# From Plan A to Plan B?

## The Impact of the Affordable Care Act on Women's Choices of Birth Control Methods

by

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**Abstract**

This paper estimates the impact of the Affordable Care Act on individual women's decisions to invest in contraception and different methods of contraceptives, through the implementation of the ACA's contraceptive mandate. By our estimates, privately insured women were 3.05% less likely to use sterilization after the Affordable Care Act when compared to all women, and uninsured women were 3.77% more likely to use sterilization after the Affordable Care Act when compared to privately insured women. We find that the contraceptive mandate reduced the rates at which privately insured women used sterilization as their primary method of contraception, and also measured their use of reversible, less costly methods covered by insurance.

# 1 Question of Interest and Motivation

Before the Affordable Care Act (ACA) was passed in 2010, approximately 21% of adults in the United States ages 18-64 were uninsured, according to a National Health Interview Survey. Within six years, by 2016, this percentage of the population had nearly halved, dropping to around 12.4% (Cohen, 2018). The Affordable Care Act represented the most significant regulatory overhaul and expansion of the United States healthcare system since the creation of Medicare and Medicaid. Its many provisions were rolled out over four years (2010 - 2014), and had five major parts. Medicaid was expanded to 138% of the federal poverty line for individuals under age 65. Health care exchanges were created, through which individuals who did not have access to public coverage or affordable employee coverage were able to purchase insurance with premium and cost-sharing credits to make coverage more affordable. The ACA required that individuals buy insurance and that insurers cover a list of "essential health benefits" (including, but not limited to, emergency services and maternity and newborn care). It required that most individuals have insurance by 2014. Lastly, it imposed penalties on employers who did not offer affordable coverage to their employees (Kaiser Family Foundation, 2012). It is to be noted that the implementation of some of these provisions was delayed or the provisions themselves were reversed later.

Most notably in the context of this paper, the ACA included a contraceptive mandate, requiring insurance companies to cover all FDA-approved forms of contraception. Before the ACA was passed, twenty-eight states had already implemented contraceptive equity laws, which functionally acted as contraceptive mandates on a state level. However, the ACA's contraceptive mandate differed from these state laws by forbidding insurance companies from charging part of the cost of medication to their customers (Sonfield, 2013).

The combination of the increase in private insurance coverage and the imposition of the contraceptive mandate for private plans form the motivation of this paper. The ques-

tion that we will explore in this paper is how the implementation of the Affordable Care Act's contraceptive mandate changed the decision making for women investing in birth control — essentially, do privately insured women change their decision to invest in birth control more than women on Medicaid or uninsured women after the implementation of the Affordable Care Act, and if so, what methods do these different groups decide to invest more heavily in after the passage of the ACA? To explore these questions, we will be using an economic model of contraceptive choice to study them.

For women, the decision to invest in birth control is a significant one; there are many factors she has to weigh. How effective is the method at preventing pregnancy? Does the method prevent sexually transmitted infections (STIs)? Is the method available over the counter or does it require a prescription? How expensive is the method? These questions are just an example of things women have to consider when selecting a form of contraception; women also have to weigh the potential side effects that accompany most methods.

In this paper, we will assume that the decision of a woman to invest in a given method of birth control is solely dependent on her assessment of the expected utility she will gain from that method for each year of use. Essentially, a woman will choose contraceptive method X over contraceptive method Y if the expected utility she will get from method X is greater than the expected utility she will get from method Y. As mentioned above, the utility she gets from any contraceptive method is dependent on the various benefits and costs she incurs from use of that method. Some benefits from a given contraceptive method includes how long it lasts, how effective it is, and whether it prevents STIs. Some costs from a given contraceptive method include if a prescription is needed, how difficult it is to use, as well as out-of-pocket costs.

For three of the most common birth control methods, the benefits and costs are easily analyzed. Oral contraception (or the Pill) is simple to take and is obtained relatively easily through a prescription from a doctor. However, the Pill must be taken once a day to prevent pregnancy, does not prevent against STIs, and still is not 100% effective even

when taken perfectly by users.

Condoms are likely the most easily obtained method of birth control, as they can be bought in any pharmacy or grocery store without a prescription. It is important to note here that internal and external condoms are the only form of contraception that prevent against contraction of sexually transmitted infections (STIs). However, Planned Parenthood and most gynecologists estimate condoms to be around 85% effective when used perfectly, and they must be used during every sexual encounter to prevent against contraction of STIs and pregnancy (Planned Parenthood, 2018). Most gynecologists recommend that condom users use them in conjunction with other methods of contraception, as their failure rates are relatively high and rely heavily on perfect use every time.

Another form of birth control that has become more popular in recent years is the intrauterine device, or IUD, a form of long-acting reversible contraceptive (LARC). The IUD is 99% effective, is low maintenance, and can last anywhere from three to twelve years (Planned Parenthood, 2018). The costs of an IUD are not much higher than any other method, as the side effects are relatively the same: irregular menstrual cycle, worse premenstrual cycle symptoms, etc. However, without insurance, the most notable cost of an IUD is its out-of-pocket cost, made even higher by the necessity of a prescription.

This benefit-cost analysis by women is the foundation of this paper. Without insurance coverage, the out-of-pocket costs for contraception can be prohibitive for some women, without even including the costs of obtaining a prescription. According to the National Women's Health Network, LARCs such as IUDs and implants can cost anywhere from $800 to $1000 without insurance. The Pill costs around $240 to $600 annually (NWHN, 2017). In a study in July and August of 2009 by the National Center for Health Statistics, researchers found that women altered their contraceptive use habits due to credit constraints, especially due to the Financial Recession. 25% of Pill users struggling financially reported inconsistent use of the Pill due to high costs and 23% of all women surveyed reported that they had a harder time paying for contraception than

they did in the past (Guttmacher Institute, 2009).

Especially in light of the Great Recession, it is likely that, before the passage of the Affordable Care Act, women who would like to use contraception are effectively being barred from doing so by the high costs. As insurance in general was costlier and a greater financial burden, women likely switched to over-the-counter contraception, such as condoms.

Figures 1 - 6 in Appendix A show the percentage of women surveyed who have ever used a given contraceptive method, cut by insurance status. As we can see in the figures, there has been a small decrease in sexual activity over time for all women, particularly concentrated among uninsured women and women on Medicaid. Sexual activity for privately insured women has remained relatively stable from 2006 - 2017, with a peak around 2011 - 2012. Similarly, we can see average contraception use rates remaining relatively stable for privately insured women, while rates are increasing for women insured through Medicaid after 2013, or the implementation of the ACA. Looking specifically at each method of contraception, Pill use has decreased for all insurance statuses while IUD use has increased. In conjunction with these trends, it could easily be imagined that women decided to invest in more long-term contraceptive methods, such as IUDs, as the cost of raising a child (i.e., the cost of birth control failing) has increased nearly 40% from 2000 to 2010, according to a report by the Department of Agriculture (Dickler, 2011). This cost estimate is even lower than the true cost, as it is based on the direct cost of raising a child, and does not include the implicit "cost" of the mother's time.

This cost barrier of use is where the Affordable Care Act and our question of interest come in. We can easily assume that a woman would change her contraceptive method if the costs or benefits incurred by that method suddenly change. By implementing the zero cost-sharing contraceptive equity mandate, the Affordable Care Act theoretically should have reduced the costs that women face when making the decision to invest in a given birth control method. This effect is particularly important in light of the economic re-

cession at the time — contraception took up a larger share of individual budget as costs rose and individual income fell (National Center for Health Statistics, 2009). In this paper, we will be examining how the passage of the Affordable Care Act and the ensuing contraceptive mandate impacted women's decision to invest in different methods of contraception, and how this change in decision-making affected other behaviors for women, namely sexual activity.

We should expect to see an increase in overall contraception use because of the increased use of insurance. Within contraceptive methods, we expect to see an increase in investment in LARCs, especially IUDs. These methods of contraception have the highest barrier to use in terms of out-of-pocket costs for women without insurance, and are the most effective. The reduction in costs in the expected utility for a given woman will likely have a significant impact on her decision to invest in that method over another.

As a result of this altered decision-making process, we anticipate a potential unforeseen cost on society, specifically, an increase in sexual activity among younger women, possibly leading to higher contraction rates of STIs and unplanned pregnancy. This will only be the case if condom use decreases, which could be imagined if women are switching their primary method of birth control from condoms to other methods, such as the Pill or LARCs. Essentially, we expect women who had previously been using condoms to instead use the Pill or LARCs, which fail to protect against contraction of an STI. We expect the cost reduction in LARCs effect to dominate over the increased cost of potential contraction of an STI due to not using a condom.

The trends displayed in Figures 1 - 6 in Appendix A lend support to these hypotheses. Average sexual activity rates remain relatively stable for privately insured women from 2006 - 2017, while rates fall for uninsured women and women on Medicaid. As discussed above, the cost of prescription contraception is higher for uninsured women, which represents a barrier to use. Privately insured women and women on Medicaid can access prescription birth control methods at a much lower cost than uninsured women. This

higher cost for uninsured women also translates into a higher cost of sexual activity - condoms are not costless, with an average price of $1 - $2 per use (Hirsch, 2019). While the cost is still low, it could be imagined that women choose to remain abstinent instead of incurring these costs.

# 2 Review of Prior Literature

The literature surrounding the various effects of birth control is broad. Unlike this thesis, many of these papers generally study the impacts of access to contraception on a range of outcomes for women. Many of these papers exploit legal variation in access, specifically the Supreme Court decisions of *Griswold v. Connecticut* (permitted legal access to contraception for married women) and *Eisenstadt v. Baird* (expanded the decision of *Griswold* to apply to unmarried women). Beauchamp and Pakaluk (2018) exploit exogenous differences in legal access to find that marital access to the Pill significantly increases non-marital childbearing and reduced the likelihood of high-school graduation. Bailey (2006) uses legal variation in age-restricted access to medical care to find that legal access to the Pill before the age of 21 significantly reduced the likelihood of first birth before age 22, increased the number of women in the paid labor force, and raised the number of annual hours worked. There is an extensive literature on the impacts of contraception, especially the Pill, on a range of outcomes for women: namely fertility (Guldi, 2008) and labor market outcomes (Bailey, 2010). For more papers on the impact of the Pill on various outcomes, see: Potter, Jain, and McCann (1970), Goldin and Katz (2002), Goldin and Katz (2000), Christensen (2012), Marcén (2015), and Ananat and Hungerman (2012).

Some medical papers compare the cost-effectiveness of the various birth control methods. Torres and Forrest (1983) find that the Pill has the highest first-year costs of any contraceptive measure, but these measures are certainly not recent nor up-to-date. Trussell et al. (2009) utilizes average wholesale price (i.e. price for uninsured women) to compare

the cost effectiveness of methods of contraception, finding that the IUD is the most cost-effective. The researchers estimate a monthly cost of $52.81 of oral contraception alone, with an additional $40.55 for a doctor's visit for a prescription (Trussell et al., 2009). This estimates are much higher than those from Planned Parenthood, possibly to do with the brand estimated by the researchers – Planned Parenthood and most online estimators evaluate oral contraceptive costs in terms of the generic brand, this study evaluates cost using the brand *Ortho Novum* (which is a name brand, not generic). An online cost estimator similarly finds a cost for insured women of $5-$40/month, and a cost for uninsured women of $20-$50+/month.

An investigation into how costs have impacted use — and then certain outcomes — has only recently begun through investigation into how insurance coverage increases access. Through implementation of zero-copayment contraceptive mandates, researchers can estimate how a cost reduction impacts use of contraception — for insured women, the financial cost of contraception is reduced to zero after the enactment of such a policy.

Before the passage of the Affordable Care Act, some states enacted "contraceptive equity" laws, which acted as state-level contraceptive mandates — requiring insurance companies to cover prescription contraceptive methods. Raissian and Lopoo (2014) exploit state-level variation in contraceptive mandates requiring coverage of prescription contraceptives to estimate if women in states with state-level insurance mandates experienced changes in their utilization of contraception and preventative health care services. They find a positive relationship between policies and prescription contraception use for women with low educational attainment, as well as an increase in use of preventative health services for women with low educational attainment (Raissian and Lopoo, 2014). While not making use of variation through the Affordable Care Act, their paper discusses implications of their findings for the contraceptive mandate included in the passage of the Affordable Care Act. However, their paper does not differentiate between different methods of contraception, and does not assess the difference in impact on in-

sured versus uninsured women, leaving room for further research.

Likewise, Atkins and Bradford (2014) make use of state-level variation in state contraceptive coverage laws to estimate a logistic regression to calculate the marginal effects of state contraceptive coverage laws on insured and uninsured women's use of prescription methods. The researchers find that insured women who live in a state with a contraceptive coverage law are 5% more likely than their counterparts in states without such laws to use an effective method (i.e., a prescription method or sterilization) (Atkins and Bradford, 2014).

In this paper, we will be assessing a similar question, but instead making use of data from variation in insurance coverage (and therefore access) caused by the Affordable Care Act. The variation in access to contraception caused by the Affordable Care Act may be better for assessing the impact of insurance coverage on use of contraception — the state level contraceptive mandates were not identical, and consequently may have had differing impacts. For example, Arizona's contraceptive mandate required coverage only for prescription contraceptives, while Illinois required coverage for all methods of contraception (including over the counter methods, extended supply, and male and female sterilization) apart from male condoms (Guttmacher Institute, 2009). Even though researchers used state fixed effects and changes over time, the differences in the laws between states makes it more difficult to obtain true randomization of access.

As it is relatively recent, the literature surrounding the impact of the Affordable Care Act on women's health is small. There is literature on the effects of the ACA on contraceptive use (to which this paper hopes to add), contraceptive costs, unintended pregnancy and teen birth rates, HPV, and insurance coverage.

The literature surrounding the effects of the Affordable Care Act on contraceptive costs largely examines how out-of-pocket costs have changed with respect to contraception. Abramowitz (2018) studies the extent to which the ACA's state expansions of Medicaid affect out-of-pocket medical expenditures. She finds that expansions were associated

with a larger likelihood of having zero premium expenditures and of having zero non-premium medical out-of-pocket expenditures for low-income individuals (Abramowitz, 2018). Besides suggesting that the ACA's Medicaid expansion was very effective in reducing medical out-of-pocket expenditures, her findings also give weight to the assumption that the ACA had a significant impact on the decision-making process for women with respect to contraception.

As the ACA reduced out-of-pocket costs for medical expenditures, it similarly reduced out-of-pocket costs for contraception, especially with regards to newly insured women. In a 2019 paper combining a cost analysis and variation caused by the Affordable Care Act, Bullinger and Simon estimate how the implementation of the zero-copayment contraceptive coverage mandate impacted national trends in contraceptive sales. Comparing states that had a state-level insurance coverage mandate before the Affordable Care Act to states that did not, the researchers estimated results that imply that the ACA increased sales of prescription contraceptives, with stronger effects for some methods than others (Bullinger and Simon, 2019). Becker and Polsky (2015) estimated out-of-pocket spending on contraception to find that these costs for most methods (notably, the Pill, IUDs, and emergency contraception) were significantly reduced after the introduction of the ACA's contraceptive mandate. On average, the price of a six-month pill prescription decreased from $33.58 to $19.84 from June 2012 to June 2013, saving women on the pill an average of $254.91 per year. Sonfield et al. (2015) found that the federal contraceptive coverage guarantee had a substantial impact in eliminating out-of-pocket costs for privately insured women using some methods of contraception.

There have also been a number of studies analyzing the unintended consequences of providing access to birth control and how this access specifically impacts unplanned pregnancy and teen birth rates. Kearney and Levine (2015) conduct an in-depth investigation of United States birth rates from 1981 to 2010. Most notably in the context of this paper, they find that declining welfare benefits and expanded access to family planning

services through Medicaid are the only targeted policies that have had a statistically significant impact on teen birth rates, but these policies only account for 12.6% of the observed decline in birth rates since 1991 (Kearney and Levine, 2015). However, many of these studies are centered around specific programs that remove financial and access barriers to contraception, rather than the Affordable Care Act. While many of the studies focus on contraceptive access and its impact on sexual behavior, Corriero et al. (2017) analyze how the ACA's requirement of coverage of HPV vaccinations through the increase in preventative service coverage. The researchers find that vaccination uptake increased when comparing pre- and post-ACA waves of data (Corriero et al., 2017).

