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Control Trial

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ABSTRACT

The Affordable Care Act eliminated cost-sharing for contraception for Americans with health insurance, but substantial cost sharing remains for uninsured individuals who seek care through Title X—a national family planning program that provides patient-centered, subsidized contraception and reproductive health services in the U.S. This paper uses a randomized control trial (RCT) to examine how cost-sharing at Title X providers affects the choice of contraceptive method. The study randomizes vouchers that cover any contraceptive method up to the cost of 50% or 100% of a name-brand intra-uterine device (IUD). The results show that Title X clients are highly constrained by the out-of-pocket costs of contraception. The offer of free contraception is associated with a 40% increase in the use of any birth control method (ITT effect), a 94% increase in the value of birth control purchased, a 328-day (226%) increase in the period covered by contraceptives purchased, and a 324% increase in the likelihood of choosing a long-acting, reversible method (an IUD or implant). The results imply that eliminating the costs of contraception for Title X clients nationwide would reduce undesired pregnancies by 5.3%, birth rates by 3.9%, and abortions by 8.3%, and save $1.43 billion in the first year of the program.

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For over half a century, two schools of thought have debated the determinants of childbearing. One emphasizes *demand* factors, arguing that pregnancies and contraceptive use are mainly determined by preferences, wages, and income (Blake 1969, Easterlin 1980, Becker 1981, Pritchett 1994a, b). The other stresses the primacy of factors impeding *access* to contraception, suggesting that barriers such as costs or information play a critical role in preventing women from achieving their desired childbearing (Harkavy, Jaffe, and Wishik 1969, Ryder and Westoff 1971, Knowles, Akin, and Guilkey 1994). [1]

The resolution to this debate has important implications for public policy. Whereas policy can have immediate and direct effects on access to contraception, it is less clear whether policy makers could (or should attempt to) shape preferences, wages and incomes. The resolution could also affect the lives of many Americans. Around 40% of pregnancies in the U.S. occurred either sooner than desired or when no pregnancy was desired at any point in the future (Kost, Zolna, and Murro 2023). Prior to the U.S. Supreme Court's July 2022 *Dobbs* decision, which has allowed 15 states to restrict or eliminate abortion access (McCann et al. 2023), about 40% of undesired pregnancies ended in abortion (Kost and Lindberg 2015). Children born from undesired pregnancies are more likely to have low birth weight and other birth complications (Mohllajee et al. 2007, Kost and Lindberg 2015). Undesired births contribute to the cycle of poverty by decreasing women's educational attainment, employment, and family resources (Bailey 2006, Bailey, Hershbein, and Miller 2012, Bailey, Malkova, and McLaren 2018, Miller, Wherry, and Foster 2020) and limiting the life opportunities of children (Ananat and Hungerman 2012, Bailey 2013).

This paper presents evidence from the Michigan Contraceptive Access, Research, and Evaluation Study (M-CARES), which uses a randomized control trial to estimate the role of cost as a barrier to contraceptive choice among uninsured women. Although the Affordable Care Act (ACA) eliminated cost-sharing for contraception for those with health insurance, it did not affect costs for uninsured individuals seeking reproductive care through Title X—a national family planning program that offers patient-centered,

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[1] We understand and acknowledge that people of all genders give birth. For parsimony, this paper uses the word "woman," "mother," and female pronouns when discussing individuals who become pregnant or give birth.

subsidized contraception and reproductive health services to low-income individuals. In 2018, around 1.4 million Title X clients (or 40% of all 2018 Title X clients) were uninsured and faced substantial out-of-pocket costs for contraceptives after applying Title X discounts. Importantly, no market mechanism or public program allows individuals wishing to delay or avoid pregnancy to finance these out-of-pocket costs; these costs are paid upfront.

Between August 2018 and November 2019, M-CARES recruited 1,597 uninsured women aged 18 to 35 at twelve Planned Parenthood of Michigan (PPMI) health centers. Half of the participants were randomized to receive vouchers that could be used toward their out-of-pocket costs for contraception, and the other half (the control group) received the usual clinical care at usual costs. The study did not nudge, advocate for, or compel individuals to use any method of contraception. The premise of the study was that individuals, in consultation with their physicians, know best which method of contraception is best suited for them. Consequently, vouchers could be used for *any* contraceptive method at PPMI for up to 100 days after enrollment and varied by phase. In the first study phase, vouchers covered costs up to 50% of a name-brand intrauterine device (IUD). In the second phase, vouchers covered costs up to 100% of a name-brand IUD. With participants' consent, the study then collected information on participants' use of contraception in a follow-up survey and PPMI medical records over the next two years.

If financial access posed little barrier to using a preferred contraceptive method, the study would find that vouchers have no effect on women's use of contraceptives or choice of method. But the results show otherwise. Participants receiving 100% vouchers were 40% more likely to use any birth control, nearly doubled the value of the birth control they purchased, purchased contraceptives covering around 328 more days, and switched to more effective methods. Over one-third of 100%-voucher recipients switched to a more effective method versus one-quarter in the control group. Among 100% voucher recipients, the likelihood of choosing a long-acting, reversible method (LARC, either an IUD or implant) increased by 324%. These effects persist two years after study enrollment, which implies that the voucher resolved a binding, long-term constraint limiting women's ability to use their desired method of contraception.

A comparison of the effects of the 50% and 100% vouchers also sheds light on a highly relevant

public policy choice: how generous of a subsidy is required to enable women to use their preferred method? Doubling the voucher subsidy from 50% to 100% more than quadrupled the relative effect size for LARCs, raising the treatment effect from 77% to 324%. This large increase in the relative effect shows that even 50% of the already discounted Title X price remains prohibitive for uninsured women. Eliminating cost-sharing—as with the 100% voucher—allows many more to use their preferred contraceptive method.

We also explore heterogeneity in these effects to better understand which groups were more financially constrained in their choice of contraceptive methods. Subsidizing contraceptives has large and similar effects on contraceptive efficacy for a broad set of pre-specified subgroups, including stratifications by race and ethnicity, education, relationship/marital status, religiosity, and having a usual place for reproductive health care. For women who were not planning to get a LARC at the time of enrolling, receiving a voucher that eliminated cost-sharing increased more than eight times the likelihood that they changed course and elected to use a LARC. Women with children appear to be one of the most financially constrained groups. One fifth of mothers receiving the 100% voucher chose to use a LARC versus just three percent in the control group. These findings allow a simple cost-benefit calculation of scaling this RCT's intervention to make all contraceptives free through Title X. The findings imply that a U.S. policy eliminating out-of-pocket costs for all Title X patients would reduce pregnancies by 5.3%, birth rates by 3.9%, and abortions by 8.3%. We also find that the increased costs of such a policy would be offset by reductions in federal health care spending through Medicaid, resulting in a net *savings* of $1.43 billion in the first year alone.

