NBER WORKING PAPER SERIES

BIRTHING A NATION:
THE EFFECT OF FERTILITY CONTROL ACCESS ON THE 19TH CENTURY DEMOGRAPHIC TRANSITION

Joanna Lahey

Working Paper 18717
http://www.nber.org/papers/w18717

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 2013

The author thanks the National Institute on Aging NBER Grant # T32-AG00186 for funding and support. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

Birthing a Nation: The Effect of Fertility Control Access on the 19th Century Demographic Transition

Joanna Lahey

NBER Working Paper No. 18717
January 2013
JEL No. J11,J13,K3,N31

ABSTRACT

During the 19th century, the US birthrate fell by half. While previous economic literature has emphasized demand-side explanations for this decline—that rising land prices and literacy caused a decrease in demand for children—historians and others have emphasized changes in the supply of technologies to control fertility, including abortion and birth control. In this paper I exploit the introduction during the 19th century of state laws governing American women's access to abortion to measure the effect of changes in the supply of fertility technologies on the number of children born. I estimate an increase in the birthrate of 4 to 12% when abortion is restricted, which lies within the ranges of estimates found for the effect of fertility control supply restrictions on birthrates today. The importance of legal abortion in reducing 19th-century birthrates helps to account for a previously unexplained portion of the demographic transition. This paper posits that there has long been a demand, often unmet, for fertility control that should be considered in future demographic research as well as in policy formulation.

Joanna Lahey
The Bush School
Texas A&M University
Mailstop 4220
College Station, TX 77843
and NBER
jlahey@nber.org

Introduction

At the start of the 19th century, the US birthrate was among the highest in the world. During the 1800s, however, the US experienced one of the world's largest decline in fertility. Total female fertility dropped from seven children per woman in 1800 to less than four per woman at the end of the 19th century (Degler 1980). This drop is referred to as the 19th Century Demographic Transition. Economic and demographic studies have largely focused on the demand-side for fertility control during this transition. Why were people demanding smaller families during this time period?

The demand hypotheses that have found the most support in the literature are the land availability hypothesis (Degler 1980, Easterlin 1971, 1976a, 1976b, Forster and Tucker 1972, Haines and Guest 2008, and Yasuba 1962) and the related bequest hypothesis (Carter et al. 2004, Easterlin, Alter and Condran 1978, Haines 1987, Steckel 1992, Sundstrom and David 1988). There is a negative correlation between child-woman ratios and population density at the state level (Yasuba 1962) and the county level (Forster and Tucker 1972). Easterlin presents a sociological hypothesis that the reason for this correlation is that parents, wanting to divide their property equally between their heirs, would rather keep their children close than send them West where land was cheaper, and thus have fewer children (Easterlin 1976a). Haines and Hacker (2006) argue that parents wanted this proximity as a form of old-age insurance. However, this is more of a motivation for parents to keep the most productive children nearby than to keep all of them. In addition, in the tradition of primogeniture that British settlers brought to the early United States, there was no need to divide up land among heirs (Easterlin

1976b). Nonetheless, Steckel (1992) finds that the strongest predictive variables for fertility were financial institutions and labor market structures, and Carter et al. (2004) and Sundstrom and David (1988) suggest that the land-availability hypothesis does poorly in the South is because slaves provided a version of old-age insurance. Carter et al (2004) presents and excellent analysis of these literatures.

There is also some support in the literature for the increased education hypothesis (Degler 1980, Easterlin 1976b, McLaren 1990, Reed 1978). Easterlin (1976b) finds a small negative correlation between literacy of parents and fertility rates among farm families, although Carter et al. (2004) find mixed results of literacy and education on fertility. McLaren (1990) and Degler (1980) report that literate wives had lower fertility than did illiterate wives married to men of the same class. Education may change attitudes towards fertility and raise the cost of children by increasing women's income potential. A similar hypothesis is the "outside opportunities for women" hypothesis. In this hypothesis, women are attracted to paid employment at the expense of childbearing. However, differences in fertility rates are found even between more and less densely populated rural areas in the 19th century, where education and literacy levels were high for all women and there were very few employment opportunities outside of the "farm-wife" role. Therefore these hypotheses cannot entirely explain the decrease in fertility rates (Easterlin 1976a).

Other hypotheses that have not found as much support include the child labor hypothesis and the burden of aged dependents hypothesis. As the US industrialized, child labor was less useful than it had been in an agricultural economy (Gordon 1976). Again, examining fertility differences among agricultural areas finds that fertility was

actually higher in areas where child labor was less useful (Easterlin 1976a). Therefore this hypothesis cannot explain the entire decline. Similarly, little evidence has been found to support the idea that families in newer areas were less likely to be supporting aging relatives. Perhaps the most convincing argument against this explanation is Easterlin's (1976a) assertion that there were not enough aged persons relative to prime-aged working adults to account for any differences in fertility.

Early economics theories also touched on fertility control as a side-effect of delayed marriage or increased breast-feeding (Degler 1980, Reed 1978, Sanderson 1979, Wahl 1986). Although these methods may have been in part responsible for some of the earlier, 18th-century, demographic transition, especially in France, they cannot explain all of the increase in child spacing or the termination of childbearing within marriage before a woman's fertile years had ended. Easterlin (1976b) provides a summary of the evidence that marital fertility limitation was more important than delayed marriage in the 19th-century U.S. demographic transition (c.f. Degler 1980, Reed 1978). These and other hypotheses are discussed in greater detail by Easterlin (1976a, 1976b), and Haines and Hacker (2006). Similarly, urbanization and industrialization have been cited as sources of lower fertility, but the drop precedes the greater part of these phenomena, and the drop in the rural birth rate matched that of the urban birth rate (Degler 1980, Reed 1978).

Outside of the field of economics, the supply side of fertility control technology has been explored more thoroughly. Historians, using letters and other print evidence, have pointed out that there has always been a demand for fertility control (Degler 1980, Mohr 1978), but the 19th century provided information and access to abortion and birth control through word of mouth, print literature, lecture tours, and the new catalogue

market (Brodie 1994, Mohr 1978, Scott Smith 1973, Smith-Rosenberg 1985, van de Walle and de Luca 2006). Put in economics terms, transaction costs for fertility control access had decreased with improved information transfer, product markets, and decreased transportation costs.

Why has this supply-side view been substantially ignored by economists?[2] Some argue that there were no birth control or abortion inventions in the 19th century (Degler 1980). Indeed, much of the birth control and abortion technology had been invented in Roman times or earlier. The only major fertility control invention in the 19th century was the 1844 vulcanization of rubber, which greatly improved the quality of condoms and decreased prices. However, just because the technology had been invented does not mean that it was available to the average American. Innovation and information transfer played an important role in 19th century fertility, as they did in many spheres during the second industrial revolution. A parallel can be made to the steam engine, invented during the time of Archimedes, but not used for practical purposes until the 18th century, and having its largest effect on the economy when applied to railroads with increasing refinements in the 19th century.[3]

A second reason for this lack of interest in supply-side causes of the demographic transition is that only recently have economists taken an interest in the effects of birth control and abortion access on major economic outcomes (cf. Angrist and Evans 2001, Bailey 2006, Donohue and Levitt 2012, Goldin and Katz 2002, Levine 2004, and others).

[2] But not all economists—David and Sanderson (1986) specifically address the supply-side of 19th century family limitation and its "quiet percolation" throughout the 19th century. Haines (1986) and Haines and Guest (2008) also mention the need for more research on information diffusion about the means to control fertility.

[3] There is some disagreement among economic historians as to the validity of this analogy. It is true that many technological advances needed to be made before Archimedes steam engine could be harnessed for practical use.

Haines (1986) also argues that the availability of 19th century data may also have limited previous activity in this area.

Information transfer and innovation can help explain the correlations that have been found between fertility rates and land prices (which are directly related to population density), between fertility rates and railroadization (Carter et al. 2004 and the author's calculations), and between fertility rates and literacy rates. Higher population density means that women can communicate different birth control techniques to each other, and that there is a market to support midwife and abortion services. Places with a large enough population center might also be included on the lecture circuit, which grew dramatically over this period (Degler 1980). Population density is also tied to canals and railroadization, which facilitated the circulation of paper information in the form of newspapers, advertisements, mail-order services, pamphlets, and books.[4] Higher literacy rates allow people to digest the flow of information.

