# Contraceptive Choice after the Affordable Care Act

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***Abstract***

This study examined the effect of free contraceptive coverage under the Affordable Care Act on patterns of contraceptive use and elective abortions. We used claims data from a sample of women aged 18-45 with employer-sponsored coverage to examine the contraceptive choices made by those in employer groups whose coverage complied with the mandate, compared to those whose coverage did not comply. We found the reduction in copayment was associated with a 2.3 percentage point increase in any contraceptive use, relative to the 30 percent rate of use prior to the change in copayments. A disproportionate share of this increase came from increased use of long-term methods. We also found a marginally significant decline in the rate of elective abortions associated with this increased contraceptive coverage. Thus, the removal of cost as a barrier was an important factor in contraceptive choice, and may have reduced the rate of unintended pregnancy.

Key words: Health Reform, Cost of Health Care, Insurance Coverage

## Introduction

The Affordable Care Act (ACA) mandated that, starting in late 2012, private health insurance plans that are not exempt or grandfathered were required to cover all contraceptive methods approved by the Food and Drug Administration as prescribed for women without a patient copayment. It has been estimated that ignoring the effect on premiums, this mandate saved women between $483 million and $1.4 billion in out-of-pocket spending on birth control pills alone in 2013. [1,2] This policy has the potential to save billions in health care expenditures by reducing the number of unintended pregnancies, thereby reducing the number of deliveries and elective abortions.[3,4] Because unwanted pregnancy is associated with poor birth outcomes,[5] this policy also has the potential to reduce the fraction of high cost births and children in poor health.

The societal cost savings attributable to the mandate depend on the extent to which women respond to the change in their out-of-pocket price for contraceptives. Previous studies have shown that prior to the mandate, women's contraception decisions did respond to price changes, especially the decision to use long-term methods of contraception, like intrauterine devices (IUD), implants, and sterilization, which have high one-time out-of-pocket costs relative to shorter term methods prior to the mandate.[6,7,8] Long-term methods may gain market share when price differences between short- and long-term methods disappear because long-term methods have significantly higher effectiveness rates than short-term methods like the pill, the patch, or a vaginal ring[9] and because recent improvements in IUDs have reduced the safety concerns that were prevalent in the 1970s.[10] Studies also have shown that increased access to long-term methods reduced the rate of elective abortions.[4] As a result, we expect that the mandate has not only increased contraceptive use overall, but also increased the probability that women use long-term contraceptive methods above and beyond the current rising trend, and

decreased the probability of an elective abortion.

To test these hypotheses, this study investigated the effect of the ACA-induced change in cost-sharing for contraceptive care on the rate of contraceptive use, the choice between long- and short-term contraceptive methods, and the probability of elective abortion. To our knowledge, this is the first study examining the effect of the ACA-mandated cost sharing changes on women's decisions about contraception, and also the first study to use longitudinal data (following a group of women over time) with a control group to look at the effect of *any* cost sharing change on women's decisions about contraception. We used longitudinal health insurance claims data on women age 18-45 with coverage through 486 employers who complied with the mandate (with staggered compliance dates) and 13 employers who had not yet complied with the mandate as of the end of our observation period because they were exempt or had grandfathered plans.[11] We found that the reduction in cost-sharing was associated with a 2.3 percentage-point increase in contraceptive use, relative to the 30 percent rate of use prior to the change in copayments, with a disproportionate share coming from increased use of long-term methods. We also found a marginally significant decline in the rate of elective abortions associated with this increased contraceptive coverage.

**Study Data and Methods**

For this analysis, we used claims data from a regional health plan operating in the upper Midwest. The sample included female enrollees aged 18-45 (n=29,990)[12] in insurance plans obtained through 499 employer groups with at least 50 enrollees. Medical and pharmacy claims from 2008 through 2014 were extracted for the sample. All employer groups in the sample offered contraceptive coverage (with varying degrees of cost-sharing) throughout the entire period. We observe the same women before and after ACA-induced changes in contraception

cost-sharing, creating a true panel dataset.

Employer-specific compliance with the ACA requirements for contraceptive coverage ranged from August 2012 through January 2014.[13] Our control group was women covered by the employers who had not yet complied with the ACA-mandated cost sharing as of the end of 2014. These were primarily employers with grandfathered plans, but also included employers exempt from contraceptive compliance. Additional statistical identification was provided by the variance in compliance dates among the treatment group.