This study contributes to the literature by using the gold-standard of causal inference—a randomized control trial—to address a highly relevant policy question that has been almost exclusively studied in observational and quasi-experimental settings. One of the most influential studies to date, the St. Louis Contraceptive Choice Project (CHOICE), found that giving no-cost LARCs to study participants affects birth rates (Secura et al. 2010, Mestad et al. 2011, McNicholas et al. 2014, Birgisson et al. 2015, Broughton et al. 2016). Because CHOICE had no control group, this study's design makes it difficult to

interpret these findings as reflecting costs alone (Bailey and Lindo 2018).[2] In addition, this study contributes evidence collected in the current policy environment. Previous studies with credible quasi-experimental designs consider contexts prior to the Affordable Care Act's (ACA) expansion of health insurance coverage and mandate that insurance policies cover the costs of contraception for millions of American women (Becker 2018, Carlin, Fertig, and Dowd 2016, Dalton et al. 2020, Heisel, Kolenic, and Moniz 2018).[3] Third, no study to date is able to link out-of-pocket costs to women's choice of contraceptive methods or identify *individual* characteristics that mediate or moderate the effects of costs. This study's individual-level randomization allows the consideration of differences in sensitivity to cost across groups as well as predictors of this sensitivity, allowing a novel characterization of who is most affected by the cost of contraception.

I. Theoretical Framework and Hypotheses

A simple theoretical framework by Michael and Willis (1976) combines elements of the neoclassical model of demand for children (Becker 1960, 1965, Becker and Lewis 1973, Willis 1973) with a model of contraceptive use (Sheps 1964, Sheps and Perrin 1966)—an innovation that relaxes the neoclassical assumption that fertility regulation is costless. Each contraceptive method j is associated with a fixed and marginal price per birth prevented, and pregnancy occurs probabilistically rather than deterministically as in the standard neoclassical model. The number of children is a random variable, and women choose a method j to reduce the monthly probability of conception, which is equivalent to choosing an expected distribution of the number of pregnancies, summarized by the first, μ_j, and second moment, σ_j. Women maximize their utility by weighing the marginal costs of preventing pregnancy using different

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[2] CHOICE's research design compares outcomes for women who enrolled in the study (who wanted to start a new contraceptive method) to similarly aged women in the greater St. Louis area, who differed from study participants in that they were seeking reproductive care. Perhaps unsurprisingly, the group of women in CHOICE were less likely to give birth than the broader population. Other RCTs in the U.S. have been limited to adolescents and have not included the broader population of women facing high costs of contraception (Kirby 1997, DiCenso et al. 2002).

[3] Previous quasi-experimental studies consider how expansion in federally funded family planning programs in the 1960s and 1970s reduced birth rates (Bailey 2012); state-level expansions in Medicaid eligibility for family planning services in the 1990s and 2000s increased the use of contraception and reduced childbearing (Kearney and Levine 2009); and Colorado's Family Planning Initiative (CFPI), which made LARCs free in 2009, reduced teen birth rates (Packham 2017, Lindo and Packham 2017).

contraceptive methods against the marginal benefit of attaining different expected distributions.

Closely related to the M-CARES intervention, the model distinguishes between the fixed and marginal costs of a contraceptive method. The total cost of using method j to attain an expected pregnancy distribution, μ, is given by $\pi_j = \alpha_j + \beta_j (\mu_N - \mu)$, where μ_N is the mean of the distribution of pregnancies in the absence of any contraception. The fixed cost of using a method j is α_j, which includes any out-of-pocket costs, the fixed cost of going to the doctor, and the cost of learning about a particular method (e.g., overcoming misinformation, personal circumstances, or other external factors). β_j is the marginal cost of preventing a pregnancy using method j. The marginal cost reflects behaviors (e.g., abstinence), inconvenience or discomfort at the time of intercourse (e.g., withdrawal or barrier methods like diaphragms or condoms), and the necessity of returning to fill a prescription (e.g., the pill or injections).

Figure 1A plots an example of total costs for different contraceptive methods and pregnancies prevented. Different methods are optimal for women wishing to avoid different numbers of pregnancies. For instance, if a woman wishes to prevent two pregnancies, then method 1, which entails a small fixed cost but a high marginal cost (like condoms or withdrawal, represented by line Π_1), would be her lowest cost option. One wishing to prevent three births would choose method 2, paying a higher fixed cost but gaining a lower marginal cost. The high fixed but near zero marginal cost of method 4 is similar to LARC methods, which require an upfront, fixed investment of time and out-of-pocket payments, but have the lowest total cost for women seeking to prevent eleven or more pregnancies. The lowest-cost function for achieving an expected number of births before the M-CARES intervention is given by the dashed, lower envelope, or $C(\mu) = \min_j [\alpha_j + \beta_j (\mu_N - \mu)]$.

This model does not include behavioral biases and optimization missteps in the behavioral hazard literature (Baicker, Mullainathan, and Schwartzstein 2015). Yet it clarifies the endogeneity of method choice to prices and suggests several testable hypotheses for M-CARES. First, the use of contraception is endogenous to both the demand for children (preferences, wages, income) *and* the costs of different contraceptives. Method use itself does not indicate that women are constrained by costs or motivated by

other factors. M-CARES uses random assignment to circumvent this complication and compares women expected to have identical demand for children who face different fixed, out-of-pocket costs for contraceptives. Second, reducing the fixed costs of contraception would lead many women to adopt more effective, and lower marginal cost, methods, because many women seeking care are highly financially constrained. M-CARES vouchers reduce the fixed costs of contraception and shift the lowest-cost function downward as shown in Figure 1B. For instance, the 50% voucher reduces the fixed costs of contraceptive method 2 from Π_2 to Π'_2; the fixed cost of method 3 from Π_3 to Π'_3; and so forth. The lowest-cost envelope would, therefore, shift such that women seeking to prevent three to nine pregnancies would choose method 3, and women seeking to prevent nine or more pregnancies would choose method 4. Third, receiving a higher valued voucher should have larger effects on take-up of higher fixed cost methods such as LARCs, as shown in Figure 1C. For instance, the 100% voucher would reduce the lowest-cost envelope such that women seeking to prevent one to five pregnancies would choose method 3 and women wishing to prevent five or more pregnancies method 4.

II. M-CARES Methods

M-CARES recruited women at 12 PPMI health centers to participate in a randomized control trial.[4] PPMI is Michigan's largest Title X service provider, and Planned Parenthood affiliates served 40% of the 4 million Title X clients in the U.S. in 2018, making this study's context and focus on the costs of contraception highly policy relevant to Title X providers today. M-CARES's goal is to support reproductive autonomy by eliminating cost barriers: the vouchers should make *any desired method of contraception* more financially accessible or free. The analysis covers the period between August 20, 2018, and November 3, 2019, before Planned Parenthood withdrew from the Title X program, increasing its prices and altering other operations and the trial.

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[4] The trial protocol is approved by the University of Michigan's Health Sciences and Behavioral Sciences Institutional Review Board (HUM00132909) and registered at clinicaltrials.gov (NCT03673007). A pre-analysis plan for the first year is available at Open Science Framework and the American Economic Association RCT Registry.

Study Enrollment, Randomization, and Sample Inclusion

Study eligibility required that participants were (1) females ages 18 to 35, (2) at risk of unintended pregnancy, (3) facing out-of-pocket costs for contraceptives, and (4) at PPMI for a clinician visit. Criteria (1) and (2) ensure that participants are legal adults, biologically capable of pregnancy, and are not pregnant at the time of enrollment or wishing to become pregnant in the next year. Out-of-pocket costs for criterion (3) are determined using PPMI's income assessment during check-in. PPMI does not charge patients with incomes below the poverty line for services, so this group had no out-of-pocket costs and were excluded from the study. Criterion (4) was logistically necessary, because few patients without clinician visits remained in the waiting room long enough to complete the screening and enrollment process. The study did *not* require that participants be visiting PPMI to obtain contraception.

