

TRAP'd Teens: Impacts of abortion provider regulations on fertility & education*

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Abstract

Targeted regulations of abortion providers (TRAP laws) are the fastest-growing abortion restriction in the U.S. These often result in clinic closures, limiting abortion access. We study how women's exposure to these laws in adolescence affects their fertility and educational attainment. For this study, we codify the legal history of all TRAP laws ever implemented. We explore the impacts of TRAP laws on teen births using an event-study analysis and stacked difference-in-differences methodology to avoid issues of negative weighting inherent in two-way fixed effects approaches. Consistent with other evidence on abortion access, we find that impacts on births are large and robust for Black women. Black teen births in states that implemented TRAP laws increased by 3 percent relative to changes in states without these restrictions. We offer evidence that these impacts are driven by reductions in abortion access, abortion use, and contraception use among Black teens. We further document that adolescent exposure to TRAP laws has downstream impacts on education. We find that Black women first exposed to TRAP laws before age 18 are 1 to 3 percentage points less likely to initiate and complete college. This study documents the important role that abortion access plays in reducing the harmful economic impacts of unintended teen motherhood. The findings suggest that modern abortion restrictions are harming women's efforts at economic advancement and are perpetuating racial inequality. This work is particularly relevant given the current consideration by the U.S. Supreme Court of the state of Mississippi's plea to overturn *Roe*. A central argument in an amicus brief for Mississippi is that "there is no adequate credible evidence that women have enjoyed greater economic and social opportunities because of the availability of abortion" – this study provides direct evidence to the contrary.

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1 Introduction

Access to abortion services in the United States has long been a divisive issue and a political flashpoint. When the Supreme Court decision *Roe v. Wade* declared that an individual’s right to privacy provided a right to abortion, the national debate only intensified. Since that time, in states where opposition to abortion is strong, various measures have been implemented to restrict abortion access. Existing evidence suggests that modern abortion restrictions, such as parental involvement laws, mandatory waiting periods, and reductions in Medicaid funding for abortion, reduce abortion use, delay abortion timing, and increase births, especially among young women.¹ We hypothesize that restricting access to abortion, especially among adolescents, may additionally impact women’s educational attainment.

Access to family planning services such as contraception and abortion can impact women’s economic outcomes through several mechanisms. The direct effects of these policies are reflected in their fertility impacts. When a young woman experiences an unintended birth, she may pause or abandon her educational or other career investments.² However, these services can also indirectly affect such investments even in the absence of an unwanted pregnancy. Expectations about one’s future ability to control whether and when to have a child can affect aspirations, planning, and investment for the future.³ As such, abortion access may impact future welfare by changing the course of a young woman’s life.

Targeted regulations of abortion providers or TRAP laws are the fastest growing abortion restrictions in the U.S. Between 2010-2017, the number of states that implemented these restrictions increased by 53 percent. Existing evidence has documented the detrimental impacts of such restrictions in Texas and Pennsylvania in terms of abortion access, abortion rates, and abortion timing (Quast, Gonzalez, and Ziemba, 2017; Fischer, Royer, and White, 2018; Lindo et al., 2020; Kelly, 2020). We test whether such impacts extend beyond these two states and whether such restrictions have downstream impacts on fertility and education.

In this study, we estimate the impacts of twenty-seven targeted regulations of abortion providers (TRAP laws) implemented across twenty-one states since 1994. To do so, we first code the complete legal history of all TRAP laws in each U.S. state. We then estimate the impact of teen exposure to TRAP laws on teen births, using natality data from Vital Statistics. We exploit the fact that TRAP laws vary across states and over time, however, we acknowledge recent evidence suggesting that such “staggered adoption” estimations may be biased by heterogeneous treatment effects over time (Callaway and Sant’Anna, 2020; de Chaisemartin and D’Haultfoeuille, 2020b; Athey and Imbens, 2021; Goodman-Bacon, 2021). To address this concern, we use a pooled event study methodology to examine the difference in teen birth rates in each year leading up to and following a TRAP law between the state that implemented the law and other states that do not implement a law in that period. This methodology allows us to test the assumption of common trends and to examine heterogeneous effects of policies over time. Yet, we also acknowledge that pooled event studies may still be biased in the presence of heterogeneous treatment effects across units (Sun and Abraham, 2020; Borusyak, Jaravel, and Spiess, 2021). We demonstrate robustness of our findings to a stacked difference-in-differences methodology, which is not subject to this concern.⁴ We also explore differential effects by type,

¹See Section 2.1 for a review of this evidence.

²Upchurch and McCarthy (1990); Geronimus and Korenman (1992); Ribar (1994); Klepinger, Lundberg, and Plotnick (1999); Chevalier, Viitanen, and Viitanen (2003); Levine and Painter (2003); Kaplan, Goodman, and Walker (2004); Holmlund (2005); Hotz, McElroy, and Sanders (2005); Sanders and Smith (2007); Ashcraft, Fernández-Val, and Lang (2013); Schulkind and Sandler (2019) provide evidence on the relationship between teen fertility and educational attainment. See section 2.2 for more information on these studies.

³Evidence suggests that early legal access to contraceptives in the 1970s affected women’s educational choices and attainment (Goldin and Katz, 2002; Hock, 2008; Bailey, Hershbein, and Miller, 2012; Ananat and Hungerman, 2012).

⁴See Cengiz et al. (2019) for an application of this methodology to the study of the effects of minimum wages on on low-wage jobs.

severity, and number of TRAP laws.

We find that the onset of a TRAP law increases births among Black teens by 3 percent. Among White teens, the onset of a law has no impact on the pre-existing trend in teen births. This is consistent with previous evidence that Black women are disproportionately affected by restrictions to family planning access.⁵ We also analyze potential mechanisms driving changes in fertility. Our findings suggest that decreases in abortion use, abortion access, and contraception use are channels through which TRAP laws increase Black teen birth rates.

We next explore the impacts of teen exposure to TRAP laws on the educational attainment of Black women, as measured at ages 25 and older, using information from the American Community Survey. We use a pooled difference-in-differences methodology that allows us to measure TRAP laws' longer-term impacts. As before, we demonstrate robustness of our findings in a stacked difference-in-differences methodology, to allay concerns about bias arising from heterogeneous treatment effects. We also offer evidence that the assumption of common trends holds, demonstrating that the impacts of first exposure at ages 30 or older are zero, with effects becoming negative and monotonically increasing in magnitude as the age of first exposure falls. We find that first exposure to a TRAP law before age 18 reduces the probability of having ever entered college by 1 to 3 percentage points, relative to a mean of 55 percent, and reduces the probability of completing college by 1 to 3 percentage points, relative to a mean of 24 percent.

We contribute to the literature in several ways. This is the first study to estimate the impacts of TRAP laws on abortion access, abortion use, and teen fertility nationally. Second, we contribute to a limited body of evidence on the causal impacts of modern abortion restrictions on women's outcomes beyond abortion use and fertility. This evidence includes only two papers of which we are aware: Borelli (2011) documents impacts of parental involvement laws on education and the Turnaway study documents impacts of gestational limits on economic duress, both in the relatively short term (Foster et al., 2018b; Miller, Wherry, and Foster, 2020a).⁶

Finally, our study also updates our knowledge on the effects of early fertility on measures of socioeconomic success, a topic of long-standing interest across the social sciences. Despite great interest in the relationship between teen fertility and educational attainment, a challenge in studying this relationship is that socio-demographic characteristics of women often are strong predictors of both fertility-related behaviors and economic outcomes. Researchers have relied on various strategies to isolate the causal impacts of teen pregnancy on educational attainment, such as controlling for individual and family characteristics by comparing women within families or within schools,⁷ or by relying on potentially exogenous sources of variation in the timing of childbearing, such as age at menarche or the experience of miscarriage.⁸ Other studies have estimated the causal relationship between teen fertility and educational attainment by exploiting the geographic and temporal variation in the implementation of family planning policies implemented in the 1960s and 1970s.⁹ However, the U.S. economic, social, and political landscapes have changed dramatically

⁵See Bailey, Malkova, and Norling (2014); Bailey, Malkova, and McLaren (2018); Browne and LaLumia (2014); Myers (2017); Myers and Ladd (2020).

⁶Additionally, Angrist and Evans (2000) document impacts of abortion *legalization* in the 1970's on women's educational and labor market outcomes. Further, some studies have also documented the economic impacts of abortion access on the *next generation* (Ananat et al., 2009; Foster et al., 2018a,c).

⁷Studies that employ this methodology include Olsen and Farkas (1989); Upchurch and McCarthy (1990); Geronimus and Korenman (1992); Hoffman, Foster, and Furstenberg (1993); Levine and Painter (2003); Holmlund (2005); Sanders and Smith (2007); Schulkind and Sandler (2019).

⁸Ribar (1994); Klepinger, Lundberg, and Plotnick (1999); Chevalier, Viitanen, and Viitanen (2003); Kaplan, Goodman, and Walker (2004); Hotz, McElroy, and Sanders (2005); Ashcraft, Fernández-Val, and Lang (2013) rely on these quasi-exogenous sources of variation.

⁹See Angrist and Evans (2000); Goldin and Katz (2002); Hock (2008); Bailey, Hershbein, and Miller (2012); Ananat and

in the past 30 years. Thus, our paper also updates the knowledge base by providing evidence on the modern relationship between teen fertility and educational attainment as identified by exogenous shifts in teen births induced by policies occurring in recent decades.

In the case *Mississippi v. Jackson Women’s Health*, currently under consideration by the US Supreme Court, a central argument of one amicus brief is that "there is no adequate credible evidence that women have enjoyed greater economic and social opportunities because of the availability of abortion." Our findings provide direct evidence to the contrary.

The remainder of the paper is structured as follows: Section 2 discusses existing evidence on the modern abortion restrictions and the relationship between teen motherhood and educational attainment. Section 3 describes TRAP laws and the creation of the legal data set. Section 4 presents the impacts on teen births and explores the mechanisms driving these impacts. Section 5 presents the impacts on women’s education and Section 6 concludes.

2 Existing evidence

2.1 Modern abortion restrictions

In 1973, the US Supreme Court legalized abortion nationwide in the landmark case *Roe v. Wade*, which established the right to an abortion during the first trimester as protected under a constitutional right to privacy. The Court allowed states to place restrictions in the second trimester to protect a woman’s health and, in the third trimester, to protect a viable fetus. In 1992, the abortion regulation landscape dramatically changed with the next major Supreme court ruling regarding abortion access. In *Planned Parenthood v. Casey* (henceforth *Casey*), the Court upheld the legality of abortion throughout the US but dramatically changed regulatory standards in several ways. Under *Casey*, while a state could not prohibit a woman from obtaining an abortion prior to viability, states did have the right to restrict abortion, as long as those restrictions did not pose an “undue burden” on the woman seeking an abortion. Courts were now directed to consider the particular restriction and the degree to which it would interfere with the woman’s ability to access abortion. States seeking to regulate or restrict abortion had a new standard to meet and a template for a law that met this standard (Mercier, Buchbinder, and Bryant, 2016). Following *Casey*, state and local legislatures began to pass more and more laws to restrict abortion access, and the Supreme Court has more often upheld them.

Figure 1 documents the increase over time in the three of the most common types of abortion restrictions.¹⁰ Following *Casey*, there was rapid growth in parental involvement laws, which require that minors have parental notification or parental consent to access abortion. More recent and less common are manda-

Hungerman (2012); Edlund and Machado (2015) for this evidence.

¹⁰According to Guttmacher Institute (2021b), the most common types of abortion laws are: 1) refusal, which allows health care providers or institutions to refuse to participate in an abortion, 2) gestational limits, which prohibit abortions after a specific point in pregnancy, usually 20+ weeks since last menstrual period (LMP) or fetal viability (Kaiser Family Foundation, 2021b), 3) TRAP laws, 4) parental involvement laws, and 5) mandatory waiting periods. We do not include in Figure 1 refusal laws because the refusal happens on a case-by-case basis and the law does not prevent or limit the existence of abortion facilities or providers. We also exclude from Figure 1 gestational limits because the majority of abortions happen in the first trimester, so these are binding for a minority of women. Other abortion laws we do not consider in our analysis are so-called “partial-birth abortion” bans, because these apply to an abortion method used only after 20 weeks since LMP (Kaiser Family Foundation, 2021a). Additionally, we do not include public funding bans because these bans were triggered by the 1976 Hyde Amendment and, therefore, most of these laws have been already enforced for several decades (Salganicoff, Sobel, and Ramaswamy, 2021). We also exclude state-mandated counseling laws as they are usually implemented in combination with mandatory waiting periods. Finally, we do not include bans of coverage by private insurance because they have been implemented in few states and most states allow individuals to purchase additional abortion coverage at an additional cost.

tory waiting periods, which require that a women wait a specified period (usually 24 or 48 hours) after receiving specified information before she can access abortion services. Since 2010, the fastest growing abortion restriction is a category known as targeted regulations of abortion providers, or TRAP laws. Though our data and analysis end in 2017, we note that, by 2021, TRAP laws were more common than parental involvement laws across the U.S. (Guttmacher Institute, 2021b). TRAP laws require providers to comply with various regulations including having specific agreements with hospitals for transfer and treatment of patients, locating within a specified distance to a hospital, or meeting advanced surgical center requirements for building structure or utility systems. When clinics cannot comply with such requirements, they may be forced to close either temporarily or permanently, thereby reducing abortion access. The number of states enforcing TRAP laws increased by 53 percent between 2010 and 2017.

The most widely studied TRAP law is Texas HB2, implemented in 2013. It required the most stringent form of hospital admitting privileges and mandated a minimum distance to a hospital.¹¹ Several studies have documented that HB2 resulted in an increase in distance to the nearest provider, which decreased abortion rates and/or increased birth rates (Quast, Gonzalez, and Ziemba, 2017; Lu and Slusky, 2016; Fischer, Royer, and White, 2018; Lindo et al., 2020). One study also documents increases in clinic congestion and delays in abortion timing as a result (Lindo et al., 2020). These findings are consistent with evidence from Wisconsin that abortion clinic closures (unrelated to TRAP laws) decreased abortion rates and increased births (Venator and Fletcher, 2020).

Outside Texas, TRAP laws have only been examined in Pennsylvania. In 2012, Pennsylvania implemented building regulations for abortion providers, causing the closure of almost half of the abortion facilities and creating increased congestion in those remaining open. Kelly (2020) shows that the reduced clinic capacity significantly shifted abortion timing, decreasing abortions within the first eight weeks of gestation and increasing abortions in later stages of pregnancy. It also caused a reduction in the total abortion rate of 14 percent and increases in total birth rates of 3 percent.

A first contribution of our study is to provide the first national-level evidence regarding the impact of TRAP laws on abortion access, abortion use, and fertility. In doing so, we also provide the first detailed, quantitative coding of the history of TRAP laws in all US states.

We note that beyond TRAP laws, other abortion restrictions have also been documented to affect abortion use, abortion timing, and fertility. Parental involvement laws, particularly those post-*Casey*, have been shown to reduce minors' abortion use, delay their abortion timing, and increase early fertility.¹² Mandatory waiting periods, particularly those that require two trips to the clinic, have been shown to reduce abortion use, delay abortion timing, and increase births, particularly for young women and women of color.¹³ Other studies have also documented the harmful consequences of cuts to public funding of family planning, especially for those living in poverty.^{14, 15}

¹¹It also required that all abortion facilities meet new ASC standards (see Section 3.1). The ASC standard was scheduled to be enforced in 2014, but it never happened. The case *Whole Woman's Health v. Hellerstedt* confirmed this requirement would not be applied.

¹²On minor's abortion use, see Cartoof and Klerman (1986); Haas-Wilson (1993); Ohsfeldt and Gohmann (1994); Kane and Staiger (1996); Joyce and Kaestner (1996); Haas-Wilson (1996); Ellertson (1997); Altman-Palm and Tremblay (1998); Tomal (1999); Levine (2003); Joyce, Kaestner, and Ward (2020).

On abortion timing, see Rogers et al. (1991); Bitler and Zavodny (2001); Joyce and Kaestner (2001); Colman and Joyce (2009).

On early fertility, see Tomal (1999); Myers and Ladd (2020).

¹³See Joyce, Henshaw, and Skatrud (1997); Bitler and Zavodny (2001); Lindo and Pineda-Torres (2021); Myers (2021).

¹⁴See Stevenson et al. (2016); Packham (2017); Lu and Slusky (2016).

¹⁵Prior evidence on the impacts of other abortion restrictions include studies on the use of Medicaid for abortion, showing these restrictions decrease abortion use among minors and low-income populations, though they have not been shown to impact overall birth rates (Lundberg and Plotnick, 1990; Haas-Wilson, 1993; Meier and McFarlane, 1994; Blank, George, and London,

Differences by race

Existing evidence documents that the impacts of abortion access may be different across demographic groups. This is true both for the impacts of abortion legalization, as well as the impacts of modern abortion restrictions.

Abortion legalization has been found to decrease births to Black women more than births to White women (Gruber, Levine, and Staiger, 1999; Levine et al., 1999), including teen births (Joyce and Mocan, 1990; Donohue, Grogger, and Levitt, 2009; Ozbeklik, 2014; Myers, 2017). It has also been documented to increase women's education and labor market participation, but only among Black women (Angrist and Evans, 2000; Kalist, 2004).

Parental involvement laws increase births for both White and Black teens. However, at higher avoidance distances, the estimated effects are 50 to 100 percent larger for Black women (Myers and Ladd, 2020).¹⁶ Parental involvement laws also negatively impact educational attainment for Black but not White women (Borelli, 2011).

Distance to the nearest abortion provider affects abortion use and births more among Black women. Joyce, Tan, and Zhang (2013) document that distance to a provider has a greater impact on abortion use for non-White vs. White women. Venator and Fletcher (2020) find that a distance increase of 100-miles increases births by five times as much among Black women compared to White women.

Reductions in abortion funding also differentially affect Black women. Funding cuts in North Carolina increased births by twice the amount among Black women as White women (Cook et al., 1999; Morgan and Parnell, 2002), and reductions in Medicaid funding for abortion increased fatal injuries to Black children but not White children (Sen, 2007).

Why does research find greater impacts of abortion access among Black women? Black women have higher rates of unmet need for contraception, higher rates of unintended pregnancy, and report higher use of abortion (Bernstein and Jones, 2019). Lower access to contraception is likely to increase the potential need for access to abortion. Black women are also more likely to be living in poverty than White women and so generally face greater barriers to accessing reproductive health care and are less able to overcome abortion access restrictions.

These disparities stem from the broader environment of structural racism and oppression facing Black women in the United States. Throughout the history of the country, there have been efforts to control the fertility of women of color and low-income women, including through involuntary sterilization and long-acting contraception for public assistance recipients.¹⁷ This legacy of reproductive coercion perpetuates mistrust of the health care system and may deter women from seeking care.

Given the evidence of sizable impacts of abortion access on Black women relative to other women, it seems likely that TRAP laws would also differentially affect these two groups. Our analysis explores the impacts separately by race.

1996; Haas-Wilson, 1996; Levine, Trainor, and Zimmerman, 1996; Haas-Wilson, 1997; Matthews, Ribar, and Wilhelm, 1997; Tomal, 1999; Cook et al., 1999; Morgan and Parnell, 2002). Also, gestational limits have been shown to contribute to worse health and economic outcomes for women who were denied needed abortion care (see Miller, Wherry, and Foster, 2020b for an annotated list of findings from the Turnaway Study). Compulsory ultrasound requirements have not been found to affect abortion use (Gius, 2019). We do not discuss these policies since most of them were implemented several decades ago. Some other evidence focuses on access to fertility controls in the nineteenth century based on anti-obscenity laws, which restricted access to information, products, and services to control fertility, particularly abortion. Findings indicate that these policies led to increases in births (Lahey, 2014a,b).

¹⁶Myers and Ladd (2020) define "avoidance distance" as the difference between the distance to the nearest provider of a confidential abortion and the nearest abortion provider.

¹⁷See Rocca and Harper (2012); Thorburn and Bogart (2005); Gold (2014).

2.2 Early fertility and education

A second literature to which this study contributes is one that assesses the economic impacts of early births on economic outcomes such as educational attainment. Identifying this relationship requires separating the causal effects of the birth from other socio-economic factors that may drive both early pregnancy and educational attainment. Researchers have relied on various strategies to isolate the causal impacts of unintended pregnancy on educational attainment.

Studies have documented that teen mothers have lower educational attainment, even after controlling for individual and family characteristics, either through propensity score matching, estimating within families, or estimating within schools (Olsen and Farkas, 1989; Upchurch and McCarthy, 1990; Geronimus and Korenman, 1992; Hoffman, Foster, and Furstenberg, 1993; Levine and Painter, 2003; Holmlund, 2005; Sanders and Smith, 2007; Schulkind and Sandler, 2019). Yet such comparisons may not fully account for unobservable factors that affect teen pregnancy and educational attainment. Other studies have relied on potentially exogenous sources of variation in the timing of childbearing, such as age at menarche or the experience of miscarriage. These studies have found negative but more modest impacts of early fertility on educational attainment (Ribar, 1994; Klepinger, Lundberg, and Plotnick, 1999; Chevalier, Viitanen, and Viitanen, 2003; Kaplan, Goodman, and Walker, 2004; Hotz, McElroy, and Sanders, 2005; Ashcraft, Fernández-Val, and Lang, 2013). However, even these sources of variation may still be related to individual characteristics, including health, which may also affect educational attainment.

Researchers have also examined the relationship between early fertility and education by estimating the impacts of policy changes that create differential access to contraception. Variation in the geography and timing of such policies allows for the comparison of women exposed to these policies across and within states, examining differences in outcomes for exposed women versus the unexposed. A policy widely studied using this approach is early legal access (ELA) to oral contraception. “The pill” was introduced in 1960, but most unmarried women under age 21 did not have access. However, in the 1960s and 1970s, states implemented laws that either lowered the age of majority or granted more rights to minors, making the pill accessible for single women ages 18-20. Researchers have documented that ELA increased enrollment of women in both college and professional schools, and increased attainment of bachelor’s degrees (Goldin and Katz, 2002; Hock, 2008; Bailey, Hershbein, and Miller, 2012; Ananat and Hungerman, 2012). These effects were documented to be the greatest among high-income women, women with higher measured ability, and women from less-advantaged backgrounds (Ananat and Hungerman, 2012; Bailey, Hershbein, and Miller, 2012). Other laws that increased contraceptive access for young women have also been documented to increase college attendance, such as reductions in the minimum age at marriage (in a time where marriage was a pathway to contraception for minors) (Edlund and Machado, 2015).