*Measures*

We identified each woman's contraception choice as of the end of each plan year, capturing a total of 151,499 observations over this 7-year period, categorized into short-term and long-term contraceptive methods. Short-term methods included oral contraception, hormone patch, vaginal ring, diaphragm or cervical cap, and injectable hormones. Long-term methods included implant, intrauterine device or intrauterine system (IUD/IUS), and sterilization. We categorized observations as having no contraception if we did not observe protection that was effective as of the plan year end.[14] We also examined the short-term impact of free contraceptive coverage on the rate of elective abortions.

The only observable characteristic of the enrollee in the administrative data was age. Thus, we could not adjust for race/ethnicity, partner status, the presence of other children, or socioeconomic status. However, we were able to include characteristics of her neighborhood and adjust for time-invariant unobservable individual characteristics. Neighborhood characteristics included the percentage of the population that was non-Hispanic White, the percentage of the adult population that had less than a high school education or GED, the percentage with a high school degree but no college, and the percentage of the population living

below the federal poverty limit (FPL). We also included a quadratic quarterly time trend to capture secular trend in contraception choice.

*Empirical Strategy*

We employed a difference-in-differences framework, comparing the experience of the treatment group to the control group over time. We categorized contraception choice into three options: no contraceptive protection, use of a short-term method, or use of a long-term method. We modeled this choice using a multinomial probit regression, with individual random effects to control for the woman's time-invariant unobserved characteristics.[15] In a second regression, we modeled elective abortion using a binary probit regression with random effects.[16]

Both of these regression techniques are based on latent utility variables, with the woman's choice determined by the alternative with the largest utility. The utility for the $j^{th}$ alternative for individual $i$ at time $t$ is specified as follows:

$$U_{itj} = \text{Treatment}\beta_{1j} + \text{Trend}'\beta_{2\text{j}} + \text{ZeroedCopay}\beta_{3\text{j}} + x'_{it}\beta_{4j} + \eta_{ij} + \varepsilon_{itj}$$

Here, *Treatment* indicates whether the woman was a member of the treatment group. The vector *Trend* models general time trends in contraceptive use, in quadratic form. The indicator *ZeroedCopay* identifies observations from the treatment group, when the observation was made after the employer had complied with ACA coverage provisions; thus $\beta_{3j}$ is our variable of interest for choice $j$. The vector $x_{\text{it}}$ captures observable characteristics of the woman, and the random effect $\eta_{\text{ij}}$ models the impact of time-invariant unobserved characteristics of the woman influencing choice $j$. The general error term is $\varepsilon_{\text{itj.}}$ The reference utilities for "no protection" and "no abortion" were defined to be zero.

A test of pre-compliance contraceptive choice showed no statistically significant difference in trend between treatment and control groups. This is important, as a difference in

the pre-treatment trend would indicate that a differences-in-differences framework was inappropriate.

## Study Results

### *Descriptive Results*

Table 1 summarizes the data for the treatment and control groups. For trend comparison, the control group was split into observations before and after January 2013, the most common ACA compliance date within the treatment group. The control group had a slightly lower rate of contraceptive use in the pre-ACA period (26.4% vs. 30.2% for the treatment group), and resided in neighborhoods with a greater fraction of non-Hispanic White people (86.7% vs. 82.1%) and a smaller fraction of people with more than a high school diploma (65.6% vs. 68.1%). Both groups showed increased rates of contraceptive use over time, with a shift toward long-term methods.

Table 2 shows the average copayments before and after compliance date (or January 2013 for the control group). The fraction of contraceptives with a $0 copay obtained by women in the treatment group increased dramatically after compliance, particularly for short-term methods obtained at a pharmacy.[17] In contrast, the changes over time in the percentage of contraceptives with a $0 copay were negligible for the control group, as would be expected. Zero-dollar copayments for the control group (before and after 2013) and the pre-ACA compliance observations in the treatment group occurred when the woman had reached her out-of-pocket spending limit for the year.

### *Impact of Copay Change on Contraceptive Choice*

Table 3 displays the estimated coefficients for the contraceptive choice model. The coefficients on the main treatment group indicator suggest that there is no significant difference

in the baseline contraception choices between the treatment and control groups. There was a significant and nonlinear increase in the use of contraception over time that is an order of magnitude greater for long-term methods than short-term methods, consistent with other findings.[18] Before discussing the key findings, note that the age and neighborhood characteristics were not significantly associated with long-term methods, but were associated with short-term methods. This may be due to a difference in precision because of the much higher rate of short term method use relative to long-term methods (23 percent vs. 7 percent of all contraception choice observations).