Professionally trained NORC field interviewers recruited patients in the waiting room to complete a 5-minute screening survey, which was compensated with $10.[5] If a patient met the inclusion criteria and was willing to participate, a tablet led her through the informed consent with optional assistance from the NORC interviewer. Consenting participants were randomly assigned in a 1:1 ratio to receive a voucher. After the appointment, interviewers invited participants to complete a baseline survey, and the participants were compensated with $60 for taking the survey in the health center on the same day. Participants unable to complete the survey in the health center received a link by email/text to complete the survey later for $40.

Figure 2 documents the enrollment, randomization, and inclusion in the analysis samples. 2,561 participants met eligibility criteria (1), (3), and (4) and agreed to take the 5-minute screening survey on a tablet. 1,603 patients met all inclusion criteria, were able to enroll before their appointment began, and elected to participate. 819 received vouchers, and 784 were assigned to the control group. After randomization, two participants withdrew from the voucher group, and four withdrew from the control group. All but 16 participants were linked to PPMI billing records (10 in the control and six in the treated

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[5] NORC is a non-partisan research organization at the University of Chicago that specializes in survey research.

group). The baseline survey, which contains information for subgroup analyses, achieved a response rate of 79%, which did not differ between the treatment and control groups.[6]

Table 1 compares M-CARES participants (column 1) to a nationally representative sample of women ages 18-35 from the 2017-2019 National Survey of Family Growth (NSFG, column 2) and to the characteristics of 2018 Title X clients reported in the Health and Human Services (HHS) Family Planning Annual Report (column 3) {Fowler, 2019 #1803}. Relative to the NSFG, M-CARES participants are slightly younger, less likely to be a racial or ethnic minority, and significantly more likely to have lower incomes. They are also less likely to use contraception than the national sample of women. The M-CARES sample also differs in expected ways from the national population of Title X patients. While similar in the use of birth control, the M-CARES sample contains no one with income below than the federal poverty line (per the study inclusion criteria). In addition, the M-CARES sample is less likely to be Hispanic, owing to this group's underrepresentation in Michigan, and less likely to be Black, owing to this group's underrepresentation in the areas served by Planned Parenthood health centers participating in M-CARES.

Table 1 also documents balance in the intervention (column 4) and control groups (column 5) in pre-specified patient characteristics, including contraceptive methods used before enrollment, age, race/ethnicity, marital/cohabitation status, income as percent of federal poverty line, and previous childbearing. Consistent with randomization, these characteristics do not jointly predict voucher receipt (F-statistic of 0.97, p-value=0.50). Our main specifications include indicator variables for race and education to account for the slight imbalance between these groups that occurred by chance.

B. The Intervention and Voucher Amounts

By design, this RCT sets aside other aspects of access to contraception and focuses on the role of costs as a barrier to use. Consequently, the study altered as little as possible relating to the health center operations. Following randomization, recipients were handed an M-CARES card with their study number,

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[6] To evaluate systematic non-response, we regress a binary variable equal to 1 if a participant completed the baseline survey/0 otherwise on voucher receipt and correct standard errors for heteroskedasticity. The estimate of the effect of receiving a voucher on response is 0.0072 (se: 0.021).

an email address to contact the study, and voucher amount. They were also sent a text and email with the same information in case they lost the M-CARES card. Recipients were told that vouchers could be used to pay for *any* contraceptive and related services at PPMI *for 100 days after enrollment.*[7] The voucher could not be used for an abortion, because Title X funds do not cover abortion. The 100-day time limit allowed recipients to return to PPMI to use their vouchers, which was enough time to get two shots of Depo-Provera (each lasts 90 days) or have an IUD inserted (which often requires a return visit). We used a deadline to help minimize procrastination, which could lead participants to forget about or lose the voucher (Ariely and Wertenbroch 2002, O'Donoghue and Rabin 1999). Surveyors informed voucher recipients that M-CARES would pay for removal of any device funded by the voucher within one year of enrollment.

Participants assigned to the control group were also handed an M-CARES card with their study number and an email address to contact the study team with any questions or concerns. The card had no voucher amount filled in, and these participants received the usual clinical care with costs determined by the standard PPMI sliding scale as described below.

Participants in both the voucher and control groups were handed a standard information sheet about the effectiveness of different contraceptive methods. Following enrollment, participants proceeded with their pre-scheduled appointments with PPMI clinicians with no involvement from M-CARES.

Voucher amounts were initially chosen to make any contraceptive up to the cost of the lowest-cost LARC free of charge after applying the PPMI sliding scale in the first stage of the study. Vouchers were applied at check-out by PPMI, similar to a gift card. When the study started, PPMI indicated that the lowest cost LARC was a Liletta IUD, which cost half as much as name-brand devices (e.g., Skyla, Paragard, and Mirena). During the first study phase from August 20, 2018, to March 3, 2019, all contraceptives at PPMI up to the out-of-pocket costs of a Liletta insertion were free for voucher recipients. PPMI charges patients with incomes at 101-150% of the poverty line 25% of the total costs for services; those with 151-200% of the poverty line 50%; 201-250% of the poverty line 75%; and 251% or above the poverty line 100% for the

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[7] "Related services" are those medically required to use a contraceptive. For example, inserting an IUD requires a pregnancy test.

services they receive. Voucher amounts were, therefore, $123, $246, $369, and $492 for the respective income categories (Appendix Table A1.1). The voucher could be used for less expensive methods, such as birth control pills, injections, rings, and hormonal patches, or more expensive methods, such as name-brand IUDs or an implant. However, participants had to pay any costs above the voucher value out of pocket. PPMI's sliding fee scale means that out-of-pocket costs depend on a woman's income relative to the federal poverty line.

In early 2019, the M-CARES team learned that Liletta was only rarely stocked or inserted by PPMI. This meant that—although the voucher was intended to make the lowest cost, available LARC free—the voucher had only covered 50% of the cost for *available* IUDs. The study team subsequently increased voucher amounts to cover the costs of the available, name-brand IUDs as of March 4, 2019. The cost of insertion and related services did not change, so the amount of the voucher almost doubled in the second study phase. Voucher amounts were $223, $446, $669, and $892 for women with incomes at 101-150%, 151-200%, 201-250%, and 251% or above of the poverty line, respectively. Our analysis refers to the period before March 4, 2019, as the 50% phase, and the period on or after March 4, 2019, as the 100% phase.

On November 4, 2019, Planned Parenthood withdrew from Title X due to new Trump Administration requirements that organizations providing both family planning and abortion services must physically separate these services in order to receive federal funding, affecting both PPMI pricing and operations. This paper, therefore, analyzes the period from August 20, 2018, when recruitment started, to November 3, 2019, which informs the causal effect of providing a 50% and 100% voucher for contraceptives to low-income women with out-of-pocket costs.