Legal access to abortion has also been documented to both reduce teen fertility and increase educational attainment. Before the nationwide legalization of abortion in 1973, five states legalized abortion by repealing anti-abortion laws and ten other states relaxed their abortion restrictions.¹⁸ Angrist and Evans (2000) use this state-level variation in legality of abortion to estimate the effects of abortion access on teen childbearing and women’s schooling and labor market outcomes. Their findings indicate that abortion access reduced births by 5 percent for White teens and nearly 10 percent for Black teens. Instrumenting teen childbearing with abortion access, the authors find that Black teen mothers are 17 to 35 percentage points less likely

¹⁸These “repeal” states included California, New York, Washington, Alaska, and Hawaii. The states that relaxed their abortion restrictions are Oregon, Colorado, New Mexico, Delaware, Maryland, Virginia, North Carolina, South Carolina, Arkansas, and Kansas.

to complete high school and 52 percentage points less likely to ever attend college. Findings from studies outside the US context are consistent with these. Abortion legalization in Oslo in the 1960s and in Spain in 1985 also delayed fertility and increased women’s education (Mølland, 2016; Gonzalez et al., 2018).

These policy evaluations document that access to contraception and abortion in the 1960s to 1980s reduced early fertility and also exhibited positive impacts on women’s educational attainment. However, the economic, social, and political landscape of the U.S. has changed dramatically in the past 30 years. Between 1960 and 2019, the rate of high school completion for women age 25 and over has increased from 42.5 percent to 90.5 percent (NCES, 2019), the share of women age 25 and over with a bachelor’s degree has increased from 5.8 percent to 36.6 percent (NCES, 2019), and the share of women in the labor force has increased from 37.7 percent to 57.4 percent (BLS, 2021). Norms have shifted; many women expect and plan for a career. Motherhood no longer means an end to a women’s economic life, in fact, in 2019, 72.4 percent of mothers with young children are were in the labor force (BLS, 2021). Increased focus on the importance of education may reduce the willingness of pregnant teens to drop-out, and may reduce the social costs of continuing schooling while pregnant or parenting. Increased social supports may somewhat ease the difficult task of completing one’s education while parenting. In addition, the decades since the civil rights movement has brought (somewhat) increased racial equity, indicating that previously documented differences by race may no longer apply. It is not clear that the existing evidence about the impact of early fertility on education still applies today.

We turn to modern abortion restrictions as an exogenous change in teen childbearing that can offer evidence on the links between the risks of early fertility and education today. Only one study of which we are aware examines the impact of early fertility on women’s educational outcomes using a modern policy as an exogenous change.¹⁹ In an unpublished dissertation, Borelli (2011) examines the impact of exposure to parental involvement laws during adolescence in the 1980s and 1990s on fertility and educational outcomes. She finds that exposure to these laws for Black women increased fertility by 4 to 6 percent; impacts on White women were not significantly different from zero. This exposure reduced the probability of Black women completing high school by 2.4 to 3 percent and the probability of entering college by 5 to 7 percent.

The impacts of early fertility on education have been well identified through exogenous policy changes that occurred in the mid- to late-20th century. However, none of this evidence reflects changes in the past two decades. A primary contribution of this paper is to fill this gap by providing evidence on the causal impact of early fertility on educational attainment as identified by exogenous shifts in teen births induced by policies occurring in recent decades.

3 TRAP laws

Abortion providers are subject to strict evidence-based regulations explicitly created to ensure patients’ safety. These include state licensing requirements, federal workplace safety requirements, association requirements, and medical ethics requirements. Despite these regulations, states have also enacted TRAP

¹⁹While they do not study early fertility or educational attainment, we note that the investigators of the Turnaway Study do provide evidence of the impact of unwanted births on economic outcomes. The researchers compared medium-term outcomes of women who were denied wanted abortions due to gestational limits to the outcomes of women who were able to receive abortions. They find that abortion access increased the probability of full-time employment and reduced the probability of living in poverty at six months and four years after the abortion was sought (Foster et al., 2018b). They also document that being denied an abortion results in a large and persistent increase in financial distress for these women that is sustained for up to four years after the birth year. An abortion denial increases the probability of bankruptcies and evictions by 81 percent and increases the amount of debt 30 days or more past due by 78 percent, relative to women who interrupted their pregnancies (Miller, Wherry, and Foster, 2020a).

laws, which mandate requirements that are more stringent than those for other medical procedures of similar risk (Jones, Daniel, and Cloud, 2018).²⁰

The passage of TRAP laws is a function of complicated political processes. For instance, Texas HB2 provides an example of how politically influenced abortion restrictions are. Passage of this bill involved a governor’s special session, a 10-hour filibuster, an after-hours vote later nullified by the Lieutenant Governor, a second special session, and a heavily partisan vote. As in Texas, abortion legislation in many other states is heavily charged by political decisions.

Figure 2 displays the enforcement of the first TRAP law in each state across the years. The map indicates that most of the states that have implemented TRAP laws are in the Midwest and the South. States in the South generally have higher percentages of Black population relative to states in other regions. Also, the map reveals that the implementation of these laws became more frequent post-*Casey*.

TRAP laws may affect abortion access because some clinics and providers cannot comply with the requirements, which obliges them to stop operating. In 2017, ninety-five percent of all abortions reported were provided at clinics. So a change in the number of clinics is a good proxy for a change in abortion access overall.

According to Nash and Dreweke (2019), who examine the period between 2011 and 2017, TRAP laws and administrative regulations reduced the number of clinics providing abortions. During this period, the South and the Midwest had the largest share of new abortion restrictions, with nearly 86 percent of total restrictions nationwide enacted in those two regions. As a result, the South had a drop of 50 clinics, with 25 in Texas alone, and the Midwest had a decline of 33 clinics, mainly in Iowa, Michigan, and Ohio (*ibid*). Regulations also resulted in the closure of nearly half of all the clinics that provided abortions in Arizona, Kentucky, Ohio, and Texas and the closure of five clinics in Virginia, including two of the state’s largest providers. Smaller changes in clinic numbers are also significant in states where access to abortion services is already extremely limited. Missouri, West Virginia, and Wisconsin, each lost one clinic out of an already small number in each state. In cases like this, the remaining clinics typically cannot absorb all the patients seeking abortion care, and patients face significant obstacles to obtaining an abortion, such as longer travel distances and increased financial costs (*ibid*).

In recent years, efforts have been made to strike down TRAP laws. In June 2016, in *Whole Woman’s Health v. Hellerstedt*, the Supreme Court ruled that two of the most burdensome TRAP laws that had been enacted in Texas were unconstitutional. The Supreme Court did not find any evidence to support the need for these requirements and concluded that the restrictions created an undue burden for women seeking abortion services (NARAL, 2021). Since 2016, TRAP laws have been overturned in at least four states.

3.1 Types of TRAP laws

A common method of enacting TRAP laws is to require abortion facility licensing (AFL) that is in addition to standard licensing for health facilities, and to enforce a number of regulations as part of AFL. These may include some or all of the regulations as discussed below. A second method is to require abortion clinics to operate as ambulatory surgical centers (ASC), or ambulatory surgical facilities. ASCs are health facilities that perform surgical procedures that typically do not require an overnight stay. These facilities usually

²⁰The leading medical groups uniformly oppose TRAP laws. They state that, far from making women safer, they put women’s health in jeopardy by shutting down clinics and making it more difficult for women to access safe and legal abortion care. The American Medical Association and the American College of Obstetricians and Gynecologists have said, “there is simply no medical basis” for the TRAP law and that it “does not serve the health of women..., but instead jeopardizes women’s health by restricting access to abortion providers” (American Civil Liberties Union, 2019).

perform surgical procedures that are more invasive and use higher levels of sedation than abortion clinics do. They generally are equipped for emergencies and meet a high standard of sterility. Each state mandates a different set of requirements for licensing as an ASC, including some or all of the regulations discussed below.

Admitting privileges (AP) This type of regulation requires that some or all of a clinic’s physicians must have admitting privileges or staff privileges at a hospital. These privileges allow providers to admit patients and personally provide specific medical services at that hospital.²¹ Securing privileges may be difficult for abortion providers based on public relations concerns of hospitals. Further, privileges often require that providers live near the hospital and admit a certain number of patients per year. However, since abortion is a very safe procedure, it is difficult for providers to meet the admission threshold.²² Securing privileges may be particularly challenging for rural providers as there is often no hospital nearby.

Transfer agreements (TA) This type of regulation requires clinics to have a written agreement with a hospital for the transfer of patients in case of emergency. While admitting privileges are granted to individual physicians, a transfer agreement is signed between the hospital and the clinic itself. Opponents argue that transfer agreement laws are unnecessary, as federal law already requires hospitals to admit to anyone who needs emergency services. These agreements may also be difficult to secure due to hospitals’ concerns over public relations. In an extreme case, after requiring clinics to secure transfer agreements, the state of Ohio prohibited all public hospitals from entering into such agreements with abortion clinics.

In some cases, states enact regulations that require clinics to meet either an admitting privileges requirement or a transfer agreement requirement.

Distance regulations (DR) This type of regulation requires clinics to be located within a certain distance (or a certain driving time) from a hospital. This is sometime included as part of AP or TA regulations, for example, a “clinic must have a transfer agreement with a hospital that is located within 30 miles of the clinic,” requires a TA, but also requires that the clinic be located within 30 mi of a hospital. However, these regulations are also sometimes enacted separately from AP and TA regulations. Clinics in rural or remote locations can rarely meet this regulation, as the requirements are typically 15 or 30 miles, or 15 or 30 minutes of driving time.

Building regulations (BR) This category includes a wide variety of regulations that may apply, typically as part of ASC requirements, though they also occur under AFL requirements. Opponents argue that building regulations are too restrictive as clinics and providers already comply with federal and state safety and building standards. The requirements considered in this analysis include minimum widths for hallways or doorways; requiring clinics to meet detailed specifications for hospital-grade ventilation or have an emergency source of electricity; requirements on rooms such as having an operating room, a dedicated recovery room, or separate clean and dirty laundry areas; or specifying the minimum size of procedure, operating, or recovery rooms. In some states, the list extends well beyond these, even specifying less related aspects such as bathrooms, water fountains, staff locker rooms, parking and receptions areas, etc, those these are not considered in our analysis.

²¹Missouri was the first state to enact such a policy in 1986, and these laws remained relatively rare until 2011.

²²Fewer than 0.5 percent of abortion patients in the United States experience a major complication that requires hospitalization (Guttmacher, 2020)

Other regulations The four types of regulations discussed above are those we expect to have the greatest potential impact on clinic closures and abortion access. However, we also note here other types of provider regulations that are not codified or included in this study based on their lower potential impact. These include staffing requirements, such as specific required qualifications for physicians beyond training, experience, and state licensing, such as specific residency training or certification by specific professional boards, or specific levels of nursing staff for specific functions. These also include requirements about certain policies the clinic should have in place, including preventive maintenance, infection control, disaster preparedness, quality assurance, peer review of physicians, or patient satisfaction assessments. Finally, we note that many states prohibit the provision of abortion by advanced practice clinicians, such as nurse practitioners or physician assistants, who are trained and regularly perform procedures at comparable levels of complexity and risk. While we do expect this regulation to have a significant impact on abortion access, we do not include these regulations in our analyses due to the fact that they mostly originate in the 1970s and have little variation in the modern period.

3.2 Legal coding of TRAP laws

We use as a starting point the information on State Abortion Laws from the Policy Surveillance Program at LawAtlas. This includes all ASC and AFL laws ever implemented as of March 2021. It also provides, for each, a breakdown of specific regulations included in each. A drawback of this information is that it does not provide the dates of implementation for specific requirements.²³

Austin and Harper (2019) is the only available source on the history of effective dates of TRAP laws. Their database includes information on three types of laws: ASC, AP, and TA. As noted above, the specific regulations of an ASC law vary by state (and over time within state). As such, ASC, like AFL, is not a specific type of regulation, but rather, a method for enacting specific requirements. Therefore, for this study, we create a more comprehensive legal coding on TRAP laws, focusing on the nature of the requirement rather than the type of law from which it originates.

To obtain information on implementation dates, we collated the text and dates of each listed law, regulation, or set of rules using the information in WestLaw, LexisNexis, Justia Law, and CaseText.com. In instances where implementation dates were not precise (especially when restrictions come not from legislation but rather from health department regulations, which are often undated), we relied on historical “Who Decides?” reports from NARAL Pro-Choice America.²⁴ In addition, we occasionally relied on older reports from the American Civil Liberties Union (ACLU) and the Center for Reproductive Rights (CRR). In those instances where we could not find any information on implementation dates from the sources described above, we contacted states’ Departments of Health and/or state archives to request the laws’ original and amended texts. This allowed us to identify the timing of the relevant changes to the laws.

We record the effective date for each state law or regulation separately for requirements that apply to all facilities versus only facilities providing second-trimester abortions.²⁵ Providers of second trimester abortions

²³LawAtlas has three comprehensive TRAP laws data sets: ambulatory surgical center requirements, abortion facility licensing, and hospitalization requirements. For this study, we only focus on the information of the first two datasets. First, because hospitalization requirements usually target post-first trimester abortions and do not impose specific requirements on the building, staffing, policies, and hospital relationships, as ASC and AFL requirements do. Second, these requirements were enforced in most of the states in the 1970s. As such, most of the population in our sample has been fully exposed to them, creating no variation for our estimations.

²⁴We used the information available on the 2002-2005 PDFs. For the following years, we relied on online archive information.

²⁵A few laws are specific to providers that provide surgical abortion, providers that provide medication abortion, or first-trimester providers. In each of these cases we included these regulations with those that apply to all facilities because the vast majority of abortion providers do provide first-trimester abortions, surgical abortions, and medication abortions.

are a small minority of all abortion providers, as the vast majority of abortions occur in the first trimester. Therefore, in this analysis, we focus on regulations coded as applying to all providers.

In our analysis, our main independent variable of interest is a binary indicator for the presence of any TRAP law. We also explore impacts of each of the four TRAP types individually. We treat each type of TRAP law as binary.²⁶ However, for three of the four types of TRAP laws we coded, the level of stringency can vary. For example, some states require all physicians in the clinic performing abortions to have admitting privileges. Other states require at least one physician in the clinic to meet the requirement. A less stringent version requires clinics to have an agreement with an external physician who has admitting privileges. Further, at each of these levels, some states require this without exception, while others allow that clinics meet this regulations *or* a separately specified TA regulation. In Appendix C, we define the levels of stringency and explore the impact of a change in the level of stringency for AP, TA, and BR.

4 Impacts on teen births

4.1 Data

We employ natality data from Vital Statistics, which include a record for every birth in the United States from 1989 to 2018 (NCHS, 2018). We collapse this to the state-year-race-age group level. Primary outcomes include the number of births to women aged 15 to 19 in each state-year, separately for White and Black women.²⁷ We additionally employ population counts at the state-year-race-age group level from SEER (2018), which are based on census counts and extrapolated for inter-censal years. The race-specific population of women aged 15 to 19 in a state-year is used to scale birth counts by relevant population size.

As described in Section 3.2, we create a data set that indicates the presence of each type of TRAP law for each state-year observation. In addition, we rely on existing data that indicate the presence of a parental involvement law or a mandatory waiting period in each state-year as controls (Myers, 2020). Given the evidence that these restrictions also impact fertility, it is important that we control for their implementation to accurately estimate the impacts of TRAP laws.²⁸ These same data indicate the presence of other relevant policies; we test the robustness of our findings to their inclusion as controls. These include other abortion-related policies (state Medicaid funding for abortion), other policies related to reproductive health care access (availability of over-the-counter emergency contraception, insurance mandates to cover contraception, and expanded Medicaid eligibility for family planning services), and welfare policies (welfare reform, maximum benefits, and family caps).

²⁶In our analysis, we define an AP regulation as one that requires at least one of the clinic’s own physicians to have admitting privileges. We define a TA regulation as requiring either a formal agreement *or* a plan or protocol. In Appendix Figure D.1, we show that our findings are robust to defining AP to also include the minimum stringency and defining TA to exclude the minimum stringency.

²⁷The selection of the age group 15 to 19 is constrained by the available population data, which provide counts for this age group, but not for single-age groups.

²⁸Based on the findings in Myers and Ladd (2020) and Myers (2021), we ignore parental involvement laws in the pre-*Casey* period and mandatory waiting periods that do not require two trips.

4.2 Estimation

We estimate an event study using

$$E[y_{it+1}|b_{it}, \mathbf{X}_{it}, \nu_i, \nu_t] = \exp\left(\sum_{j=\underline{j}}^{\bar{j}} \beta_j b_{it}^j + \ln(\text{pop}_{it+1}) + \mathbf{X}_{it}'\delta + \nu_i + \nu_t + \varepsilon_{it}\right) \quad (1)$$

where y_{it+1} is births to women aged 15 to 19 in state i in year $t + 1$, focusing on $t + 1$ because, in the majority of cases, abortion access in year t would affect births in year $t + 1$. b_{it}^j is an indicator that a TRAP law in state i turned on j periods away from t , where $j \in [\underline{j}, \bar{j}]$. \mathbf{X}_{it} is a vector of controls for other policies relevant to teen birth outcomes in state i in year t , as described in Section 4.1. ν_i represents the state fixed effects, which control for time-invariant differences across states. ν_t are the year fixed-effects, which control for time-varying factors affecting teen birth rates in all the states in the same manner.

Following Myers (2021), we estimate Equation 1 using a Poisson regression, controlling for the exposure, pop_{it+1} , the population of women aged 15 to 19 in state i in year $t + 1$, and constraining the coefficient on this control to be unity.²⁹

We define

$$b_{it}^j = \begin{cases} \mathbb{1}[t \leq e_i + j] & \text{if } j = \underline{j} \\ \mathbb{1}[t = e_i + j] & \text{if } \underline{j} < j < \bar{j} \\ \mathbb{1}[t \geq e_i + j] & \text{if } j = \bar{j} \end{cases} \quad (2)$$

That is, the treatment indicator is binned at the endpoints of the effect window. This assumes that the effect of the policy is constant over time outside of the effect window, that is, for all $j < \underline{j}$ and $j > \bar{j}$. As such β_j captures the change in the teen birth rate.

We set $\underline{j} = 5$ and $\bar{j} = 4$, that is, the effect window includes 5 years before, the year of, and 4 years after the policy change. We chose this range to ensure enough years to fully observe dynamic policy effects while avoiding potential contamination by other adjacent policies. We omit the year before the policy change as the comparison year, standardizing $b_{it}^{-1} = 0$. The parameter β_j indicates the impact of a TRAP law on teen births j years later. We cluster the standard errors at the state level.

We note that, beginning in 2016, some TRAP laws are overturned in court and regulations are removed. We therefore exclude years after 2016 from our analysis. We employ data on births from 1989 to 2016, so we can estimate the impact of events occurring from 1994 to 2012. This aligns with the post-*Casey* period, which has been shown to exhibit greater impact of abortion restrictions (Myers and Ladd, 2020).

This method assumes that in the absence of the policy, the trend in teen births would have been the same in treated states as what is observed in control states. We test this assumption by checking whether the trends are the same across these two groups prior to policy onset. That is, we check whether we fail to reject that $b_{it}^j = 0$ for $j \in [-5, -2]$.

We note that this methodology also relies on the assumption that the effects of a law of a given type are homogeneous across states (Sun and Abraham, 2020). We recognize that this is a strong assumption that may be violated if the severity of laws differs across states, or if some states enact multiple TRAP laws in succession. Section C in the Appendix presents an event-study analysis that accounts for the intensity of treatment based on the severity of the restriction. Further, to test whether effect heterogeneity is biasing our main results, we also implement an alternative estimation that is robust to this issue, as presented in

²⁹In Stata this is achieved using the `xtpoisson` command and specifying the relevant population in the `exposure` option.

4.3 Results

We estimate the impact separately for each of the four regulation types described in Section 3.1, separately and altogether, which generates five separate analyses. Consistent with previous studies documenting differential impacts of abortion access by race, we estimate the impacts separately for Black and White teens. We note that estimates for the aggregate sample are indistinguishable from the effects for White teens, given their strong majority status.

White teens When estimating effects among White teens, we find strong violations of the assumption of common trends, for four out of five types of regulations examined. The event study plots do not indicate any break in the pre-existing trend as a result of policy onset. As such we find no evidence that our underlying assumption hold for this group, i.e., we find no evidence that TRAP laws shift births to White teens in any substantial way. We also conclude that further analysis for this sample is not valid. These estimations are presented in Appendix B. The following Sections will focus on the results for Black teens.

Black teens Figure 3 shows the event-study estimates of the impacts of TRAP laws on Black teen births. When estimating the impact of any TRAP law, we observe a very clear zero trend in the pre-period, suggesting that the onset of TRAP laws is unrelated to existing trends in Black teen births. Following the onset of a policy, we see a clear divergence in the trend between those who are, versus are not, exposed. The average effect over the post-period is an increase in Black teen births of 3 percent. This represents an increase of 1.8 births per 1,000 women, relative to the median birth rate for Black teens, 60 births per 1,000 women.³⁰ We observe that the effect develops over time. The first significant effect appears two years after policy onset.

There are several reasons why we might observe policy impacts increasing over time. First, some policies include a grace period after enforcement, which may allow clinics to remain open while working on compliance; for clinics that are unable to comply, closure may occur after the grace period. Second, clinic closures may result in increased congestion in remaining clinics with some lag, as patients may take time to learn about their next nearest option. Third, demand may be “chilled” as women hear about clinic closures and difficulties in securing appointments due to congestion and decide that abortion is too difficult to access; such “hearsay” effects may take time to develop. Further, supply may also be “chilled” over time as providers that are willing and able to meet the new restrictions at first may become unable to meet the restrictions later (e.g. admitting privileges were not renewed) or they may decide to stop providing services in a state that is making it increasingly difficult. The increase in impacts over time is potentially a combination of all of these factors. We also note that one might expect that these dynamic affects arise from the pattern whereby a state continues to implement additional TRAP laws over time following the first onset. In Appendix C we estimate a modified event study that takes into account the occurrence of multiple events and we find that the increasing effect over time remains.