Our parameters of interest, the coefficients for *ZeroedCopay*, were both estimated to be positive and highly significant. In order to gain an intuitive understanding of the impact of reducing the cost of contraceptive coverage, we computed the marginal effect of the change in cost sharing on the probabilities of each contraceptive option. Our estimates predict that reducing the cost of contraception to zero, on average, increased the overall rate of contraceptive use by 2.3 percentage points (p-value<0.01), relative to a pre-compliance contraception rate of approximately 30 percent. Two thirds of the increase (1.5 percentage points, p-value=0.04) was driven by short-term methods due to the high pre-compliance short-term contraception rate of 25 percent. The rest of the increase (0.8 percentage points, p-value<0.01) was driven by long-term methods, which only had a pre-compliance use rate of 6 percent. However, the long-term contraception *share* among those who chose a contraceptive method rose from 19 percent pre-compliance to 31 percent post-compliance.

*Short-term Impact of Copay Change on Elective Abortions*

We modeled the occurrence of any elective abortion in the post-compliance time period (or after January 2013 for the control group) relative to the occurrence of any abortion in the

equivalent pre-compliance time period, and found there was a marginally significant negative coefficient (p-value=0.06) on the *ZeroedCopay* variable (Table 4). The associated change in the estimated probability of an elective abortion was a 0.03 percentage-point decline (p-value=0.13), relative to a baseline 0.38 percent probability of an elective abortion. While the estimated *short-term* decline in probability due to the change in contraceptive cost sharing was quite small and driven by a parameter that was not quite statistically significant, its magnitude has practical significance relative to the very small baseline probability of an elective abortion. This suggests that *long-term* impacts may be meaningful in terms of a reduction in unintended pregnancies.

*Robustness Testing*

To strengthen our ability to make a causal inference, we restricted our sample to make the treatment and controls groups more similar, since some differences between the groups were noted in Table 1. Adapting a robustness test used by Dowd, Swenson, et al.,[19] we first estimated the women's propensity to be included in the treatment group, based on an expanded set of neighborhood characteristics. For each group we identified the propensity range defined between the 2.5$^{th}$ percentile and the 97.5$^{th}$ percentile (the "inter-95% range"), and restricted our sample to the women with a propensity in the area where these two inter-95% ranges overlapped. Specifically, the inter-95% range of the propensity in the treatment group was 79.2% - 99.9%, and in the control group was 74.8% - 92.9%. We included only women with a propensity in the overlap range of 79.2% - 92.9% for our robustness test. This sample restriction involved a loss of 40% of our observations, thereby reducing the precision of our estimates. Using the restricted sample, we estimated the marginal effect of reducing the cost of contraception to zero to be an increase in the overall rate of contraceptive use of 2.0 percentage points, which is close to the 2.3 percentage-point marginal effect we estimated using the unrestricted sample. As in the

unrestricted sample, a $0 copay increases the probability that a long-term method was selected by 0.8 percentage points. The elective abortion results became statistically significant: the magnitude of the marginal effect increased from the baseline -0.03 percentage points (p-value=0.13) to -0.04 percentage points (p-value=0.03).

**Limitations**

Although the baseline use of short- and long-term contraceptives in this study sample was similar to that available in national data,[20,21] our sample was drawn from the upper Midwest, and thus captured the prices and the cultural attitudes about the use of contraception and elective abortions in that region. The out-of-pocket costs prior to the mandate were slightly smaller and the change in the percent with $0 copays was greater in this study relative to recent national estimates. Specifically, in this study, the pill cost roughly $177 per year and an IUD cost $234 prior to the mandate, while Becker and Plosky[2] estimated that the average pill user saved $255 per year and the savings on an IUD was $248 after compliance. Both studies were based on claims data from one health insurance company, but this study was limited to the Midwest and could reflect lower prices or richer plan designs in that region. We also found that the proportion of oral contraceptives with a $0 copay rose from 6% to 92% averaged across treatment and controls groups, where a national survey (n=1842)[22] found that the proportion of privately insured women paying a $0 copay for oral contraceptives increased from 15% in 2012 to 67% in 2014. Our data were not based on a national sample, so could reflect higher compliance in the upper Midwest or within this particular health insurance company. However, our data may be more accurate in that they were based on actual claims instead of self-report. Thus, while this study sample spans a broad cross-section of the privately insured population, additional evaluations in other markets are needed to gain a complete understanding of the impact of cost

sharing on contraceptive choices.

