The Price of Permanence: A Study of Household Contraceptive Choice including Sterilization

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Abstract

In 2015–2017, 17% of women aged 20–45 relied on female sterilization for contraception, compared with 5% who relied on a partner's vasectomy. The Affordable Care Act's contraceptive mandate requires coverage of female sterilization but imposes no equivalent requirement for vasectomies, leaving households facing substantial out-of-pocket costs. Motivated by this policy asymmetry, this paper estimates household contraceptive demand using a nested logit model and MarketScan® claims data on approximately 14.2 million observations from 2015–2017. Estimates reveal a strong aversion to permanent contraception, but a preference for male sterilization, with households indifferent between paying $346 for a vasectomy and female sterilization at zero cost, holding other characteristics constant. Consistent with differences within couples in preferences for the male contraceptive method, I find the valuation of vasectomy increases by $85 with each standard-deviation increase in a proxy for female bargaining power. Eliminating out-of-pocket costs for vasectomy increases predicted annual uptake 87 percent from 1.58 to 2.95 percent, increasing overall contraceptive use by 1.26 percent, as some additional vasectomies substitute for existing methods. These findings carry implications for contraceptive coverage policy, suggesting that eliminating vasectomy cost sharing can increase permanent contraceptive adoption while reducing the financial and medical burdens associated with sterilization.

1 Introduction

For many women, contraception is a responsibility that continues long after they have finished having children. Pills must be taken, prescriptions renewed, and contraceptive devices inserted or replaced, often for years after a couple has decided against future pregnancies. Permanent contraception offers an alternative to this continued management, yet women bear much of the burden of obtaining it as well. In the 2015–2017 National Survey of Family Growth, 17.38 percent of women aged 20–45 relied on female sterilization, compared with 5.96 percent who relied on a partner's vasectomy, making female sterilization the most common contraceptive method among women in this age group ((National Center for Health Statistics, 2018)). Vasectomy, however, is generally less invasive, requires less recovery time, is less expensive to perform and more effective than female sterilization.

This disparity raises a question about how couples choose between contraceptive methods that provide similar protection against pregnancy but impose different costs on each partner. A couple that has completed its desired childbearing may prefer vasectomy to female sterilization because of its smaller procedural burden. Yet the couple may face a higher out-of-pocket price for vasectomy, particularly as the Affordable Care Act (ACA) requires most private insurance plans to cover female sterilization without cost sharing but does not impose the same requirement for male sterilization. Financial costs are not the only consideration. Even couples who do not intend to have additional children may value the possibility of future childbearing or prefer to avoid the risks and discomfort associated with sterilization. The relative attractiveness of vasectomy may also depend on how the couple weighs the costs borne by each partner. These considerations create competing incentives: lowering the price of vasectomy could shift couples away from female sterilization, encourage the adoption of permanent contraception in place of reversible methods, or have little effect if the value of reversibility and other nonpecuniary costs outweigh the financial savings.

Survey evidence suggests that these competing considerations are relevant to contraceptive decisions. Among women who were not using their preferred contraceptive method, 23

percent reported that they would choose a partner's vasectomy if cost and other barriers were removed (KFF, 2025a). At the same time, among men who had considered but not obtained a vasectomy, 39 percent cited concerns about pain or complications, 31 percent cited cost, and 21 percent cited wanting the option of future children (KFF, 2025b). These responses suggest that financial barriers may discourage vasectomy even when it is an attractive alternative, but also that eliminating those barriers may be insufficient to overcome concerns about the procedure or its permanence. Understanding the effects of contraceptive prices therefore requires accounting for the characteristics couples value, the burdens borne by each partner, and the alternatives they would choose in the absence of a price change. In this paper, I examine how financial and nonpecuniary costs shape household demand for permanent contraception, how these preferences vary with family size and household bargaining conditions, and how they determine the consequences of eliminating out-of-pocket costs for vasectomy.

I estimate a nested logit model of household contraceptive demand using the 2015–2017 Merative™ MarketScan® Commercial Claims and Encounters database. By linking medical and pharmacy claims for privately insured spouses, I observe contraceptive choices, medical histories, and out-of-pocket expenditures for both partners. The estimation sample contains approximately 14.2 million couple-quarter observations from 2,435,015 couples and includes short-acting contraception, long-acting reversible contraception, female sterilization, vasectomy, and an outside option. I model these choices using characteristics that distinguish the methods, including permanence, whether administration requires a provider, and which partner undergoes sterilization. Preferences for permanence vary with the number of children, while preferences for male rather than female sterilization vary with local gender ratios, which serve as a proxy for women's relative bargaining power. I also estimate a life-cycle specification that allows preferences for permanence to vary with age, conditional on family size. As women approach menopause, permanent contraception offers fewer years of relief from ongoing contraceptive management, potentially making an invasive procedure less

worthwhile. At the same time, the value of retaining the option of future childbearing may also decline. I address price endogeneity using a control-function approach and instruments based on insurance generosity, reimbursement fees, drug acquisition costs, and prices in other markets. The estimated model allows me to recover willingness to pay for contraceptive characteristics and the substitution patterns that determine how households respond to changes in out-of-pocket prices.

Out-of-pocket prices affect contraceptive choices, but demand for most methods is relatively inelastic at prevailing prices. At the same time, substantial differences in willingness to pay across method characteristics and family size point to the importance of nonprice considerations. Couples exhibit a strong aversion to permanent contraception that declines with the number of children they have, but remains substantial even among those with larger families. The estimated compensation required to accept a permanent rather than reversible method, holding other contraceptive characteristics constant, declines from approximately \$1,946 among childless couples to \$817 among couples with three or more children. In the life-cycle specification, the value of permanence also declines with the woman's age, conditional on family size. Among childless couples, the estimated compensation required to accept a permanent rather than reversible method rises from approximately \$2,126 at ages 20–24 to \$2,924 at ages 40–45. These findings are consistent with couples valuing the option to retain future fertility or wishing to avoid the risks and potential regret associated with an irreversible procedure, even when they may not intend to have additional children. The increasing aversion to permanence with age may also reflect a reluctance to undergo an invasive procedure when fewer reproductive years remain over which to benefit from permanent contraception.

The estimates also reveal a preference for vasectomy over female sterilization, which becomes stronger in markets where local gender ratios suggest greater bargaining power for women. Holding other characteristics constant, couples are willing to pay approximately \$346 more for vasectomy than for female sterilization, with this valuation increasing by \$85

for a one-standard-deviation increase in the bargaining proxy. This pattern is consistent with households placing greater weight on the woman's procedural costs when her relative bargaining position improves. Together with the aversion to permanence, these results indicate that the choice of sterilization depends on two distinct considerations: whether a couple is willing to accept an irreversible method and, conditional on doing so, which partner bears the procedure. Differences in prices may affect both decisions, but the consequences depend on the underlying preferences that govern substitution between methods.

I use the estimated demand model to examine the effects of eliminating out-of-pocket costs for vasectomy. Under the main specification, making vasectomy free increases predicted annual incidence by 87 percent, from 1.58 to 2.95 percent. Although some of this increase reflects substitution from existing contraceptive methods, the policy also increases overall contraceptive adoption by 1.26 percent.

Because sterilization provides ongoing pregnancy prevention without requiring subsequent contraceptive management, these changes accumulate over time. In an illustrative simulation following couples through their remaining reproductive years, eliminating vasectomy cost sharing increases cumulative vasectomy adoption by 51.2 percent, from approximately 8.4 to 12.7 percent, while increasing the proportion of time couples spend protected by contraception by 10.1 percent. Thus, even relatively inelastic demand at prevailing prices can translate into meaningful changes in cumulative permanent contraceptive adoption when financial barriers are removed.

Access to contraception has increased women's educational and professional opportunities by giving them greater control over fertility. Goldin and Katz (2002) show that access to the pill allowed women to postpone marriage and pursue professional education, while Bailey (2006) and Bailey et al. (2012) document its longer-run effects on women's labor-force participation and earnings. The importance of controlling fertility timing is also apparent when pregnancies occur earlier than women intended. Miller (2011) estimates substantial earnings gains from delaying motherhood, exploiting unexpected variation in fertility timing,

including pregnancies occurring despite contraceptive use. More recently, Gallen et al. (2026) examine women who become pregnant while using long-acting reversible contraception and find that these pregnancies disrupt career progression and generate persistent income losses. Their findings underscore the potential consequences of contraceptive failure even among women using highly effective methods. Vasectomy failure rates are even lower than those of intrauterine devices and female sterilization, yet unlike female sterilization and most reversible contraception, it is not subject to the ACA's federal requirement for coverage without cost sharing. Financial barriers to accessing permanent contraception may therefore influence couples' ability to prevent pregnancies they do not intend, which may have downstream impacts on labor market outcomes.

A substantial literature demonstrates that contraceptive demand responds to financial costs, although existing evidence has largely focused on reversible methods. Expansions of Medicaid family-planning eligibility increased contraceptive use and reduced births among newly eligible women (Kearney and Levine, 2009). Subsequent initiatives subsidizing long-acting reversible contraception also reduced teen births, particularly among adolescents living near participating clinics (Lindo and Packham, 2017; Kelly et al., 2020). Experimental evidence further establishes that lower out-of-pocket prices increase contraceptive purchases and encourage adoption of longer-lasting methods (Bailey et al., 2023, 2024, 2026). The magnitude of these responses varies across settings, however, partly reflecting differences in existing contraceptive use and the extent to which subsidized methods replace other forms of protection. Virginia's Contraceptive Access Initiative, for example, generated more modest reductions in births than Colorado's program, with some additional LARC adoption reflecting substitution from existing methods (Kiser et al., 2026). Whether the price sensitivity documented for reversible contraception extends to sterilization remains less well understood. The ACA's differential treatment of male and female sterilization creates a particularly consequential difference in their out-of-pocket prices, raising the question of whether insurance coverage influences the choice between procedures that achieve a similar

reproductive objective but impose different costs on each partner.

Beyond financial prices, contraceptive choices reflect a range of nonpecuniary considerations, including differences in effectiveness, side effects, medical risks, and the time and effort required to obtain and maintain protection. Pennington and Venator (2025) estimate substantial nonpecuniary switching costs in a dynamic model of contraceptive choice, while Wixon (2026) finds that reducing the recurring hassle of obtaining contraception through pharmacist prescribing and longer approved device durations increases demand. The broader reproductive policy environment also influences contraceptive decisions. Pennington and Venator (2025) find that actual and anticipated abortion restrictions increase demand for more effective methods, while Gallen and Lu (2026) document increases in both male and female sterilization, as well as LARC insertions, following the *Dobbs* decision in states hostile to abortion. Together, these studies illustrate how contraceptive demand responds to changes in both the characteristics of available methods and the circumstances in which reproductive decisions are made. Importantly, however, changes in demand for a particular method do not necessarily translate into equivalent changes in overall contraceptive protection. Additional sterilization procedures may replace reversible contraception or another permanent method rather than represent new contraceptive adoption. Distinguishing these responses requires understanding substitution across the contraceptive menu, particularly between male and female sterilization, which offer similar reproductive benefits but differ substantially in invasiveness, medical risks, and recovery burdens.

The question of how pecuniary and nonpecuniary costs influence substitution among contraceptive methods reflects a broader concern in health economics: how insurance coverage shapes patients' decisions among medical treatments with different costs, risks, and benefits. Evidence from the RAND Health Insurance Experiment and subsequent expansions of insurance coverage demonstrates that reducing patients' out-of-pocket costs increases healthcare utilization (Manning et al., 1987; Aron-Dine et al., 2013; Finkelstein et al., 2012). More recent work examines how these responses vary across patients and services, finding substantial

heterogeneity in price sensitivity and reductions in both valuable and lower-value care when cost sharing increases (Einav et al., 2013; Brot-Goldberg et al., 2017). The consequences of these responses can extend beyond the services directly affected by changes in coverage. Higher cost sharing for outpatient visits and prescription drugs can increase subsequent hospital utilization (Chandra et al., 2010), while increases in medication prices can interrupt valuable treatment and generate substantial health consequences (Chandra et al., 2024). Patients may also shift the timing of medical care in response to the structure of insurance contracts (Hettinger, 2026). These findings raise a broader question about insurance design: whether changes in treatment prices reduce the use of medical care, redirect patients toward alternative treatments, or generate subsequent changes in health and healthcare expenditures. Differential coverage of male and female sterilization provides a setting in which to examine these responses within a set of procedures that share a reproductive objective but differ in their medical and financial costs.

Medical treatment choices also depend on costs that insurance coverage does not eliminate. Patients face time and administrative burdens associated with obtaining care, while available treatments differ in effectiveness, medical risks, invasiveness, and recovery requirements. Information frictions and hassle costs influence health insurance choices, and administrative requirements can delay or prevent patients from obtaining care even when they have coverage (Handel and Kolstad, 2015; Kyle and Frakt, 2021; Shepard and Wagner, 2025). Evidence from surgical decision-making further demonstrates that patients weigh treatment characteristics and information about medical risks when choosing between invasive and less invasive alternatives. Cornaglia et al. (2026) examine how information about postoperative risks and nonsurgical alternatives influences patients' preferences over surgical treatment, while Zhuang et al. (2020) find that presenting cost information changes preferences between surgical and nonsurgical treatment for carpal tunnel syndrome. These findings suggest that responses to insurance coverage depend not only on the financial price of treatment, but also on the medical burdens patients are willing to accept to obtain its benefits. This

consideration is particularly important for permanent contraception, where vasectomy and female sterilization differ substantially in invasiveness and recovery despite providing similar reproductive benefits. Unlike most medical treatment decisions, however, the choice between these procedures also determines which member of the household bears the physical costs of treatment.