Figure 4 presents the event study for each type of TRAP law. For admitting privileges regulations we also observe a clear zero trend prior to policy onset. The estimated effects of AP on Black teens are increases in births between 2.5 to 13 percent, relative to Black teens not exposed. The average effect over the post-period is 7.39 percent. For transfer agreement regulations, we also observe a clear zero trend in the pre-period. The

³⁰ Authors’ estimates using natality and population data at the state-age-race level, 1993 to 2016.

implementation of TA increases Black teen births with a lagged response, with significant effects beginning three years after the effective date. The average effect over the post-period is 2.07 percent.

For distance and building regulations, we observe an approximate, but not exact, zero trend in the pre-period. DR increases Black teen births in four out of five of the post periods. The average impact is 3.48 percent. However, a robustness check in Section 4.4 suggests that this estimate may be upward-biased, with an unbiased estimate that is smaller, though still positive.

Finally, for building regulations, we again observe a pre-trend that is approximately, though not exactly, zero. However, we find that BR results in a temporary reduction in Black teen births, followed by a spike increase four years after onset. The average impact over the post-periods is 0.07 percent. However, the results in Section 4.4 suggests that this effect is potentially downward-biased, with an unbiased effect as large as 2.33 to 2.41 percent.

Table 1 presents suggestive evidence to explain why the underlying assumption—teen births in states that implemented TRAP laws trended similarly to teen births in states that did not implement TRAP laws before implementation—does not hold for White teens, but it does for Black teens. This table shows the averages of different variables by race and future state-TRAP status, using information from the 1990 American Community Survey; information collected before the first treatment occurred (1993). The variables presented in this table are potential determinants of unintended pregnancy for women who responded to the 1990 American Community Survey. The information in this table suggests that before TRAP law implementation, potential determinants of births for Black women were similar across TRAP and non-TRAP states. In contrast, means differed for White women living in TRAP states vs. White women living in non-TRAP states. For example, White women living in states that eventually implemented TRAP laws had lower educational attainment than White women living in non-TRAP states. In comparison, the percentage of Black women by educational attainment is similar across TRAP vs. non-TRAP states. Regarding employment and labor force participation, we observe similar patterns; White women who lived in future-TRAP states were less likely to be employed or in the labor force than White women who lived in future-non-TRAP states. However, Black women were similarly likely to be employed or in the labor force disregarding on the future TRAP law status in their states of residence. The most striking difference is observed in the real family income. Black women living in future-TRAP and future-non-TRAP states had a family income of around \$22,000 in 2012 USD, with a difference between groups of less than 200 dollars. In contrast, White women living in future-non-TRAP states had a family income of \$44,395 in 2012 USD, and White women in future-TRAP states had a family income of \$39,808, a difference of almost \$5,000 between these two groups. Overall, this table indicates that Black women have been similarly disadvantaged across states and over time, disregarding TRAP law implementation in the subsequent years. However, White women living in TRAP states have been historically more disadvantaged than White women living in non-TRAP states. These comparisons suggest that White teen births in future-TRAP states were likely to have trended differently from White teen births in future-non-TRAP states because the determinants of such births behaved differently across these groups of states. In contrast, Black teen births trended similarly before TRAP law implementation because the determinants of Black teen births were similar across states before TRAP laws were implemented.

Our results differ somewhat from the evidence presented in previous studies on the impacts of TRAP laws on birth rates. Findings by Fischer, Royer, and White (2018) indicate that the impacts of Texas HB2 were concentrated among women in their 30s and 40s. However, they do not find any evidence of impacts on teen births, and they do not provide evidence of impacts by race. Lindo et al. (2020) also explore HB2's

impacts on different demographic groups. Overall, their findings do not provide robust evidence of effects on births among teens or Black women. Finally, Kelly (2020) finds that a TRAP law in Pennsylvania increases birth rates for women overall, though her results are not disaggregated by age. However the effects she estimates appear to be driven by White women. Therefore, we provide the first evidence of TRAP laws impacts disaggregated by both age and race.

4.4 Robustness

We next test whether the results presented in Section 4.2 are biased by heterogeneous effects across units, as proposed by Sun and Abraham (2020) and Borusyak, Jaravel, and Spiess (2021).

We separately estimate the impact of each TRAP law implementation using a difference-in-differences design, selecting the appropriate comparison group for each estimation. We construct event-specific data sets containing only the treated state and the selected comparison states, creating a symmetric panel of r years, centered on the year of the policy change, where $r \in \{6, 8, 10, 12\}$. We follow the recommendation of Callaway and Sant’Anna (2020) to include in the comparison group those states that have never implemented a TRAP law (never-treated).³¹ We supplement this group by also including those that implemented a TRAP law after the end of the included time window (future-treated). Our approach is similar to Cengiz et al. (2019), who estimate the effects of minimum wages on low-wage jobs using an event-study analysis and check robustness using estimates of separate treatment effects for each minimum wage change.

Table 2 shows the TRAP laws we are able to explore using this methodology. For some policy changes, we cannot estimate the impact using this methodology as the state enacted another TRAP law or other major abortion regulation within the period of years examined. Table 3 shows other TRAP laws excluded from our analyses because they occurred before our after our period of analysis, or because they apply only to providers of second-trimester (or later) abortions.

For each policy change, we estimate the equation:

$$E[y_{it+1}|b_{it}\nu_i, \nu_t] = \exp(\beta b_{it} + 1\ln(pop_{it+1}) + \nu_i + \nu_t + \varepsilon_{it}) \quad (3)$$

We estimate Equation 3 using a Poisson regression where y_{it+1} is the number of teen births in period $t + 1$, controlling for the population of women aged 15 to 19 in state i in year t , pop_{it} , and constraining the coefficient on this control to be unity. We also control for state fixed effects, μ_i , and year fixed effects, θ_t . We exclude controls for other policies, X_{it} , from Equation 1 to avoid contamination issues, since, these other policies may potentially represent other treatments. de Chaisemartin and D’Haultfoeulle (2020c) point out that regressions with several treatments may be contaminated by the effect of other treatments, an issue that is not present in a regression with one treatment.

We note that the purpose of this exercise is to estimate the magnitude of the treatment effect using a method that is robust to treatment effect heterogeneity. We compare the magnitudes of these alternative

³¹To deal with the bias induced by the heterogeneity of treatment, Callaway and Sant’Anna (2020) propose that practitioners should favor the comparison with the never treated group rather than comparisons with future treated only. Never treated units are preferred as long as there is a sizeable group of units that do not participate in the treatment in any period, and, at the same time, these units are similar enough to the “eventually” treated units. These authors consider that the comparison with future-treated only may create issues because pre-treatment trends may capture differences in the economic environment between “early periods” and “later periods” of treatment. In such cases, the outcomes of different groups may evolve in a non-parallel manner during “early periods” because the groups were exposed to different shocks, while trends become parallel in the “later periods.” Our preferred comparison is with never-treated+future-treated. However, in Table 8, we demonstrate that our estimates do not suffer from these issues since they are robust to the selection of different time windows and the comparison with never-treated only.

estimates to those presented in Section 4.2 to assess whether the primary estimations are biased. In particular, our concern is whether the primary estimations are upward-biased, potentially indicating that TRAP laws have an impact when they in fact do not. As such, statistical inference on these alternative estimates is not our objective. Nonetheless, we present Fisher exact p -values beside each estimate (Fisher, 1922).³² Given the significantly reduced sample size in each estimation one should expect much less precision on these estimates.

We estimate the impact separately for each of the five types of TRAP laws described in Section 3.1. Estimations for $r = 10$ are presented in Figures 5 and 6, as $r = 10$, or $j = [-5, 4]$, is the most comparable to the event studies presented in Section 4.2. For each state, we show in brackets the one-sided and two-sided Fisher exact p -values for treatment permutation at the state level, as described above. We present the average effect across all the estimations presented in the figure for comparison with the average effects presented in Section 4.2.

Estimates for other values of r are presented in Table 4, including estimations employing two different sets of controls: (i) never treated states only and (ii) never or future treated states. For each type of TRAP law, Table 4 compares the primary estimate from Section 4.2 to the alternative “stacked DiD” estimate, that is, the unweighted average of the coefficients from the separate estimations of Equation 3 for each policy change.

This exercise confirms that estimated impacts of exposure to any TRAP law are not upward-biased. The stacked DiD estimates are nearly all larger in magnitude than the average of post-intervention treatment effects in the primary estimation of 3, with median values across the various specifications of 1.96 and 3.02. The same is true for admitting privileges, transfer agreement laws, and building regulations, where the stacked DiD estimates are all larger in magnitude than the primary estimation. Only for distance regulations we find that the stacked DiD estimations are smaller than the event study estimation. Nonetheless, nearly all of the variations of stacked DiD estimates for distance regulations remain positive, with median values of 0.99 and 1.79. This suggests that while the event study estimate of 3.48 may be an overestimate, there is still good reason to believe that the impact of distance regulations on Black teen births is positive.

³²Since one state is treated in each estimation, using traditional inference methods such as clustered-standard errors would lead to incorrect inference (Bertrand, Duflo, and Mullainathan, 2004; Roodman et al., 2019). Inference using clustered standard errors requires a sample with many clusters in which many of them change treatment status. Clustered standard errors at the state level tend to over reject the zero effect null hypothesis when the number of treated units is small. (MacKinnon and Webb, 2018, 2020). In the extreme case, when only one cluster is treated, cluster-robust standard errors would severely underestimate the variance of the difference-in-difference estimator (Ferman and Pinto, 2019).

Therefore, we conduct exact inference without relying on large-sample approximations and without making assumptions about the distribution of the error terms. We consider the distribution of possible treatment effect estimates obtained by estimating Equation 3 where we have reassigned treatment to each state in the sample, one-by-one. We then compare the estimate for the actual treated state with the distribution of possible treatment effect estimates. We follow the p -values definition in Young (2019), which specifies the exact p -values to be uniformly distributed, and which offers an exact test with a rejection probability equal to the nominal level of the test.

The definition is as follows:

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

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 a uniform distribution (0,1).

Since this definition has a random component from a uniform distribution, we report the upper bound of each p -value, which corresponds to a draw from the uniform distribution equal to one. Based on the potential control states in each “quasi-experiment,” the minimum p -values will be between 1/28 and 1/19. SC 1996 and AL 1997 are compared to 28 states; AR and PA 1999 are compared to 25 states; MI 2000 and NE 2001 are compared to 24 states; RI 2002, MO 2005, IN, OH, and SD 2006 are compared to 23 states; KS, MO, and UT 2011, MD and PA 2012, and VA 2013 are compared to 18 states. These 18 states are the never-treated states.

4.5 Mechanisms

In this section we present evidence on the pathways by which the implementation of a TRAP law may impact teen births. There is anecdotal evidence that TRAP laws result in the closures of clinics that are unable to comply with the new regulations. This may increase distance to the nearest clinic and/or increase clinic congestion and wait times, thereby reducing access to abortion. Such impacts have been documented as a result of TRAP laws in Texas and Pennsylvania (Fischer, Royer, and White, 2018; Lindo et al., 2020; Kelly, 2020). We document that TRAP laws exhibit similar impacts on distance to clinic and reduce abortion use nationally.

A second mechanism by which TRAP laws may affect teen fertility is through changes in teen sexual behavior. If teens perceive a reduction in abortion access, they may reduce sexual activity or increase contraception use to avoid unintended pregnancy. Such behavioral responses may dampen the impact of TRAP laws on teen births.³³

4.5.1 Abortion access

We employ county-by-year data on distance to the nearest abortion clinic compiled by Caitlin Myers. These data begin in 2009, so, as a suggestive analysis, we test whether the most recent TRAP laws have increased average distance to the nearest clinic.³⁴ We estimate a simple, two-period difference-in-differences estimation

$$D_{cst} = \alpha + \beta_1 TRAP_s + \beta_2 post_t + \beta_3 (TRAP * post)_{st} + \varepsilon_{cs} \quad (4)$$

where D_{cst} indicates distance to the nearest abortion clinic from county c in state s in year t , where $t \in \{2009, 2017\}$. $TRAP_s$ indicates that state s turned on a new TRAP law between 2010 and 2016, and $post_t$ indicates that $t = 2017$. β_3 estimates the impact of TRAP laws on average distance to clinic from 2009 to 2017.

Estimates of β_1 are presented in Panel A of Table 5. We find that the enforcement of a TRAP law increases the average distance to the nearest abortion provider by 10 to 12 percent when measured in distance and by 15 percent when measured by driving time.

4.5.2 Abortion use

We employ state-by-year data on abortion counts provided by the Center for Disease Control and Prevention’s Abortion Surveillance System (Kortsmit, 2020). These data are available from 1992 to 2018, both aggregated and disaggregated by age. They are additionally available disaggregated by race from 2008 to 2018.³⁵ CDC collects abortion counts at the state level both for residents of the state and occurrences in that state. We focus on abortions of residents to avoid compositional effects due to the impacts that policies could have on residents of bordering states. A downside of this information is that states reporting to CDC is voluntary

³³There is some potential for reverse causality between contraception use and unintended pregnancy. If a teenager faces an unintended pregnancy, she might respond by increasing contraception use to avoid future pregnancies. Under that scenario, we would also observe increases in contraception use, but indirectly driven by changes in teen fertility. Another possibility is that a teen mother may reduce her contraception use since her past incentives to use it may have been related to avoiding motherhood, which may not be relevant anymore.

³⁴We note that the Alan Guttmacher Institute also provides data on the number of abortion providers per county in 28 separate years since 1973. However, these data are truncated for security purposes. For any county-year in which there were fewer than 400 abortions provided, the data reflect zero providers. This truncation is particularly salient in rural and remote counties, where TRAP laws such as admitting privileges and distance regulations are most likely to close clinics. As such, this data is not useful for our purposes.

³⁵We thank Caitlin Myers for sharing with us a version of these data already extracted from the CDC’s website and compiled.

and some states fail to report in some years. We supplement our analysis using state-by-year information on abortion use of state residents from Guttmacher Institute (Guttmacher Institute, 2021a). The advantage of this information is that it is collected through direct surveys of abortion providers, which usually results in higher counts, relative to CDC abortion counts. However, Guttmacher surveys are not conducted every year and information is not disaggregated by race or age group.³⁶

We estimate

$$E[y_{st}|TRAP_{st}, \mathbf{X}_{st}, \nu_s, \nu_t] = \exp(\gamma TRAP_{st} + \ln(pop_{st}) + \mathbf{X}'_{st}\delta + \nu_s + \nu_t + \varepsilon_{st}) \quad (5)$$

where y_{it} is the number of abortions in state s in year t , $TRAP_{st}$ indicates that any TRAP law was enforced in that state and year, \mathbf{X}_{st} is a vector of state-year policy controls as described in Section 4.1, and fixed effects are included at the state and year levels. As in Equation 1, we estimate a Poisson model and control for the exposure, pop_{it} , the relevant population of women in state s in year t , and constraining the coefficient on this control to be unity.

Estimates of γ are presented in Table 5 for all women, White women, Black women, and all teens. Column 1 controls for other major abortion restrictions; Column 2 additionally controls for other relevant state policies. Whether using CDC or Guttmacher data, we consistently find a reduction in abortion rates of 4 to 4.3 percent in the fully controlled model; this effect is statistically significant at the 10 percent level when estimated with the CDC data. Consistent with our findings in Section 4.2, effects are entirely driven by reductions in abortion use among Black women. Effects for White women in the fully controlled model are very close to zero (though with a wide confidence interval). Among Black women, the estimated effect is 4.7 percent, although not statistically significant at convenient levels. Among all teens, TRAP laws reduce abortion use by 5.5 percent, an effect that is significant at the 10 percent level. Unfortunately, data on abortion counts by race *and* age are not available. Nonetheless, given the fact that impacts are larger for teens than for all women and are almost entirely driven by Black women, we speculate that the impacts on Black teens are larger than 5.5 percent.

4.5.3 Teen sexual behavior

We rely on data from the Center for Disease Control’s Youth Risk Behavior Surveillance System (CDC, 2019), which includes a representative sample of students in grades 9 through 12 in odd-numbered years from 1991 to 2017. From these data, we employ information on sexual activity and contraceptive use, as well as information on gender, age, race, and state of residence.³⁷ We combine this with our state-by-year data set on TRAP law enforcement.

We estimate

$$Y_{isya} = \beta TRAP_{sy} + \mathbf{X}'_{sy}\delta + \nu_s + \nu_y + \nu_a + \varepsilon_{isya} \quad (6)$$

where Y_{isya} is the outcome of interest for individual i in state s interviewed in year y at age a . $TRAP_{sy}$ indicates the enforcement of any TRAP law in state s in year y . \mathbf{X}_{sy} is the same policy controls as described in section 4.1. We include fixed effects for state, year, and age. The outcomes of interest are whether or not

³⁶For the post-*Casey* era, the years in which Guttmacher Institute did not collect data are 1993, 1994, 1995, 1997, 1998, 2001, 2002, 2003, 2006, 2009, 2012, 2015, 2016.

³⁷The YRBSS combined dataset does not contain information on all the states. Some state and district health and education agencies that conducted the surveys did not give CDC permission to include their data in this dataset. Furthermore, some states did not collect information on specific questions or did not release this information to CDC. The combined dataset contains data for 44 states. The states whose information is not collected are Indiana, Massachusetts, Minnesota, Ohio, Oregon, and Washington.

the individual has initiated sexual activity (had sexual debut) and whether or not contraception was used at last intercourse.³⁸

Results are presented in Table 6, with and without the full set of controls, separately for Black and White teen girls. We find that TRAP laws delay sexual debut among White teen girls 2.3 percentage points, a 5.5 percent effect relative to the mean of 42 percent. Among Black teen girls, the impacts on sexual debut are 50 percent smaller and not statistically significant. This may be one reason why we observe impacts of TRAP laws on births for Black teens and not White teens. White teens are more likely to delay sexual debut as a response to TRAP laws.

We also find that Black teen girls experience a large and significant decline in contraception use as a result of TRAP laws. This decline is not observed among White teens, whose change in contraceptive use is approximately zero. This is the opposite of the expected behavioral response, which would be to increase contraceptive use in response to a reduction in abortion access. However, it is important to note that many clinics that close as a result of TRAP laws, such as Planned Parenthood clinics, are providing not only abortion services but also other reproductive health services. Planned Parenthood and other Title X clinics are a primary source of contraception for young women and low-income women. If TRAP laws result in the closure of some of these clinics, it is not surprising to see decreases in contraceptive use among Black teens as a result in reduced access. This offers a second reason why we observe impacts of TRAP laws on Black teen births: not only are these young women less able to access abortion, they are also potentially less able to access contraception.

5 Impacts on women’s educational attainment

5.1 Data

We employ nationally representative microdata from the American Community Survey as provided by IPUMS (Ruggles et al., 2021), using all available waves from the first year of the data, 2000, until 2019. These are monthly cross-sections covering 3.5 million households per year. We rely on information regarding state of birth, year of birth, race, and educational attainment.

Based on the findings in Section 4, we restrict our sample to Black women.³⁹ We further restrict our sample to women aged 25 or older at interview, as women younger than 25 may be still completing their education. We also exclude women born outside the U.S. as their adolescent exposure to TRAP laws is unknown. Exposure is determined by state and year of birth, relative to the year a TRAP law was implemented in that state. We acknowledge that some women may have spent adolescence in a state other than their state of birth. Lacking detailed information on state of residence in each year of life, we believe state of birth is a good proxy for state of residence during adolescence as most adolescents still reside in their parents home, and 75 percent of migration is intrastate (Frost, 2020; Dey and Pierret, 2014).⁴⁰ For robustness, we present a version of our analysis where we define exposure based on state of residence at interview rather than state of birth in Appendix Table D.2 and the results are consistent.

³⁸The contraception methods we consider to construct this variable are: condom, birth control pills, IUD, implant, injection, patch, and birth control ring.

³⁹An alternative identification strategy would be to employ exposed men as the control group (instead of or in addition to unexposed women). However, we highlight that men are not unaffected by abortion access, as unintended births may also affect their education. As such, their use as a control group would significantly underestimate policy impacts.

⁴⁰A potential implication of using state of birth as a proxy for the state of residence during adolescence is measurement error, and therefore, attenuation bias.

In order to evaluate the impact of a policy in year t , the data must include cohorts with and without teen exposure to that policy. That is, we must include cohorts born both before and after $t - 19$. Therefore, in order to restrict our analysis to post-*Casey* TRAP laws, we do not consider cohorts born before $1992 - 19 = 1973$. Because we restrict our sample to those aged 25 and older and the last year of data employed is 2019, the youngest birth cohort in our sample was born in 1994. Our analysis sample includes Black women born in the U.S., aged 25-46 at interview, and born between 1973 and 1994.

Our outcomes of interest are college initiation, defined as completing at least one year of college or more, and college completion, defined as completing at least a bachelor’s degree. In our sample, 55 percent of women initiated college and 24 percent of women completed college. In terms of exposure to TRAP laws, 23 percent of the sample were exposed to a TRAP law in adolescence, 39 percent were exposed later in life, and 38 percent were never exposed, as shown in Figure 7.

5.2 Estimation

We estimate the impact of exposure to TRAP laws during adolescence on college initiation and college completion. We begin with a pooled difference-in-differences estimation. In section 5.4, we demonstrate that our findings are robust to heterogeneous treatment effects using a stacked difference-in-differences approach. The pooled estimation is found to be biased towards zero but is nonetheless our preferred specification given its greater statistical power.

We estimate the Equation:

$$y_{ibsa} = \beta exp_{bs} + \mathbf{X}'_{bs} \delta + \nu_b + \nu_s + \nu_a + \varepsilon_{ibsa}$$

where y_{ibsa} is the outcome of interest for individual i , born in year b in state s , and interviewed at age a . exp_{bs} is an indicator of adolescent exposure to a TRAP law, which is determined by birth year b and state s . \mathbf{X}_{bs} is a vector of indicators of adolescent exposure to other relevant state-level policies, which are discussed in Section 4.1. We include fixed effects for the birth year to control for national cohort trends in outcomes. We include state fixed effects to control for time-invariant differences across states. We include age at interview fixed effects to control for natural increase in average educational attainment with age, which occurs even after our threshold of age 25. Standard errors are clustered at the state level.