This paper focuses on the effects of limiting availability to fertility-control information, products, and services, specifically those of abortion. It finds that fertility rates are higher in states and times when access to this technology has been cut off by state laws restricting abortion. When the costs of obtaining fertility control are higher, people will not limit their fertility as easily as when costs are lower, even when demand for fertility control does not change. Therefore, the fertility ratio will be higher in areas where access to products and information has been cut off by legislative action. This paper's estimates that abortion restrictions led to an 4-12% increase in births are

[4] Appendix Figure 1 charts the number of American books discussing reproduction and birth control found in van de Walle and de Luca (2006). Appendix Table 1 provides estimates of the correlation between state railroad mileage and child woman ratios and between having a railroad in a county and child woman ratios.

strikingly similar to results on the effects of limited abortion access for modern populations (cf. Levine et al. 1999, Angrist and Evans 1999).

The value added to recent discussions of fertility control by the approach of examining the 19th century is twofold. First, identification of effects is easier—fertility has been completed, so regressions do not need to censor for potential future children. Second, laws changed over a long period of time rather than providing, as in the case of 1970s abortion legalization, just a few years of differences between states (in addition, higher travel costs make contamination between states less of an issue). In a companion paper (Ananat and Lahey, *mimeo*), the long period since these law changes means that full lifecycle effects on the cohorts of children born to women who had more versus less fertility control can be observed. These effects include not only education, marriage, and childbearing, but even longevity and mortality.

Background

Nineteenth-century women seeking to abort often used herbal remedies before resorting to surgical ones. Some of these herbs, such as cotton root, black or blue cohosh, rue, or savin, were potentially effective abortifacients, and some herbs made women ill enough that their bodies aborted on their own (see, for example, Ernst 2002, Madari and Jacobs 2004). Other herbal remedies were not actually abortifacients, but emenogogues that did help regulate menstrual cycles and so gave the appearance of being effective abortifacients. Others were purgatives, causing illness and intestinal problems, or were harmless but useless. These remedies were widely advertised and available through mail

order until changes in the legal environment in the latter part of the 19th century made them more difficult to obtain (Brodie 1994, King 1992, Smith-Rosenberg 1985).

As in the early to mid 20th century, membrane rupture through the use of metal rods (knitting needles and crochet hooks are reported to have been popular) or sharp sticks was a common surgical method of abortion used by "irregular" abortionists and women themselves. Once the membrane was ruptured, the body would expel the fetus on its own. This method was very dangerous and could easily injure the woman's internal organs if performed incorrectly (King 1992).

Dilation and cutterage, though invented in ancient Greece, was only reintroduced to the Western world in the 1840s; it became prominent among regular physicians sometime in the 1860s or 1870s (King 1992). This method first dilates the cervix, then uses surgical tools to scrape fetal tissue out of the uterus. It is still common today, but must be performed with the appropriate tools. Although thought to be safer and more effective than membrane rupture when performed by a trained professional, it can still lead to infection.

It is not known whether abortion or childbirth was the more dangerous option during the 19th century (King 1992).[5] Observers from that time period have made the claim in either direction depending on their agenda (King 1992), and scattered statistics also point in either direction (Degler 1980, Gordon 1976, Mohr 1978, Tribe 1990). The relative danger may have varied over the time period, as both childbirth technology and

[5] Initial examination of death records provided by Fogel and by Ferrie suggests that reported deaths from childbirth were several times larger than those from abortion and miscarriage during this time. When including child bed deaths (a form of sepsis), this fraction is even larger. It should be noted that death by "abortion" in these early death certificates may mean the same as death by miscarriage (personal communication Noelle Yetter). However, it is not clear that all deaths from botched abortions would be coded as such.

abortion technology were changing throughout the century. Increases in hospital birthing have been shown to have increased maternal mortality in Europe in the 19th century and the United States in the early 20th century (maternal mortality statistics are not available for the US before the 20th century) because hospitals introduced more germs than did home births (Loudon 1993). Hospital births did not really become "safe" until the 1940s with the invention of sulpha drugs (McLaren 1990, Thomasson and Treber 2008). The germ theory of disease and the spread of dilation and cutterage may have made surgical abortions safer, if performed by trained professionals with the appropriate tools. However, the legal environment that this paper exploits made these safer abortions difficult to obtain in the second half of the 19th century.

Doctors began to notice an increase in abortions in the late 1830s and 1840s (Degler 1980, McLaren 1990). The most famous abortionist, New York City's Madame Restell, began her practice in 1838. Abortions early in the century were generally sought by poor, unmarried women. The increase in professional abortions, however, drew from the married middle-class (Degler 1980, Mohr 1978, Reagan 1991). Two thirds of abortion cases cited in the medical journals in the second half of the 19th century were of married women (Mohr 1978). Mohr (1978) and Scott Smith (1971) separately estimated that there was one abortion for every 25-30 live births in the early 19th century, but one abortion for every 5-6 live births in the mid to late 19th century.[6] Some authors estimate as many as one abortion for every 4 live births (McFarlane and Meier 2001, McLaren 1990, Tribe 1990). A study by the 1891 Michigan Board of Health cited one abortion for

[6] David and Sanderson (1986) argue that the 1 in 5 number was caused by a typographical error in the original source material and should actually be 1 in 50, a number they estimate as much too small because the rate of natural miscarriage is 1 in 5. However, the rate of natural miscarriage that they obtain is from a 1979 source, after the advent of home pregnancy tests, and thus overestimates the number of miscarriages likely to be known in the 19th century.

every 3 pregnancies, 70-80% of which were obtained by middle and upper class women, and a 6 percent mortality rate (Gordon 1976, Smith-Rosenberg 1985). Gordon (1976) suggests that earlier estimates of the number of abortions were understated and the death rates overstated because successful abortions were undercounted by contemporaries. On the other hand, David and Sanderson (1986) argue that these numbers are overestimates because they underestimate the natural rate of miscarriage. However, Sanderson (1979) suggests that somewhat under half of all births averted by ever married women were averted through induced abortion rather than birth control.

The 19th century U.S. saw many major changes besides declining fertility rates. Transaction costs were decreasing—in modern parlance, the world was getting "flatter." The United States was undergoing an early information revolution: as railroads spread across the country, mass production and distribution became a reality, and the growth of printing presses, combined with faster transportation and mass literacy, allowed for more information transfer (Smith-Rosenberg 1985). The Second Industrial Revolution brought significant changes in economic organization and modes of production. All these changes, however, were gradual, in contrast to the sharp changes that occurred within states when abortion restrictions were enacted.

History of abortion laws

Early abortion laws, beginning in the 1830s and 1840s, were some of the first instances of malpractice laws. They regulated who could legally give abortions and punished unlawful abortionists, especially if the woman died, but they did not punish women seeking abortions (Brodie 1994). Traditionally under British common law, abortions before "quickening," when the woman could feel movement, were not

considered immoral both because the fetus was generally not thought to be alive at that point and because proving pregnancy before quickening was difficult (Degler 1980, Gordon 1976, King 1992). During this time period, many state supreme courts ruled that abortion before quickening was not a criminal offense (Brodie 1994). Moreover, many of the early state abortion laws were the result of automatic criminal code revisions and were not well publicized (Brodie 1994). Many others were parts of omnibus laws protecting consumers from dangerous poisons or protecting women in general (Degler 1980, Lader 1966, Mohr 1978, Polsky 1970).

In 1860s through 1880s, however, states began to pass more restrictive anti-abortion laws that outlawed advertisements, closed loopholes, and made women liable for seeking an abortion. Many of these laws also prohibited abortions before "quickening." Unlike previous laws, these laws specifically focused on preventing abortion and were not part of omnibus law changes as the earlier laws had been (Degler 1980). Although the courts were often sympathetic to women and abortionists, the publicity and questioning during a trial could permanently tarnish a reputation and in many cases the official investigations and court trials amounted to harassment (Reagan 1991).[7]

Social Movements Towards Restriction

There are many theories as to why the more restrictive abortion laws were passed after the 1860s. The American Medical Association (AMA) was the leading force behind anti-abortion legislation. The leading theory on the subject, put forth by Mohr (1978) and

[7] Anne McCants (personal communication) suggests that even if anti-abortion laws did not directly affect ability to procure an abortion (for example, if purported abortifacents do not actually work, or women and abortionists do not actually fear the laws) they could still increase fertility if men believe that any attempts to restrict fertility in an environment where such attempts are illegal. In this case, husbands may worry that having fewer children would be indicative of lower masculinity and would thus increase their reproductive efforts in order to prevent gaining a negative reputation.

taken up by many others (Brodie 1994, King 1992), is that the fledgling AMA used abortion as a focal point in its fight to distinguish its doctors from quacks and other "irregulars." One argument made by some historians is that the AMA had originally tried to use prostitution regulation as their core issue but that effort had failed dramatically and lent strength to their opponents. Abortion better served their purpose (Reed 1978). A similar but less Machiavellian explanation for the actions of the AMA is that regular doctors believed that the Hippocratic oath disallowed abortions and did not want others practicing abortions (and, in addition, possibly stealing patients) if they could not (Mohr 1978). Another, less mainstream, theory of AMA involvement suggests that through advancing medical technology of the time, doctors had a better understanding of conception and gestation and viewed fetal growth as a continuous process, rather than one in which life was infused at "quickening," or when the mother could first feel movement (generally around 18-20 weeks) (Degler 1980). Reed (1978) suggests that physicians saw each abortion as a lost potential paying customer, especially as well-off middle class women began to be the primary recipients of abortions.