The allocation of medical burdens within households connects sterilization to a broader literature challenging the assumption that households behave as single decision-makers with common preferences. Collective models recognize that spouses may have different preferences and that household allocations depend on the distribution of bargaining power between them (Chiappori, 1992; Chiappori et al., 2002; Jayachandran and Voena, 2026). Empirical evidence demonstrates that the distribution of resources and decision-making authority within households influences expenditures, investments in children, and health outcomes (Thomas, 1990; Duflo, 2003; Lundberg et al., 1997). Marriage-market conditions may also shape these allocations by influencing the relative bargaining positions of spouses. Chiappori et al. (2002) establish the relevance of marriage-market sex ratios for household behavior, while recent evidence links the relative availability of potential partners to marriage, fertility, and maternal and neonatal health (Zaremba, 2026). These considerations extend to healthcare decisions, where spouses may differ in their incentives to invest in their own health and that of other household members (Bolin et al., 2001, 2002). The importance of individual preferences within households is particularly apparent in reproductive decisions. Involving husbands in access to family-planning services reduced women's contraceptive adoption and increased subsequent births in Zambia (Ashraf et al., 2014), while providing men with information about maternal health risks changed desired fertility and reduced pregnancies (Ashraf et al., 2026). These findings establish that reproductive decisions cannot necessarily be understood as the expression of a single household preference. The choice between male and female sterilization presents a distinct application of this problem: both partners benefit from permanent pregnancy prevention, but the medical risks and recovery costs are borne by the individual

undergoing the procedure. Differences in bargaining positions may therefore influence which partner receives treatment, even when the household's reproductive objective is shared.

Within the literature on contraception, this paper offers new evidence on how households value the financial and nonfinancial costs of permanent pregnancy prevention and how they substitute between contraceptive methods. Building on research demonstrating the influence of prices, access, and method characteristics on contraceptive use, I extend the analysis to sterilization, which has received relatively little attention in the economics literature despite its prevalence. Considering permanent and reversible methods together also allows me to examine substitution across a broader range of contraceptive alternatives, while revealing how preferences for permanence vary with age and family size. When methods differ in effectiveness, the consequences of expanding access depend in part on whether additional adoption replaces similarly effective contraception or represents a shift toward more reliable pregnancy prevention. Understanding these patterns helps illuminate how changes in contraceptive access may influence fertility and, through that channel, the educational and labor market outcomes documented in the existing literature.

The implications extend beyond contraception to the design of health insurance and the role of financial incentives in medical treatment decisions. Previous research has established that cost sharing influences healthcare utilization, sometimes with consequences for other services and subsequent health outcomes. The choices underlying these responses, however, also depend on the medical risks and other nonfinancial costs associated with alternative treatments. Vasectomy and female sterilization offer a particularly useful comparison because their relative out-of-pocket prices can run counter to their medical burdens: although vasectomy is generally less invasive, less expensive to perform, and associated with a shorter recovery, insurance coverage may make it more expensive for patients. This setting allows me to examine how financial incentives interact with differences in procedural risks and invasiveness, and how changes in coverage for one treatment may influence the use of another. The choice between these procedures also introduces a household dimension, since both part-

ners share the benefits of pregnancy prevention but face different physical costs depending on who undergoes sterilization. By examining how preferences for these procedures vary with bargaining conditions, I bring the distribution of medical burdens within households into the study of insurance coverage and treatment choice, extending the literature on how bargaining power shapes household decisions to the allocation of medical care.

2 Institutional Background

2.1 Contraceptive Methods

Contraceptive methods differ in effectiveness, duration, reversibility, frequency of administration, and the physical burden associated with their use. Short-acting hormonal methods, including oral contraceptives, patches, vaginal rings, and injections, require regular administration and have first-year typical-use failure rates of approximately 6–9 percent. Long-acting reversible contraceptives (LARCs), including intrauterine devices (IUDs) and contraceptive implants, provide several years of protection without continued administration and have substantially lower failure rates, ranging from 0.05 percent for implants to 0.8 percent for copper IUDs (Trussell, 2011). Both categories preserve the option of future childbearing, in contrast to permanent contraception.

Male and female sterilization provide permanent protection against pregnancy through a single procedure, but differ substantially in invasiveness, recovery, effectiveness, and cost. Female sterilization involves blocking or removing the fallopian tubes through tubal ligation, occlusion, or bilateral salpingectomy. When performed independently of childbirth, it typically requires laparoscopic surgery under general anesthesia. Vasectomy, by contrast, interrupts the vas deferens and is generally performed in an outpatient setting under local anesthesia, without entering the abdominal cavity (Blocker, 2022). Female sterilization carries risks associated with abdominal surgery and anesthesia, including bleeding, infection, and injury to surrounding organs, whereas serious complications following vasectomy are

uncommon (Mayo Clinic, 2024, 2025). Recovery following female sterilization performed separately from childbirth can take approximately two weeks, compared with a few days following vasectomy.

Vasectomy is also somewhat more effective and generally less costly than female sterilization. First-year typical-use failure rates are approximately 0.15 percent for vasectomy and 0.5 percent for female sterilization, although effectiveness varies across female sterilization techniques (Trussell, 2011). Without insurance, vasectomy can cost approximately $1,000, compared with as much as $6,000 for female sterilization (Planned Parenthood Federation of America, nd). Both procedures are intended to be permanent; surgical reversal is not always possible, and attempts at reversal may be expensive and unsuccessful.

Female sterilization may also be performed during the same hospital admission as childbirth, either at the time of cesarean delivery or following vaginal delivery. The timing of the procedure affects both its medical costs and the burden imposed on the patient. During a cesarean delivery, sterilization can be performed as part of an existing abdominal operation, whereas sterilization following vaginal delivery generally requires a separate procedure during the delivery hospitalization. Female sterilization performed independently of childbirth instead requires a separate surgical encounter. These differences distinguish postpartum sterilization from procedures performed outside the delivery setting.

2.2 Insurance Coverage

The Affordable Care Act (ACA) requires most non-grandfathered private health insurance plans to cover recommended preventive services without patient cost sharing. Under contraceptive guidelines adopted by the Health Resources and Services Administration (HRSA) in August 2011, applicable plans must cover female contraceptive methods, including female sterilization, without copayments, coinsurance, or deductibles, beginning with plan years starting on or after August 1, 2012 (U.S. Health Resources and Services Administration, 2011). Vasectomy, however, is excluded from the federal contraceptive coverage requirement,

leaving its coverage and cost sharing to individual insurance plans. The mandate therefore provides more favorable coverage for female sterilization despite vasectomy's generally lower medical costs and procedural burden.

In practice, however, insurers did not always comply with these requirements. Reviews of insurance plan documents identified instances in which insurers imposed cost sharing for contraceptive care, including associated services such as anesthesia (National Women's Law Center, 2015). Federal guidance issued in 2022, after the 2015–2017 sample period, clarified that services integral to the provision of covered contraception must also be covered without cost sharing, even when billed separately (U.S. Departments of Labor, Health and Human Services, and the Treasury, 2022). Consequently, billing practices and inconsistent implementation of the mandate could result in positive out-of-pocket payments for covered contraceptive care.

The resulting differences in insurance coverage stand in contrast to the medical characteristics of the two permanent procedures. Vasectomy is generally less invasive, has a shorter recovery period, is at least as effective at preventing pregnancy, and is less costly to perform than female sterilization. Yet the ACA requires no-cost coverage of female sterilization while imposing no equivalent requirement for vasectomy. Privately insured couples may therefore face higher out-of-pocket costs for the procedure that is generally safer, more effective, and less expensive to provide.

3 Conceptual Framework

Contraceptive methods provide the common benefit of preventing pregnancy but differ in financial costs, effectiveness, convenience, side effects, and permanence. In particular, permanent contraception provides highly effective pregnancy prevention without requiring continued administration or replacement, but eliminates the possibility of conceiving in the future. The value of retaining future fertility may decline as couples have more children, making

permanent contraception more attractive. As women approach menopause, however, permanent contraception offers fewer years of relief from continued contraceptive management, potentially making an invasive procedure less worthwhile. The value of retaining the option of future childbearing may also decline with age, leaving the overall relationship between age and preferences for permanence ambiguous. Sterilization also introduces a household allocation problem: both partners benefit from pregnancy prevention, but only one partner undergoes the procedure, though either partner can do so. Consequently, the choice between male and female sterilization depends not only on their relative prices and characteristics but potentially on how the household weighs the costs borne by each partner.

To illustrate this tradeoff, consider a household choosing contraceptive method j. Its valuation of the method is

$$W_j = b_j - p_j - \mu c_j^f - (1-\mu)c_j^m, \tag{1}$$

where b_j represents the shared benefits of the method, p_j is its out-of-pocket price, and c_j^f and c_j^m represent the nonpecuniary costs borne by the female and male partners, respectively. The parameter $\mu \in [0,1]$ represents the relative weight placed on the woman's costs in the household decision. The financial cost is shared by the household, whereas nonpecuniary costs are weighted according to the partners' relative influence.

The distinction between shared benefits and partner-specific costs is especially clear when comparing male and female sterilization. Suppose the two procedures provide equivalent contraceptive benefits and that their primary nonpecuniary costs are borne by the partner undergoing the procedure. The difference in household valuations is then

$$W_{\text{vas}} - W_{\text{fs}} = (p_{\text{fs}} - p_{\text{vas}}) + \mu c_{\text{fs}}^f - (1-\mu)c_{\text{vas}}^m. \tag{2}$$

where the subscripts vas and fs denote vasectomy and female sterilization, respectively, while the superscripts m and f denote the male and female partners. The relative attractiveness of

vasectomy therefore depends on both the difference in out-of-pocket prices and the weighted procedural costs borne by each partner. Holding these costs and prices fixed, an increase in the weight placed on the woman's costs raises the relative attractiveness of vasectomy. Conversely, holding bargaining weights fixed, a reduction in the price of vasectomy makes it more attractive relative to female sterilization, even if neither partner's valuation of the procedures changes.

Beyond the choice between male and female sterilization, a reduction in vasectomy prices may induce substitution from several alternatives, depending on households' preferences for permanence and the costs associated with each method. A couple that prefers permanent contraception may choose female sterilization despite its greater procedural burden because it faces a lower out-of-pocket price. Reducing the price of vasectomy could reverse this choice without changing the household's underlying preferences or bargaining weights. For couples using reversible contraception, the tradeoff is different, as vasectomy eliminates the need for continued contraceptive management but also removes the option of future childbearing. Both long-acting and short-acting reversible methods preserve this option, but differ in the burdens they impose. Couples using short-acting methods may wish to avoid the procedural burdens associated with long-acting contraception, making vasectomy an attractive alternative if the household places greater weight on the woman's contraceptive costs. In either case, a reduction in vasectomy prices induces switching only if the financial savings are sufficient to offset the value of reversibility and the costs of the procedure.

Couples choosing the outside option present another possibility. Some may rely on condoms or other unobserved methods, while others may use no contraception despite wishing to avoid pregnancy. These couples may find available female methods unattractive because of their side effects, procedural burdens, or continued management requirements, while vasectomy remains too costly. Reducing its price could make permanent contraception preferable, particularly when the household places substantial weight on the woman's contraceptive burdens.

4 Data

In the 2015–2017 National Survey of Family Growth (NSFG), 17.38 percent of women aged 20–45 report female sterilization as their method of contraception, while 5.96 percent rely on a partner's vasectomy. Because sterilization decisions often involve both partners, these shares are slightly higher among married and cohabiting women, with 19.6 percent reporting female sterilization and 9.3 percent relying on a partner's vasectomy. Although the overall prevalence of sterilization (male and female) is similar among privately insured and Medicaid-covered women, at 29.1 and 27.0 percent, respectively, the distribution between partners differs considerably. Among privately insured women, 17.3 percent report female sterilization and 11.8 percent rely on a partner's vasectomy, compared with 24.7 and 2.3 percent among Medicaid-covered women. Female sterilization thus accounts for approximately 60 percent of permanent contraception among privately insured women, compared with more than 90 percent among Medicaid-covered women (National Center for Health Statistics (2018)).

However, the NSFG does not contain information on the prices couples face, and its sample size is insufficient to draw precise inferences about sterilization decisions. To study these choices, I use the 2015–2017 Merative™ MarketScan® Commercial Database[1], which contains de-identified health insurance claims and enrollment records for employees and their dependents covered by employer-sponsored health insurance (Merative, 2023). The data allow me to link spouses within insurance policies and observe contraceptive procedures for both partners, together with their associated payments, providing the first analysis of contraceptive choice using these claims data.

4.1 Sample Construction

I construct a quarterly panel of opposite-sex married couples using the family identifier and relationship-to-policyholder information in MarketScan®. The sample is restricted to

[1]Merative™ and MarketScan® are trademarks of Merative™ Corporation in the United States, other countries, or both.

couples in which the woman is aged 20–45 and both spouses are observed to be continuously enrolled in the same health insurance policy throughout the quarter. Linking spouses is particularly important for studying permanent contraception, as vasectomies appear on the husband's claims and would otherwise be absent from the woman's observed choice set. Each couple's contraceptive decision in a given quarter is treated as a separate, independent observation, allowing the same couple to contribute observations in multiple quarters. I observe the woman's age, which I group into five-year bands, and the number of dependent children enrolled on the policy.

I group insurance plans into four categories reflecting differences in plan design and patient cost sharing. The first includes health maintenance organizations (HMOs), exclusive provider organizations (EPOs), and capitated point-of-service (POS) plans, which typically rely on managed provider networks and arrangements that limit patients' exposure to medical spending. The second consists of noncapitated POS plans, which combine managed-care networks with greater flexibility to seek care outside the network, potentially exposing enrollees to additional cost sharing. The third includes basic or major medical, comprehensive, and preferred provider organization (PPO) plans, which generally allow broader provider choice but differ in their deductible and coinsurance arrangements. The fourth combines consumer-directed and high-deductible health plans, which place a larger share of initial medical spending on enrollees through deductibles. These distinctions are reflected in the claims: the average patient share of noncontraceptive medical spending increases across the four groups, from 11.3 percent to 15.2 percent, 16.8 percent, and 24.9 percent, respectively. I retain these categories when constructing contraceptive price menus to account for systematic differences in insurance coverage and cost sharing.

