PRELIMINARY—DO NOT CITE

Vice and Comstockery:
Abortion and Birth Control Access and the 19th Century Demographic Transition

by

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Draft: April 2007

[1] Thanks to Martha Bailey, Dora L. Costa, Claudia Goldin, Michael Haines, Bob Margo, and Karen Norberg for helpful discussions, Michael Haines for assistance with census tables, Bob Margo for railroad data, and state law librarians in many states for assistance with historical vice laws. Thanks also to participants at APPAM and at the University of Kansas. Finally, thanks also to Alejandro Bras, Rebecca Willis, and YiDing Yu for excellent research assistance and to M. Rose Barlow for comments. The authors thank the National Institute on Aging NBER Grant # T32-AG00186 for funding and support. Email the authors at eoananat@duke.edu and jlahey@nber.org.

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 we 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. We estimate an increase in the birthrate of 3 to 8% when abortion is restricted, which lies within the ranges of estimates found for the effect of fertility control supply restrictions on birthrates today. Restriction of birth control access led to an increase of 3 to4%, numbers also consistent with modern evidence. By demonstrating the importance of legal abortion and birth control in reducing 19th-century birthrates, we account for a previously unexplained portion of the demographic transition. Moreover, we show 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.

Introduction

At the start of the 19th century, the US birthrate was the highest in the world. During the 1800s, however, the US experienced 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. That is, why were people demanding smaller families during this time period?

The demand hypothesis that has found the most support in the literature is the land availability hypothesis (Degler 1980, Easterlin 1971, 1976a, 1976b, Forster and Tucker 1972, Yasuba 1962). 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).

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. 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. 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 in the United States 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). Put in economics terms, transaction costs for fertility control access had decreased with improved information transfer, product markets, and decreased transportation costs. Demographers (e.g. Carlsson 1966, Coale and Watkins 1986) term this approach the "innovation" approach, a name which nicely parallels what economic historians believe was going on with other technology during the second industrial revolution.[2]

[2] More discussion of supply vs. demand approaches can be found in Bleakley and Lange (2005).

Why has this supply-side view been substantially ignored by economists? Some have argued that supply-side stories are implausible because 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.)

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. Ananat and Hungerman 2006, Ananat et al. 2006, Angrist and Evans 2001, Bailey 2006, Donohue and Levitt 2002, Goldin and Katz 2002, Levine 2004, and others). Constraints on the availability of 19th century data may also have limited previous activity in this area.

We argue that information transfer and innovation can explain the correlations that have been found between fertility rates and land prices (which are directly related to population density) 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 railroadization, which facilitated the circulation of paper information in the form of newspapers, advertisements, mail-order services, pamphlets, and books. Higher literacy rates allow people to digest the flow of information. **[Information access strategies to go here in the future]**

Furthermore, we show that fertility rates are higher in states and times when access to this technology has been cut off by restrictive state laws. 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. We estimate that birth control restrictions led to a 3-4% increase in births and abortion restrictions led to an 3-8% increase in births; these estimates are strikingly similar to results on the effects of limited abortion and birth control access for modern populations (cf. Ananat and Hungerman 2006, Levine et al. 1999, Angrist and Evans 1999).

The value added to recent discussions of fertility control by our approach of examining the 19th century is twofold. First, identification of effects is easier;fertility has been completed, so we do not need to censor for potential future children. Moreover, 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 in the 1800s relative to the 1970s make contamination between states less of an issue). Second, the long period since these law changes means that we can observe

full lifecycle effects on the cohorts of children born to women who had more versus less fertility control. These effects include not only education, marriage, and childbearing, but even longevity and mortality. In a later iteration of this project, this strategy will allow us to answer the question: do more "wanted" children do better and live longer?

Background

Nineteenth-century women seeking to abort often used herbal remedies before resorting to surgical ones. Some of these herbs, such as cotton root or black or blue cohosh, were effective abortifacients if used early in the pregnancy, and some herbs made women ill enough that their bodies aborted on their own. 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 (King 1992, Smith-Rosenberg 1985).

As in the early to mid 20th century, membrane rupture through the use of metal rods (knitting needles 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.

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). 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 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). 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 we exploit in this paper 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. 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 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.