Some feminist historians emphasize that the leaders in both the anti-abortion and anti-birth control movements, such as Storer and Comstock, were themselves infertile. Recent modern evidence that legislators who are also fathers are more likely to favor abortion rights if they have daughters (Washington 2008) lends plausibility to the argument that 19th-century views on abortion were affected by such personal characteristics—that "the personal is political." A final argument is that since white, middle class women were practicing family limitation in greater numbers, middle class

white men (which included the members of the AMA) were worried about immigrants and other undesirables populating the country (Smith-Rosenberg 1985).

Data

Abortion Laws

A number of secondary sources exist describing abortion laws. Contemporary activists from both sides of the abortion debate provided snapshots of the laws as they existed at the time (Dennett 1926, Storer 1859, 1868). Additionally, historians have compiled lists of these laws for various time periods, and legal scholars have discussed specific laws in depth (Dellapena 2006, Lader 1966, Mohr 1978, Quay 1961). To identify all state laws regulating abortion, I compiled and compared these secondary sources. The original laws were also obtained from the Harvard Law Library's microfiche of superceded state statutes and the UCLA law library superceded state statutes. Additional laws were obtained via Google books and state law librarians.

In addition to the existence of the law, various characteristics of these laws were coded. These include laws regarding: obscene supplies ("articles or instruments of immoral use," such as devices, appliances, apparatuses, drugs); obscene information (any material containing obscene language or images, including information on how to obtain supplies); and laws specifically outlawing information or actions related to "procuring a miscarriage" (abortion). For each law, it is noted how what share of possible activities it restricted: importing; sale; advertisement; distribution (including circulating or printing information); verbal communication (including "uttering" or giving oral information); using the postal service; possession; possession with intent to sell or distribute; or singing. Each law's severity was also recorded: whether the offense was classified as a

misdemeanor or a felony (or left unclassified), as well as the punishment, if specified. Exemptions include coding for each law whether it contained a clause indicating that it did not apply to the following: scientific or medical works or books; medical colleges; practitioners of medicine (which could refer to physicians, nurses, druggists, midwives, etc.); artists and works of art; or activities for saving the life of the mother.

Fertility rates

Fertility behavior is observed at the level of state and decade. Ideally, to test the effect of the introduction of laws on childbearing behavior, there would be individual birth cohort data by year, i.e., the number of children born in each state in 1850, in 1851, etc. Cohort size could then be predicted using an indicator for whether there was a law in place in that state in the year before that cohort was born, when abortion policy would have been relevant for that cohort. Ideally there would also be information on individual characteristics of women linked with childbearing, in order to test hypotheses such as those in the literature on recent fertility control legal innovations that access affected the behavior of groups (such as teens, or poor women) that had relatively high demand for fertility control differently from other women.

Unfortunately, Census information on single years of birth is not available for the full sample—the Census tables only provide population data by five-year age groups (0-4, 5-9, etc). Moreover, historical Census tables do not provide information on childbearing linked to mothers. Instead, the standard measure of 19th century fertility is the child:woman ratio, calculated as the ratio of the number of children aged 0-9 to the number of women of childbearing age, or 15-44 (some authors use ages 20-44 or 20-49). Child:woman ratios were calculated by state-decade from 1800-1910 using tabulated

census data from Haines Census tables in the *Historical Statistics of the United States* (Carter et al. 2006), which is Census data cleaned by Haines (many earlier studies used a version of the data presented by Kuznets). For the 1880 census, I replaced the Haines data with collapsed cells from the IPUMs 100% sample.[8] The sample contains white women aged 15-44 (using the Yasuba interpolation for 40-44 year olds from data for 30-39, 40-49 and 50-59 year olds[9])—see Figure 1. This measure captures fertility rate and spacing between children; it is also highly correlated with total fertility (Haines and Hacker 2006). More thorough discussions of the benefits and limitations of these measures can be found in Easterlin (1976a), Haines and Hacker (2006) and Yasuba (1966).[10]

Methodology

To examine the impact of abortion restrictions on the number of children born, I exploit the quasi-experiment provided by the variation across states in the timing of passage of laws prohibiting abortion (shown in Figure 2).[11] Analysis is limited to 1850 and later for several reasons. First, many states did not exist before 1850 and did not have state law books. Second, as discussed above, there is reason to believe that there are actually two phenomena occurring in the 19th century: an increase of technology and information transfer in the first half of the century, and a legal brake on this flow in the

[8] Approximately half of the cells do not differ between the two datasets, most of those that do differ at the 100s place, several differ at the 1000s place, and three cells (Arkansas women age 10-14, Indiana women age 15-19, and Missouri women age 20-24) differ at the 10000s place. The results are very similar using the 1880 Haines census tables (generally changes only occur at the third decimal place on coefficients if at all).
[9] The interpolation formula is (A+8B-C)/16, where A is the 30-39 cohort, B is 40-49, and C is 50-59.
[10] IPUMs cell sizes for 1850-1870 are too small to be representative of the population needed.
[11] States in the chart that are not included in the regressions (because of late state-hood and/or lack of population data) are: Arizona, New Mexico, North Dakota, Oklahoma, South Dakota, and Utah.

second half. Whereas early abortion laws tended to focus on malpractice and may have actually made abortions safer for the women seeking them, later laws made abortions more dangerous and difficult to obtain. States that did not exist before 1890 were also excluded. (Most of the states gaining statehood between 1850 and 1890 had law and population information collected while territories). The Dakotas are also excluded because population information is not collected for the separate states in the early decades.[12]

Because only the entire number of children born over the ten years prior to each Census (i.e., those aged 0 to 9) is observable, the relationship between a law passed in a given year and the number of children born the next year cannot be identified. To capture the fact that a law passed between Censuses affected only those pregnancies that began afterward, a measure of for how much of a decade there was a valid law in place is defined. This measure captures the share of the decade for which the law was relevant to childbearing. This variable is lagged one year, because abortions in year 0 cause a change in births in year 1.

For a law to be relevant to the cohorts of children aged 0 to 9 in 1880, the law must have been passed in the period 1870-1879. A law passed in 1876 was relevant to those children born in 1877, 1878, and 1879—that is, it was relevant for roughly 30% of the children who were aged 0 to 9 in 1880. Therefore such a law is coded as 0.3 for the decade ending in 1880. A law passed in 1870 or earlier was coded with an indicator value of 1.0 for the decade ending in 1880. If a state did not have a law for any of the

[12] Population information is available for West Virginia, and I double checked the state ratio in Carter et al. (2006) with county-level data. WV laws are coded as the same as those in VA prior to the split until WV updated its law sometime after the split.

period 1870-1879, the indicator has a value of 0 for the decade ending in 1880. Details of the laws, such as restrictions, were coded by decade in a similar fashion.

The empirical specification is as follows:

$$(1) \qquad F_{ds} = \beta_1 \, havelaw_{ds} + \delta_d + \delta_s + d*\delta_s + e_{ds}$$

where F_{ds} represents alternative measures of ten-year fertility in decade d in state s, and $havelaw_{ds}$ is a continuous indicator variable ranging in value from 0 to 1 that reflects the share of the decade for which a state has a law restricting abortion. State-specific (δ_s) and decade-specific (δ_d) fixed effects are included to capture longstanding differences in fertility patterns across states over time as well as aggregate patterns of changing fertility preferences over time. In some specifications I also allow the state-specific differences to trend over time by including an interaction between δ_s and decade d. In some specifications, I include $d^2*\delta_s$, the square of the state-specific time trend. The main specification is unweighted to study the effect of the experiment, other specification checks were weighted by total population to provide information for back of the envelope calculations on the overall effect of the changes or women age 15-44 as a specification check. The coefficient β_1 measures the difference in ten-year fertility between states for which a law was in effect for the entire decade ($havelaw_{ds}$ =1) and states for which a law was never in effect in that decade ($havelaw_{ds}$ =0). In some specifications F_{ds} is measured as the level of the child:woman ratio, and in others as the log of that ratio. When using the ratio itself, β_1 represents an estimate of the change in the number of children born per woman; when using the logged ratio, β_1 represents the percent change in childbearing.