Lastly, at a more basic level, there has been research to estimate how the Affordable Care Act has increased insurance coverage. In this paper, we will seek to combine the Affordable Care Act's impact on insurance status and its contraceptive mandate to estimate a woman's likelihood to invest in different methods in contraception. Jones and Sonfield (2016) find that the proportion of women who were uninsured declined from 19% to 12%. Among low-income women in states that expanded Medicaid, the proportion uninsured declined from 38% to 15%, largely due to an increase in Medicaid coverage (Jones and Sonfield, 2016). Sommers et al. (2015) investigate changes in self-reported insurance coverage, access to care, and general health under the Affordable Care Act. The researchers find that trends in access and coverage prior to the ACA were declining, with trends improving after the Affordable Care Act's open enrollment began in October 2013 (Sommers et al., 2015).

This paper is most interested in the impact of the Affordable Care Act on choice of contraceptive method. Bearak and Jones (2017) study the impact of the Affordable Care Act on contraceptive use patterns, using logistic regression to find that use patterns are largely the same for sexually active women as non-sexually active women. Interestingly, the researchers find that use of the Pill doubled for women who are not sexually active, citing its benefits apart from preventing pregnancy (Bearak and Jones, 2017). In this

paper, we seek to answer a question very similar to the question in Bearak and Jones's paper. However, this paper will make use of newly available data and a different method of analysis. Bearak and Jones used a logistic regression to investigate their question of interest, particularly focusing on the effects of the Affordable Care Act on sexually active versus non-sexually active women. In this paper, we will be centering our analysis on the differing impact of the Affordable Care Act on privately insured versus uninsured women and women on Medicaid. Additionally, we will be exploring how the Affordable Care Act affected women's decisions to invest in different methods of contraception, rather than contraception as a whole.

Similar to Bearak and Jones, Palmer (2018) examines how eligibility for subsidized insurance affects birth-related outcomes, such as birth rates, pre-natal care, maternal health behaviors, and delivery procedures. She ultimately finds that the large increases in pre-pregnancy insurance coverage and additional increases in maternity service coverage had no significant impact on pregnancy and birth-related outcomes (Palmer, 2018). In a forthcoming paper, Willage examines the unintended consequences of zero-copayment contraceptive mandates. His paper uses mandated zero-cost sharing policies and pre-policy insured rates to find that these policies had the unintended consequence of decreased prevention and increased contraction of STIs (Willage, forthcoming).

In a 2018 paper, Becker seeks to answer how the Affordable Care Act's contraceptive mandate altered insurance coverage, and how this change in coverage altered use of prescription contraceptives. Similar to this thesis, Becker utilizes a difference-in-difference approach, but examines the impact of the contraceptive mandate on privately insured women to find that the mandate has increased insurance claims for short-term contraceptive methods (the Pill, patch, ring, shot, diaphragms/cervical caps, and prescription emergency contraception) by 4.8 percent and increased initiation of long-term methods (intrauterine devices, implants, or sterilization) by 15.8% (Becker, 2018). Becker's difference-in-difference approach makes use of employer-level variation in compliance

with the mandate — different to many other papers on the subject that use a cross-section design. While similar to Becker's methodology and question of interest, this paper seeks to estimate the effect of the ACA's contraceptive mandate on privately insured versus uninsured women, with respect to their decision to invest in different methods of contraception.

However, this paper differs from these above and seeks to add to the literature surrounding the Affordable Care Act and contraception in a key way. The main method of analysis in this paper will be a linear probability model (LPM) estimated through ordinary least squares (OLS) to examine the likelihood of women selecting different methods of contraception. Additionally, much of the literature surrounding the economics of contraception is centered on oral contraception (the Pill). This paper hopes to add to the new and growing literature surrounding the impact of the Affordable Care Act on the decision to invest in birth control and different methods of birth control, and will make use of newly available data to get a better sense of the true impact of the ACA's contraceptive mandate and expansion of Medicaid.

The specific difference-in-difference strategy in this paper has not previously been used in the literature surrounding contraception use and access. However, Delavande (2008) provides a solid basis for the utility model assumption that women select a contraceptive method based on their expected utility from a given method, through combining data on expectations with data on actual choice to estimate a random utility model of contraceptive choice. She finds that women primarily consider effectiveness, protection against STIs, and partner's disapproval when choosing a contraception method (Delavande, 2008).

In this thesis, we will be evaluating the impact of the passage of the Affordable Care Act on a woman's decision to invest in different methods of contraception. As the Affordable Care Act included a contraceptive mandate, access to contraception greatly increased for privately insured women. This paper aims to estimate how the ACA's con-

traceptive mandate affected contraceptive decision-making for privately insured women relative to uninsured women and women on Medicaid.

# 3 Data

The data we will be using to answer this question is from the National Survey of Family Growth (NSFG). The NSFG is a survey conducted by the Center for Disease Control and Prevention's National Center for Health Statistics, and is designed to be nationally representative of women ages 15 – 44 years old in the civilian, non-institutionalized population of the United States (CDC/National Center for Health Statistics, 2018). It is widely considered to have the most thorough, nationally representative sample for measuring contraceptive use in the United States, and is used by many of the papers referenced in the literature review. The survey "gathers information on family life, marriage and divorce, pregnancy, infertility, use of contraception, and general and reproductive health" (CDC/National Center for Health Statistics, 2018). The first five surveys were conducted in 1973, 1976, 1982, 1995, and 2002. In 2006, the survey shifted from periodic to continuous interviewing. The continuous interviews, conducted in four rounds, will form the dataset used in this paper. The rounds include 2006 – 2010, 2011 – 2013, 2013 – 2015, and most recently, 2015 – 2017. These datasets all include a variable on time of interview, permitting an exact distinction between before and after the implementation of the Affordable Care Act.

The NSFG provides information on a multitude of variables, collecting information on a woman's demographics, contraception use, insurance status, and sexual behavior. Specifically, the NSFG includes variables on insurance coverage, method of contraception used, and controls. This variable of insurance coverage will permit us to examine how the lower costs through the Affordable Care Act affected privately insured, unin-

sured, and women on Medicaid differently.

These data allow for an in-depth study of our question of interest. The research design in this paper is a difference-in-difference ordinary least squares (OLS) regression, wherein we construct linear probability models to compare the likelihood of use of different contraceptive methods for privately insured versus uninsured women or women with Medicaid before versus after the enactment of the Affordable Care Act. The question here is whether the gap between privately insured women and uninsured women or women insured through Medicaid before the ACA widened after the implementation of the ACA with respect to use of different contraceptive methods. Essentially, the question of interest is whether the change in contraceptive use by women was due to the implementation of a nation-wide contraceptive mandate.

Additionally, as the survey examines women ages 15 – 44, it is possible to conduct a comparison by age group. Did the ACA have a differing impact on younger women, encouraging an investment in more long-term methods or encouraging an increase in sexual activity? Similarly, the demographic information on the respondents allows for an analysis of the differing impacts on different groups of women in the population. The controls used in this analysis will be race, age groups, educational attainment level, marital status, insurance status, and poverty level.

Perhaps most notably, the NSFG data for the 2015 – 2017 survey recently became available for use, published in January of 2019. Access to this data will permit for an analysis of the more long-term effects of the impact of the Affordable Care Act — as the data has become available so recently, most of the analyses on the Affordable Care Act and its impact have only been able to use data before 2015.

Unfortunately, the NSFG has some significant shortcomings. The sample size of the respondents is relatively small, especially since we are only using the female respondent data files for this analysis: 12,171 respondents in 2006 – 2010, 3,522 respondents in 2011 – 2013, 5,585 respondents in 2013 – 2015, and 7,048 in 2015 – 2017.

Another significant limitation lies in the design of the survey itself. The questions asked within the survey are not perfect for answering this research question. To denote the contraceptive method used by the respondent, the surveyor asks the method(s) used in month of the interview. This question is only asked if the respondent has ever used a method of contraception, and is asked seven times total, allowing multiple responses. For example, a woman could list the Pill as her first method of contraception, and then condoms as her second — however, in our analysis, we will only be assessing the changes in the first listed method of contraception used. Additionally, we will be analyzing the impact of the Affordable Care Act on sexual activity. To define sexual activity as a binary variable, we can define it as "ever had sex" or "had sex within the last 12 months". In this paper, we will be designating a woman as sexually active if she has had sex within the last 12 months. Women who are currently having sex will likely use contraception differently than women who are not – who would plausibly discontinue their method after a certain length of time of not having sex. This limitation with the NSFG questions is not necessarily detrimental to our analysis; it just alters the specific questions of interest we are studying.

# 4 Empirical Framework

As discussed in the review of prior literature, the method of analysis in this paper will be a weighted OLS regression to assess for differences in contraceptive use patterns before versus after 2013 (the implementation of the Affordable Care Act's contraceptive mandate) between privately insured women and uninsured women or women insured through Medicaid. The unit of observation is an individual woman in year $t$. We control for age group, race, educational attainment, and marital status, insurance status, and include a set of year fixed effects. We report contraceptive use separately by whether or not women

had had sex in the past 12 months ("sexually active"). For select methods, we report contraceptive use separately by whether or not the woman is currently using contraception. This method expands on previous analyses; the literature has demonstrated that the Affordable Care Act had an impact on women's use of contraception and different methods. We are seeking to assess whether this impact is due to the implementation of the contraceptive mandate. As mentioned above, this analysis also includes data from 2015 – 2017, which allows for an assessment of more long-run trends.

The analysis conducted in this paper is most similar to the work done by Bearak and Jones (2017). Through estimation of logistic regression models, Bearak and Jones found that contraceptive use, especially prescription contraception, increased significantly after the implementation of the Affordable Care Act. The researchers include a sensitivity analysis that examines the differing impact of the ACA on insured versus uninsured women, but do not investigate fully what about the Affordable Care Act changed women's decision to invest in contraception and different contraceptive methods. As discussed, we also have access to more recent data (from 2015 - 2017) whereas Bearak and Jones made use of data from 2012 to 2015, allowing for an analysis that examines the impact of the ACA more in the long-term. This access to data, especially when compared with the results in Bearak and Jones's paper, will allow us to examine how the Affordable Care Act impacted contraceptive use in the short-term versus the long-term.

When regressing with a binary outcome, as in this paper, many researchers opt for the logit or probit model, which asymptote at zero and one and therefore do not produce any estimates above one or below zero. However, these results have to be converted to marginal effects to be useful to those reading and interpreting the paper. According to Angrist and Pischke in their book *Mostly Harmless Econometrics*, the marginal effects estimated by a probit model often come very close to the estimates produced by a standard OLS regression. As Angrist and Pischke write, models do not need to be complicated unnecessarily – OLS allows for a simpler and more straightforward assessment of the

question of interest (Angrist and Pischke, 2008).

Rather than a regression discontinuity approach analyzing annual trends in contraception use before the Affordable Care Act vs. after, our model will make use of a difference-in-difference approach. The difference-in-difference will be estimated on several different levels, to truly capture where the effect of the Affordable Care Act came from. The first level will be confirming the results found in the prior literature, comparing the impact of the Affordable Care Act on privately insured women versus all other women. The difference-in-difference estimator in this model will be an interaction term between pre- versus post-ACA, and insurance status. Our coefficient of interest will be *post-ACA*private-insurance*. The second and third estimations will split the control group into 2. The second level difference-in-difference estimator will be an interaction term between pre- versus post-ACA, and privately insured women versus women on Medicaid. The third difference-in-difference estimator will be an interaction term between pre- versus post-ACA and privately insured women versus uninsured women. Calculating these different interaction effects will allow us to assess the impact of the Affordable Care Act's contraceptive mandate on use of contraception by evaluating different counterfactuals.

Our estimation equation will be as follows:

$$y_{it} = \beta_0 + \beta_1(D_{post-ACA} * D_{insurancestatus}) + \beta_2 D_{insurancestatus} + \gamma' X_i + \theta_t + \epsilon_{it}$$

where $y_{it}$ is the likelihood of outcome $y$ for woman $i$ at time $t$. The outcomes calculated in this analysis will be dummy variables for: sexual activity, use of contraception, Pill use, condom use, being sterilized, and LARC use. $D_{post\text{-}ACA}$ is a dummy variable which is 1 if the year is later than 2013 - after the implementation of the Affordable Care Act's contraceptive mandate and expansion of Medicaid. $D_{insurance\ status}$ is a dummy variable for insurance status.In the first analysis, $D_{insurance\ status}$ will be equal to 1 when a woman

is privately insured, 0 otherwise. In the second analysis, $D_{insurance\ status}$ will be equal to 1 when a woman is privately insured, 0 if the woman is on Medicaid (uninsured women will be dropped from this analysis). In the third analysis, $D_{insurance\ status}$ will be equal to 1 when a woman is privately insured, 0 if the woman is uninsured (women on Medicaid will be dropped from this analysis). $X_i$ is a vector of controls; we will be controlling for race, age groups, education, marital status, and poverty level.

# 5 Results

Tables 1 - 3 in Appendix B present the predicted likelihood for multiple outcomes: sexual activity, use of contraception, Pill use, condom use, sterilization, and LARC use. Each table estimates the different treatment and control groups: table 1 estimating likelihoods for privately insured women versus all other women, table 2 estimating likelihoods for privately insured women versus women on Medicaid, and table 3 estimating likelihoods for privately insured women versus uninsured women. As we can see, most of our results for our coefficient of interest (the interaction between insurance status and post-ACA) are statistically insignificant. While this goes against what our original hypothesis was, the results here are still interesting.

The results from these regressions suggest that the implementation of the Affordable Care Act, specifically the contraceptive mandate, had no marked effect on a woman's decision to: be sexually active, use contraception, or use any given method of contraception. This contradicts what many previous works found in the literature: that when given access to contraception, women decide to use it. The Affordable Care Act represented a reduction in cost of contraception, which lowered a barrier to use for many women, especially lower income women. Theoretically, this cost change should have affected use, plausibly increasing use as prescription contraceptive methods became more accessible

to both privately insured women and women who became eligible for Medicaid. However, our results suggest otherwise: according to our model, the Affordable Care Act had no significant effect on women's decision-making with regards to contraception and sexual activity.

These results imply that an indirect cost reduction through insurance, as with the Affordable Care Act, has no impact on women's investment in contraception. It could easily be the case that, for the most part, women have a method of contraception that they prefer to use and are unlikely to deviate from that method even if price is reduced for a more effective or easy-to-use method. For example, a privately insured woman could be using the Pill to regulate her menstrual cycle *and* as a contraceptive measure. After the passage of the Affordable Care Act and being able to access prescription contraception at no cost through her private insurance, she sees no need to switch her method of contraception, even though a LARC or sterilization would be a more effective and cheaper method of contraception. It could also be the case that since women already have legal access to contraception, they do not consider price as a major factor in their choice of contraceptive method. Essentially, our model fails to account for a woman's preference of contraceptive method, an interesting area for future research. Past research has demonstrated that when women are allowed legal access to contraception, they use it. However, our results imply that a cost reduction does not have a noticeable effect on the choice of a contraceptive method.

However, we did find some notable results, as shown in tables 4 - 8. Table 4 utilizes an alternate definition of sexual activity, wherein the outcome of being sexually active is equal to 1 if the woman has ever had sex. To examine this question, we restrict our subsample to only include 15 - 25 year olds, the youngest age group in our data. Generally after the age of 25, most women will have had sex, so the question is more salient when restricted to only examine a younger subsample of the population. As we can see by the results presented in table 4, two of our coefficients of interest are significant at the 5%

level. When compared with privately insured women, uninsured women ages 15 - 25 are 8.81% less likely to be sexually active after the implementation of the Affordable Care Act, an impact that is significant at the 0.1% level. Similarly, when compared with all other women, privately insured women ages 15 - 25 are 5.51% more likely to be sexually active after the implementation of the Affordable Care Act, an impact significant at the 5% level.

These results imply that younger, privately insured women have increasingly decided to start having sex after the enactment of the Affordable Care Act. This goes along with what we would expect: privately insured women have access to contraception at a lower price than uninsured women, and therefore have a lower cost of being sexually active than do uninsured women. Uninsured women not only face a higher cost of contraception, but they also face a higher cost of raising a child, without insurance coverage of child services or doctor's visits. As the contraceptive mandate was implemented in 2013, privately insured women suddenly faced lower costs of using contraception, and therefore lower costs of being sexually active. These results would imply that women would therefore start using contraception in greater rates, but we do not find this. Perhaps it is the case that privately insured women view the cost reductions from the Affordable Care Act as an incentive to instead use other preventative services covered by the ACA's contraceptive mandate, such as HIV and syphilis screening or STI prevention counseling. This again presents an interesting area for future research, where use of preventative services is the outcome of interest — similar to Corriero et al. (2017).