III. Outcomes and Research Design

M-CARES combines survey and administrative data to create five pre-specified primary outcomes capturing different dimensions of contraceptive efficacy: (1) the dollar value of services purchased; (2) a binary measure for whether any contraceptives were purchased; (3) a binary measure of LARC insertion; (4) the likelihood of a pregnancy within one year based on the CDC failure rate with typical use of the most

effective method purchased (Trussell 2011); and (5) the days covered by the most effective contraceptive method purchased.[8] Following Kling, Liebman, and Katz (2007), we also create an index of contraceptive efficacy that combines these five outcomes to summarize the *overall* effect of receiving a voucher and limit the number of statistical tests. The index is constructed as the arithmetic mean of its component z-scores,

$$ContraceptiveEfficacy_i = \frac{1}{5}\sum_{o=1}^{5}\frac{y_i^o - \bar{y}^{o,c}}{\sigma^{o,c}}.$$

y_i^o is the value of outcome o for individual i, $\bar{y}^{o,c}$ is the mean of outcome o and $\sigma^{o,c}$ is the standard deviation of outcome o in the control group by study phase. Note that we reverse code outcome (4) as one minus the failure rate, so that a positive value indicates a higher efficacy contraceptive.

We estimate the reduced-form effects of receiving a voucher for contraceptives using the following linear specification separately by phase,

(1) $$Y_{ij} = \tau_1 Voucher_i + X_i'\beta + \varepsilon_i,$$

where Y_i is one of the five measures of contraceptive efficacy above or the index of contraceptive efficacy, which combines them; $Voucher_i$ is a binary variable equal to 1 if an individual i was randomly selected to receive a voucher and 0 otherwise; X_i is a vector of exogenous covariates, including indicator variables for race and education account for slight imbalance in these characteristics in Table 1, and indicators for the patient's income relative to the poverty line, which determine the PPMI sliding scale and level of the voucher.[9] Standard errors are corrected for heteroskedasticity (Huber 1967, White 1980). This "intention-to-treat" (ITT) estimate captures the net, causal effect of providing a voucher to women seeking reproductive health care, which could be used for 100 days toward the purchase of any contraceptive.[10]

Another relevant policy question is: what is the causal effect of the voucher among women who

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[8] Days of coverage is the number of days that a purchased unit covers multiplied by the number of units purchased. Unit coverage is 1095 days (3 years) for implants, 2190 days (6 years) for Liletta, 1825 days (5 years) for Mirena, 3650 days (10 years) for Paragard, 1095 days (3 years) for Skyla, 28 days for birth control pills, 90 days for Depo-Provera injections, 1 day for diaphragm, and 28 days for rings.

[9] Our pre-analysis plan explained that the inclusion of covariates "is intended to increase precision by accounting for differences in characteristics between the treatment and control groups that occur by chance" (p. 12). Slight imbalance in race and education characteristics in Table 1 led us to include indicators for race and education. Results without covariates are available upon request.

[10] Our Appendix A3 presents alternative estimates using dollars spent as the first stage outcome.

used it? To answer this question, we estimate the local average treatment effect (LATE) of receiving a voucher using two-stage least squares (2SLS), which also allows us to explore heterogeneity in the causal effect of treatment on the treated across the two study phases and pre-specified subgroups. The first-stage equation is,

$$(2) \qquad 1(Used\ Voucher = 1) = \pi_1 Voucher_i + \mathbf{X}_i' \boldsymbol{\pi}_2 + \varepsilon_{2i},$$

and the second-stage is,

$$(3) \qquad Y_i = \delta_1 Voucher_i + \mathbf{X}_i' \boldsymbol{\delta} + \varepsilon_i,$$

The estimate of δ_1 is given by the ratio of the reduced form and first stage coefficients (τ / π_1).

The causal interpretation of the 2SLS estimate as the treatment effect of reducing out-of-pocket costs for contraception on the treated requires several assumptions: (1) exogeneity, (2) excludability, and (3) monotonicity. Randomization ensures that exogeneity holds. Excludability requires that receiving a voucher only affects contraceptive efficacy *only* by reducing out-of-pocket costs. This assumption seems plausible as the voucher can only be used for purchasing contraceptives at PPMI. Moreover, women in both the treatment and control groups receive cash benefits for completing the surveys, implying that any effects of these cash benefits should be the same in the two groups. It is possible that receiving a voucher may have other effects on outcomes (e.g., a voucher can imbue a recipient with a positive or optimistic feeling), but it seems unlikely that this indirect effect would have a large effect on contraceptive efficacy over two years. Monotonicity requires that, if participants were moved from the control to the treatment group, their contraceptive efficacy would not decrease (or vice versa). While it is not possible to test this directly, there is little reason to believe that receiving a voucher would induce participants to reduce their contraceptive efficacy.

Under these assumptions, we interpret the 2SLS estimate as the local average treatment effect, or LATE (Imbens and Angrist 1994), of reducing out-of-pocket costs on contraceptive efficacy. The 2SLS estimate, δ_1, identifies the causal effect of receiving a voucher among the women who shift their use of contraceptives after receiving a voucher and who would not have shifted their use without the voucher.

IV. The Effect of Subsidizing Contraception on Use

A central question of the study is whether out-of-pocket costs affect patients' use of contraception or their choice of method. If patients' choice of method is not driven by financial constraints, voucher dollars may simply crowd out money that patients would have spent in the absence of the intervention. Table 2 shows decisively that financial constraints play a large role in patients' choice of contraceptives, both in the immediate term of the first 100 days after enrollment (panel A) and longer-term over the next two years (panel B). Our discussion focuses on the LATE, but Table 2 also presents ITT effects for the interested reader.[11]

The 50% voucher increased PPMI charges by 89% (LATE, $268 over a control mean of $300) and, in the 100% phase, by 144% ($413 over a control mean of $287). The "+++" symbol to the right of the estimates in the 100% phase indicates that the 100%-voucher effect was also significantly larger than in the 50% phase at the 1% level. The length of the bar on the right side of the figure indicates the percent increase in the LATE over the control mean along with the 95% confidence interval. (Note that the LATE abstracts from changes in take-up in the two periods, as indicated by the first stage, and the percent change in the LATE over the control mean accounts for time-varying factors affecting the patient population and health center operations). Recipients of the 50% and 100% vouchers were 56% and 69% more likely to purchase contraception relative to the control group, and they also purchased more effective methods and more days of coverage. The 50% voucher more than doubled LARC use (0.09 relative to a control mean of 0.07), and the 100% voucher increased LARC use by roughly five times the control group (0.22 over a control mean of 0.04). Doubling the value of the subsidy more than doubles the percent increase in LARC take-up, which indicates that, even at half price relative to the subsidized Title X sliding scale, out-of-pocket costs dissuade many women from choosing their preferred methods. Voucher recipients also chose methods or purchased more of their preferred methods. The period covered by contraceptive purchases increased by 152% (280

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[11] Note that percent changes in the text may differ from what is implied in the tables due to rounding.

days) in the 50% phase and 346% (503 days) in the 100% phase, minimizing the need to return to the health center. Altogether, the voucher allowed women to shift to more effective methods, reducing the expected one-year incidence of pregnancy by 0.32 in the 100% phase and 0.27 in the 50% phase.[12] Summarizing over the five primary outcomes, the index of contraceptive efficacy increased by 0.60 of a standard deviation in the 50% phase and 1.0 of a standard deviation in the 100% phase.