I restrict the sample to couples facing an active contraceptive decision. I exclude couples with evidence of prior sterilization, infertility, or absence of the uterus, as well as periods during which an existing IUD or implant provides contraceptive protection. Prior sterilization is identified from procedure histories and sterilization-status diagnoses for either spouse,

while hysterectomy and infertility are identified using relevant procedure and diagnosis codes. Following sterilization or the insertion of a long-acting reversible method during the sample window, subsequent quarters covered by the procedure or device are excluded. IUD coverage windows extend up to four years, while implant coverage windows extend up to two years. These restrictions ensure that observed choices reflect decisions among contraceptive alternatives rather than the continued use of methods adopted in an earlier period.[2]

I also exclude periods during which couples are pregnant or attempting to conceive, when avoiding pregnancy is not the relevant contraceptive decision. Pregnancy-related exclusions are identified through delivery records, pregnancy-related diagnoses, and prenatal care claims. Attempts to conceive are identified using assisted reproductive procedures, fertility-treatment diagnoses, fertility medications, and sterilization reversals. Following evidence of attempted conception, quarters without an observed contraceptive method are excluded until contraceptive use resumes. Quarters in which childbirth occurs remain eligible for the sample, allowing sterilization performed in conjunction with delivery to enter the household's contraceptive choice. From 15,640,479 observations after the permanent-method and device exclusions, the pregnancy-related restrictions remove 1,052,595 observations, leaving 14,587,884 observations in the estimation panel.

I exclude 8,735 observations involving interval bilateral salpingectomy, which may be performed for noncontraceptive indications, including ovarian cancer risk reduction. I further exclude 126,444 observations without an identified insurance plan type, which is necessary to construct market-specific contraceptive prices, and 231,655 observations from Puerto Rico. The final estimation sample contains 14,221,050 quarterly household observations from 2,435,015 couples. Table 1 summarizes the sample restrictions and the number of observations remaining after each exclusion. Additional details on sample construction and exclusion criteria are provided in Appendix A.1.

[2]For a related analysis of nonfinancial barriers to contraceptive use, Wixon (2026) examines how prescription access and the duration of contraceptive protection affect demand, as well as how competition shapes manufacturers' incentives to extend the approved duration of long-acting methods.

These restrictions yield a sample of married, privately insured couples for whom pregnancy prevention remains a relevant decision and whose contraceptive choices can be observed alongside those of their spouses. The women are relatively mature within their reproductive years, with an average age of 37 and approximately 40 percent aged 40–45 as seen in Table 2. Couples also tend to have established families, with an average of 1.8 dependent children and nearly two-thirds having at least two. This composition is particularly relevant for studying permanent contraception, as many couples are at a stage of life when they may have completed their desired fertility and are weighing sterilization against continued use of reversible methods.

4.2 Contraceptive Choices and Prices

I identify short-acting reversible contraceptives through pharmacy claims, while long-acting reversible methods, injections and sterilization procedures are identified using pharmacy, inpatient, and outpatient claims, depending on how the method is administered and billed. I aggregate individual products and procedures into eight contraceptive alternatives: the pill, patch, vaginal ring, injection, intrauterine device, implant, female sterilization, and vasectomy. Together with an outside option, these form the nine alternatives in the household's choice set. For couples using more than one contraceptive method within a quarter, I assign the choice to sterilization if a procedure occurs, followed by long-acting method insertion and then the most frequently used short-acting method. The outside option includes over-the-counter contraceptive methods that cannot be observed in claims, such as condoms, abortion[3], and fertility-awareness methods, as well as couples using no contraception or not engaging in sexual activity.

I measure out-of-pocket prices using copayments, coinsurance, and deductible payments recorded in the claims. For short-acting methods, I standardize payments to 90 days of use. I sum out-of-pocket payments and days supplied across a couple's prescription fills for each

[3]The estimation sample contains 11,331 quarters with an observed abortion, representing approximately 0.08 percent of observations.

method, divide total payments by total days supplied, and multiply the resulting daily cost by 90. When days supplied are missing, I infer them from the quantity dispensed, using one day per pill, seven days per patch, 28 days per ring, and 90 days per injection[4]. If neither days supplied nor quantity is recorded, I use the method's standard dosing interval. This produces a comparable quarterly price for methods dispensed in different quantities or at different refill intervals.

For IUDs, implants, and sterilization, I instead measure the out-of-pocket cost of the procedure episode, including associated same-day anesthesia and facility charges. Female sterilization includes interval procedures and sterilization performed during childbirth, although the latter requires a different approach to measuring costs. Payments for postpartum sterilization are bundled with those of delivery, making the contraceptive component difficult to identify directly. I therefore calculate the difference in mean out-of-pocket delivery payments with and without sterilization. Negative differences are set to zero before these incremental payments are aggregated with interval procedures to construct the price of female sterilization[5].

Although claims record the out-of-pocket payments for methods couples choose, they do not reveal what those couples would have paid for the alternatives they did not select. Following Ho and Pakes (2014) and Starc and Swanson (2021), I construct price menus at the state, insurance plan type, year, and quarter level. Each couple is assigned the mean out-of-pocket payment among users of each method in its market, regardless of its own choice. When a method is not observed in a market, I assign its national average price. Approximately 1 percent of couple-method price assignments rely on national rather than market-specific prices. The outside option has a price of zero. This results in a sample spanning 2,451 markets, with a median of 1,814 couples per market. Additional details on price construction are provided in Appendix A.2.

[4]Days supplied is missing for only 0.11 percent of contraceptive pharmacy fills in the estimation sample.

[5]Approximately 40 percent of estimated incremental postpartum payments are negative before being set to zero. These differences may reflect variation in delivery costs unrelated to sterilization, including differences in delivery complexity.

As shown in Table 3, the pill is one of the least expensive contraceptive methods and the most frequently chosen, accounting for 11.8 percent of all household choices at an average out-of-pocket price of $7.11. Likewise, among LARCs, IUDs are on average less expensive and more commonly used than implants, with an average price of $4.06 and 0.75 percent of choices, as compared to $34.74 and 0.07 percent for the implant. The outside option is the largest group, accounting for 85.4 percent of household choices.

Vasectomy, in contrast, is more frequently chosen than female sterilization even though it carries a substantially higher out-of-pocket price. The average assigned price of vasectomy is $209.06, compared with $107.90 for female sterilization, yet vasectomy accounts for 0.375 percent of all household choices compared with 0.195 percent for female sterilization. This relationship is consistent with couples placing considerable weight on differences between the procedures beyond their financial costs. As discussed in section 2, female sterilization generally entails more invasive surgery, greater medical risks, and a more demanding recovery. However, preferences over which partner bears these burdens, and the relative influence of each spouse in the decision, may also contribute to the observed vasectomy incidence despite the higher out-of-pocket costs.[6]

The likelihood of choosing permanent contraception increases with the number of dependent children. Among couples without dependent children, approximately 0.14 percent of quarterly household choices involve either female sterilization or vasectomy, compared with 0.68 percent among couples with two children and 0.96 percent among those with three or more. This pattern is consistent with couples becoming more willing to adopt permanent contraception as they complete their desired fertility.

Among couples with no children or one child, sterilization becomes more common through

[6]The greater frequency of vasectomy in MarketScan® contrasts with the NSFG, where female sterilization accounts for most permanent contraceptive use among privately insured women. The apparent discrepancy partly reflects differences in how female sterilization is defined. The estimation sample exclude procedures for non-contraceptive indications, resulting in approximately 1.9 vasectomies per female sterilization. Including these salpingectomies and hysterectomies however reverses this ratio to approximately 1.8 female procedures per vasectomy, closer to the 1.5 female sterilizations per vasectomy reported in the NSFG for privately insured, married or cohabiting women aged 20–45.

ages 35–39 before declining, while among couples with larger families, incidence peaks considerably earlier, as shown in Table 4. Despite these differences, sterilization incidence declines at older ages across all family sizes. Among couples with three or more children, for example, quarterly incidence falls from 2.09 percent at ages 30–34 to just 0.30 percent at ages 40–45. Although couples with larger families are generally more likely to choose sterilization, the declining incidence at older ages is suggestive of a shorter remaining reproductive horizon reducing the attractiveness of an invasive, permanent procedure relative to continued use of reversible contraception.

The choice between male and female contraception may also be a product of household bargaining. To examine this measure, I construct a measure of household bargaining conditions using the American Community Survey (ACS) public-use microdata. Following Chiappori et al. (2002), I use the local gender ratio as a measure of marriage-market conditions that may affect bargaining power within couples. Specifically, I calculate the ratio of men to women within each state, year, and five-year age group, using ACS person weights. I match this measure to couples in MarketScan® using the woman's age group and state of residence. Chiappori et al. (2002) show that gender ratios affect household labor supply and the intrahousehold allocation of resources, consistent with a role for marriage-market conditions in household bargaining. In the present setting, the gender ratio may similarly be associated with how couples allocate contraceptive burdens between partners. I standardize the gender ratio to have a mean of zero and a standard deviation of one for estimation. Table 5 reports the share of sterilization choices accounted for by vasectomy across quartiles of the local male-to-female sex ratio. Among couples choosing sterilization, the vasectomy share increases modestly from 64.8 percent in the lowest quartile to 66.5 percent in the highest quartile, although the relationship is not monotonic across quartiles.

Although these patterns suggest that both financial and nonfinancial considerations may enter contraceptive decisions, observed choices do not reveal how couples would respond to changes in out-of-pocket prices or how those responses would be distributed across competing

methods. In addition, unobserved determinants of contraceptive demand may be correlated with prices, confounding the relationship between observed prices and choices. Recovering causal responses therefore requires addressing the endogeneity of prices while accounting for substitution among contraceptive alternatives.

5 Empirical Demand Framework

I model contraceptive demand as a discrete choice among differentiated methods. Each couple chooses the contraceptive alternative that provides the greatest utility. The choice set consists of eight contraceptive methods and an outside option, as described in Section 4. Including the outside option allows changes in contraceptive prices to affect both the choice among methods and the probability of choosing any observed method.

Figure 1 illustrates the nesting structure, which follows the nested logit framework of Goldberg (1995). At the highest level, the choice set is divided into two branches: contracepting and not contracepting. The contracepting nest contains eight methods, which are further organized into four subnests according to their contraceptive characteristics. Short-acting methods include the pill, patch, ring, and injection, while long-acting reversible contraception (LARC) includes the IUD and implant. Female sterilization and vasectomy each form their own singleton nest. The outside option represents the alternative to choosing one of the eight observed contraceptive methods.[7]

The nesting structure allows substitution patterns to reflect similarities among contraceptive methods that are not fully captured by their observed characteristics. For example, a couple may place particular value on retaining the ability to discontinue contraception, making reversible methods more attractive than sterilization. Other couples may be more willing to manage contraception regularly, increasing their preferences for several short-acting methods at once. These shared preferences allow substitution to be stronger among related

[7]In the robustness analysis, I also consider a nesting structure that groups female sterilization and vasectomy within a common permanent method nest. That specification violates the standard restrictions for consistency with random utility maximization.

methods when prices change. For example, a reduction in the pill's price may draw relatively more demand from the patch, ring, and injection than from LARC or sterilization.

Let h denote households, j contraceptive alternatives, and m markets defined by state, insurance plan type, year, and quarter, so that $m = (s, t, y, q)$. Household h's utility from alternative j in market m is

$$U_{hjm} = V_{hjm} + \varepsilon_{hjm},$$

where V_{hjm} is the deterministic component of utility and ε_{hjm} captures unobserved determinants of contraceptive choice. I specify the deterministic component as

$$\begin{aligned} V_{hjm} = {} & \alpha p_{jm} + \beta_0 \text{Inside}_j + \beta_2 \text{ProviderAdmin}_j + \beta_3 \text{Permanent}_j + \beta_4 \text{MaleBorne}_j \\ & + \sum_{k \in \{1,2,3+\}} \gamma_k \text{Children}_{hk} \text{Permanent}_j \\ & + \delta \, \text{GenderRatio}_{sya(h,m)} \text{MaleBorne}_j + \theta_{t(m),q(m)} \text{Inside}_j. \end{aligned}$$

The variable p_{jm} is the price of method j in market m, and α measures the change in utility associated with a one-dollar increase in that price. I assume that this coefficient is common across methods and households. An additional dollar of out-of-pocket cost therefore has the same effect on utility regardless of the method, household, or market, although its effect on choice probabilities depends on the attractiveness of the available alternatives and their positions in the nesting structure.

The remaining coefficients capture preferences for observed contraceptive characteristics relative to the pill, patch, and ring. The inside indicator, β_0, captures a common utility component of all eight observed contraceptive methods relative to the outside option. The provider-administered reversible characteristic applies to the injection, implant, and IUD. Its coefficient, β_2, captures their common utility relative to the reference group, holding prices fixed. Unlike the pill, patch, and ring, these methods require a clinician to administer or place them. Permanence, captured by β_3, measures the relative utility of sterilization for childless couples. Finally, β_4 captures the relative preference for a male-borne rather than

female-borne permanent procedure.

I include insurance-plan-type-by-calendar-quarter effects, $\theta_{t(m),q(m)}$, for all observed contraceptive methods. These effects allow the utility of choosing an observed method rather than the outside option to vary across quarters differently by plan type. This flexibility is motivated by differences in cost-sharing arrangements and deductible accumulation over the calendar year: the seasonal attractiveness of obtaining contraception may differ across plan types even after controlling for observed out-of-pocket prices.

