using Wayback Machine. Source: Knoxville Center for Reproductive Health.