Results

The results of OLS estimates of equation (1) are shown in Table 1, Panel I. Log and level regressions give similar results. Estimates suggest that laws restricting abortion led to an increase of between 106 and 137 children born over a decade per 1000 women, or a 9% to 12% increase in the number of children per woman from a base of about 1100 on average. These results are statistically significant at conventional levels in most specifications, depending on decisions about weighting. The preferred specification is that in column (4), with a full set of state and year fixed effects and state trends, suggesting a 12% increase. Including state-specific time trends generally increases the estimated strength and significance of the relationship between legal restrictions and birth rates, suggesting that it is important to include controls for secular trends.

The second panel of Table 1 estimates the overall affect of these laws on the population of the United States. Unlike Panel I, which tests the effect of the natural experiment, Panel II includes weights by total population, giving more power to the actions of larger states. The point estimates for these results are somewhat smaller and less significant, particularly when state trends are included in the estimation. These results suggest that the laws increased the national child/woman ratio by 4 to 12%.

Table 2 tests the different aspects of these laws that may have strengthened or weakened the effects of the laws. The effect of a medical exemption signed as expected and not significant, however it increases the effect of having an abortion law on fertility to an increase of 15%. This variable indicates that an abortion is legal if there is a therapeutic exception to save the life of the mother or child or that physicians and medical texts are exempt from the law. Controlling for laws that allow for a crime to be committed only if the fetus dies also strengthens the impact of the have law variable to

13%. With this exception, a woman can seek an abortion or a practitioner can perform one without being prosecuted. Since early abortions with abortifacients are difficult to detect as abortions, the law essentially allows early abortions prior to quickening as had been allowed by common law. Holding the female at fault increases fertility, but not significantly so and controlling for female fault does not affect the effect of having a law. However, this results should be interpreted with caution as only a few laws deem the female at fault. Prohibiting sale, ads, and mailing of abortion information does not seem to affect fertility beyond the effect of the original law.[13] Classifying abortion as a felony seems to have no impact on the law; this lack could be because judges and juries were generally sympathetic to abortion cases in terms of finding fault and sentencing, but the true penalty for those accused came from the publicity associated with the trial (Reagan 1991).[14]

One controversy in the literature is on the effects of the legality of abortion prior to quickening. Mohr (1978) holds that the change in legality of abortions prior to quickening is important and makes the laws more restrictive. Later and openly pro-life scholars (e.g. Dellapenna 2006, Olansky 1995) disagree, arguing that abortion before quickening was always prohibited. King (1992), in contrast to either faction, takes a more pragmatic view and argues that physicians could not determine pregnancy prior to quickening. Columns (7) and (8) in Table 2 examine the effect of laws restricting abortion prior to quickening and find no effect of these law characteristics. This null

[13] Disallowing any information about abortions has similar results. It may be that the availability of effective early abortifacents was limited and that the majority of the action of these laws is occurring with later term abortions. However, I do not want to put too much weight on this conclusion.

[14] Coefficients are remarkably similar when all characteristics are included in the same regression; the effect of having a law increases to 16% with all characteristics included. Other law characteristics discussed in the literature but not presented here include poison and instrument prohibitions. These do not seem to have much of an impact, probably because the majority of laws include poison and instrument prohibitions so there is not much variation in these restrictions.

result suggests that how quickening was treated was not that important in the 19th century.

Another Mohr hypothesis that can be examined is the relationship between AMA strength and passage of anti-abortion legislation. Figure 3a provides a scatter-plot with the date of a physician licensing law (Marks 2009) on the X-axis and year of first anti-abortion law on the Y-axis. The thought would be that an upward slope would indicate a positive relationship between physician political power and passage of anti-abortion laws. There appears to be no such effect. Figure 3b uses a different measure of physician power, the year that the first medical school was passed (US Bureau of Education 1898).[15] Here there is an upward trend suggesting that the relationship is worth looking into. Table 3 shows the standard regression including whether or not a state has a physician licensing law in columns (1) and (2) or a medical school in columns (3) and (4). The lack of effect of physician licensing law is borne out in the first two columns. Column (3) suggests that having a medical school may impact the effect of an anti-abortion law, however, that effect goes away once state specific time trends are controlled for as in column (4). Thus physician strength does not seem to be related to passage of anti-abortion legislation. However, the measures of physician strength are crude and better measures may find an effect.

[15] Year medical school was passed includes regular and eclectic schools and does not include homeopathic and postgraduate. Dates of first medical school after 1898 were taken from later editions of *The Report of the Commissioner of Education Made to the Secretary of Education* and from http://en.wikipedia.org/wiki/List_of_medical_schools_in_the_United_States , confirmed on each medical school's webpage as the earliest. Later editions of *The Report of the Commissioner of Education* have different definitions of what is counted as a medical school, but we use the 1898 definition for all schools prior to 1898. The results are very similar using different definitions.

Laws restricting abortion are positively correlated (correlation is .47) with those restricting birth control.[16] Putting the two types of fertility restriction laws together as in Table 4, controlling for birth control laws does not seem to change the effect of having an abortion law. Different methods of measuring birth control laws also do not seem to affect the effect of an abortion law.

If, rather than childbearing patterns changing in reaction to laws, in fact the passage of laws reflected legislative reaction to changes in childbearing, then these estimates could not be interpreted as the effects of changes in access to fertility control. The falsification check shown in Table 5 tests for this possibility; I attempt to predict the passage of a law in the next decade using the child to woman ratio in the current decade. These tests find no consistent or statistically significant relationship between fertility and subsequent passage of a law in any specification, as shown in column (1). There is also no evidence for an effect of the percent immigrant, the female-male ratio, or the percent of the population lost in the Civil War on the probability that a law was passed in the next decade, as demonstrated in columns (2)-(4) respectively.[17]

Another worry is that these laws prohibiting abortion are merely symptomatic of changes in social mores that themselves affect fertility. Therefore I collected information on legislation that prevented obscene singing, something that should be correlated with social mores, but presumably would not affect fertility directly. I also used data from (Eskridge 2009) on state laws banning public indecency and public exhibition which

[16] I collected laws restricting birth control from primary sources and compared them to those collected by Bailey (2010). However, the passage of these laws is predicted by previous fertility rates and thus the laws do not exogenously predict current fertility.

[17] Pretending the law was introduced 10 or 20 years earlier in results available from the author also decreases the magnitude and significance of the coefficient (eventually flipping the sign), further suggesting that the laws are not endogenous to fertility.

should be similarly correlated with social mores but should not directly affect fertility.[18] Table 6 shows that all of these laws have a negative rather than a positive effect on ln(fertility) in specifications without a state-specific time trend included. Indecency laws are significant at the 5% level in column (1) but this significance disappears and the sign flips once a state specific time trend is accounted for. Exhibition laws show a similar sign flip from column (3) to (4). Obscene singing laws remain negative and insignificant in both column (5) and (6).

Finally, Table 7 provides additional specification checks. The magnitudes of the coefficient of *havelaw* are smaller when weighted by the number of women age 15-44 as in column (1). Percent black in a state does not affect the coefficient of *havelaw* in column (2). Although a south dummy is positive and significant, it does not change the coefficient of *havelaw* once state dummies and state trends are also controlled for as in column (3). Clustering by state, column (4), or by state*year, column (5), does not affect the results. Results are also nearly identical when fertility is measured with children age 0-9/ women age 20-44 or when measured with children age 0-4/women age 15-44 as in columns (6) and (7). The coefficient is somewhat larger when the sample is limited to 1860-1910 rather than 1850-1910, despite the larger sample size, as in column (8).

Discussion and Conclusion

These estimates are highly consistent with research on recent (1970s-era) changes in legal access to abortion and birth control, which find effects from 5% for the overall population to 15% for groups that are particularly likely to want to decrease childbearing

[18] Eskridge (2009) also included laws on indecent liberties, enticement, contributing to sexual delinquency, and schoolyard loitering but these laws tended to be passed later than anti-abortion laws.