The model also allows preferences for permanence to vary with the number of dependent children. The coefficients γ_1, γ_2, and γ_{3+} capture the change in utility associated with permanent contraception among couples with one, two, and three or more children, respectively, relative to childless couples. For example, the utility associated with permanence for a couple with two children is $\beta_3 + \gamma_2$, compared with β_3 for a childless couple. This allows the value of permanent contraception to differ with family size without imposing a monotonic relationship.

The final interaction allows the relative utility of vasectomy to vary with local marriage-market conditions. The coefficient δ measures how a one-standard-deviation increase in the ratio of men to women within an age group shifts utility for vasectomy, holding the remaining characteristics fixed. This allows local marriage-market conditions to influence the relative attractiveness of male sterilization without imposing the same relationship on female sterilization or reversible methods. As an alternative to the gender-ratio specification, I estimate a life-cycle model in which preferences for permanence vary with the woman's age, conditional on the number of children.[8] As women approach menopause, permanent contraception provides fewer years of pregnancy prevention without continued contraceptive management, but the option of future childbearing may also become less valuable. Allowing these preferences to vary with age provides a way to examine how the relative importance of these considerations changes over the reproductive life cycle. In both specifications, I

[8]The overlap in variation between the gender-ratio and age-by-permanence interactions makes their effects difficult to identify independently, motivating their estimation in separate specifications.

normalize the deterministic utility of the outside option to zero.

I assume that the unobserved utility terms ε_{hjm} follow a generalized extreme-value (GEV) distribution. This distribution allows unobserved preferences to be correlated among all observed contraceptive methods through the contracepting nest, with stronger correlation permitted among methods within the short-acting and LARC subnests. Under this assumption, the attractiveness of the methods within each nest is summarized by an inclusive value, which depends on their utilities and an inclusive value parameter governing the correlation in unobserved preferences among them.

Let σ_I, σ_S, and σ_L denote the inclusive value parameters for the contracepting, short-acting, and LARC nests, respectively. I define the inclusive values for the short-acting and LARC nests as

$$I_{hSm} = \log\left(\sum_{j\in S} \exp\left[\frac{V_{hjm}}{\sigma_I \sigma_S}\right]\right),$$
$$I_{hLm} = \log\left(\sum_{j\in L} \exp\left[\frac{V_{hjm}}{\sigma_I \sigma_L}\right]\right).$$

The inclusive value for the contracepting nest is

$$I_{hIm} = \log\left(e^{\sigma_S I_{hSm}} + e^{\sigma_L I_{hLm}} + e^{V_{hFm}/\sigma_I} + e^{V_{hMm}/\sigma_I}\right),$$

where F and M denote female sterilization and vasectomy. The probability of choosing a method can be expressed as the product of the conditional probabilities along its path through the tree. For a short-acting or LARC method, this combines the probability of choosing contraception, the probability of choosing its reversible-method nest conditional on contraception, and the probability of choosing the particular method within that nest. Female sterilization and vasectomy enter directly within the contracepting nest and therefore have only two components.

Smaller values imply stronger substitution among methods within the corresponding nest relative to alternatives outside it. For example, when the pill becomes cheaper, it becomes

more attractive than the other short-acting methods, while short-acting contraception also becomes more attractive relative to LARC and sterilization. This also increases the attractiveness of the entire contracepting nest relative to the outside option, potentially drawing additional couples into observed contraception. A smaller σ_S concentrates more of the resulting substitution among the pill, patch, ring, and injection rather than drawing demand from other contraceptive methods, holding initial choice probabilities fixed. The short-acting and LARC parameters are expressed relative to their parent nest, so their absolute scales are $\sigma_I\sigma_S$ and $\sigma_I\sigma_L$, respectively.

Consider a reduction in the price of vasectomy. The lower price increases the attractiveness of the contracepting nest relative to the outside option, increasing the probability that a household chooses an observed contraceptive method. Among households choosing observed contraception, vasectomy also becomes more attractive relative to short-acting contraception, LARC, and female sterilization. The increase in vasectomy demand therefore reflects both substitution from the outside option and substitution from other observed contraceptive methods.

The model imposes a restriction on how substitution from the other observed methods is distributed. Because vasectomy enters directly within the contracepting nest, lowering its price does not change the relative probabilities of choosing short-acting contraception, LARC, and female sterilization. For example, suppose a household initially has a 20 percent probability of choosing short-acting contraception and a 5 percent probability of choosing female sterilization. If a reduction in vasectomy's price lowers the first probability to 18 percent, the second must fall to 4.5 percent. Both probabilities decline by 10 percent, but the reduction in the probability of choosing short-acting contraception is four times as large due to its larger initial choice probability. Thus, even though the model imposes the same proportional reduction across other observed methods within the contracepting nest for a given household, the amount of substitution from each method depends on its initial choice probability.

The relative amount of substitution from the outside option depends on σ_I, which governs how closely observed contraceptive methods substitute for one another relative to the outside option. A smaller σ_I concentrates more substitution among observed methods, while a larger value permits relatively more substitution from the outside option, holding initial choice probabilities fixed. Aggregate substitution patterns are obtained by summing changes in choice probabilities across households. Because households differ in their characteristics, prices, and initial choices, these aggregate responses depend on both the inclusive value parameters and the baseline distribution of demand across contraceptive methods and the outside option.

For the nesting structure to satisfy the standard sufficient conditions for consistency with random utility maximization, each inclusive value parameter must be positive and no greater than one,

$$0 < \sigma_I \leq 1, \qquad 0 < \sigma_S \leq 1, \qquad 0 < \sigma_L \leq 1.$$

These restrictions ensure that the correlation in unobserved preferences is consistent with the nesting structure: methods grouped more closely together cannot be less closely related than methods in different nests. A parameter equal to one implies that the corresponding nest introduces no additional correlation in unobserved preferences beyond that of its parent nest. Values above one would violate these standard restrictions by implying substitution patterns inconsistent with that ordering. I evaluate these restrictions after estimation as a specification test of consistency with random utility maximization, rather than imposing them during estimation.

6 Demand Model and Estimation

6.1 Identification and Estimation

Identification comes from variation in contraceptive choices across methods, households, and markets. After accounting for prices and the nesting structure in Figure 1, differences in the relative choice probabilities of provider-administered methods (injection, IUD, and implant) and self-administered methods (pill, patch, and ring) identify the provider-administered coefficient. The relative frequency of female sterilization and reversible contraception among childless couples identifies preferences for permanence, while comparisons between vasectomy and female sterilization identify the male-borne coefficient. Observing these choices across markets with different prices helps separate preferences for method characteristics from responses to cost.

Household interactions are identified by differences in choices among couples facing the same market-level prices. For example, if couples with two children are more likely than childless couples to choose sterilization over reversible contraception within the same market, that difference identifies the interaction between permanence and having two children. The bargaining interaction instead uses variation in local gender ratios across states, years, and women's age groups, including differences between age groups within the same insurance market. If couples facing higher gender ratios are more likely to choose vasectomy relative to otherwise comparable methods and households, that relationship identifies the bargaining coefficient. Interpreting this interaction as bargaining requires assuming that, conditional on the included controls, differences in local gender ratios are not simply proxying for other determinants of vasectomy demand. In the life-cycle specification, differences in the relative frequency of permanent and reversible contraception across women's age groups, conditional on the number of children and market-level prices, similarly identify the age-by-permanence interactions. I estimate the bargaining and life-cycle specifications separately as local gender ratios vary systematically with age, making it difficult to distinguish the two relationships

when both sets of interactions are included. The specifications therefore examine how contraceptive preferences vary with household bargaining conditions and over the reproductive life cycle, respectively.

The inclusive value parameters are identified by how choice probabilities differ across markets as the relative attractiveness of alternatives changes. Because methods within the short-acting and LARC nests have similar or identical observed characteristics, differences in their relative attractiveness across markets arise primarily from variation in prices. For example, consider two markets where the pill is cheaper relative to other short-acting methods in one market than in the other. The model uses how this price difference changes the pill's probability relative to other short-acting methods, compared with how it changes the probability of choosing short-acting contraception relative to methods outside that nest. This relationship provides information about the extent to which substitution is concentrated within the short-acting nest rather than across contraceptive groups, helping distinguish the inclusive value parameter from the price coefficient. Analogous comparisons between IUD and implant prices and choices identify the LARC parameter. Differences in the attractiveness and choice probability of contraception as a whole relative to the outside option identify the contracepting-nest parameter. These parameters are jointly identified with the utility coefficients under the assumption that the remaining unobserved utility shocks follow the specified nested extreme-value distribution (Train, 2009).

Out-of-pocket contraceptive prices may be endogenous if local demand influences the prices negotiated between providers and insurers. For example, urology practices or health systems in markets with greater demand for vasectomy may negotiate higher reimbursement rates, raising patients' out-of-pocket payments. This generates a positive relationship between price and demand even if couples respond negatively to higher prices. Insurance selection creates a related concern: couples anticipating contraceptive care may enroll in plans with more favorable benefits, while differences in prescription coverage and provider networks can affect method choice independently of price. The timing of care also matters,

as couples may postpone procedures until later in the benefit year, after meeting more of their deductible, with different incentives across plan types.

I address price endogeneity using a control function (Train, 2009). The first stage regresses each market-level method price on six excluded variables, comprising a noncontraceptive cost-sharing measure, two reimbursement benchmarks, their interactions with cost sharing, and an other-state price measure, along with method characteristics and plan-type-by-quarter effects:

$$\begin{aligned} p_{jm} = Z'_{jm}\pi + \kappa_1 \text{ProviderAdmin}_j + \kappa_2 \text{Permanent}_j \\ + \kappa_3 \text{MaleBorne}_j + \phi_{t(m),q(m)} + v_{jm}. \end{aligned} \tag{3}$$

The first stage weights method-market cells equally. The method characteristics account for systematic price differences across contraceptive technologies. Plan-type-by-quarter effects allow seasonal price patterns to vary across plan types, reflecting differences in benefit structures and the timing of deductible accumulation.

The first excluded variable captures the share of medical spending paid by patients through deductibles, copayments, and coinsurance, calculated from noncontraceptive and nonpregnancy claims within each market. A higher value indicates greater patient cost sharing and predicts contraceptive out-of-pocket prices through the cost-sharing provisions of the insurance plan. Excluding contraceptive claims avoids directly incorporating contraceptive prices into the measure. The exclusion restriction requires that cost sharing for unrelated medical services is not correlated with unobserved contraceptive demand, conditional on plan-type-by-quarter effects and the other controls. Insurance plan selection reflects a broad range of healthcare needs, premiums, and benefits, with contraceptive coverage representing a relatively small component of overall insurance costs. Estimates reviewed by the U.S. Department of Health and Human Services suggest that contraceptive coverage adds no more than approximately 0.5 percent to insurance premiums (Bertko et al., 2012), limiting the extent to which contraceptive preferences are likely to drive differences in general cost-sharing

arrangements across markets. .

For procedures, I construct a Medicare-based reimbursement index from the Physician Fee Schedule published by the Centers for Medicare and Medicaid Services (CMS). I sum the physician-work, practice-expense, and malpractice relative-value units for each procedure code, average across codes associated with a method, and multiply by the physician-work Geographic Practice Cost Index (GPCI). The resulting measure varies by method, state, and year and is a relative fee index rather than a Medicare payment in dollars. Commercial procedure reimbursements are frequently negotiated relative to Medicare benchmarks, making the index predictive of private payments and associated patient cost sharing. Medicare's relative values reflect nationally determined estimates of physician work, practice expenses, and malpractice costs, including the resources required to perform each procedure. The geographic adjustment is based on wages in nonphysician professional occupations, such as engineers, teachers, and lawyers, rather than local physician earnings[9]. Together, these components provide variation in reimbursement benchmarks driven by the resources required to deliver care and broader regional labor costs, rather than local demand for sterilization. Although regional economic conditions may also influence contraceptive preferences, the use of national procedure valuations and nonphysician wage measures limits the direct relationship between the instrument and unobserved contraceptive demand.

For prescription methods, I use National Average Drug Acquisition Cost (NADAC) data published by CMS, constructing annual method-level measures for pills, patches, and rings. NADAC measures pharmacy acquisition prices nationally, providing a benchmark for reimbursement that can affect patients' payments through deductibles and coinsurance. The exclusion restriction requires that changes in national acquisition prices are not systematically correlated with national shifts in contraceptive preferences. These prices reflect national pharmaceutical pricing and supply conditions, including manufacturer pricing decisions and

[9]The construction uses total relative-value units multiplied by the physician-work GPCI, rather than Medicare's full payment formula, which adjusts the three RVU components separately and applies a conversion factor. See Centers for Medicare & Medicaid Services (nda) and U.S. Government Accountability Office (2022).

competition among suppliers, rather than demand in any single local contraceptive market. I interact the procedure and pharmacy benchmarks separately with the cost-sharing measure, allowing reimbursement benchmarks to affect patient payments differently across insurance arrangements.[10]

Finally, following Hausman (1996), I use the mean price of the same contraceptive method in other states within the same plan type, year, and quarter. Identification requires that common price movements across states are not driven by correlated unobserved contraceptive demand. National changes in the supply of urologists and OB/GYNs, including changes in the number of physicians entering these specialties, and shifts in medical equipment and supply costs can affect procedure prices across states independently of demand in any particular market. Similarly, changes in pharmaceutical manufacturing costs, production disruptions, and drug shortages can generate common price movements for prescription methods. The other-state price captures these common supply-side price movements while excluding the local market's own price.