Our data have too few observations in each single-year category of age at first exposure to estimate an event study. However, we can test the assumption of common trends by replacing exp_{bs} with a set of indicators for first exposure at various age groups. The results are shown in Figure 8. Consistent with the assumption of common trends, first exposure to a TRAP law at ages 30 to 34 or ages 25 to 29 has a near-zero impact on educational attainment. We see that first exposure at ages 20 to 24 or 18 to 19 reduces college initiation by 1 percentage point, whereas exposure before age 18 reduces college initiation by nearly twice as much. A similar pattern applies to college completion. Based on these findings, we feel confident in the assumption of common trends, and we recognize that exposure as a minor (under 18) rather than as a teen (under 20) may be the more relevant exposure. We present preferred findings for exposure as a minor in the body of the paper, and present findings for exposure as a teen in Appendix Table D.1.

5.3 Results

Table 7 shows the estimates of β from Equation 5.2, where exp_{bs} indicates exposure before age 18. Each coefficient comes from a separate estimation of the impact of each TRAP law type. Estimations in column

(1) include controls for exposure to parental involvement laws and two-trip mandatory waiting periods. Estimations in column (2) additionally control for exposure to the other policies described in Section 4.1.

Panel A shows the impacts on college initiation. These estimates indicate that exposure to an TRAP law before age 18 reduces the probability of initiating college by 1.1 to 1.2 percentage points, significant at the 5 percent and 10 percent levels, respectively. These reductions represent 2 to 2.2 percent reductions in college initiation relative to the mean of 55 percent. Examining each type of TRAP law, we find that early exposure to admitting privileges laws, distance regulations, and building regulations reduce the probability of college initiation by 0.9 to 2 percentage points. This is equivalent to reductions of 1.6 to 3.8 percent relative to the mean. In addition, early exposure to transfer agreement laws shows moderate reductions in college initiation of 0.6 to 0.9 percentage points. However, these estimates are not large enough to be statistically significant at conventional levels.

Panel B indicates that exposure to any TRAP laws before age 18 reduces college completion by 1.2 percentage points. This represents a 5 percent reduction relative to a mean of 24 percent and is significant at the 5 percent level in the model with full controls. Considering TRAP laws by type, we find this effect is driven by distance and building regulations. Impacts of exposure to admitting privileges laws and transfer agreement laws are also negative but not significant at conventional levels.

5.4 Robustness

We next test whether the results presented in Section 5.2 may be biased by heterogeneous effects over time or across units, as recently proposed by several studies (de Chaisemartin and D’Haultfœuille, 2020a; Athey and Imbens, 2021; Callaway and Sant’Anna, 2020; Goodman-Bacon, 2021). We separately estimate the impacts of exposure to each policy change, selecting the appropriate set of control states in each estimation. We then “stack” these separate estimates by averaging their coefficients, absent the complex weighting schemes inherent in the pooled analysis.

We separately estimate the impact of each TRAP law implementation using a difference-in-differences design, selecting the appropriate comparison group for each estimation. We construct event-specific data sets containing only the treated state and the selected comparison states. The comparison group includes states that have never implemented a TRAP law (never-treated) and those that implemented a TRAP law more than five years after the policy of interest (future treated). Table 2 shows the TRAP laws we are able to explore using this methodology, which span the years 1993 to 2011. For policy changes after 2011, there is no variation in our birth cohorts in exposure before age 18. For some policy changes, we cannot estimate the impact using this methodology as the state enacted another TRAP law or other major abortion regulation within five years of the policy examined. We also must exclude policy changes in states for which the ACS data include fewer than 150 Black women in the sample (due to very small Black populations in these states). Table 3 contains further information on the excluded policies.

We estimate the Equation:

$$y_{ibsa} = \beta exp_{bs} + \nu_b + \nu_s + \nu_a + \varepsilon_{ibsa}$$

where the variables represent the same as in Equation 5.2. We estimate the impact separately for each of the five types of TRAP laws. We employ the same sample restrictions as described in Section 5.1. We present estimations including all available cohorts, and an alternative estimation limiting the sample to at most 10 treated and 10 comparison cohorts.

Figure 9 presents the estimates for each policy change of any TRAP law for college initiation and college completion. We report in each figure the average across estimates. For each outcome, nearly all DiD estimates are negative and most estimates are between 1 and 5 percentage points. For each outcome there is one outlier state with a very large estimated effect (MO 2011 for college initiation and KS 2011 for college completion). While these outliers pull up the mean effect to 4 or 5 percentage points, most estimates are in the range of 1 to 3 percentage points. Table 8 presents alternative versions of the stacked DiD estimates, varying the nature of the control group, and whether there is a limit on the number of cohorts.

For both college initiation and college completion, we find that all variations of the stacked DiD estimates are larger in magnitude than the pooled estimations presented in Table 7, with only one exception out of forty comparisons. This rules out the possibility that the primary methodology is overestimating the impact of TRAP laws on Black women’s education. In fact, it suggests that the estimates in Table 7 are biased towards zero and are lower bounds for the true magnitude of the impacts. This is consistent with the issues recently identified with the pooled DiD, two-way fixed effects method: in the presence of heterogeneous effects over time the earliest and latest events are underweighted and events in the middle are overweighted. As shown in Figure 9, the largest estimates are for the most recent events. Nonetheless, despite the attenuation bias, the pooled DiD estimates are useful given their superior statistical power for hypothesis testing.

Overall, we conclude that TRAP law exposure before age 18 negatively impacts college initiation and college completion. The median impact on college initiation across all law types and specifications is a reduction of 2.4 percentage points, representing a 4.4 percent decrease in the probability of college initiation. Likewise, the median impact on college completion is a reduction of 4.8 percentage points, which corresponds to a 20 percent decline in the probability of completing college.

6 Conclusion

In this study, we provide new evidence on the modern relationship between women’s ability to control their fertility and an important investment in economic welfare—educational attainment. Earlier studies have documented the causal impact of early fertility on education, but these studies rely on policy changes occurring two to five decades ago (Angrist and Evans, 2000; Goldin and Katz, 2002; Hock, 2008; Bailey, Hershbein, and Miller, 2012; Ananat and Hungerman, 2012; Edlund and Machado, 2015). Given the significant economic and social shifts since that time, it is not clear whether such estimated effects are still relevant today. We provide the first evidence of the impact of teen motherhood on education that relies on policy changes in recent decades.

We examine the impacts of teen exposure to TRAP laws as an exogenous shifter of teen fertility. To do so, we create a historical coding of TRAP law implementation that is more accurate and detailed than what previously existed. We provide the first national-level estimates of the impacts of TRAP laws on teen fertility, and we present a variety of estimates, taking into account the type, severity, and number of TRAP laws implemented in a given year. We also take seriously recent concerns about the biasing effects of heterogeneity in two-way fixed effects estimations. As such, we employ an event study approach and show robustness to a stacked difference-in-differences approach as well.

Our results indicate that TRAP laws increase birth to Black teens by 3 percent, while they do not change existing trends in births to White teens. We provide evidence that these effects are operating through the expected mechanisms – decreases in abortion access and abortion use – and through an unexpected mechanism, decreases in contraceptive use. We speculate that TRAP-induced clinic closures reduced Black

teen’s access to not only abortion services but also contraception.

Our findings are consistent with previous evidence that TRAP laws in Texas and Pennsylvania reduced abortion use and increased birth rates, either through increasing the average distance to the nearest abortion clinic or increasing clinic congestion (Quast, Gonzalez, and Ziemba, 2017; Lu and Slusky, 2016; Fischer, Royer, and White, 2018; Lindo et al., 2020; Kelly, 2020). The impacts of TRAP laws are consistent with evidence that other abortion restrictions, such as parental involvement laws and mandatory waiting periods, also decrease abortion use and increase births (Myers and Ladd, 2020; Myers, 2021). Across all these findings, a consistent theme is the stronger impacts of abortion restrictions on Black women. This likely reflects the higher level of unmet need for contraception and higher level of abortion use among Black women. In turn, these factors likely reflect the structural racism facing Black women in the United States, including a history of reproductive coercion that perpetuates mistrust of the health care system and may deter women from seeking care.

We also document the impacts of TRAP laws on educational attainment. This study is among the first to present evidence on the impacts of abortion restrictions in recent decades on women’s long-term economic welfare.⁴¹ Using pooled and stacked difference-in-differences approaches, we find that exposure to TRAP laws before age 18 reduces Black women’s college initiation and college completion as measured at ages 25 to 40. Our results indicate that college initiation is reduced by 1 to 3 percentage points, an effect of at least 2 percent, relative to the percent of Black women initiating college. Similarly, their probability of completing college decreases by 1 to 3 percentage points, an effect of at least 4 percent, relative to the percent of Black women completing college. As of 2015, Black women’s college completion rate was only 25 percent, as compared to 45 percent for White women (Guyot and Reeves, 2017). Our findings suggest that TRAP laws are acting to exacerbate this existing racial inequality by preventing Black teens from avoiding unwanted motherhood and thereby reducing their ability to complete their education.

As the reproductive health care landscape continues evolving and more states enforce restrictions on abortion providers, evidence of these policies’ impacts is critical. A recent amicus brief to the U.S. Supreme Court claimed that, as a result of social and economic changes in recent decades, access to abortion is no longer necessary in order for women to fulfill their economic potential. The evidence provided here suggests otherwise. Access to abortion, especially in the early reproductive years, can be a significant predictor of investment in one’s economic future. While it may be true that restrictions to access have a lesser impact on the most privileged women, women who already face the greatest barriers to economic advancement are the most harmed by restrictions. In light of this, it is clear that access to fertility controls is necessary for women’s economic advancement.

⁴¹Other evidence on the impacts of modern abortion restrictions include the Turnaway study, which has documented that gestational limits harm the economic wellbeing in the near-term of women who were denied wanted abortions between 2008 and 2010, focusing on outcomes 6 months and 4 years later (Miller, Wherry, and Foster, 2020a) and unpublished dissertation that documents that minors’ exposure to parental involvement laws in the 1990s reduced high school completion and college initiation for Black women, as measured at ages 21 to 32 (Borelli, 2011).

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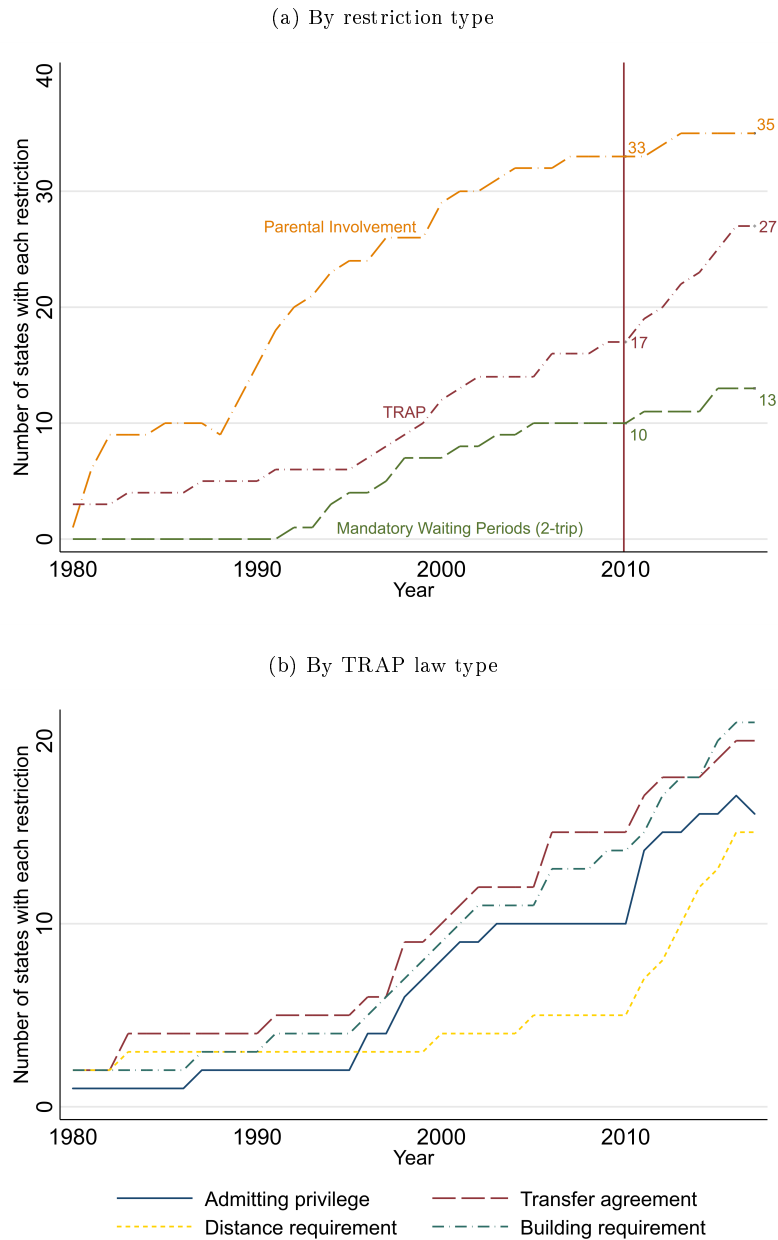
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Figures

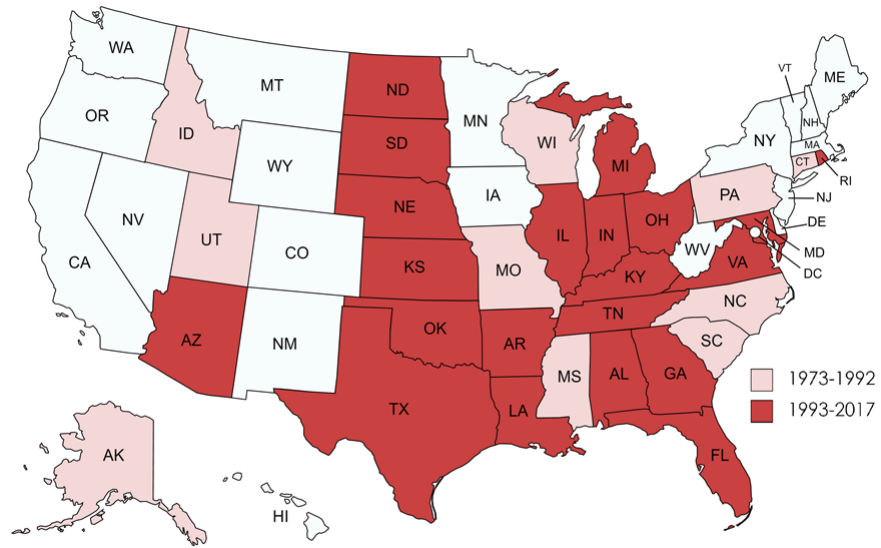
Figure 1: Recent increases in abortion restrictions over time



Note: Subfigure (a) compares the evolution of the number of states implementing three of the most common abortion restrictions types (parental involvement laws, two-trip mandatory waiting periods, and targeted regulations of abortion providers (TRAP laws)) from 1980-2017. See section 2.1 for more information on abortion restrictions. Though our data and analysis end in 2017, we note that, by 2021, TRAP laws were more common than parental involvement laws across the U.S. Guttmacher Institute (2021b).

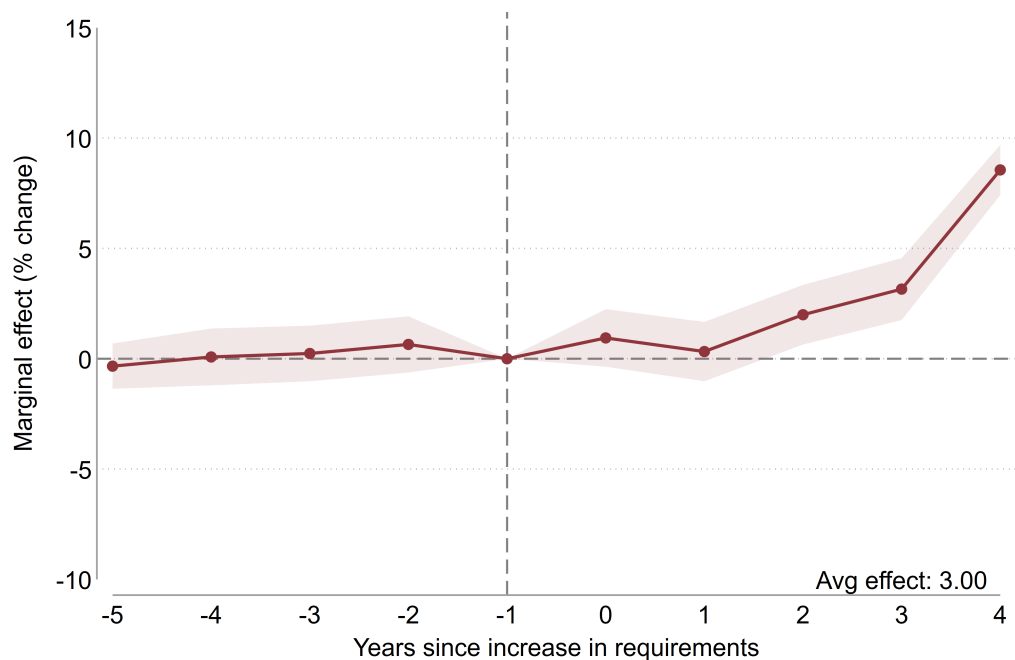
Subfigure (b) compares the number of states implementing TRAP laws by type (admitting privileges, transfer agreement, distance regulations, and building regulations) from 1980 to 2017. See section 3.1 for more information on TRAP laws. Sources: The information on parental involvement laws and mandatory waiting periods comes from Myers and Ladd (2020). The information on TRAP comes from the authors' legal coding dataset, described in detail in Appendix A.

Figure 2: TRAP laws by state and era



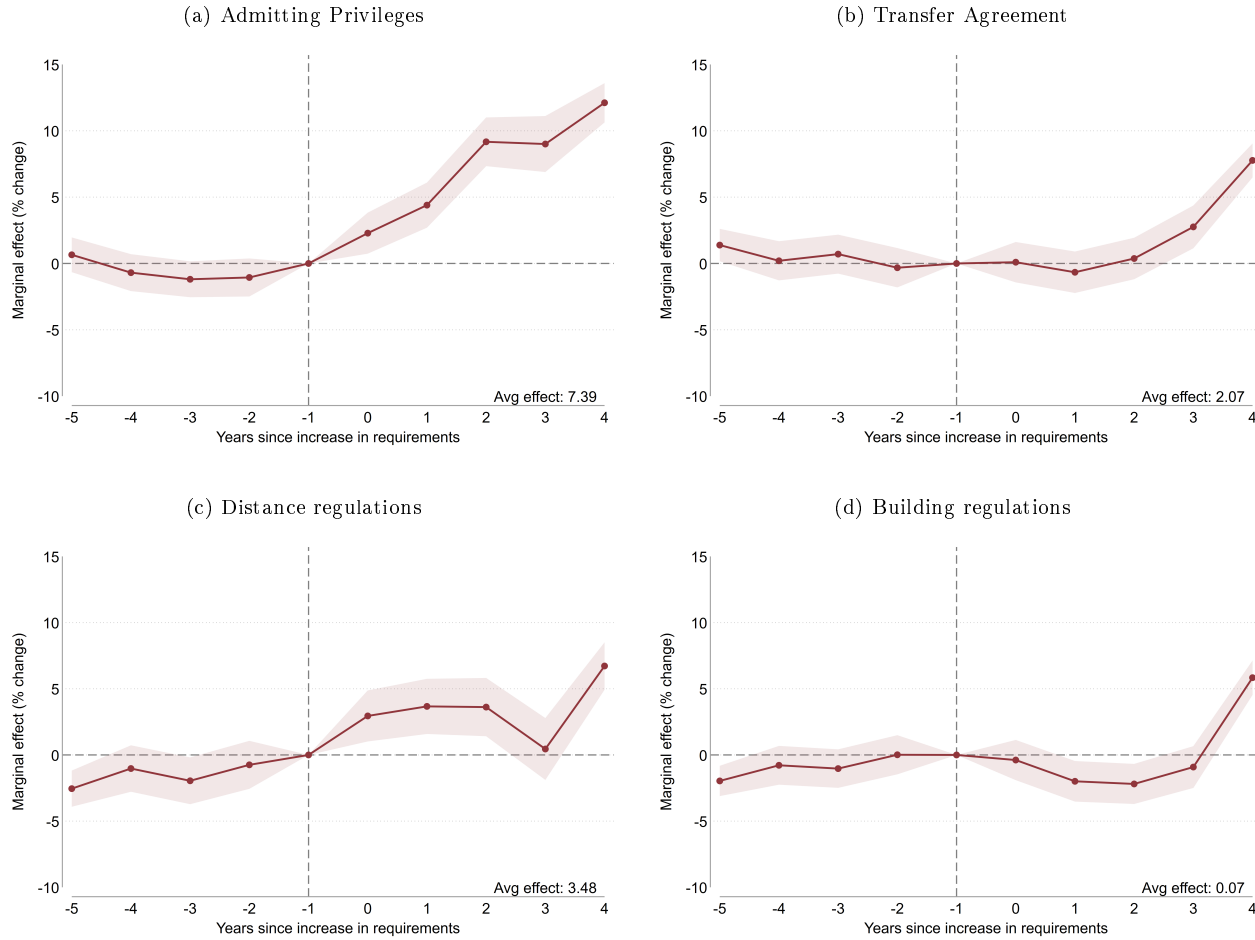
Note: This map shows the states that ever implemented a TRAP law between 1973 to 2017, by the year of first implementation. Light-colored states implemented their first TRAP law between 1973-1992. Darker-colored states implemented their first TRAP law between 1993-2017. Source: TRAP laws legal coding, described in detail in Appendix A.