(e.g. poor women, teenagers) (Ananat and Hungerman 2006, Levine et al. 1999). The consistency of the birthrate response to restrictions on fertility control is remarkable particularly because of the lower efficacy and higher risks associated with 19th-century methods of abortion. These results suggest that demand for increased fertility control has been persistent since the 19th century, rather than being a recent social development driven merely by shifting gender roles or increased labor market opportunities. How much lower would fertility have been in the absence of these laws? A back of the envelope calculation, shown in Table 8, suggests that in the absence of abortion laws, fertility would have been 5.23% lower without abortion laws in 1900 and 5.72% lower in 1910 and 13.81% lower in 1920.

The flow and eventual cutting off of information and product availability for fertility control did have real effects on fertility rates in the 19th century United States. Using laws restricting abortion as a source of variation in availability, reducing the availability of abortion increased fertility rates in the 19th century. These estimates of the effects of abortion access are similar to those found in more recent times, and suggest that when studying the 19th century U.S. demographic transition, explanations based on supply factors cannot be neglected relative to those based on demand.

Works Cited

Ananat, Elizabeth Oltmans and Daniel M. Hungerman. "The Power of the Pill for the Next Generation: Oral Contraception's Effects on Fertility, Abortion, and Maternal and Child Characteristics," *The Review of Economics and Statistics*, MIT Press, vol. 94(1), pages 37-51, 2012.

Angrist, Joshua and Evans, William N. "Schooling and Labor-Market Consequences of the 1970 State Abortion Reforms," S. Polachek and J. Robst, *Research in Labor Economics 18.* Greenwich: JAI Press, 1999.

Bailey, Martha J. "More Power to the Pill: The Impact of Contraceptive Freedom on Women's Life Cycle Labor Supply." *Quarterly Journal of Economics*, 2006, *121*(1), pp. 289-320.

____."*Momma's Got the Pill*: How Anthony Comstock and *Griswold v. Connecticut* Shaped U.S Childbearing," *American Economic Review*, 2010.

Brodie, J.F. *Contraception and Abortion in Nineteenth-Century America*. Ithaca, NY: Cornell University Press, 1994.

Carter, S., R. Ransom, and R. Sutch, 2004, "Family Matters: The Life-Cycle Transition and the Antebellum American Fertility Decline," in: T. Guinnane, W. Sundstrom, and W. Whatley, eds., *History Matters: Essays on Economic Growth, Technology, and Demographic Change* (Stanford University Press, Stanford) 271-327.

Carter, Susan B.; Gartner, Scott Sigmund; Haines, Michael R.; Olmstead, Alan L.; Sutch, Richard and Wright, Gavin eds**.** *The Historical Statistics of the United States* 2006.

David, Paul A. and Sanderson, Warren C. "Rudimentary Contraceptive Methods and the American Transition to Marital Fertility Control, 1855-1915," S. L. Engerman and R. E. Gallman, *Long-Term Factors in American Economic Growth.* Chicago and London: University of Chicago Press, 1986, 307-90.

Degler, C.N. *At Odds: Women and the Family in America from the Revolution to the Present.* New York, NY: Oxford University Press, 1980.

Dellapenna, Joseph W. *Dispelling the Myths of Abortion History*, 2006, Carolina Academic Press.

Dennett, M. W. *Birth control laws, shall we keep them, change them, or abolish them*, F. H. Hitchcock, 1926.

Donohue, John J. and Levitt, Steven D. "The Impact of Legalized Abortion on Crime." *Quarterly Journal of Economics*, 2001, *116*(2), pp. 379-420.

Easterlin, Richard A. "Does Human Fertility Adjust to the Environment?" *The American Economic Review*, 1971, *61*(2), pp. 399-407.

____. "Factors in the Decline of Farm Family Fertility in the United States: Some Preliminary Research Results." *The Journal of American History*, 1976a, *63*(3), pp. 600-14.

____. "Population Change and Farm Settlement in the Northern United States." *The Journal of Economic History*, 1976b, *36*(1), pp. 45-75.

Easterlin, Richard A.; Alter, George and Condran, Gretchen. "Farms and Farm Families in Old and New Areas: The Northern States in 1860.," T. K. Hareven and M. Vinovskis, *Family and Population in Nineteenth Century America.* Princeton, NJ: Princeton University Press, 1978, 22-84.

Ernst, E. "Herbal Medicinal Products During Pregnancy: Are they safe?" *BJOG: An International Journal of Obstetrics & Gynaecology*, 109: 227-235, 2002.

Forster, C. and Tucker, G.S.L. *Economic Opportunity and White American Fertility Ratios 1800-1860*. New Haven, CT: Yale University Press, 1972.

Goldin, Claudia and Katz, Lawrence F. "The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions." *Journal of Political Economy*, 2002, *110*(4), pp. 730-70.

Gordon, L. *The Moral Property of Women: A History of Birth Control Politics in America*. Chicago, IL: University of Illinois Press, 2002.

Gordon, Linda. *Woman's Body, Woman's Right: A Social History of Birth Control in America*. New York: Penguin Books, 1976.

Gruber, Jonathan; Levine, Phillip B. and Staiger, Douglas. "Abortion Legalization and Child Living Circumstances: Who Is the 'Marginal Child?" *Quarterly Journal of Economics*, 1999, *114*(1), pp. 263-92.

Haines, Michael R. "Comment on New Results on the Decline in Household Fertility in the United States from 1750 to 1900," S. L. Engerman and R. E. Gallman, *Long-Term Factors in American Economic Growth.* Chicago and London: University of Chicago Press, 1986, 426-37.

____. "Economic History and Historical Demography: Past, Present, and Future," A. J. Field, *The Future of Economic History*. Boston: Kluwer, 1987, 185-253.

Haines, M. R. and A. M. Guest. "Fertility in New York State in the Pre-Civil War Era." *Demography*, 2008, **45**(2): 345-361.

Haines, Michael R. and Hacker, David. "The Puzzle of the Antebellum Fertility Decline in the United States: New Evidence and Reconsideration." *National Bureau of Economics Working Paper*, 2006, *12571*.

Haines, Michael R. and J. David Hacker "Spatial Aspects of the American Fertility Transition in the Nineteenth Century" 3 in *Navigating Time and Space in Population Studies*. M. P. Gutmann et al. (eds), International Studies in Population 9, DOI 10.1007/978-94-007-0068-0_1, Spring Science and Business Media B.V., 2011.

King, Charles R. "Abortion in Nineteenth Century America: A Conflict between Women and Their Physicians." *Women's Health Issues*, 1992, *2*(1), pp. 32-39.

Lader, L. *Abortion*. New York, NY: Bobbs-Merril Company, 1966.

Law, Marc, and Mindy Marks. "Effects of Occupational Licensing Laws on Minorities: Evidence from the Progressive Era." *The Journal of Law and Economics*, 52(2):351-366, 2009.

Levine, Phillip. *Sex and Consequences*. Princeton: Princeton University Press, 2004.

Levine, Phillip; Staiger, Douglas; Kane, Thomas and Zimmerman., David. "Roe V. Wade and American Fertility." *American Journal of Public Health*, 1999, *89*(1), pp. 199-203.

Loudon, Irvine. *Death in Childbirth: An International Study of Maternal Care and Maternal Mortality 1800-1950.* Oxford University Press, 1993.

Madari, Hamta and Robert S. Jacobs. "An Analysis of Cytotoxic Botanical Formulations Used in the Traditional Medicine of Ancient Persia as Abortifacients." *Journal of Natural Products*, 67: 1204-1210, 2004.

McFarlane, D.R and Meier, K.J. *The Poiltics of Fertility Control: Family Planning and Abortion Policies in the American States*. New York, NY: Seven Bridges Press, 2001.

McLaren, A. *A History of Contraception*. Cambridge, MA: Basic Blackwell, 1990.

Mohr, J.C. *Abortion in America: The Origins and Evolution of National Policy, 1800-1900*. New York, NY: Oxford University Press, 1978.

Polsky, S. "Legal Aspects of Abortion." *Seminars in Psychiatry*, 1970, *2*, pp. 246-57.

Reagan, Leslie J. "About to Meet Her Maker: Women, Doctors, Dying Declarations, and the State's Investigation of Abortion, Chicago, 1867-1940." *The Journal of American History*, 1991, *78*, pp. 1240-64.

Reed, J. *From Private Vice to Public Virtue: The Birth Control Movement and American Society since 1830*. New York, NY: Basic Books, 1978.

Quay, E. "Justifiable Abortion--Medical and Legal Foundations." *The Georgetown Law Journal* **49**(3): 395-538, 1961.

Sanderson, Warren C. "Quantitative Aspects of Marriage Fertility and Family Limitation in Nineteenth Century America: Another Application of the Coale Specifications." *Demography*, 1979, *16*, pp. 339-58.