The first stage uses 19,608 method-market observations, with standard errors clustered by state. As shown in Table 6, the six excluded instruments are jointly predictive of out-of-pocket prices, with a cluster-robust joint F-statistic of 61.14 ($p < 0.001$), indicating a substantial first-stage relationship. All six coefficients have signs consistent with the mechanisms discussed above: greater patient cost sharing, higher external reimbursement benchmarks, and higher prices in other states are associated with higher local out-of-pocket prices. These results support the relevance of the excluded instruments, although their validity rests on the exclusion restrictions discussed above.

I obtain the first-stage residual $\widehat{v}_{jm}$ and include it in the nested-logit utility:

$$V_{hjm} = V^0_{hjm} + \rho \widehat{v}_{jm}, \tag{4}$$

[10]NADAC is based on a national survey of retail pharmacy acquisition costs and is reported per dispensing unit. The method-level measure averages the available annual acquisition-cost observations; dispensing units differ across pills, patches, and rings. See Centers for Medicare & Medicaid Services (ndb).

where V^0_{hjm} contains the price and method characteristics specified above. The first-stage residual captures price variation not explained by the instruments and included controls. The control-function specification assumes that, conditional on this residual and the observed covariates, price is independent of the remaining unobserved determinants of contraceptive choice, and that the dependence between the residual and utility is adequately captured by the linear term. Under these assumptions and the exclusion restrictions, the price coefficient identifies responses to exogenous changes in out-of-pocket prices (Train, 2009).[11] Counterfactual simulations change prices while holding the fitted residuals fixed.

I estimate the nested-logit parameters by maximum likelihood. Standard errors are obtained using a state-cluster bootstrap that resamples states and reestimates both stages in each replication (Petrin and Train, 2010). This procedure allows for dependence across markets within states and accounts for uncertainty from the estimated first-stage residuals.

7 Results

The estimated demand model provides a way to assess not only how couples respond to contraceptive prices, but also how preferences for method characteristics and household circumstances shape those responses. Out-of-pocket prices affect contraceptive choices, but demand for most methods is relatively inelastic at prevailing prices. At the same time, substantial differences in willingness to pay across method characteristics and family size point to the importance of nonprice considerations. Couples exhibit an aversion to permanent contraception that declines with the number of children they have, but remains substantial even among those with larger families. They also exhibit a preference for vasectomy over female sterilization, which becomes stronger in markets where local gender ratios suggest greater bargaining power for women. These preferences shape how couples respond to dif-

[11] This control-function specification estimates the household-level nested-logit likelihood directly, rather than recovering market-level mean utilities as in the aggregate-share approach of Berry et al. (1995). It retains household-level variation in observed characteristics but imposes a parametric relationship between endogenous prices and unobserved utility.

ferences in contraceptive prices and, ultimately, the effects of eliminating out-of-pocket costs for vasectomy.

7.1 Price Responsiveness and Method Characteristics

Table 7 reports the estimated own-price elasticities across contraceptive methods. Out-of-pocket prices influence contraceptive choices, although the magnitude of the response varies across methods. The estimated price coefficient is negative (-0.0018, SE 0.0006), implying that a \$100 increase in out-of-pocket price reduces the deterministic component of utility by approximately 0.178, with a 95 percent bootstrap percentile confidence interval of $[-0.0029, -0.0004]$. The resulting own-price elasticities, reported in Table 7, vary across contraceptive methods. Vasectomy has an estimated own-price elasticity of -0.561, implying that a 10 percent increase in out-of-pocket prices would reduce aggregate predicted demand by approximately 5.6 percent, at an average out-of-pocket price of \$209. Female sterilization is somewhat less responsive, with an elasticity of -0.313 and an average price of \$108. Among the other reversible methods, estimated price elasticities range from -0.007 for the injectable to -0.055 for the IUD. Across all eight methods, the unweighted average own-price elasticity is -0.342.[12] Although the price coefficient is common across methods, own-price elasticities vary with prices, initial choice probabilities, and the estimated nesting parameters. A given percentage change in price corresponds to different dollar changes across methods and markets, while initial choice probabilities and the nesting structure determine how those changes translate into demand responses.

While these estimates indicate that demand for most methods is relatively inelastic at prevailing prices, substantial differences in willingness to pay across method characteristics point to the importance of nonprice considerations. In particular, sterilization eliminates the

[12]Following Goldberg (1995), I calculate own-price elasticities from changes in total predicted demand rather than averaging elasticities across couples. I apply the same proportional price change to each couple's assigned price for a method and compare predicted demand with prices slightly higher and lower, holding other utility components, including the price control-function residuals, fixed. These elasticities are evaluated at the assigned prices in the estimation sample rather than at the mean prices in Table 7. The 10 percent interpretation is a local approximation, not a separate simulation of a 10 percent price change.

option of future childbearing, while the choice between vasectomy and female sterilization determines which partner undergoes the procedure. The estimated willingness to pay for permanence is negative and statistically significant at the 1 percent level, with its magnitude declining substantially as couples have more children. As shown in Table 8, for childless couples, the estimated compensation required to accept an otherwise identical permanent rather than reversible method is $1,946, compared with $1,313 for couples with one child, $973 for those with two children, and $817 for those with three or more children. The aversion to permanence therefore falls by more than half between childless couples and those with larger families, but remains substantial even among couples who may have completed childbearing.

Couples may value retaining the option to have children in the future, even if they do not expect to exercise it, or they may be concerned about regretting an irreversible decision or the risks of undergoing sterilization. Survey evidence supports the relevance of these concerns. Among men who had considered but not obtained a vasectomy, 39 percent cited concerns about pain or complications, 31 percent cited cost, and 21 percent cited wanting the option of future children (KFF, 2025b). Regret is also documented among women who have undergone sterilization: Hillis et al. (1999) find that 20.3 percent of women sterilized at age 30 or younger and 5.9 percent of those sterilized after age 30 reported regret within 14 years. Although these surveys cannot explain the estimated aversion to permanence directly, they illustrate why the appeal of reversible contraception may persist even among couples who do not currently intend to have additional children.

The estimates also reveal a statistically significant preference for vasectomy over female sterilization: the male-borne coefficient is positive (0.617, SE 0.093), significant at the 1 percent level. As seen in Table 8, couples are willing to pay $346 more for vasectomy than for female sterilization, at the average value of the bargaining proxy and before accounting for differences in out-of-pocket prices. Put differently, couples would be willing to pay $346 for vasectomy rather than obtain female sterilization for free, holding other differences between

the procedures constant.[13] This preference is consistent with couples valuing the medical advantages of vasectomy, including its lower invasiveness, reduced procedural risks, and high contraceptive effectiveness. The result is particularly relevant because vasectomy is not subject to the same federal no-cost coverage requirement as female sterilization. Evidence from KFF's 2024 Women's Health Survey provides complementary support for the appeal of vasectomy: among women who were not using their preferred contraceptive method, 23 percent reported that they would choose a partner's vasectomy if cost and other barriers were removed (KFF, 2025a).

The preference for vasectomy also varies with local conditions associated with household bargaining. A higher male-to-female gender ratio, used here as a proxy for women's relative bargaining power, is associated with a stronger preference for vasectomy. The gender-ratio interaction is positive (0.152, bootstrap SE 0.029), with a 95 percent bootstrap percentile interval of [0.063, 0.185]. A one-standard-deviation increase in the gender ratio raises the estimated willingness to pay for vasectomy relative to female sterilization by approximately 25 percent, from \$346 to \$432, as shown in Table 8. This relationship is consistent with the bargaining framework, in which a change in relative bargaining power alters the weights placed on each partner's costs. As women's relative bargaining power increases, the utility costs associated with female sterilization receive greater weight, increasing the relative attractiveness of vasectomy.

Preferences over reversible contraception reveal another dimension of the burdens associated with contraceptive use. Table 8 also shows that couples exhibit a negative willingness to pay of \$647 for provider-administered methods—the IUD, implant, and injectable—relative to self-administered reversible methods. These methods can offer advantages in duration and effectiveness, but they also require clinical involvement for insertion or administration. The negative valuation may therefore reflect inconvenience, discomfort, or other burdens associated with provider administration, alongside differences between the methods that the

[13]This comparison holds the bargaining proxy at its sample mean.

model does not separately identify.

Tables 8 and 10 show that the life-cycle specification produces similar findings for the principal contraceptive characteristics. The estimated price coefficient remains negative (-0.001844), aversion to permanence declines with the number of children, and couples continue to prefer vasectomy over female sterilization, with an estimated willingness to pay of \$420 for vasectomy relative to female sterilization. In this specification, aversion to permanence also increases with the woman's age, conditional on the number of children. As reported in Table 10, all four age-by-permanence interactions are negative and statistically significant at the 1 percent level relative to the omitted age group, women ages 20–24. As shown in Table 9, among childless couples, the estimated willingness to pay for permanence declines from $-\$2,126$ at ages 20–24 to $-\$2,924$ at ages 40–45, indicating a stronger aversion to permanence at older ages, holding parity fixed. With fewer remaining years over which to benefit from permanent contraception, the upfront procedural costs and irreversibility of sterilization may be less attractive relative to reversible methods for older couples.

7.2 Substitution Patterns

The own-price elasticities establish how strongly demand for each contraceptive method responds to changes in its price, but the consequences of these changes depend on the alternatives couples would otherwise choose. In particular, lowering the price of vasectomy could shift contraceptive responsibility from women to men by reducing female sterilization, replace ongoing use of reversible contraception with permanent protection, or attract couples from the outside option. These changes have different implications for the distribution of contraceptive burdens and potentially for fertility. Table 11 reports the cross-price elasticities and cross-price semi-elasticities I use to examine substitution across methods.[14] Both measures are evaluated using the prices assigned to individual couples in the estimation sample, holding all other components of utility fixed.

[14]Cross-price elasticities measure the percentage change in demand for one method following a 1 percent decrease in another method's price, while semi-elasticities measure the response to a \$1 decrease.

Table 12 reports an estimated inclusive value parameter of 0.597 for the broader contraception nest, indicating that substitution is more concentrated among contraceptive methods than between contraception and the outside option, conditional on initial choice probabilities. Vasectomy and female sterilization enter as separate alternatives directly within this nest, without a shared sterilization nest that would allow additional substitution between the two procedures. A 1 percent decrease in vasectomy's price reduces predicted female sterilization demand by approximately 0.010 percent, while a 1 percent decrease in female sterilization's price reduces vasectomy demand by approximately 0.003 percent. In the life-cycle specification, a 1 percent decrease in vasectomy's price reduces female sterilization demand by approximately 0.006 percent. As shown in Table 11, the semi-elasticities indicate similarly small responses to absolute price changes: a $1 decrease in vasectomy's price reduces predicted female sterilization demand by approximately 0.0055 percent, while a $1 decrease in female sterilization's price reduces vasectomy demand by approximately 0.0028 percent. Because the two procedures do not share a narrower nest, the model does not allow additional substitution specifically between them beyond the substitution permitted within the broader contraception nest.[15]

The nesting structure also shapes substitution between vasectomy and reversible contraception. A 1 percent decrease in vasectomy's price reduces predicted demand for the pill, patch, and ring by approximately 0.0075 percent each, and demand for the IUD and implant by 0.0076 and 0.0068 percent, respectively. Table 11 also shows that a $1 decrease produces reductions of approximately 0.0039 percent for the pill, patch, and ring, 0.0038 percent for the IUD, and 0.0042 percent for the implant. Although short-acting and long-acting reversible contraception each have their own nests, vasectomy lies outside both. Consequently, for a given household, a reduction in vasectomy's price produces the same proportional decline in the probabilities of choosing each other observed contraceptive method. The aggregate per-

[15]As a robustness check, I estimate a specification that places vasectomy and female sterilization within a common sterilization nest. The estimated nesting parameters violate the restrictions required for consistency with random utility maximization.

centage responses can nevertheless differ across methods because households have different characteristics, prices, and initial choice probabilities.

The model permits stronger substitution among methods that share a narrower nest, particularly the IUD and implant. The IUD and implant form the long-acting reversible contraception nest, which sits within the broader contraception nest. The absolute inclusive value parameter for long-acting reversible contraception is 0.021, measuring the scale of unobserved preference differences between the IUD and implant relative to the overall choice model, including the outside option. As shown in Table 12, dividing 0.021 by 0.597 gives a conditional inclusive value parameter of 0.035, measuring that scale relative to the broader contraception nest and indicating particularly strong substitution between the IUD and implant compared with other contraceptive methods. The corresponding absolute and conditional parameters for short-acting contraception are 0.446 and 0.748, suggesting weaker additional substitution within that nest than within LARC. A 1 percent decrease in the implant's price reduces predicted IUD demand by approximately 0.307 percent, while a 1 percent decrease in the IUD's price reduces implant demand by approximately 0.236 percent. All three conditional parameters, including the 0.597 parameter for contraception relative to the outside option, lie between zero and one, satisfying the restrictions for consistency with random utility maximization.

The estimated substitution patterns are also consistent with the tradeoffs developed in the conceptual framework in Section 3. Moving from reversible contraception to vasectomy requires couples to accept permanence, a characteristic for which the estimates indicate a substantial negative willingness to pay. This aversion may help explain vasectomy's limited baseline appeal, although the cross-price responses also reflect the nesting structure and other estimated preferences. Moving from female sterilization to vasectomy does not require accepting permanence, but instead changes which partner undergoes the procedure and bears its associated burdens. The estimated substitution between these procedures reflects these differences in preferences alongside the restrictions imposed by the nesting structure.

8 Counterfactual Analysis

I use the estimated demand models to evaluate two counterfactual changes in contraceptive prices. First, I remove insurance coverage for all contraceptive methods, replacing observed out-of-pocket prices with the full allowed amounts paid to providers and pharmacies. This exercise quantifies the extent to which existing insurance coverage supports contraceptive use and how choices would change in its absence. Second, I eliminate out-of-pocket costs for vasectomy, holding the prices of all other methods fixed. This exercise examines how much the current cost of vasectomy limits its use and whether eliminating that cost changes the contraceptive choices of couples considering permanent contraception. I evaluate both price changes under the main and life-cycle specifications, then use the life-cycle model to simulate contraceptive decisions over couples' remaining reproductive years. By updating predicted contraceptive choices as couples age and have additional children, the simulation projects how differences in vasectomy adoption accumulate into changes in the stock of couples protected by sterilization and, consequently, differences in pregnancies and births.