By the 1830s, people of all social classes gained access to information about many birth control methods and to mass markets for birth control devices (Brodie 1994, Tone 1996). Withdrawal, or coitus interruptus, is thought by historians to have been the most popular method of birth control, followed by douching (Degler 1980, McLaren 1990, Tone 1996). Other methods included douching powders, astringents, suppositories, pessaries, male withdrawal and abstinence (Brodie 1994, Tone 1996). The 1840s brought the vulcanization of rubber, then development of seamless thin latex condoms. By 1870s, condoms, douching syringes, solutions, sponges and cervical caps were available by mail

order, whole-sale, and pharmacy while pessaries were generally available from physicians. These methods varied in effectiveness from negative (certain versions of the rhythm method actually promoted conception) to approaching sterilization (douching with carbolic acid could eventually cause sterility) (Degler 1980, McLaren 1990, Tone 1996). The most common method, withdrawal, is thought to have an 18% failure rate, that is, out of every 100 couples using withdrawal exclusively, 18 will become pregnant by the end of a year (Green 1971). While none of these methods compare to modern technologies in terms of efficacy, they were not completely ineffective and could reduce the total number of children a woman had by the end of her childbearing years.

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 and birth control 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, 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).

History of Birth Control Laws

There were very few birth control laws or obscenity laws referencing birth control before the passage of the federal Comstock Act in 1873 (St. John-Stevas 1960). This act defined birth control to be obscene and prevented contraceptive information from being distributed across state lines or through the mail. This federal law was followed by state

"mini-Comstocks" that were often more restrictive than the original, the most famous of which being Connecticut's ban of the actual use of birth control.

Birth control and obscenity laws are much more scattered throughout legal codes than abortion laws, and several states have had multiple laws limiting or forbidding birth control access. Several states had obscenity laws that only covered birth control because the federal law defined birth control as obscene (Dennett 1926). The content of these laws also changed across time, with states varying whether or not there were druggist or physician exemptions and whether birth control could be mailed, advertised, or sold, among other characteristics. Although there is not much hard quantitative evidence on the change in the volume of information, several historians find that the frequency of advertisements, lecture tours, and the distribution of print matter drops sharply after the introduction of the federal and state Comstocks (Brodie 1994, Tone 1996). Although some advertisers got around bans by using creative code words or selling their items as feminine hygiene devices, reputable firms left the market, prices increased, and information was suppressed. The mass market for these products did not reappear until the 1930s (Tone 1996).

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 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.

The political history of the introduction of birth control restrictions, although it overlapped with the abortion restriction movement in time, followed a somewhat different path. It is not clear that there was majority support for the birth control provisions of the original federal law defining birth control as obscenity. Although there is no information on the Senate, the Comstock Act was passed in the House without quorum while usual parliamentary rules were suspended, and congressmen at the time complained that they couldn't tell what they were voting on because of poor handwriting (Brodie 1994). The author of the act, Anthony Comstock, a lobbyist with influential supporters, arranged himself a position as a special investigator for the U.S. Postal Service and personally enforced his law until his death in 1915.

Some feminist historians emphasize that the leaders in the anti-abortion and anti-birth control movements, including both Horatio Storer of the AMA and Anthony 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 2006) 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 for the development of both movements 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 as well as the YMCA, which bankrolled Comstock) were worried about immigrants and other undesirables populating the country (Smith-Rosenberg 1985).

Data

Abortion and Birth Control laws

A number of secondary sources exist describing abortion and birth control laws. Contemporary activists from both sides of the abortion debate provided snapshots of the laws as they existed at the time. Additionally, historians have compiled lists of these laws for various time periods, and legal scholars have discussed specific laws in depth. To identify all state laws regulating abortion, we compiled and compared these secondary sources. In cases where there was a disagreement between sources, the original laws were obtained from the Harvard Law Library's microfiche of superceded state statutes. Birth control and obscenity laws were compiled from primary sources, and in cases where Harvard's law library did not have these sources, the original laws were obtained from state law libraries, to whom we are very grateful.

In addition to the existence of the law, we coded various characteristics of these laws. For abortion, we looked at whether there was a law prohibiting abortion**.** For birth control laws, which are more complicated, we looked at whether there was a law, as well as how many activities the law restricted (importation, circulation, sales, advertisement, and possession with intent to sell)**,** whether or not it included a druggist exclusion (that is, it allowed birth control to be sold at pharmacies), and whether or not a fine was specified by the law.