Figure 3: Impact of TRAP laws on Black teen births



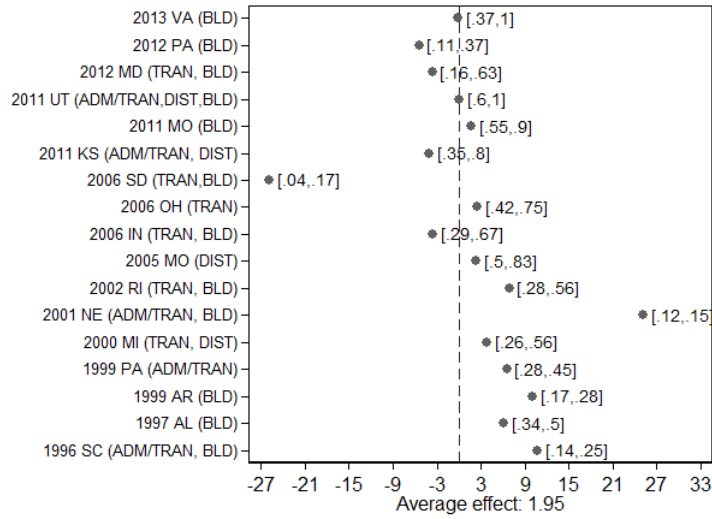
Note: The figure presents the estimates of b_{it}^j from Equation 1. The dependent variable is the number of births of 15 to 19-year-old Black women in state i and year $t+1$. Year zero indicates the implementation of either admitting privileges, transfer agreement, distance regulation, or building regulations. The omitted year is the year before the policy change, $t = -1$. The shaded region indicates the 95 percent confidence interval corresponding to clustered standard errors at the state level. Sources: Figure created using the information on births recorded by state-age-race group in the U.S. from NCHS (2018), information on population counts from SEER (2018), information on other policies from Myers and Ladd (2020), and the authors' legal coding on TRAP laws, as described in detail in Appendix A.

Figure 4: Impact of TRAP laws on Black teen births, by TRAP type



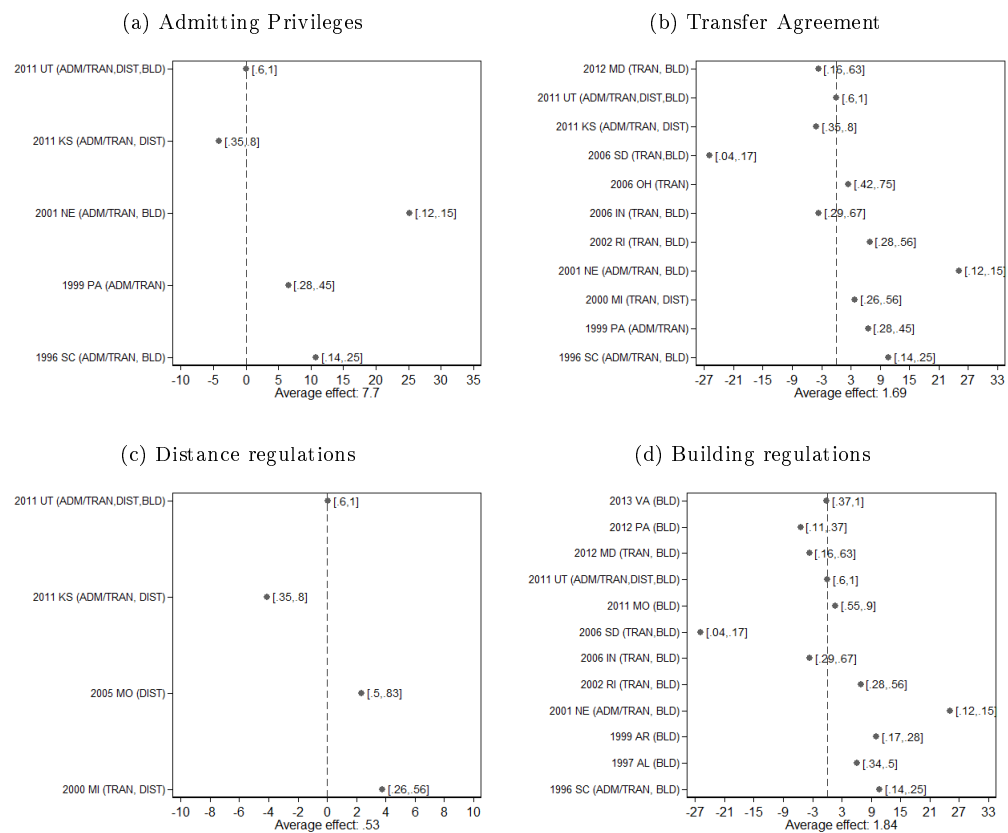
Note: The figures present the estimates of b_{it}^j from Equation 1. The dependent variable is the number of births of 15 to 19-year-old Black women in state i and year $t + 1$. In each figure, year zero indicates the addition of a requirement, as follows: (a) that one or more staff members of a clinic providing abortion to have hospital admitting privileges, (b) a written transfer agreement or a plan/protocol for hospital transfer, (c) distance regulations, and (d) building regulations. The omitted year is the year before the policy change, $t = -1$. The shaded region indicates the 95 percent confidence interval corresponding to clustered standard errors at the state level. Sources: Figure created using the information on births recorded by state-age-race group in the U.S. from NCHS (2018), information on population counts from SEER (2018), information on other policies from Myers and Ladd (2020), and the authors' legal coding of TRAP laws, as described in detail in Appendix A.

Figure 5: Impact of TRAP laws on Black teen births; stacked DiD



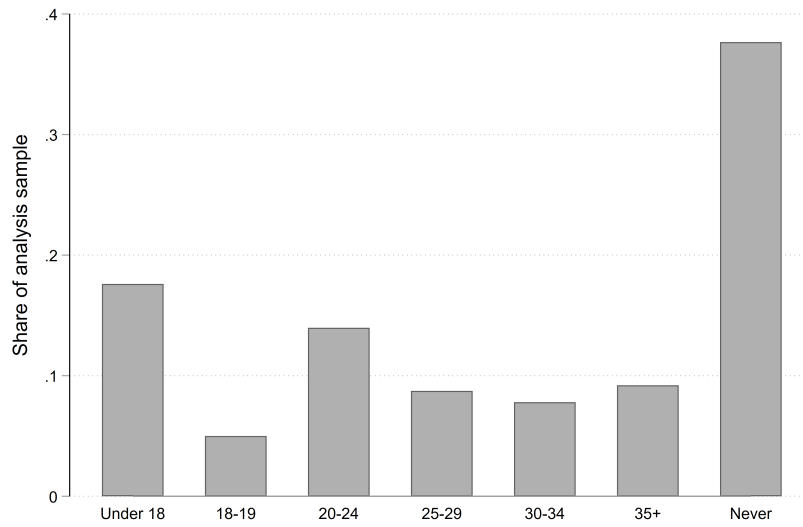
Note: This figure displays the estimates of b_{it} from equation 3 for states that implemented a TRAP law in year t and did not implement any other abortion restriction within $[t - 5, t + 4]$. The dependent variable is the number of births of 15 to 19-year-old Black women in state i and year $t + 1$. Each estimate comes from a separate regression that compares a treated state with states that never implemented an abortion restriction (never-treated) and states that implemented restrictions after period $t + 4$ (future treated). The labels in the y-axis indicate the year, state, and restriction type (in parentheses) that correspond to each coefficient. ADM stands for admitting privileges laws, TRAN stands for transfer agreements, DIST stands for distance regulations and, BLD stands for building regulations. Some states implemented more than one TRAP law in a year, as indicated in the parentheses. The average of these coefficients is included at the bottom of the figure. The numbers in brackets represent the one-sided and two-sided Fisher exact p -values. See section 4.4 for more information on the methodology. Sources: Figure created using the information on births recorded by state-age-race group in the U.S. from NCHS (2018), population counts from SEER (2018), and the authors' legal coding of TRAP laws, as described in detail in Appendix A.

Figure 6: Impact of TRAP laws on Black teen births, by TRAP type; stacked DiD



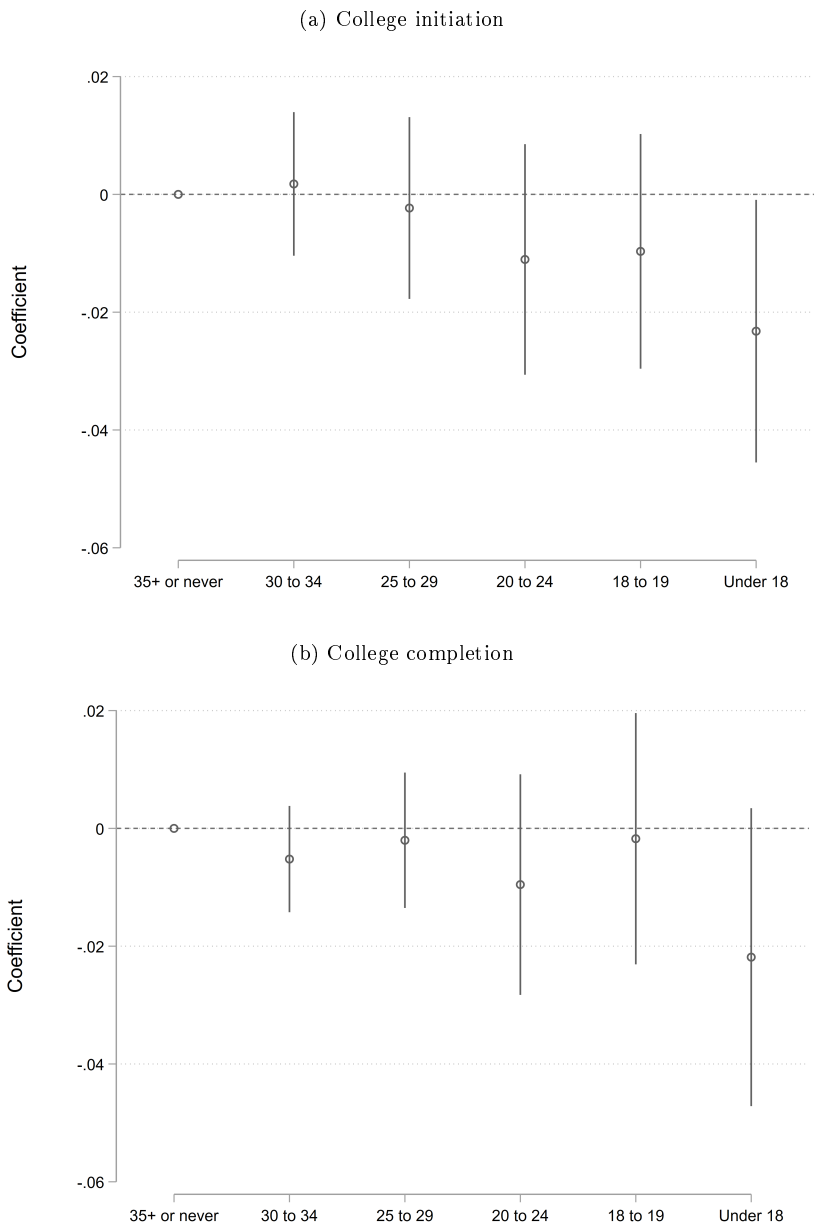
Notes: See notes in Figure 5.

Figure 7: Age at first TRAP exposure



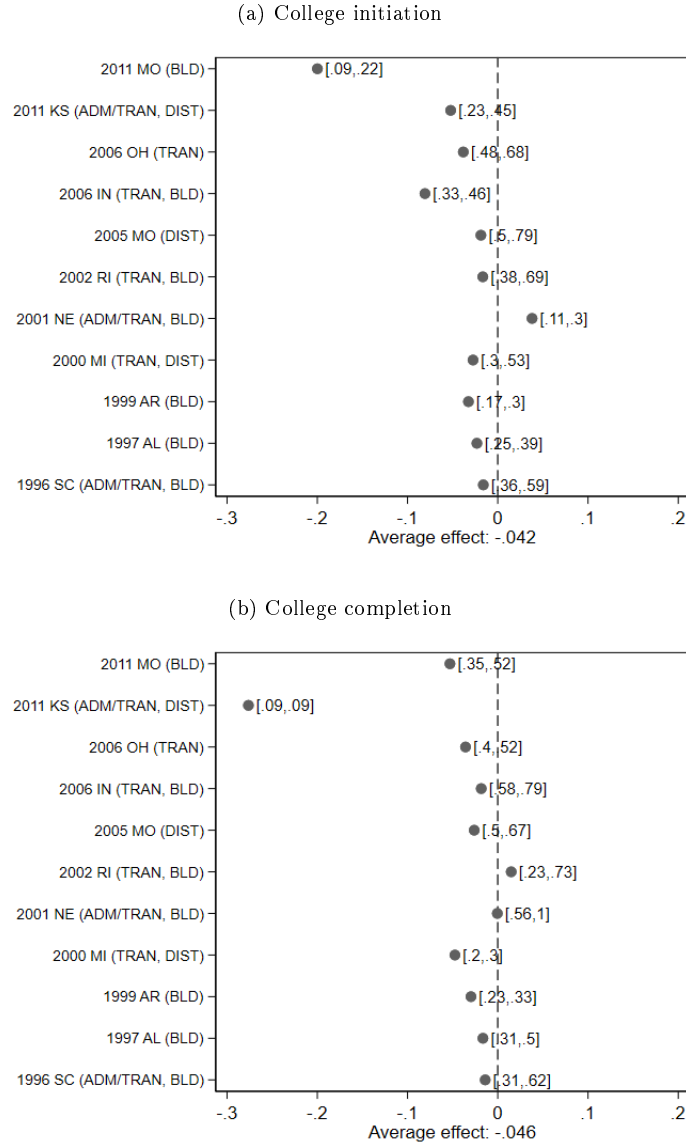
Notes: This figure shows the distribution of women by age at first exposure to a TRAP law. Source: Own calculations using ACS data from IPUMS (Ruggles et al., 2021) and the authors' legal coding of TRAP laws, as described in detail in Appendix A.

Figure 8: Impacts of TRAP law on Black women’s education, by age at first exposure



Notes: The figures show the estimates of a set of indicators for first exposure at various age groups, from an equation similar to 5.2, but replacing exp_{bs} by these indicators. College initiation indicates completing at least one year of college or more. College completion refers to completing at least a bachelor’s degree. The estimations control for state, year, and age fixed effects. They additionally control for implementation of parental involvement laws, two-trips mandatory waiting periods, and other abortion, contraception, and welfare policies. These figures provide evidence of the common trends assumption for the analysis presented in section 5.2. Sources: ACS data from IPUMS (Ruggles et al., 2021); information on other policies from Myers and Ladd (2020), and the authors’ legal coding of TRAP laws, as described in detail in Appendix A.

Figure 9: Impacts of TRAP laws on Black women’s education: Stacked DiD



Note: These figures display the estimates of exp_{bs} from equation 5.4, which indicates exposure before age 18 to a TRAP law, which is determined by birth year b and birth state s . College initiation indicates completing at least one year of college or more. College completion refers to completing at least a bachelor’s degree. The labels in the y-axis indicate the year, state, and restriction type (in parentheses) that correspond to each coefficient. Each estimate comes from a separate regression that compares individuals exposed before age 18 to TRAP laws with individuals first exposed to TRAP laws at older ages or never. ADM stands for admitting privileges laws, TRAN stands for transfer agreements, DIST stands for distance regulations and, BLD stands for building regulations. Some states implemented more than one TRAP law in a year, as indicated in the parentheses. The average of these coefficients is included at the bottom of the figure. The numbers in brackets represent the one-sided and two-sided Fisher exact p -values. See section 5.4 for more information on the methodology. Sources: ACS data from IPUMS (Ruggles et al., 2021); information on other policies from Myers and Ladd (2020), and authors’ legal coding of TRAP laws, as described in detail in Appendix A.

Tables

Table 1: Variables averages by state's future TRAP law status. 1990 American Community Survey

	White women		Black women	
	Non-TRAP	TRAP	Non-TRAP	TRAP
Highest educational attainment				
High-school	0.33	0.35	0.27	0.29
Associate's degree	0.28	0.23	0.17	0.17
College initiation	0.48	0.41	0.36	0.35
College completion	0.20	0.17	0.12	0.11
Graduate school	0.07	0.05	0.04	0.04
Employment				
Labor force participation	0.57	0.54	0.61	0.60
Employed	0.55	0.51	0.55	0.54
Income (2012 USD)				
Total family income (2012 USD)	44,395	39,808	22,025	21,843

Notes: This table shows the averages of potential determinants of unintended pregnancies by race and future TRAP status in the respondent's state of birth. Source: These averages are based on the information on the 1990 American Community Survey.

Table 2: Implementation of TRAP laws

Year	State	Admit	Transfer	Dist	Build	Reason if excluded from analysis, by type		
						All analyses	Both Stacked DiD	ACS Stacked DiD
2013	Alabama	X					3	6
2013	North Dakota	X		X			4	6
2013	Ohio		X				4	6
2013	Texas	X		X			4	6
2013	Virginia				X			6
2012	Maryland		X		X			6
2012	Tennessee	X					3, 4	6
2012	Pennsylvania				X			6
2012	Arizona			X			5	6
2011	Indiana	X				1		
2011	Kansas	E	E	X				
2011	Missouri				X			
2011	North Dakota	X				1		
2011	Utah	E	E	X	X			7
2009	Texas				X		4	
2006	Indiana		X		X			
2006	Ohio		X					
2006	South Dakota		X		X			7
2005	Missouri			X				
2003	Alabama	X				1		
2002	Rhode Island		X		X			
2001	Nebraska	E	E		X			
2000	Arizona	X			X		5	
2000	Michigan		X		X			
1999	Arkansas				X			
1999	Pennsylvania	E	E			2		
1998	Kentucky		X				5	
1998	Oklahoma				X		5	
1998	Texas		X				5	
1997	Alabama				X			
1996	Mississippi	X				1		
1996	South Carolina	E	E		X			
1994	North Carolina				X	1		

Notes: The exclusion codes are as follows: 1=Below minimum stringency (these are included in Appendix Figure D.1); 2=Decrease in stringency; 3=Blocked within 5 years; 4=Adjacent TRAP within 5 years; 5=Adjacent PI or MWP within 5 years; 6=Too recent to be able to analyze with the ACS data; 7=Too few Black women in ACS.

Table 3: TRAP laws excluded from analyses

		Admit	Transfer	Dist	Build
Pre-Casey					
1991	Mississippi		X		X
1987	Missouri	X			X
1983	Alaska		X		
1983	Pennsylvania		X	X	X
1976	North Carolina	E	E	X	X
1976	Wisconsin		X	X	
1974	Connecticut				X
1973	Idaho		X		
Too recent to evaluate					
2016	Florida	X			
2016	Illinois	X		X	X
2015	Louisiana				X
2015	Ohio			X	
2015	South Dakota				X
2015	Tennessee		X		X
2014	Louisiana	X		X	
2014	Oklahoma	X		X	
Applies to 2nd trimester providers only					
2017	Utah		X		
2016	Florida	X			
2015	Louisiana				X
2015	South Dakota				X
2015	Tennessee		X		X
2015	Ohio			X	
2015	North Carolina		X		
2014	Louisiana	X		X	
2014	Oklahoma	X		X	
2013	Georgia	E	E		X
2012	Virginia		X		
2010	Utah	E	E		
2006	Florida				X
2005	Mississippi		X	X	X
1999	Indiana				X
1993	Indiana		X		X
1985	Utah	X	X	X	X
1976	South Carolina		X		

Table 4: Impact of TRAP laws on Black teen births: Average effects from stacked DiD

Abortion restriction	Event-study	$r = 6$		$r = 8$		$r = 10$		$r = 12$	
		NT	NT+NYT	NT	NT+NYT	NT	NT+NYT	NT	NT+NYT
Any TRAP law	3.00	2.79	1.96	2.17	1.13	3.25	1.95	5.23	3.77
Admitting privileges	7.39	6.16	4.75	9.55	7.49	9.98	7.70	14.82	12.38
Transfer agreements	2.07	2.14	1.23	2.61	1.36	3.03	1.69	5.28	3.78
Distance requirement	3.48	1.86	1.50	1.57	0.67	1.71	0.53	2.63	1.30
Building requirements	0.07	2.15	1.24	1.54	0.54	3.11	1.84	6.32	4.60

Notes: This table compares the average of the post-intervention estimates in Figures 3 and 4, to the averages of the estimators obtained in the stacked difference-in-differences analyses. The dependent variable in all these analyses is the number of births of 15 to 19-year-old Black women in state s and year $t + 1$. The first column shows the average post-TRAP effect from the event-study analyses. The subsequent columns present the average of the DiD treatment effects from the states that meet the following criteria: 1) they implemented the TRAP law listed in the first column in year t , and 2) within r years (centered at t) these states did not implement any other policy that restricted access to abortion. NT and NYT refer to the states considered in the control group. NT stands for “never treated states,” which are those states that have never implemented an abortion restriction. NYT stands for “not yet treated;” these are the states that implemented an abortion restriction in a period after period $t + l$, where $l = 2, \dots, 5$, and $r = [t - l - 1, t + l]$. Sources: Table created using the information on births recorded by state-age-race group in the U.S. from NCHS (2018), population counts from SEER (2018), and the authors’ legal coding on TRAP laws, as described in detail in Appendix A.

Table 5: Impact of TRAP laws on abortion access and use

Panel A. Distance to nearest abortion provider	Mean	β
Geodesic distance (miles)	85.11	8.429*** (2.569)
Travel distance (miles)	75.38	9.520*** (3.120)
Travel time (minutes)	59.81	9.049*** (2.988)

Panel B. Abortion use	(1)	(2)
<u>CDC data</u>		
All women	-3.9483 (2.6593)	-4.3058* (2.45)
White women	-6.2925 (4.6564)	-0.1124 (4.8529)
Black women	-11.0096** (5.2643)	-4.7289 (3.5952)
Women under age 20	-5.1385 (3.2589)	-5.515* (2.9802)
<u>Guttmacher Institute data</u>		
All women	-3.5189 (3.4668)	-4.0927 (3.8613)
Controls PI & MWP	Yes	Yes
Controls other policies	No	Yes

Notes: Panel A shows the estimates of β_3 from equation 4, which corresponds to an indicator for an observation from the year 2017 and from a state s that turned on a new TRAP law between 2010 and 2016. Geodesic distance, travel distance, and travel time represent the distances in miles and travel times in minutes, respectively, from a county to the nearest abortion facility. Panel B shows the estimates of γ from equation 5, which indicates that any TRAP law was enforced in state s in year t . The dependent variables are the number of abortions for each demographic group stated in the table. Each estimate comes from a separate regression. The estimations in this panel include state and year fixed effects. The first column additionally controls for the implementation of parental involvement laws and two-trip mandatory waiting periods. The second column also includes controls for these and other abortion, contraception, and welfare policies. See section 4.1 for more information on these policies. The standard errors in all these estimates are clustered at the state level. Sources: The information on distance and travel was provided by Caitlin Myers. She also provided us with information on abortion counts, which was compiled from the CDC (Kortsmit, 2020). Information on abortion counts also from Guttmacher Institute (2021a). Information on other policies comes from Myers and Ladd (2020). The authors' legal coding on TRAP laws is described in detail in section A.