When estimating models on the likelihood of using a given method of contraception, we estimate two definitions of method use. Tables 5 and 6 present the results of two different outcomes: likelihood of using the Pill, and likelihood of using the Pill *over other methods*. When estimating likelihood of using the Pill, the outcome is a binary variable where women who use the Pill have an outcome of one and all other women, including women who do not use any contraceptive method, have an outcome of zero. When

estimating the likelihood of using the Pill over other methods, women who do not use contraception are dropped from the analysis. Tables 5 and 6 present interesting but insignificant results. As discussed earlier, the increase in rates of ever had sex should imply that these women who are becoming sexually active are also using contraception - especially since it is privately insured women who are becoming sexually active and can obtain contraception at a low cost. Specifically, as discussed in the review of prior literature, we should expect to see an increase in Pill use, just as Bearak and Jones (2017) found that Pill use doubled for women who are not sexually active after the implementation of the Affordable Care Act. However, as demonstrated in tables 5 and 6, our model estimated no significant impact of the Affordable Care Act on likelihood of use of the Pill when interacted with insurance status.

Our model contradicts what the literature has found when examining the impact of the Affordable Care Act on Pill use (Bearak and Jones, 2017; Becker, 2018), namely that the ACA increased the rate of Pill use due to lower costs. Similarly, our results contradict what the literature has found on the impact of insurance coverage on Pill use: that an increase in insurance coverage leads to an increase in Pill use (Becker, 2018). These contradictions could be due to a number of things, including our failure to include a more specific metric of poverty status rather than a binary variable of above or below the poverty line. Insurance status is highly correlated with wealth, and without accounting for socio-economic status accurately, we could be missing the true impact of the Affordable Care Act, particularly on low-income women.

Lastly, as we can see in tables 7 and 8, the interaction between insurance status and the implementation of the Affordable Care Act has a significant effect on sterilization. For all women, the subsample of women who are sexually active, *and* the subsample of women who use contraception, sterilization was significantly impacted by the passage of the Affordable Care Act. Here, insurance status defined as privately insured women versus all other women and insurance status defined as privately insured women versus

uninsured women are the only significant results. However, the direction of the impact goes in the opposite direction of what was hypothesized. Essentially, women who are privately insured were 3.05% *less* likely to be sterilized after the Affordable Care Act than any other women, and uninsured women are 3.77% *more* likely to be sterilized after the implementation of the Affordable Care Act than privately insured women.

These significant results could be due to a number of factors. Interestingly, the contraceptive mandate included in the Affordable Care Act did not include coverage for male sterilization procedures such as vasectomies, a reversible method (Kaiser Family Foundation, 2018). Female sterilization is an intensive procedure that requires 48 hours of bed rest after the surgery. Additionally, female sterilization is not a reversible process, and would typically only be used by women who do not want to get pregnant ever again. The direct costs of sterilization are also high: female sterilization procedures range from $1,500 to $6,000, and male sterilization procedures range from $350 to $1,000 (Kaiser Family Foundation, 2018). Though the costs are high, sterilization is a highly cost-effective method of contraception and requires no follow-up care, potentially making it cheaper than other methods in the long run. The zero cost-sharing mandate applies for insured women for only *female* sterilization, drastically reducing otherwise high out-of-pocket costs.

For many older married couples, it could easily be imagined that one member of the couple would choose to be sterilized so as to avoid an unwanted pregnancy in the future. Due to the invasive and irreversible nature of female sterilization, it seems reasonable to assume that many of these couples would opt to have the male partner go through the sterilization procedure rather than the woman. As male sterilization procedures are not covered by the Affordable Care Act's contraceptive mandate, our results may signify a decrease in the form of contraception whose relative cost has increased. After the implementation of the Affordable Care Act, privately insured women would likely decide to invest in other long-term contraceptive methods, but ones that are *reversible*. Some of

these contraceptive methods could be intrauterine devices, injections, and contraceptive implants. While our results did not show a significant effect of the Affordable Care Act on LARC use, this could be explained as women did not switch their contraceptive method from sterilization to LARCs, but rather decided to use LARCs instead of being sterilized. An alternate model studying the impact of the Affordable Care Act on use of sterilization services would be an interesting area for future research.

As we can see from the results, uninsured women use sterilization more than privately insured women, robust to subsamples of only sexually active women and only women who use contraception. Although not shown in the data, it is possible these uninsured women are getting sterilized at Planned Parenthood. We can infer from this that it was the contraceptive mandate that impacted this change in rates of use - due to the fact that the comparison of women on Medicaid to privately insured women was insignificant while the comparison of uninsured to privately insured women was statistically significant. We can interpret these results to mean that rather than switch their method of contraception from a reversible method to sterilization, privately insured women are instead choosing to *not* get sterilized at all.

Similarly, we can also interpret these results as an unintended consequence of the Affordable Care Act's contraceptive mandate. After the implementation of the Affordable Care Act, uninsured women are choosing to use sterilization as their primary method of contraception. It is likely the case that their husbands or long-term male partners are the ones undergoing the sterilization procedure, as female sterilization is an expensive and taxing procedure. Sterilization is likely seen by these women as a cost-effective, long-term method to ensure that pregnancy will not occur.

Instead of the contraceptive mandate having the impact of incentivizing women to invest in contraception, or to switch methods of contraception, it seems that the contraceptive mandate instead gave privately insured women the incentive to *not* use methods that were *not* covered by insurance. Similarly to the discussion above about conducting

a study on women's preferences for contraceptive methods, these findings imply areas for future research on the impact of the Affordable Care Act on a given woman's preference for different methods of contraception. Essentially, as implied by our findings in this paper, did the Affordable Care Act make sterilization a less attractive procedure for privately insured women, as other long-acting, but reversible, methods were covered? Similarly, did the Affordable Care Act's contraceptive mandate make sterilization a more attractive method to uninsured women? All methods of contraception remained the same price before and after the Affordable Care Act for uninsured women; maybe now sterilization became more attractive as a one-time fee to pay for an extremely effective method of contraception.

# 6 Limitations

There are many limitations to this study, which imply areas for future research. Most notably, as discussed in the data section, the variables asked within the survey were not optimal for this analysis. All outcome variables for the contraceptive method used were defined based on a variable that asked the respondents what method of contraception they were currently using. This could especially be a problem if women use methods in conjunction with each other - for example, condoms and the Pill. Condoms are listed as the second method of contraception for 33.59% of women who list a second method, likely used in conjunction with other methods as it is the only method that protects against the contraction of STIs.

However, the main interest in this paper is the estimation of the Affordable Care Act on use of prescription contraceptive methods, as the effects of the Affordable Care Act would theoretically only be impacting use of prescription methods that are only obtained at a lower price with insurance, and additionally only measures the impact of shifting

away from other methods.

Additionally, there were not many respondents to the survey. Over the course of 11 years, from 2006 - 2011, our analysis only includes 28,326 women. The estimations and results of this study would be much improved if more respondents were added. The small sample size is particularly a limitation when analyzing privately insured women versus women on Medicaid and uninsured women. While the NSFG is designed to be representative of the United States population as a whole, the numbers of uninsured women and women insured through Medicaid are small: 5,310 and 6,535 women in all 11 years, respectively. It is possible that these small sample sizes are unable to catch the true impact of the Affordable Care Act through insufficient sample sizes, especially for uninsured women and women insured through Medicaid.

Additionally, as shown in the histograms in Appendix C (figures 1-18), the predicted values from the models are not always exactly between zero and one, which does not make sense - a woman cannot be more than 100% likely to use a given method of birth control, or less than 0% likely. While this might imply that a different model would be better suited to the analysis of this question of interest, it is not necessarily the case that these models are inaccurate and not useful for prediction. The predicted values all lie relatively close to the zero through one range, and are centered around particular values. This centering pattern demonstrates that, even though the model is not perfect, an OLS linear probability model is likely adequate to analyze this question, as the values are not evenly spread from zero to one. Logit and probit models work best on samples that are distributed Normally from 0 to 1, something we can see through the shape of the logit and probit curves which asymptote at 0 and 1.

Lastly, as mentioned in the introduction, the Affordable Care Act also included an expansion of Medicaid eligibility, increasing availability to contraception as previously uninsured women were now Medicaid eligible, and able to obtain contraception through Medicaid coverage. An interesting area of future study would be a paper utilizing state-

level identifiers to compare states that expanded Medicaid to those that did not on women's use of contraception methods.

# 7 Conclusion

This paper presents causal evidence that the impact of the Affordable Care Act on women's decision making lies in the ACA's contraceptive mandate. This paper demonstrates evidence that the Affordable Care Act's contraceptive mandate caused an incentive for privately insured women to not use sterilization as their primary method of contraception, and additionally provides evidence that the ACA lowered indirect costs of being sexual active, by lowering costs of contraception. However, we find no significant causal evidence that the Affordable Care Act caused changes in contraceptive use patterns.

These results indicate the power of policy initiatives to change behavior through changing costs, and therefore, availability. Especially in the case of sterilization, where costs are high and potentially prohibitive, we can see that the Affordable Care Act has a significant impact on women's decisions to invest in that method. As discussed in the results section, it is likely the case that privately insured women incorporated the lowered costs of other contraception methods relative to sterilization into their utility maximization, and decided to instead invest in reversible or less costly methods.

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# A Appendix A: Summary Statistics and Trends Over Time

| Measure | Number of Respondents | Percentage |
|---|---|---|
| **Race** | | |
| White | 14,744 | 61.16% |
| Black | 5,873 | 14.26% |
| Hispanic | 5,990 | 18.33% |
| Other | 1,689 | 6.24% |
| **Education** | | |
| Some High School | 6,954 | 19.69% |
| High School Degree or Equivalent | 7,083 | 23.53% |
| Some College | 5,908 | 21.86% |
| Associate's Degree | 2,108 | 7.87% |
| Bachelor's Degree | 4,291 | 18.14% |
| Higher Degree | 1,982 | 8.92% |
| **Marital Status** | | |
| Never Married | 13,085 | 38.93% |
| Divorced, widowed, or separated | 2,816 | 8.5% |
| Married | 8,848 | 38.96% |
| Cohabiting | 3,577 | 13.61% |
| **Age Groups** | | |
| 15-25 | 11,028 | 35.94% |
| 26-36 | 10,965 | 37.27% |
| 37-45 | 6,333 | 26.79% |
| **Contraceptive Methods** | | |
| Pill, Patch, or Ring | 4,434 | 16.25% |
| Condoms | 3,323 | 10.96% |
| Sterilization | 4,350 | 18.32% |
| LARC(IUD or Shot) | 2,714 | 9.61% |
| Other | 1,522 | 6.09% |
| No method | 11,803 | 38.76% |
| **Insurance Status** | | |
| Private Insurance | 15,209 | 63.29% |
| Insured through Medicaid | 6,535 | 18.86% |
| Uninsured | 5,310 | 17.85% |
| **Interview Year** | | |
| 2006 | 1,569 | 3.33% |
| 2007 | 2,665 | 6,48% |
| 2008 | 2,766 | 6.02% |
| 2009 | 3,097 | 6.01% |
| 2010 | 1,632 | 3.34% |
| 2011 | 690 | 3.15% |
| 2012 | 2,580 | 12.32% |
| 2013 | 2,682 | 12.49% |
| 2014 | 2,672 | 12.14% |
| 2015 | 2,680 | 13.19% |
| 2016 | 2,298 | 13.06% |
| 2017 | 1,723 | 8.46% |

Table 1: Summary statistics for given set of controls and outcomes included in regression equations.

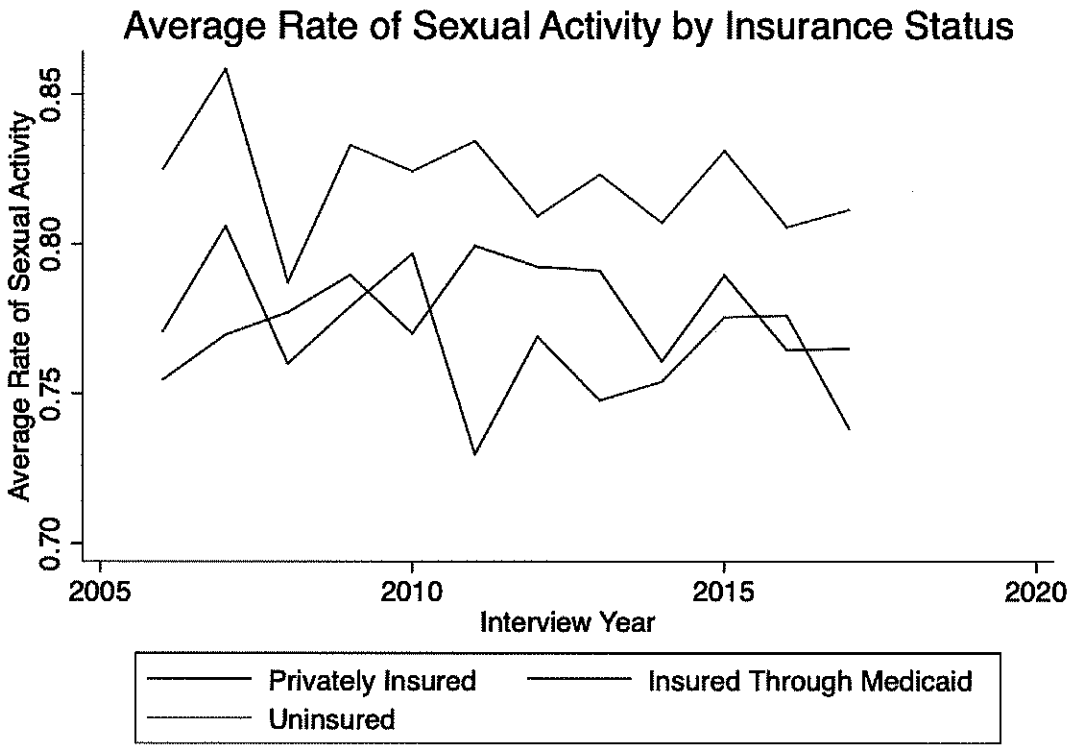


Figure 1: Percentage of women surveyed who have had sex in the last 12 months, self reported (our definition of sexually active) and cut by insurance status.

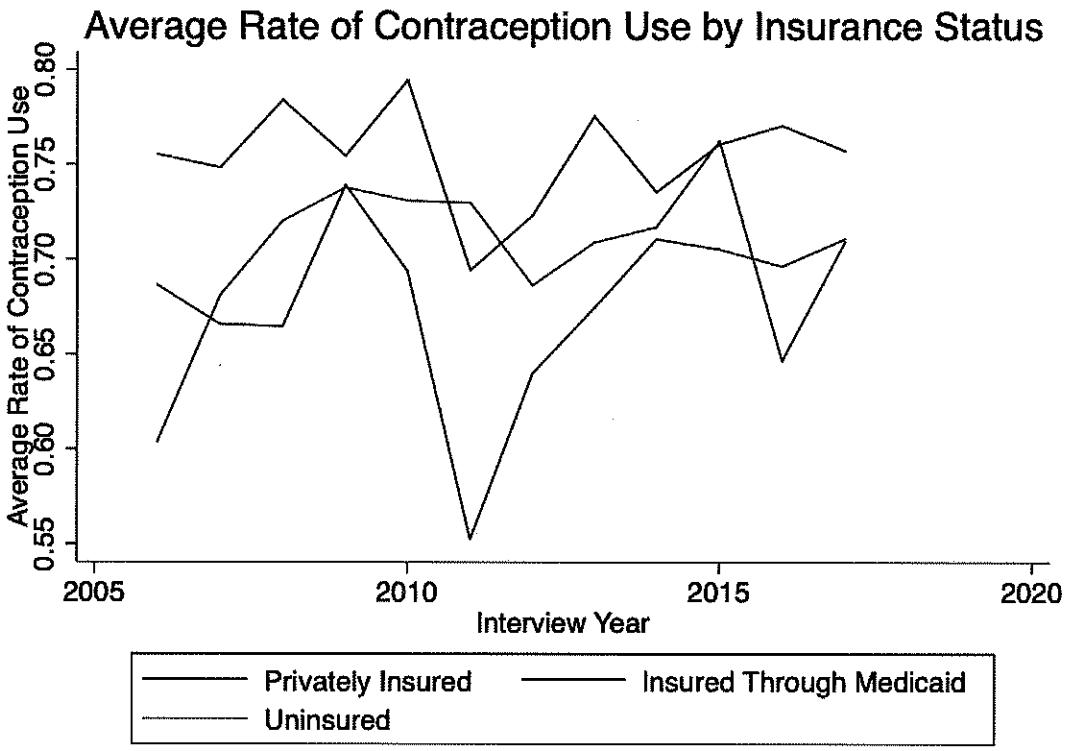


Figure 2: Percentage of women surveyed who are currently using any method of contraception, cut by insurance status.