Fertility rates

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

Unfortunately, Census information on single years of birth is not available—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 1860-1920 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). We look only at white women aged 15-44 (using the Yasuba interpolation for 40-44 year olds from data for 40-49 year olds)—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).

Methodology

To examine the impact of restrictions on the number of children born, we exploit the quasi-experiment provided by the variation across states in the timing of passage of restrictive laws (the variation in introduction of abortion laws, which are simpler to represent, is shown in Figure 2). We limit our analysis to 1860 and later for several reasons. First, many states did not exist before 1860 and did not have state law books. Second, as discussed above, there is reason to believe that there were 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 second half. In later extensions of this project, we will acquire data on information transfer, and then will be able to examine the entire 19th century.

Some areas of the United States had not yet achieved statehood by 1860, and therefore lack Census information on fertility as well as state legal codes for the period we examine. These states were excluded from the analysis.

Because we can observe only the entire number of children born over the ten years prior to each Census (i.e., those aged 0 to 9), we cannot identify the relationship between a law passed in a given year and the number of children born the next year. To capture the fact that a law that passed between Censuses affected only those pregnancies that began afterward, we defined a measure of for what portion of a decade there was a valid law in place. 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. We therefore coded such a law with an indicator equal to 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 period 1870-1879, the indicator has a value of 0 for the decade ending in 1880.

A similar technique was used to code whether there was a law prohibiting birth control in place. In addition, characteristics of the law or laws in place during the decade were coded. So, for example, if a law prohibiting birth control was passed in 1874, and a new law exempting druggists was passed in 1876, then the prohibition law was coded as

0.5 for the decade ending in 1880, and the indicator for druggist exemption was coded as 0.3. To measure the extent of the prohibition on birth control, several dimensions were used. A law was coded for the share of major activities—importation, circulation, sales, advertisement, and possession with intent to sell—it prohibited. For example, a law that prohibited only importation and sales was coded as a 0.4 if it was in place for the whole decade, and as 0.2 (0.4*0.5) if it was passed in 1874.

This discussion brings us to an empirical specification of our model of fertility. We estimate models of the form:

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

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 either abortion or birth control depending on the specification. We include state-specific (δ_s) and decade-specific (δ_d) fixed effects 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 we also allow the state-specific differences to trend over time by including an interaction between δ_s and decade d, and an interaction between δ_s and d^2. 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 the top panel Table 1. Log and level regressions give similar results. Estimates suggest that laws restricting abortion led to an increase of between 40 and 47 children born over a decade per 1000 women, or between a 4 and 8% increase in the number of children per woman). These results are all statistically significant at conventional levels. Including state-specific time trends only slightly decreases the estimated strength and significance of the relationship between legal restrictions and birth rates; we conclude that it does not appear that laws are just reflecting secular trends.

The bottom panel of Table 1 displays estimates of the effect on the birthrate of having had a law in place for at least two years. We include this specification in order to test for the possibility that laws took time to affect birthrates, especially in the 19th century when information about legal changes may have moved more slowly. In fact, however, the relationships in this specification are smaller and only sometimes significant, suggesting that lagging the laws introduces measurement error, particularly when we also control for state-specific trends in childbearing. We conclude that childbearing patterns changed quickly in reaction to laws.

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. To test for this possibility, we conduct a falsification check, shown in Table 2, in which we attempt to predict the passage of an abortion law in the next decade using the

child:woman ratio in the current decade. These tests find no consistent or statistically significant relationship between fertility and subsequent passage of an abortion law in any specification.

Table 3 reports results from estimating equation (1) looking at the effect of birth control laws. All regressions have ln(fertility) as the dependent variable and include state-specific time trends Estimates suggest that laws restricting birth control led to an increase in fertility of between 3 and 4 percent. These results are all statistically significant at conventional levels . Weighting the law indicator by the share of the major distribution activities (importation, circulation, sales, advertisement, and possession with intent to sell) that it restricts increases the size and precision of the coefficient on having a law.to around 5%. Including a control for whether a law has a fine associated with it has little effect on the main effect of having a law; the coefficient on the fine itself indicates a positive effect on the child:woman ratio (around 2%) but is not statistically significant.