Table 6: Impact of TRAP laws on teen sexual behavior

	Mean	(1)	(2)
Panel A. White teen girls			
Sexual debut	0.42	-0.0256*** (0.00826)	-0.0231*** (0.00859)
Contraception use	0.57	0.0051 (0.0114)	-0.0015 (0.0128)
Panel B. Black teen girls			
Sexual debut	0.54	-0.0131 (0.0143)	-0.0127 (0.0181)
Contraception use	0.6	-0.0374** (0.0172)	-0.0481*** (0.0182)
State, year, and age FE		X	X
Abortion policies controls		X	X
Other policies controls			X

Notes: The table shows the estimates of β from equation 6, which indicates that any TRAP law was enforced in state s in year y . The dependent variables are indicators of whether or not an individual has initiated sexual activity (had sexual debut) and whether or not contraception was used at last intercourse. Each estimate comes from a separate regression. All the estimations include state, year, and age fixed effects. The first column additionally controls for the implementation of parental involvement laws and two-trip mandatory waiting periods. The second column includes these and also controls for other abortion, contraception, and welfare policies. See section 4.1 for more information on these policies. The standard errors are clustered at the state level. Sources: The information on sexual activity and contraception use was obtained from CDC (2019). Information on other policies comes from Myers and Ladd (2020). The authors' legal coding on TRAP laws is described in detail in section A.

Table 7: Impact of TRAP laws on Black women’s education: pooled DiD

	(1)	(2)
<hr/>		
College initiation		
Any TRAP law	-0.012** (0.006)	-0.011* (0.0057)
Admitting privileges	-0.0116** (0.0032)	-0.0087* (0.0047)
Transfer agreements	-0.0083 (0.0084)	-0.0062 (0.0078)
Distance regulations	-0.0205** (0.0039)	-0.0183** (0.0042)
Building regulations	-0.0161** (0.005)	-0.0166** (0.0047)
<hr/>		
College completion		
Any TRAP law	-0.0117* (0.0062)	-0.0116** (0.0056)
Admitting privileges	-0.0056 (0.0054)	-0.002 (0.0052)
Transfer agreements	-0.0078 (0.0087)	-0.0072 (0.0079)
Distance regulations	-0.0344** (0.0064)	-0.0346** (0.0063)
Building regulations	-0.0108** (0.0033)	-0.0095** (0.0034)
Controls PI & MWP	Yes	Yes
Controls other policies	No	Yes
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Notes: The coefficients correspond to the value of β in Equation 5.2, the coefficient on the variable indicating a woman was exposed to a TRAP law before age 18, as determined by her birth year b and birth state s . College initiation indicates completing at least one year of college or more. College completion refers to completing at least a bachelor’s degree. Each coefficient comes from a separate estimation. All the estimations control for state of birth, year of birth, and age fixed effects. Estimations in column (1) include controls for exposure during adolescence to parental involvement laws and two-trips mandatory waiting periods. Estimations in column (2) control for these and additionally for exposure to other abortion, contraception, and welfare policies. See section 4.1 for more information on these policies. The estimations are weighted by the person weight provided in ACS-IPUMS. The standard errors are clustered at the state of birth level. * $p < 0.1$, ** $p < .05$. Sources: ACS data from IPUMS (Ruggles et al., 2021); information on other policies from Myers and Ladd (2020). The authors’ legal coding on TRAP laws is described in detail in section A.

Table 8: Impact of TRAP laws on Black women’s education: Average effects from stacked DiD

Abortion restriction	Pooled DiD	Unlimited cohorts		Max 10 cohorts per group	
		NT	NT+NYT	NT	NT+NYT
Panel A. College initiation					
Any TRAP law	-0.0110	-0.0403	-0.0452	-0.0349	-0.0399
Admitting privileges	-0.0087	-0.0047	-0.0101	0.0031	-0.0022
Transfer agreements	-0.0062	-0.0232	-0.028	-0.0155	-0.0202
Distance regulations	-0.0183	-0.0328	-0.0399	-0.0152	-0.0218
Building regulations	-0.0166	-0.0427	-0.0474	-0.0400	-0.0449
Panel B. College completion					
Any TRAP law	-0.0116	-0.0504	-0.0481	-0.0397	-0.0383
Admitting privileges	-0.0020	-0.0990	-0.0969	-0.0858	-0.0848
Transfer agreements	-0.0072	-0.0560	-0.0541	-0.0447	-0.0436
Distance regulations	-0.0346	-0.1627	-0.1620	-0.1388	-0.1384
Building regulations	-0.0095	-0.0200	-0.0172	-0.0121	-0.0102

Notes: This Table compares the estimate in Table 7 column (2) (shown here in column (1)) to the averages of the estimates obtained in the stacked difference-in-differences analyses (shown here in subsequent columns). NT and NYT refer to the states considered in the control group. NT stands for “never treated states,” which are those states that have never implemented an abortion restriction. NYT stands for “not yet treated.” These are the states that implemented an abortion restriction at least five years after period t . The first row specifies the number of cohorts included in each analysis: 1) all the possible cohorts, and 2) at most ten cohorts. Sources: ACS data from IPUMS (Ruggles et al., 2021); authors’ legal coding of TRAP laws, as described in detail in section A.

Appendix

A Details on legal coding of TRAP laws

Alaska

- Transfer agreement requirement: Since 11/19/1983, 7 AK Admin Code 7 AAC 12.370 allows ambulatory surgical facilities to terminate pregnancies. Also, effective on 11/19/1983, Alaska Admin. Code tit. 7, § 12.910 requires ambulatory surgical facilities to have a signed agreement with a general acute care hospital for transfer of patients who require medical or emergency care beyond the scope of the ability or license of the facility. So then, we coded 1983 as the effective year for the transfer agreement requirement for abortion facilities. However, since this is a pre-*Casey* TRAP law, we do not consider it in our analysis.

Alabama

- Admitting privileges:
 - On 5/22/2003, amends to Ala. Admin. Code r. 420-5-1-.03 became effective. These amends include a requirement for abortion providers to comply with their own admitting privileges or an agreement with an external physician with admitting privileges. We coded this restriction as the least stringent version of admitting privileges laws. It is not included in the main analyses but the robustness check shown in Figure D.1.
 - According to NARAL Pro-Choice America, Admin. Code r. 420-5-1-.03 was amended in 2013 to require abortion providers to have admitting and staff privileges at an acute care hospital in the same standard metropolitan statistical area. No exceptions are made for rural areas, and nothing in the statute requires a hospital to agree to such an arrangement. A federal court has blocked this provision of the law. The U.S. District Court for the Middle District of Alabama, Northern Division issued a preliminary injunction after pro-choice activists challenged the law before it could go into effect (*West Alabama Women’s Center v. Williamson Planned Parenthood Southeast*, Inc. v. Bentley, 120 F.Supp.3d 1296, 2015 (M.D.Ala.)). Therefore, we coded the effective year as 2013 and the blocked year as 2015.
- Building regulations: On 3/27/1997, Alabama amended Ala. Admin. Code r. 420-5-1-.04 specifying requirements for doors and corridors width. It also indicates characteristics of examining facilities, procedure room, recovery room, clean workroom, and soiled workroom.

Arkansas

- Building regulations: Since 1999, the Rules and Regulations for Abortion Facilities §§12 require abortion facilities include specific requirements for ventilation and temperature, examination, procedure, recovery, and soiled workrooms. We verified this information with NARAL’s *Who Decides?* 2002.

Arizona

- Admitting privileges: 1999 Ariz. Legis. Serv. Ch. 311 (H.B. 2706) required that at least one physician with admitting privileges at an accredited hospital in the state is available when a abortion procedure is performed. Also, a physician with admitting privileges at an accredited hospital in this state remains on the premises of the abortion clinic until all patients are stable and are ready to leave the recovery room and to facilitate the transfer of emergency cases if hospitalization of the patient or viable fetus is necessary. The effective date of this law was 31/3/2000. We coded the effective year as 2000.
- Building regulations: AZ ST § 36-449.03 requires abortion facilities to comply with specific characteristics on the procedure, examination, recovery, rooms, adequate lighting and ventilation, and areas for cleaning and sterilizing instruments. This law has been amended several times, but the requirements on lighting and ventilation appeared in the law in 1999. Given that this law occurs in the year before the admitting privileges law (discussed above), we code both laws as a single policy change in 2000.
- Distance regulations: Starting on 2012, Ariz. Rev. Stat. Ann. §§ 36-449.03, physicians providing surgical abortions, must have admitting privileges at a hospital within thirty miles of the abortion facility, must remain on the premises of the abortion clinic until all patients are stable and are ready to leave the recovery room and to facilitate the transfer of emergency cases if hospitalization of the patient or viable fetus is necessary. Since this restriction applies to surgical abortions, we include this law in our main analyses.

Connecticut

- Building regulations: Since 2/25/1974, CT ADC § 19-13-D54 specifies standards for operating and recovery rooms. We do not consider this law in our analysis because it was implemented in the pre-Casey era.

Florida

- Building regulations: FL ADC 59A-9.022 requires abortion clinics providing second-trimester abortions to meet physical and plant requirements. This includes specifications on the procedure and recovery rooms and cleaning and sterilizing areas. This law was adopted on 9/25/2006. So, we coded 2006 as the effective year. However, we exclude this law from our main analyses because it only targets second-trimester abortion providers.

Georgia

- Since 1974, post-first-trimester abortions should be performed in a licensed hospital, ambulatory surgical center, or in a health facility licensed as an abortion facility by the Department of Community Health (Ga. Code Ann., § 16-12-141).
- Admitting privileges and/or transfer agreements: Effective on 3/12/2013, Ga. Comp. R. & Regs. 111-8-4-.09 requires ambulatory surgical facilities to have written procedures for emergency services. The centers should have a hospital affiliation agreement, and/or the medical staff must have admitting privileges or other acceptable documented arrangements to ensure the necessary back-up for medical complications. The centers must have the capability to transfer a patient immediately to a hospital with adequate emergency room services.

- Building regulations: Effective on 3/12/2013, Ga. Comp. R. & Regs. 111-8-4-.09 requires ambulatory surgical facilities to meet physical plant and operational standards. These include specific characteristics of procedure and recovery rooms.
- Since only abortion facilities providing post-first-trimester abortions licensed as ASCs are the ones complying with these regulations, we do not include these laws in our main analyses.

Idaho

- Admitting privileges: Since 5/10/2011, the Ind. Code § 16-34-2-4.5 (P.L.193-2011, SEC.14) requires physicians working at facilities performing five or more medical abortions per year at any stage of pregnancy; or facilities performing surgical abortions at any stage of pregnancy to have admitting privileges at a hospital located in the county where abortions are provided or a contiguous county, or to have entered into an agreement with a physician who has admitting privileges at a hospital within the county or in a contiguous county, to manage possible complications arising from the abortion procedure. Effective on 7/1/14, the law was modified to specify that the admitting privileges should be provided in writing. Effective on 7/1/2016, it was additionally included that the agreement should be renewed annually. We coded this law as the less stringent version of admitting privileges laws and considered coded 2011 as its effective year. However, this law is not included in our main analyses but as part of the robustness check in Figure D.1.
- Building regulations:
 - Since 1993, 410 IAC 15-2.5-7 establishes physical plant, equipment maintenance, and environmental services for ambulatory outpatient surgical center services following the Guidelines for Design and Construction of Hospital and Health Care Facilities. On 12/1/1999, it became also required for ambulatory outpatient surgical center services to have emergency power and lighting following the National Fire Protection Association standards. These regulations only apply to post-first-trimester abortions performed in ambulatory outpatient surgical centers. So then, we exclude this law from our main analyses.
 - 410 IAC 26-17-2 contains specifications of physical plants for abortion clinics. Among these specifications, it includes characteristics of procedure, examination, and recovery rooms. It also specifies minimum corridor and doorway widths. This law was filed on 5/11/2006. We are not sure this same year the law became effective. However, since we could not find further information, we consider 2006 the effective year.
- Transfer agreements:
 - Ind. Code § 16-34-2-1, effective in 1993, specifies that after the first trimester of pregnancy and before the earlier viability of the fetus or twenty (20) weeks of post-fertilization age, abortions should be performed in a hospital or ambulatory outpatient surgical center. Effective in the same year, Ind. Code § 16-18-2-14 requires ambulatory outpatient surgical centers to maintain a written agreement with at least one hospital for immediate acceptance of patients who develop complications or require postoperative confinement. Since only facilities providing post-first-trimester abortions must operate as ambulatory outpatient surgical centers, we exclude this law from our main analyses.

- 410 IAC 26-12-1 requires abortion clinics to have a readily accessible written protocol to manage medical emergencies that occur within the clinic and to transfer to a hospital a patient requiring further emergency care. This law was filed on 5/11/2006. We did not find information on the effective date. However, the 2006 version of the law is the same as today. So then, we assume the effective year is 2006 and consider it as a plan/protocol.

Illinois

- Admitting privileges, distance regulations, and building regulations: Effective 9/21/2016, 77 Ill. Adm. Code 205.710 states that facilities terminating pregnancies within 18 weeks should be considered pregnancy termination specialty centers. This law also requires the medical director or a physician practicing at the facility has a professional working relationship or agreement, maintained in writing at the facility and verifiable by the Department, with a physician who does have admitting or practice privileges at a licensed hospital within approximately 15-30 minutes from the facility and who will assume responsibility for all facility patients requiring hospitalization or inpatient hospitalization follow-up care. Additionally, it establishes standards for the plant, such as rooms sizes and corridor and hallway widths. This law was repealed in 2020. Given that these regulations were implemented recently, data limitations do not allow us to evaluate them. So, we do not include them in our analysis.
- We also found some indications that some abortion facilities may have to be licensed as ASCs if providing general anesthesia. It seems this decision is the result of *Ragsdale v. Turnock*, C.A.7 (Ill.) 1988, 841 F.2d 1358. Before that, abortion facilities were required to be licensed as ASCs. However, we did not find information on what ASC standards were then. Since after 1988, no law establishes all abortion facilities must operate as ASCs, we did not code any hospital relationship requirements and building regulations applying to ASCs, because those requirements only potentially affect those few facilities providing general anesthesia.

Indiana

- Admitting privileges: Since 5/10/2011, the Ind. Code § 16-34-2-4.5 (P.L.193-2011, SEC.14) requires physicians working at facilities performing five or more medical abortions per year at any stage of pregnancy; or facilities performing surgical abortions at any stage of pregnancy to have admitting privileges at a hospital located in the county where abortions are provided or a contiguous county, or to have entered into an agreement with a physician who has admitting privileges at a hospital within the county or in a contiguous county, to manage possible complications arising from the abortion procedure. Effective on 7/1/14, the law tax was modified to specify that the admitting privileges should be provided in writing. Effective on 7/1/2016, it was additionally included that the agreement should be renewed annually. We coded this law as the less stringent version of admitting privileges laws and considered coded 2011 as its effective year. However, this law is not included in our main analyses but as part of the robustness check in Figure D.1.
- Building regulations:
 - Since 1993, 410 IAC 15-2.5-7 establishes physical plant, equipment maintenance, and environmental services for ambulatory outpatient surgical center services following the Guidelines for Design and Construction of Hospital and Health Care Facilities. On 12/1/1999, it became also

required for ambulatory outpatient surgical center services to have emergency power and lighting following the National Fire Protection Association standards. These regulations only apply to post-first-trimester abortions performed in ambulatory outpatient surgical centers. So then, we exclude this law from our main analyses.

- 410 IAC 26-17-2 contains specifications of physical plants for abortion clinics. Among these specifications, it includes characteristics of procedure, examination, and recovery rooms. It also specifies minimum corridor and doorway widths. This law was filed on 5/11/2006. We are not sure this same year the law became effective. However, since we could not find further information, we consider 2006 the effective year.
- Transfer agreements:
 - Ind. Code § 16-34-2-1, effective in 1993, specifies that after the first trimester of pregnancy and before the earlier viability of the fetus or twenty (20) weeks of post-fertilization age, abortions should be performed in a hospital or ambulatory outpatient surgical center. Effective in the same year, Ind. Code § 16-18-2-14 requires ambulatory outpatient surgical centers to maintain a written agreement with at least one hospital for immediate acceptance of patients who develop complications or require postoperative confinement. Since only facilities providing post-first-trimester abortions must operate as ambulatory outpatient surgical centers, we exclude this law from our main analyses.
 - 410 IAC 26-12-1 requires abortion clinics to have a readily accessible written protocol to manage medical emergencies that occur within the clinic and to transfer to a hospital a patient requiring further emergency care. This law was filed on 5/11/2006. We did not find information on the effective date. However, the 2006 version of the law is the same as today. So then, we assume the effective year is 2006 and consider it as a plan/protocol.

Kansas

- Admitting privileges and minimum distance regulations: Effective on 7/1/2011, Kan. Admin. Regs. § 28-34-132 requires that a physician performing or inducing abortion procedures in a facility has clinical privileges at a hospital located within 30 miles of the facility.
- Transfer agreements: Effective on 7/1/2011, Kan. Admin. Regs. § 28-34-140 requires developing written policies and procedures to transfer patients to a hospital. We consider this law a plan/protocol more than a formal transfer agreement.

Kentucky

- Transfer agreements: Effective on 7/15/1998, Ky. Rev. Stat. § 216B.0435 requires written agreements between an abortion facility and acute-care hospital capable of treating patients with unforeseen complications related to an abortion facility procedure by which the hospital agrees to accept and treat these patients. The law also requires a similar agreement with a local ambulance service for the transportation of patients.

Louisiana

- Admitting privileges and distance regulations: Effective on 9/1/2014, La. Rev. Stat. Ann. §40:1061.10 started requiring physicians performing or inducing abortions to have active admitting privileges at a hospital that is located not further than thirty miles from the location at which the abortion is performed or induced. The hospital should provide obstetrical or gynecological health care services. According to NARAL, "That decision was appealed to the U.S. Supreme Court and the high court granted an emergency stay—blocking the law from going into effect. *June Medical Serv., et al. v. Gee, Sec.*, LA DHH, 577 US 15A880 (2016). The Fifth Circuit did not oppose the motion—pending the ruling in the *Whole Woman's Health v. Hellerstedt* case—challenging a similar law in Texas. The U.S. District Court for the Middle District of Louisiana issued a permanent injunction against the law and any implementing regulations in April 2017. *June Medical Services LLC v. Caldwell*, No. 3:14-CV-525 (M.D. La. April 26, 2017)." There were some other appeals later, but they are not relevant for our analysis, as it runs up to 2016. Then, for our legal coding, we consider this law to law as blocked in 2016.
- Building regulations: Promulgated on April 2015, La. Admin. Code tit. 48 § I-4445 specifies general requirements for abortion providers. It includes specifications on procedure room and recovery area size and characteristics of a clean utility room used for clean or sterile supplies. Unfortunately, we could not locate any information on the effective date. So, we assigned as the effective year the promulgation year 2015.

Maryland

- Building regulations: Md. Code Regs. 10.12.01.15 contains some requirements on the physical environment of surgical abortion facilities. In particular, it includes specifications on the procedure and recovery rooms.
- Transfer agreements: Md. Code Regs. 10.12.01.10 requires surgical abortion facilities to have an effective procedure for transferring patients to a nearby hospital when care beyond the facility's capabilities is required. Since the law only requires written protocols and procedures related to emergency transfer procedures but not a formal transfer agreement with a hospital, we consider this law a plan/protocol. Therefore, we exclude this law from the robustness check in Figure D.1.
- COMAR 10.12.15 became effective on 7/23/2012. Both subsections 15 and 10, mentioned above, are part of it. So, we assigned 2012 as the effective year. Also, since its content applies to surgical abortions, we consider both building regulations and transfer agreements in our main analyses.

Michigan

- Since 2000, Michigan Compiled Laws, Chapter 333. Health § 333.20115 requires abortion facilities to be licensed as freestanding outpatient facilities if they perform a certain number of abortions a year. Before 2013, the rules applied to facilities where 50 percent or more of the patients served annually undergo an abortion. After 2013, the facilities required to operate as ASCs performed 120 or more surgical abortions per year and publicly advertised outpatient abortion services.

- Distance regulations: Mich. Admin. Code r. 325.3832 requires freestanding surgical outpatient facilities to be located not more than 30 minutes normal travel time from the hospital with which written emergency admission arrangements are made.
- Transfer agreement: Mich. Comp. Laws Ann. § 333.20821 requires the freestanding surgical outpatient facility to have a written agreement with a nearby licensed hospital to provide for the emergency admission of post-surgical patients who may require hospital admission and care for unpredictable reasons.
- Since these two regulations only apply to freestanding surgical outpatient facilities, and abortion facilities became required to be licensed as such in 2000, we coded 2012 as the effective year for both requirements. Also, we consider the pre-2013 laws as applying to all abortion facilities and the post-2013 law as applying to surgical facilities only. However, for our main analyses, we consider the transfer agreement and distance regulations as effective since 2012, without distinction. Both laws were rescinded in 2020.

Missouri

- Building and distance regulations:
 - In 1987, of Mo. Code Regs. Ann. tit. 19, §30-30 was created, and it included some physical plant requirements and surgical privileges with a hospital for physicians providing abortions. We coded these restrictions as admitting privileges and building regulations, respectively, with 1987 as the effective year.
 - A distance regulation was created in 2004. However, it was restrained until a case dropped due to a clinic closure in 2005. This law required abortion facilities to be located within 30 miles of a hospital. Therefore, we coded 2005 as the effective year of this law.
 - In 2007, the state revised Mo. Rev. Stat. § 197.200 to require that all abortion providers operate as ASCs. This increased the physical plant requirements and changed the distance regulation to be located within 15 minutes from a hospital. Later this law was challenged in court (Drummond). This challenge implies that the same abortion provider regulations continued applying since the 2007 law was enjoined in our coding. In 2010, the parties executed an agreement to end the injunction. Beginning 16 months after the May 2010 agreement, the 2007 ASC requirements were enforced with some exceptions and modifications for Columbia Center and Brous Center clinics. We consider these requirements more stringent building regulations than those from the 1987 law and coded 2011 as their effective year.
 - There were posterior changes to the ASC law. However, in terms of our analyses, they are irrelevant since they happened after 2016, and this is our last year of data.