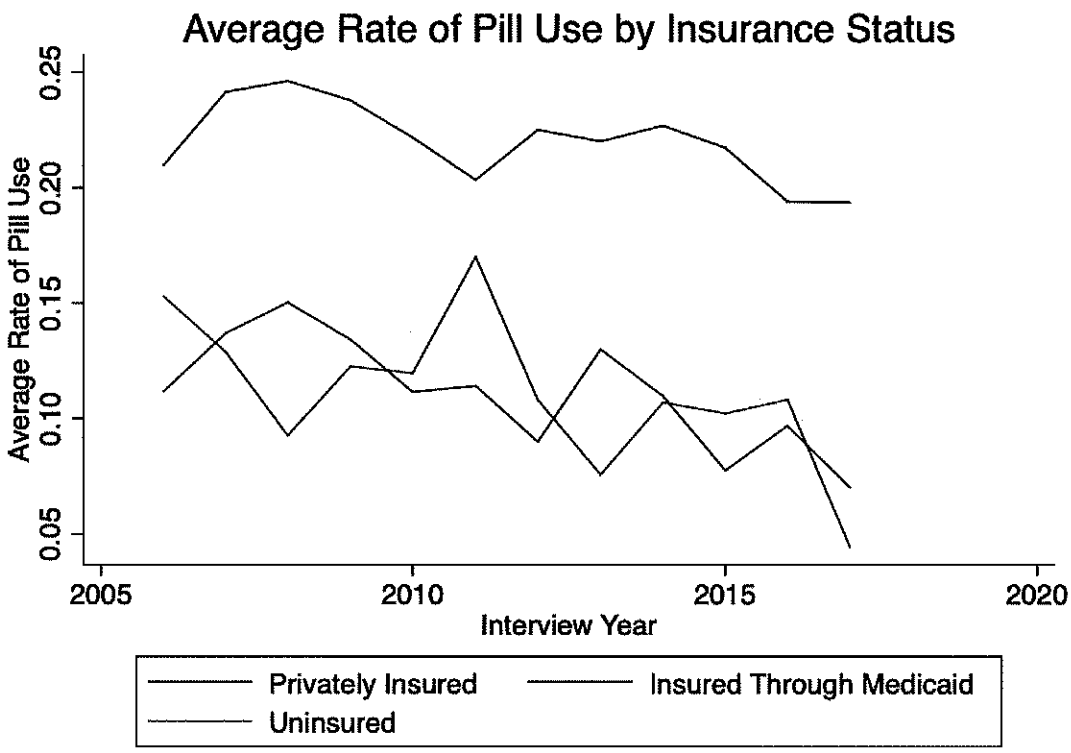


Figure 3: Percentage of women surveyed who are currently using the Pill, patch, or Ring as their primary method of contraception, cut by insurance status.

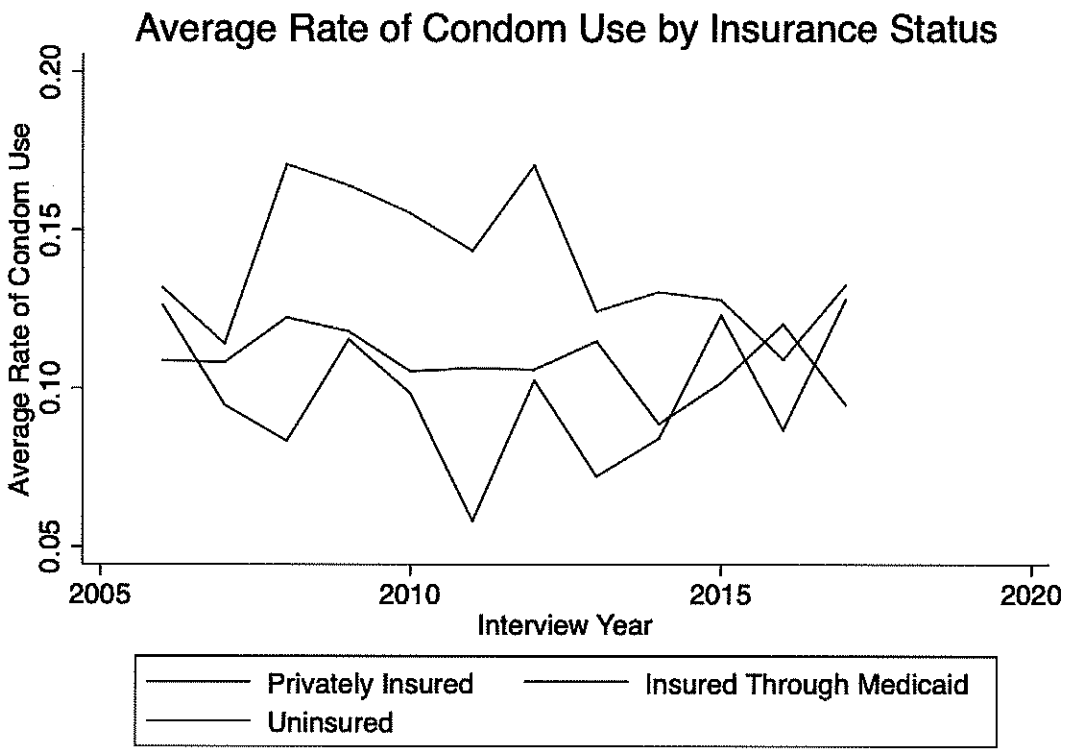


Figure 4: Percentage of women surveyed who are currently using condoms as their primary method of contraception, cut by insurance status.

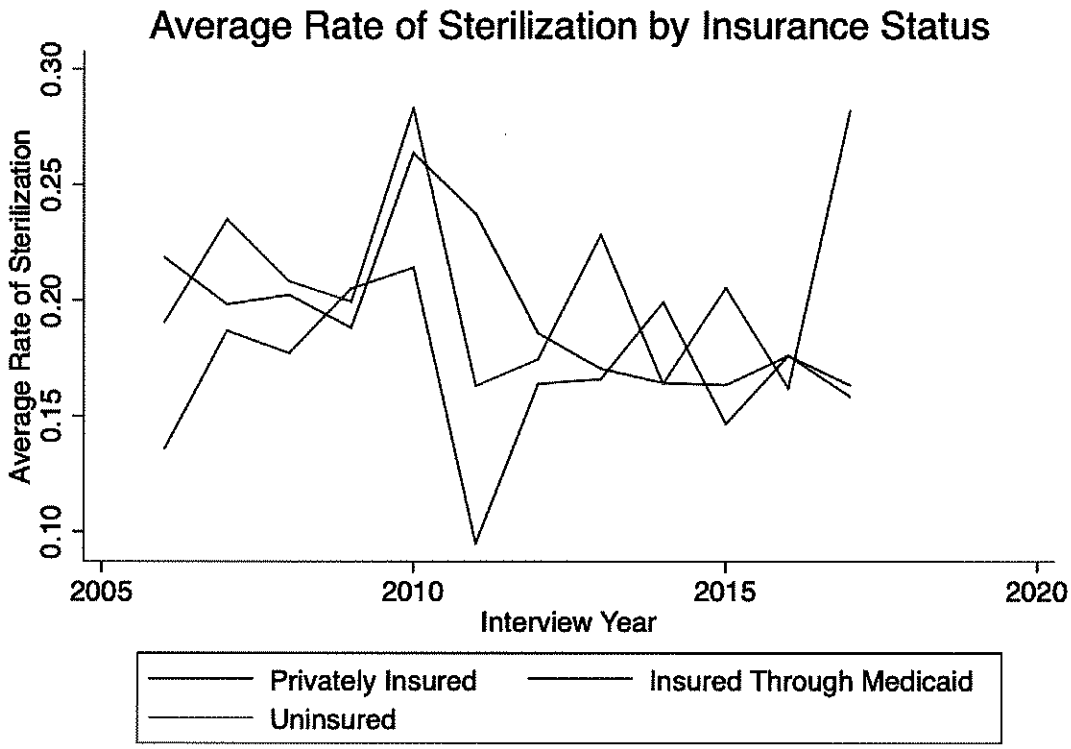


Figure 5: Percentage of women surveyed who are currently using sterilization as their primary method of contraception, cut by insurance status.

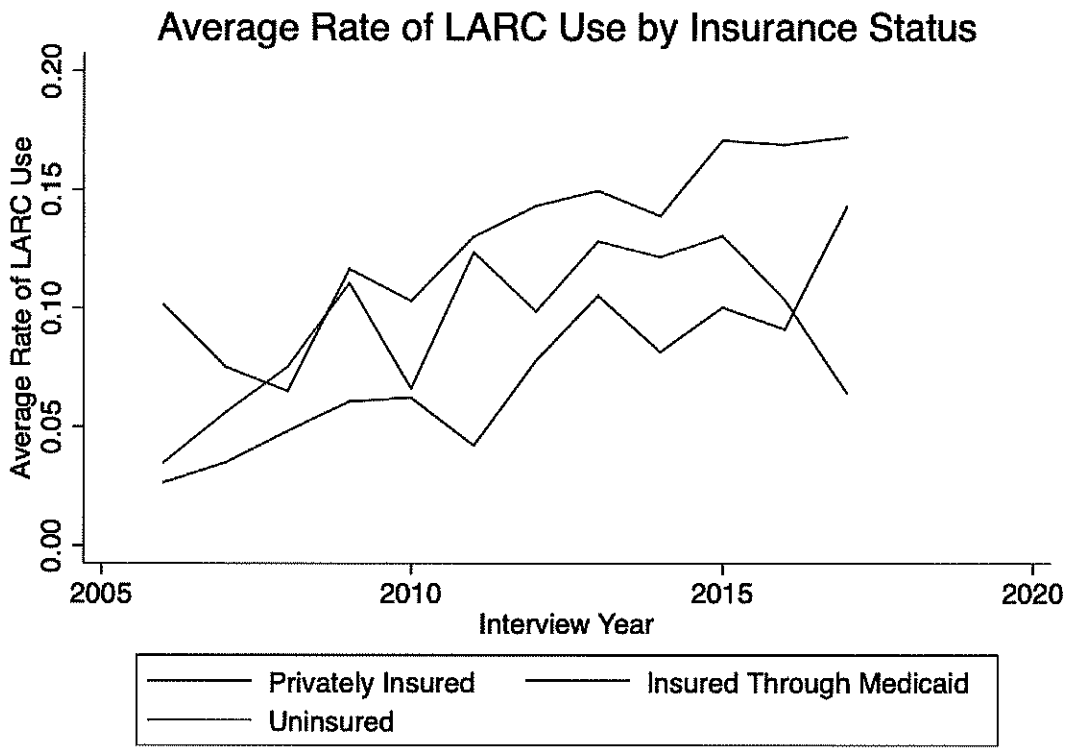


Figure 6: Percentage of women surveyed who are currently using LARCs as their primary method of contraception, cut by insurance status.

# B Appendix B: Regression Tables

| | Likelihood of: | | | | | |
|---|---|---|---|---|---|---|
| **Variable Name** | Sexual Activity | Contraception Use | Pill Use | Condom Use | Sterilization | LARC Use |
| Private Insurance | -0.0572*** | 0.0634*** | 0.0703*** | -0.0216* | 0.0123 | -0.0289*** |
| | (0.00929) | (0.0127) | (0.0103) | (0.00922) | (0.0102) | (0.00752) |
| Post-ACA × Private Insurance | 0.0213 | -0.00295 | 0.0142 | 0.0115 | -0.0305* | 0.000667 |
| | (0.0121) | (0.0167) | (0.0132) | (0.0119) | (0.0134) | (0.0112) |
| **Race** (omitted = White) | | | | | | |
| Other | -0.0492*** | -0.0364* | -0.0760*** | 0.0548*** | -0.0701*** | -0.0213* |
| | (0.0138) | (0.0186) | (0.0148) | (0.0152) | (0.0145) | (0.00926) |
| Black | 0.0768*** | -0.0596*** | -0.0590*** | 0.0254*** | -0.00907 | 0.0227** |
| | (0.00909) | (0.0119) | (0.00945) | (0.00743) | (0.00934) | (0.00743) |
| Hispanic | 0.0332*** | -0.0263* | -0.0431*** | 0.0263*** | -0.0249** | 0.0143 |
| | (0.00880) | (0.0114) | (0.00883) | (0.00797) | (0.00940) | (0.00856) |
| **Age Groups** (omitted = 15-25) | | | | | | |
| 26-36 | 0.0579*** | -0.0582*** | -0.0716*** | -0.0173* | 0.144*** | 0.00832 |
| | (0.00880) | (0.0115) | (0.0101) | (0.00853) | (0.00696) | (0.00789) |
| 37-45 | 0.0123 | -0.0401** | -0.154*** | -0.0582*** | 0.358*** | -0.0406*** |
| | (0.00958) | (0.0138) | (0.0104) | (0.00905) | (0.0111) | (0.00867) |
| **Education** (omitted = Some HS) | | | | | | |
| HS Degree | 0.165*** | -0.0521*** | 0.0627*** | 0.0339*** | -0.000488 | 0.00160 |
| | (0.0101) | (0.0122) | (0.00900) | (0.00857) | (0.00960) | (0.00884) |
| Some College | 0.194*** | -0.0540*** | 0.119*** | 0.0346*** | -0.0399*** | 0.00359 |
| | (0.0113) | (0.0128) | (0.0109) | (0.00873) | (0.00923) | (0.00908) |
| Associates Degree | 0.165*** | -0.0692*** | 0.106*** | 0.0346** | -0.0468** | 0.00290 |
| | (0.0132) | (0.0185) | (0.0146) | (0.0131) | (0.0162) | (0.0121) |
| Bachelors Degree | 0.161*** | -0.0870*** | 0.159*** | 0.0637*** | -0.140*** | -0.00649 |
| | (0.0118) | (0.0148) | (0.0128) | (0.0110) | (0.0115) | (0.0100) |
| Higher Degree | 0.155*** | -0.103*** | 0.155*** | 0.0822*** | -0.178*** | 0.00883 |
| | (0.0130) | (0.0199) | (0.0164) | (0.0151) | (0.0167) | (0.0130) |
| **Marital Status** (omitted = Never married) | | | | | | |
| Divorced, widowed, or separated | 0.137*** | -0.0444* | -0.0250* | -0.00722 | 0.0959*** | 0.0364** |
| | (0.0162) | (0.0181) | (0.0121) | (0.00965) | (0.0153) | (0.0117) |
| Married | 0.396*** | 0.0657*** | -0.0517*** | 0.0347*** | 0.155*** | 0.0450*** |
| | (0.00925) | (0.0122) | (0.00982) | (0.00805) | (0.00843) | (0.00782) |
| Cohabiting | 0.387*** | 0.0497*** | 0.0280* | 0.0459*** | 0.0611*** | 0.0578*** |
| | (0.00860) | (0.0141) | (0.0124) | (0.0109) | (0.00874) | (0.00979) |
| **Poverty Status** (omitted = Below Poverty Line) | | | | | | |
| Above or At Poverty Line | -0.00757 | 0.0166 | 0.00711 | -0.000227 | -0.0190* | -0.00777 |
| | (0.00850) | (0.0104) | (0.00797) | (0.00728) | (0.00784) | (0.00744) |
| **Year Fixed Effects** (F-statistic) | 1.58 | 1.67 | 3.07*** | 1.26 | 0.96 | 7.13*** |
| **Observations** | 28326 | 28326 | 28326 | 28326 | 28326 | 28326 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1: Likelihood of various outcomes. Treatment = privately insured women. Control group = all other women. Sample = civilian, non-institutionalized women ages 15-45.