Some laws allow druggists (i.e. pharmacists or apothecaries) to provide birth control information, a major exception to an anti-birth control law which we hypothesized might dull the impact of other restrictions. In fact, a control for a druggist exception has a marginally significant coefficient of around -4%; that is, it decreases fertility almost enough to offset the 5% increase in fertility caused by having a law. It appears to be true that a druggist exception is an important aspect of a birth control prohibition.

In Table 4 we include the indicators for abortion and birth control restrictions simultaneously. It appears that laws restricting abortion and birth control access are

positively correlated, so that controlling for birth control laws decreases the effect of an abortion law from around 4% to less than 3%, and the effect of an abortion law ceases to be significant at conventional levels. Controlling for abortion access, on the other hand, has little effect on the coefficient of the weighted birth control law or the controls for fines or druggist exception.

Discussion

Our estimates are highly consistent with research on recent (1970s-era) changes in legal access to abortion and birth control. That research, which exploits identifying variation from the liberalization of abortion policy and access to oral contraceptives, finds a change in the birthrate of about 5% (Ananat and Hungerman 2006, Levine et al. 1999). The consistency of the response is remarkable particularly because of the lower efficacy and higher risks associated with 19th-century methods of abortion and birth control. Our 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.

Conclusion and Future Research

When studying the 19th century U.S. demographic transition, explanations based on supply factors cannot be neglected relative to those based on demand. 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 and birth control as a source of variation in availability **[and in the future**

possibly sources of information flow in the early 19th century], we find that reducing the availability of abortion and birth control increased fertility rates in the 19th century. Our estimates of the effects of access to fertility control are similar to those found in more recent times.

Future research (for this paper):

- ***Details and harshness of abortion laws***
- ***Evidence on information access channels***
  - ***Railroadization***
  - ***Printing press routes for major books (Fruits of Philosophy 1831, Moral Physiology 1831, etc.)***

For future papers

- ***Using these sources of variation as a first stage, we intend to look at second-stage outcomes for "wanted" children.***

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Table 1

Abortion prohibitions and fertility

	Child-woman ratio (levels)				Child-woman ratio (logs)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Have a Law	46.833	39.6011			0.0885	0.0410		
	(26.350)	(22.557)			(0.0234)	(0.0197)		
Had a law 2 years prior			67.0944	20.1332			0.0848	0.0253
			(25.987)	(22.581)			(0.0230)	(0.0198)
State Dummies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Trends?	No	Yes	No	Yes	No	Yes	No	Yes
Observations	326	326	326	326	326	326	326	326

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. Years included are 1860-1920 and states include all states extant before 1890 excluding the Dakotas and West Virginia.Regressions are weighted by state population and state trends include linear and quadratic trends.

Table 2

Checks on endogeneity of abortion law introduction

	New law introduced in next decade			
	(1)	(2)	(3)	(4)
Lagged child:woman ratio (level)	0.0000	-0.0003		
	(0.0002)	(0.0006)		
Lagged child:woman ratio (log)			0.1174	-0.0552
			(0.2733)	(0.7213)
State Dummies?	Yes	Yes	Yes	Yes
Year Dummies?	Yes	Yes	Yes	Yes
State Trends?	No	Yes	No	Yes

