The Impact of Legal Abortion on Maternal Health: Looking to the Past to Inform the Present*

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Abstract: From 1959 to 1980, abortion-related mortality declined by 97%, and maternal mortality fell by 86%. In this study, we question whether the legalization of abortion over 1969-1973 explains a portion of this maternal mortality decline. We exploit state-level variation in changes to abortion laws predating *Roe vs. Wade*, as well as the effect of *Roe vs. Wade* on states with differential baseline abortion demand. Our results suggest that legal abortion reduced non-white maternal mortality by 28-40%, with little impact on overall or white maternal mortality. Our findings also indicate that early state-level legalizations were crucial and more important than the *Roe v. Wade* decision itself. Then, we explore the effect of legal abortion on infant health and delivery characteristics. Legal abortion increases the average (maternal) age at delivery, and for white deliveries, it leads to healthier infants and a larger share of births to married mothers.

JEL codes: I18, J13, K38, H75

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1 Introduction

During the late 1960s and early 1970s, individual states began reforming and repealing their long-standing 1800s-era anti-abortion legislation.[1] Closely following these state-level reforms, in 1973, the Supreme Court handed down its landmark *Roe v. Wade* decision. This decision overturned restrictive state-level abortion laws and legalized abortion nationally. The importance of legal abortion has been studied widely, with notable effects on family formation, fertility, crime, and schooling.[2] However, despite this broad literature studying legal abortion, fewer studies have considered the direct short-run health benefits for mothers and infants. While several studies have speculated on the importance of abortion for maternal and infant mortality[3] (examining differential trends between states) few studies have considered the causal impact of legal abortion on maternal mortality.[4]

In this study, we consider whether the legalization of abortion is responsible for a portion of the 86% decline in maternal mortality and the 97% decline in abortion-related mortality over 1959-1980. In 1960, abortion remained a major cause of maternal mortality (NCHS, 1960), with significant variation in access to safe abortion depending on class and race. In the early 1960s in New York City, "one in four childbirth-related deaths among white women was due to abortion; in comparison, abortion accounted for one in two childbirth-related deaths among nonwhite and Puerto Rican women" (Gold, 2003, pg. 10). And while abortions of the nineteenth and early twentieth-century had been quite dangerous, in 1973 when *Roe v. Wade* was decided, the Supreme Court itself noted that legal abortion "is now relatively safe" (Roe v Wade, 1973). The Supreme Court decision also emphasized that while nineteenth-century abortion laws were enacted to protect the health of women, at the time of the ruling, "mortality rates for women undergoing early abortions, where the procedure is legal, appear to be as low as or lower than the rates for normal childbirth" (Roe v Wade, 1973).

Based on the safety of legal abortion relative to the illegal procedures of the past, we question whether legal abortion can explain the profound declines in maternal and abortion-specific mortality from 1959 to 1980. Our primary analysis focuses on states that repealed their criminal abortion laws and provided legal abortion access, including seven states plus the

[1] See Gold (2003); Lahey (2014a,b); Myers (2021a).

[2] See Zabin et al. (1989); Angrist and Evans (1996); Levine et al. (1996); Angrist and Evans (1996); Donohue III and Levitt (2001); Guldi (2008); Foote and Goetz (2008); Donohue and Levitt (2008); Ananat and Hungerman (2012); Lahey (2014b); Myers (2017); Fischer et al. (2018).

[3] Studies include Cates et al. (1978); Grossman and Jacobowitz (1981); Miller et al. (1988); Coble et al. (1992); CDC (1999); Krieger et al. (2015); Bauman and Anderson (1980). Several studies also present evidence of fiscal and legislative changes restricting women's access to family planning and reproductive health services contributing to rising maternal mortality rates (Hawkins et al., 2020; Jarlenski et al., 2017; Verma and Scott, 2020; Addante A.N and M.H., 2021).

[4] Clarke and Mühlrad (2021); Castillo Betancourt (2017) examines abortion reforms in Mexico City on maternal/women's health.

District of Columbia (DC), as well as the *Roe v. Wade* decision in 1973. Using an event-study design, we assess whether the changes to legal abortion impacted maternal and abortion-related mortality (and to what extent).[5]

Our results suggest that legal abortion reduced non-white abortion-related mortality by 30-60% and non-white maternal mortality by 28-40%. However, our main findings suggest little impact of legal abortion on white abortion-related mortality or overall maternal mortality. Instead, white abortion-related mortality appears to have been on a preexisting decline before legalization. This pre-legalization decline aligns with historical narratives, suggesting that white women were better poised to navigate the medical system and obtain a therapeutic abortion (an abortion to prevent medical harm) before formal legalization (Law et al., 1989; Rubin, 1994). Women with more resources at their disposal were also able to travel cross-state and even overseas to obtain a legal abortion (Law et al., 1989; Rubin, 1994; Gold, 2003). For this reason, over "1972 to 1974, the mortality rate due to illegal abortion for nonwhite women was 12 times that for white women" (Gold, 2003, pg. 4). Put together, our findings indicate that legal abortion was crucial for non-white women, who struggled to obtain a safe abortion before the procedure was legal (Coble et al., 1992; Gold, 2003; Joyce et al., 2013; Solinger, 2017).

We then examine whether legal access through travel and informal *de facto* legalizations truly explain the early declines in white abortion-related mortality. First, the preexisting decline in white abortion-related mortality dissipates when we account for inter-state travel to early-legal states. In this specification, we account for states within 500 miles of DC, NY, and CA, and find a clearer decline in all and white abortion-related mortality. These findings align with the narratives of the period, which suggest that many women traveled to obtain abortions. For instance, "in 1971, just over 100,000 women left their own state to obtain a legal abortion in New York City" (Gold, 2003, pg. 10). However, this inter-state travel was limited by economic means, where access was "really only available to the small proportion of women who were able to pay for the procedure plus the expense of travel and lodging" (Gold, 2003, pg. 4), which explains why between-state travel affects white mortality more than non-white mortality. Second, we consider the year each state allowed *de facto* legal abortion access instead of the formal *de jure* dates of legalization. We capture *de facto* access by the first year each state allowed a substantial number of abortions to be performed. When we use the dates of *de facto access*, we find clear declines in all and non-white maternal mortality as well as some decline in white abortion-related mortality. These findings indicate that early-legal access to abortion came from both within-state *de facto* access as well as travel between states.

Finally, we also show that the majority of the mortality decline occurred before *Roe v. Wade*. Early legalizations over 1969-1971 explain a substantial portion of the mortality decline,

[5]While we focus on full abortion legalizations (over 1970-1973), we also consider early reforms to the abortion criminal codes (over 1966-1972, 14 states).

while *Roe v. Wade* itself produced little noticeable effect. *Roe v. Wade* only impacts white abortion-related mortality (but not non-white mortality) after accounting for illegal abortion demand. Generally, our findings indicate that the largest benefit came from the early state-level legalizations. These early legalizations, combined with travel to early legal states and looser therapeutic abortion laws (allowing *de facto* access), led to mortality declines prior to the national *Roe v. Wade* decision.

Then, we conclude by examining the impact of abortion policy on delivery characteristics and infant health.[6] We find that infant health at birth, measured by birth weight, may have improved (primarily for white deliveries). We also show that legal abortion reduced the birth rate, especially for non-white women, reflecting prior findings (Guldi, 2008). Legal abortion also raised the share of births to married women (for white women), increased average maternal age, and reduced teen births.

Put together, we document several impacts of legal abortion. Our findings indicate that legal abortion shifted delivery characteristics towards older married mothers, lowered fertility, and led to improvements in maternal health through lower abortion-related deaths. The majority of the effects on birth rate and maternal health occur for non-white women; however, the effects on infant health appear primarily for white births. These findings add to a broad literature studying the effects of access to fertility control through the pill (Goldin and Katz, 2002; Bailey, 2006, 2010; Bailey et al., 2012; Ananat and Hungerman, 2012; Zuppann, 2012; Steingrimsdottir, 2016; Myers, 2017) and legal abortion (Bitler and Zavodny, 2001; Hock et al., 2007; Oreffice, 2007; Guldi, 2008; Myers, 2017). Studies in this literature have also examined contemporary changes to abortion access (Lindo et al., 2020) as well as laws surrounding consent and parental notification (Kane and Staiger, 1996; Klick and Stratmann, 2008; Sabia and Rees, 2013; Sabia and Anderson, 2016; Myers and Ladd, 2020; Myers, 2021b). One notable related study, Clarke and Mühlrad (2021), finds that the impact of decriminalization of abortion in Mexico City reduced maternal morbidity, with some evidence of declines in maternal mortality.

The present study also adds to a literature that has studied the maternal mortality declines over the 20th century (Thomasson and Treber, 2008; Jayachandran et al., 2010; Albanesi and Olivetti, 2014, 2016; Anderson et al., 2020). The majority of this work has focused on pre-1940 maternal mortality declines, with our study being one of the few to consider the contribution of public policies past 1940. While our findings suggest that legal abortion played no direct role in reducing overall and white maternal mortality, legal abortion does appear essential for the non-white maternal mortality declines.

[6] Prior work has suggested differential infant mortality trends in states that legalized abortion, and in foundational research such as Grossman and Jacobowitz (1981); Corman and Grossman (1985); Corman et al. (1987); Joyce (1987); Joyce et al. (1988); Krieger et al. (2015) suggesting a strong association of abortion availability or rates with favorable birth outcomes (Corman et al., 2018).

The remainder of this study proceeds as follows. Section 2 describes the background on maternal mortality and abortion laws in the United States. Section 3 describes the data used throughout the analysis. Section 5 presents the main findings for maternal mortality and abortion-related mortality. Section 6 highlights the pertinent issues in identifying a precise impact of abortion policy, and Section 7 presents additional robustness checks. Then, Section 8 examines delivery characteristics and infant health. Finally, Section 9 concludes.

2 Background

2.1 The 20th Century Maternal Mortality Decline

From 1900 to 1982, maternal mortality declined substantially. At the beginning of the twentieth century, between six and nine mothers died for every 1,000 births (CDC, 1999).[7] By 1982, the U.S. maternal mortality rate had declined to 7.5 deaths per *100,000 live births* (Koonin et al., 1988). This 100-fold decline in maternal mortality over the course of 80 years has been attributed to several achievements in medical technology and public health. Examples of notable improvements in maternal mortality include better sanitary standards and regulatory reforms over 1900-1940 (CDC, 1999), including the occupational licensing of midwives (Anderson et al., 2020). Blood banks also improved survival from maternal hemorrhage (Albanesi and Olivetti, 2016). Though the most notable technological progress came in the form of sulfa drugs, which lowered the incidence of sepsis (Thomasson and Treber, 2008; Jayachandran et al., 2010). For a more complete discussion of the maternal mortality decline before 1960, see Appendix Section E.

Declines in Maternal Mortality, 1960-1980 By 1960, the start of our study, maternal mortality had declined to 97.1 per 100,000 births for non-white mothers and 26 per 100,000 for white women (NCHS, 1960). 1960 was also the first year that maternal deaths were reported per 100,000 births, indicating a significant decline in the maternal mortality rate (NCHS, 1960). Over 1960-1980, legal abortion has been suggested as a major contributor to the decline in maternal deaths, primarily from abortion-related sepsis (Coble et al., 1992; CDC, 1999). During the 1960s, when abortion was illegal, septic abortion remained common. One account from an obstetrician who practiced in New York and Pittsburgh before 1967 describes that the "complications of illegal abortion were so common that a septic ward was set aside for the infections. Surgery for hemorrhage was a common night duty" (Rubin, 1994, pg. 76).

As abortion became legal and available, septic abortions declined. Atrash et al. (1987)

[7] Infant mortality was even bleaker, with nearly one in ten infants dying before their first birthday (CDC, 1999).

reports that deaths from legal abortion dropped "from 4.1 per 100,000 abortions in 1972 to 0.8 in 1982." Another study focused on a single medical center in California reported similar trends–while the number of legal abortions over 1966 to 1971 increased from zero to three thousand (per year), the number of septic abortions dropped from 646 to under 150 (per year) (Seward et al., 1973). Further, CDC (1999) reports that "the legalization of induced abortion beginning in the 1960s contributed to an 89% decline in deaths from illegal septic abortions during 1950-1973."

By the 1980s, the leading causes of maternal death had shifted to "embolism, indirect causes, hypertension in pregnancy, sequelae from ectopic pregnancy, hemorrhage, stroke, and anesthesia-related complications" (Koonin et al., 1988), with abortion and sepsis from abortion notably absent. By 1982, maternal mortality reached its lowest point and held steady at 7.5 maternal deaths per 100,000 live births (Koonin et al., 1988). Since 1982, maternal mortality has not continued to decline (CDC, 1999).

2.2 A Brief History of Abortion Laws in the United States

Abortion at the founding of the United States was legal until the quickening (the first fetal movement felt by the mother) (Roe v Wade, 1973; Law et al., 1989; Rubin, 1994). This focus on abortion only until the quickening was a practice based on English common law (Mohr, 1979; Gold, 2003). After the quickening, abortion was considered a criminal offense (Mohr, 1979; Gold, 2003; Lahey, 2014a). Early laws that regulated and restricted abortion began to appear in the 1830s and 1840s. These laws evolved as medical malpractice laws and targeted abortion practitioners rather than the women themselves (Rubin, 1994; Lahey, 2014a,b). Connecticut was the first state to pass an anti-abortion law, which was intended to protect women from poisoning, and "made it a crime to give a poisonous substance to a woman in order to cause a miscarriage" (Rubin, 1994, pg. 2). States that followed over the early 1800s passed "anti-poisoning statutes" (Law et al., 1989, pg . 66) and it became a crime to "administer such remedies" (Law et al., 1989, pg . 66).

As the 1800s progressed, state regulation became more stringent so that by the 1860s, many states were actively outlawing abortion (Mohr, 1979; Lahey, 2014a). Still, over the nineteenth century, abortion was common enough that performing "abortions became one of the first specialties in American medical history" (Law et al., 1989, pg. 63). But as the American Medical Association (AMA) grew in influence, physicians attempted to distinguish themselves from non-physician providers (Mohr, 1979; Lahey, 2014a). Thus, the AMA became the "single most important factor in altering the legal policies towards abortions in this country" (Law et al., 1989, pg. 63).

State laws outlawing abortion spanned 1840 to 1899, with women facing potential prosecution for obtaining an abortion (Mohr, 1979; Lahey, 2014a,b). As these criminal abortion laws went into effect, the years spanning 1880 to 1960 were "labeled 'the silent decades"' for abortion (Rubin, 1994, pg. 2). During this period, abortion was forced underground and ill-reported in public records. However, a substantial number of abortions still occurred, with some estimates suggesting as many as "one million illegal abortions a year" (Rubin, 1994, pg. 2). In fact, in 1871 NYC, the city's population of less than a million " supported two hundred full-time abortionists, not including doctors who sometimes performed abortions" (Law et al., 1989, pg. 64). The legal restrictions on abortion, "did not stop abortion, but made it furtive, humiliating, and dangerous" (Law et al., 1989, pg. 66).

Abortion remained a crime in state legal statutes until the 1960s (Gold, 2003; Myers, 2021a). In 1967, abortion was a felony in the 49 states and DC (Lewis et al., 1981), with 42 states having legal exceptions to preserve the mother's life, and the remaining states having somewhat looser language, enabling doctors and courts more scope for the application of abortion (Lewis et al., 1981).[8] States began reforming and repealing their anti-abortion legislation in the mid-to-late 1960s (see Table F.1 and F.2). The repeal states (early-legal) removed their criminal abortion laws and passed clear legal abortion over 1969-1972, the period just before the *Roe v. Wade* decision. Repeal states made explicit the decision to obtain an abortion was a matter for the woman in consultation with her physician (Roemer, 1971). Repeal states include California in 1969 and Alaska, Hawaii, New York, and Washington in 1970 (Merz et al., 1996; Myers, 2021a; Roemer, 1971). The District of Columbia also allowed legal abortion beginning in 1971 (based on a court case), with formal abortion outpatient clinics available prior to *Roe v. Wade* (CDC, 1972; Myers, 2021a).[9] Two other states, Vermont and New Jersey, had court rulings overturn their abortion laws in 1972. However, these states had less clear allowances for abortion after the court rulings. While we include Vermont and New Jersey as repeal states in the main results, we also show the results without New Jersey, Vermont, and DC, in the robustness checks (see Section 6.3 and Section 7).[10]

In addition to the broad legalizations, 14 other states reformed their abortion laws to var-

[8] 'Other States allowed abortion to save a woman from "serious and permanent bodily injury or her "life and health." Three States allowed abortions that were not "unlawfully performed" or that were not "without lawful justification", leaving interpretation of those standards to the courts'. (Lewis et al., 1981, pg. 2).

[9] DC also had the second highest abortion ratio (abortion-to-births) in the 1970 version of the CDC abortion surveillance program.

[10] We include Vermont and New Jersey as the demand for an illegal abortion should be the most important factor in explaining high abortion mortality, and having legal abortion should reduce this demand for illegal abortions.
For New Jersey, the US District Court ruled that the New Jersey statute violated the 4th, 9th, and 14th amendment (CDC, 1972). According to Myers (2021a) at least one physician began performing abortions publicly in 1972, which will be important for mortality decline with access to legal abortion. For Vermont, the Vermont Supreme Court ruled that the law in place to only allow abortion to save the life of the mother was discriminatory, and the law should be broadened.

ious degrees of permissiveness over the 1960s and 1970s (see Table F.2). Mississippi was the first state to pass a legal abortion reform in 1966; however, the reform was relatively weak, and abortion was only legalized in the case of rape (Merz et al., 1996). Then, 13 other states adopted all or part of the Model Penal Code (MPC) provisions.[11] MPC provisions decriminalized abortion procedures performed by a licensed physician (Merz et al., 1996; Roemer, 1971), in cases of:

1. A pregnancy threatening the physical or mental health of the mother
2. A fetus with a serious defect (physical or mental)
3. A pregnancy due to rape or incest

Following these individual states' abortion reforms, the January 22, 1973, *Roe v. Wade* decision overturned restrictive abortion laws and legalized abortion throughout the United States.

2.3 Abortion in the 1970s

Women were able to obtain abortions before national legalization through illegal abortion, travel to legal states, international travel, and by appealing to physicians (in their own residence state) for a therapeutic abortion. The distribution of access was described in one account (by an individual based in Massachusetts) as, "*forty percent of those women in the pre-New York era went to London and had abortions there. Ten percent decided to continue with their pregnancy or had no option but to continue with their pregnancy. Ten percent got abortions under therapeutic laws that were beginning to loosen up in Massachusetts, California and Washington, D.C., although it cost more to go to California than it did to fly to London. Forty percent of that caseload went illegally or, as people say euphemistically, extra legally*"' (Rubin, 1994, pg. 50).

International travel in the pre-legalization era also appears to have been available to those with financial resources. Women traveled to London, Japan, Sweden, and in other cases, to Mexico (Rubin, 1994, pg. 50). In the years before abortion became legal in London (in 1968), a Massachusetts Planned Parenthood directly referred women to Japan. When this referral process began, "*a flood gate of people who felt that they could somehow manage $800 and who came to Planned Parenthood for help and information.*" However, this access was only available for those with financial resources, as suggested by the same account, which goes on to describe, "*even more frustrating, the ones who when you said $800, sat there in utter silence and bewilderment, with tears in their eyes because there was nothing they could do. These were the people who went back out of that office and started the hunt for classic illegal abortions*" (Rubin, 1994, pg. 50). Further, women with economic means were able to obtain legal and therapeutic

[11] These MPC statutes were proposed in 1962 by American Law Institute (ALI) in the publication "Model Penal Code on Abortion." Colorado was the first state to reform its abortion law based on these ALI recommendations (or MPC statutes) in 1967 (Gold, 2003)

abortions, with private hospitals performing more abortions than public hospitals (Calderone, 1960). These historical accounts suggest that pre-legalization, safe abortion access was divided by socioeconomic status, with many women (likely to be white) having access to therapeutic abortion in the United States or legal abortion overseas.

In 1969, the Centers for Disease Control and Prevention (CDC) began separately compiling statistics on legal abortion throughout the United States in its abortion surveillance publication (Cates et al., 1977). By 1972, the abortion surveillance program included data from 20 states (plus DC) with state-wide abortion data, as well as abortion data from single hospitals in eight non-reporting states (CDC, 1972).[12] We digitize this CDC surveillance program data to demonstrate that in the years before *Roe v. Wade*, abortion was still quite prevalent.

In 1972 there were 586,760 known cases of legal abortion (versus 1,864,064 births) in 27 states and DC, and legal abortion to live birth ratio was 0.18 (CDC, 1972). As shown in Figure I abortions per reproductive-age female were highest in repeal (fully legal) states (both before and after *Roe v. Wade*). While abortion rates were more similar between reform states and states that never adopted any legal changes, reform states had slightly higher abortion rates. States without repeals or reforms also had the highest share of abortion occurring outside of the women's state of residence (as demonstrated by the green dashed line).

In 1972, just before *Roe v. Wade*, 43% of all abortions occurred outside the individual's state of residence (CDC, 1972). The prominence of out-of-state abortions is demonstrated clearly by the 1972 abortion counts by the known state of residence shown in Figure II. The prominence of the purple bars reveals that many women traveled outside their state of residence to obtain an abortion in the year just prior to *Roe v. Wade*.[13]

Then, in 1973, the year of the *Roe v. Wade* decision, the abortion rate gradually increased in all states (Figure I). The number of legal abortions reported by the CDC increased to 616,000 in 1973 (in all 50 states and DC). By 1974, there were 763,476 legal abortions per year, and by 1979, 1,251,921 legal abortions were performed in the United States (CDC, 2011)–an abortion to live birth rate of 0.35. The fact that almost one abortion occurred for every three live births by 1979 suggests that abortion was an important fertility control method over this period.

[12]Reporting states with legal abortion include: Alaska, California, District of Columbia, Hawaii, New York, Vermont, and Washington (only excluding New Jersey). Reporting States with MPC provisions include Arkansas, Colorado, Delaware, Georgia, Florida, Kansas, Maryland, North Carolina, Oregon, South Carolina, Virginia. Other reporting states include Mississippi and Massachusetts. Single hospitals reporting include Alabama, Arizona, Connecticut, Nebraska, New Mexico, Pennsylvania, Tennessee, and Wisconsin.

[13]New York City and the District of Columbia had the highest rate of abortion to live births. In New York City, there were 299,891 abortions versus 253,439 live births, a rate of 1.2 abortions to live birth (CDC (1972) Table 2). In the District of Columbia, there were 38,868 abortions to 21,5793 births, a rate of 1.8 abortions per live birth (CDC (1972) Table 2). These high volume cities also performed a high percentage of out-of-state abortions, 61.2% in the case of New York City, and 74.5% in the case of the District of Columbia (CDC (1972) Table 4).