| | Likelihood of: | | | | | |
|---|---|---|---|---|---|---|
| **Variable Name** | Sexual Activity | Contraception Use | Pill Use | Condom Use | Sterilization | LARC Use |
| Medicaid | 0.0829*** | -0.0930*** | -0.0754*** | -0.00615 | 0.00393 | 0.0495*** |
| | (0.0131) | (0.0174) | (0.0132) | (0.0108) | (0.0127) | (0.0111) |
| Post-ACA × Medicaid | -0.0222 | 0.0260 | -0.00582 | 0.00684 | 0.0188 | 0.00614 |
| | (0.0159) | (0.0209) | (0.0159) | (0.0137) | (0.0159) | (0.0152) |
| **Race** (omitted = White) | | | | | | |
| Other | -0.0489** | -0.0422* | -0.0801*** | 0.0576*** | -0.0801*** | -0.0267** |
| | (0.0152) | (0.0213) | (0.0177) | (0.0156) | (0.0172) | (0.0103) |
| Black | 0.0701*** | -0.0637*** | -0.0669*** | 0.0242** | -0.00863 | 0.0205* |
| | (0.0104) | (0.0133) | (0.0111) | (0.00786) | (0.0109) | (0.00864) |
| Hispanic | 0.0270* | -0.0405** | -0.0578*** | 0.0337*** | -0.0329** | 0.00366 |
| | (0.0106) | (0.0131) | (0.0110) | (0.00967) | (0.0109) | (0.00984) |
| **Age Groups** (omitted = 15-25) | | | | | | |
| 26-36 | 0.0504*** | -0.0615*** | -0.0851*** | -0.0167 | 0.132*** | 0.0115 |
| | (0.0104) | (0.0133) | (0.0124) | (0.00997) | (0.00803) | (0.00916) |
| 37-45 | 0.0142 | -0.0371* | -0.171*** | -0.0565*** | 0.348*** | -0.0285** |
| | (0.0113) | (0.0163) | (0.0128) | (0.0107) | (0.0126) | (0.0101) |
| **Education** (omitted = Some HS) | | | | | | |
| HS Degree | 0.196*** | -0.0531*** | 0.0821*** | 0.0270* | 0.0107 | 0.00771 |
| | (0.0125) | (0.0138) | (0.0114) | (0.0107) | (0.0111) | (0.0106) |
| Some College | 0.233*** | -0.0637*** | 0.140*** | 0.0296** | -0.0335** | 0.0118 |
| | (0.0135) | (0.0146) | (0.0133) | (0.0105) | (0.0106) | (0.0106) |
| Associates Degree | 0.206*** | -0.0975*** | 0.130*** | 0.0209 | -0.0462* | 0.0128 |
| | (0.0145) | (0.0215) | (0.0176) | (0.0141) | (0.0185) | (0.0143) |
| Bachelors Degree | 0.191*** | -0.103*** | 0.177*** | 0.0545*** | -0.131*** | -0.000648 |
| | (0.0139) | (0.0165) | (0.0147) | (0.0124) | (0.0131) | (0.0112) |
| Higher Degree | 0.187*** | -0.112*** | 0.174*** | 0.0729*** | -0.163*** | 0.0175 |
| | (0.0148) | (0.0216) | (0.0181) | (0.0164) | (0.0184) | (0.0144) |
| **Marital Status** (omitted = Never married) | | | | | | |
| Divorced, widowed, or separated | 0.136*** | -0.0616** | -0.0301* | -0.00516 | 0.0997*** | 0.0282* |
| | (0.0196) | (0.0216) | (0.0148) | (0.0112) | (0.0179) | (0.0140) |
| Married | 0.397*** | 0.0462** | -0.0648*** | 0.0381*** | 0.162*** | 0.0366*** |
| | (0.0109) | (0.0142) | (0.0115) | (0.00924) | (0.00959) | (0.00907) |
| Cohabiting | 0.380*** | 0.0299 | 0.0304 | 0.0398** | 0.0581*** | 0.0478*** |
| | (0.00976) | (0.0164) | (0.0156) | (0.0122) | (0.0102) | (0.0115) |
| **Poverty Status** (omitted = Below Poverty Line) | | | | | | |
| Above or At Poverty Line | -0.00391 | 0.0126 | 0.0109 | -0.00707 | -0.0180* | -0.00549 |
| | (0.0107) | (0.0123) | (0.0103) | (0.00850) | (0.00906) | (0.00934) |
| **Year Fixed Effects** (F-statistic) | 1.17 | 1.67 | 1.95* | 0.97 | 1.48 | 9.76*** |
| **Observations** | 21744 | 21744 | 21744 | 21744 | 21744 | 21744 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Likelihood of various outcomes. Treatment = privately insured women. Control group = women insured through Medicaid. Sample = civilian, non-institutionalized women ages 15-45 who are insured privately or through Medicaid.

| | Likelihood of: | | | | | |
|---|---|---|---|---|---|---|
| **Variable Name** | Sexual Activity | Contraception Use | Pill Use | Condom Use | Sterilization | LARC Use |
| Uninsured | 0.0617*** | -0.0497** | -0.0772*** | 0.0511*** | -0.0134 | 0.0147 |
| | (0.0113) | (0.0159) | (0.0122) | (0.0129) | (0.0128) | (0.00945) |
| Post-ACA × Uninsured | -0.0278 | -0.00246 | -0.0139 | -0.0240 | 0.0377* | -0.0166 |
| | (0.0163) | (0.0233) | (0.0167) | (0.0173) | (0.0186) | (0.0149) |
| **Race** (omitted = White) | | | | | | |
| Other | -0.0361* | -0.0309 | -0.0802*** | 0.0714*** | -0.0781*** | -0.0193* |
| | (0.0147) | (0.0204) | (0.0165) | (0.0181) | (0.0165) | (0.00932) |
| Black | 0.0689*** | -0.0654*** | -0.0663*** | 0.0215* | 0.00161 | 0.0137 |
| | (0.0110) | (0.0149) | (0.0122) | (0.00936) | (0.0121) | (0.00839) |
| Hispanic | 0.0476*** | -0.0206 | -0.0362*** | 0.0235* | -0.0194 | 0.0320** |
| | (0.0104) | (0.0136) | (0.0110) | (0.00977) | (0.0115) | (0.00996) |
| **Age Groups** (omitted = 15-25) | | | | | | |
| 26-36 | 0.0404*** | -0.0814*** | -0.0812*** | -0.0242* | 0.122*** | 0.0187* |
| | (0.0108) | (0.0140) | (0.0126) | (0.0107) | (0.00814) | (0.00867) |
| 37-45 | 0.00397 | -0.0598*** | -0.165*** | -0.0690*** | 0.344*** | -0.0260** |
| | (0.0114) | (0.0163) | (0.0128) | (0.0110) | (0.0126) | (0.00963) |
| **Education** (omitted = Some HS) | | | | | | |
| HS Degree | 0.193*** | -0.0519*** | 0.0820*** | 0.0402*** | -0.00323 | 0.00143 |
| | (0.0129) | (0.0153) | (0.0121) | (0.0108) | (0.0125) | (0.0102) |
| Some College | 0.223*** | -0.0598*** | 0.137*** | 0.0385*** | -0.0396*** | 0.00211 |
| | (0.0136) | (0.0154) | (0.0134) | (0.0103) | (0.0111) | (0.00998) |
| Associates Degree | 0.193*** | -0.0730*** | 0.128*** | 0.0447** | -0.0520** | 0.00153 |
| | (0.0151) | (0.0213) | (0.0174) | (0.0150) | (0.0183) | (0.0134) |
| Bachelors Degree | 0.197*** | -0.0891*** | 0.180*** | 0.0699*** | -0.138*** | -0.00286 |
| | (0.0136) | (0.0166) | (0.0148) | (0.0121) | (0.0129) | (0.0108) |
| Higher Degree | 0.186*** | -0.100*** | 0.179*** | 0.0896*** | -0.174*** | 0.00867 |
| | (0.0149) | (0.0216) | (0.0181) | (0.0162) | (0.0180) | (0.0135) |
| **Marital Status** (omitted = Never married) | | | | | | |
| Divorced, widowed, or separated | 0.157*** | -0.0361 | -0.0239 | 0.00679 | 0.0767*** | 0.0475** |
| | (0.0198) | (0.0221) | (0.0159) | (0.0126) | (0.0182) | (0.0144) |
| Married | 0.410*** | 0.0857*** | -0.0627*** | 0.0474*** | 0.168*** | 0.0426*** |
| | (0.0110) | (0.0142) | (0.0116) | (0.00962) | (0.00951) | (0.00851) |
| Cohabiting | 0.403*** | 0.0823*** | 0.0382* | 0.0625*** | 0.0616*** | 0.0572*** |
| | (0.0102) | (0.0172) | (0.0160) | (0.0136) | (0.0104) | (0.0110) |
| **Poverty Status** (omitted = Below poverty line) | | | | | | |
| Above or At Poverty Line | -0.00536 | 0.0218 | 0.00312 | 0.00468 | -0.0133 | -0.0102 |
| | (0.0109) | (0.0133) | (0.0106) | (0.00965) | (0.0101) | (0.00877) |
| **Year Fixed Effects** (F-statistic) | 0.90 | 1.63 | 1.39 | 0.98 | 1.68 | 9.64*** |
| **Observations** | 20519 | 20519 | 20519 | 20519 | 20519 | 20519 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Likelihood of various outcomes. Treatment = privately insured women. Control group = Uninsured women. Sample = civilian, non-institutionalized women ages 15-45 who are privately insured or uninsured.

| | Model | | |
|---|---|---|---|
| **Likelihood of being sexually active among 15 - 25 year olds** | 1 | 2 | 3 |
| Private Insurance | -0.127*** | | |
| | (0.0174) | | |
| Post-ACA × Private Insurance | 0.0551* | | |
| | (0.0235) | | |
| Medicaid | | 0.151*** | |
| | | (0.0221) | |
| Post-ACA × Medicaid | | -0.0371 | |
| | | (0.0276) | |
| Uninsured | | | 0.134*** |
| | | | (0.0213) |
| Post-ACA × Uninsured | | | -0.0881** |
| | | | (0.0340) |
| **Year Fixed Effects** | 1.46 | 0.96 | 0.75 |
| Observations | 11028 | 8580 | 7336 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Likelihood of being sexually active among 15 - 25 year olds. Sexually active is defined here as binary: 1 if ever had sex, and 0 otherwise. Model 1 estimates likelihood for privately insured women versus all other women, Model 2 estimates likelihood for privately insured women versus women with Medicaid, and Model 3 estimates likelihood for privately insured women versus uninsured women. Models 4, 5, and 6 follow the same pattern, but exclude women who are not sexually active. The year fixed effects row presents the F-statistic for joint significance of the year dummy variables. Excluded covariates from this model include dummy variables for: race, education, marital status, poverty status, and age groups.

| | Model | | | | | |
|---|---|---|---|---|---|---|
| **Likelihood of Pill Use** | 1 | 2 | 3 | 4 | 5 | 6 |
| Private Insurance | 0.0703*** | | | 0.0905*** | | |
| | (0.0103) | | | (0.0121) | | |
| Post-ACA × Private Insurance | 0.0142 | | | 0.00496 | | |
| | (0.0132) | | | (0.0153) | | |
| Medicaid | | -0.0754*** | | | -0.116*** | |
| | | (0.0132) | | | (0.0157) | |
| Post-ACA × Medicaid | | -0.00582 | | | 0.0105 | |
| | | (0.0159) | | | (0.0186) | |
| Uninsured | | | -0.0772*** | | | -0.0939*** |
| | | | (0.0122) | | | (0.0145) |
| Post-ACA × Uninsured | | | -0.0139 | | | -0.00251 |
| | | | (0.0167) | | | (0.0193) |
| **Year Fixed Effects** | 3.07*** | 1.95* | 1.39 | 2.97*** | 2.78** | 2.10* |
| Observations | 28326 | 21744 | 20519 | 22177 | 16836 | 16173 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Likelihood of using the Pill. Model 1 estimates likelihood for privately insured women versus all other women, Model 2 estimates likelihood for privately insured women versus women with Medicaid, and Model 3 estimates likelihood for privately insured women versus uninsured women. Models 4, 5, and 6 follow the same pattern, but exclude women who are not sexually active. The year fixed effects row presents the F-statistic for joint significance of the year dummy variables. Excluded covariates from this model include dummy variables for: race, education, marital status, poverty status, and age groups.

| | Model | | | | | |
|---|---|---|---|---|---|---|
| **Likelihood of Pill Use over Other Methods** | 1 | 2 | 3 | 4 | 5 | 6 |
| Private Insurance | 0.0995*** | | | 0.0995*** | | |
| | (0.0155) | | | (0.0155) | | |
| Post-ACA × Private Insurance | 0.0119 | | | 0.0119 | | |
| | (0.0197) | | | (0.0197) | | |
| Medicaid | | -0.116*** | | | -0.116*** | |
| | | (0.0213) | | | (0.0213) | |
| Post-ACA × Medicaid | | -0.00478 | | | -0.00478 | |
| | | (0.0253) | | | (0.0253) | |
| Uninsured | | | -0.115*** | | | -0.115*** |
| | | | (0.0183) | | | (0.0183) |
| Post-ACA × Uninsured | | | 0.00000479 | | | 0.00000479 |
| | | | (0.0245) | | | (0.0245) |
| **Year Fixed Effects** | 3.76*** | 3.46*** | 2.87*** | 3.76*** | 3.46*** | 2.87*** |
| Observations | 15825 | 12058 | 11912 | 15825 | 12058 | 11912 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Likelihood of using the Pill over other methods. Model 1 estimates likelihood for privately insured women versus all other women, Model 2 estimates likelihood for privately insured women versus women with Medicaid, and Model 3 estimates likelihood for privately insured women versus uninsured women. Models 4, 5, and 6 follow the same pattern, but exclude women who are not sexually active. The year fixed effects row presents the F-statistic for joint significance of the year dummy variables. Excluded covariates from this model include dummy variables for: race, education, marital status, poverty status, and age groups.

| | Model | | | | | |
|---|---|---|---|---|---|---|
| **Likelihood of Being Sterilized** | 1 | 2 | 3 | 4 | 5 | 6 |
| Private Insurance | 0.0123 | | | 0.0147 | | |
| | (0.0102) | | | (0.0123) | | |
| Post-ACA × Private Insurance | -0.0305* | | | -0.0318* | | |
| | (0.0134) | | | (0.0161) | | |
| Medicaid | | 0.00393 | | | 0.00761 | |
| | | (0.0127) | | | (0.0161) | |
| Post-ACA × Medicaid | | 0.0188 | | | 0.0145 | |
| | | (0.0159) | | | (0.0195) | |
| Uninsured | | | -0.0134 | | | -0.0178 |
| | | | (0.0128) | | | (0.0150) |
| Post-ACA × Uninsured | | | 0.0377* | | | 0.0445* |
| | | | (0.0186) | | | (0.0216) |
| **Year Fixed Effects** | 0.96 | 1.48 | 1.68 | 1.02 | 1.41 | 1.39 |
| Observations | 15825 | 12058 | 11912 | 15825 | 12058 | 11912 |

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Likelihood of being sterilized. Model 1 estimates likelihood for privately insured women versus all other women, Model 2 estimates likelihood for privately insured women versus women with Medicaid, and Model 3 estimates likelihood for privately insured women versus uninsured women. Models 4, 5, and 6 follow the same pattern, but exclude women who are not sexually active. The year fixed effects row presents the F-statistic for joint significance of the year dummy variables. Excluded covariates from this model include dummy variables for: race, education, marital status, poverty status, and age groups.

| | Model | | | | | |
|---|---|---|---|---|---|---|
| **Likelihood of Being Sterilized over Other Methods** | 1 | 2 | 3 | 4 | 5 | 6 |
| Private Insurance | 0.00498 | | | 0.0107 | | |
| | (0.0125) | | | (0.0154) | | |
| Post-ACA × Private Insurance | -0.0387* | | | -0.0426* | | |
| | (0.0166) | | | (0.0201) | | |
| Medicaid | | 0.0247 | | | 0.0324 | |
| | | (0.0157) | | | (0.0206) | |
| Post-ACA × Medicaid | | 0.0144 | | | 0.00945 | |
| | | (0.0198) | | | (0.0252) | |
| Uninsured | | | -0.0124 | | | -0.0242 |
| | | | (0.0163) | | | (0.0188) |
| Post-ACA × Uninsured | | | 0.0483* | | | 0.0548* |
| | | | (0.0234) | | | (0.0269) |
| **Year Fixed Effects** | 0.47 | 1.46 | 1.25 | 0.56 | 1.39 | 1.11 |
| Observations | 20177 | 15641 | 14934 | 15825 | 12058 | 11912 |

*t* statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Likelihood of being sterilized over other methods. Model 1 estimates likelihood for privately insured women versus all other women, Model 2 estimates likelihood for privately insured women versus women with Medicaid, and Model 3 estimates likelihood for privately insured women versus uninsured women. Models 4, 5, and 6 follow the same pattern, but exclude women who are not sexually active. The year fixed effects row presents the F-statistic for joint significance of the year dummy variables. Excluded covariates from this model include dummy variables for: race, education, marital status, poverty status, and age groups.