Table 2B examines the long-term effect of the intervention using data at two years after the participant enrolled in M-CARES, which sheds light on whether the voucher hastened contraceptive purchases by a few months or resolved a binding, long-term credit constraint. The results point to the latter. While the effects relative to the control mean fall over time as more individuals in both the treatment and control group purchase more contraceptives, the gaps between the treatment and control group remain large and highly statistically significant after two years. The voucher's effect on the value of contraceptive purchased (PPMI charges) remained at $200 after two years for the 50% phase participants (vs. $268 at 100 days) and at $319 for the 100% phase participants (vs. $413 at 100 days). Its effect on the use of a LARC remained 0.06 higher after two years for the 50% phase participants (vs. 0.09 at 100 days) and 0.19 for the 100% phase participants (vs. 0.22 at 100 days). The effect on the expected one-year incidence of pregnancy remained 0.23 lower after two years for the 50% phase participants (vs. 0.27 at 100 days) and 0.30 lower for the 100% phase participants (vs. 0.32 at 100 days). The "set-it-and-forget-it" nature of LARCs along with the near zero failure rate suggests that the voucher's effect on pregnancy could last from 3 years (e.g., implants) up to 10 years (e.g., Paragard IUD). Summarizing over the five primary outcomes, the index of contraceptive efficacy remained 0.38 standard deviations higher after two years for the 50% phase and 0.68 standard deviations higher after two years for the 100% phase. These modest reductions indicate that vouchers hastened some contraceptive purchases, but the treatment effects are highly persistent.

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[12] Appendix Table A1.2 summarizes these method changes. 36% of 100%-voucher recipients switched to a more effective method versus 25% in the control group. 61% of women in the voucher group stayed on the same method or did not purchase any contraceptives at PPMI compared to 72% in the control group. Only 3% switched to less effective methods in both the control and treatment groups.

We also explore how making LARCs free allowed women to follow through on their plans or induced others to change them (Appendix Table A2.1C). To study this, a screening survey prior to randomization asked respondents what they planned to do during their PPMI appointment that day. If they answered, "get family planning services," the survey asked what methods they "*planned* to get" [emphasis added] that day. In the 100% phase control group, 29% of the women who indicated that they planned to get a LARC that day followed through within the next 100 days. In treatment group, this number was more than three times higher at 73%. This indicates that just over two thirds of the gap between women's plans and their follow-through is explained by the high price of LARCs, with the remaining gap reflecting factors not considered in this study (e.g., medical contraindications). For the 86% of participants who did not plan to get a LARC in the 100% phase, less than 1% got a LARC within 100 days. In the treatment group, more than 8% did—a statistically significant effect over *eight times* as large as in the control group. In short, making LARCs free allowed more women to follow through on their plans and allowed others to change plans to get their preferred method.

Table 3 summarizes treatment-effect heterogeneity by pre-specified demographic subgroups (panel A) and baseline survey question answers (panel B). Because the index is constructed separately by phase, but not separately for each sub-group, the control mean for subgroups differs from zero. Per our pre-analysis plan, we use the index of contraceptive efficacy to increase statistical power to detect same-signed changes in efficacy across the five outcomes for these smaller subgroups. (Appendix Table A2.1 presents estimates for each of the primary outcomes separately for the interested reader.) For the 100% phase, the treatment effect among women who used the voucher on the index of contraceptive efficacy is highly statistically significant and exceeds 0.78 standard deviations for all demographic subgroups in panel A. The effect is 0.94 standard deviations for White, Non-Hispanic women; 1.09 for Hispanic/Latina women; and 0.78 for Black women (statistically different from White, Non-Hispanic women, p=0.043). The magnitudes of the effects differ somewhat across demographic groups, but the differences are not statistically different: 0.89 standard deviations for women below the median age of 26 versus 1.13 for women above the median age; 0.94 standard deviations for women with less than a Bachelor's degree versus

1.04 for women with a Bachelor's degree or more; 0.84 standard deviations for married or cohabiting women versus 1.13 among those who are single. The effects are also slightly larger among higher income women than lower income women.

Panel B of Table 3 stratifies on other pre-specified baseline characteristics. The treatment effects are large and significantly different from zero in most of the pre-specified sub-groups but *not* significantly different among these groups. Financial constraints appear similarly binding for women with and without a usual place to obtain birth control, those using highly effective and less effective methods at enrollment, and women with different beliefs that they will achieve their career aspirations. The effects are statistically larger for women in the 100% phase who delayed getting birth control in the previous year relative to those who did not (p-value=0.022), which is consistent with financial barriers playing a role in their choices to delay getting contraception before the trial. In addition, the effects of the voucher were significantly larger for women with more positive desires to avoid childbearing relative to women with less strong feelings (p-value=0.019).

V. Conclusion: Subsidizing Contraception Facilitates Take-Up of More Effective Methods

This study shows that the choice of contraceptive methods is highly sensitive to out-of-pocket costs. Reducing high out-of-pocket costs has large and persistent effects on women's ability to choose their preferred methods, especially when that method is more effective (and more expensive). These effects attenuate only slightly over two years, suggesting that the intervention did not simply hasten the use of a preferred method. Making contraception free eliminated a binding, long-term financial constraint that significantly limited women's reproductive autonomy. This finding held in all age, race, and demographic groups we considered as well as across women with different aspirations, desires, and access to reproductive care. This study sets aside the consideration of other barriers to reproductive autonomy to focus on the role of out-of-pocket costs, and these other barriers remain important and fruitful directions for future research. A key finding is that making contraception more affordable could have large effects on women's take-up of their preferred methods and, ultimately, undesired pregnancies.

The study also sheds light on how the generosity of subsidies for contraception matter. Making LARCs half price increased take-up by 78% (ITT effect), whereas doubling the value of the voucher to 100% (making them free) increased take-up by 324%. That is, many contraceptive methods remain prohibitively expensive even with a 50% discount from the already subsidized Title X sliding scale.

As with any RCT, it is important to consider external validity, which in this case will be limited to populations seeking reproductive health care. To understand how a national policy making any contraceptive free at Title X providers could affect outcomes, we reweight the M-CARES sample to reflect the age, race/ethnicity, and income of the national Title X population (see Table 1, col 3)—all of whom were seeking care at Title X providers (Hainmueller 2012, Fowler et al. 2019). If every Title X patient in the U.S. received free contraception up to the price of the lowest-cost LARC, the reweighted results indicate that pregnancies would fall by 21 pp (versus 19 pp unweighted, Table 2, ITT estimate).

An important caveat is that reweighting does not account for treatment effect heterogeneity due to unobserved factors. For instance, treatment effects for Title X patients nationally may differ due to different state reproductive health care programs or policies or states' decisions to expand Medicaid coverage under the ACA (as Michigan did). In addition, these results may misstate the intervention's true effects on pregnancies if (1) low-income, uninsured women obtain contraception from other providers not observed in our data; (2) women do not use the most effective method purchased for one year (we use the one-year method failure rate as a summary metric); or (3) women make other adjustments in their sexual behavior to accommodate their contraceptive method. The first issue is not likely important in practice, because PPMI served 70% of all Michigan Title X patients in 2018, and Title X clients have few other options for affordable care. The quantitative importance of the second and third issues is harder to gauge, so they remain important caveats to the external validity of the results.