Smith-Rosenberg, C. *Disorderly Conduct: Visions of Gender in Victorian America*. New York, NY: Oxford University Press, 1985.

Smith, Daniel Scott. "Parental Power and Marriage Patterns: An Analysis of Historical Trends in Hingham, Massachusetts." *Journal of Marriage and the Family*, 1973, *35*, pp. 419-28.

Steckel, R. H. "The Fertility Transition in the United States: Tests of Alternative Hypotheses." *Strategic Factors in Nineteenth Century American Economic History: A Volume to Honor Robert W. Fogel*. C. Goldin and H. Rockoff, 1992. Chicago and London, The University of Chicago Press**:** 351-397.

Storer, H. R. and F. F. Heard (1868). *Criminal Abortion: Its Nature, Its Evidence, and Its Law*, Little, Brown.

Storer, H. R. (1868). *Why not?: A book for every woman*, Lee and Shepard.

Sundstrom, W., and P. David, 1988, "Old-Age Security Motives, Labor Markets, and Farm-Family Fertility in Antebellum America," *Explorations in Economic History* 25, 164-197.

Thomasson, Melissa A. & Treber, Jaret, 2008. "From home to hospital: The evolution of childbirth in the United States, 1928-1940," *Explorations in Economic History*, Elsevier, vol. 45(1), pages 76-99, January.

Tribe, L. H. *Abortion: The Clash of Absolutes*. New York, NY: W. W. Norton & Company, 1990.

United States, Bureau of Education. *Report of the Commissioner of Education Made to the Secretary of Education, Vol 2*. 1898.

van de Walle, Etienne and de Luca, Virginie. "Birth Prevention in the American and French Fertility Transitions: Contrasts in Knowledge and Practice." *Population and Development Review*, 2006, *32*(3), pp. 529-55.

Wahl, Jenny Bourne. "New Results on the Decline in Household Fertility in the United States from 1750 to 1900," S. L. Engerman and R. E. Gallman, *Long-Term Factors in American Economic Growth.* Chicago and London: University of Chicago Press, 1986, 391-437.

Washington, Ebonya Lia. "Female Socialization: How Daughters Affect Their Legislator Fathers' Voting on Women's Issues." *American Economic Review*, 2008, 98(1): 311-332.

Yasuba, Y. *Birth Rates of the White Population in the United States, 1800-1860: An Economic Study*. Baltimore, MD: Johns Hopkins Press, 1962.

Figure 1. Fertility Rate by Decade

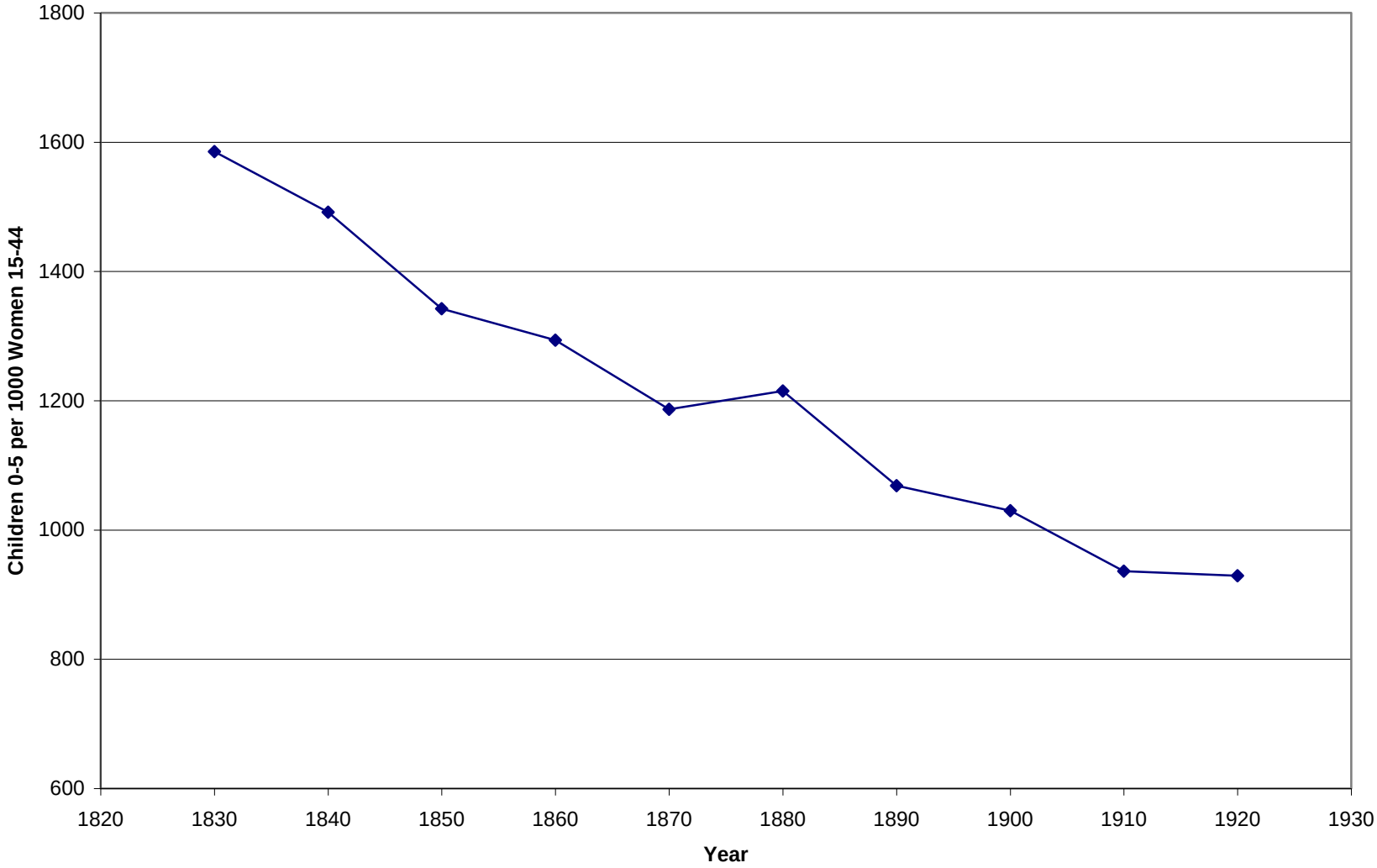
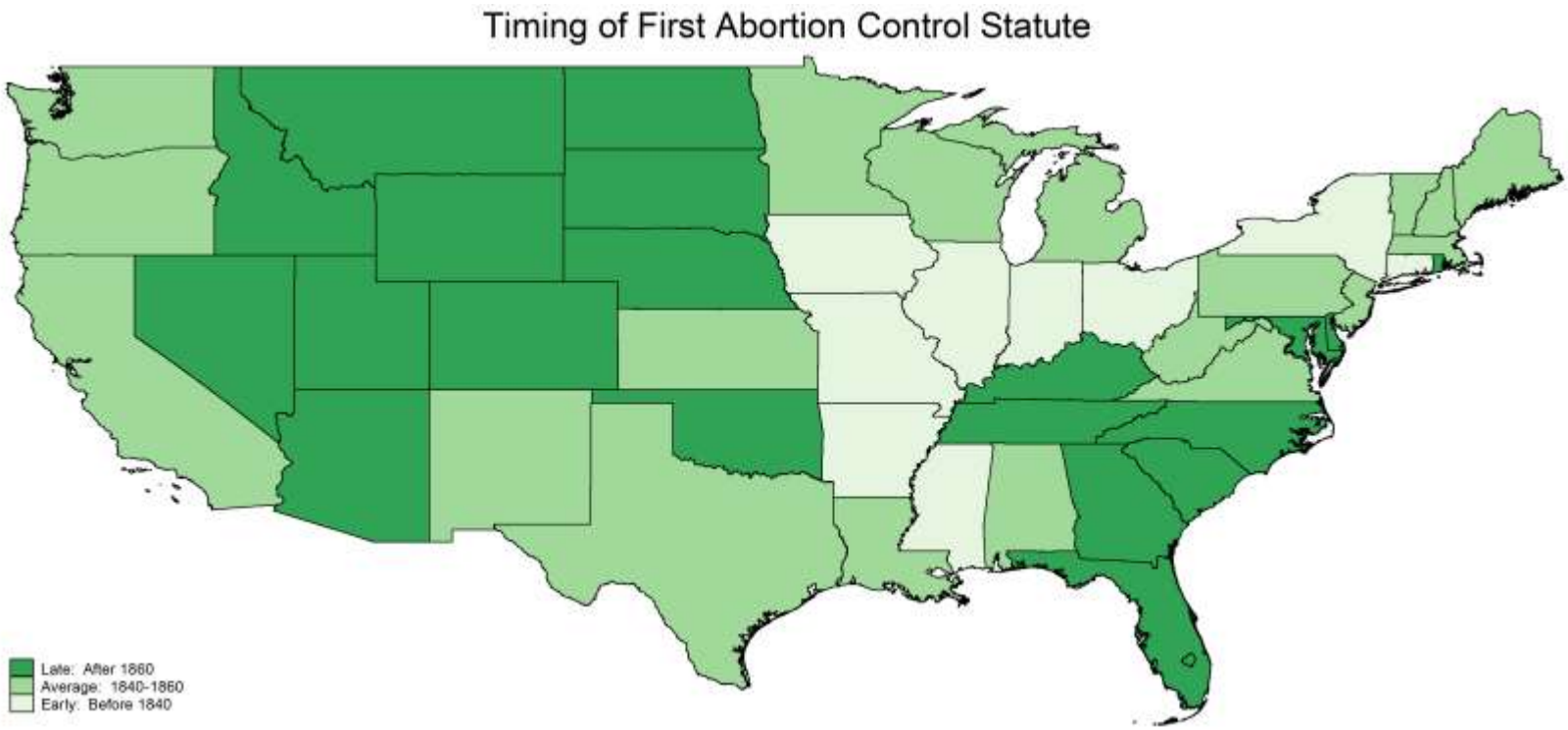