**Conclusions**

In the first study of its kind, we use longitudinal data with a control group to look at the effect of any cost sharing change on women's decisions about contraception. We found that when the copay for contraceptives fell to $0 for those in compliant plans, contraceptive use rose substantially more than for those in non-compliant plans. Moreover, the mandate has increased the probability that a woman chose a long-term contraceptive method above and beyond the general increasing trend for these methods. We also observed a marginally significant decline in elective abortions. These findings suggest that women are price sensitive with regard to contraception choice and thus the ACA mandate will likely significantly reduce the rate of unintended pregnancy. Trussell et al[23] find that all forms of contraception (which does not include abortion), and especially long-term methods, are cost effective from the payer's perspective, thus the savings in health care spending from increasing the rate of contraception could be substantial.

Table 1: Summary Statistics

| | Treatment | | | Control | | |
|---|---|---|---|---|---|---|
| | Before Compliance | After Compliance | Total | Before Jan 2013 | Jan 2013 and after | Total |
| Observations | 82200 | 49506 | 131706 | 15810 | 3983 | 19793 |
| Unique women | | | 27113 | | | 2877 |
| Contraceptive Choices | | | | | | |
| No protection | 69.8% | 69.0% | | 73.6% | 70.9% | |
| Short-term protection | 24.6% | 21.2% | | 21.8% | 21.1% | |
| Long-term protection | 5.7% | 9.8% | | 4.6% | 8.0% | |
| Elective Abortions | 0.37% | 0.25% | | 0.39% | 0.29% | |
| Age at Plan Year-End | | | 33.7 | | | 34.0 |
| Neighborhood Characteristics | | | | | | |
| % White | | | 82.1% | | | 86.7% |
| % with <HS | | | 7.2% | | | 7.4% |
| % with HS/GED | | | 24.8% | | | 27.0% |
| % with some college+ | | | 68.1% | | | 65.6% |
| % below FPL | | | 9.3% | | | 9.8% |
| Observations by Year | | | | | | |
| 2008 | 9493 | 0 | 9493 | 1836 | 0 | 1836 |
| 2009 | 10689 | 0 | 10689 | 2275 | 0 | 2275 |
| 2010 | 13992 | 0 | 13992 | 2830 | 0 | 2830 |
| 2011 | 17133 | 0 | 17133 | 3696 | 0 | 3696 |
| 2012 | 25571 | 1076 | 26647 | 5131 | 0 | 5131 |
| 2013 | 5295 | 24627 | 29922 | 0 | 2960 | 2960 |
| 2014 | 27 | 23803 | 23830 | 0 | 1065 | 1065 |

Table 2: Change in Patient Copayment for Contraceptive Care

| | Treatment | | Control | |
|---|---|---|---|---|
| | Before Compliance | After Compliance | Before Jan 2013 | Jan 2013 and after |
| **SHORT-TERM METHODS** | | | | |
| ***Pill**** | | | | |
| # of claims | 115684 | 41553 | 13279 | 3428 |
| % with $0 copay | 4.6% | 98.7% | 14.0% | 15.6% |
| Average Cost (including 0s) | $14.51 | $0.23 | $16.42 | $15.30 |
| ***Vaginal Ring**** | | | | |
| # of claims | 9979 | 3309 | 895 | 203 |
| % with $0 copay | 3.7% | 98.7% | 12.4% | 14.3% |
| Average Cost (including 0s) | $34.14 | $0.36 | $30.85 | $30.46 |
| ***Injectable*** | | | | |
| # of claims | 4551 | 69 | 671 | 0 |
| % with $0 copay | 23.8% | 75.4% | 27.0% | n/a |
| Average Cost (including 0s) | $29.88 | $7.17 | $28.39 | n/a |
| ***Patch**** | | | | |
| # of claims | 2074 | 562 | 286 | 40 |
| % with $0 copay | 5.3% | 99.8% | 19.6% | 12.5% |
| Average Cost (including 0s) | $30.99 | $0.32 | $40.44 | $65.86 |
| ***Diaphragm/Cervical Cap*** | | | | |
| # of claims | 51 | 11 | 9 | 3 |
| % with $0 copay | 35.3% | 81.8% | 55.6% | 66.7% |
| Average Cost (including 0s) | $45.06 | $3.72 | $43.23 | $5.85 |
| **LONG-TERM METHODS** | | | | |
| ***IUD/IUS*** | | | | |
| # of claims | 2256 | 1167 | 223 | 74 |
| % with $0 copay | 34.0% | 97.3% | 41.3% | 45.9% |
| Average Cost (including 0s) | $231.06 | $8.91 | $260.36 | $306.11 |
| ***Sterilization*** | | | | |
| # of claims | 630 | 289 | 88 | 27 |
| % with $0 copay | 43.3% | 97.6% | 47.7% | 74.1% |
| Average Cost (including 0s) | $329.82 | $23.20 | $270.13 | $244.27 |
| ***Implant*** | | | | |
| # of claims | 136 | 136 | 17 | 13 |
| % with $0 copay | 33.1% | 94.9% | 41.2% | 23.1% |
| Average Cost (including 0s) | $329.10 | $26.99 | $390.53 | $511.91 |