With these caveats in mind, we use the reweighted estimates to evaluate the implications of scaling the M-CARES intervention to the entire U.S.—implementing a federal policy making all contraception free for low-income Title X patients up to the cost of the lowest price IUD. Based on the income distribution of Title X patients historically and costs based on voucher use from M-CARES, a national policy making all

contraceptives free would cost $178 million annually—an increase of around 62% over current funding levels for the program.[13] Assuming the demand for children remained constant, we apply the reweighted estimate of the reduction in pregnancies with the 100% voucher (0.21) to the 1.4 million Title X patients nationally with out-of-pocket costs.[14] As with the M-CARES sample, all of the Title X patients sought reproductive health care. The results imply that the policy should reduce pregnancies by 301,000, or 5.3% relative to the estimated 2018 level. Using previously published estimates of the share of pregnancies that result in childbirth, these numbers imply a reduction in births of 144,000, or 3.9% from the 2021 level (Bailey, Bart, and Lang 2022). Another consequence of eliminating cost-sharing for contraception for Title X clients is that the number of abortions would fall by around 77,000, or 8.3% relative to the 2020 level (Diamant and Mohamed 2023). The number of births and abortions would continue to be reduced to some degree in later years, although these reductions in later years are less certain and are not included in these calculations.

The reduction in unplanned pregnancies resulting from the policy would also have immediate budgetary implications. Assuming that around 62% of the 144,000 births would be funded through Medicaid implies a reduction in Medicaid costs of more than $1.61 billion in the first year of the policy.[15] That is, eliminating Title X cost-sharing for contraception for low-income women would cost the federal government around $178 million per year and reduce federal and state government spending by $1.61 billion in the first year of the program, for a net savings to taxpayers of around $1.43 billion in the first year of the program. Around 50% of the $1.6 billion in total savings, or $804 million, less $178 million in additional Title X appropriations would accrue to the federal government under the FY 2024 FMAP rates (Kaiser Family Foundation 2023). While the actual reduction in childbirth in the first year of the program

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[13] Estimates assume no increases in the use of Title X services due to an increase in funding generosity.
[14] Around 1.4 million individuals—36% of Title X clients nationally who are female, are uninsured, and have out-of-pocket costs—would be immediately affected by eliminating cost-sharing for contraceptives (Fowler, Gable, and Lasater 2022).
[15] This calculation uses Guttmacher's estimate of $12,770 in 2010, which includes the costs of delaying prenatal care, labor and delivery, postpartum care, and 12 months of infant care and inflates this estimate using the health care inflation index (Sonfield et al. 2011). This inflation yields $17,987 in 2022 dollars. Fowler et al. (2019) show that around 38% of Title X clients have private health insurance, implying that 62% of births to Title X clients will be paid by public insurance (i.e., Medicaid). We obtain $1.61 billion by multiplying $17,987 per birth by the reduction of 62% of the 142,000 unplanned births.

could be more or less than what we estimate, this estimate would have to be too high by an order of magnitude to change the conclusion that a policy making contraception free to Title X clients would pay for itself. In addition, state governments would save the remaining $812 million.

These estimates of cost savings are conservative because they do not account for the fact that some unplanned pregnancies will be deferred for more than one year and that some unplanned pregnancies are undesired, meaning that they may never occur in the future. This calculation also ignores likely revenue gains from more women remaining in the labor force (and paying taxes). Moreover, given the significant increase in unplanned childbirth expected in the aftermath of the *Dobbs* decision, free contraception could reduce births resulting from unplanned pregnancies by more than we estimate. Thus, the reduction in costs by expanding access to contraception could be more substantial.

VI. References

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Figure 1. How Out-of-Pocket Costs and Vouchers Affect the Choice of Contraceptives

A. No intervention

Lowest cost contraception envelope

B. 50% voucher

Lowest cost contraception envelope

Lowest cost contraception envelope (50% Voucher)

C. 100% voucher

Lowest cost contraception envelope
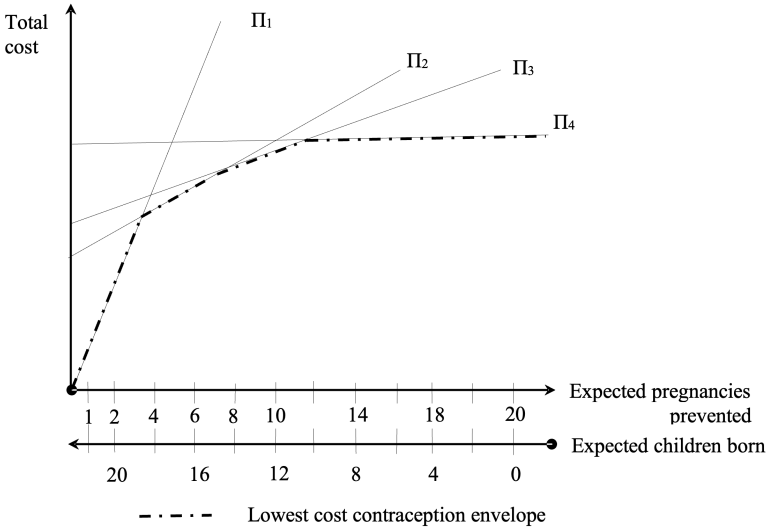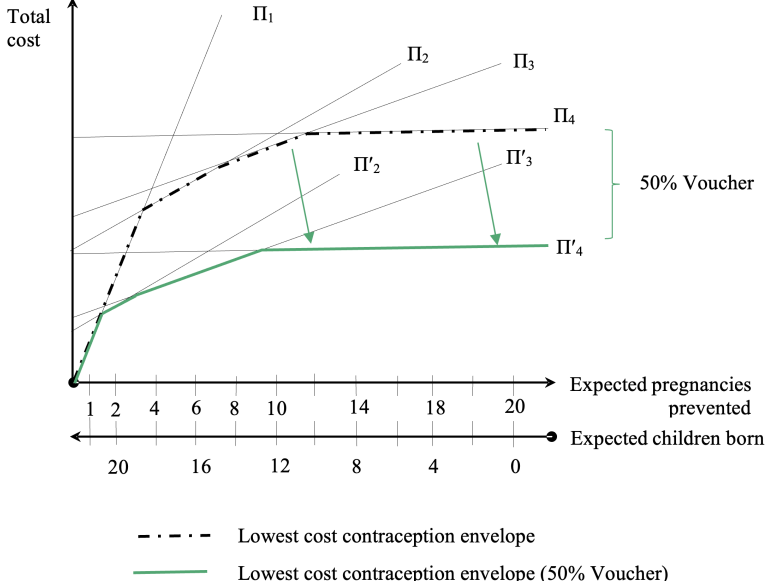
Lowest cost contraception envelope (100% Voucher)
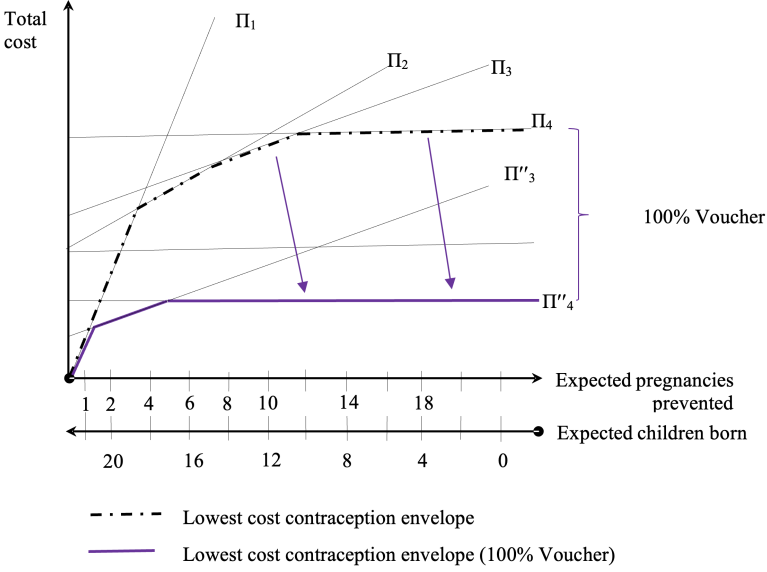
Figure 2. M-CARES Enrollment and Randomization of Patients