The model estimates contraceptive choices at the couple-quarter level. Because couples leave the estimation sample following sterilization, the predicted probability of choosing vasectomy in a given quarter can be interpreted as a quarterly incidence rate among couples eligible to choose the procedure. To express the vasectomy counterfactual in annual terms, I convert the predicted quarterly probability q, evaluated under either observed or counterfactual prices, into an annual probability:

$$P^{\text{annual}} = 1 - (1 - q)^4. \tag{5}$$

This is the probability of undergoing vasectomy at least once over four quarters under a constant quarterly hazard, assuming the couple remains eligible until sterilization. The conversion approximates annual incidence because the demand model does not explicitly account for changes in individual circumstances or competing contraceptive choices across

quarters. I report both quarterly and annual probabilities in Table 13, while the discussion focuses on annual effects.

8.1 Main Specification

8.1.1 Removing Insurance Coverage

Under current coverage, most methods have relatively low out-of-pocket prices, including highly effective methods that require expensive procedures. Removing coverage exposes couples to the much higher underlying costs of these methods, potentially changing both whether they use contraception, what methods they choose, and how effectively those methods prevent pregnancy.

Table 14 shows that the magnitude of the financial protection provided by insurance is substantial. An IUD costs couples approximately $4 out of pocket, compared with an average allowed amount of $889, while the corresponding figures are $35 and $1,354 for the implant. Likewise, vasectomy costs approximately $209 out of pocket compared with an allowed amount of $969, while female sterilization has an average out-of-pocket price of $108 and an allowed amount of approximately $4,038. By contrast, the allowed amount for the pill is approximately $127. Insurance therefore allows couples to choose highly effective long-acting and permanent contraception without bearing the substantial upfront costs of these methods.

Removing this protection substantially reduces the use of contraceptive methods observed in the claims. As shown in Table 15, under the main specification, the outside-option share rises from 85.4 to 90.7 percent. This 5.3-percentage-point increase corresponds to a decline of approximately 36 percent in the share choosing a modeled contraceptive method, from 14.6 to 9.3 percent. The results suggest that existing insurance coverage supports a substantial amount of prescription and procedural contraceptive use that would otherwise be displaced by methods outside the observed choice set or by no method.

The decline is concentrated among the most effective contraceptive methods due to their

steep increase in price under the counterfactual. As seen in Table 15, under the main specification, IUD use falls by 89 percent and implant use by 61 percent, while vasectomy falls by 75 percent and female sterilization by more than 99 percent. These are methods that provide highly effective pregnancy prevention without requiring ongoing action by the user. Their sharp decline suggests that a central benefit of contraceptive insurance coverage is maintaining access to methods with the greatest protection against unintended pregnancy.

Among couples who continue choosing a modeled method, demand shifts toward less expensive short-acting alternatives. Yet these methods do not absorb enough of the displaced demand to offset the broader decline in contraceptive use. Under the main specification, pill, patch, and ring use collectively falls from 12.85 to 8.62 percent, a reduction of approximately one-third, as shown in Table 15. Thus, even as relatively inexpensive methods become more attractive within the remaining contraceptive choices, their overall use falls substantially.

The counterfactual illustrates two ways in which existing insurance coverage supports pregnancy prevention. It increases the number of couples choosing prescription or procedural contraception and, importantly, helps sustain the use of highly effective long-acting and permanent methods. Without coverage, the model predicts a substantial shift away from these methods, toward the outside option and, among those remaining in the modeled contraceptive market, toward less effective alternatives. The potential consequence is therefore not simply a reduction in contraceptive use but a decline in the effectiveness of the contraceptive methods couples choose.

8.1.2 Eliminating Out-of-Pocket Costs for Vasectomy

Unlike female sterilization, vasectomy is not subject to a federal requirement for coverage without cost sharing under the Affordable Care Act. As of 2025, nine states required certain state-regulated insurance plans to cover vasectomy without patient cost sharing. This raises the question of whether eliminating the remaining financial barrier to vasectomy can meaningfully change contraceptive choices, given the importance of permanence, procedural

burdens, and which partner undergoes sterilization.

As shown in Table 3, at baseline, vasectomy is the most expensive contraceptive method in the observed out-of-pocket price menu, with an average price of approximately $209, compared with $108 for female sterilization. Making vasectomy free removes that financial disadvantage while leaving the characteristics of the procedure and the prices of competing methods unchanged.

Table 13 shows that, under the main specification, eliminating vasectomy cost sharing increases predicted annual vasectomy incidence by 87 percent, from 1.58 to 2.95 percent. This represents an increase of 1.37 percentage points, or approximately 14 additional vasectomies per 1,000 eligible couples annually.

Most additional vasectomies replace less effective contraceptive choices rather than other highly effective methods. As shown in Table 16, under the main specification, 52.6 percent of additional vasectomies come from the outside option and 43.8 percent from short-acting contraception. Fewer than 4 percent come from long-acting reversible contraception or female sterilization. Despite the substantial change in vasectomy's price relative to female sterilization, the model predicts little substitution between the two procedures. This may partly reflect the small baseline share of female sterilization and the substitution patterns implied by the estimated nesting structure. Instead, the subsidy primarily draws couples away from methods that do not require a sterilization procedure, including short-acting methods and the outside option. Because vasectomy provides highly effective permanent protection, these substitutions have the potential to improve contraceptive effectiveness, particularly among couples moving away from short-acting methods.

Although an increase of 1.37 percentage points in annual vasectomy incidence may appear modest, the estimated change is a flow of new sterilizations, not a change in the stock of couples relying on vasectomy. Because sterilization is permanent, additional procedures in one year continue to affect contraceptive protection in subsequent years. The cumulative effect of eliminating cost sharing may therefore be considerably larger than the annual incidence

change alone suggests, with implications for fertility over couples' remaining reproductive years.

8.2 Life-Cycle Specification

The life-cycle specification produces similar predictions for the removal of insurance coverage. As shown in Table 15, the outside-option share increases to 91.1 percent, compared with 90.7 percent under the main specification. The use of long-acting and permanent methods also declines substantially, while pill, patch, and ring use collectively falls by approximately 36 percent. Both specifications therefore suggest that removing insurance coverage would substantially reduce the use of prescription and procedural contraception, particularly methods with high upfront costs.

Table 13 shows that eliminating out-of-pocket costs for vasectomy increases predicted annual incidence by 60 percent under the life-cycle specification, from 1.51 to 2.41 percent, equivalent to approximately nine additional vasectomies per 1,000 eligible couples annually. Although this response is smaller than the 87 percent increase predicted by the main specification, both models indicate that eliminating cost sharing would substantially increase vasectomy adoption. The composition of substitution also differs: 70.5 percent of additional vasectomies come from the outside option and 27.1 percent from short-acting contraception, compared with 52.6 and 43.8 percent, respectively, under the main specification, as shown in Table 16. In both specifications, fewer than 4 percent of additional vasectomies replace long-acting reversible contraception or female sterilization.

The two specifications provide complementary perspectives on contraceptive demand. The main specification allows the relative preference for vasectomy to vary with local conditions associated with household bargaining, while the life-cycle specification examines how preferences for permanence vary with age, holding the number of children fixed. Their counterfactual predictions suggest that eliminating vasectomy cost sharing would increase adoption under either specification, although the magnitude of the increase and the sources

of substitution differ. The life-cycle specification also provides age- and parity-specific choice probabilities that can be updated as couples move through their reproductive years. I use these probabilities to simulate contraceptive choices under observed and counterfactual vasectomy prices and examine the resulting differences in the stock of couples protected by vasectomy, pregnancies, and births in.

9 Fertility Implications

9.1 Simulation Framework

I use the age- and parity-specific choice probabilities from the life-cycle specification to examine how changes in contraceptive choice might accumulate into differences in vasectomy adoption, pregnancies, and births over couples' remaining reproductive years. As couples age or have additional children, their predicted contraceptive choices change, allowing the simulation to account for variation in preferences for permanence over time. I combine these estimates with assumptions about contraceptive effectiveness, duration of protection, and pregnancy outcomes, following couples from their observed age and parity until the woman reaches age 45. The simulation compares outcomes under observed prices with two counterfactuals: removing contraceptive insurance coverage and eliminating out-of-pocket costs for vasectomy.

9.1.1 Fertility scenarios.

Although the estimation sample excludes periods of observed pregnancy and periods identified as attempts to conceive using fertility treatments, fertility-related diagnoses, and other claims-based indicators, some couples attempting pregnancy may remain in the sample. I therefore consider two scenarios that differ in their treatment of intended fertility. The first, *unintended fertility*, assumes that couples continue seeking to avoid pregnancy throughout their remaining reproductive years and considers pregnancies resulting from contraceptive

failure or nonuse. The second, *including intended fertility*, additionally accounts for pregnancies among couples actively trying to conceive. Both scenarios use the same estimated contraceptive demand model, differing only in their assumptions about pregnancy and birth probabilities.

9.1.2 Contraceptive choice.

Let a denote the woman's age group, $k \in \{0, 1, 2, 3+\}$ the couple's parity, and $j \in \mathcal{J}$ a contraceptive alternative. The estimated life-cycle demand model determines the probability of selecting method j:

$$P_j(a, k; \mathbf{p}) = \Pr(j \mid a, k, \mathbf{p}; \widehat{\boldsymbol{\theta}}_{LC}), \tag{6}$$

where $\mathbf{p}$ is the vector of out-of-pocket prices and $\widehat{\boldsymbol{\theta}}_{LC}$ contains the estimated demand parameters. Unlike the main specification, the life-cycle specification allows preferences for permanent contraception to vary with age, making it possible to update predicted choices as couples move through their reproductive years. I evaluate two counterfactual price vectors: one replacing observed out-of-pocket prices with the full allowed amounts for all contraceptive methods, and another setting the out-of-pocket price of vasectomy to zero while holding other prices fixed. Both counterfactuals hold the estimated demand parameters unchanged.

9.1.3 Contraceptive protection and pregnancy.

Each quarter, couples not already protected by a long-acting or permanent method select contraception according to the estimated choice probabilities. Short-acting methods provide protection for one quarter, IUDs for five years, and implants for three years, while sterilization is permanent. Previous contraceptive choices determine when couples become eligible to choose again but do not otherwise affect their choice probabilities.

I assign each contraceptive method an annual typical-use failure rate from Trussell (2011). For the outside option, I use the National Survey of Family Growth (NSFG) to estimate the shares of couples using no contraception or barrier and behavioral methods, weighting these

shares by annual pregnancy rates of 85 and 18 percent, respectively. This yields an annual outside-option pregnancy probability of 24.65 percent under the unintended-fertility scenario. When intended fertility is included, I additionally account for the 15.7 percent of outside-option users classified as trying to conceive, assigning them an annual conception probability of 85 percent following Practice Committee of the American Society for Reproductive Medicine and the Practice Committee of the Society for Reproductive Endocrinology and Infertility (2022). The resulting annual outside-option conception probability is 38.01 percent.

I convert annual pregnancy probabilities into quarterly probabilities using

$$q_j = 1 - (1 - f_j)^{1/4}, \tag{7}$$

where f_j denotes the annual pregnancy probability for method j. For the outside option, I first calculate the weighted average annual probability and then apply the same conversion.

Expected conceptions are calculated each quarter using the number of couples choosing or continuing each method and its associated pregnancy probability. I assume that 49.5 percent of unintended conceptions result in live births, based on the pregnancy and birth rates reported by Kost et al. (2023). I assume that 90 percent of intended conceptions result in live births, informed by evidence that approximately 10 percent of clinically recognized pregnancies end in early pregnancy loss(American College of Obstetricians and Gynecologists, 2018). This yields a conception-weighted live-birth probability of 63.73 percent for the outside option when intended fertility is included.

Couples associated with an expected birth are excluded from contraceptive choice for the following three quarters to represent gestation, after which they return with parity increased by one, up to the category of three or more children. Conceptions not resulting in live births do not change parity or interrupt subsequent contraceptive choice. The simulation calculates expected outcomes rather than drawing realized choices or pregnancies for individual couples.

9.1.4 Simulation population and outcomes.

I initialize the simulation using the observed joint distribution of age and parity across the 14,221,050 observations in the estimation sample, grouped into 20 age-by-parity categories. After initialization, all subsequent contraceptive choices, pregnancies, and births are simulated using the estimated choice probabilities and fertility assumptions, rather than observed outcomes from the claims data. Couples are followed quarterly until the woman reaches age 45, with an average remaining horizon of 8.15 years. Each quarter, I calculate expected new vasectomies, conceptions, and births while accounting for continuing contraceptive protection. Summing these outcomes across quarters gives cumulative adoption, conceptions, and births under each price scenario.

The simulation projects contraceptive choices and fertility outcomes over couples' remaining reproductive years using the estimated age- and parity-specific preferences and the assumptions about contraceptive protection and pregnancy described above. These projections hold the estimated demand parameters fixed and do not explicitly model changes in fertility intentions or persistent unobserved differences in preferences. The two fertility scenarios examine how the results differ depending on whether intended fertility is included in the outside option.