* Cost per 28-day supply

Table 3: Estimated Coefficients for Contraceptive Choice

| | Short-Term Method | | | Long-Term Method | | |
|---|---|---|---|---|---|---|
| | Coef | Std Err | p-value | Coef | Std Err | p-value |
| In Tx Group | -0.014 | 0.066 | 0.837 | 0.050 | 0.120 | 0.676 |
| Quarter | 0.023* | 0.014 | 0.097 | 0.287*** | 0.045 | 0.000 |
| Quarter ^ 2 | -0.001** | 0.001 | 0.027 | -0.005*** | 0.001 | 0.000 |
| Zeroed Copay | 0.178** | 0.076 | 0.019 | 0.401*** | 0.109 | 0.000 |
| Age | | | | | | |
| 18-21 yo | 0.087 | 0.153 | 0.571 | -0.108 | 0.823 | 0.895 |
| 22-25 yo | -0.213 | 0.149 | 0.151 | 0.089 | 0.819 | 0.913 |
| 26-30 yo | -0.774*** | 0.148 | 0.000 | 0.185 | 0.818 | 0.821 |
| 31-35 yo | *ref* | | | *ref* | | |
| 36-40 yo | -1.484*** | 0.149 | 0.000 | -0.135 | 0.818 | 0.869 |
| 41-46 yo | -2.050*** | 0.156 | 0.000 | -0.409 | 0.820 | 0.618 |
| Neighborhood Effects | | | | | | |
| % White | 0.003** | 0.001 | 0.042 | 0.000 | 0.002 | 0.905 |
| % with <HS | -0.020*** | 0.004 | 0.000 | -0.003 | 0.006 | 0.582 |
| % with some college | -0.012*** | 0.002 | 0.000 | 0.003 | 0.003 | 0.253 |
| % below FPL | 0.004 | 0.003 | 0.207 | -0.005 | 0.005 | 0.294 |
| Constant | -1.181*** | 0.209 | 0.000 | -11.979*** | 0.919 | 0.000 |

N=151,499 (29,990 individual women)
Wald $Chi^2$ p-value<0.001
* p<0.10; ** p<0.05; *** p<0.01

Table 4: Estimated Coefficients for Elective Abortions

| | Coef | Std Err | p-value |
|---|---|---|---|
| In Tx Group | -0.146 | 0.283 | 0.606 |
| Quarter | -0.875* | 0.511 | 0.087 |
| Quarter ^ 2 | 0.021* | 0.012 | 0.081 |
| Zeroed Copay | -0.451* | 0.244 | 0.064 |
| Age | | | |
| 22-25 yo | 0.015 | 0.272 | 0.956 |
| 26-30 yo | 0.241 | 0.210 | 0.250 |
| 31-35 yo | *ref* | | |
| 36-40 yo | -0.150 | 0.225 | 0.504 |
| 41-46 yo | -0.983*** | 0.295 | 0.001 |
| Neighborhood Effects | | | |
| % White | -0.023*** | 0.005 | 0.000 |
| % with <HS | -0.034** | 0.014 | 0.019 |
| % with some college | -0.010 | 0.008 | 0.188 |
| % below FPL | 0.006 | 0.011 | 0.549 |
| Constant | 4.504 | 5.601 | 0.421 |

N=60,476 (30,238 individual women)
Wald $Chi^2$ p-value<0.001
* p<0.10; ** p<0.05; *** p<0.01

## Endnotes

[1] IMS Institute for Healthcare Informatics. Medicines Use and Spending Shifts: A Review of the Use of Medicines in the U.S. in 2014. 2015.