3 Data

3.1 Maternal and Abortion-Related Mortality

We use the Mortality Data from the Vital Statistics *National Center for Health Statistics Multiple Cause of Death Files* available through the *Centers for Disease Control and Prevention (CDC)* and *National Bureau of Economics (NBER)* to calculate mortality rates. The mortality data includes all deaths in the United States from multiple causes of death. These national records incorporate the information from the death certificates of each U.S. state beginning in 1959 and continuing to the present. However, we conclude our study in 1980, seven years after the *Roe v. Wade* decision. For the analysis, we identify abortion-related deaths, maternal deaths, infant deaths, and neonatal deaths.

For maternal and abortion-related mortality, we rely on the primary noted underlying cause of death (ucod). In Section F.1, we discuss each of the individual causes included in maternal and abortion-related deaths. In addition to the very broad measure of maternal causes of death and the very specific abortion-related causes of death, we also include a medium measure of plausibly abortion-related deaths. This broader classification of abortion-related deaths accounts for any potential misclassification of abortion-related deaths into general maternal deaths. We view potential misclassification as more plausible under illegal abortion as physicians may be less likely to categorize abortion-related deaths and women may be less likely to report an attempt to procure an abortion (Cates et al., 1978; Shah and Åhman, 2009).[14] Thus, causes of death from illegal abortions or self-induced abortions, may be more likely to be coded under general pregnancy-related deaths. To account for this potential issue, we reclassify abortion deaths from the general categories of maternal death most likely to be miscategorized. These categories include pregnancy/postpartum sepsis, hemorrhage, and ectopic pregnancies (Meyer and Buescher, 1994; Walker et al., 2004; Hansen, 2010). In the results, we report all-cause maternal mortality, narrow abortion-related mortality (based on the ICD codes for abortion-related deaths), and broad abortion-related mortality (with the recategorized sepsis, hemorrhage, and ectopic pregnancies plus the narrow abortion-related deaths).

To calculate mortality rates, we use the number of maternal deaths and abortion deaths per female 15-44. For non-white and white mortality, we use the measures per white and non-white reproductive-age females, those between 15 and 44. We choose per female instead of the traditional measure of per birth because abortion legalization also may affect the birth rate (which we demonstrate, but this is also supported by Roht et al. (1974); Ananat et al. (2007);

[14] Cates and Rochat (1976) suggests, deaths from causes relating to illegal procedures were, on average, more likely to be that of non-white women.

Levine and Staiger (2004); Guldi (2008)). Moreover, as highlighted by Roht et al. (1974) and Clarke and Mühlrad (2021) *per live birth* denominator does not fully capture the risk associated with conception and all of its possible terminations.

When we calculate the birth rate, we also measure the birth rate per reproductive-age female in the population. However, for infant and neonatal mortality, we still compute these measures per 1,000 births. We maintain the infant and neonatal deaths per birth due to the fact that these deaths are a direct function of the number of infants born in a given year. Thus, for infant and neonatal mortality, both the numerator and denominator will be affected by any change to the birth rate.

Figures I and B.1 demonstrate the declines in maternal and abortion-related mortality for the study period (1959-1980). Figure I Panel B presents the decline in narrowly-defined abortion-related mortality grouped by the state-level legal change. The graph illustrates that repeal states had the largest declines in abortion-related mortality over the period. Both sets of graphs also highlight the major dates of legal abortion in red vertical dashed lines. The most precipitous decline in abortion-related mortality occurred between 1969 and 1973 when states began to legalize abortion. For non-white women, after 1970, there is a clear break in the abortion-related mortality series, with most of the observed decline occurring before 1973, the year of the *Roe v. Wade* decision.

Then, in Figure B.1 we show the substantial nationwide reductions in both abortion-related and all-cause maternal deaths from 1959-1980. The most significant drop in maternal mortality occurs for non-white mothers, where maternal deaths fall from 15.6 per 10,000 to 1.7 per 10,000 or an 89% reduction. Abortion-related mortality for non-white women falls from 22.6 to 1.5 deaths per 100,000 births, a 93% reduction. For all abortion-related deaths, abortion-related mortality declines from 3.4 deaths to 0.12 deaths per 10,000 reproductive-age females, a 96% reduction.

To show the general decline in the counts or number of abortion deaths, we plot abortion deaths per year in Figure B.2 and show the number of abortion deaths by age and year in Figure B.3. Figure B.3 shows that despite the importance of abortion for young women's fertility, abortion deaths appear normally distributed by age. The composition does not appear disproportionately driven by young or older women. Both figures illustrate the profound reduction in the number of abortion deaths over time, falling from a high of 324 deaths per year in 1961 to a low of 13 deaths per year.

Then in Figure B.4 we show the composition of abortion deaths by race and the share of deaths where the state of residence differs from the occurrence (green). The graph suggests that after *Roe v. Wade*, the share of non-white abortion-related deaths increases, and the share

of white abortion-related deaths declines. Pre-*Roe v. Wade*, the composition by white and non-white deaths is roughly equal, despite the smaller share of non-white women in the population (15-20%). We also plot the share of out-of-state deaths in green. The green line indicates a slight increase in out-of-state deaths beginning with the first legalization of abortion. The share of out-of-state deaths then declines post-*Roe v. Wade* but increases again after 1975. Still, the share of deaths from abortion that occur out of the state of residence composes a relatively low share over the entire period.

3.2 Measures of the Birth Rate and Population

For population data covering the state-level size of the population, the number of births, and additional controls, we add several other data files. First, we take the share of the population in each category of age and race as well as the share married from the U.S. Census for 1950-1990.[15] We combine this census data with state totals from Wolfers (2006) to obtain the total number of reproductive-age females (all, white, and non-white). We also add births from the *US County-Level Natality and Mortality Data, 1915-2007* from Bailey et al. (2016). Here we aggregate births to the state level from the county level. Because there are some missing observations for Alaska and Hawaii in particular, we add data from the Natality Detailed File (NCHS, 1968-1980).

We also include a number of state-level policy controls due to several changes in family and fertility control policies. First, we control for the passage of unilateral divorce, which may affect family dissolutions (dates from Wolfers (2006)). Second, we control for general access to the pill and access to the pill by minors (Bailey, 2006; Myers, 2021a),[16] which may affect pregnancy and fertility. Finally, we control for state-level equal pay laws with dates from Myers (2017).

3.3 Summary Statistics

Table 1 shows the summary statistics for our primary measures of mortality and the controls. We separate states into those without early-legal changes (only treated by the *Roe v. Wade* decision), those with early abortion reforms, and states that repealed their anti-abortion legislation (legalized abortion). All mortality measures are displayed, including all-cause maternal mortality, broad abortion-related mortality, and narrow abortion-related mortality. These mortality rates and birth rates are per 10,000 females (15-44). For infant mortality and neonatal mortality, these measures are per 1,000 births

[15] We linearly interpolate the years between census decades to form annual estimates. Data available from IPUMs data (Ruggles et al., 2021).

[16] Specific dates are from Myers (2021a).

Table 1 suggests differential state-level characteristics by legal access to abortion Non-white maternal and abortion-related mortality are highest pre-legalization in early-legal states. However, white maternal and abortion-related mortality are lowest in these early-legal states. Early-legal states also have the largest share of non-white reproductive-age females. These repeal states also differ in other characteristics, including having the largest state-level population, the lowest share of married individuals, and the highest incomes.

4 Empirical Strategy

We primarily rely on an event study design to consider the impact of legal abortion on maternal mortality and abortion-specific maternal mortality. We prefer the event study to other approaches, such as a difference-in-differences specification, for three main reasons (see Section 7 for the difference-in-differences results). First, the event study allows us to consider whether the treatment effect varies after the passage of legal abortion (Wolfers, 2006; Goodman-Bacon, 2021). As compared with a single grouped post-period from the difference-in-differences specification, the event study tracks the evolution of outcomes over the post-period. Tracking the evolution of the treatment effect helps to alleviate concerns over time-varying treatment effects biasing the observed impact of legal abortion. Second, the event study directly reveals whether mortality rates follow preexisting trends (or pre-trends) leading up to the passage of legal abortion.

Third, the canonical two-way fixed effects estimator has the potential to make improper comparisons between treated groups (e.g., already-treated groups acting as controls). These unclear comparisons may produce estimates outside of the bounds of the true treatment effect (Sun and Abraham, 2020; Callaway and Sant'Anna, 2020; Goodman-Bacon, 2021). Thus, to account for the issues with the canonical TWFE estimator, we present an alternative to two-way fixed effects throughout the findings. We choose to test the Interaction-Weighted (IW) estimator from Sun and Abraham (2020) as our alternative estimator. However, since we lack a never-treated group, we use the last-treated group as the comparison group in the IW specification.[17]

More formally, we estimate the following equation:

$$\begin{aligned} \text{Mortality}_{st} = \alpha + \sum_{m=-7}^{6} \beta_m \text{ Legal Abortion}_{sm} + \lambda \text{ Abortion Reform}_{st} \\ + \mathbf{X}'_{st}\gamma + \alpha_s + \eta_t + \epsilon_{st} \end{aligned} \tag{1}$$

[17] Baker et al. (2021) show that Sun and Abraham IW Estimator performs similarly to Callaway and Sant'Anna (2020).

where Mortality_{st} reflects the mortality rate in state s during year $t = 1959, \ldots, 1980$. For the mortality rates, we take the inverse hyperbolic sine of the mortality rate to include zeros in our main findings. The inverse hyperbolic sine produces results that approximate the natural log of mortality while maintaining zero observations (Bellemare and Wichman, 2020).[18] For our main measures of mortality, we use the number of maternal and abortion-specific deaths per 100,000 reproductive-age females, those between 15 and 44. We choose the mortality rate per reproductive-age female, as legal abortion has been shown to affect the birth rate (Guldi, 2008), a fact we also demonstrate in Section 8.

The passage of legal abortion is captured by the indicator variables $\text{Legal Abortion}_{sm}$. $\text{Legal Abortion}_{sm}$ represents the state-level passage of legal abortion in state s during period $m = 0$, where m ranges from seven years before to six years after legalization. More formally, m represents the difference between the observation year (t) and the year legal abortion went into effect (T), where $m = t - T$. The main impact of legal abortion (our 'treatment' effect) is captured by the six post-treatment dummy variables, $m = 0, 1, \ldots, 6$, which are relative to the pre-legalization year, $m = -1$.

As all states eventually legalized abortion, we lack a never-treated comparison group. To address the lack of a proper control group, we take two approaches. First, in the main TWFE specification, we must either omit two pre-periods or bin the endpoints to avoid collinearity (Borusyak et al., 2018; Schmidheiny and Siegloch, 2020). In the TWFE specification, we choose to bin the left endpoint at $m = -7$ and bin the right endpoint at $m = 6$. Binning, as opposed to excluding two pre-treatment periods, allows us to capture the effect of legal abortion extrapolated from the secular linear trend in maternal (and abortion-related) mortality over our study period (Schmidheiny and Siegloch, 2020).[19] Second, we use the IW specification to compare the effect of early-legalizations relative to the last-treated cohort, *Roe v. Wade* states. Because the IW specification provides a control cohort (the last-treated group), in the IW specification, we leave the event-study fully saturated (unbinned).

Another complication of our study design is that while some states legalized abortion, other states passed pre-legalization abortion reforms. Because the legalization of abortion is fundamentally different than the MPC abortion reforms, we focus on full legalization while controlling for other abortion reforms (similar to Myers (2017)). Thus, we include an indicator $\text{Abortion Reform}_{st}$. $\text{Abortion Reform}_{st}$ equals one in the years following the state-level adoption of MPC provisions. However, in subsequent results, we directly test the effect of

[18] The inverse hyperbolic sine has the advantage of including zeros, and is potentially preferred to more crude measures of including zeros, such as taking the natural logarithm of mortality plus a constant. However, our general conclusions are similar if we use the log of mortality plus one or log of mortality (though we lose data, especially with abortion deaths).

[19] We have also performed the analysis using -4 and -1 as reference groups and the findings are similar to the binning, the main impact appears to be for non-white women, with pre-trends for white and potentially overall mortality.

either passing legal abortion or an abortion reform (MPC provisions) and find only minimal impacts of legal changes that were not direct legalizations (see Section 6.2 and Figure C.2). We also test whether the results change when omitting these reform states in Section 7.

$\mathbf{X}_{st}$ contains state-level controls. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. α_s accounts for the state fixed effects or time-invariant state characteristics. η_t captures the year fixed effects. ϵ_{ijst} is the regression error. We cluster the standard errors at the state level.

5 Main Results

We begin by testing whether legal abortion affects maternal mortality or abortion-specific mortality in an event-study design. Figure III presents maternal mortality in green (left graphs), broad abortion-related mortality in blue (middle graphs), and narrow abortion-related mortality in purple (right graphs). Each individual graph plots the coefficients from both a canonical two-way fixed effects (TWFE) estimation of Equation 1 and an Interaction-Weighted (IW) estimator from Sun and Abraham (2020). In the IW specification, the early-treated cohorts are compared against states that were treated by the passage of *Roe v. Wade*. Thus, to avoid improper comparisons between treated and already-treated, for the IW specification, we only estimate the effect over the years leading up to *Roe v. Wade* (1973 and beforehand). We also only show the coefficients in the main event window, even though the TWFE specification includes the binned endpoints $m = -7$ and $m = 6$ and the IW specification is fully saturated. In each graph, the plotted diamonds/circles/squares connected by solid lines reflect point estimates, and the dashed lines reflect the 95% confidence intervals. The vertical line indicates the excluded period, $m = -1$.

Beginning with maternal mortality (green, left graphs), only non-white maternal mortality declines after abortion legalization, with slightly more noticeable declines in the TWFE specification. In the TWFE specification, the decline in non-white maternal mortality appears consistently statistically significant at the 5% level until the last post-period, and also shows a relatively flat pre-period. For overall maternal mortality, there is a slight dip in period two, but the confidence intervals include zero again beginning three years after legalization. Finally, white maternal mortality fails to show any evident decline after legalization.

Broad and narrow abortion-related mortality each show clearer declines. However, the

most apparent decline again appears for non-white women. Across both definitions of abortion-related mortality, there is a clear and significant decline in non-white abortion-related mortality. By contrast, the plotted points for white abortion-related mortality suggest evidence of a preexisting decline before formal legalization. While the TWFE specification for white abortion-related mortality does show a post-period reduction, this decline appears inextricable from a preexisting trend before legalization. In the IW specification, white abortion-related mortality fails to show a clear significant drop post-legalization.

The results over Figure III reveal both maternal and abortion-related mortality declines primarily for non-white women. To interpret the size of the reduction, we must transform the coefficients into percentage-change effects (see Bellemare and Wichman (2020), Equation (12)). The percentage reductions in mortality are displayed in Table A.1 and A.2. For the main effect on non-white maternal mortality, beginning one year after legalization, legal abortion reduces non-white maternal mortality by 28-40%. For broad non-white abortion-related mortality, the reduction is 15-56%. For the narrowest definition of non-white abortion-related mortality, the reduction is 30-60%.

The importance of legal abortion for non-white maternal and abortion-related mortality aligns with the historical narratives of the time, indicating that poor and non-white women faced the most significant hurdles to obtaining abortions before legalization. Physicians (particularly those in public hospitals) "saw women who needlessly suffered and died as a consequence of illegal abortion" (Rubin, 1994, pg. 71) with these physicians "disturbed that most of those women were poor and black" (Rubin, 1994, pg. 71). Another account describes, "in the first half of the twentieth century, a two-tiered abortion system emerged in which service depended on the class, race, age and residence of the woman. Poor and rural women obtained illegal abortions, performed by people, physicians and others, who were willing to defy the law out of sympathy for the woman or for the fee. More privileged women steadily pressed physicians for legal abortions and many obtained them" (Law et al., 1989, pg. 18).

These period-specific observations also suggest a potential explanation for why we observe a preexisting decline in white abortion-related mortality. White and more privileged women were more likely to obtain a therapeutic abortion or travel to early-legal states and international destinations before formal legalization. Therapeutic abortion, in particular, had a clear "class bias inherent in the psychiatric indications for therapeutic abortions" (Rubin, 1994, pg. 71). Thus, in the next section, we attempt to test whether white women experienced early-legal access through travel or early-*de facto* access through therapeutic abortions, which may have lowered mortality before full legalization.

6 Issues in Identifying the Effect of Abortion Legalization

We next perform several essential checks on the main findings to account for travel to early-legal states as well as abortion access through informal means. First, as described in the background section, women frequently traveled between states (and internationally) to obtain abortions (see Figure II). This early-legal access through travel may create beneficial spillovers to later-treated states, effectively lowering deaths from illegal abortion even in states with criminal abortion legislation. Second, states began allowing abortions before full legalization through MPC provisions and therapeutic abortions. Thus, the state-level *de facto* date of abortion legalization may be more critical for improvements in mortality than the formal *de jure* legalizations. Third, we test the impact of early legalizations (1969-1971) versus later legalizations (court-instituted through *Roe v. Wade*), which may have differential treatment effects.

6.1 Travel to early-legalization states reduces white abortion-related mortality before full legalization

Women frequently traveled to legal states, outside their state of residence, to obtain an abortion before *Roe v. Wade*. To account for potential spillovers from early-legal states, we broaden our definition of treated states to those within 500 miles of the primary early-legalization states (CA/NY/DC, Myers (2017)). These states acted as hubs for women to obtain an abortion and may have produced regional declines in mortality after early legalization. For instance, we categorize the Northeast as treated in 1970, based on the close proximity of these states to New York.

Figure IV displays the findings accounting for the potential spillovers. After broadening the definition of legalization to all repeal states plus states within 500 miles of NY, DC, and CA, the results show clearer declines in overall and white abortion-related mortality (compared to the baseline results). With the adjusted timing of treatment, all abortion-related mortality shows a flat pre-period and clear break after abortion legalizations. White abortion-related mortality shows clearer declines than the baseline, but there is still some evidence of a change in mortality leading up to legalization, mainly in the IW specification. These findings indicate that the preexisting downward trend in the baseline results for white abortion-related mortality is partially attributable to out-of-state abortion access. However, one surprising fact is that after accounting for spillovers, non-white abortion-related mortality declines are less noticeable than in the baseline results.

This importance of spillovers for white women aligns with historical narratives of the

pre-*Roe v. Wade* era, where women with the means to travel had better access to out-of-state abortions (Gold, 2003; Joyce et al., 2013).[20] In the period of early legalizations "class and regional differentiations were accentuated as it became possible for women with resources to travel to states where abortion was legal" (Law et al., 1989, pg. 72). Emphasizing this point, at the height of early abortion access in NYC, the majority of the elevated abortion numbers appear attributable to white abortions in Figure B.5. Figure B.5 shows that white women traveled to NYC frequently before *Roe v. Wade*. After 1973, there is a sharp decline in white abortions occurring in NYC, with only a slight drop in non-white abortions, illustrating that most out-of-state traffic was from white women.

6.2 *De facto* legalizations are important for non-white maternal mortality

In many cases, states allowed abortion to occur before the full formal legalization (see gray bars in Figure II). Of these states with clear abortion access before legalization, some states had adopted MPC provisions, including Maryland and North Carolina. However, even states with MPC provisions, such as Pennsylvania and Massachusetts, still allowed legal abortions to occur. This observation opens up the possibility that early *de facto* (in practice) legalizations impacted mortality before the *de jure* legalizations took effect,[21] especially for white women, who may have had better access to therapeutic abortions. Complicating this issue further, in some cases, states with MPC reforms had higher abortion rates than even repeal (full legalization) states (Myers, 2017). Thus, we next explore the possibility that either MPC provisions or *de facto* legalizations lowered mortality before abortion was legalized within each state.

Early Abortion Reforms First, we test the impact of state-level adoption of either an early MPC reform (plus Mississippi's 1966 reform) or full legalization. Figure C.2 shows a decline only in non-white maternal mortality in the IW specification. There is a brief decline in abortion-related mortality, but the decline disappears after two years. This muted impact

[20] This is in line with the facts presented in Gold (2003), p. 10-11: "The year before the Supreme Court's decision in *Roe v. Wade*, just over 100,000 women left their own state to obtain a legal abortion in New York City. According to an analysis by The Alan Guttmacher Institute, an estimated 50,000 women traveled more than 500 miles to obtain a legal abortion in New York City; nearly 7,000 women traveled more than 1,000 miles, and some 250 traveled more than 2,000 miles, from places as far as Arizona, Idaho and Nevada." and, "Data from the New York City Department of Health confirm that this option, as difficult as it was, was really only available to the small proportion of women who were able to pay for the procedure plus the expense of travel and lodging. (Nonresidents were not eligible for either Medicaid-covered care in New York or care from the state's public hospitals.) While eight in 10 nonresidents obtaining abortions in the city between July 1971 and July 1972 were white, seven in 10 city residents who underwent the procedure during that time were nonwhite."

[21] The importance of *de facto* dates has been shown previously in the divorce literature, where Hoehn-Velasco and Penglase (Forthcoming, 2021) find an impact of unilateral divorce primarily with *de facto* instead of *de jure* reforms.

is not surprising. While certain MPC states, such as Maryland, North Carolina, and Colorado, allowed a substantial number of legal abortions to occur, other states had relatively restrictive access. Thus, *on average* the impact in MPC states (either due to doctors or lawmakers) appears weaker than the baseline findings.

***De Facto* Abortion Reforms** Second, we turn to *de facto* legalizations. We base the *de facto* year of legalization on when states began to report a substantial number of legal abortions. We use two different measures of *de facto* access, when states began reporting an abortion ratio (abortions-to-live-births) of more than 0.15 (Figure V) and more than 0.10 (Figure C.3). The results are similar across each specification, but slightly stronger in the specification using the abortion-to-live-birth ratio of 0.15.[22]

Figure V presents the results from broad abortion access for abortions occurring in the state of residence (>15% of births). The plotted points suggest that widespread access to informal abortion substantially reduces maternal mortality, both overall and non-white. However, compared to the baseline specification, non-white abortion-related mortality shows less of a decline over the post-period. White abortion-related mortality shows some decline, though there is also a pre-legalization spike 5-6 years before *de facto* legalization.

These results using *de facto* dates suggest that widespread access to an abortion produces a substantial reduction in non-white maternal mortality and potentially some decline in white abortion-related mortality. When states began to allow more liberal access to abortion appears to be essential for non-white maternal mortality but is less crucial for non-white abortion-related mortality (compared to the baseline results). The independent decline in non-white maternal mortality, without corresponding declines in narrow or broad abortion-related mortality, is surprising. The reduction in non-white maternal mortality in states with a high abortion ratio provides some evidence that legal abortion may shift delivery characteristics towards healthier mothers. Thus, the reduction in maternal mortality may be partially due to healthier pregnancies instead of only through declines in abortion-related deaths. The improvement in non-white maternal mortality is large enough to produce a noticeable reduction in overall maternal mortality as well. Combined with our baseline findings, these results suggest that while legal abortion may have directly impacted abortion-related mortality, broader legal access may have also indirectly influenced maternal mortality through changes to the characteristics of pregnant mothers.

[22] We sensor the final year at 1974. Thus, in the IW specification, states that passed *de facto* reforms are compared against states that did not have a substantial number of abortions in 1973.