Figure 2


Timing of First Abortion Control Statute
Late: After 1860
Average: 1840-1860
Early: Before 1840

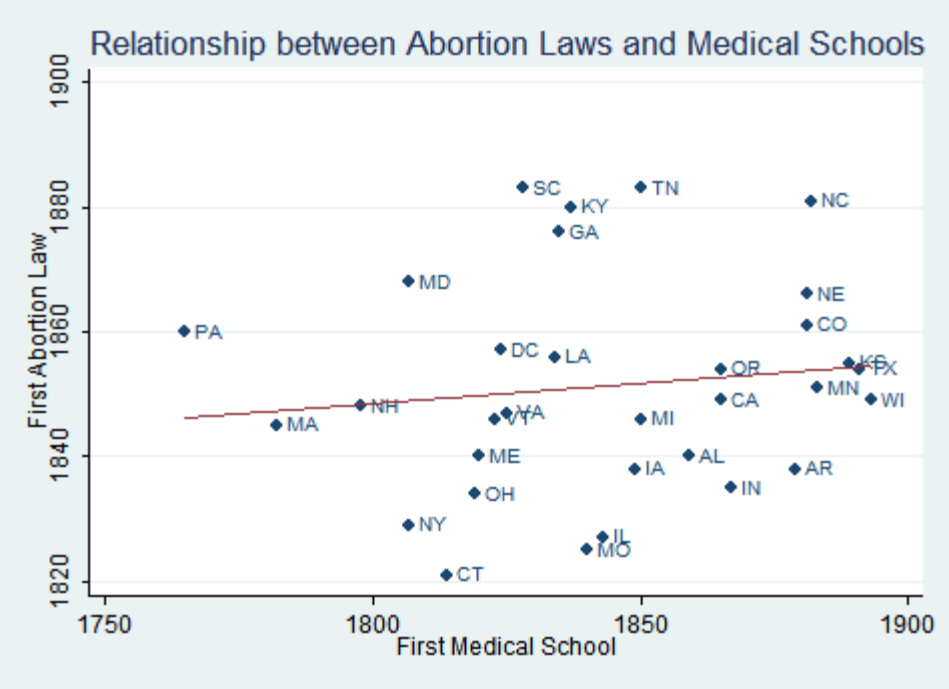


Figure 3a

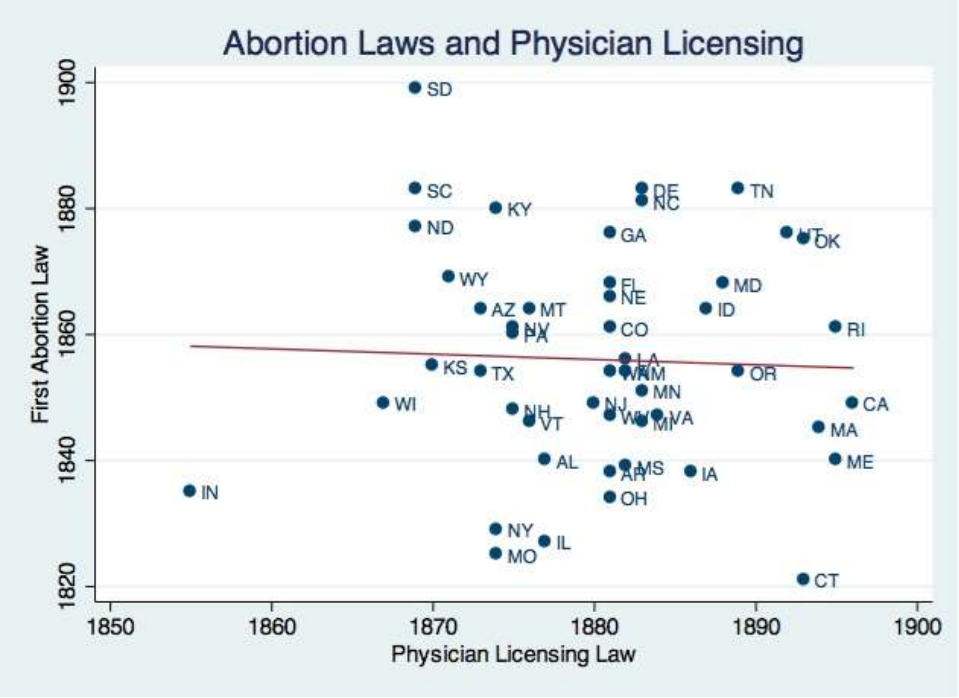


Figure 3b

Table 1

Abortion Prohibitions and Fertility

	Child-woman ratio (levels)		Child-woman ratio (logs)	
	(1)	(2)	(3)	(4)
	Panel I: Unweighted Results			
Have an abortion law	106.50**	136.77**	0.100**	0.121**
	(32.16)	(33.79)	(0.028)	(0.029)
	Panel II: Weighted by total population			
Have an abortion law	111.03**	53.25	0.122**	0.044+
	(29.46)	(34.03)	(0.024)	(0.026)
State Trends?	No	Yes	No	Yes

Robust standard errors in parentheses. Regressions report the results from equation (1), the effect of a state having an abortion law on the child 0-9/women 15-44 ratio including state and year fixed effects. Years included are 1850-1910 and states include all states extant before 1890 excluding the Dakotas for which population information is available. State trends include linear trends. There are 291 observations.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 2

The Effect of Abortion on ln(Fertility)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Have Abortion Law	0.121**	0.149**	0.134**	0.118**	0.123**	0.119**	0.128**	0.118**
	(0.029)	(0.034)	(0.032)	(0.030)	(0.030)	(0.030)	(0.034)	(0.030)
Medical Exemption		-0.030						
		(0.025)						
Only a Crime if Fetus Dies			-0.033					
			(0.025)					
Female at Fault				0.031				
				(0.038)				
Prohibits Sale, Ads, or Mailing					-0.021			
					(0.027)			
Felony						0.006		
						(0.026)		
Abortion illegal any stage							-0.018	
							(0.028)	
Law silent on quickness or specifies quick								0.005
								(0.025)

Robust standard errors in parentheses. Regressions report the results from equation (1), the effect of a state having an abortion law on the log of child 0-9/women 15-44 ratio. Regressions include state and year fixed effects and a state-specific time trend. Years included are 1850-1910 and states included are all states extant before 1890, excluding the Dakotas for which population information is available. All regressions include state dummies, year dummies, and linear state trends. A severe penalty is one in which the penalty is considered a felony or has life imprisonment. There are 291 observations.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 3

Abortion Laws on ln(Fertility) and the Mohr Hypothesis

	(1)	(2)	(3)	(4)
Have Abortion Law	0.105**	0.121**	0.097**	0.118**
	(0.028)	(0.030)	(0.029)	(0.029)
Have Physician Licensing Law	0.034	0.032		
	(0.027)	(0.022)		
Have Medical School			-0.048+	-0.033
			(0.027)	(0.022)
State Trends?	No	Yes	No	Yes