# C Appendix C: Histograms of Predicted Results

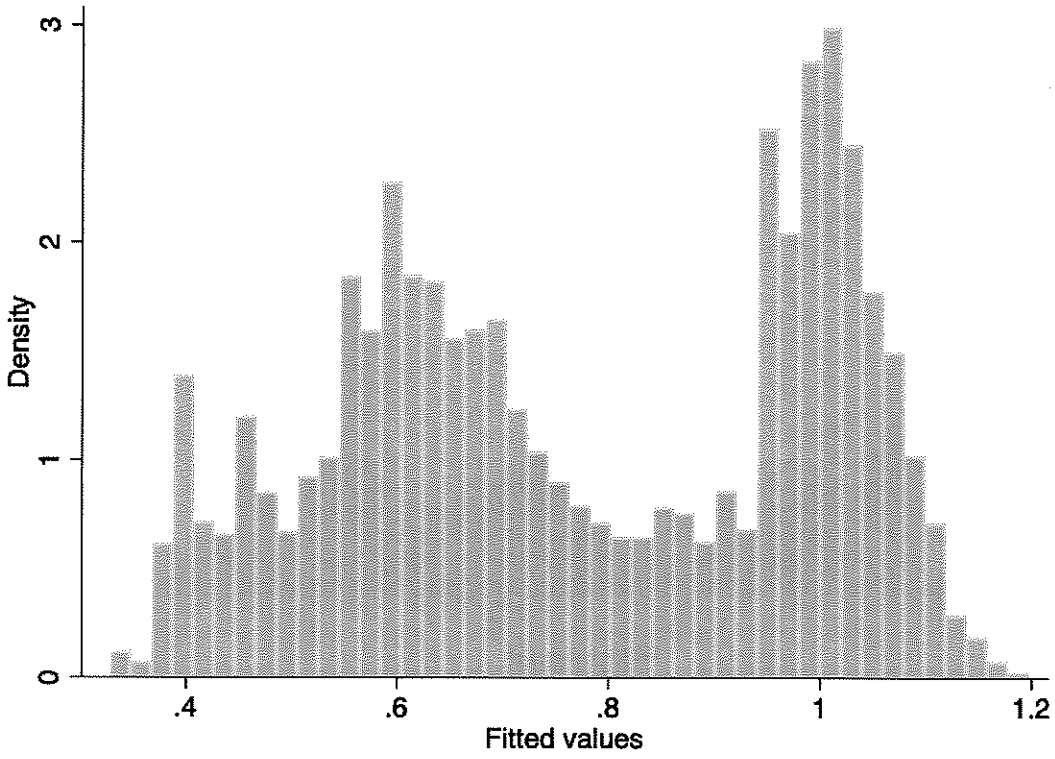


Figure 1: Histogram of predicted results from the model regressing sexual activity on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to all other women.

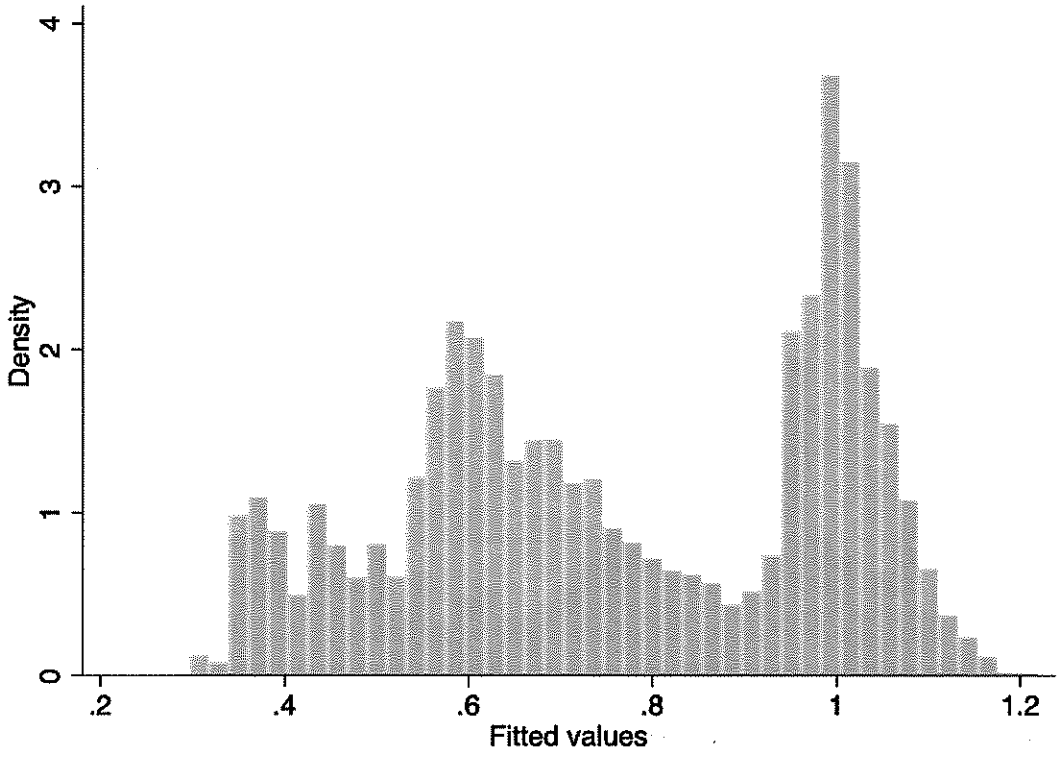


Figure 2: Histogram of predicted results from the model regressing sexual activity on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to women on Medicaid.

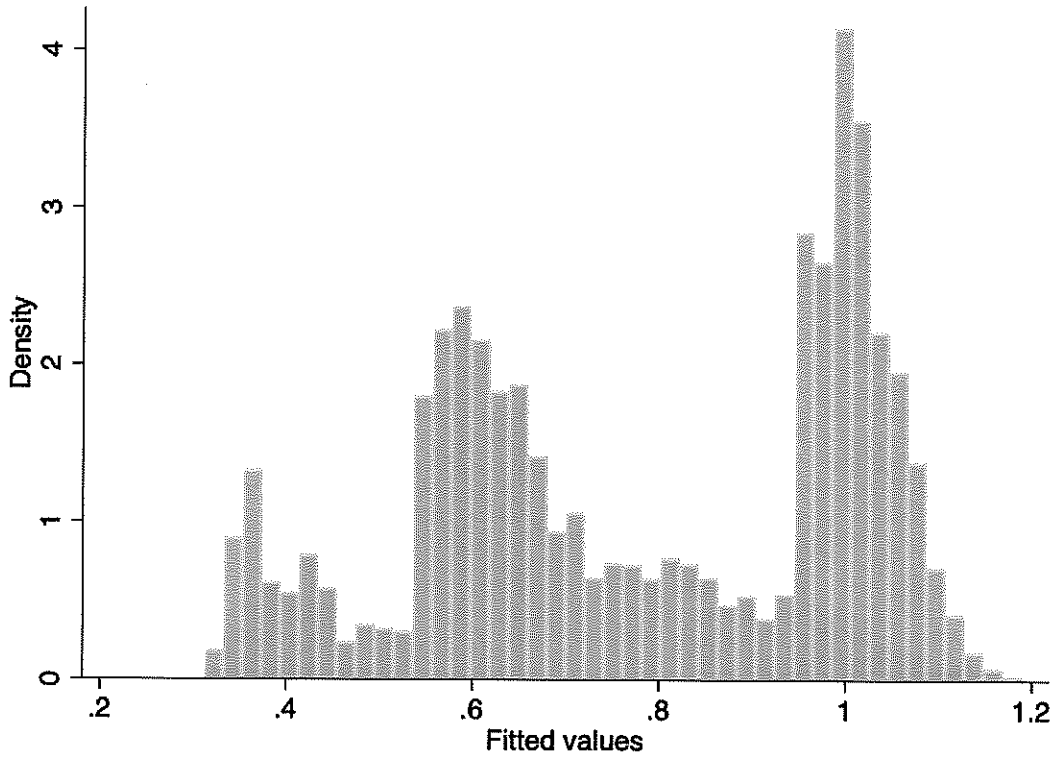


Figure 3: Histogram of predicted results from the model regressing sexual activity on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to uninsured women.

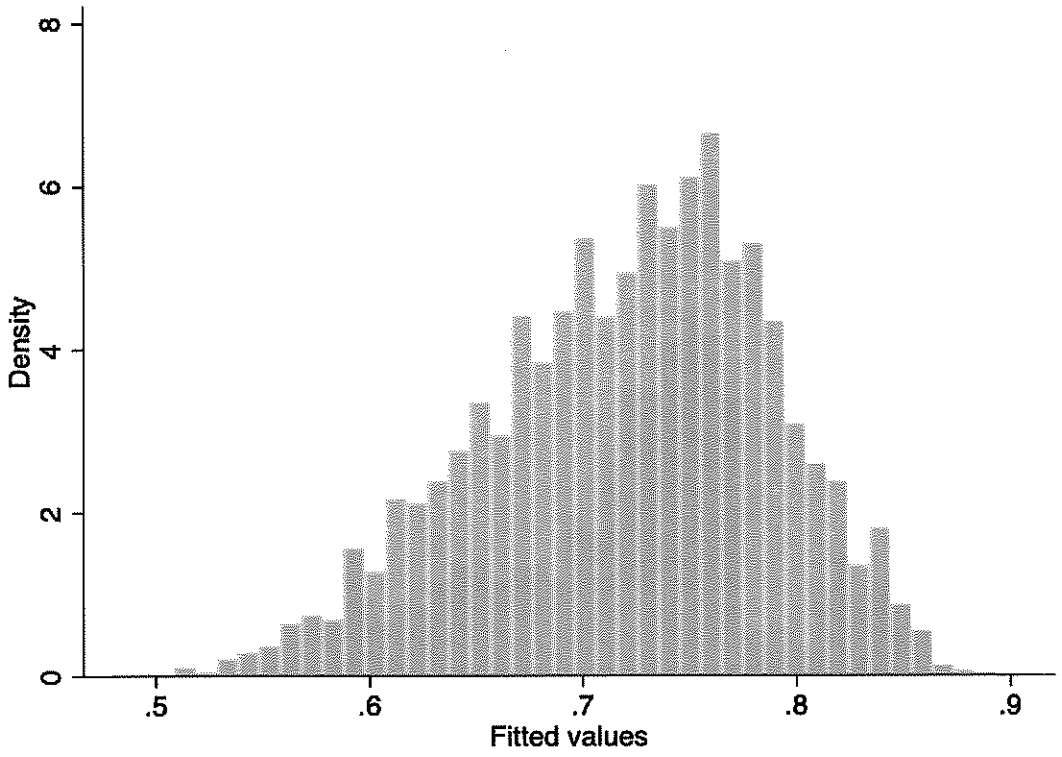


Figure 4: Histogram of predicted results from the model regressing use of contraception on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to all other women.

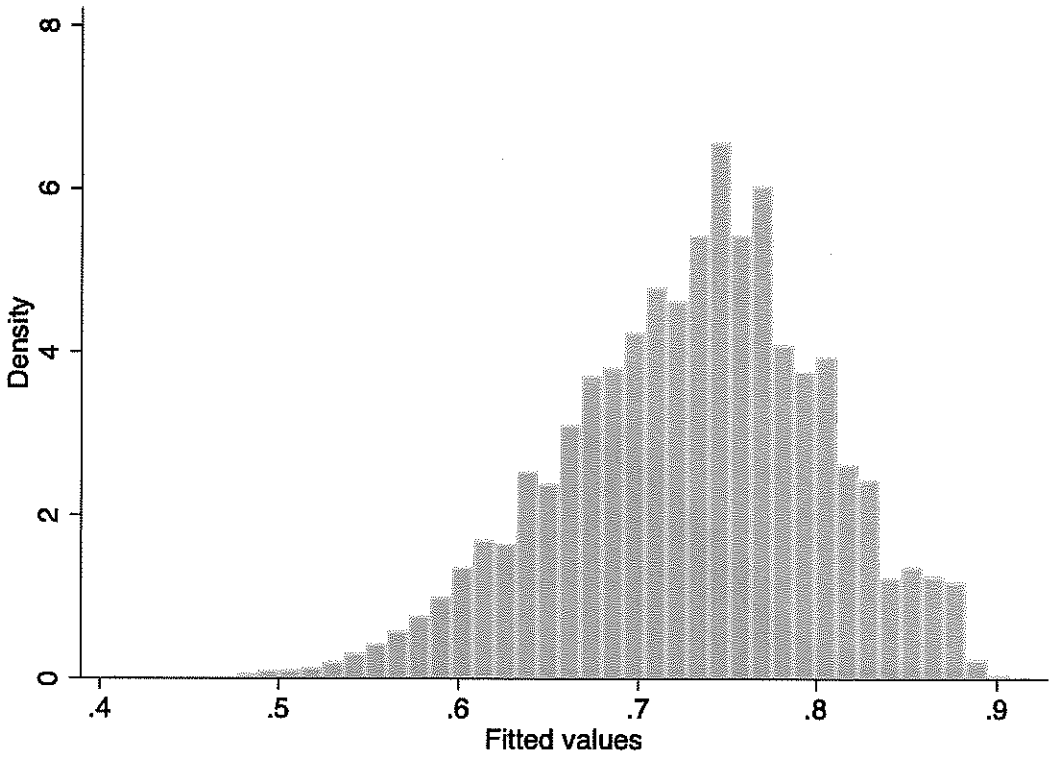


Figure 5: Histogram of predicted results from the model regressing use of contraception on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to women on Medicaid.

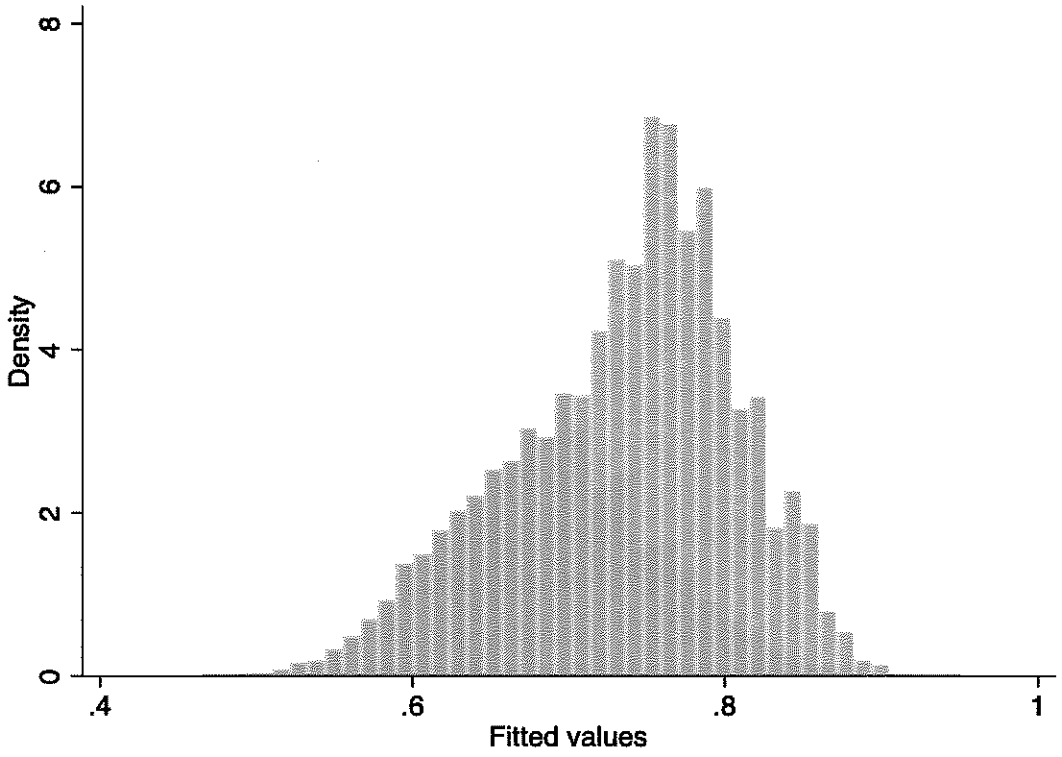


Figure 6: Histogram of predicted results from the model regressing use of contraception on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to uninsured women.