9.1.5 Simulated Fertility Effects

Tables 17 and 18 report simulated contraceptive adoption and fertility outcomes under the two fertility scenarios. Removing contraceptive insurance coverage substantially reduces projected adoption of permanent and long-acting contraception over couples' remaining reproductive years. Under the unintended-fertility scenario, the cumulative share of couples undergoing vasectomy falls from 8.4 percent at observed prices to 3.0 percent when coverage is removed, while female sterilization falls from 4.3 percent to nearly zero. Together, these changes reduce cumulative sterilization adoption from 12.7 to 3.1 percent. The reduction is similarly large when intended fertility is included, with cumulative sterilization adoption

falling from 13.7 to 3.3 percent. Long-acting reversible contraception also declines substantially: cumulative IUD and implant selections fall from 0.20 to 0.05 per couple under the unintended-fertility scenario, and from 0.18 to 0.05 when intended fertility is included. Given the high allowed amounts for sterilization and LARCs, removing coverage substantially increases couples' out-of-pocket prices for these methods. Whereas the annual counterfactual captures the change in contraceptive choices associated with these higher prices, the lifecycle simulation shows how reduced adoption translates into less contraceptive protection over subsequent years. This distinction is especially important for sterilization, where foregoing a procedure also means foregoing the protection it would have provided throughout the remainder of a couple's reproductive years.

This decline in permanent and long-acting contraception is not offset by increased use of short-acting methods. Under the unintended-fertility scenario, short-acting contraception accounts for 9.7 percent of projected couple-quarters at observed prices and 7.6 percent when coverage is removed. Although use of relatively inexpensive pills and injections increases, these gains are more than offset by reductions in patch and ring use. Instead, the share of projected couple-quarters spent in the outside option rises from 63.0 to 79.7 percent. Overall, removing coverage reduces the proportion of time couples spend protected by contraception by 59.1 percent, from 30.6 to 12.5 percent of projected couple-quarters. When intended fertility is included, short-acting use similarly declines, from 8.9 to 6.9 percent of projected couple-quarters, while time spent in the outside option increases from 57.9 to 73.0 percent. The proportion of time spent protected by contraception falls by 60.2 percent, from 30.1 to 12.0 percent.

These changes in contraceptive protection accumulate into higher expected fertility. Under the unintended-fertility scenario, expected conceptions increase 23.6 percent, from 1.481 to 1.831 per couple. Expected live births increase by approximately 23.6 percent, from 0.733 to 0.906 per couple, corresponding to approximately 2.46 million additional births across the 14.2 million simulated couples. When intended fertility is included, expected live births over

couples' remaining reproductive years increase by approximately 24.7 percent, from 1.391 to 1.735 per couple, corresponding to approximately 4.90 million additional births across the same simulated population. The increase in both scenarios is driven primarily by greater exposure to the outside option, which has a substantially higher pregnancy probability than the contraceptive methods it replaces.

Eliminating out-of-pocket costs for vasectomy, by contrast, substantially increases cumulative vasectomy adoption in the simulation. Under the unintended-fertility scenario, the life-cycle model projects approximately 1.20 million vasectomies at observed prices, compared with 1.81 million when vasectomies are free. This represents approximately 613,000 additional procedures, or 43 additional vasectomies per 1,000 couples over their remaining reproductive years, a 51.2 percent increase in cumulative adoption from 8.4 to 12.7 percent. Similarly, when intended fertility is included, cumulative vasectomy adoption increases by approximately 51 percent, from 9.0 to 13.6 percent, corresponding to approximately 654,000 additional procedures. Some of this increase reflects substitution away from female sterilization, whose cumulative adoption falls from 4.3 to 4.0 percent under the unintended-fertility scenario. However, greater vasectomy adoption also draws couples away from reversible contraception and the outside option. Cumulative LARC selections decline modestly, from 0.20 to 0.19 per couple, while the share of projected couple-quarters spent in the outside option falls from 63.0 to 60.2 percent. A similar reduction in outside-option use occurs when intended fertility is included, from 57.9 to 55.1 percent. These changes increase the proportion of time couples spend protected by contraception by 10.1 percent under the unintended-fertility scenario, from 30.6 to 33.7 percent of projected couple-quarters, and by 11.2 percent when intended fertility is included, from 30.1 to 33.4 percent. Thus, eliminating vasectomy cost sharing not only induces substitution between contraceptive methods but also increases overall contraceptive protection. Importantly, these changes accumulate over couples' remaining reproductive years. Even a relatively small change in the probability of choosing vasectomy in a given quarter can produce a substantial increase in cumulative adoption,

because couples have repeated opportunities to undergo the procedure and each additional adoption provides protection in subsequent periods.

This increase in cumulative vasectomy adoption has implications for unintended pregnancies and births. The simulation projects a reduction in unintended conceptions from 1.481 per couple under observed prices to 1.415 when vasectomies are free. As a result, expected live births decline by approximately 4.4 percent, from 0.733 to 0.701 per couple, corresponding to approximately 462,000 fewer births across the 14.2 million simulated couples. When intended fertility is included, expected live births decline by approximately 4.8 percent, from 1.391 to 1.324 per couple, corresponding to approximately 950,000 fewer births over couples' remaining reproductive years. Although the reduction in expected births is larger when intended fertility is included, both scenarios show that eliminating vasectomy cost sharing increases permanent contraceptive adoption and reduces subsequent fertility.

Together, the simulations demonstrate why the distinction between contraceptive choice flows and the stock of contraceptive protection matters for evaluating policy. The annual counterfactuals capture how prices change the probability of choosing each method, but these immediate responses do not fully describe their consequences over couples' remaining reproductive years. For permanent and long-acting methods, each adoption affects not only current contraceptive use but also protection in subsequent periods. Removing insurance coverage reduces these investments in future protection, increasing exposure to the outside option and expected fertility, while eliminating vasectomy cost sharing has the opposite effect, increasing the stock of permanently protected couples and reducing subsequent births.

10 Robustness

I examine the sensitivity of the estimated price response to alternative assumptions about price endogeneity, unobserved heterogeneity, and substitution across contraceptive methods. Table 19 reports the alternative specifications and their implied demand responses. I also

examine the model's sensitivity to the stock of previously sterilized individuals in the outside option and assess whether observed contraceptive behavior is consistent with the substitution patterns implied by the model using the NSFG. Finally, I compare observed and predicted market shares as a test of model fit.

An important concern in estimating contraceptive demand is that couples may select into insurance plans based on anticipated healthcare needs or time elective procedures to take advantage of lower out-of-pocket costs after meeting their deductible. In either case, observed prices may be correlated with contraceptive choices for reasons other than the causal effect of price. I first examine whether the estimated price response is sensitive to the treatment of unobserved differences across insurance plans and time. Alternative fixed-effects specifications vary the extent to which persistent differences across plan types, seasonal patterns, and common year-quarter shocks are absorbed. Across seven such specifications, as shown in Table 19, the estimated vasectomy own-price elasticity ranges from -0.423 to -0.563, compared with -0.561 in the preferred specification. This stability suggests that the estimated price response is not driven primarily by differences across plan types or common temporal patterns in contraceptive use, although fixed effects cannot eliminate selection or procedure timing within these groups.

Similarly, insurance generosity may be correlated with contraceptive preferences through selection into coverage, while reimbursement fees and Hausman instruments provide alternative sources of price variation. Excluding insurance generosity and its interactions from the control function, while retaining reimbursement fees and Hausman instruments, produces an elasticity of -0.551, nearly identical to the preferred estimate of -0.561. This comparison indicates that the estimated price response does not depend on variation in insurance generosity, which may be particularly susceptible to endogenous plan selection and deductible-related timing.

The Hausman instruments introduce a different identifying assumption: prices in other states must be correlated with local prices without reflecting unobserved determinants of lo-

cal contraceptive demand. Common changes in medical practice or demand across markets could threaten this assumption. Excluding the Hausman instruments to test whether the price response persists without relying on geographic price variation increases the estimated elasticity to -1.422. Conversely, relying exclusively on Hausman instruments tests whether demand can be identified without relying on insurance generosity, which may reflect endogenous coverage choices, or reimbursement fees, which may reflect differences in provider markets and negotiated payments. This specification isolates the identifying variation from prices in other states, at the cost of relying entirely on their exclusion restriction. Although the Hausman-only specifications exhibit strong first-stage relationships, six of the seven alternative fixed-effects specifications violate the restrictions required for consistency with random utility maximization. These violations imply that the estimated nesting structure cannot represent the assumed pattern of correlated preferences across contraceptive methods. Rather than capturing stronger similarities in unobserved preferences among methods within a nest, the estimates imply a substitution structure that is inconsistent with the nested logit model.

The nesting structure imposes assumptions about which contraceptive methods share correlated unobserved preferences, making its specification consequential for the substitution patterns implied by the model. Permanence provides a natural basis for grouping male and female sterilization: both procedures offer long-term pregnancy prevention without requiring continued contraceptive use. At the same time, the procedures differ in which partner undergoes the intervention, their medical burden, and the circumstances in which they are typically performed. These differences may limit the extent to which couples view the two procedures as close substitutes, even when they share preferences for permanent contraception. To assess whether permanence provides a more appropriate basis for grouping these methods, I estimate an alternative specification that places male and female sterilization within a common permanent-method nest. The estimated nesting parameters violate the restrictions required for consistency with utility maximization, indicating that there is insuf-

ficient correlation in unobserved preferences between male and female sterilization to support a common permanent-method nest, providing evidence against this structure.

A separate concern is that claims data may not identify couples who underwent sterilization before entering the sample. As a robustness check, I exclude couple-quarters identified as likely already sterilized using age- and parity-specific prevalence targets from the NSFG and re-estimate the preferred specification. Appendix A.3 describes the construction of the age- and parity-specific prevalence targets and their use in adjusting the estimation sample. Table 20 shows that the estimation sample falls from 14.2 million to 12.0 million couple-quarters, while the estimated vasectomy own-price elasticity changes from -0.561 to -0.537 and the predicted increase in vasectomy uptake when out-of-pocket costs are eliminated changes from approximately 88 to 82 percent. The similarity of these estimates suggests that the main price response is not driven by the inclusion of couples who may have been sterilized before entering the claims panel.

Finally, I compare the model's predicted substitution into vasectomy with observed contraceptive behavior in the 2015–2017 NSFG. Among married or cohabiting couples aged 20–45 with private insurance who report a transition into vasectomy during the survey's contraceptive calendar, 61.0 percent (SE 11.1 percentage points) were using methods outside the modeled contraceptive choice set in the preceding month. This is consistent with the preferred model's prediction, reported in Table 16, that 52.6 percent of additional vasectomies following the elimination of out-of-pocket costs come from the outside option. The NSFG measures observed transitions rather than responses to an exogenous price change, so the two quantities are not directly equivalent. Nevertheless, both indicate that couples previously relying on methods outside the modeled choice set constitute an important source of vasectomy adoption.

Table 21 compares observed and predicted contraceptive shares to assess how closely the estimated models reproduce choices in the estimation sample. Both specifications closely match the overall distribution of contraceptive methods, with root mean squared errors across

nest shares of 0.0137 percentage points in the preferred specification and 0.0035 percentage points in the life-cycle specification. Particularly important for the analysis is whether the models capture the relatively infrequent choice of permanent contraception. In the preferred specification, predicted vasectomy incidence is 0.396 percent compared with 0.375 percent observed, while predicted female sterilization incidence is 0.202 percent compared with 0.195 percent observed. The life-cycle specification reduces these differences further, predicting shares of 0.379 and 0.194 percent, respectively. The models also closely reproduce the aggregate shares of short-acting contraception and LARC, although the fit is less precise for individual short-acting methods. These comparisons indicate that the models capture the relative prevalence of permanent and reversible contraception, providing a useful basis for examining changes in their predicted shares under alternative prices.

11 Conclusion

Contraceptive choice involves more than selecting a method of preventing pregnancy. Couples must weigh the financial and physical costs of contraception against the value of preserving future reproductive flexibility, often deciding which partner will bear those costs. This paper estimates household demand for reversible and permanent contraception using linked medical and pharmacy claims for privately insured couples. By linking claims for both spouses, I analyze household contraceptive demand that incorporates both male and female methods. This approach also allows me to examine demand for sterilization, a consequential contraceptive choice, and estimate substitution between vasectomy, female sterilization, and reversible alternatives. I find that households place substantial value on reversibility and avoiding medical intervention, even after they have had several children. Yet among permanent methods, couples prefer vasectomy to female sterilization, with the strength of this preference varying with a proxy for household bargaining power. These findings suggest that contraceptive decisions reflect both the costs of individual methods and how those costs are

distributed within the household.

The policy counterfactuals demonstrate the importance of insurance coverage for contraceptive choice. Removing contraceptive coverage reduces contraceptive use overall, with particularly pronounced effects on long-acting methods, highlighting the role of insurance in sustaining access to contraception, especially highly effective methods.

Although demand for sterilization is relatively price-inelastic, the consequences of changing its price can be substantial. Eliminating out-of-pocket costs for vasectomy increases predicted annual adoption, with much of the increase coming from couples who would otherwise choose the outside option. Lower prices therefore do more than shift the procedural burden between spouses. They can increase the adoption of permanent contraception, with implications for contraceptive effectiveness and pregnancy risk. Moreover, these changes accumulate over time. In an illustrative life-cycle simulation, eliminating vasectomy cost sharing increases cumulative vasectomy adoption by 51.2 percent, from 8.4 to 12.7 percent of couples, while increasing the proportion of time spent protected by contraception by 10.1 to 11.2 percent across the two fertility scenarios.

These findings highlight the importance of considering both household preferences and substitution patterns when evaluating contraceptive coverage policies. The effects of reducing out-of-pocket prices depend not only on how responsive demand is to financial costs, but also on how couples value permanence, how they weigh the burdens borne by each partner, and which contraceptive alternatives they would otherwise choose. In the case of vasectomy, eliminating cost sharing does more than redistribute sterilization procedures between men and women: it encourages some couples to adopt permanent contraception in place of methods requiring continued management or providing less effective protection. Insurance coverage can therefore influence both the distribution of contraceptive burdens within households and reproductive outcomes over time.