2,561 patients meet initial screening criteria (e.g., age, fee scale, no insurance)

374 patients screened out on survey (e.g., pregnant, no risk of pregnancy)

2,187 patients eligible for randomization

584 unable to enroll before appointment or choose to not participate

1,603 patients randomly assigned

819 patients randomized to get vouchers

784 patients randomized to control group

2 patients withdrew

4 patients withdrew

Patient sample (treatment group)
N= 817
321 got 50% voucher
496 got 100% voucher

Patient sample (control group)
N= 780
318 in 50% group
462 in 100% group

Completed baseline survey (treatment group)
N=645 (79%)

256 in 50% group
389 in 100% group

Completed baseline survey (control group)
N=612 (78%)

264 in 50% group
348 in 100% group

Notes: Participants in the 50% phase received vouchers between August 20, 2018, and March 3, 2019, valued at 50% of the cost of receiving a name-brand IUD. Participants in the 100% phase received vouchers between March 4, 2019, and November 3, 2019, valued at 100% of the cost of receiving a name-brand IUD.

Table 1. Representation of M-CARES Participants and Balance in Characteristics

	(1) M-CARES participants	(2) NSFG	(3) 2018 Title X Population	(4) Voucher	(5) Control	(6) Significance of diff (p-values)
Observations	1,597	2,768	.	817	780	.
Birth control use[1]						
Any birth control	0.79	0.90	0.79	0.79	0.79	0.99
Birth control pills	0.31	0.23	0.24	0.32	0.30	0.53
LARC (IUD, implant)	0.14	0.17	0.16	0.13	0.14	0.82
Withdrawal	0.02	0.06	0.02	0.01	0.02	0.36
Condoms	0.22	0.13	0.15	0.22	0.21	0.76
Other method	0.09	0.32	0.18	0.09	0.09	0.98
Age						
Age 18-19	0.10	0.12	0.10	0.10	0.10	0.76
Age 20-24	0.38	0.28	0.25	0.36	0.40	0.08
Age 25-29	0.31	0.29	0.21	0.32	0.30	0.53
Age 30-34	0.19	0.26	0.15	0.20	0.17	0.27
Age 35+	0.02	0.05	0.22	0.03	0.01	0.10
Race						
Non-Hispanic White	0.69	0.55	0.33	0.69	0.69	0.89
Non-Hispanic Black	0.11	0.16	0.19	0.10	0.13	0.11
Hispanic any race	0.11	0.21	0.34	0.11	0.11	0.94
Other	0.09	0.08	0.13	0.10	0.07	0.08
Marital status						
Single	0.51	0.26	-	0.50	0.51	0.49
Cohabiting	0.26	0.17	-	0.27	0.25	0.27
Married	0.08	0.56	-	0.08	0.07	0.25
Education						
Less than high school	0.02	0.07	-	0.02	0.02	0.90
High school degree	0.15	0.24	-	0.17	0.13	0.03
Some college	0.45	0.37	-	0.43	0.47	0.09
College degree or more	0.22	0.31	-	0.23	0.21	0.30
Previous childbearing						
0 births	0.85	0.63	-	0.85	0.85	0.87
1 birth	0.09	0.17	-	0.09	0.09	0.97
2 births	0.04	0.13	-	0.04	0.04	0.65
3+ births	0.01	0.08	-	0.01	0.01	0.43
Income as % of federal poverty line (FPL)						
Up to 100%	0.00	0.22	0.65	0.00	0.00	
101-150%	0.45	0.13	0.14	0.46	0.45	0.54
151-200%	0.27	0.11	0.07	0.27	0.27	0.74
201-250%	0.13	0.08	0.03	0.13	0.14	0.56
251+%	0.14	0.46	0.07	0.15	0.14	0.91

Notes: Column 1 presents the M-CARES sample, column 2 the population-weighted means from the 2015-17 NSFG, and column 3 the selected characteristics of the Title X population reported in the Family Planning Annual Report (Fowler et al. 2018). [1]For M-CARES participants, birth control use refers to the month before enrollment and is asked during screening before enrollment. Age and fee scale are also derived from the screening survey. Race, marital status, education, and previous childbearing come from both survey and, when missing, PPMI data.

Table 2. Treatment Effects of Receiving a Voucher on Contraceptive Efficacy

	50% Voucher Group			100% Voucher Group			Std. Deviation Increase (x100, Index) or Percent Change of LATE over Control Mean	
	Control mean	ITT effect	LATE	Control mean	ITT effect	LATE	50% voucher	100% voucher
A. Contraceptive efficacy within 100 days of enrollment								
First stage: 1=Used voucher		0.72 (0.03)			0.66 (0.02)			
PPMI charges in dollars	300	181 (25)	268 (33)	287	270 +++ (22)	413 +++ (29)	89%	144%
Any birth control purchase	0.52	0.18 (0.04)	0.29 (0.05)	0.48	0.19 (0.03)	0.33 (0.04)	55%	68%
LARC insertion	0.07	0.05 (0.02)	0.09 (0.03)	0.04	0.14 +++ (0.02)	0.22 +++ (0.03)	126%	499%
Expected annual pregnancies	0.52	-0.17 (0.03)	-0.27 (0.04)	0.55	-0.19 (0.03)	-0.32 (0.04)	-52%	-57%
Temporal coverage	184	186 (48)	280 (66)	145	328 ++ (41)	503 + (57)	152%	346%
Index of contraceptive efficacy	0.00	0.39 (0.07)	0.60 (0.09)	0.00	0.65 +++ (0.06)	1.02 +++ (0.08)	60 std	102 std
B. Contraceptive efficacy within two years of enrollment								
First stage: 1=Used voucher		0.72 (0.03)			0.66 (0.02)			
PPMI charges in dollars	596	120 (41)	200 (55)	561	191 (33)	319 (46)	34%	57%
Any birth control purchase	0.57	0.15 (0.04)	0.25 (0.05)	0.52	0.18 (0.03)	0.31 (0.04)	43%	60%
LARC insertion	0.11	0.03 (0.03)	0.06 (0.04)	0.08	0.12 ++ (0.02)	0.19 +++ (0.03)	56%	250%
Expected annual pregnancies	0.47	-0.14 (0.03)	-0.23 (0.04)	0.52	-0.17 (0.03)	-0.30 (0.04)	-49%	-58%
Temporal coverage	350	135 (56)	220 (76)	283	265 + (46)	427 ++ (64)	63%	151%
Index of contraceptive efficacy	0.00	0.23 (0.06)	0.38 (0.08)	0.00	0.41 ++ (0.06)	0.68 ++ (0.08)	38 std	68 std

Notes: Panel A presents the estimated treatment effects using equation 1 for participants up to 100 days after enrollment when the voucher expired; panel B presents the estimated treatment effects for participants at two years after enrollment. +++, ++ and + indicate that the 100% effect is statistically different from the 50% effect at the 1, 5, and 10% levels, respectively.