[2] Becker NV, Polsky D. Women Saw Large Decrease In Out-Of-Pocket Spending For Contraceptives After ACA Mandate Removed Cost Sharing. Health affairs. 2015;34(7):1204-11. Epub 2015/07/15.

[3] Dieguez G, Pyenson BS, Law AW, Lynen R, Trussell J. The cost of unintended pregnancies for employer-sponsored health insurance plans. American health & drug benefits. 2015;8(2):83-92. Epub 2015/05/26.

[4] Birgisson NE, Zhao Q, Secura GM, Madden T, Peipert JF. Preventing Unintended Pregnancy: The Contraceptive CHOICE Project in Review. Journal of women's health (2002). 2015;24(5):349-53. Epub 2015/04/01.

[5] Foster DG, Rostovtseva DP, Brindix CD, Biggs MA, Hulett D, Darney PD. Cost Savings from the Provision of Specific Methods of Contraception in a Publicly Funded Program. American journal of public health. 2009;99:446-51.

[6] Pace LE, Dusetzina SB, Fendrick AM, Keating NL, Dalton VK. The Impact of Out-of-Pocket Costs on the Use of Intrauterine Contraception among Women with Employer-sponsored Insurance. Medical Care. 2013;51(11):959-63.

[7] Peipert JF, Madden T, Allsworth JE, Secura GM. Preventing Unintended Pregnancies by Providing No-Cost Contraception. Obstetrics & Gynecology. 2012:1.

[8] Gariepy AM, Simon EJ, Patel DA, Creinin MD, Schwarz EB. The impact of out-of-pocket expense on IUD utilization among women with private insurance. Contraception. 2011;84(6):e39-42. Epub 2011/11/15.

[9] Hatcher RA, Trussell J, Nelson AL, Cates WJ, Stewart FH, Kowal D, editors. Contraceptive Technology. Atlanta, GA: Bridging the Gap Communications; 2011.

[10] Branum AM, Jones J. Trends in long-acting reversible contraception use among U.S. women aged 15-44. NCHS data brief. 2015(188):1-8. Epub 2015/02/26.

[11] Policies created or sold before March 23, 2010, that have not made significant changes reducing coverage or increasing enrollee costs are grandfathered at the pre-ACA contraceptive cost sharing until such modifications are made. Certain employers may also have a religious exemption from compliance with ACA-mandated coverage levels for contraceptive care.

[12] To be included, women had to be age 18-45 during the entire observation period and have at least one observation prior to and one after the change in cost-sharing (or January 2013 for the control group).

[13] Additional details on definition of ACA compliance dates and identification of contraceptive choice are provided in a technical appendix available from the corresponding author.

[14] However, some of these women may have been sterilized prior to our observation, been protected through male sterilization, or protected through over-the-counter products not in these data.

[15] This regression was implemented using David Roodman's cmp package in Stata 12.

[16] This regression was implemented using Stata 12's xtprobit command.

[17] We see some evidence of errors in post-compliance claims adjudication in the post compliance timeframe, as not all claims are processed at a $0 copay. This error is slight in all but the low-frequency injectable and diaphragm methods, where errors in programming are less likely to be corrected due to infrequent use.

[18] Finer LB, Jerman J, Kavanaugh ML. Changes in use of long-acting contraceptive methods in the United States, 2007-2009. Fertility and sterility. 2012;98(4):893-7. Epub 2012/07/17.

[19] Dowd BE, Swenson T, Parashuram S, Coulam R, Kane R. PQRS Participation, Inappropriate Utilization of Health Care Services, and Medicare Expenditures. Medical Care Research and Review. 2015;forthcoming.

[20] Jones J, Mosher W, Daniels K. Current contraceptive use in the United States, 2006-2010, and changes in patterns of use since 1995. Hyattsville, MD: National Center for Health Statistics, 2012.

[21] The rate of sterilization in this study (<1 percent) is much lower than that observed in national survey data (17 percent) because we can only observe sterilizations that occur during our 7 year observation window.

[22] Sonfield A, Tapales A, Jones RK, Finer LB. Impact of the federal contraceptive coverage guarantee on out-of-pocket payments for contraceptives: 2014 update. Contraception. 2015;91(1):44-8. Epub 2014/10/08.

[23] Trussell J, Lalla AM, Doan QV, Reyes E, Pinto L, Gricar J. Cost effectiveness of contraceptives in the United States. Contraception. 2009;79(1):5-14. Epub 2008/12/02.