6.3 The mortality decline is for early-legalization states rather than *Roe v. Wade*

Finally, we attempt to separate the impacts of early (voluntary) legalizations over 1969-1971 versus the impact of the court-instituted *Roe v. Wade* decision. (see also Table A.3, Section 7). To identify heterogeneous impacts of these legislative changes, we separately consider the effect of early legalizations occurring over 1969 to 1971 (relative to *Roe v. Wade*). In this specification, we omit the last-treated states, including NJ and VT, and only consider the years up to 1973 (before *Roe v. Wade*). Then, we attempt to identify the impact of *Roe v. Wade* in two ways. First, by comparing the effect of *Roe v. Wade* against states that had legalized by 1970.[23] Second, we consider the national implementation of *Roe v. Wade* in treated states alone, taking into account abortion demand. In this specification, we assume that *Roe v. Wade* should have a larger effect in states with higher demand for illegal abortions.

Early-legalizations over 1969-1971 Relative to *Roe v. Wade* Figure VI presents the effect of early legalization (1969-1971) for the years leading up to national legalization, over 1959 to 1972. In this specification, we compare the impact of legal abortion in early-legal states against *Roe v. Wade* states in the control group. Because these later-adopting *Roe v. Wade* states act as a control group, we include the fully-saturated event-study specification. Throughout Figure VI, the TWFE and the IW specification show similar results, likely reflecting the fact that we have only limited staggering of treatment timing.

Figure VI shows that non-white abortion-related mortality declines substantially after early legalizations. The reduction is similar to the baseline findings and suggests a considerable reduction in non-white abortion-related mortality with little evidence of preexisting declines before legalization. Turning to white and overall abortion-related mortality, there is a slight decline over the post-period, especially for overall abortion-related mortality. However, white abortion-related mortality again appears to be on a preexisting trend before legalization. For the reasons described above, the control group for white mortality likely suffers from spillovers from early-to-later-legal states and early access through *de facto* legalizations.

***Roe v. Wade* relative to Early Legalizations** We also consider the separate effect of *Roe v. Wade* in Figure C.1. Here we compare the effect of *Roe v. Wade* to already-treated early-legalization states or states that legalized abortion in 1969 and 1970. For this specification, we use the TWFE estimator because there is no staggered treatment timing. We also limit the pre-period to only consider the period after early-legalizations, 1970-1980.

The results in Figure C.1 show little impact of *Roe v. Wade*, with a flat post-period for

[23] For the specification focusing on *Roe v. Wade*, we omit DC, NJ, and VT.

all measures of mortality. While the plotted point estimates show no apparent impact, these results reflect an imperfect comparison. The few early-adopting states that serve as a control group may experience heterogeneous effects over their own post-period, making it difficult to gauge the parallel trends for *Roe vs. Wade* states. Thus, we next turn to a specification where we consider the effect for states treated by *Roe v. Wade* alone.

The Impact of *Roe v. Wade* Based on Pre-Roe Abortion Demand Due to the lack of a (never-treated) control group for the states affected by the national *Roe v. Wade* decision; we turn to an alternative specification to estimate the impact of *Roe v. Wade*.

To address the challenge of measuring the impact of *Roe v. Wade* apart from the preexisting decline in abortion-related mortality, we assume that states with higher abortion demand should experience a greater benefit from the legalization of abortion.[24] Formally, this specification appears as:

$$\text{Mortality}_{st} = \alpha + \phi_t \times \text{Abortion Demand}_s^{Pre} + \alpha_s + \eta_t + \epsilon_{st} \tag{2}$$

where we replace our staggered event study from Equation 1 with a pre-*Roe v. Wade* measure of abortion demand ($\text{Abortion Demand}_s^{Pre}$) interacted with year indicators (ϕ_t) for the years directly surrounding *Roe v. Wade*, 1967-1977. $\text{Abortion Demand}_s^{Pre}$ is a fixed measure of demand for abortion from the pre-*Roe v. Wade* period.

We proxy abortion demand using the following two measures. First, we take the abortion-related mortality from the year just before the first state-level change in abortion legislation (1965). This pre-reform mortality level captures the state-level demand for illegal abortions, as illegal abortions are presumed to be the main driver of high levels of abortion-related mortality. Second, we measure abortion demand using the pre-legalization reported legal abortion rate. This abortion rate for each state comes from the 1972 CDC abortion surveillance program (the number of abortions per 10,000 reproductive-age females). While the legal abortion rate is imperfectly reported, it will include the 28 reporting states plus women who traveled to legal states to obtain an abortion (a measure of abortion demand itself).[25] Using these two measures of demand for abortions, we then interact state-level abortion demand with year indicators, allowing us to test the before and after effect of *Roe v. Wade*. When we estimate Equation 2 we exclude the year just before *Roe v. Wade* ($\phi_{1972} \times \text{Abortion Demand}_s^{Pre}$). Further, α_s accounts for the state fixed effects or time-invariant state characteristics. η_t captures the year fixed effects.

[24] This follows related work such as Alpert et al. (2018) and Callison and Pesko (2020).
[25] As an alternative we also test this measure over only the reporting states in Figure C.4.

Figure VII plots the results for both measures of abortion demand. In this specification, we only include states that were treated by the *Roe v. Wade* decision and omit early-legalization states. Across all three measures of mortality and both measures of abortion demand, the plotted point estimates suggest little impact of *Roe v. Wade* on any measure of mortality. The only exception is a slight decline for white narrow abortion-related mortality using the pre-reform measure of abortion-related mortality (from 1965). There is no similar decline in the narrow abortion mortality when using the 1972 abortion rate. The difference between the two specifications is likely due to the reality that abortion-related mortality better captures demand for illegal abortions, as opposed to general abortion demand. While demand for illegal and legal abortions appears similar, many women willing to obtain a legal abortion may be hesitant or lack the contacts to obtain illegal abortions. States with the highest demand for illegal abortions should show the most apparent response to legalization. Still, despite the decline in white abortion-related mortality, these findings suggest a muted impact of *Roe v. Wade* relative to early legalizations.

Put together, the results indicate that while there may have been some benefit of *Roe v. Wade*, the main mortality benefits came from early legal access to abortions rather than national legal abortion through the *Roe v. Wade* decision. The larger impact of early legalization versus *Roe v. Wade* may be surprising, but several explanations for this fact exist. First, early-legalization states may have been better poised to track and record abortion-related deaths, providing proper identification and detection of abortion mortality (as compared with illegal states). Second, early-legalization states had the highest abortion-related deaths to begin with, which may have pushed these states to legalize abortion in order to improve poor outcomes associated with illegal abortion. This fact is illustrated in Figure I where Panel A shows the mortality rate from abortion-related mortality in repeal states is double the remainder of the United States.

Third, as demonstrated above, women traveled to obtain abortions and also gained *de facto* legal access to abortions, reducing mortality before *Roe v. Wade* went into effect. Thus, it is quite possible this pre-*Roe v. Wade* access reduced mortality to a low enough point that *Roe v. Wade* had little noticeable effect. This possibility is supported by Figures I and B.1, where much of the abortion-related mortality decline occurred before 1973. More specifically, in 1959, abortion-related mortality was 0.78 per 10,000 reproductive-age females. Before any reforms or legalizations, in 1965, abortion-related mortality reached 0.59 per 10,000 reproductive-age females (nationally). However, by 1973 abortion-related mortality fell to 0.079. This decline represents a 90% reduction from the height of abortion-related mortality in 1959, and an 87% decline from 1965 (the period just before reforms began). Then, following the *Roe v. Wade* decision, abortion-related mortality hovered at 0.058 in 1974 and 0.056 in 1975. These facts illustrate that the majority of the decline in abortion deaths occurred before *Roe*

v. Wade, and combined, help to explain why we observe little benefit of national legalization.

7 Additional Robustness Checks

7.1 Difference-in-Differences Specification

We next turn to a difference-in-difference specification to consider the impact of abortion legalization in a single grouped post-period. Within this alternative specification, we also show a number of different tests, including adding additional controls and subsetting to alternative treatment states. Formally, our difference-in-differences specification is expressed as:

$$\begin{aligned} \text{Mortality}_{st} = &\alpha + \beta\ \text{Legal Abortion}_{st} + \lambda\ \text{Abortion Reform}_{st} \\ &+ \mathbf{X}'_{st}\gamma + \alpha_s + \eta_t + \epsilon_{st} \end{aligned} \tag{3}$$

where $\text{Legal Abortion}_{st}$ captures the effect of legal abortion and includes both the early legalization of abortion in repeal states as well as the 1973 passage of Roe v. Wade. $\text{Legal Abortion}_{st}$ is a dummy variable that is equal to one in the year following the passage of a legal abortion law in state s and year t, and zero in the year the abortion law passed and beforehand. All other features of Equation 3 reflect Equation 1.

7.2 Difference-in-Differences Results

We plot the impact of abortion legalization ($\text{Legal Abortion}_{st}$ from Equation 3) in Figure D.1. Throughout Figure D.1 we show both maternal mortality (left), broad abortion mortality (middle), and narrow abortion mortality (right) for all women (gray circles), white women (purple triangles), and non-white women (green squares). We plot the coefficients on legalization in a single graph to simultaneously display how our robustness checks impact the main coefficient. However, we show the baseline findings in Tables A.5 and A.6. The general theme of the coefficients in Figure D.1 indicates that abortion legalization consistently reduced non-white maternal mortality and all measures of abortion-related mortality.

Beginning in the specification with only fixed effects (no controls or trends), legalizing abortion lowers maternal and abortion-related mortality for all measures, with similar impacts after adding controls (our baseline specification). In the third specification, after adding trends, the effect shrinks slightly for white women but not for non-white women.

Throughout the remainder of the specifications–including adding additional controls e.g., AFDC benefits,[26] omitting DC, omitting NJ/VT, omitting states within 500 miles of California/New York/DC, controlling for the share of border states with legal abortion, and omitting MPC states–the reduction in maternal and abortion-related deaths is consistent across these alternatives, except white maternal mortality, which is more sensitive to spillovers, omitting states, and adding additional controls. Overall, these findings suggest that abortion legalization explains a sizable portion of the non-white abortion-related mortality decline but had more questionable impacts on white maternal mortality.

7.3 Goodman-Bacon Decomposition

Based on the importance of early-legalization states in the main results, we further test the impacts by treatment timing using a Goodman-Bacon decomposition (Goodman-Bacon, 2021) in Table A.3. The results presented are without weights or controls.

The findings in Table A.3 illustrate that, as suspected, the impact of abortion legalization depends on the timing of the legal reform. For non-white maternal mortality, the main effect is through early abortion legalization, with later legalization having a positive coefficient. For white maternal mortality, the reverse is true, with later-treated showing a reduction while early-treated fails to show a decline in maternal mortality. However, the effect on white maternal mortality is relatively small in magnitude.

Then, focusing on abortion-related mortality, the results suggest similar heterogeneous treatment effects to maternal mortality. Abortion-related mortality declines are highest in early-treated states, with the impact most apparent for non-white abortion-related mortality. White abortion-related mortality actually is higher after legalizations in later-treated states.

These heterogeneous treatment effects align with the findings from Section 6.3, suggesting that early legalizations were more important than Roe v. Wade itself, with the effect most pronounced for non-white rather than white women. To more explicitly test the separate effect of all legalization states, we present the heterogeneous treatment effects from the Goodman-Bacon Decomposition excluding states treated by *Roe v. Wade* in Table A.4. The results indicate that all voluntary abortion legalizations produced declines in non-white maternal and abortion-related mortality. For non-white mortality, excluding *Roe v. Wade*, the effect appears symmetric in early versus later-treated states.

[26] Additional controls include AFDC benefits, from Jordan and Grossmann (2020), cigarette taxes from the Tobacco Institute's annual Tax Burden on Tobacco data, the state-level economic conditions measured by the unemployment rate from Cohen and Land (1999), and a binary variable capturing state-level access to public health insurance through initial Medicaid implementation (Boudreaux et al., 2016). [27]

7.4 Interaction of State-level Policies

Finally, in addition to the difference-in-differences results, to test whether our focus on abortion is misdirected away from other family and fertility policies, we also show the findings for interactions of state-level policies in Tables A.5 and A.6. In Column (1), we begin by outlining our baseline difference-in-differences specification. In Column (2), we add an interaction with unilateral divorce and minor's access to the pill in Column (3). Then in Column (4) we show the additional controls. The findings suggest little interacting impact of the state-level policies.

8 Changes in Delivery Characteristics and Infant Health

Due to the decline in non-white maternal mortality, we next try to understand whether abortion legalization affects infant health and pregnancy characteristics. These findings help contextualize our main results by showing whether pregnancies became healthier in the wake of legal abortion and answering whether mortality declines were broader than just maternal mortality.

8.1 Infant and Neonatal Mortality

Based on evidence suggesting that access to abortion may have impacted infant mortality (Krieger et al., 2015), we consider the effect of legal abortion on infant mortality and neonatal mortality. We show the event-study results in Figure VIII on the left (in green) for infant mortality and in the middle graphs (blue) for neonatal mortality. The results only show some reduction in white infant and neonatal mortality, with the effect clearer for infant mortality as compared to neonatal mortality. There is no impact on non-white infant or non-white neonatal mortality.

We also show neonatal, and infant mortality in a difference-in-differences specification plotted in Figure D.2. Over the first specification the results indicate that legal abortion led to declines in white neonatal and infant mortality. However, the results are not robust to alternative specifications.

These findings fall somewhat in line with previous work in Bauman and Anderson (1980); Miller et al. (1988), where each study found no discernible impact on neonatal mortality or infant mortality. However, Bauman and Anderson (1980) did find a modest and brief contribution of the 1970s legalizations to reducing fetal deaths. Our event-study results also partially

align with findings from added abortion restrictions, which increase the risk of infant mortality in Pabayo et al. (2020). However, our differences-in-differences findings indicate that the infant mortality decline may be sensitive to alternative specifications.

8.2 Birth Rates

We then test the effects of abortion legalization on the state-level birth rate. The effects on birth rates have been studied previously in Guldi (2008). While these effects have been previously documented, we present the fertility effects to emphasize two points. First, the fact that we consider abortion and maternal deaths per reproductive-age female instead of traditional measures of abortion and maternal deaths per birth. If we use births, mortality may change as a result of the denominator (births) adjusting in response to the passage of legal abortion. Second, the characteristics of pregnancies themselves may be changing due to a reduction in the birth rate. Thus, without examining the birth rate and delivery characteristics, the main reduction in maternal deaths for non-white women is not clearly interpretable. The effect may be coming from access to legal abortion, pushing down abortion-related deaths, or from healthier pregnancies carried to term, which is something we explore directly in Section 8.3.

Figure VIII in the right-purple specification shows the impact of abortion legalization on the number of births per 10,000 females 15-44. Following abortion legalization, there is a substantial reduction in the birth rate, especially for non-white women. White women show a more transient decline. The clear reduction in the birth rate is also robust to alternative specifications, both the difference-in-differences specification shown in Figure D.2 as well as in interactions of state-level policies in Figure A.7.

Given the magnitude of the number of abortions performed in the wake of Roe v. Wade (discussed in Section 2), the importance of abortion for the birth rate is not surprising. Over 1973 to 1980, abortions appear to have doubled in counts, rising from 616,000 in 1973 to 1,298,000 abortions in 1980 (CDC, 2011). Based on the increase in abortions over this time period, the substantial decline in the birth rate is quite plausible.

8.3 Delivery Characteristics

Finally, we conclude by testing the impact of legal abortion on delivery characteristics for all available U.S. births reported in the Natality Detail Files from 1968 onward. These records collected through the Centers for Disease Control (CDC) and the National Center for Health Statistics (NCHS) include microdata of U.S. deliveries for all U.S. states. The data consists of maternal characteristics, including age, education, and marital status, as well as infant health

measured by birth weight.

Two limitations of this data exist for our sample time frame. First, the microdata is only available from 1968 onward, limiting our ability to consider an extensive pre-period. Still, since all legalizations occurred from 1970 onward, the data allows us at least one pre-period for each state. Thus, due to the limited pre-legalization years in the sample, we consider the impact of early legalizations relative to *Roe v. Wade* using the IW specification (rather than TWFE). Second, the data are based on a 50% sample for specific years, with states gradually expanding from 1973 onward. To account for these changes, we take the average delivery characteristics by state for each year. When considering the delivery characteristics, we focus on infant health measured by birth weight, maternal marital status (dubbed legitimacy in the Natality Files), and maternal age.

Figure IX shows the main change in delivery characteristics with the passage of legal abortion. First, we consider the effect of legal abortion on the average maternal age. Teen mothers and younger mothers should be the most likely to obtain an abortion post-legalization. We expect younger mothers to have the most limited access to abortion pre-legalization, and we anticipate that this group will have the largest share of unwanted pregnancies. In Figure IX, the results reflect expectations and reveal a decline in teen births with a corresponding increase in the average maternal age. As anticipated, in light of existing evidence in works like Cates et al. (2003); Donohue III et al. (2009); Ananat et al. (2009), the clearest prevention of unwanted pregnancies is for younger mothers. The increase in average age and decline in teenage pregnancy is symmetric across both white and non-white mothers, though white mothers show less evidence of preexisting trends in maternal characteristics.

Then we turn to marital status. The birth certificates record whether the newborn was born 'legitimate' until 1978 and in 1978 and onward. The certificates report whether the newborn was born to a married mother. For white births, following legalization, unmarried white births decline. However, the share of unmarried non-white births does not appear to fall after legalization. As expected, the most considerable change in delivery characteristics is for unmarried mothers (in line with Donohue III et al. (2009); Cates et al. (2003); Ananat et al. (2009); Rotz (2012)), but this effect only shows up for white mothers. Finally, we turn to birth weight, our best measure of infant health. Following legal abortion, there is an increase in birth weight for white deliveries. These findings align with the infant mortality results and suggest some increase in white infant health after legalization.

Overall, these findings suggest that abortion legalization leads to a change in delivery characteristics. Newborns are born healthier (for white deliveries), to older mothers, and to married mothers (for white mothers). Unlike the maternal mortality results, the change in delivery characteristics mainly occurs for white women, with less noticeable changes for

non-white women.

9 Conclusion

In this study, we question whether abortion reforms that occurred over the 1960s and 1970s can explain a portion of the decline in maternal or abortion-related mortality over 1959-1980. Our findings suggest that legal abortion reduced non-white abortion-related mortality by 30-60%. Non-white abortion-related mortality declines are so apparent that non-white maternal mortality also fell by 28-40%. Despite these substantial impacts for non-white women, in our main findings, white abortion-related mortality fails to clearly decline.

However, documenting the size of the main effect comes with two main issues. First, women traveled internationally and domestically to obtain legal abortions, and second, certain states allowed a substantial number of abortions to occur through *de facto* means. Once we account for these areas of early-legal access, we find declines in abortion-related mortality for both white and non-white women. Finally, we also demonstrate that the reduction in abortion-related mortality is primarily a result of early abortion legalizations (before *Roe v. Wade* itself). When we separately examine the impact of *Roe v. Wade*, the passage of national legal abortion appears less critical for mortality declines. While this finding may appear unexpected at first, this observation is less surprising after examining the period-specific trends in mortality. In 1973 abortion-related mortality had already fallen by 90% from the start of our period (in 1959) and 87% from the pre-reform period (1965), indicating that much of the abortion-related mortality decline had occurred before the national decision. This substantial reduction in abortion-related mortality pre-Roe suggests that the majority of the period-specific declines are attributable to early legalizations, inter-state travel, and informal access rather than through *Roe v. Wade* itself.

Overall, these findings indicate that while we find consistent declines in non-white abortion-related mortality and non-white maternal mortality, identifying the precise impact of abortion policy presents several challenges. These underlying factors also have broader implications for identifying the effects of legal abortion (and related fertility policies), indicating that early-legal and informal abortion access was critical (before *Roe v. Wade*). The passage of early legal abortion was essential for those without financial resources, as economically disadvantaged women were more likely to seek an illegal abortion than to travel overseas or out of state (Rubin, 1994; Gold, 2003; Joyce et al., 2013). For those with the financial resources to travel (captured by white women, Gold (2003)), early-legal access provided safe and legal abortion before *Roe v. Wade*. Our findings align with historical descriptions of the time, where one account from Massachusetts describes, "with the advent of the New York law, it was extraor-

dinary what a difference it made. Within 1 month there was not one more illegal case that came through the office. There was not one more trip to London" (Rubin, 1994, pg. 50).

These findings also have implications for public policy today, both in the United States and worldwide. First, worldwide each year, approximately 4-13% of maternal deaths result from unsafe abortions (Singh and Ratnam, 1998; Haddad and Nour, 2009; Say et al., 2014). Our results suggest that abortion restrictions may produce higher than necessary abortion-related deaths, especially for disadvantaged groups who cannot advocate for themselves in the medical system or travel to obtain an abortion. However, we caution that our findings may not fully apply in the modern context when abortion technologies have improved and antibiotics may be more widely available.

Second, in the United States today, Figure X demonstrates that if *Roe v. Wade* were overturned, the United States would return to a legal landscape similar to 1972. In that case, abortion access would depend on each individual's financial resources to travel to legal coastal states (plus Illinois). Many states may also revert to a system of therapeutic abortions. In this case, in-state abortion would depend on the individual's autonomy to advocate for themselves in the medical system. While we cannot say how prevalent illegal or self-administered abortions would become, our research instead suggests that the disadvantaged would be the most affected by such a decision. In this light, our study adds to a literature that has similarly demonstrated that abortion restrictions affect the most disadvantaged groups (Gold, 2003; Joyce et al., 2013). We contribute to this literature by showing that legal abortion not only affects life-long economic outcomes (Myers, 2017) but also substantially impacts non-white maternal mortality. Today, U.S. maternal mortality is already notably higher than comparable developed settings (Carroll, 2017; Artiga et al., 2020), and non-Hispanic black women suffer three times the maternal mortality of white women (Carroll, 2017; Artiga et al., 2020). Thus, if legal abortion access were reversed, our research suggests that the racial gap in maternal mortality has the potential to widen further.