Robust standard errors in parentheses. Regressions report the results from equation (1), the effect of a state having an abortion law on the log of child 0-9/women 15-44 ratio. Regressions include state and year fixed effects. Years included are 1850-1910 and states included are all states extant before 1890, excluding the Dakotas for which population information is available. All regressions include state dummies, year dummies, and linear state trends. A severe penalty is one in which the penalty is considered a felony or has life imprisonment. There are 291 observations.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 4

Abortion and Birth Control Laws Effect on Fertility

	(1)	(2)	(3)	(4)	(5)	(6)
Have an Abortion Law	0.121**	0.124**	0.122**	0.148**	0.124**	0.122**
	(0.029)	(0.030)	-0.029	(0.034)	(0.030)	(0.029)
Have a Birth Control Law		-0.012		-0.010	-0.018	
		(0.019)		(0.019)	(0.021)	
Have a Restrictive Birth Control Law			-0.015			-0.022
			(0.022)			(0.024)
Medical Exemption Allowed for Abortions				-0.028		
				(0.025)		
Druggist Exclusion for Birth Control					-0.060	-0.057
					(0.043)	(0.042)
Incur a Fine for Birth Control					0.027	0.027
					(0.026)	(0.026)

Note: Robust standard errors in parentheses. Regressions include state and year fixed effects and state-specific time trends. Years included are 1850-1910 and states included are all states extant before 1890, excluding the Dakotas, for which population information is available. There are 291 observations.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 5

Probability of an Abortion Law

	Outcome: State got a law in the following decade				
	(1)	(2)	(3)	(4)	(5)
ln(child:woman ratio)	-0.6472				-0.6577
	(0.510)				(0.574)
Percent Immigrant		-1.0727			-0.7111
		(1.437)			(1.566)
ln(female: male ratio)			-0.4868		1.4682
			(2.063)		(2.091)
Percent of population Lost in the Civil War				-1.8051	-1.3680
				(2.211)	(2.418)

Note: Robust standard errors are in parentheses. Regressions report the results from equation 2, the probability that a state got a law in the following decade. Regressions with civil war independent variables also include an indicator for missing Civil War information. Years included are 1850-1910 and states include all states extant before 1890 excluding the Dakotas for which population information is available. Regressions include state fixed effects, year fixed effects, and linear state trends. There are 291 observations.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 6

Effect of Other Morality Laws on ln(Fertility)

	Indecency		Exhibition		Obscene Singing	
	(1)	(2)	(3)	(4)	(5)	(6)
Have an X law	-0.084*	0.040	-0.014	0.033	-0.040	-0.036
	(0.033)	(0.027)	(0.027)	(0.033)	(0.058)	(0.069)
State Dummies?	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies?	Yes	Yes	Yes	Yes	Yes	Yes
State Trends?	No	Yes	No	Yes	No	Yes

Note: Robust standard errors in parentheses. The dependent variable in columns is the log ratio of children age 0-9/ women age 15-44. Years included are 1850-1910 and states include all states extant before 1890 excluding the Dakotas for which population information is available. There are 291 observations.

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 7

Abortion Law on ln(Fertility): Specification Checks

	w=f1544	% black	South	Cluster on state	Cluster on state*year	ln(Child0-9/ wom20-44)	ln(Child0-4/ wom15-44)	1860-1910
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Have Abortion Law	0.0366	0.1212**	0.1213**	0.1213**	0.1213**	0.1236**	0.1283**	0.1346**
	(0.0252)	(0.0295)	(0.0294)	(0.0418)	(0.0294)	(0.0288)	(0.0333)	(0.0481)
Percent black		-0.1027						
		(0.2760)						
South			16.4177*					
			(6.6360)					

Note: Robust standard errors in parentheses. Column (1) is weighted by the number of women age 15-44 in a state*year. Regressions include state and year fixed effects and state-specific time trends. The dependent variable in columns (1)-(5) and (8) is the log ratio of children age 0-9/ women age 15-44. Years included in columns (1)-(7) are 1850-1910 and states include all states extant before 1890 excluding the Dakotas for which population information is available. There are 291 observations for columns (1)-(7) and 255 observations for column (8).

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 8

Predicted Fertility in the Absence of Laws

	1900		1910		1920	
	Actual	No laws	Actual	No laws	Actual	No laws
child:woman	1019.09	965.84	931.66	878.41	921.87	794.52
% change		5.23%		5.72%		13.81%

Note: child: woman refers to the # of children between the ages of 0 and 9 / # women age 15-44 * 1000. Universe is the same as the universe used in the Table 1 Panel II regressions.

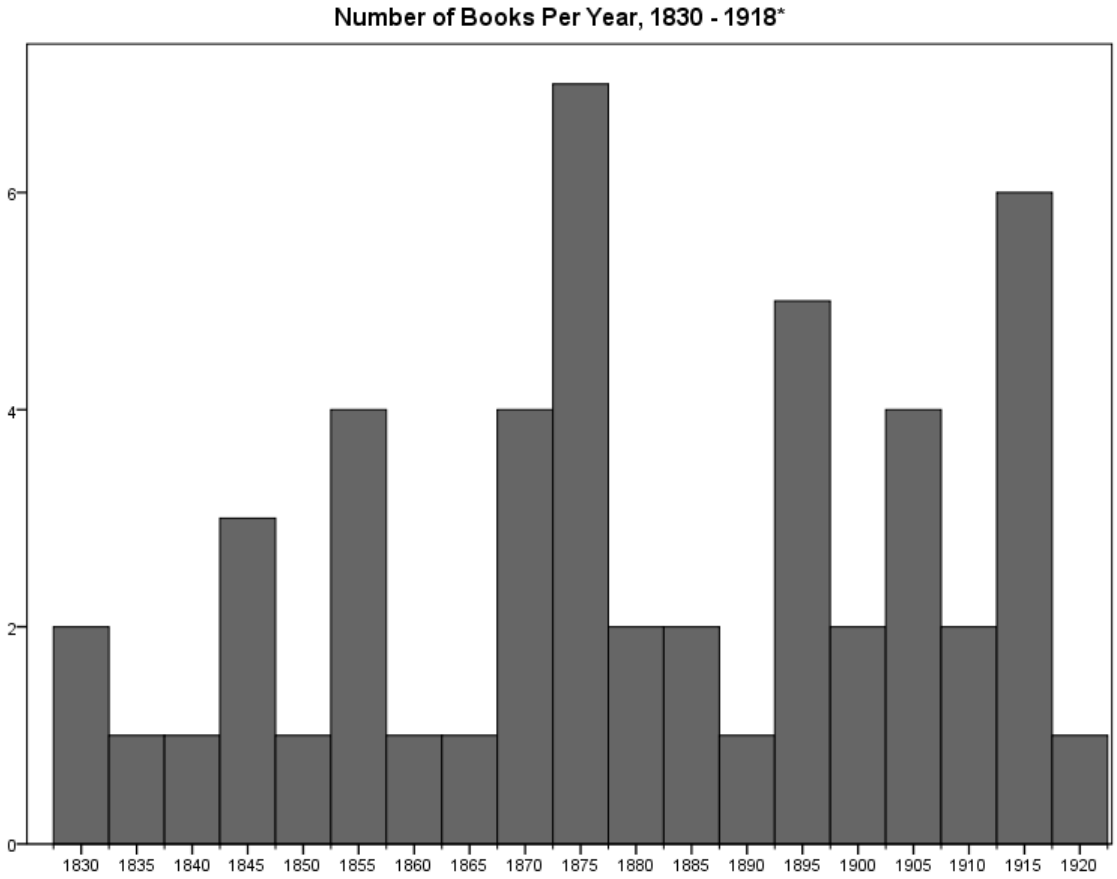
Appendix Table 1: Effect of railroads on population

	ln(child/ women)	children0-9/ women15-44	ln(child/ women)	children0-9/ women15-44
	(1)	(2)	(3)	(4)
ln(mileage)	-0.017*	-23.357*		
	(0.006)	(9.899)		
rail			-0.103**	-147.246**
			(0.006)	(7.719)
Observations	83	83	3,688	3,690

Robust standard errors in parentheses. Regressions include state fixed effects and year fixed effects. Years included are 1850-1860. Columns (1) and (2) are from regressions at the year/state level. Columns (3) and (4) are from regressions at the year/county level. Rail indicates whether or not there is rail in a county that year.

+ significant at 10%; * significant at 5%; ** significant at 1%

Appendix Figure 1



*Data from van de Walle, Etienne and de Luca, Virginie. "Birth Prevention in the American and French Fertility Transitions: Contrasts in Knowledge and Practice." Population and Development Review, 2006, 32(3), pp. 529-55.