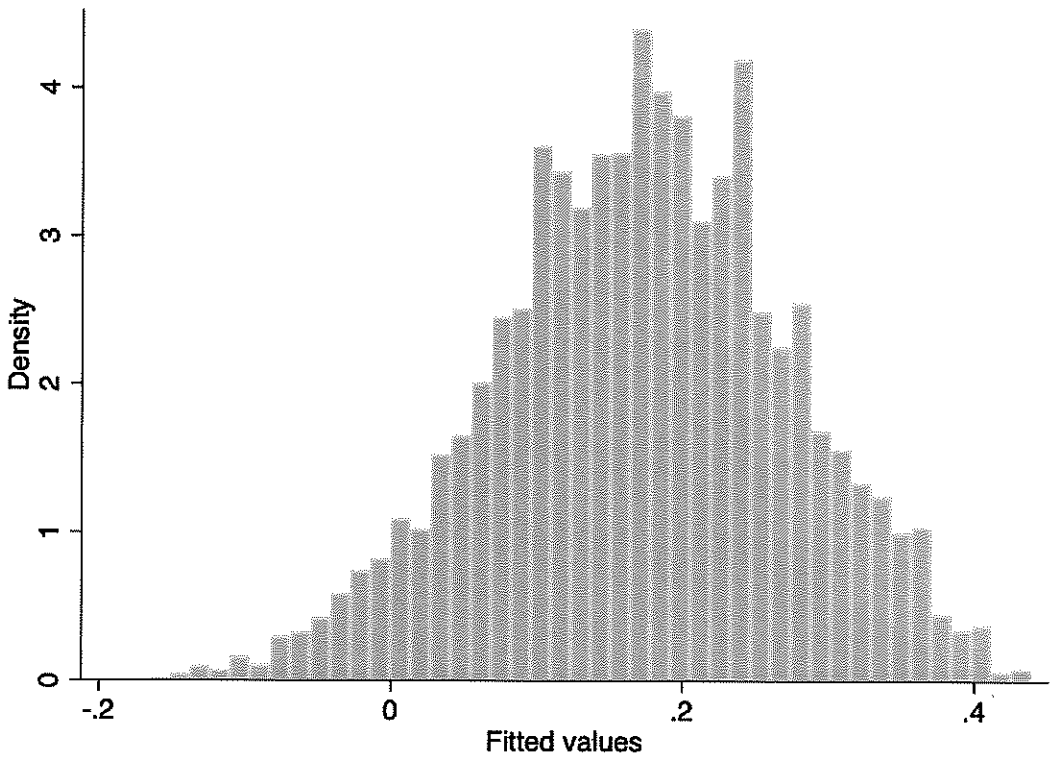


Figure 7: Histogram of predicted results from the model regressing Pill use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to all other women.

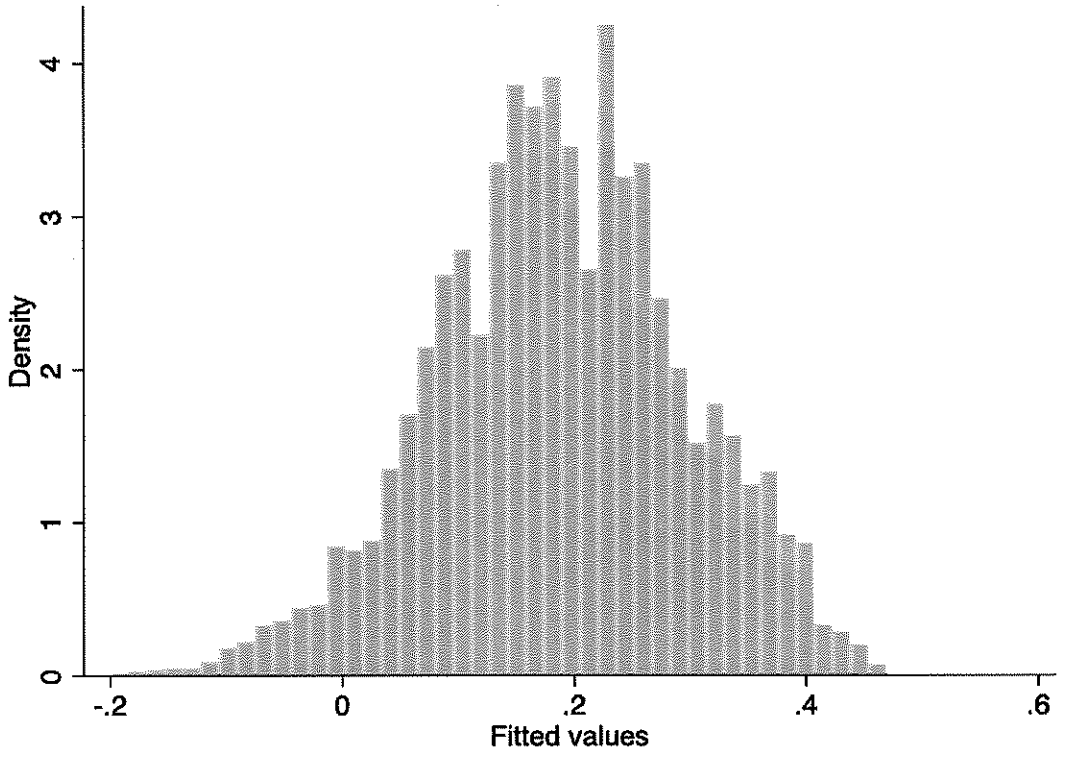


Figure 8: Histogram of predicted results from the model regressing Pill use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to women on Medicaid.

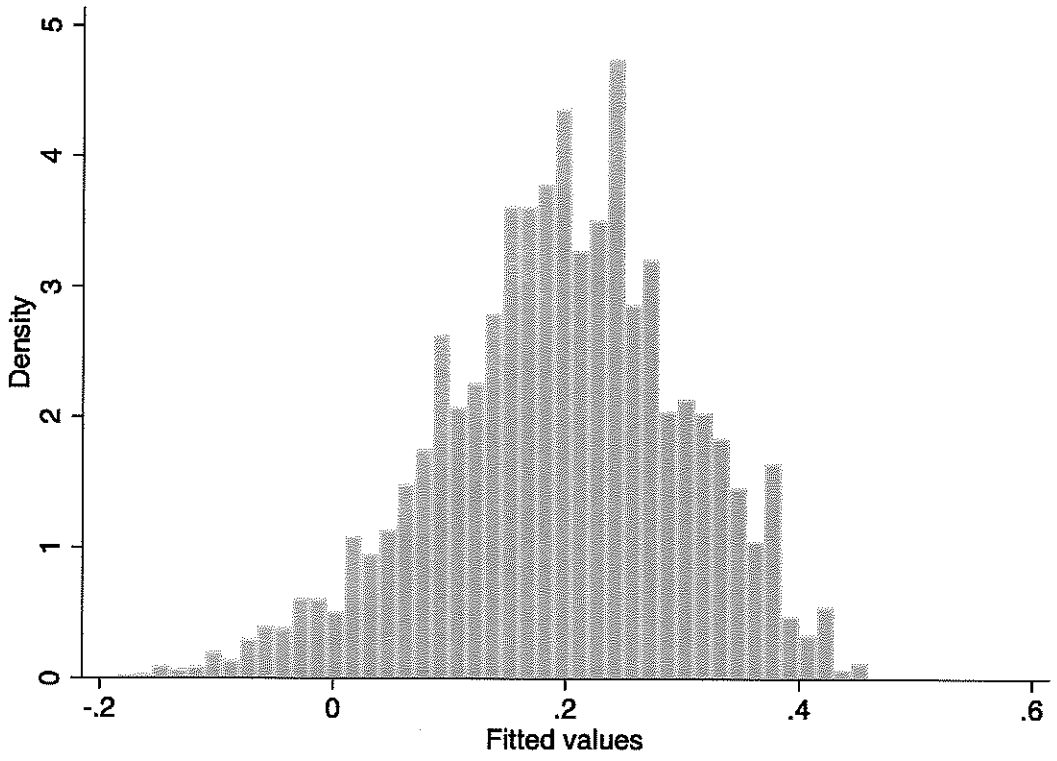


Figure 9: Histogram of predicted results from the model regressing Pill use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to uninsured women.

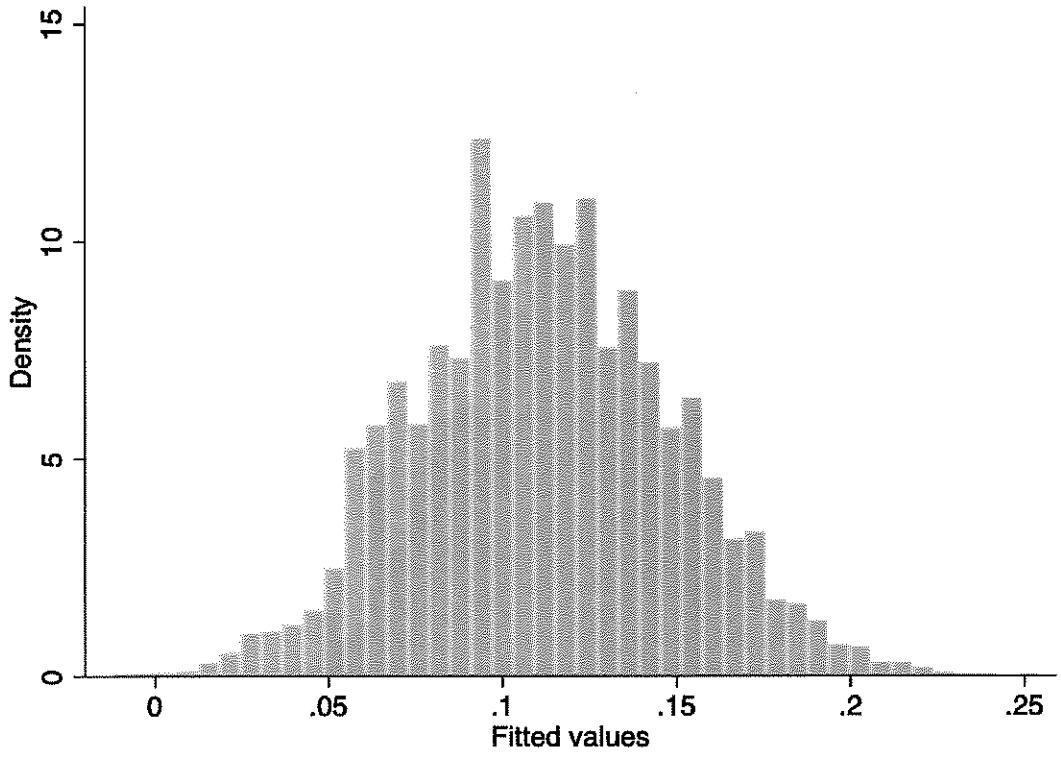


Figure 10: Histogram of predicted results from the model regressing condom use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to all other women.

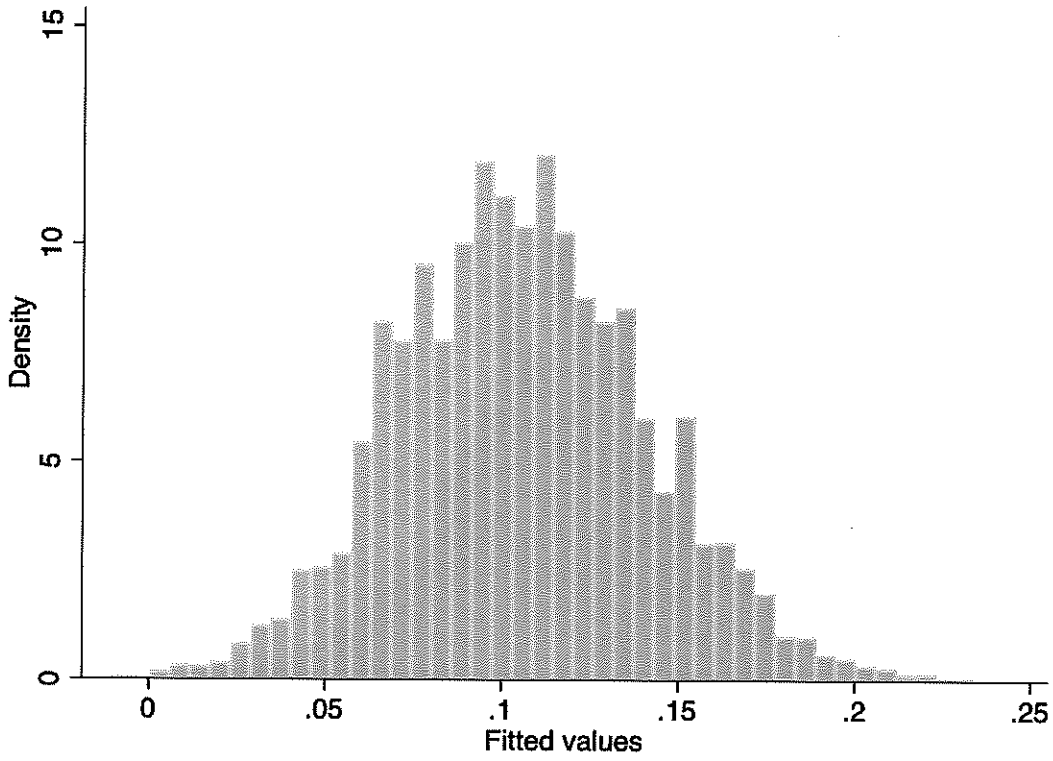


Figure 11: Histogram of predicted results from the model regressing condom use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to women on Medicaid.

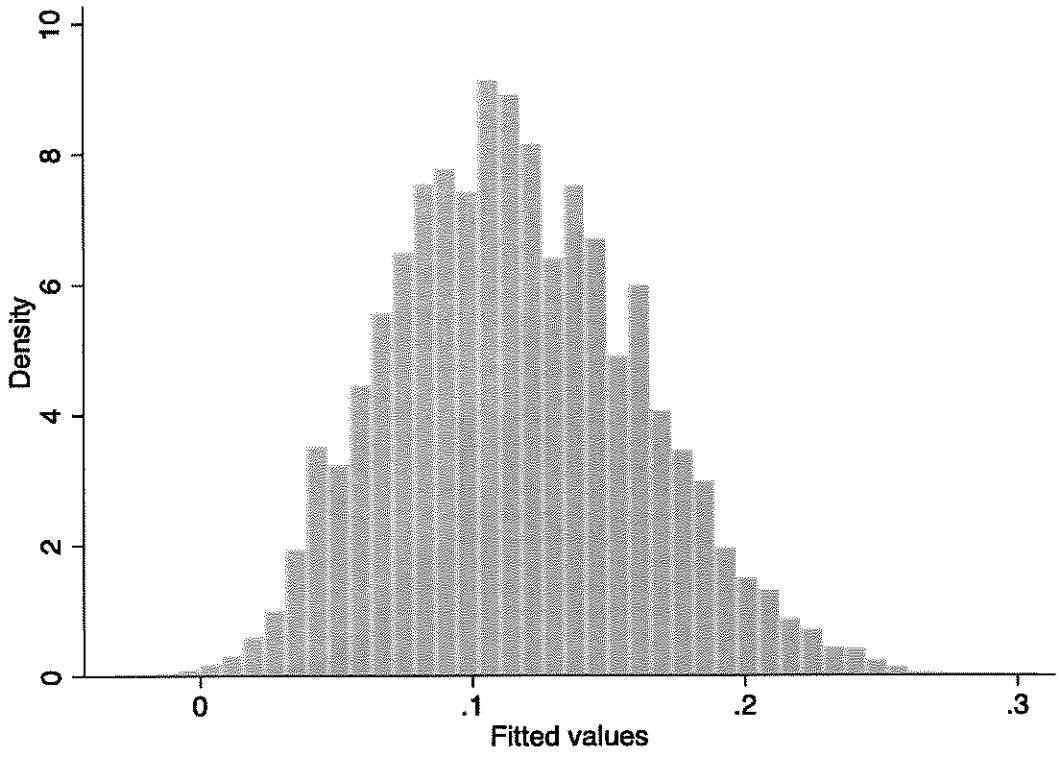


Figure 12: Histogram of predicted results from the model regressing condom use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to uninsured women.