10 Tables

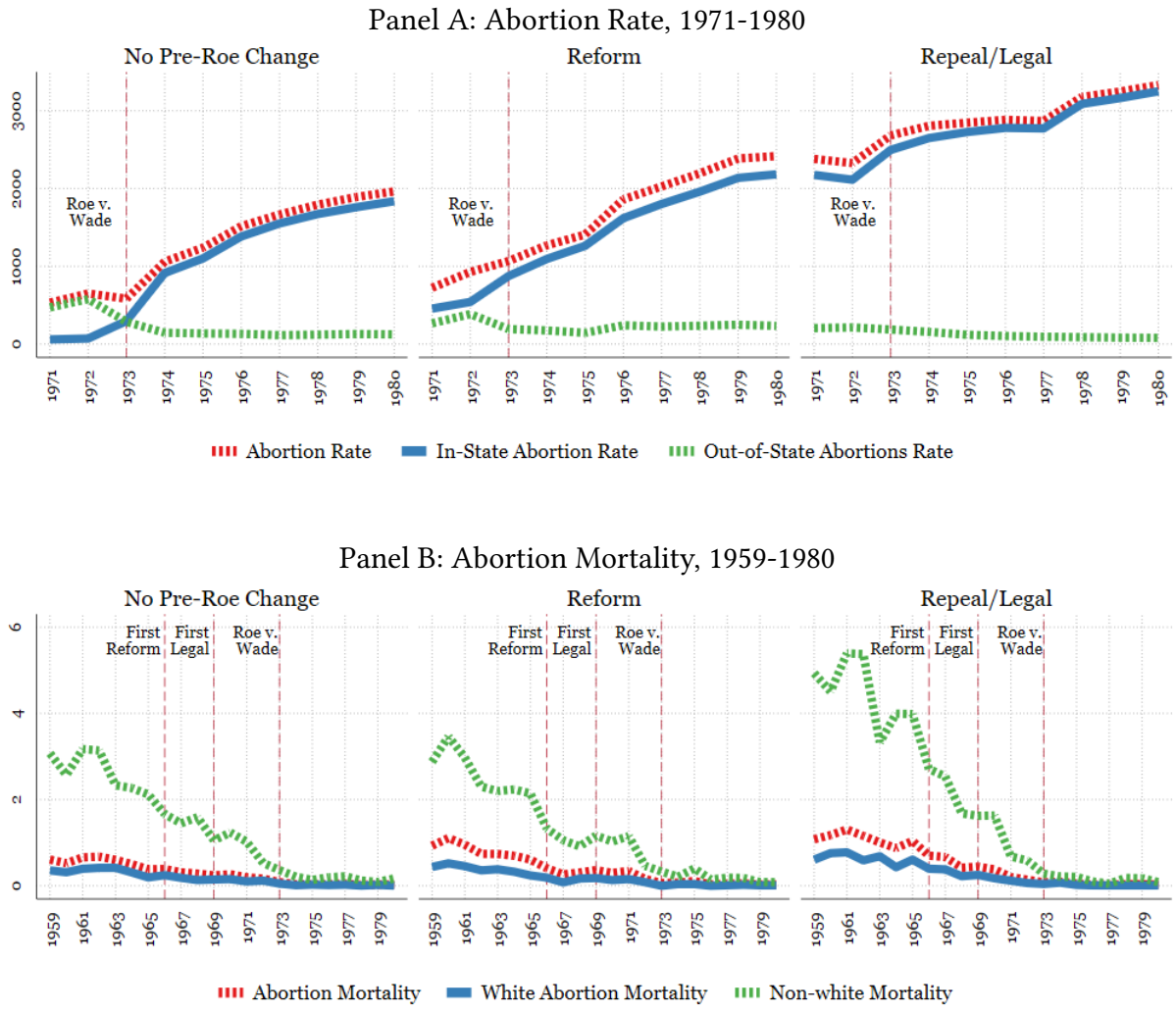
Table 1: Summary Statistics, by Legal Status

	Roe v. Wade Pre	Roe v. Wade Post	Reform Abortion Pre	Reform Abortion Post	Legal Abortion Pre	Legal Abortion Post
	Mean	Mean	Mean	Mean	Mean	Mean
Maternal						
Maternal Mortality	2.600	0.778	4.108	1.282	3.099	0.750
White Maternal Mortality	1.972	0.585	2.202	0.756	1.646	0.591
Non-white Maternal Mortality	9.304	2.312	11.620	2.977	12.354	1.276
Broad Abortion						
Broad Abortion Mortality	0.692	0.182	1.106	0.281	1.055	0.182
Broad White Abortion Mortality	0.486	0.122	0.601	0.156	0.423	0.133
Broad Non-white Abortion Mortality	2.835	0.858	3.304	0.696	3.249	0.367
Narrow Abortion						
Narrow Abortion Mortality	0.347	0.042	0.636	0.097	0.650	0.057
Narrow White Abortion Mortality	0.240	0.028	0.372	0.044	0.263	0.035
Narrow Non-white Abortion Mortality	1.546	0.235	1.840	0.258	2.037	0.114
Controls						
Log Average Personal Income	8.069	8.856	7.938	8.686	8.210	8.943
Married	0.458	0.456	0.455	0.450	0.438	0.421
Share of Population Non-white	0.074	0.084	0.172	0.179	0.227	0.257
Share of the Population 55+	0.186	0.202	0.171	0.190	0.166	0.178
1(Abortion Reform)	0.000	0.000	0.000	1.000	0.020	0.145
1(Access to the Pill)	0.740	0.992	0.700	1.000	0.780	1.000
1(Minor Access to the Pill)	0.031	0.317	0.007	0.715	0.000	0.368
1(EPL)	0.548	0.733	0.380	0.563	0.730	0.776
1(Unilateral)	0.033	0.579	0.027	0.399	0.000	0.355
Population						
State population	360.091	398.144	377.626	481.408	565.794	706.046
Share Reproductive-Age Females	0.202	0.221	0.206	0.223	0.209	0.231
Share White Reproductive-Age Females	0.186	0.201	0.171	0.182	0.158	0.168
Share Non-white Reproductive-Age Females	0.015	0.020	0.035	0.041	0.052	0.063
Births						
Birth Rate	100.990	72.339	104.678	73.479	98.380	68.558
White Birth Rate	97.474	69.543	96.144	67.537	89.778	59.947
Non-white Birth Rate	150.491	103.284	143.878	98.445	123.613	85.206
Neonatal						
Neonatal Mortality	16.654	10.214	18.133	12.112	17.462	11.282
White Neonatal Mortality	15.837	9.591	16.380	10.656	15.934	9.953
Non-white Neonatal Mortality	22.544	13.313	23.505	15.584	21.271	12.740
Infant Mortality						
Infant Mortality	22.583	14.397	26.419	17.227	23.137	15.587
White Infant Mortality	20.875	13.287	21.789	14.557	20.691	13.551
Non-white Infant Mortality	35.304	20.462	39.447	23.650	29.022	18.320
N	420	240	150	158	100	76

Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980. State population characteristics are from Ruggles et al. (2021) and Wolfers (2006). See data section for sources of each reported covariate.
Notes: Unweighted means reported. State population are shown in 10,000s. Maternal mortality, abortion mortality, and the birth rate are per 10,000 females 15-44. Non-white maternal mortality, non-white abortion mortality, and the non-white birth rate are per 10,000 non-white females 15-44. White maternal mortality, white abortion mortality, and the white birth rate are per 10,000 white females 15-44. Infant and neonatal mortality are per 1,000 births. White infant and white neonatal mortality are per 1,000 white births. Non-white infant and non-white neonatal mortality are per 1,000 non-white births.

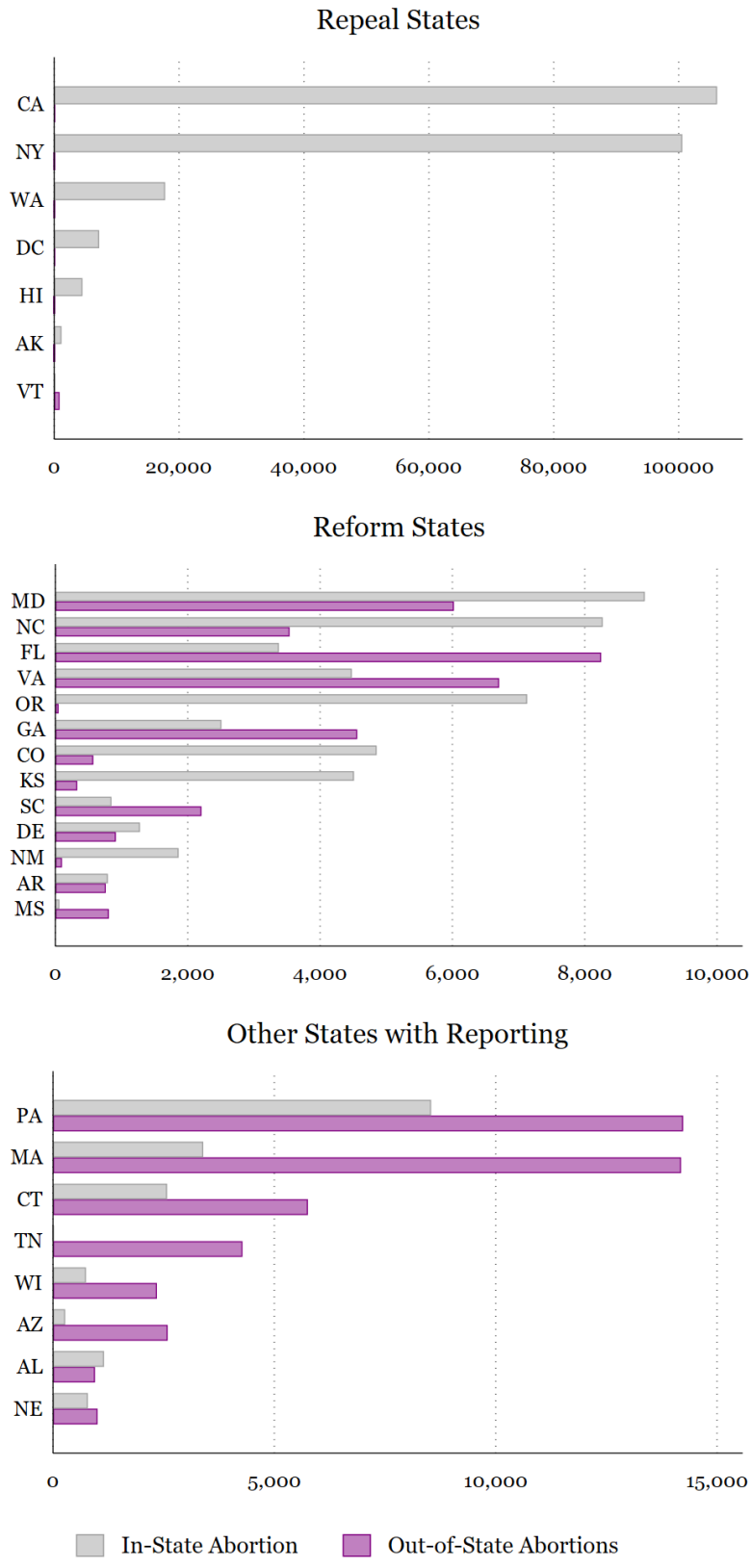
11 Figures

Figure I: Abortion Rate and Abortion-related Mortality, by Legal Abortion Status



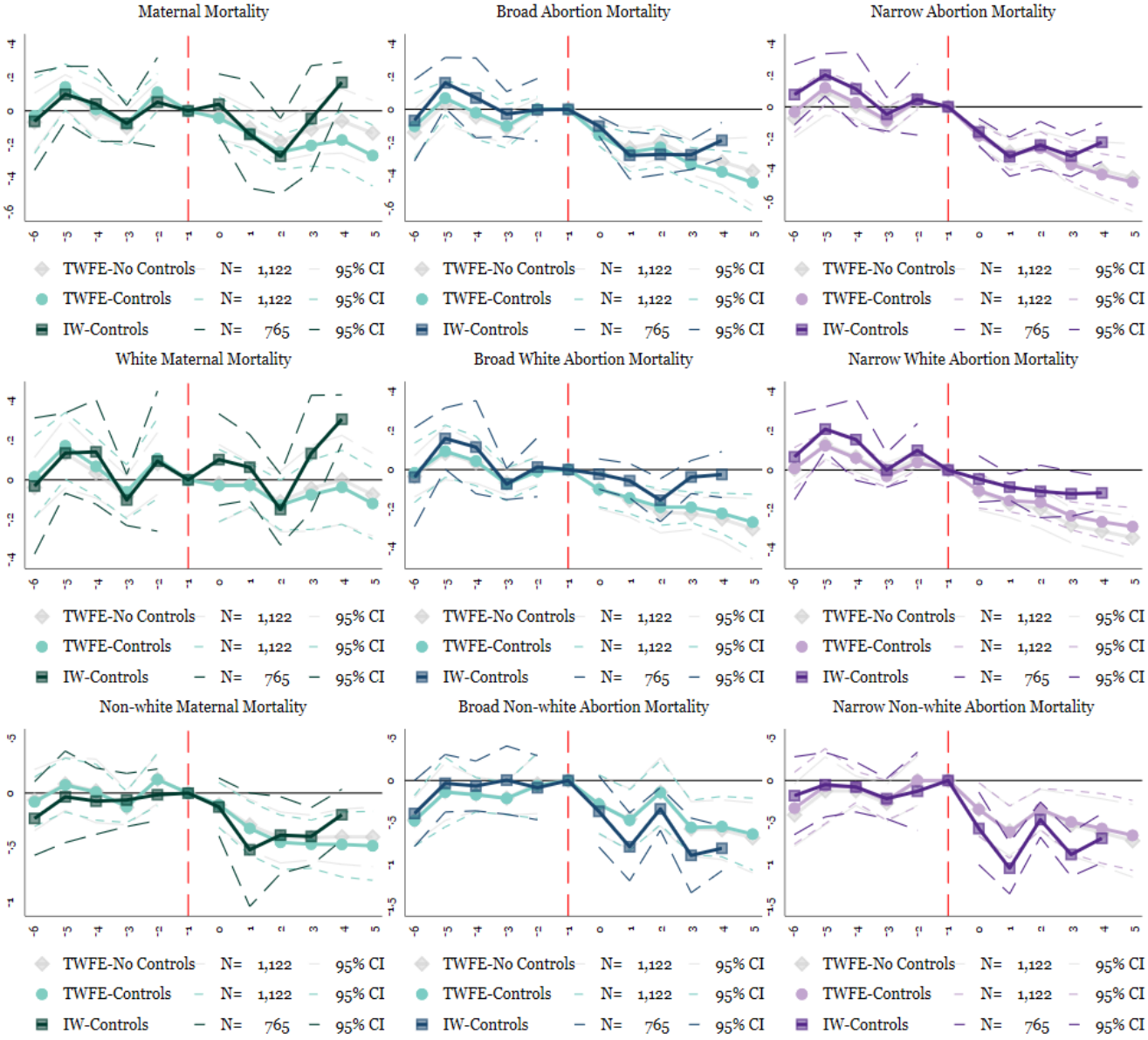
Source: CDC Abortion Surveillance Program, 1971-1980. NVSS/CDC Multiple Cause of Death Files, 1959-1980.
Notes: Rates are 10,000 reproductive-aged females in each population (all, white, and non-white).

Figure II: Abortion Counts by Known State of Residence in 1972



Source: CDC (1972).
Notes: States sorted by total reported abortions, note the scaling differences between state groups. Reporting states with legal abortion include: Alaska, California, District of Columbia, Hawaii, New York, Vermont, and Washington (only excluding New Jersey). Reporting States with MPC provisions include Arkansas, Colorado, Delaware, Georgia, Florida, Kansas, Maryland, North Carolina, Oregon, South Carolina, Virginia. Other reporting states include Mississippi and Massachusetts. Single hospitals reporting include Alabama, Arizona, Connecticut, Nebraska, New Mexico, Pennsylvania, Tennessee, and Wisconsin.

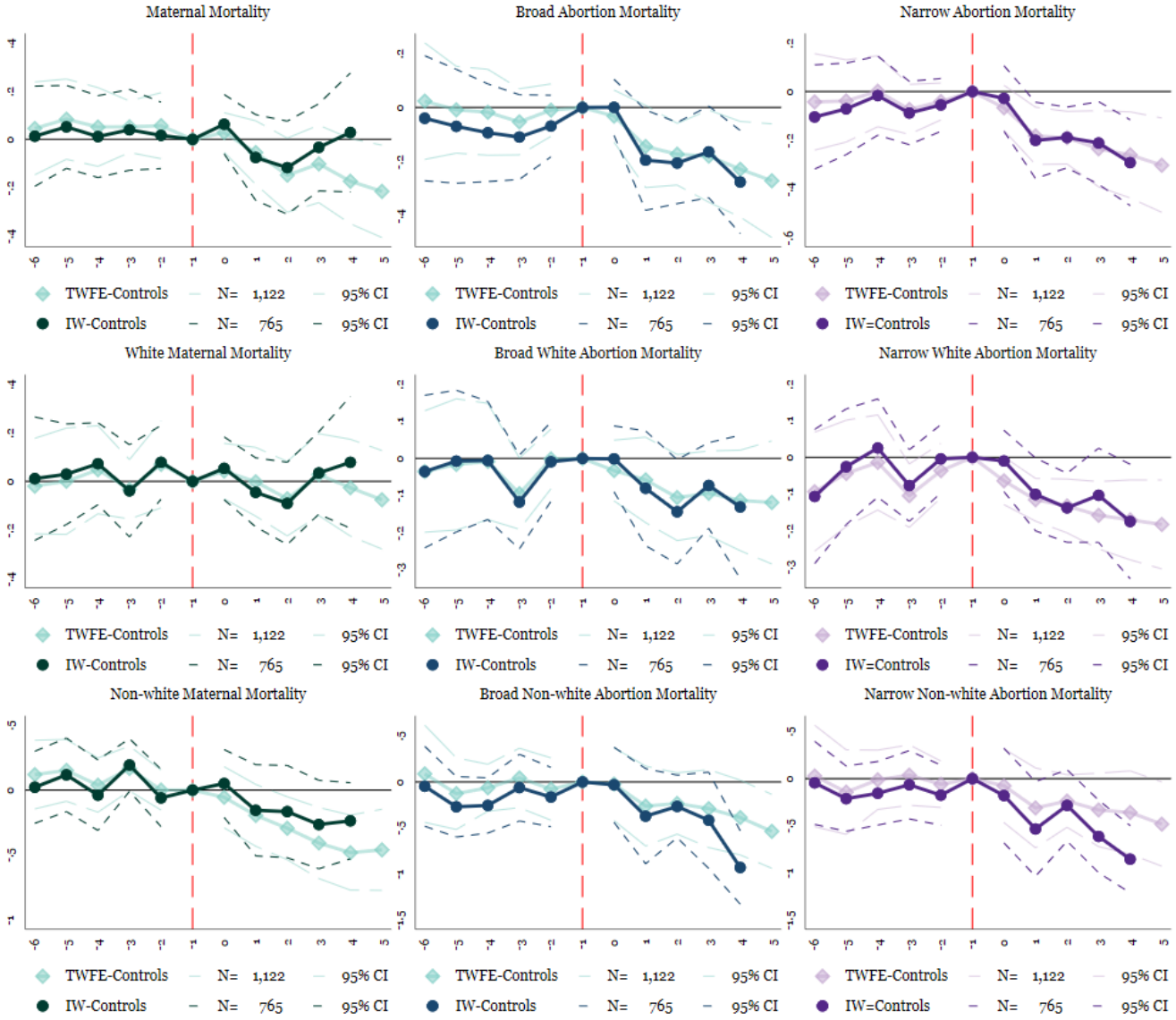
Figure III: Main Event Study: Effect of Legal Abortion on Maternal and Abortion-Related Mortality



Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. For the two-way fixed effects specification (TWFE), the left endpoint is binned at $m = -7$, and the right endpoint is binned at $m = 6$. For the Interaction-Weighted (IW) specification, the event study is fully saturated. In the IW specification, we only consider the years 1959-1973, with *Roe v. Wade* states as the last-treated comparison group. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

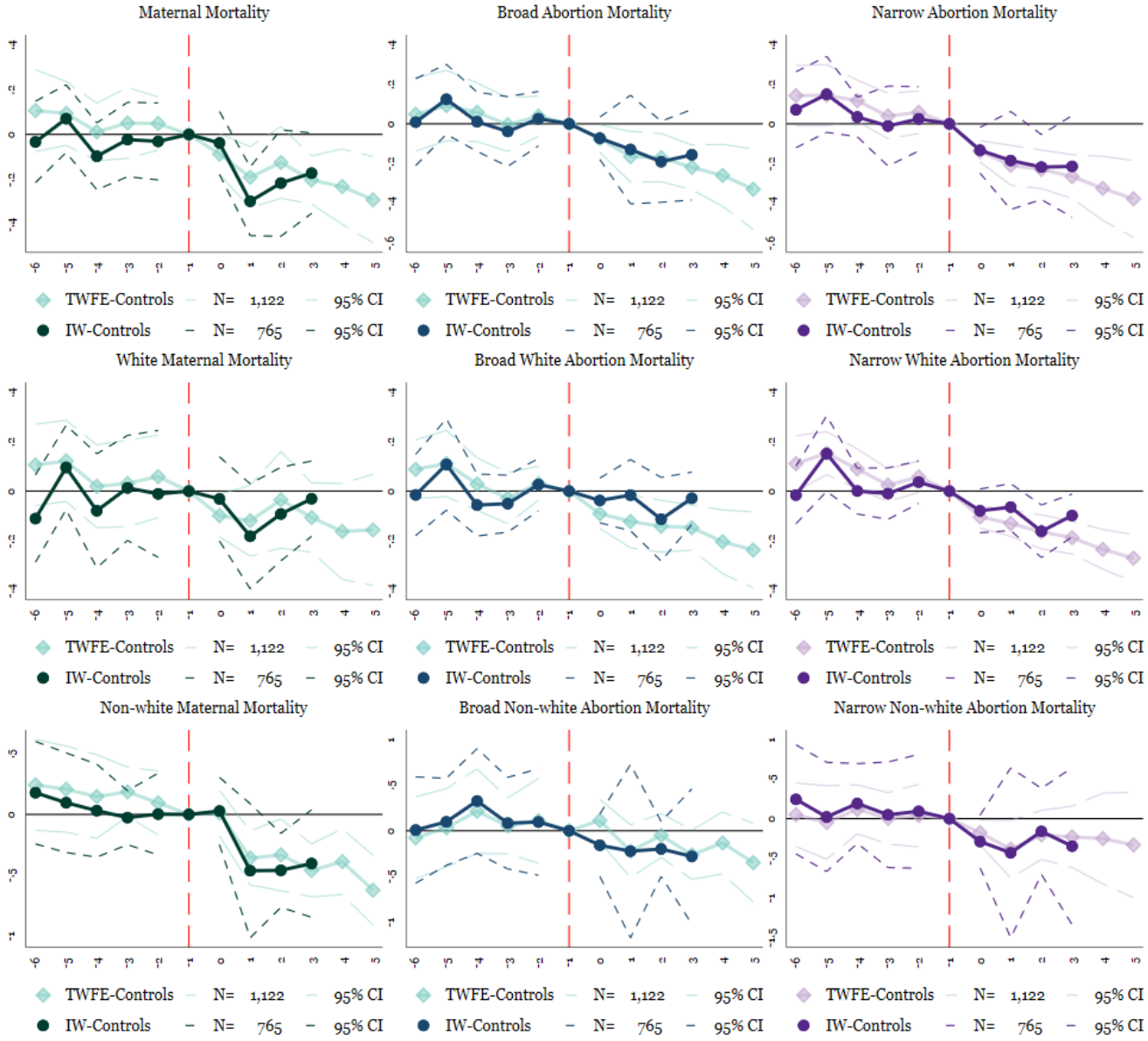
Figure IV: Effect of Travel to Early-Legal States (Spillovers): Each Stated Treated based on Proximity to DC/CA/NY (if within 500 Miles)



Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. For the two-way fixed effects specification (TWFE), the left endpoint is binned at $m = -7$, and the right endpoint is binned at $m = 6$. For the Interaction-Weighted (IW) specification, the event study is fully saturated. In the IW specification, we only consider the years 1959-1973, with *Roe v. Wade* states as the last-treated comparison group. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

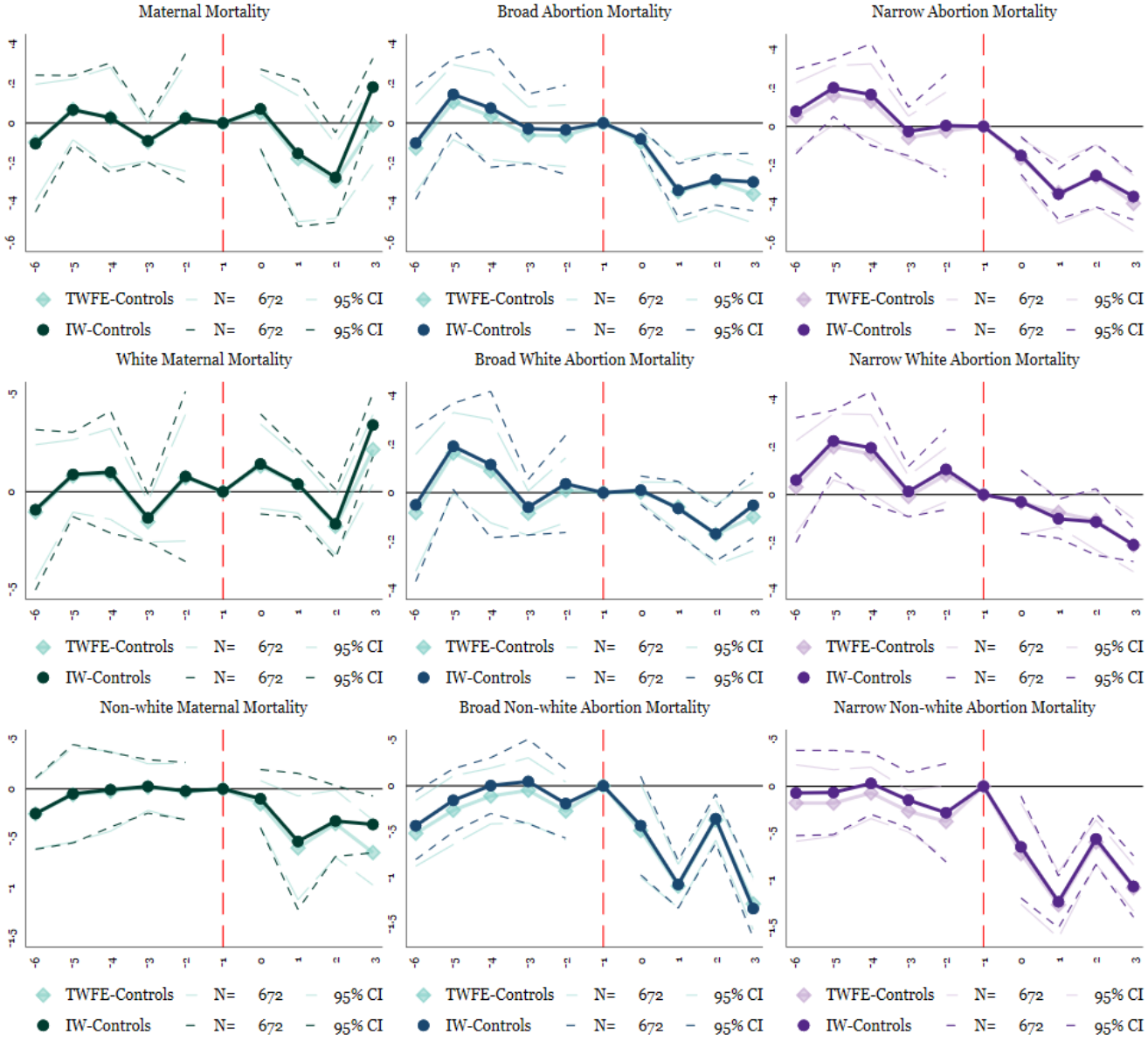
Figure V: Effect of *De Facto* Legalizations: Date of Legalization from the First Year Abortion-to-Birth Ratio Greater than 0.15



Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. For the two-way fixed effects specification (TWFE), the left endpoint is binned at $m = -7$, and the right endpoint is binned at $m = 6$. For the Interaction-Weighted (IW) specification, the event study is fully saturated. In the IW specification, we only consider the years 1959-1973, with *Roe v. Wade* states as the last-treated comparison group. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

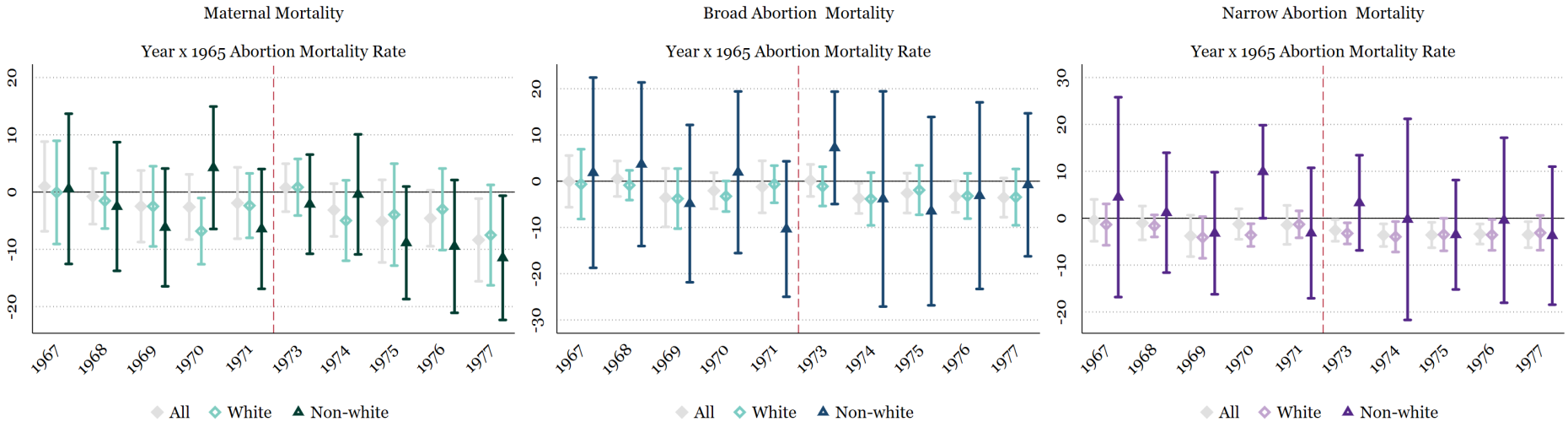
Figure VI: Effect of Early Legalizations: Legalization over 1969-1971 Relative to *Roe v. Wade* States



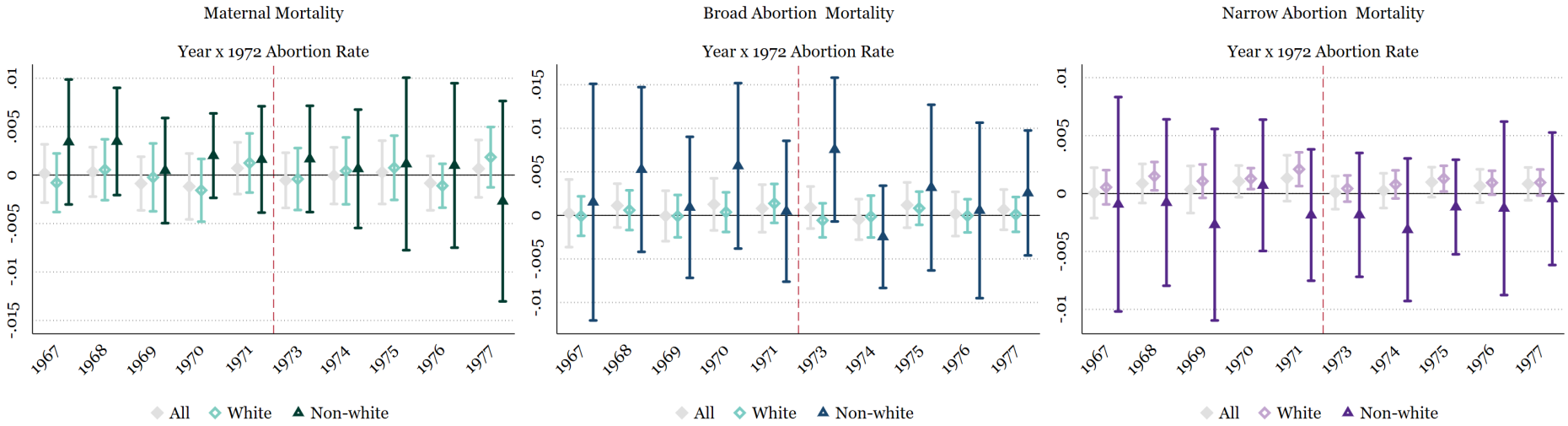
Source: NVSS/CDC Multiple Cause of Death Files, 1959-1972. States omitted include NJ and VT.
Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. Event study is fully saturated with endpoints unbinned. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

Figure VII: Effect of *Roe v. Wade*: Impact of *Roe v. Wade* in 1973 by Preexisting Abortion Demand

Panel A: Illegal Abortion Demand Measured by Pre-legalization (1965) Abortion Mortality Rate



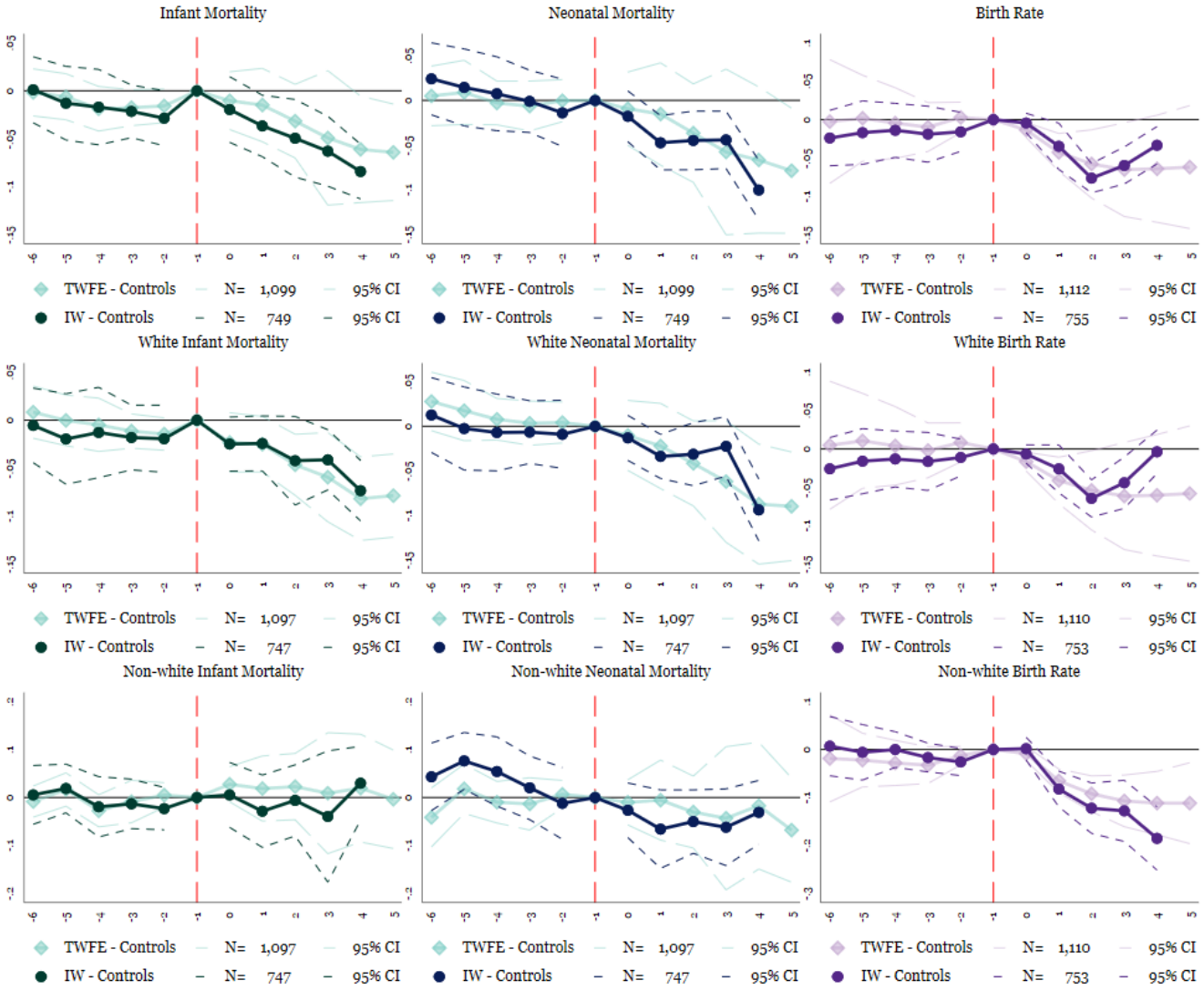
Panel B: Abortion Demand Measured by 1972 Abortion Rate



Source: NVSS/CDC Multiple Cause of Death Files, 1967-1977. Only states treated by *Roe v. Wade* are included.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the 1973 *Roe v. Wade* decision interacted with abortion demand (see Equation 2). The abortion demand interaction with 1972 is excluded. The vertical line indicates the excluded period. Lines reflect 95% confidence intervals—robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. For Panel B with only reporting states see Figure C.4.

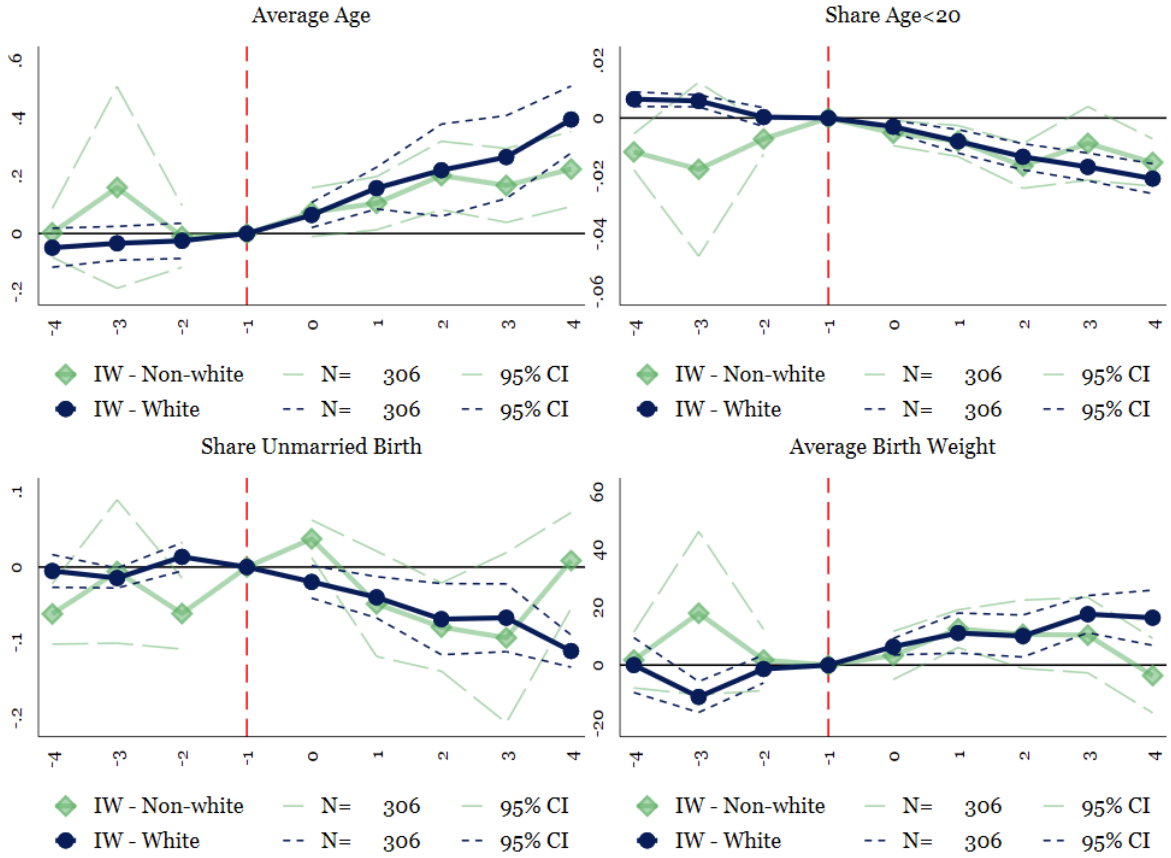
Figure VIII: Additional Results: Effect of Legal Abortion on Infant and Neonatal Mortality



SOURCE: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

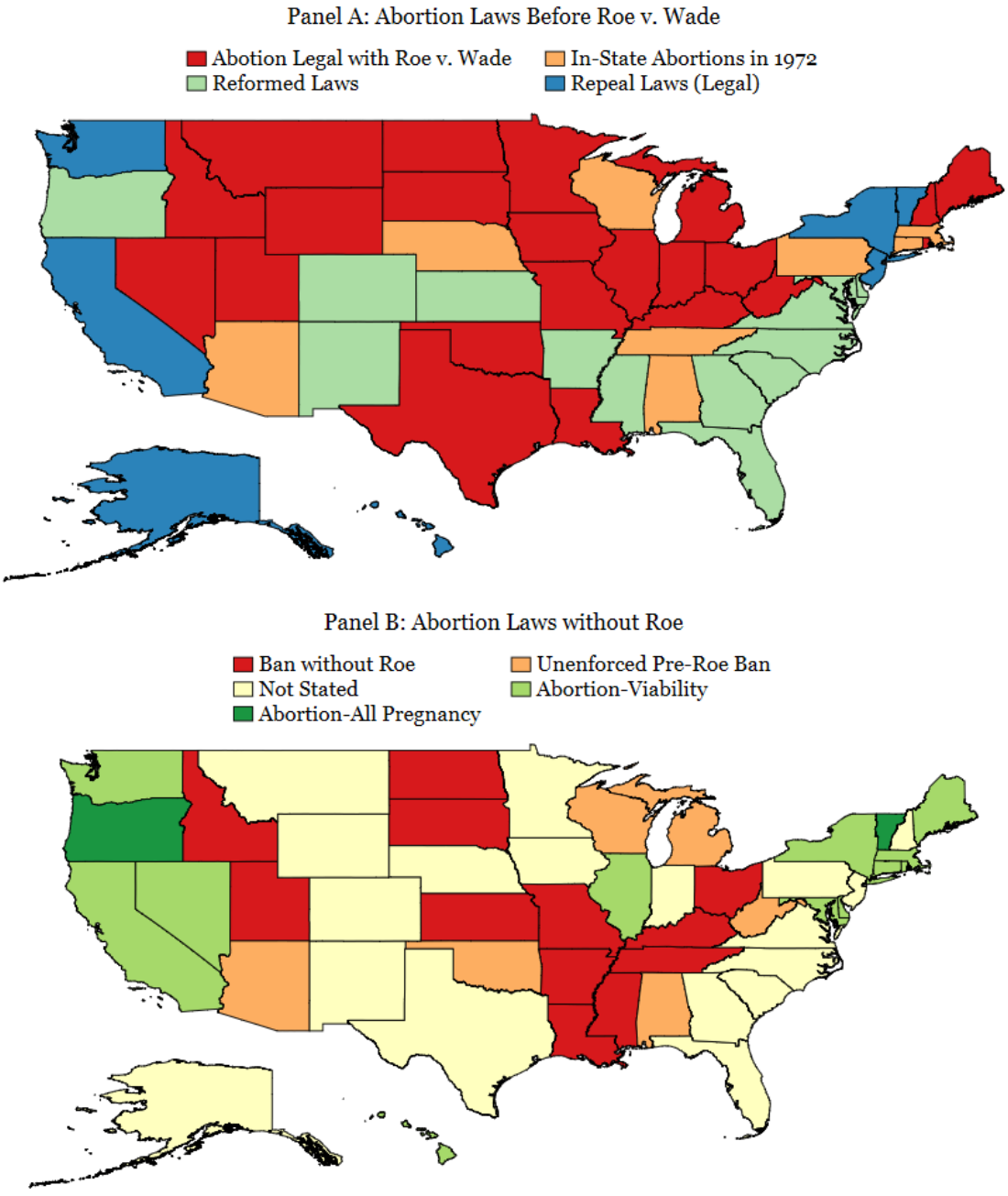
NOTES: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. For the two-way fixed effects specification (TWFE), the left endpoint is binned at $m = -7$, and the right endpoint is binned at $m = 6$. For the Interaction-Weighted (IW) specification, the event study is fully saturated. In the IW specification, we only consider the years 1959-1973, with *Roe v. Wade* states as the last-treated comparison group. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality and birth rates. Infant and neonatal mortality are per 1,000 births. The birth rate is per 10,000 reproductive-age females. Non-white (white) rates are per non-white (white) 1,000 births (infant/neonatal) or 10,000 reproductive-age female (births). Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

Figure IX: Additional Results: Effect of Legal Abortion on Delivery Characteristics



Source: Natality Detailed File or Birth Certificate Records, 1968-1973.
Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. Event study is fully saturated with endpoints unbinned. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. Estimates are weighted by the births (white and non-white). Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

Figure X: Map of Past and Present Abortion Restrictions



Source: Current policies from Guttmacher-Institute (2021). Past policies from CDC (1969-1980), Rubin (1994), Merz et al. (1996), Myers (2021a) .

Notes: Texas has an unenforced pre-Roe ban that is "permanently enjoined by court order; law not in effect." Green and blue indicate abortion access (in both graphs). Red indicates no abortion access. Orange indicates unclear or some access. For a clear description of contemporary Post-Roe policies, see the table available on the Guttmacher Institute website, which has additional details available https://www.guttmacher.org/state-policy/explore/abortion-policy-absence-roe.