Mississippi

- Transfer agreements and building regulations:
 - 1991 amend to Miss. Code Ann. § 41-75-1 establishes that abortion facilities shall make arrangements with a local ambulance service, duly licensed by the State of Mississippi, to transport emergency patients to a hospital and provide documentation to the Department of proof of such

arrangements. We considered this requirement a plan/protocol to transfer patients since it does not require a formal transfer agreement with a hospital. However, since it was implemented in the pre-Casey era, we do not consider it in our analysis.

- 1996 Miss. Laws Ch. 442 (S.B. 2817) required abortions performed at 16+ weeks to be performed in ambulatory surgical facilities (ASF). 2004 Miss. Laws Ch. 584 (H.B. 1038), effective in 2005, required post-first trimester abortions to be performed in ambulatory surgical facilities. Then, for ASF providing abortion services, it became relevant to comply with 15 Miss. Code R. § 16-1-42. It requires a transfer agreement for the immediate transfer to a hospital of patients requiring medical care beyond the capabilities of the ASF. It also includes other regulations applying to operating and recovery rooms, surgical suites. Then, in 1996 and 2005, transfer agreements and building regulations were implemented for ASFs providing abortions. However, since the ASF requirement only applies to post-first-trimester abortions, we did not include it in our main analyses.
- Effective on 7/1/2012, House Bill 1390 requires that all physicians performing abortions in abortion facilities have admitting privileges at a local hospital and must be board certified in obstetrics and gynecology. This law was never enforced and ultimately blocked in 2017. According to NARAL: "A court held that the admitting-privileges requirement was valid, but temporarily prohibited the state from enforcing the civil or criminal penalties while the abortion facility attempted to comply with the law. The state appealed, but a three-judge panel of the Fifth Circuit Court of Appeals upheld the temporary injunction. The full Fifth Circuit denied a rehearing in the case, so the admitting privileges requirement did not go into effect. The state appealed to the U.S. Supreme Court, but the court held the case for over a year, the day following the Supreme Court's decision in a similar TRAP case out of Texas (*Whole Woman's Health v. Hellerstedt*) denied cert. In March 2017, the state was blocked from permanently enforcing the admitting privileges requirement, though summary judgment in the case has not yet been granted."
- 15 Miss. Code R. § 16-1-44.12.1 requires abortion facilities to have a written agreement with one or more physicians for the express purpose of ensuring that patients who have complications will be immediately transferred to the physician's care. The physician who enters the written agreement with the abortion facility shall have full admitting privileges with one or more acute general hospitals that shall be located within 30 minutes travel time of the abortion facility. This is the least stringent version of admitting privileges laws. We do not consider the 30 minutes travel time a distance regulation because this is a requirement for the physician's office, not the clinic location. Unfortunately, we could not track any information on the effective date of this law. However, the history of the law shows that the last effective date was 7/1/1996. So then, we use 1996 as the effective year.

North Carolina

- Admitting privileges, distance regulations, and transfer agreements: Effective on 2/1/1976, 10A N.C. Admin. Code 14E established that abortion clinics are considered freestanding facilities if performing abortions during the first 12 weeks of pregnancy. Also, effective on that same date, that same date, the law established some emergency back-up services requirements. This includes a written transfer agreement between free abortion clinics and a licensed North Carolina hospital, was required to transfer patients in need of emergency care. In the absence of a transfer agreement, all the physicians operating

in a freestanding abortion clinic shall document that they have adequate admitting privileges at a hospital. The hospital should also be located no more than 15 minutes travel time from the freestanding abortion facility. It is also required to meet minimum standards for construction and equipment. This includes standards for sanitation, elevator, corridors, doors, and rooms. We do not include any of these laws in our analysis because they were implemented in the pre-Casey era.

- Effective on 7/1/1994, 10A N.C. Admin. Code 14E, some modifications to the existing building regulations in 10A N.C. Admin. Code 14E and additions such as ventilation requirements were made. We coded this as building regulations, with 1994 as the effective year.
- Effective on 10/1/2015, 10A N.C. Admin. Code 14E modified the emergency back-up services requirements. Now, it requires clinics to have either a written agreement between the clinic and a hospital to facilitate the transfer of patients who require emergency care or documentation of their efforts to establish such a transfer agreement with a hospital and has been unable to secure such an agreement. Since clinics can document their effort to get a transfer agreement without actually getting it, we code this law as the less stringent version of transfer agreements. In Figure D.1, we exclude from the analysis this restriction.

North Dakota

- Admitting privileges and distance regulations:
 - Effective on 8/1/2011, N.D. Cent. Code § 14-02.1-03.5. 4, requires any physician who gives, sells, dispenses, administers, prescribes, or otherwise provides an abortion-inducing drug shall enter a signed contract with another physician who agrees to handle emergencies associated with the use or ingestion of the abortion-inducing drug. The physician who contracts to handle emergencies must have active admitting privileges and gynecological and surgical privileges at the hospital designated to handle any emergencies associated with the use or ingestion of the abortion-inducing drug. This law focuses on medical abortion only.
 - Effective on 8/1/2013, N.D. Cent. Code § 14-02.1-04 requires all physicians performing abortion procedures to have admitting privileges at a hospital located within thirty miles of the abortion facility and staff privileges to replace hospital on-staff physicians at that hospital. These privileges must include the abortion procedures the physician will be performing at abortion facilities.
- We coded the 2011 admitting privileges law as the least stringent version because it only requires an agreement with another physician with active admitting privileges. We coded the 2013 laws as admitting privileges and distance regulations.

Nebraska

- Admitting privileges or transfer agreement: Effective on 1/1/2001, Neb. Admin. R. & Regs. Tit. 175, Ch. 7, § 006. 7-006.14D requires abortion facilities to have a written agreement for emergency care with a hospital that provides obstetrical services. Otherwise, each medical practitioner practicing at the facility must have admitting privileges at a transferring hospital. This requirement is triggered by facilities performing ten or more abortions of any method per week. Then, we consider it as applying to all clinics. We coded 2001 as the effective year.

- Building regulations: Effective on 1/1/2001, 175 Neb. Admin. Code § 7-006. Standards of operation, care, and treatment specify requirements on physical plan standards. They include specifications of examination rooms, procedure, and recovery rooms, as well as the corridor and hallway width and ventilation.

Ohio

- Distance regulation: Effective on 9/25/2015, Ohio Revised Code Section 3702.3010 requires that local hospitals with a written transfer agreement with an ASF shall not be further than thirty miles from the ASF. Therefore, we coded 2015 as the effective year of this restriction.
- Transfer agreements: The 2006 decision on the case *Women’s Medical Professional Corp (WMPC). v Baird* mentions that ambulatory surgical facilities (ASF) were required before 1999 with attempts to enforce licensing for abortion clinics as ASFs only beginning in 1999. Note that there is no legal code requiring abortion clinics to operate as ASFs; it seems clinics were operating as ASFs have more to do with interpreting the definition of an ASF than an ASF law. In the same court decision, it is mentioned that the state was regularly granting waivers to clinics regarding the transfer agreement until a waiver was denied to WMPC in 2003. The waiver denial was enjoined until it was held constitutional in this court decision. Then, based on this information, we considered 2006 as the transfer agreement effective year. This is consistent with the fact that this TRAP law was not mentioned in any NARAL documentation until 2007.
- Effective 9/29/2013, Ohio Rev. Code Ann. §3727.60 prohibited public hospitals from entering into a written transfer agreement with an ambulatory surgical facility where non-therapeutic abortions are performed or induced. This prohibition made it harder for abortions facilities operating as ambulatory surgical facilities to comply with the transfer agreement requirement. We also coded this transfer agreement restriction as effective in 2013 to capture the increase in stringency of the law.

Oklahoma

- Admitting privileges and distance regulation: Effective on 11/1/2014, Okla. Stat. tit. 63, § 1-748. B requires physicians performing or inducing abortions to have admitting privileges at a general medical-surgical hospital that offers obstetrical or gynecological care in this state located within thirty (30) miles of where the abortion is being performed. It also requires physicians to remain on the facility’s premises to facilitate the transfer of emergency cases if hospitalization of an abortion patient or a child born alive is necessary and until all abortion patients are stable and ready to leave the recovery room. According to Guttmacher Institute, NARAL, and Austin and Harper (2019), this law was enjoined and blocked in 2016. Therefore, we coded 2014 as the effective year.
 - Effective on 7/13/1998, Okla. Admin. Code 310:600-9-6 indicates that each abortion facility shall establish a written protocol for the transfer of patients requiring emergency treatment that cannot be provided on-site. The protocol shall include procedures to contact the local ambulance service and expedite the transfer to the receiving hospital. Appropriate clinical patient information shall be provided to the receiving facility. If the attending physician does not have admitting privileges at a local general hospital, the physician shall attest arrangements have been made with a physician having hospital privileges to receive emergency cases. Since the law only requires

an agreement with a physician with admitting privileges, we consider this law as the least stringent version of admitting privileges laws. We show in Figure D.1 that the event-study estimates are robust to the inclusion of these policies.

- Building regulations: Effective on 7/13/1998, Law 1. 310:600-11-1. Facility design and construction guidelines establish specific requirements on the procedure, operating, and recovery room characteristics. Therefore, we coded 1998 as the effective year.

Pennsylvania

- Admitting privileges, distance regulation, and transfer agreements:
 - 28 Pa. Code § 29.33 requires freestanding clinics to have a written transfer agreement. The agreement shall be entered into with a hospital that is capable of providing routine emergency services. The location of the hospital holding the agreement to supply emergency services shall not be farther than 30 minutes by ambulance from the clinic. It is not clear what the effective year is. However, 1983 corresponds to the last amendment. Also, abortion clinics became required to be licensed in 1983. Then, we assigned this year as the effective year for the transfer agreement and distance regulation.
 - 28 Pa. Code § 555.23(d) requires ASFs to have a written transfer agreement with a hospital that has an emergency and surgical services available, or physicians performing surgery in the ASF shall have admitting privileges at a hospital in close proximity to the ASF, to which patients may be transferred. This law applies to ASFs performing surgical abortions. The last amendment to this law was on 11/22/1999, and we could not trace down the previous version of the law. Then, we assigned 1999 as the effective year of the written transfer agreement or admitting privileges requirement.
- Building regulations: - 28 Pa. Code § 29.33 also require ASFs to meet some conditions in terms of the building and plant that include specification on corridor doors, elevators, and other passages shall be adequate in size and arrangement to allow a stretcher-borne patient to be moved from each procedure room and recovery room to a street-level exit. As mentioned above, we do not know the effective date of this law. So, for the reasons presented above, we assigned 1983 as the effective year.
 - Effective on 6/19/2012, Dec. 22, P.L. 563, No. 122, § 2, required all facilities performing surgical abortions to operate as ASF. The ASF requirement triggers 28 Pa. Code § 571.1, which requires ASFs to comply with specific requirements according to the "Guidelines for Design and Construction of Hospital and Health Care Facilities." Therefore, we coded 2012 as the effective year of these building regulations on surgical abortion facilities operating as ASFs.

Rhode Island

- Building regulations: Department of Health regulations (31-4 R.I. Code R. § 6:30.0, 31-1 R.I. Code R. § 2:3.0, 31-4 R.I. Code R. § 6:21.0), dated 2002 and not amended, created some rules regarding operating, procedure, and recovery rooms. They also include standards for emergency lights and power in the operating room. We assigned 2002 as the effective year.
- Transfer agreement:

- Since 1973, abortions from 15 to 18 weeks of gestation should be performed in freestanding ambulatory surgical centers (FASC). 216-40-10 R.I. Code R. § 5.5 requires FASC to have a written transfer agreement for transferring patients to a nearby hospital when hospitalization is indicated or permit elective surgery only by licensed practitioners who have similar privileges at a nearby licensed hospital and approved by the governing body of the FASC. This rule applies to abortions between 15 to 18 weeks of gestation. Then, we exclude this law from our main analyses.
- Effective on 1/2/2002, 216-20-10 R.I. Code R. § 6.3. 6.3.2, requires making provisions for the prompt and safe transfer of patients for back-up services. We consider this law a plan/protocol, as it does not require a formal transfer agreement with a hospital. Figure D.1 shows results excluding this law from the analysis.

South Carolina

- Admitting privileges and/or transfer agreement:
 - Effective in 1996, S.C. Code Ann. Regs. 61-12.309 requires physicians to have admitting privileges at one or more hospitals that have appropriate obstetrical/gynecological services. However, this law only applies to abortions beyond 14 weeks. So then, we do not include this law in our analysis.
 - The 1976 version of S.C. Code Ann. Regs. 61-12. 205, required clinics providing second-trimester abortions to have a written agreement with at least one certified general hospital for immediate admission and care of patients with complications. The clinic shall have arrangements for transporting the patient within ten minutes from the clinic to the hospital with which it has an agreement for surgical services for emergency care. From 1976 to 1995, this law focused only on second-trimester abortions. Then, we do not consider its implementation during this period in our analysis. Then, in 1996, amends to chapter 61, Section 62 indicated that the facility shall enter into a signed written agreement with at least one physician board-certified in obstetrics and gynecology who has admitting privileges at one or more local hospitals with OB/GYN services to ensure his/her availability to the staff and patients during all the operating hours.
 - However, the 1996 version of S.C. Code Ann. Regs. 61-12.305 required that all staff and/or consulting physicians shall have admitting privileges at one or more local hospitals that have appropriate obstetrical/gynecological services or shall have in place documented arrangements approved by the Department for the transfer of emergency cases when hospitalization becomes necessary. This law then requires all physicians providing abortion to have admitting privileges or to have a plan/protocol to admit patients to a hospital in case of emergency. Also, requiring all physicians to have admitting privileges is more stringent than requiring a signed agreement with at least one physician, such as S.C. Code Ann. Regs. 61-12. 205 does. Then, we coded the most stringent version of admitting privileges laws and a plan/protocol with 1996 as their effective year.
 - The 2003 version of S.C. Code of Regulations R. 61-91.504 indicates that at least one physician at an ambulatory surgical facility (ASFs) should have admitting privileges at one or more local hospitals. However, no law requires abortion facilities to operate as ASFs. S.C. Code Ann. Regs. 61-91.103 establishes that abortions cannot be performed in an ASF unless licensed as an abortion facility. In the event an ASF provides abortions, then being an ASF would trigger the ASF admitting privilege. However, abortion facilities are already required since 1996 to have

admitting privileges due to the laws described above. So then, we do not code this law because it only applies to the subset of ASFs providing abortion services.

- Building regulations: As of 1996, all clinics must follow strict building regulation rules. Also, starting in 1996, abortion clinics performing abortions after 18 weeks must be ASCs, which triggers additional rules from 1983. The rules include standards for operating and procedure rooms (S.C. Code of Regulations R. 61-91.2001), emergency power generator (S.C. Code of Regulations R. 61-91.1902), corridors width (S.C. Code of Regulations R. 61-91.2004), and ventilation (S.C. Code of Regulations R. 61-91.2017). We coded the first building regulations and ignored the second because they only apply to post-first trimester abortions.

South Dakota

- Transfer agreements: Effective on 12/26/2006, S.D. Admin. R. 44:67:04:07 requires abortion facilities to establish and implement policies and procedures for emergency care and arrange for transport to a licensed hospital sufficiently close to provide prompt care to the facility's patients if needed. We considered this law a plan/protocol since it does not require a formal written agreement with a hospital to transfer patients. Therefore, we assigned 2016 as the effective year.
- Building regulations: A set of rules effective on 11/26/2006 establish different building regulations for abortion facilities such as standards for recovery rooms (S.D. Admin. R. 44:67:05:03), procedure rooms (S.D. Admin. R. 44:67:05:02), ventilation (S.D. Admin. R. 44:73:02:13), lighting (S.D. Admin. R. 44:73:02:14). Then S.D. Admin. R. 44:73:02:03, effective on 10/13/2015, requires written procedures for cleaning and sterilization and a separate clean and soiled utility room. Since the first building regulations started in 2006, we assign this year as the effective year.

Tennessee

- Admitting privileges: In 2012, it was added to Tenn. Code § 39-15-202 that a physician performing surgical abortions must have admitting privileges at a licensed hospital in the county where the abortion is performed or in an adjacent county. This law was enjoined in 2017. Since this law applies to surgical abortions, we included it in our analysis and coded 2012 as its effective year.
- Transfer agreement: In 2015, surgical abortion facilities performing more than 50 surgical abortions in a calendar year became required to operate as ambulatory surgical treatment centers (ASTC) (Tenn. Code § 68-11-201). Tenn. Comp. R. & Regs. 1200-08-10-.05 indicates that ASTC must have a written transfer agreement with a local hospital. So then, since the ASTC requirement for surgical abortion facilities triggers the written transfer agreement, we assigned 2015 as its effective year.
- Building regulations: Tenn. Comp. R. & Regs. 1200-08-10-.06 indicates that ASCTs shall provide one or more surgical suites. It also indicates ASTCs should have separate areas for waiting rooms, recovery rooms, and treatment/examining rooms. The effective date of this law is 8/22/1977. However, surgical abortion facilities became required to comply with it until the ASC T requirement was enforced in 2015. Then, we assigned 2015 as the effective year. This law was enjoined in 2018.

Texas

- Admitting privileges, distance regulation, and transfer agreement:
 - Effective on 8/13/1998, 25 Tex. Admin. Code § 139.56 required abortion facilities to have a readily accessible written protocol for managing medical emergencies and transferring patients requiring further emergency care to a hospital. In addition, the facility shall ensure that the physicians who practice at the facility have admitting privileges or have a working arrangement with a physician(s) who has admitting privileges at a local hospital to ensure the necessary back-up for medical complications. We coded the admitting privileges as the least stringent version because it allows an arrangement with an outside physician with admitting privileges in a hospital. We only consider the written protocol as a plan/protocol because it does not imply a formal written agreement with a hospital. Therefore, we assign 1998 as the effective year for both restrictions.
 - Effective on 11/1/2013, Tex. Health & Safety Code Ann. §171.0031 requires physicians performing or inducing abortions to have active admitting privileges at a hospital located not further than 30 miles from the location at which the abortion is performed or induced. This law was blocked in 2016 after the Supreme Court decision in *Whole Woman's Health v. Hellerstedt*. Therefore, we assigned 2013 as the effective year for both requirements.
- Building regulations: 25 Tex. Admin. Code § 139.48 establishes physical and environmental requirements for licensed abortion facilities. Among the different requirements, it includes standards for recovery rooms. 25 Tex. Admin. Code § 135.52 specifies standards for the electrical system. 25 Tex. Admin. Code § 135.11 requires written policies and procedures for decontamination, disinfection, sterilization, and storage of sterile supplies. All these laws became effective on 6/18/2009. Therefore, we coded 2009 as the effective year for building regulations.
- The following regulations are not include in our analysis as these requirements only apply to post-first trimester abortions. The 2004 "Women's Right to Know" Act (Tex. Health & Safety Code § 171.004) required abortions beyond 16 weeks to take place in an ASC. This triggered a number of requirements (25 Tex. Admin. Code § 135.52), such as staff training and facility safety and cleanliness, but did not include any of the building (or other) requirements coded in this paper. As such, it is not included even in Table 3. As of 2009, (25 Tex. Admin. Code § 135.11) additionally required ASCs to have a transfer agreement, though this continued to apply only to clinics providing 16 weeks+ abortions.

Utah

- Building regulations:

We faced difficulties in tracking down the potential laws that require the implementation of TRAP laws. However, based on information from NARAL, it seems that early requirements applied only to second-trimester abortions.

The first versions of admitting privileges laws, transfer agreements, and distance regulations can be tracked down 1985 version of Utah Admin. Code r. R432-600. In the 1991 version of Utah Admin. Code r. R432-600 mentioned that clinics should follow the 1987 Guidelines for Design and Construction of Health Care Facilities, which dictate what building regulations should be implemented. However,

we could not trace down the 1987 version of these guidelines. All these early regulations seem only to apply to post-first-trimester abortions. They were also implemented in the pre-Casey era. So, we did not include them in our main analyses.

The 2011 version of Utah Admin. Code r. R432-600 updates to the 2010 Guidelines for Design and Construction of Health Care Facilities. These guidelines include building regulations for recovery room, procedure room size, sterility room, and doorway and hallway widths. These building regulations apply to all abortion facilities. This version of the administrative code also includes a requirement for admitting privileges to a hospital within a specified distance of the facility's medical director or an alternative transfer agreement. Therefore, we assigned 2011 as the effective year for admitting privileges or transfer agreement, distance regulations, and building regulations. However, since we are not sure 2011 is the year of implementation of these laws, we include Figures for

In 2017, the admitting privileges were enjoined, and the transfer agreement requirements changed to a plan/protocol that only applies to second-trimester providers. However, we do not consider this change in our analysis because it runs up to 2016.

Virginia

- Building regulations:

Effective in 2012, Va. Code § 18.2-73 requires second-trimester abortions to be provided in a hospital. 12 Va. Admin. Code 5-410-1240 requires outpatient surgical hospitals to have a written agreement with a general hospital to ensure that any patient receives needed emergency treatment. Then, triggered by Va. Code § 18.2-73, second-trimester abortion facilities must comply with a written transfer agreement. We coded 2012 as the transfer agreement effective year. However, we did not include this law in our analysis because it only targets second-trimester abortions.