Table 3. Heterogeneity in Treatment Effects of Receiving a Voucher on Contraceptive Efficacy

A. Overall effect on index and pre-specified demographic groups

	50% Voucher Group				100% Voucher Group				
	Control mean	First stage	ITT effect	LATE	Control mean	First stage	ITT effect	LATE	
Overall effect on index	0.00	0.72	0.39	0.60	0.00	0.66	0.65+++	1.02+++	
		(0.03)	(0.07)	(0.09)		(0.02)	(0.06)	(0.08)	
Pre-specified demographic groups									
Non-Hispanic White	0.03	0.73	0.42	0.60	0.07	0.69	0.65+	0.94++	
		(0.03)	(0.09)	(0.11)		(0.03)	(0.08)	(0.10)	
Non-Hispanic Black	-0.14	0.60	0.22	0.45	-0.19	0.49	0.32	0.78	
		(0.09)	(0.15)	(0.19)		(0.07)	(0.15)	(0.18)	
Hispanic any race	0.11	0.72	0.23	0.42	-0.01	0.63	0.80+	1.09+	
		(0.08)	(0.20)	(0.25)		(0.07)	(0.20)	(0.24)	
Women without children	0.04	0.74	0.38	0.56	0.00	0.66	0.65+++	1.01+++	
		(0.03)	(0.07)	(0.09)		(0.02)	(0.07)	(0.09)	
Mothers	-0.17	0.62	0.36	0.71	0.04	0.70	0.69	0.96	
		(0.07)	(0.19)	(0.24)		(0.06)	(0.17)	(0.23)	
Age<26	0.06	0.71	0.32	0.50	0.00	0.63	0.57++	0.89++	
		(0.04)	(0.09)	(0.12)		(0.03)	(0.09)	(0.11)	
Age≥26	-0.07	0.72	0.46	0.71	0.00	0.69	0.73+	1.13++	
		(0.04)	(0.10)	(0.13)		(0.03)	(0.10)	(0.12)	
Below associate's degree	-0.06	0.77	0.45	0.64	-0.05	0.63	0.53	0.94	
		(0.06)	(0.15)	(0.16)		(0.05)	(0.13)	(0.17)	
Associate's degree or higher	0.00	0.74	0.44	0.64	0.04	0.73	0.75+++	1.04++	
		(0.03)	(0.08)	(0.10)		(0.03)	(0.08)	(0.10)	
Married or cohabitating	-0.07	0.80	0.67	0.85	0.11	0.75	0.63	0.84	
		(0.04)	(0.11)	(0.13)		(0.03)	(0.11)	(0.13)	
Single	0.03	0.70	0.30	0.49	-0.03	0.69	0.75+++	1.13+++	
		(0.04)	(0.09)	(0.12)		(0.03)	(0.10)	(0.12)	
Fee scale									
101-150% FPL	0.06	0.75	0.32	0.46	0.12	0.66	0.53	0.83++	
		(0.04)	(0.09)	(0.11)		(0.03)	(0.09)	(0.12)	
151-200% FPL	0.12	0.71	0.28	0.47	0.01	0.69	0.59	0.88	
		(0.05)	(0.15)	(0.20)		(0.04)	(0.12)	(0.15)	
201-250% FPL	-0.13	0.76	0.76	1.12	-0.14	0.68	0.96	1.43	
		(0.07)	(0.19)	(0.24)		(0.06)	(0.20)	(0.22)	
250+% FPL	-0.31	0.59	0.40	0.73	-0.23	0.62	0.84+	1.46+	
		(0.08)	(0.17)	(0.26)		(0.06)	(0.17)	(0.23)	

Legend: ▮ 50% voucher   ▮ 100% voucher

Chart x-axis: 0   50   100   150   200

B. Pre-specified pre-randomization categories

	50% Voucher Group				100% Voucher Group				
	Control mean	First stage	ITT effect	LATE	Control mean	First stage	ITT effect	LATE	
Have a usual place for birth control	-0.03	0.75 (0.03)	0.49 (0.09)	0.69 (0.11)	0.01	0.74 (0.03)	0.76++ (0.10)	1.04++ (0.11)	
Do not have a usual place for birth control	0.06	0.71 (0.05)	0.38 (0.13)	0.55 (0.18)	0.03	0.67 (0.04)	0.64 (0.11)	1.00+ (0.14)	
Using Tier 1 or 2 method	-0.06	0.74 (0.03)	0.43 (0.08)	0.61 (0.10)	0.01	0.70 (0.03)	0.68++ (0.09)	0.97++ (0.11)	
Not using Tier 1 or 2 method	0.08	0.70 (0.04)	0.35 (0.12)	0.64 (0.15)	-0.02	0.62 (0.03)	0.64+ (0.10)	1.10++ (0.13)	
Delayed getting birth control	0.19	0.90 (0.04)	0.67 (0.16)	0.74 (0.17)	-0.02	0.77 (0.04)	0.97 (0.14)	1.27++ (0.16)	
Did not delay getting birth control	-0.08	0.68 (0.03)	0.40 (0.08)	0.61 (0.10)	0.04	0.68 (0.03)	0.59 (0.08)	0.88+ (0.11)	
Positive desire to have a baby	-0.01	0.68 (0.06)	0.19 (0.14)	0.37 (0.19)	-0.06	0.56 (0.05)	0.42 (0.14)	0.86 (0.22)	
Negative desire to have a baby	-0.01	0.75 (0.03)	0.51 (0.09)	0.75 (0.11)	0.07	0.75 (0.02)	0.73+ (0.09)	1.01 (0.11)	
More likely to meet career aspirations	-0.04	0.80 (0.05)	0.45 (0.15)	0.61 (0.18)	0.03	0.66 (0.04)	0.56 (0.13)	0.89 (0.16)	
Less likely to meet career aspirations	0.01	0.73 (0.03)	0.43 (0.09)	0.63 (0.11)	0.02	0.71 (0.03)	0.76+++ (0.09)	1.07+++ (0.11)	

Notes: Standard errors are presented in parentheses below the coefficients. The figure on the right plots the standard deviation increase of LATE multiplied by 100 with the 95% confidence intervals. +++, ++ and + indicate that the 100% effect is statistically different from the 50% effect at the 1, 5, and 10% levels, respectively.