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A Additional Tables

Table A.1: Percent Reduction - Non-white Mortality from Figure III

	(1)	(2)	(3)	(4)	(5)	(6)
	Non-white Maternal Mortality **TWFE**	*Non-white Maternal Mortality* **IW**	*Broad Non-white Abortion Mortality* **TWFE**	*Broad Non-white Abortion Mortality* **IW**	*Narrow Non-white Abortion Mortality* **TWFE**	*Narrow Non-white Abortion Mortality* **IW**
0	-0.108	-0.128	-0.257	-0.324	-0.300	-0.449
1	-0.282	-0.426	-0.387	-0.555	-0.466	-0.652
2	-0.369	-0.331	-0.150	-0.293	-0.294	-0.376
3	-0.378	-0.334	-0.436	-0.600	-0.401	-0.589
4	-0.383	-0.186	-0.432	-0.558	-0.447	-0.503
5	-0.392		-0.484		-0.491	

Table A.2: Percent Reduction - Abortion-Related Mortality from Figure III

	(1)	(2)	(3)	(4)	(5)	(6)
	Narrow Abortion Mortality **TWFE**	*Narrow Abortion Mortality* **IW**	*Broad White Abortion Mortality* **TWFE**	*Broad White Abortion Mortality* **IW**	*Narrow Non-white Abortion Mortality* **TWFE**	*Narrow Non-white Abortion Mortality* **IW**
0	-0.168	-0.148	-0.096	-0.023	-0.300	-0.449
1	-0.262	-0.272	-0.135	-0.056	-0.466	-0.652
2	-0.231	-0.217	-0.175	-0.145	-0.294	-0.376
3	-0.307	-0.269	-0.175	-0.038	-0.401	-0.589
4	-0.350	-0.203	-0.201	-0.026	-0.447	-0.503
5	-0.381		-0.237		-0.491	

Table A.3: Goodman-Bacon et al. (2019) Decomposition

	(1)	(2)
DD Comparison	**Weight**	**DD Estimate**
Maternal Mortality		
Earlier Treated v. Later Control	0.631	-0.229
Later Treated v. Earlier Control	0.369	-0.174
Average DD Estimate		-0.209
White Maternal Mortality		
Earlier Treated v. Later Control	0.631	0.064
Later Treated v. Earlier Control	0.369	-0.085
Average DD Estimate		0.009
Non-white Maternal Mortality		
Earlier Treated v. Later Control	0.631	-0.365
Later Treated v. Earlier Control	0.369	-0.042
Average DD Estimate		-0.246
Narrow Abortion Mortality		
Earlier Treated v. Later Control	0.631	-0.174
Later Treated v. Earlier Control	0.369	-0.034
Average DD Estimate		-0.122
Narrow White Abortion Mortality		
Earlier Treated v. Later Control	0.631	0.003
Later Treated v. Earlier Control	0.369	0.036
Average DD Estimate		0.015
Narrow Non-white Abortion Mortality		
Earlier Treated v. Later Control	0.631	-0.340
Later Treated v. Earlier Control	0.369	-0.115
Average DD Estimate		-0.257
Notes: controls and weights excluded		

Table A.4: Goodman-Bacon et al. (2019) Decomposition - Excluding *Roe v. Wade*

	(1)	(2)
DD Comparison	**Weight**	**DD Estimate**
Maternal Mortality		
Earlier Treated v. Later Control	0.582	-0.054
Later Treated v. Earlier Control	0.418	-0.012
Average DD Estimate		-0.036
White Maternal Mortality		
Earlier Treated v. Later Control	0.582	0.083
Later Treated v. Earlier Control	0.418	0.207
Average DD Estimate		0.135
Non-white Maternal Mortality		
Earlier Treated v. Later Control	0.582	-0.565
Later Treated v. Earlier Control	0.418	-0.366
Average DD Estimate		-0.482
Narrow Abortion Mortality		
Earlier Treated v. Later Control	0.582	-0.133
Later Treated v. Earlier Control	0.418	-0.084
Average DD Estimate		-0.113
Narrow White Abortion Mortality		
Earlier Treated v. Later Control	0.582	-0.099
Later Treated v. Earlier Control	0.418	0.123
Average DD Estimate		-0.006
Narrow Non-white Abortion Mortality		
Earlier Treated v. Later Control	0.582	-0.357
Later Treated v. Earlier Control	0.418	-0.384
Average DD Estimate		-0.369
Notes: controls and weights excluded		

Table A.5: Interaction of Policies: Narrow Abortion-Related Mortality

	White Abortion Mortality				Non-white Abortion Mortality			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(Legal Abortion)=1	-0.1032***	-0.0932***	-0.1044***	-0.1046***	-0.3505***	-0.3596***	-0.3927***	-0.3101***
	(0.0208)	(0.0204)	(0.0225)	(0.0230)	(0.0747)	(0.0870)	(0.0905)	(0.0748)
1(Unilateral)=1	-0.0553*	-0.0262	-0.0548*	-0.0528**	0.0508	0.0173	0.0676	0.0019
	(0.0317)	(0.0263)	(0.0310)	(0.0258)	(0.1020)	(0.1039)	(0.1054)	(0.0828)
1(Abortion Reform)=1	-0.0912*	-0.0885*	-0.0914*	-0.0875*	-0.0863	-0.0891	-0.0896	-0.0850
	(0.0532)	(0.0526)	(0.0530)	(0.0481)	(0.1018)	(0.1025)	(0.1031)	(0.1040)
1(Access to the Pill)=1	0.0284	0.0279	0.0288	0.0308	0.0527	0.0532	0.0670	0.0551
	(0.0438)	(0.0440)	(0.0444)	(0.0411)	(0.1528)	(0.1525)	(0.1552)	(0.1459)
1(Minor Access to the Pill)=1	0.0015	0.0004	-0.0018	0.0058	0.0384	0.0397	-0.0520	0.0521
	(0.0258)	(0.0256)	(0.0251)	(0.0240)	(0.0728)	(0.0721)	(0.0868)	(0.0582)
1(EPL)=1	0.0483	0.0494	0.0480	0.0527	0.0477	0.0474	0.0378	0.0735
	(0.0388)	(0.0387)	(0.0386)	(0.0397)	(0.1501)	(0.1503)	(0.1504)	(0.1553)
Log Average Personal Income	-0.1391	-0.1388	-0.1376	-0.0704	0.6884	0.6982	0.6993	-2.8431**
	(0.5104)	(0.5083)	(0.5086)	(0.4526)	(1.4000)	(1.4004)	(1.3967)	(1.3926)
Married	2.1229	2.2539	2.1266	3.0575	13.9892*	13.8729*	14.0967*	32.6302***
	(2.7087)	(2.7118)	(2.7111)	(2.6789)	(7.7033)	(7.5976)	(7.7831)	(9.7180)
Share of Population Non-white	-2.3562*	-2.3043*	-2.3551*	-2.2075	1.6164	1.5913	1.6114	-0.0873
	(1.2582)	(1.2638)	(1.2608)	(1.3287)	(1.7922)	(1.7543)	(1.7793)	(4.3317)
Share of the Population 55+	-0.8744	-1.0172	-0.8759	-1.0434	-5.8239	-5.6843	-5.9000	-14.1921**
	(1.6157)	(1.6261)	(1.6185)	(1.3887)	(6.0278)	(6.0472)	(6.0182)	(5.7337)
1(Legal Abortion)=1 × 1(Unilateral)=1		-0.0383				0.0412		
		(0.0249)				(0.1121)		
1(Legal Abortion)=1 × 1(Minor Access to the Pill)=1			0.0045				0.1274	
			(0.0226)				(0.0933)	
1(Medicaid)=1				-0.0022				-0.0299
				(0.0316)				(0.1069)
Log AFDC Benefit				0.0771				-0.1070
				(0.0641)				(0.1606)
Log Per Pupil Spending				0.1388				-0.4375
				(0.1942)				(0.4858)
% Unemployment				0.0140				-0.1201***
				(0.0155)				(0.0371)
State Cigarette Tax (inflation-adjusted)				0.0059				-0.0123
				(0.0059)				(0.0173)
N	1,122	1,122	1,122	1,069	1,122	1,122	1,122	1,069
Adjusted R-squared	0.603	0.603	0.602	0.610	0.701	0.700	0.701	0.714
1965-1968 Mean Dependent	0.337	0.337	0.337	0.337	1.465	1.465	1.465	1.465
Post-Roe Mean Dependent	0.017	0.017	0.017	0.017	0.150	0.150	0.150	0.150
State FE and Year FE	X	X	X	X	X	X	X	X
Controls	X	X	X	X	X	X	X	X

Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. The main binary variable represents legalized abortion, which captures the effect of early legal abortion as well as the 1973 *Roe v. Wade* decision (see Equation 3). In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Additional controls include the log of the state-level AFDC benefit, the cigarette tax, the unemployment rate, Medicaid access, and the log of the per-pupil education spending. Robust standard errors clustered at the state level. ***, **, * represent statistical significance at 1, 5 and 10 percent levels.

Table A.6: Interaction of Policies: Maternal Mortality

	White Maternal Mortality				Non-white Maternal Mortality			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(Legal Abortion)=1	-0.0498	-0.0635*	-0.0528	-0.0440	-0.3232***	-0.3346***	-0.2699***	-0.3163***
	(0.0300)	(0.0340)	(0.0343)	(0.0274)	(0.0651)	(0.0787)	(0.0738)	(0.0757)
1(Unilateral)=1	-0.0604	-0.1001*	-0.0591	-0.0658*	0.1189*	0.0769	0.0976	0.0819
	(0.0388)	(0.0517)	(0.0362)	(0.0352)	(0.0660)	(0.0970)	(0.0697)	(0.0668)
1(Abortion Reform)=1	0.0731*	0.0694	0.0727*	0.0714*	-0.1157**	-0.1192**	-0.1115*	-0.0844
	(0.0418)	(0.0417)	(0.0419)	(0.0369)	(0.0567)	(0.0558)	(0.0558)	(0.0651)
1(Access to the Pill)=1	0.1488	0.1494	0.1500	0.1517*	-0.1009	-0.1003	-0.1191	-0.0907
	(0.0931)	(0.0934)	(0.0936)	(0.0901)	(0.1174)	(0.1171)	(0.1175)	(0.1112)
1(Minor Access to the Pill)=1	0.0014	0.0029	-0.0070	0.0136	0.0044	0.0060	0.1185	-0.0019
	(0.0300)	(0.0302)	(0.0395)	(0.0302)	(0.0661)	(0.0666)	(0.0833)	(0.0673)
1(EPL)=1	0.0062	0.0046	0.0054	0.0279	0.0275	0.0272	0.0400	-0.0065
	(0.0508)	(0.0508)	(0.0509)	(0.0442)	(0.0637)	(0.0638)	(0.0630)	(0.0709)
Log Average Personal Income	-0.7445	-0.7449	-0.7408	-0.7727	-0.9208	-0.9085	-0.9346	-0.8171
	(0.6151)	(0.6146)	(0.6110)	(0.5983)	(0.7841)	(0.7849)	(0.7694)	(1.4608)
Married	2.4136	2.2352	2.4230	4.1607	10.8091**	10.6628***	10.6732**	19.5461**
	(3.7335)	(3.6835)	(3.7509)	(3.6067)	(4.0611)	(3.9802)	(3.9974)	(7.5749)
Share of Population Non-white	-0.2173	-0.2879	-0.2144	0.2922	3.9910**	3.9593**	3.9974**	6.9214***
	(1.4281)	(1.3952)	(1.4334)	(1.3425)	(1.6808)	(1.6482)	(1.6243)	(2.3996)
Share of the Population 55+	-0.2344	-0.0398	-0.2384	-1.9818	-4.3411	-4.1654	-4.2449	-5.1350
	(2.2633)	(2.2703)	(2.2641)	(2.2849)	(4.0330)	(4.0275)	(4.0794)	(4.2848)
1(Legal Abortion)=1 × 1(Unilateral)=1		0.0521				0.0518		
		(0.0434)				(0.1248)		
1(Legal Abortion)=1 × 1(Minor Access to the Pill)=1			0.0116				-0.1610	
			(0.0483)				(0.1269)	
1(Medicaid)=1				-0.0107				0.0367
				(0.0573)				(0.0823)
Log AFDC Benefit				0.1314				0.1355
				(0.1070)				(0.1569)
Log Per Pupil Spending				0.1318				-0.5707
				(0.2743)				(0.5245)
% Unemployment				-0.0117				-0.0068
				(0.0211)				(0.0361)
State Cigarette Tax (inflation-adjusted)				0.0101				0.0090
				(0.0086)				(0.0151)
N	1,122	1,122	1,122	1,069	1,122	1,122	1,122	1,069
Adjusted R-squared	0.786	0.785	0.785	0.788	0.773	0.773	0.774	0.766
1965-1968 Mean Dependent	1.457	1.457	1.457	1.457	3.016	3.016	3.016	3.016
Post-Roe Mean Dependent	0.463	0.463	0.463	0.463	1.400	1.400	1.400	1.400
State FE and Year FE	X	X	X	X	X	X	X	X
Controls	X	X	X	X	X	X	X	X

Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. The main binary variable represents legalized abortion, which captures the effect of early legal abortion as well as the 1973 *Roe v. Wade* decision (see Equation 3). In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Additional controls include the log of the state-level AFDC benefit, the cigarette tax, the unemployment rate, Medicaid access, and the log of the per-pupil education spending. Robust standard errors clustered at the state level. ***, **, * represent statistical significance at 1, 5 and 10 percent levels.

Table A.7: Interaction of Policies: Birth Rate

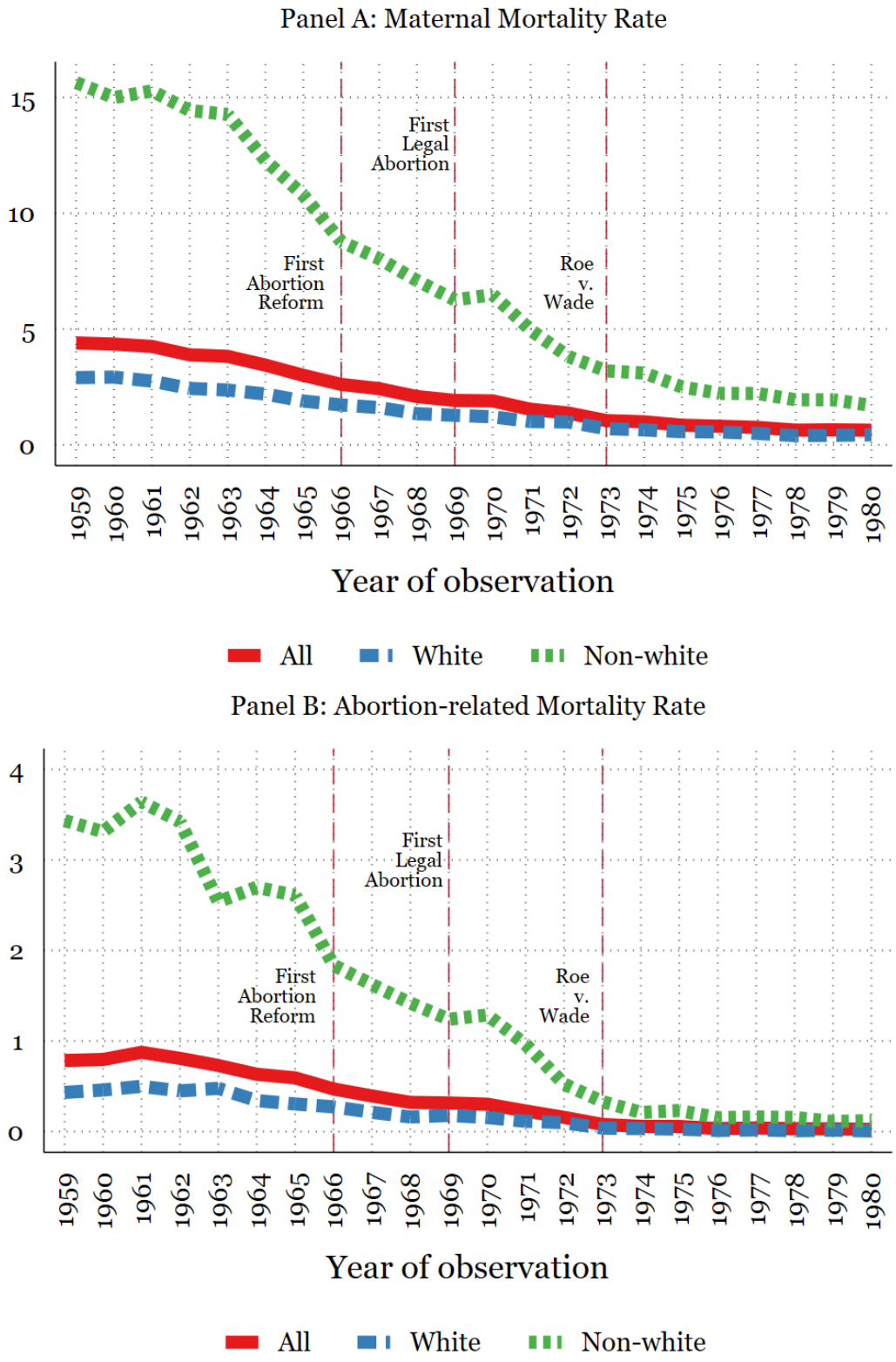
	White Birth Rate				Non-white Birth Rate			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(Legal Abortion)=1	-0.0537***	-0.0566***	-0.0528***	-0.0417***	-0.0787***	-0.0766***	-0.0849***	-0.0806***
	(0.0141)	(0.0161)	(0.0156)	(0.0094)	(0.0130)	(0.0116)	(0.0171)	(0.0119)
1(Unilateral)=1	0.0086	0.0000	0.0082	-0.0028	0.0157	0.0234	0.0182	0.0111
	(0.0161)	(0.0182)	(0.0170)	(0.0144)	(0.0167)	(0.0294)	(0.0172)	(0.0135)
1(Abortion Reform)=1	-0.0011	-0.0019	-0.0009	-0.0098	-0.0509***	-0.0503***	-0.0514***	-0.0382***
	(0.0192)	(0.0193)	(0.0192)	(0.0185)	(0.0148)	(0.0147)	(0.0151)	(0.0137)
1(Access to the Pill)=1	-0.0142	-0.0141	-0.0146	-0.0083	-0.0241	-0.0242	-0.0219	-0.0263
	(0.0170)	(0.0172)	(0.0174)	(0.0140)	(0.0226)	(0.0226)	(0.0240)	(0.0221)
1(Minor Access to the Pill)=1	-0.0020	-0.0016	0.0006	-0.0083	0.0093	0.0090	-0.0040	0.0120
	(0.0091)	(0.0089)	(0.0094)	(0.0085)	(0.0120)	(0.0121)	(0.0197)	(0.0111)
1(EPL)=1	-0.0187	-0.0190	-0.0184	-0.0235	-0.0210	-0.0209	-0.0224	-0.0194
	(0.0205)	(0.0205)	(0.0206)	(0.0208)	(0.0186)	(0.0186)	(0.0192)	(0.0165)
Log Average Personal Income	0.2506	0.2512	0.2496	0.3517	-0.2243*	-0.2264*	-0.2228*	0.0173
	(0.1892)	(0.1883)	(0.1894)	(0.2597)	(0.1273)	(0.1265)	(0.1251)	(0.2521)
Married	2.4518**	2.4138**	2.4485**	2.0991*	2.0369**	2.0629**	2.0528**	2.9427*
	(0.9897)	(0.9934)	(0.9866)	(1.1430)	(0.7749)	(0.7777)	(0.7689)	(1.5734)
Share of Population Non-white	1.1289	1.1147	1.1282	1.0702	-0.4389	-0.4324	-0.4397	-0.0766
	(0.9513)	(0.9448)	(0.9515)	(1.1311)	(0.4573)	(0.4643)	(0.4553)	(0.6732)
Share of the Population 55+	-1.5332	-1.4935	-1.5317	-1.0703	-1.3132*	-1.3428*	-1.3244*	-2.2728***
	(0.9675)	(0.9512)	(0.9680)	(1.1145)	(0.7736)	(0.7981)	(0.7639)	(0.7977)
1(Legal Abortion)=1 × 1(Unilateral)=1		0.0111				-0.0095		
		(0.0207)				(0.0266)		
1(Legal Abortion)=1 × 1(Minor Access to the Pill)=1			-0.0036				0.0187	
			(0.0123)				(0.0220)	
1(Medicaid)=1				-0.0085				0.0079
				(0.0071)				(0.0093)
Log AFDC Benefit				0.0330				0.1120***
				(0.0210)				(0.0319)
Log Per Pupil Spending				-0.1377				-0.0859
				(0.1216)				(0.0662)
% Unemployment				-0.0194***				0.0102*
				(0.0071)				(0.0060)
State Cigarette Tax (inflation-adjusted)				-0.0044				0.0062**
				(0.0049)				(0.0029)
N	1,112	1,112	1,112	1,061	1,110	1,110	1,110	1,059
Adjusted R-squared	0.969	0.969	0.969	0.971	0.970	0.970	0.970	0.971
1965-1968 Mean Dependent	5.310	5.310	5.310	5.310	5.581	5.581	5.581	5.581
Post-Roe Mean Dependent	4.890	4.890	4.890	4.890	5.133	5.133	5.133	5.133
State FE and Year FE	X	X	X	X	X	X	X	X
Controls	X	X	X	X	X	X	X	X

Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. The main binary variable represents legalized abortion, which captures the effect of early legal abortion as well as the 1973 *Roe v. Wade* decision (see Equation 3). In the main specification, we use the inverse hyperbolic sine of the mortality and birth rates. Infant and neonatal mortality are per 1,000 births. The birth rate is per 10,000 reproductive-age females. Non-white (white) rates are per non-white (white) 1,000 births (infant/neonatal) or 10,000 reproductive-age female (births). Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Additional controls include the log of the state-level AFDC benefit, the cigarette tax, the unemployment rate, Medicaid access, and the log of the per-pupil education spending. Robust standard errors clustered at the state level. ***, **, * represent statistical significance at 1, 5 and 10 percent levels.