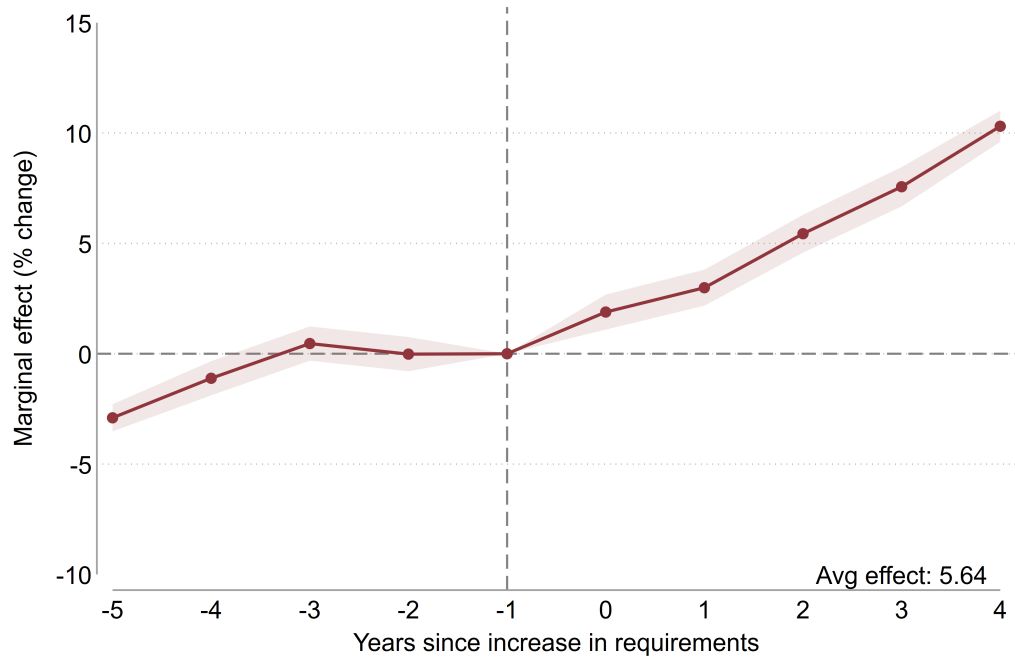
Effective on 6/20/2013, 12 Va. Admin. Code 5-412-370 requires all abortion facilities to comply with the Virginia Uniform Statewide Building Code. It also requires them to comply with Part 3 of the 2010 Guidelines for Design and Construction of Health Care Facilities of the Facilities Guidelines Institute, which establishes some room requirements and provides external guidelines and standards. Therefore, we coded 2013 as the effective year of these building regulations.

Wisconsin

- Distance regulations and transfer agreement: Effective on 11/1/1976, Wis. Admin. Code, MED. § 11.04 requires abortion facilities providing abortions within the first 12 weeks of gestation should make arrangements with a hospital for admission of patients needing hospital care. Such hospital shall be located sufficiently near the facility used so that the patient could be transferred to and arrive at the hospital within 30 minutes of the time when hospitalization appears necessary. Since this law was implemented in the pre-Casey era, we do not include it in our main analyses.

B Impact on births to White teens

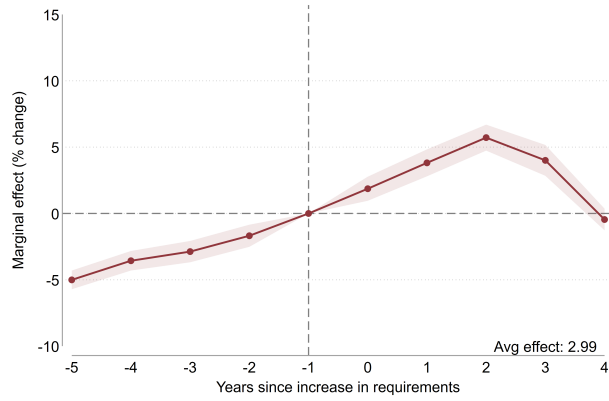
Figure B.1: Impact of TRAP laws on White teen births



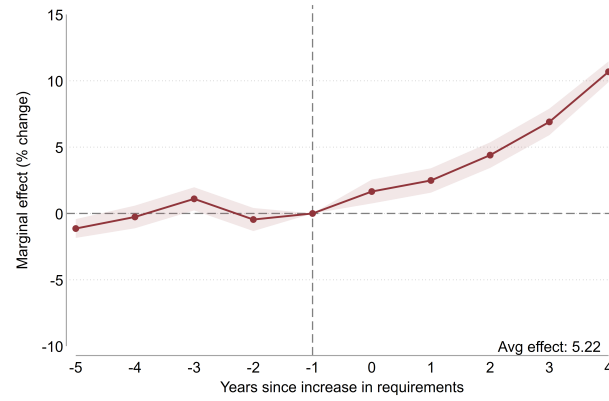
Note: The figure presents the estimates of b_{it}^j from Equation 1. The dependent variable is the number of births of 15-19-year-old White women in state s and year $t+1$. Year zero indicates the implementation of either admitting privileges, transfer agreements, distance regulation, or building regulation. The omitted year is the year before the policy change, $t = -1$. The shaded region indicates the 95 percent confidence interval corresponding to clustered standard errors at the state level. Sources: Figure created using the information on births recorded in the U.S. from NCHS (2018), information on population counts from SEER (2018), information on other policies from Myers and Ladd (2020), and the legal coding on TRAP laws, as described in detail in Appendix A.

Figure B.2: Impact of TRAP laws on White teen births, by TRAP type

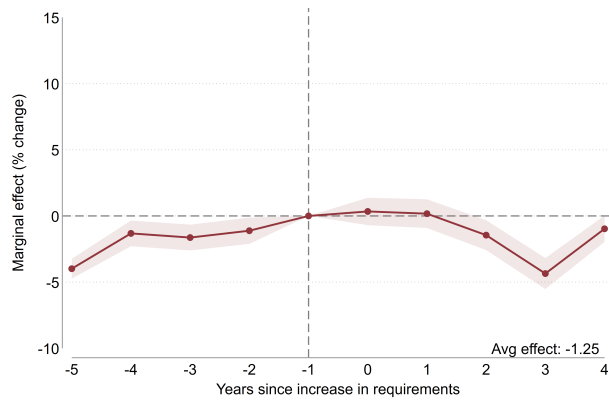
(a) Admitting privileges



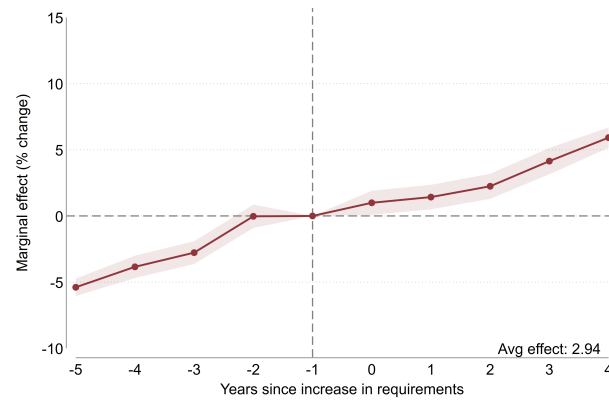
(b) Transfer agreement



(c) Distance regulations



(d) Building regulations



Note: See notes in Figure B.1.

C Impacts of TRAP severity

In the event study methodology presented in Section 4.2, d_{it} takes the value 1 in the year the policy turned on, e_i , and zero otherwise. This treats TRAP laws as binary. This differs from reality in two ways: (1) a state may have more than one policy change in a narrow band of time, and (2) even within policy type, policies vary in intensity. In this Section we explore the impact of TRAP law accumulation and severity.

We follow the procedure proposed by Schmidheiny and Sieglöcher (2019) to modify the event study design to allow for varying treatment intensity and multiple sequential changes in treatment. In this case, d_{it} is no longer a binary variable, rather, it indicates the change in intensity of the law in state i in year t .⁴² To accommodate this change we employ the suggested reformulation of b_{it}^j , that is,

$$b_{it}^j = \begin{cases} \sum_{s=t-\underline{j}}^{\bar{t}-\underline{j}-1} d_{is} & \text{if } j = \underline{j} \\ d_{i,t-j} & \text{if } \underline{j} < j < \bar{j} \\ \sum_{s=t-\bar{j}+1}^{t-\bar{j}} d_{is} & \text{if } j = \bar{j} \end{cases} \quad (7)$$

This definition of b_{it}^j is equivalent to that presented in Section 4.2, except that it accommodates non-binary values of d_{it} . As before, the treatment indicator is binned at the endpoints of the effect window, summing the d indicators over the years extending beyond the effect window in each direction, respectively.

The number of TRAP laws takes the values $d_{it}^{NumTRAP} \in [0, 4]$, corresponding to the four categories of TRAP laws included in our analysis. Admitting privileges laws have an intensity of $d_{it}^{admit} \in [0, 6]$. Levels 1 and 2 indicate that a clinic is required to have an agreement with an external physician who has hospital admitting privileges, either with (1) or without (2) possible exceptions. An exception would be that a clinic can either meet this requirement or meet some level of a transfer agreement requirement. Levels 3 and 4 indicate that at least one clinic physician must have privileges (again, with or without exception). Levels 5 and 6 require that all clinic physicians have privileges. Transfer agreement laws have an intensity of $d_{it}^{Transfer} \in [0, 4]$. Levels 1 or 2 require the clinic to have a plan or protocol for transferring patients to hospitals. Levels 3 and 4 require the clinic to have a formal transfer agreement with a hospital. Building regulations have an intensity $d_{it}^{Build} \in [0, 10]$, indicating the number of building regulations in force (see Section 3.1 for a list). Distance regulations are excluded from this analysis because there is no variation in their intensity.

Multiple policy changes within a state are captured by the increase (or decrease) in intensity of the succeeding policy, relative to the former policy. For example, in North Dakota an admitting privileges law of level 2 turns on in 2011, and an additional admitting privileges law of level 6 turns on in 2013. In this case, (a selected set of) the values of b_{it}^j would be...

⁴²This modification is the reason for the reformulation of the definition of b_{it}^j in Equation 7, which also follows Schmidheiny and Sieglöcher (2019). In the standard case is mathematically equivalent to the more common definition:

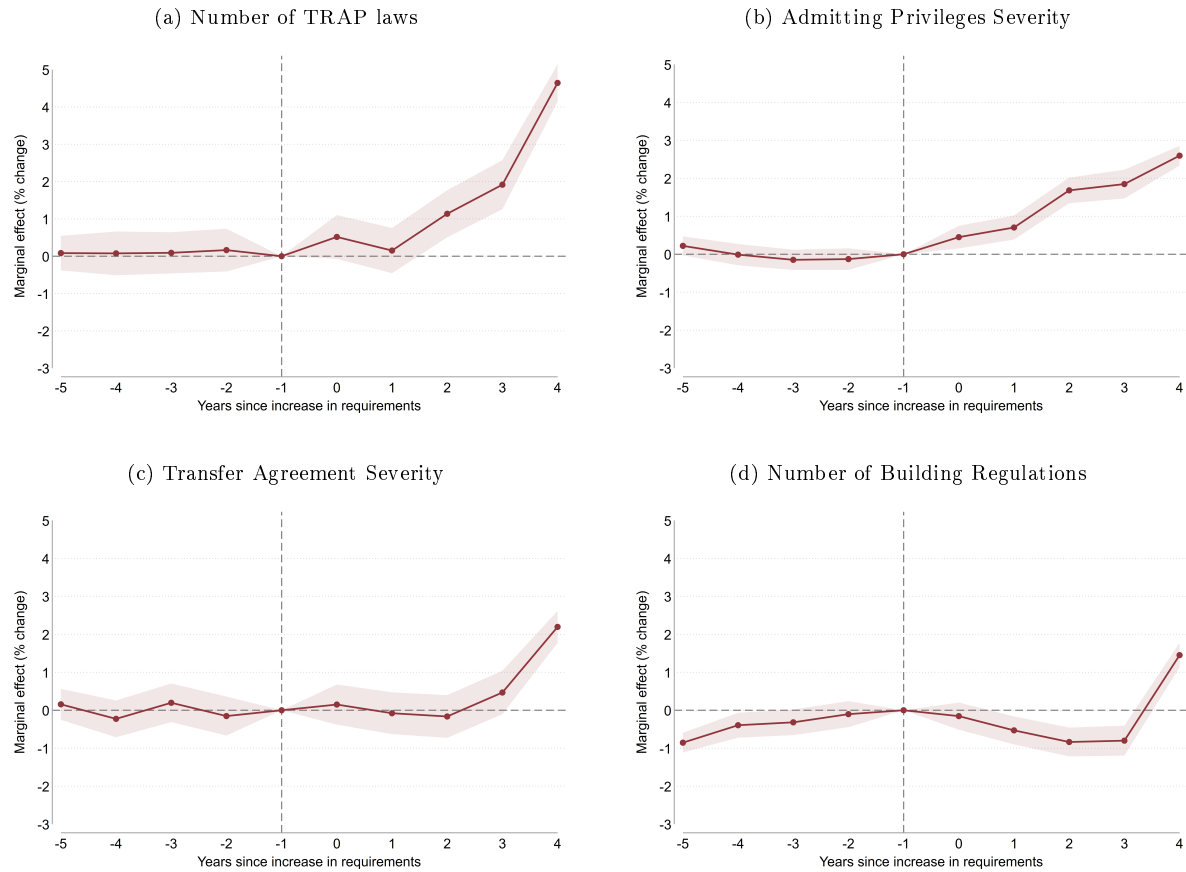
$$b_{it}^j = \begin{cases} \mathbb{1}[t \leq e_i + j] & \text{if } j = \underline{j} \\ \mathbb{1}[t = e_i + j] & \text{if } \underline{j} < j < \bar{j} \\ \mathbb{1}[t \geq e_i + j] & \text{if } j = \bar{j} \end{cases}$$

However, the reformulated definition can accommodate continuous or multi-valued treatments.

	b_{it}^{-5}	b_{it}^{-4}	$b_{it}^0 = d_{it}$
	5 or more years before	exactly 4 years before	the year of
2005	6	0	0
2006	6	0	0
2007	4	2	0
2008	4	0	0
2009	0	4	0
2010	0	0	0
2011	0	0	2
2012	0	0	0
2013	0	0	4
2014	0	0	0
2015	0	0	0

Other than the changes in d_{it} and the calculation of b_{it} , the analysis is identical to that presented in Section 4.2. The results are shown in Figure C.1. In these analyses, the event represents a one-unit change in d_{it} , for example, an increase in one TRAP law type, or an increase in admitting privileges severity from level 2 to level 3. We expect the estimated effects to be smaller than those estimated in Section 4.2, which capture binary changes from level 0 to level 1 but also binary changes from level 0 to level 6, for example.

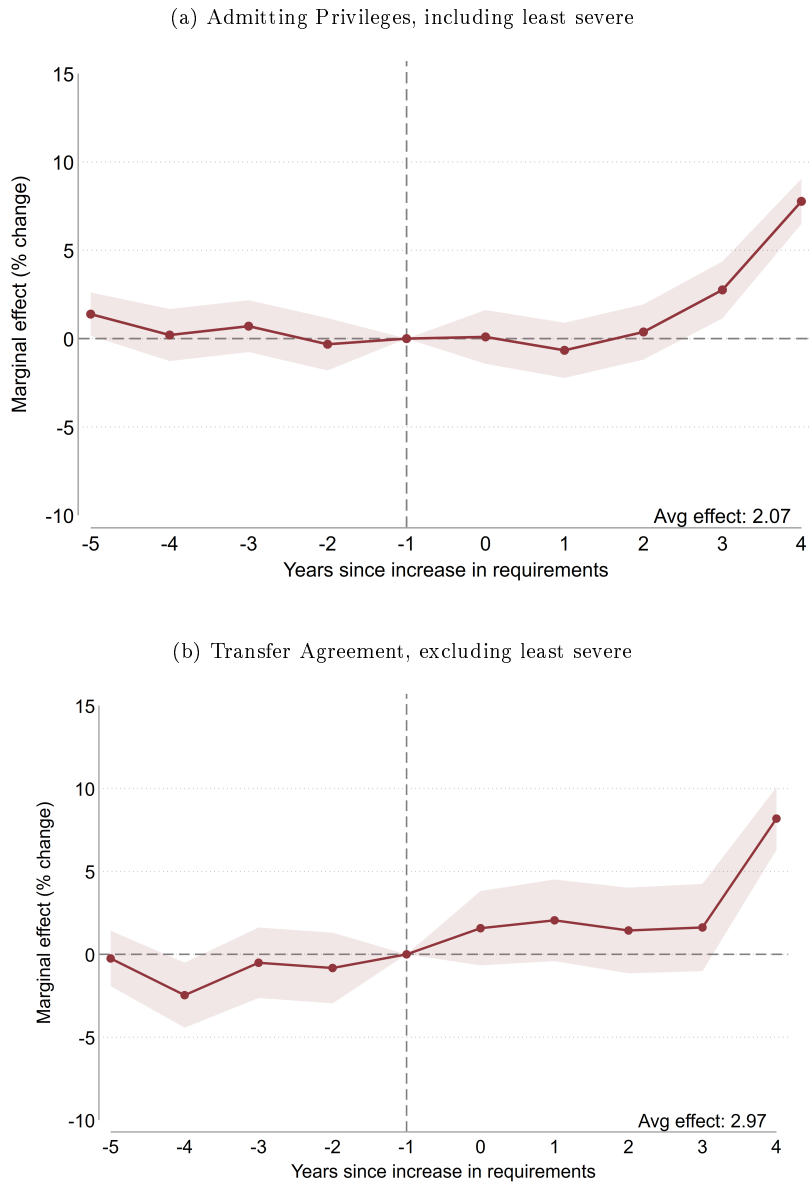
Figure C.1: Impacts of TRAP laws on Black Teen Births, by severity



Note: This figure presents the estimates of b_{it}^j from Equation 1. The dependent variable is the number of births of 15-19-year-old Black women living in state i in year $t + 1$. The treatment variable reflects the intensity of the indicated regulation, as defined in section C. Year zero indicates the implementation of a the corresponding TRAP law to the figure. The omitted year is the year before the policy change, $t = -1$. The shaded region indicates the 95 percent confidence interval corresponding to clustered standard errors at the state level. Sources: Figure created using the information on births recorded in the U.S. from NCHS (2018), information on population counts from SEER (2018), information on other policies from Myers and Ladd (2020), and the legal coding on TRAP laws, as described in detail in Appendix A.

D Robustness checks

Figure D.1: Impacts of TRAP laws on Black teen births: alternative binary definitions



Note: The figure presents the estimates of b_{it}^j from Equation 1. The dependent variable is the number of births of 15-19-year-old Black women in state i and year $t + 1$. The omitted year is the year before the policy change, $t = -1$. The shaded region indicates the 95 percent confidence interval corresponding to clustered standard errors at the state level. Year zero in subfigure (a) indicates states implemented any admitting privileges, including those that allow abortion facilities to have an agreement with an external physician that has these privileges. Year zero in subfigure (b) indicates states that required a formal written transfer agreements with hospitals, excluding those states that allow for a plan/protocol. Sources: Figure created using the information on births recorded in the U.S. from NCHS (2018), information on population counts from SEER (2018), information on other policies from Myers and Ladd (2020), and the legal coding on TRAP laws, as described in detail in Appendix A.

Table D.1: Impacts of TRAP laws on Black women’s education, defining exposure as under age 20

	(1)	(2)
<hr/>		
College initiation		
Any TRAP law	-0.0118** (0.0047)	-0.0111** (0.0046)
Admitting privileges	-0.0116** (0.0038)	-0.0109** (0.0039)
Transfer agreements	-0.0127** (0.0062)	-0.0116* (0.0061)
Distance regulations	-0.0135** (0.004)	-0.0125** (0.0041)
Building regulations	-0.0117** (0.0058)	-0.0122** (0.0061)
<hr/>		
College completion		
Any TRAP law	-0.0053 (0.0045)	-0.0047 (0.0041)
Admitting privileges	-0.0009 (0.0053)	-0.0001 (0.0057)
Transfer agreements	-0.0052 (0.005)	-0.004 (0.0042)
Distance regulations	-0.0175** (0.0046)	-0.0139** (0.0034)
Building regulations	-0.0023 (0.005)	-0.0027 (0.0049)
Controls PI & MWP	Yes	Yes
Controls other policies	No	Yes
<hr/> <hr/>		

Notes: The coefficients correspond to the value of β in Equation 5.2, which indicates a woman was exposed to a TRAP law before age 20, determined by her birth year b and birth state s . College initiation indicates completing at least one year of college or more. College completion refers to completing at least a bachelor’s degree. Each coefficient comes from a separate estimation. All the estimations control for state of birth, year of birth, and age fixed effects. Estimations in column (1) include controls for exposure during adolescence to parental involvement laws and two-trips mandatory waiting periods. Estimations in column (2) additionally control for exposure to other abortion, contraception, and welfare policies. See section 4.1 for more information on these policies. The estimations are weighted by the person weight provided in ACS-IPUMS. The standard errors are clustered at the state of birth level. * $p < 0.1$, ** $p < .05$. Sources: Ruggles et al. (2021). Information on other policies comes from Myers and Ladd (2020). The legal coding on TRAP laws is described in detail in section A.

Table D.2: Impacts of TRAP laws on Black women’s education, defining exposure based on state of residence

	(1)	(2)
<hr/> College initiation <hr/>		
Any TRAP law	-0.0059 (0.0047)	-0.0073 (0.0047)
Admitting privileges	-0.012* (0.007)	-0.0144** (0.0067)
Transfer agreements	-0.0058 (0.0054)	-0.007 (0.0058)
Distance regulations	-0.0136** (0.0044)	-0.0158** (0.0044)
Building regulations	-0.0076 (0.0052)	-0.0094* (0.0055)
<hr/> College completion <hr/>		
Any TRAP law	-0.009 (0.0071)	-0.0104 (0.0065)
Admitting privileges	-0.004 (0.0173)	-0.0055 (0.0162)
Transfer agreements	-0.0051 (0.0097)	-0.0068 (0.0092)
Distance regulations	-0.0404** (0.0099)	-0.0425** (0.0108)
Building regulations	-0.0123* (0.0063)	-0.0128** (0.0064)
Controls PI & MWP	Yes	Yes
Controls other policies	No	Yes

Notes: The coefficients correspond to the value of β in Equation 5.2, which indicates a woman was exposed to a TRAP law before age 18, determined by her birth year b and residence state s . College initiation indicates completing at least one year of college or more. College completion refers to completing at least a bachelor’s degree. All the estimations control for state of birth, year of birth, and age fixed effects. Estimations in column (1) include controls for exposure during adolescence to parental involvement laws and two-trips mandatory waiting periods. Estimations in column (2) additionally control for exposure to other abortion, contraception, and welfare policies. See section 4.1 for more information on these policies. The estimations are weighted by the person weight provided in ACS-IPUMS. The standard errors are clustered at the state of birth level. * $p < 0.1$, ** $p < .05$. Sources: Ruggles et al. (2021). Information on other policies comes from Myers and Ladd (2020). The legal coding on TRAP laws is described in detail in section A.