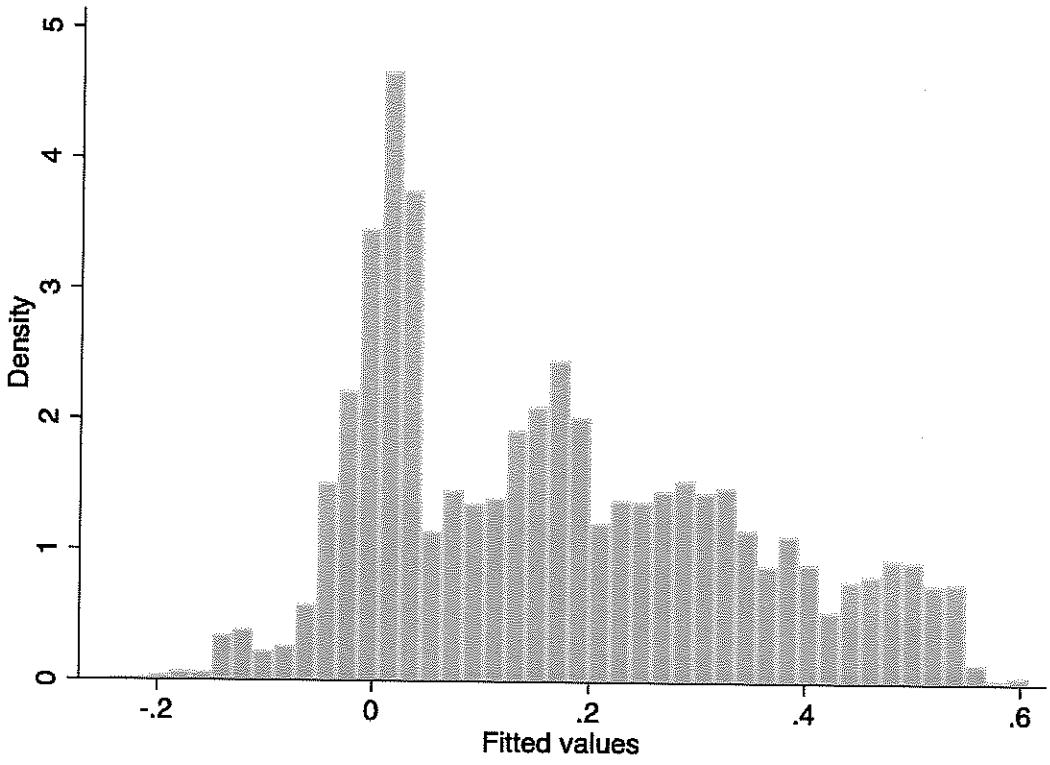


Figure 13: Histogram of predicted results from the model regressing sterilization use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to all other women.

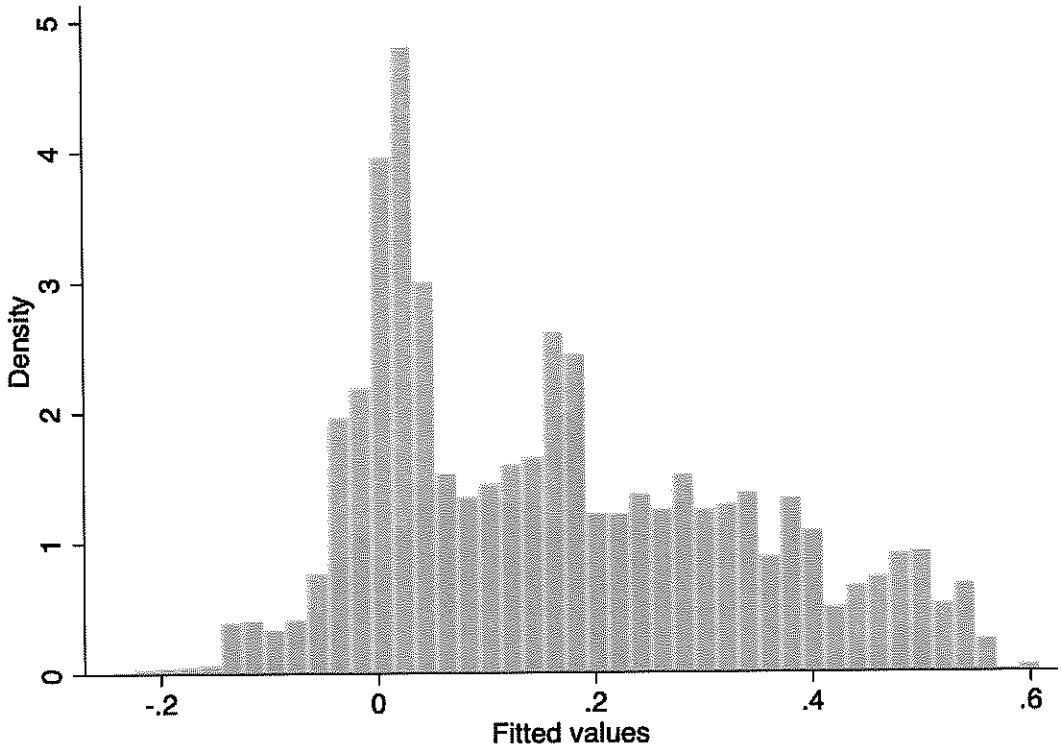


Figure 14: Histogram of predicted results from the model regressing sterilization use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to women on Medicaid.

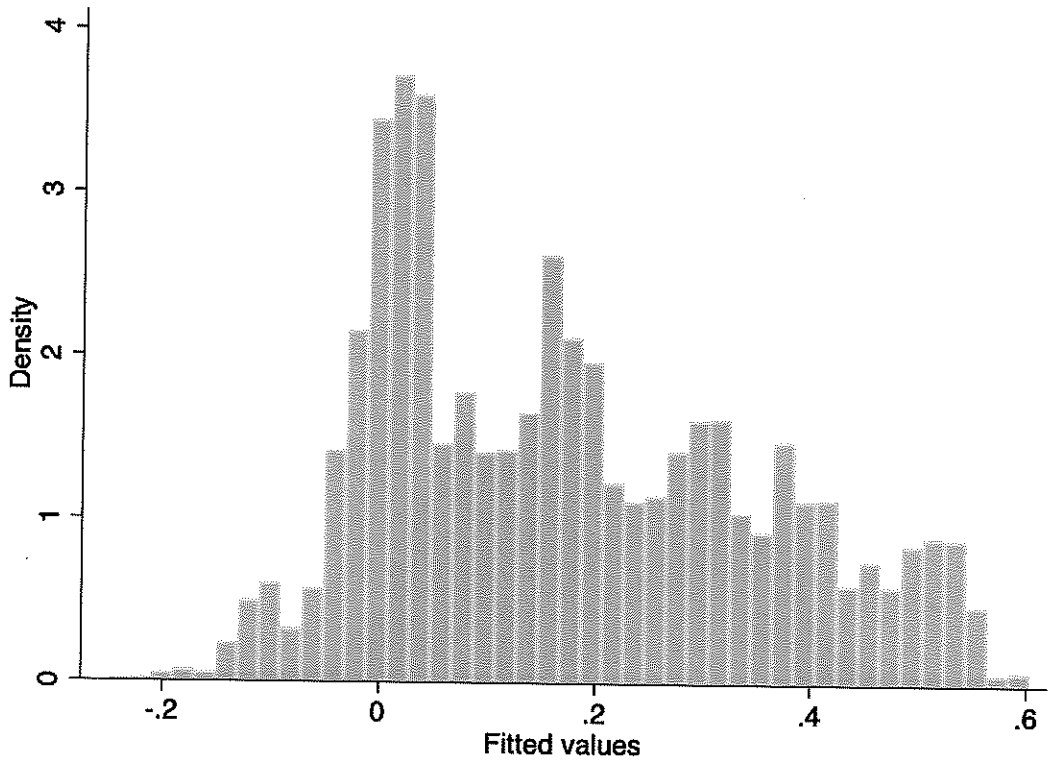


Figure 15: Histogram of predicted results from the model regressing sterilization use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to uninsured women.

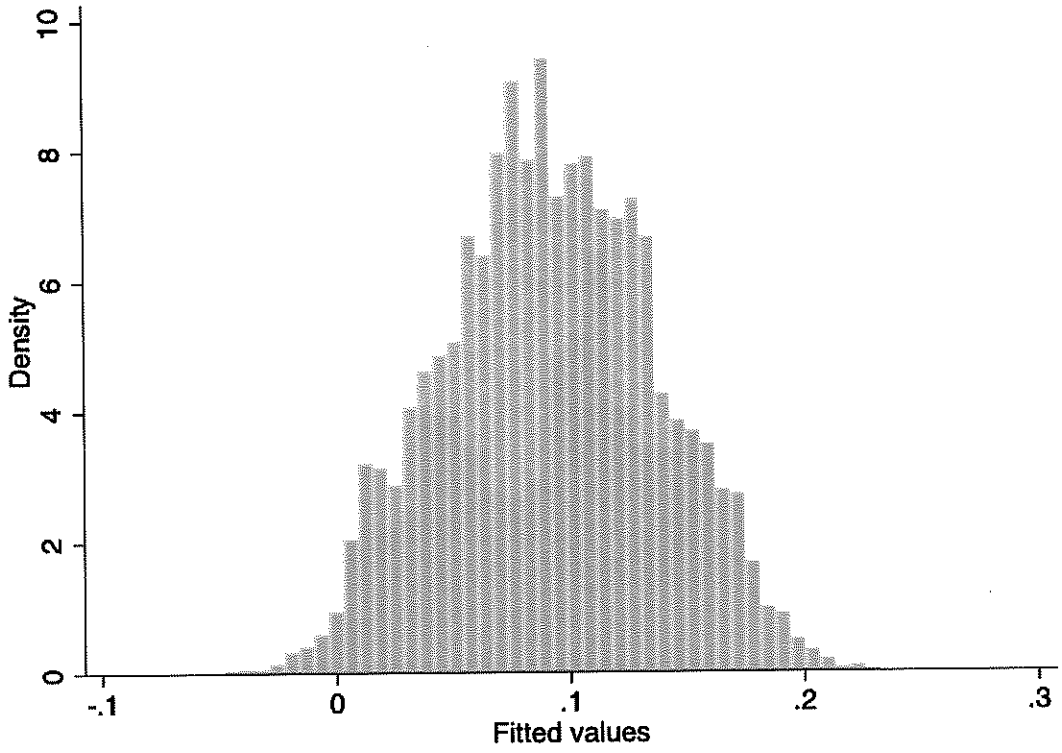


Figure 16: Histogram of predicted results from the model regressing LARC use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to all other women.

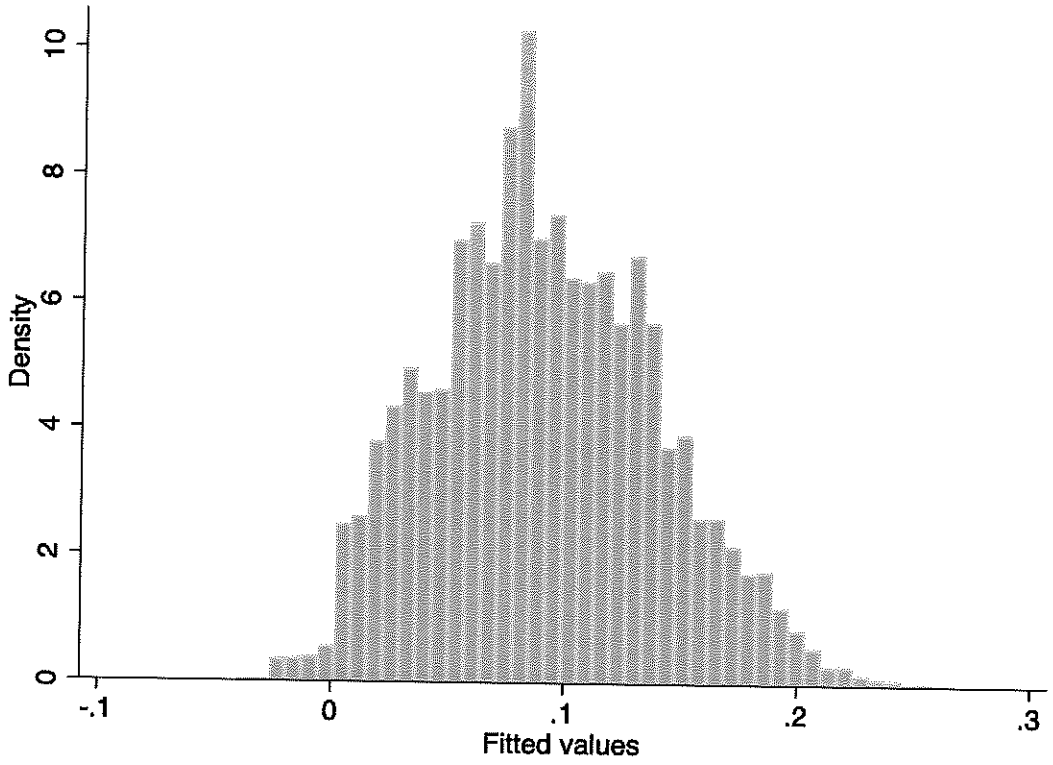


Figure 17: Histogram of predicted results from the model regressing LARC use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to women on Medicaid.

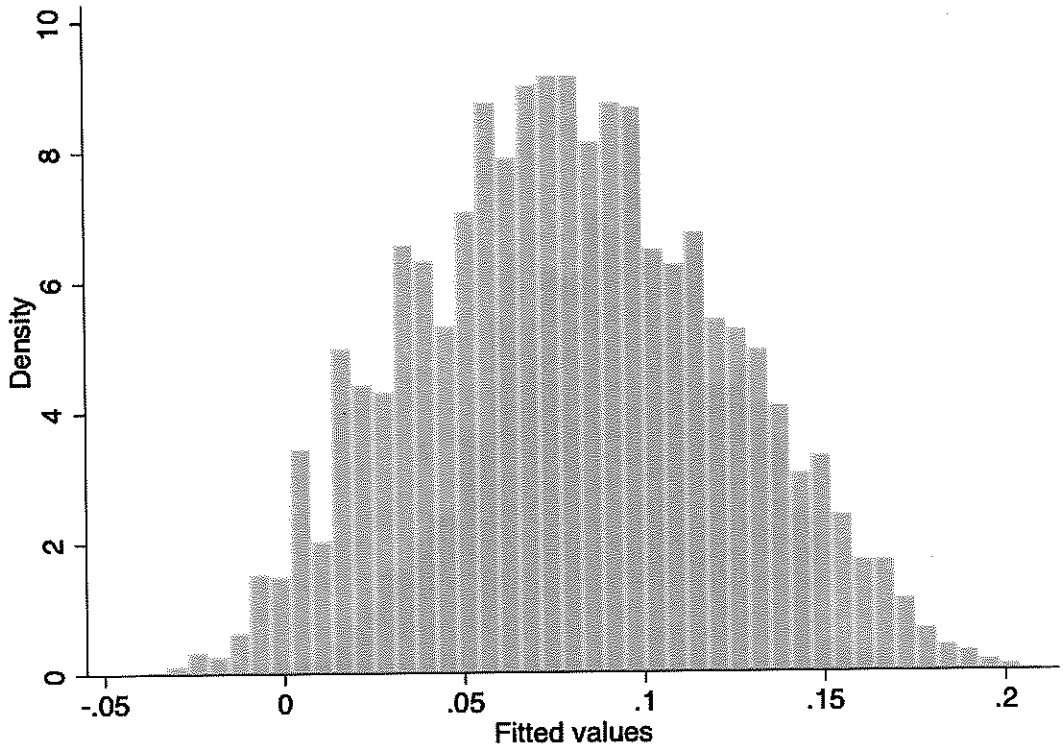


Figure 18: Histogram of predicted results from the model regressing LARC use on race, age groups, education, marital status, poverty status, year fixed effects, and the interaction term between post-ACA and insurance status. In this model, we compared privately insured women to uninsured women.