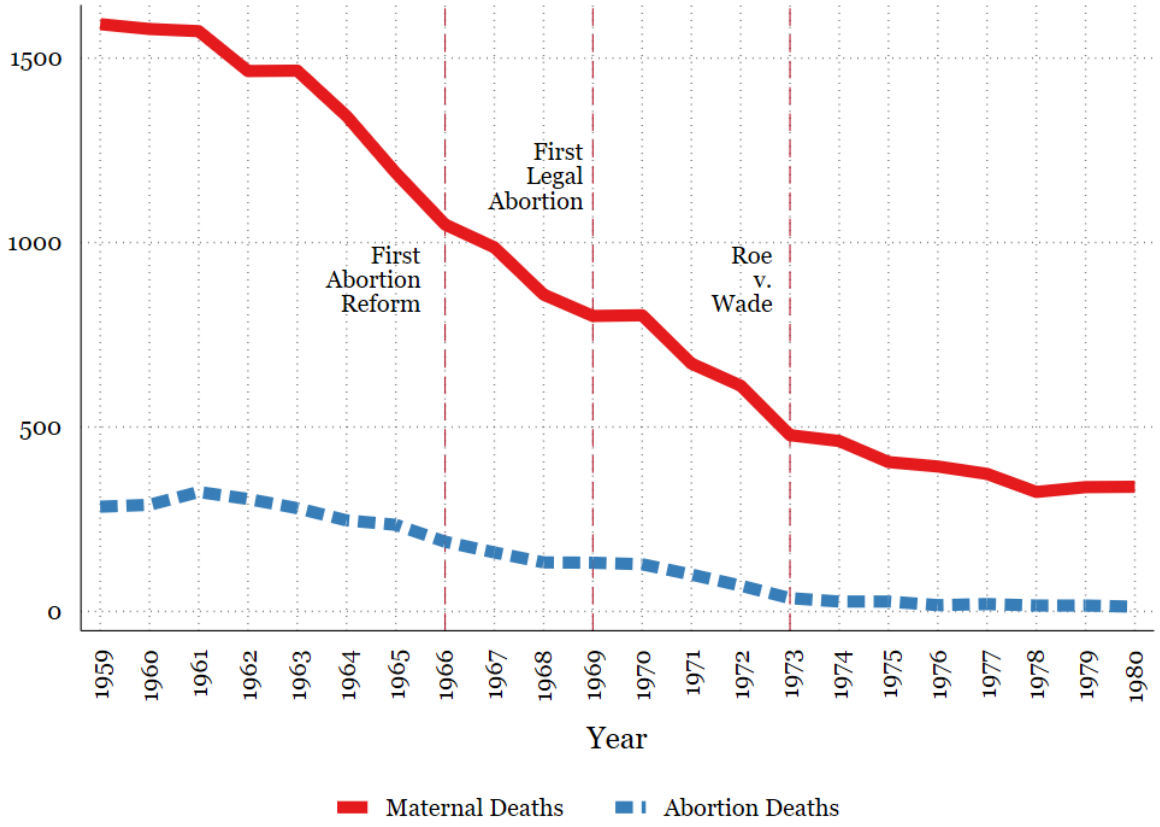
B Additional Descriptive Figures

Figure B.1: Trends in Maternal and Abortion-Related Mortality, 1959-1980



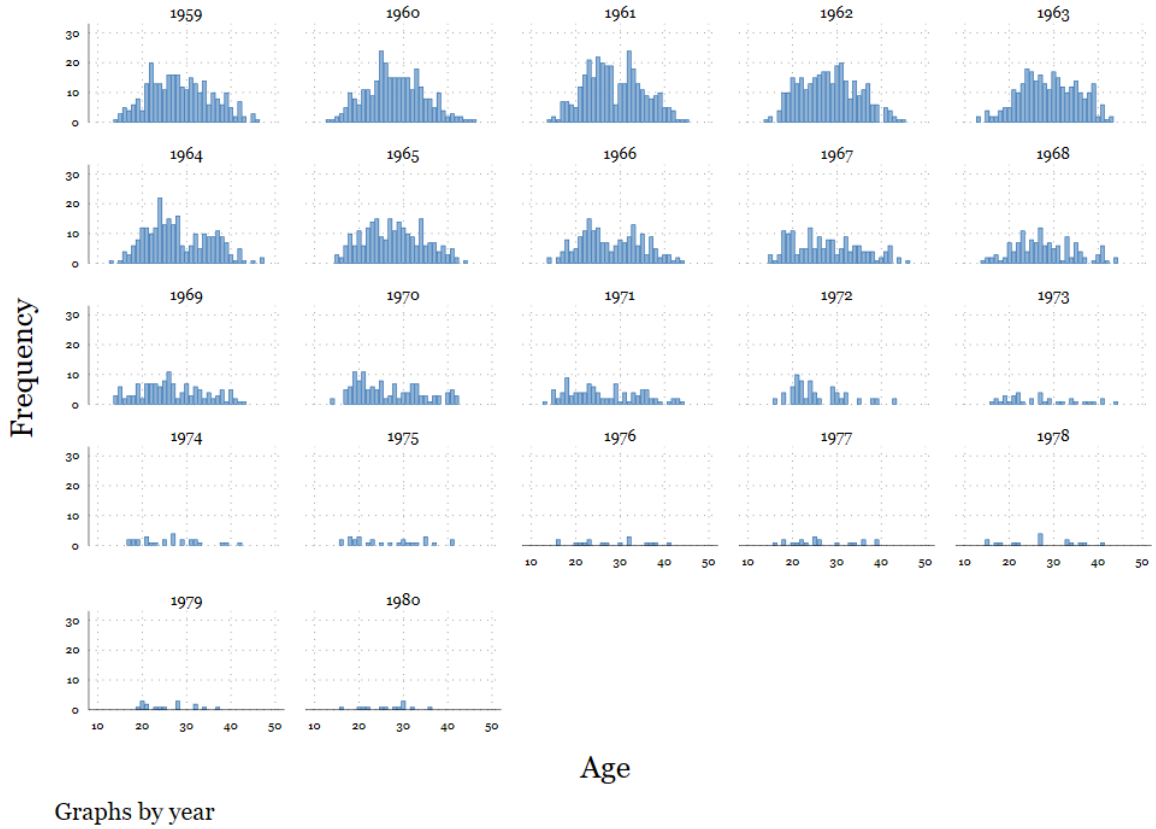
Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.
Notes: Rates are 10,000 reproductive-aged females in each population (all, white, and non-white).

Figure B.2: Trends in the Number of Maternal and Abortion-Related Deaths, 1959-1980



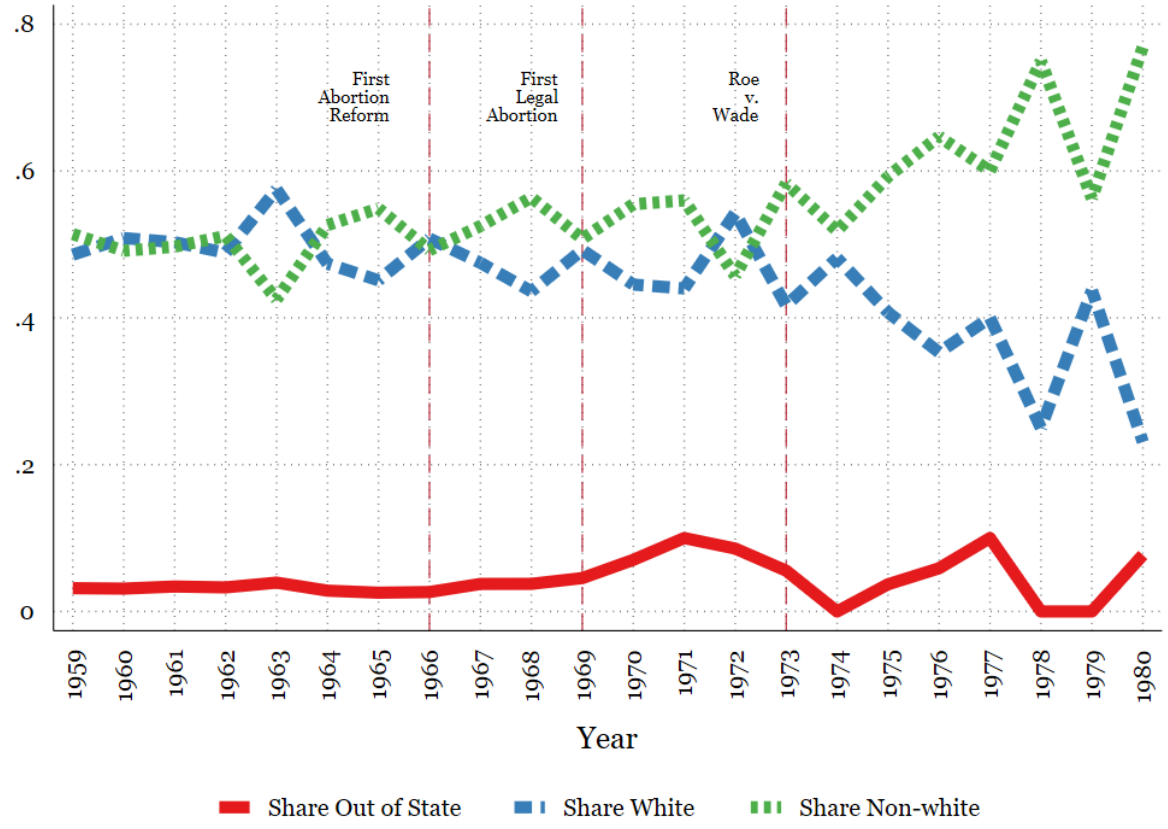
Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Figure B.3: Abortion Deaths: Counts and Age Distribution



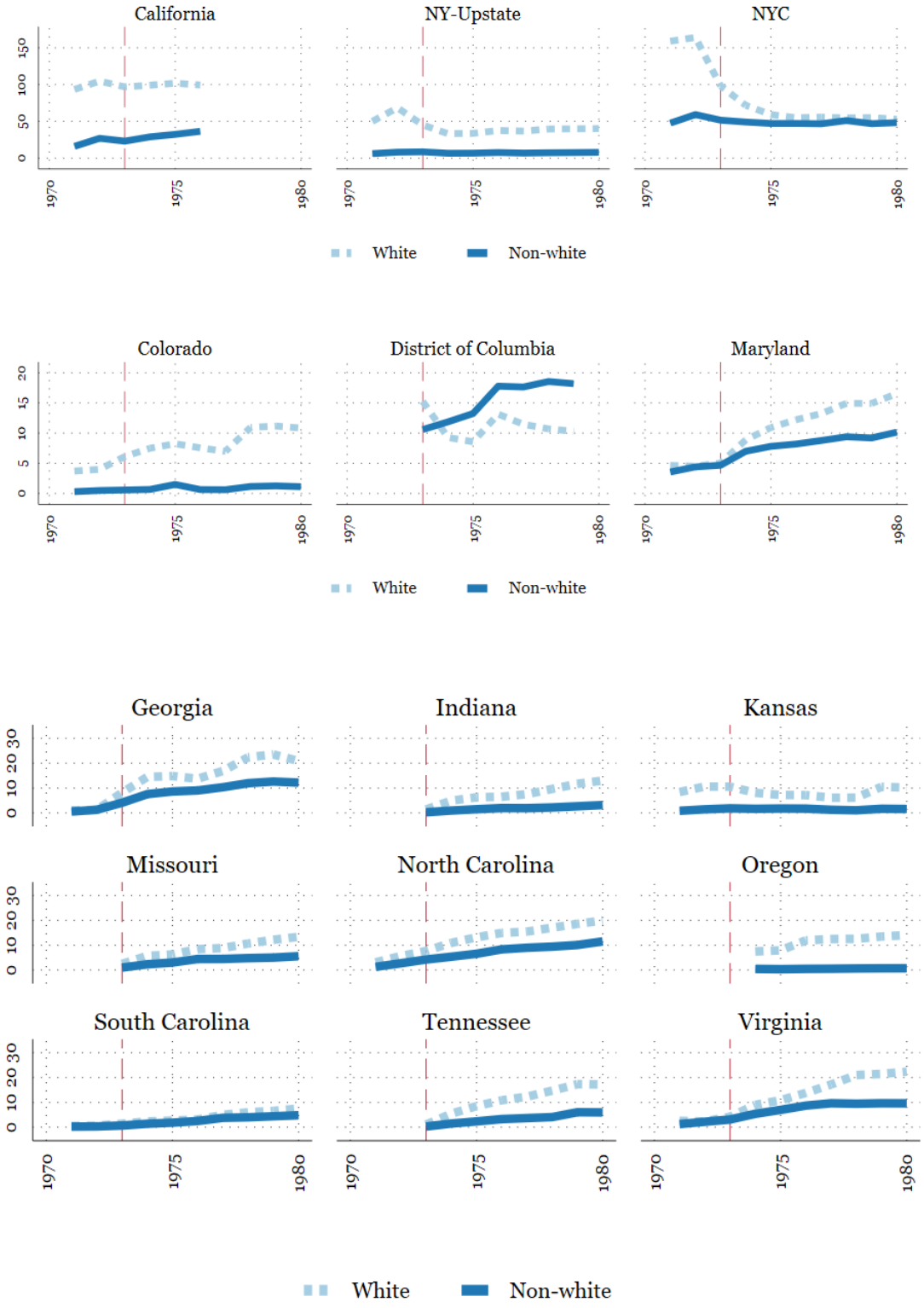
SOURCE: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Figure B.4: Abortion Deaths: Composition by Race and Non-Residents



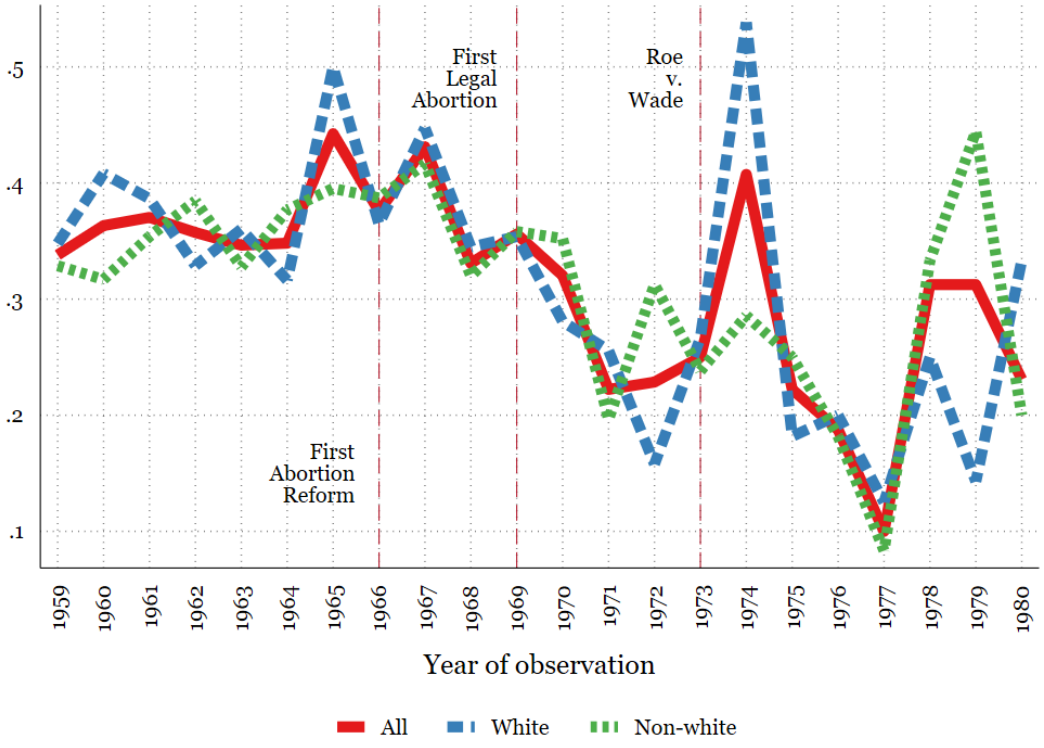
Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Figure B.5: Abortion Counts by Race and State



Source: CDC Abortion Surveillance 1971-1980.
Notes: Abortion counts in thousands. Note the scaling differences between state groups.

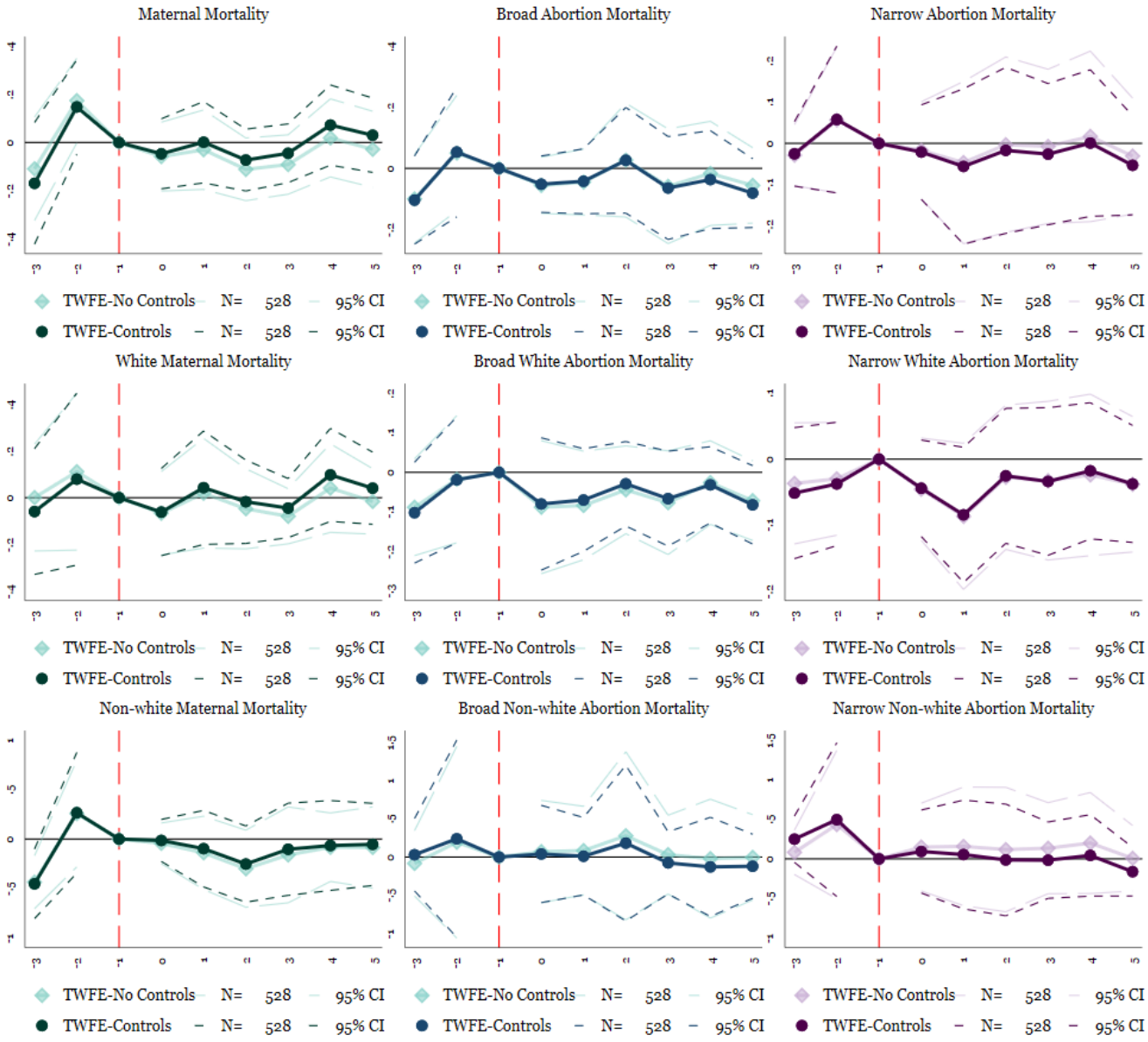
Figure B.6: Share of Maternal and Abortion-Related Mortality in Repeal States Compared to the Rest of the United States, 1959-1980



Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

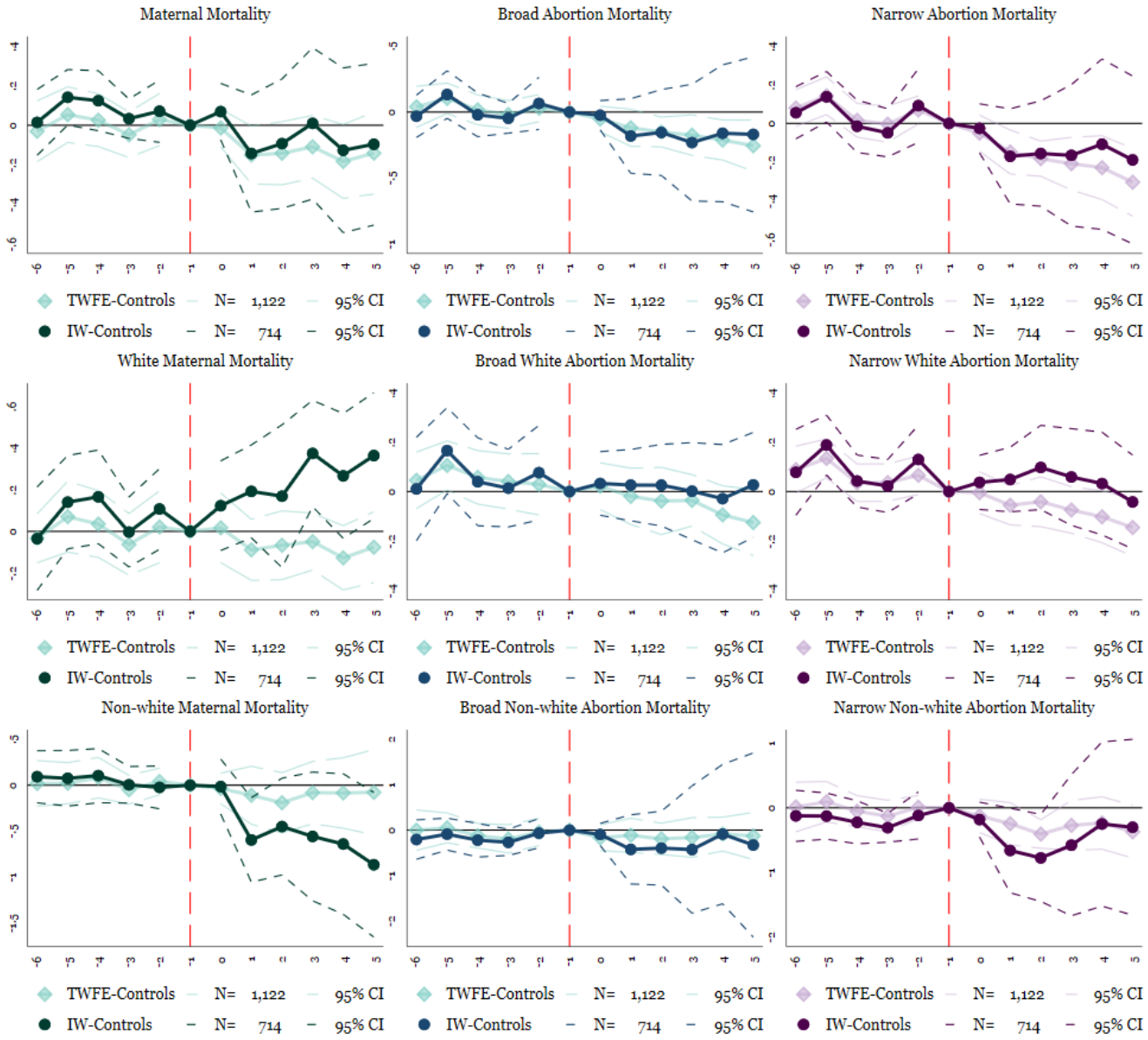
C Additional Main Figures

Figure C.1: Effect of Roe v. Wade Relative to Early-Treated



Source: NVSS/CDC Multiple Cause of Death Files. The years included in the sample are 1970-1980. States omitted include DC, NJ, and VT.
Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. Event study is fully saturated with endpoints unbinned. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