N=326. Standard errors in parentheses

Figure 1. Fertility Rate by Decade

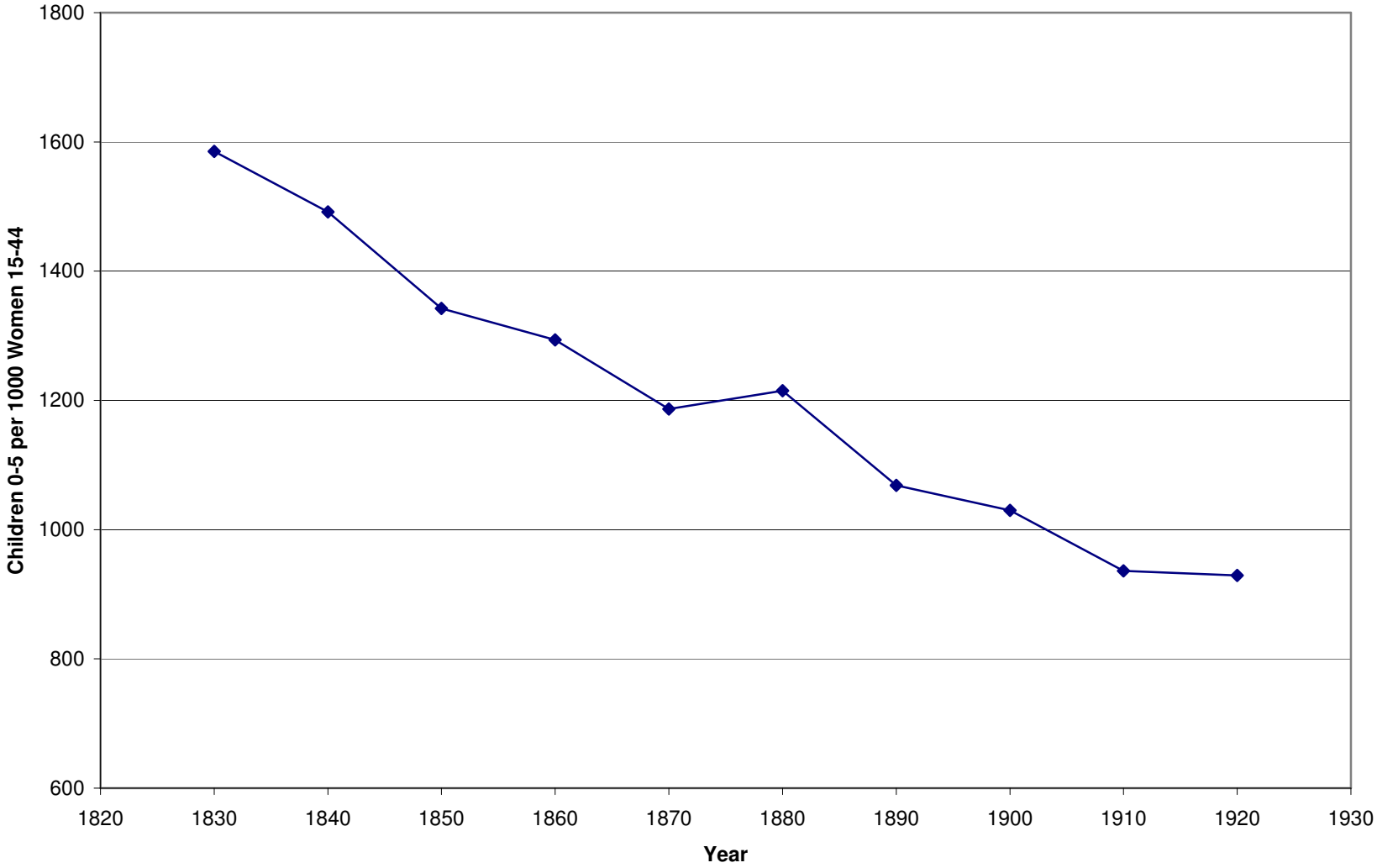

Table3

The effect of Birth Control on ln(Fertility)

	(1)	(2)	(3)	(4)	(5)
have bc law	0.036		0.041	0.032	
	(0.013)**		(0.014)**	(0.013)*	
have restrictive law		0.049			0.050
		(0.016)**			(0.016)**
druggist exclusion			-0.035+		-0.043+
			(0.023)		(0.023)
incur fine				0.022	0.026
				(0.019)	(0.020)
Observations	326	326	326	326	326
State Dummies?	Yes	Yes	Yes	Yes	Yes
Year Dummies?	Yes	Yes	Yes	Yes	Yes
State Trends?	Yes	Yes	Yes	Yes	Yes

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. Years included are 1860-1920 and states include all states extant before 1890 excluding the Dakotas and West Virginia. Regressions are weighted by state population and state trends include linear and quadratic trends.

Table 4

Abortion and Birth Control Laws Effect on Fertility

	(1)	(2)	(3)	(4)	(5)
have abortion law	0.041	0.027	0.028	0.026	0.028
	(0.020)*	(0.021)	(0.020)	(0.021)	(0.020)
have bc law		0.030		0.031	
		(0.014)*		(0.015)*	
have restrictive bc law			0.044		0.044
			(0.016)**		(0.017)*
bc druggist exclusion				-0.041+	-0.039+
				(0.024)	(0.023)
incur fine for bc				0.034+	0.029
				(0.019)	(0.020)
Observations	326	326	326	326	326
R-squared	0.98	0.98	0.98	0.98	0.98

Standard errors in parentheses

* significant at 5%; ** significant at 1%