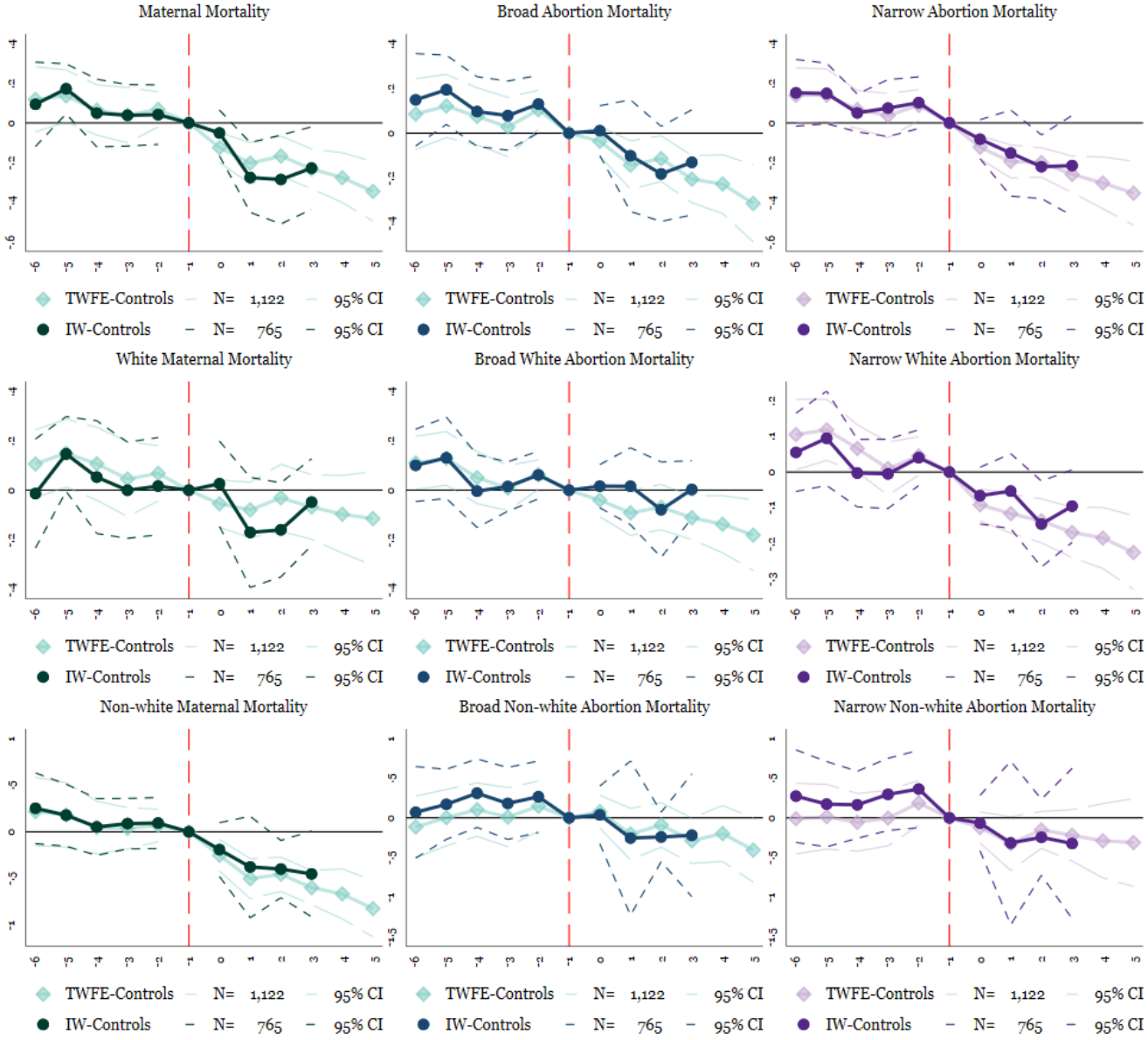
Figure C.2: Effect of Adoption of Abortion Reforms (Mainly MPC Provisions) and Abortion Legalization



Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. For the two-way fixed effects specification (TWFE), the left endpoint is binned at $m = -7$, and the right endpoint is binned at $m = 6$. For the Interaction-Weighted (IW) specification, the event study is fully saturated. In the IW specification, we only consider the years 1959-1973, with *Roe v. Wade* states as the last-treated comparison group. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

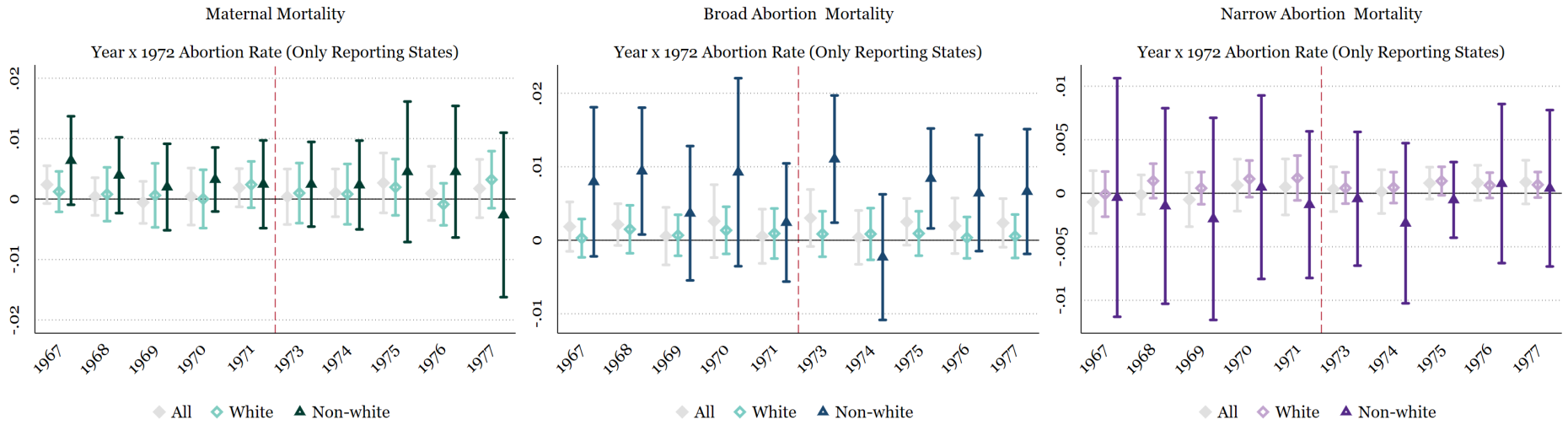
Figure C.3: *De facto* Legal Abortion: Legalizations: Date of Legalization from the First Year Abortion-to-Birth Ratio Greater than 0.1



Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the change to abortion policy (see Equation 1). The period just before the reform is the excluded period (-1)–indicated by the vertical line. For the two-way fixed effects specification (TWFE), the left endpoint is binned at $m = -7$, and the right endpoint is binned at $m = 6$. For the Interaction-Weighted (IW) specification, the event study is fully saturated. In the IW specification, we only consider the years 1959-1973, with *Roe v. Wade* states as the last-treated comparison group. Only the point estimates in the main event window are displayed. Dashed and dotted lines reflect 95% confidence intervals. Robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation.

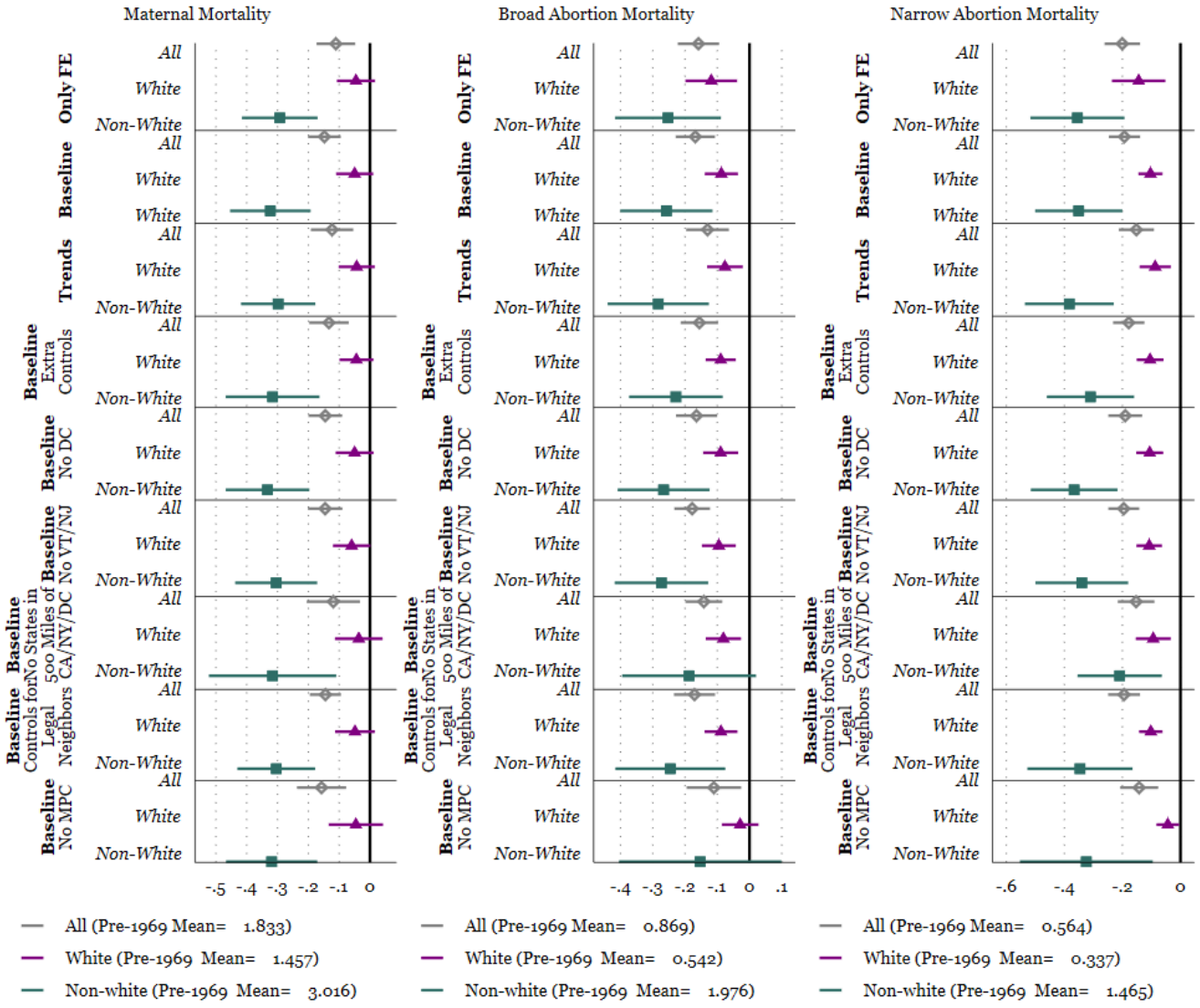
Figure C.4: Effect of *Roe v. Wade*: 1973 Impact of *Roe v. Wade* Based Abortion Demand–Measured by 1972 Abortion Rate *Only including States Reporting Abortions in 1972*



Source: NVSS/CDC Multiple Cause of Death Files. The years included in the sample are 1967-1977. Only states treated by *Roe v. Wade* are included.
Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. Plotted coefficients are dummy variables on each year before and after the 1973 *Roe v. Wade* decision interacted with abortion demand (see Equation 2). The abortion demand interaction with 1972 is excluded. The vertical line indicates the excluded period. Lines reflect 95% confidence intervals—robust standard errors clustered at the state level. In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate.

D Figures for Robustness Tests

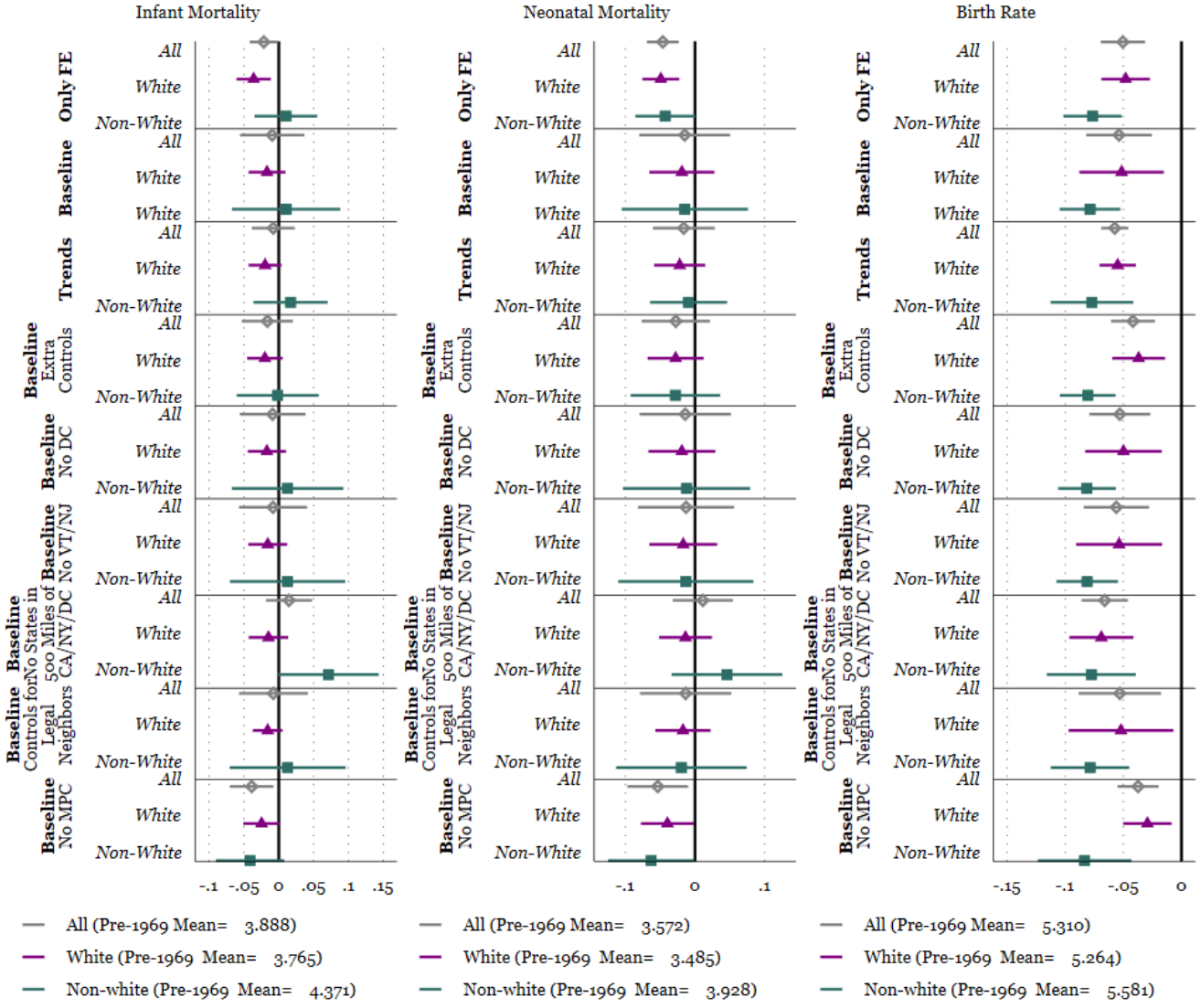
Figure D.1: Difference-in-Differences Results: Maternal and Abortion-related Mortality



Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. The main binary variable represents legalized abortion, which captures the effect of early legal abortion as well as the 1973 *Roe v. Wade* decision (see Equation 3). In the main specification, we use the inverse hyperbolic sine of the mortality rate. Maternal mortality, abortion-specific mortality, and births are per 10,000 females 15-44. Non-white (white) rates are per 10,000 non-white (white) reproductive-age females. Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Additional controls include the log of the state-level AFDC benefit, the cigarette tax, the unemployment rate, Medicaid access, and the log of the per-pupil education spending. Robust standard errors clustered at the state level. ***, **, * represent statistical significance at 1, 5 and 10 percent levels.

Figure D.2: Difference-in-Differences Results: Infant and Neonatal Mortality



Source: NVSS/CDC Multiple Cause of Death Files, 1959-1980.

Notes: OLS coefficients reported. Baseline fixed effects include state fixed effects and year fixed effects. The main binary variable represents legalized abortion, which captures the effect of early legal abortion as well as the 1973 *Roe v. Wade* decision (see Equation 3). In the main specification, we use the inverse hyperbolic sine of the mortality and birth rates. Infant and neonatal mortality are per 1,000 births. The birth rate is per 10,000 reproductive-age females. Non-white (white) rates are per non-white (white) 1,000 births (infant/neonatal) or 10,000 reproductive-age female (births). Estimates are weighted by the denominator of the rate. Our main set of state-level demographic controls includes the share married, the population share non-white, the share of the population 55+, the log of the individual average income, state-level abortion reforms, access to the pill for minors, access to the pill generally, unilateral divorce legislation, and state equal pay legislation. Additional controls include the log of the state-level AFDC benefit, the cigarette tax, the unemployment rate, Medicaid access, and the log of the per-pupil education spending. Robust standard errors clustered at the state level. ***, **, * represent statistical significance at 1, 5 and 10 percent levels.

E Declines in Maternal Mortality, 1900-1960

The leading cause of maternal mortality at the start of the twentieth century was "childbed" or puerperal fever (Anderson et al., 2020). Until 1937 (with the advent of sulfa drugs), there was no cure for puerperal fever, only preventative measures through hand-washing and the cleaning of instruments. In 1920, 40% of maternal mortality was caused by puerperal sepsis (or septicemia) (CDC, 1999; Albanesi and Olivetti, 2016). CDC (1999) reports that half of the cases of sepsis occurred directly following delivery while the other half occurred after an illegal abortion. The remaining major causes of maternal deaths included hemorrhage, toxemia, and obstructed labors (CDC, 1999; Albanesi and Olivetti, 2016). Over 1900-1930, maternal mortality showed few improvements, hovering around seven deaths per 1,000 (or 700 deaths per 100,000) (Albanesi and Olivetti, 2016).

Before the medical advancements of the 1930s and onwards, the largest contributor to improved maternal mortality occurred through public health preventive measures. Public health measures include the advent of prenatal care, which starting in the 1920s and lowered deaths from toxemia (Albanesi and Olivetti, 2016). Regulatory reforms also targeted maternal mortality over this period. Hospital and state maternal mortality review boards helped to monitor maternal health conditions (CDC, 1999). Further, state-level occupational licensing of midwives led to a reduction in maternal mortality by 6-7% over 1900-1940 (Anderson et al., 2020).

Then, between 1930 and 1950, significant medical progress produced substantial reductions in maternal mortality. In 1936, the establishment of blood banks allowed mothers to survive maternal hemorrhage for the first time (Albanesi and Olivetti, 2016). The most significant contributor to the decline in maternal mortality occurred through the discovery of sulfa drugs (between 1937 to 1943) (Thomasson and Treber, 2008; Jayachandran et al., 2010; Albanesi and Olivetti, 2016). Jayachandran et al. (2010) shows that the discovery of sulfa drugs reduced maternal mortality by 24-36%. Sulfa drugs not only lowered deaths from puerperal fever, but they also improved the survival rate from live-saving medical procedures such as cesarean section (Thomasson and Treber, 2008). Finally, the medical advancement of penicillin in the early 1940s helped further reduce maternal deaths from sepsis (Albanesi and Olivetti, 2016).

F Data Appendix

F.1 Abortion and Maternal Causes by ICD Code

We include deaths that occurred due to maternal causes (including abortion) and abortion-related causes over the period of our analysis. Due to two revisions in the ICD codes over our study period, multiple measures of maternal mortality were used to obtain maternal deaths. During the seventh revision, in place for 1958–67, maternal causes of death included ICD-7 codes 640–689 (Hoyert, 2007). In the eighth revision, applicable for 1968–78, maternal causes of death included ICD-8 codes 630–678. In the ninth revision, occurring in 1979–1998, maternal causes of death come from ICD-9 codes 630–677. In addition to the underlying causes of death, the data includes grouped causes of death, which can also be used to ascertain maternal mortality (separately from the ICD codes).

For abortion-specific causes of death, during the 7th revision, abortion includes ICD-7 codes 650–652. During the 8th revision, abortion-related deaths include ICD-8 codes 640–645. Finally, in the ninth revision, abortion-related deaths include 634–639 (Hoyert, 2007; World Health Organization , WHO). Abortion classifications change slightly between revisions to reflect the changing nature of abortion. To account for these adjustments, we take the larger header of "abortion deaths" as encompassing these changes in finer causes of abortion-related deaths.

Due to the changes in the specific causes of death, it is difficult to follow classifications of legal versus illegal abortion over time. For instance, in the ICD-9 version of the causes of death, abortion is separated into "spontaneous abortion," "legally induced abortion," and "Illegally induced abortion". However, in the ICD-7 codes, abortion is classified only as "Abortion without mention of sepsis or toxaemia," "Abortion with sepsis," "Abortion with toxaemia, without mention of sepsis." These changes in the classifications of abortion deaths are a limitation of this data, making it difficult to track individual causes of abortion deaths.

Another important feature of the multiple causes of death data is the difference between death by residence and death by occurrence. For our main results, we show the results by residence instead of occurrence. If women traveled from their residence to obtain an abortion, we would want to capture the decline in these deaths based on the residence state due to their residence states' illegal status. Despite the concern over differences between deaths in the state of residence versus occurrence, the results are similar between the use of both. We suspect this is due to the fact that only a small share of deaths occur outside the resident state (Figure B.4).

In addition to the maternal and abortion-related deaths, we also show the effect of abortion on infant and neonatal mortality. We use the age at the time of death reported on the death certificates to compute the infant and neonatal rates. Infant mortality is measured as any death occurring to infants under one year of age. Neonatal mortality is defined as the death of an infant in the first 28 days of life.

F.2 Sources

Table F.1: Abortion Legalizations–States that Repealed their Anti-abortion Statutes

	Year	State	ACTION
1	1969	California	Legalized abortion
2	1970	New York	Legalized abortion
3	1970	Alaska	Legalized abortion
4	1970	Hawaii	Legalized abortion
5	1970	Washington	Legalized abortion
6	1971	District of Columbia	Legalized abortion
7	1972	Vermont	Legalized abortion
8	1972	New Jersey	Legalized abortion
	January 22, 1973	All states	Supreme Court decisions in Roe v. Wade

Sources: CDC (1969-1980), Rubin (1994), Merz et al. (1996), Myers (2021a)

Table F.2: Abortion Reforms pre-Roe v. Wade

	Year	State	Action
1	1966	Mississippi	Legalized abortion in cases of rape.
2	1967	Colorado	MPC reform
3	1967	North Carolina	MPC reform
4	1967	California	MPC reform
5	1968	Maryland	MPC reform
6	1969	Arkansas	MPC reform
7	1969	Delaware	MPC reform
8	1969	New Mexico	MPC reform
9	1969	Georgia	MPC reform
10	1969	Oregon	MPC reform
12	1970	South Carolina	MPC reform
13	1970	Kansas	MPC reform
14	1970	Virginia	MPC reform
11	1972	Florida	MPC reform

Sources: CDC (1969-1980), Rubin (1994), Merz et al. (1996), Myers (2021a)
Notes: MPC decriminalized abortion in cases of: danger to the mother's physical or mental health, a fetus with a physical or mental defect, and a case of rape or incest.