Figures

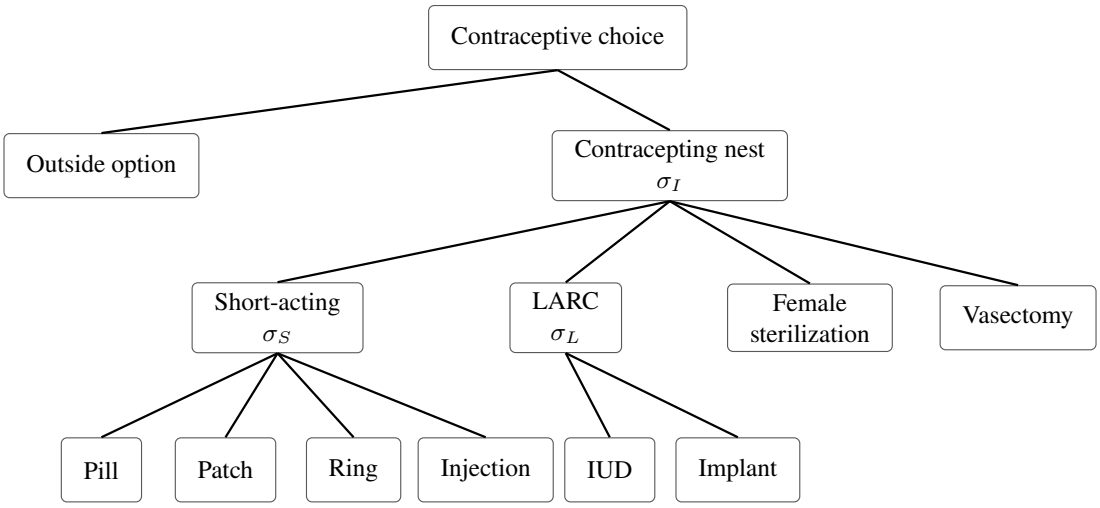


Figure 1: Nested Structure of Household Contraceptive Choice

Tables

Table 1: Estimation Sample Construction

Stage	Quarterly observations
After permanent-method and device exclusions	15,640,479
After pregnancy-related exclusions	14,587,884
After interval salpingectomy exclusion	14,579,149
After missing insurance plan type	14,452,705
After removing Puerto Rico	14,221,050

Notes: All counts are from the estimation lineage. The first row is the earliest verified stage in that lineage; earlier linking and exclusion counts are not available from the same run.

Table 2: Summary Statistics: Estimation Sample

Characteristic	Mean
Panel A. Household Characteristics	
Woman's age (years)	37.02
Ages 20–24 (%)	1.69
Ages 25–29 (%)	10.57
Ages 30–34 (%)	20.47
Ages 35–39 (%)	27.55
Ages 40–45 (%)	39.73
Number of dependent children	1.81
No children (%)	17.03
One child (%)	19.87
Two children (%)	39.06
Three or more children (%)	24.04
Woman is primary enrollee (%)	32.15
Panel B. Insurance Plan Type	
EPO, HMO, or capitated POS (%)	11.05
Noncapitated POS (%)	5.23
Basic/major medical, comprehensive, or PPO (%)	55.21
CDHP or HDHP (%)	28.51
Panel C. Out-of-Pocket Prices	
Vasectomy price ($)	209.06
Zero out-of-pocket price (%)	0.24
Female sterilization price ($)	107.90
Zero out-of-pocket price (%)	8.78
Panel D. Couple-Level Characteristics	
Woman's age at first observation	35.84
Dependent children at first observation	1.68
Quarters observed per couple	5.84
Couple-quarter observations	14,221,050
Distinct couples	2,435,015
Markets	2,451

Notes: Data are from the 2015–2017 MarketScan® Commercial Claims and Encounters database. Panels A–C report statistics across couple-quarter observations, while Panel D reports one observation per couple. Categorical characteristics are reported as percentages; continuous characteristics are reported as means. Insurance categories aggregate MarketScan® plan types according to the classification described in Section 4. Markets are defined by insurance plan type, state, year, and quarter.

Table 3: Contraceptive Choices and Out-of-Pocket Prices

Alternative	Choice share (%)	Mean assigned price ($)
Outside option	85.404	0.00
Pill	11.837	7.11
Patch	0.158	3.97
Vaginal ring	0.870	8.10
Injection	0.333	1.80
IUD	0.753	4.06
Implant	0.075	34.74
Female sterilization	0.195	107.90
Vasectomy	0.375	209.06

Notes: Choice shares are percentages of all quarterly household observations, not shares conditional on contraceptive use. Assigned prices are mean out-of-pocket prices from the market-level price menu; the outside option has zero assigned price.

Table 4: Quarterly Sterilization Incidence by Age and Number of Children

	Number of Children			
Woman's Age	0	1	2	3+
20–24	0.08	0.18	1.30	3.23
25–29	0.09	0.18	1.35	2.82
30–34	0.16	0.25	1.25	2.09
35–39	0.23	0.37	0.81	1.14
40–45	0.13	0.20	0.26	0.30

Notes: Each cell reports the percentage of couple-quarter observations in which either spouse undergoes sterilization. The sample contains 14,221,050 couple-quarter observations. The number of children is measured using dependent children enrolled on the insurance policy. Rates reflect new sterilization procedures rather than the prevalence of sterilization.

Table 5: Sterilization Choices by Local Sex Ratio

Local sex-ratio quartile	Vasectomy share (%)
Q1 (lowest)	64.77
Q2	66.00
Q3	65.48
Q4 (highest)	66.51

Notes: Quartiles of the local male-to-female sex ratio are defined using its distribution across the full estimation sample. Each entry reports the percentage of sterilization choices accounted for by vasectomy within the corresponding quartile.

Table 6: First-stage determinants of out-of-pocket contraceptive prices

Excluded variable	Coefficient	State-clustered SE
Patient cost-sharing share	87.391	(31.140)
Medicare procedure fee index	0.15553	(0.08600)
NADAC pharmacy acquisition cost	0.007157	(0.006330)
Cost sharing × procedure fee index	1.13440	(0.27199)
Cost sharing × pharmacy acquisition cost	0.75407	(0.17835)
Hausman instrument (other-state price)	0.63093	(0.04240)
Method-market observations		19,608
State clusters		52
Joint excluded-instrument $F(6, 51)$		61.14

Notes: The dependent variable is the average method-market out-of-pocket price in dollars, estimated using 2015–2017 MarketScan® claims. Markets are state-by-plan-type-by-year-by-quarter cells. Excluded instruments are market cost sharing, CMS procedure-fee and pharmacy-acquisition benchmarks, their interactions, and the same-method mean price in other states; the regression controls for contraceptive characteristics and plan-type-by-quarter fixed effects. Parentheses contain state-clustered standard errors (52 clusters), and the reported F statistic tests the six excluded instruments jointly. Sources are MarketScan® Commercial Claims and Encounters, CMS Medicare Physician Fee Schedule and Geographic Practice Cost Index, and CMS National Average Drug Acquisition Cost.

Table 7: Own-Price Elasticities and Out-of-Pocket Prices

Method	Mean price ($)	Main specification Elasticity	Life-cycle specification Elasticity
Injectable	1.80	-0.007	-0.005
Patch	3.97	-0.013	-0.010
Pill	7.11	-0.023	-0.018
Ring	8.10	-0.026	-0.021
IUD	4.06	-0.055	-0.053
Implant	34.74	-1.740	-1.741
Female sterilization	107.90	-0.313	-0.240
Vasectomy	209.06	-0.561	-0.432
Unweighted mean		−0.342	−0.315

Notes: Elasticities are proportional changes in aggregate predicted demand associated with a 1 percent increase in the indicated method's assigned price, holding other utility components fixed. The unweighted mean averages eight method-specific elasticities. The main-specification price coefficient is −0.001782 (SE 0.000629). Both specifications use 14,221,050 couple-quarters.

Table 8: Willingness to Pay for Contraceptive Characteristics

Characteristic or comparison	Main ($)	Life-cycle ($)
Permanence: no children	-1,946	-2,126
Permanence: one child	-1,313	-1,473
Permanence: two children	-973	-938
Permanence: three or more children	-817	-725
Provider-administered method	-647	-851
Vasectomy relative to female sterilization	346	420
Gender-ratio increase of one SD: additional vasectomy WTP	85	–
Vasectomy relative to female sterilization, gender ratio +1 SD	432	–

Notes: Values convert estimated characteristic coefficients into dollar equivalents using the corresponding price coefficient. Permanence valuations vary with the number of children; life-cycle entries refer to the reference age group, women ages 20–24. The life-cycle specification omits the gender-ratio interaction due to colinearity. The vasectomy comparison holds the bargaining proxy at its sample mean and abstracts from differences in control-function residuals. Uncertainty for underlying coefficients, including price, is reported in Table 10.

Table 9: Value of Permanence by Age in the Life-Cycle Specification

	Willingness to pay for permanence ($)			
Female age	0 children	1 child	2 children	3+ children
20–24 (reference)	−2,126	−1,473	−938	−725
25–29	−2,217	−1,564	−1,029	−816
30–34	−2,259	−1,606	−1,071	−858
35–39	−2,420	−1,767	−1,232	−1,019
40–45	−2,924	−2,271	−1,736	−1,523

Notes: Entries report willingness to pay for permanence, calculated from the permanence coefficient and the applicable age and parity interactions, divided by the absolute price coefficient. Age and parity enter additively, with ages 20–24 and zero children as the reference categories. Negative values indicate a preference for reversible contraception, holding other method characteristics constant.

Table 10: Structural Coefficient Estimates and Standard Errors

	Main specification		Life-cycle specification	
Parameter	Estimate	SE	Estimate	SE
Out-of-pocket price	-0.00178177	0.00062652	-0.00184428	0.00094295
Permanence	-3.467940	0.472437	-3.920912	0.098269
Provider-administered	-1.153361	0.136803	-1.569722	0.042908
Male-borne procedure	0.616807	0.093128	0.773975	0.107928
One child × permanence	1.128649	0.250838	1.203977	0.089806
Two children × permanence	1.734311	0.276076	2.191832	0.082637
3+ children × permanence	2.013100	0.299788	2.583048	0.083904
Age 25–29 × permanence	–	–	-0.168521	0.045797
Age 30–34 × permanence	–	–	-0.245862	0.049756
Age 35–39 × permanence	–	–	-0.542360	0.039785
Age 40–45 × permanence	–	–	-1.472484	0.033604
Gender ratio × male-borne	0.152149	0.028354	–	–
Inside constant	-2.336791	0.088774	-2.540077	0.042321
Control-function residual	0.001755936	0.000627	0.001814864	0.000947
σ_{SA} (self-administered / inside)	0.747676	0.021977	0.749523	0.021773
σ_{LARC} (LARC / inside)	0.035294	0.017765	0.025967	0.014078
σ_{Inside} (inside / root)	0.596952	0.070039	0.813744	0.019470
Observations	14,221,050		14,221,050	
Bootstrap replications	200		200	

Notes: Columns report full-sample point estimates and state-cluster bootstrap standard errors, calculated as the standard deviations of estimates across replications. Childless couples and ages 20–24 are the reference categories. Conditional nest parameters σ_{SA} and σ_{LARC} are reported relative to their immediate parent; absolute scales are presented separately in Table 12. Both models include 15 plan-type-by-quarter fixed effects, with one level omitted.

Table 11: Cross-Price Elasticities and Semi-Elasticities

Price of	Demand for	Cross-price elasticity	Semi-elasticity (% per $1)
Implant	IUD	0.30665	1.14013
IUD	Implant	0.23560	6.19599
Vasectomy	Female sterilization	0.01028	0.00552
Female sterilization	Vasectomy	0.00296	0.00281
Vasectomy	Pill	0.00751	0.00389
Vasectomy	Patch	0.00750	0.00390
Vasectomy	Ring	0.00745	0.00391
Vasectomy	IUD	0.00762	0.00384
Vasectomy	Implant	0.00675	0.00420
Vasectomy	Injectable	0.00752	0.00389
Vasectomy	Outside	0.00135	0.00071

Notes: Each row gives the response of demand for the second method to a change in the price of the first. Cross-price elasticities report percentage demand responses to a 1 percent price change, while semi-elasticities report percentage demand responses per $1 price change. Positive entries imply that lowering the first method's price reduces demand for the second method by approximately the reported magnitude. Values are local responses evaluated at individual assigned prices, holding other utility components fixed. The table displays the substitution pairs discussed in the text, including the outside option for vasectomy.

Table 12: Estimated Nesting Parameters

	Main specification			Life-cycle specification		
Nest	Absolute scale	σ	SE	Absolute scale	σ	SE
Contraception (inside)	0.597	0.597	0.075	0.814	0.814	0.019
Self-administered	0.446	0.748	0.022	0.610	0.750	0.022
Long-acting reversible	0.021	0.035	0.018	0.021	0.026	0.014

Notes: Absolute nest scales measure nest utility scale relative to the root, normalized to one. The reported σ parameters divide the absolute scale by that of the immediate parent. All displayed conditional scales satisfy random-utility consistency restrictions. Standard errors refer to σ, the child-to-parent scale (the inside scale relative to the root for the first row), computed from 200 headline and 200 life-cycle state-bootstrap draws.

Table 13: Eliminating Vasectomy Cost Sharing: Predicted Incidence

	Main specification		Life-cycle specification	
	Baseline	Free vasectomy	Baseline	Free vasectomy
Quarterly incidence (%)	0.3964	0.7451	0.3791	0.6081
Annual incidence (%)	1.5763	2.9472	1.5078	2.4103
Annual change (percentage points)	+1.3709		+0.9025	
Annual change (%)	+87		+60	

Notes: Annual incidence is calculated from quarterly incidence q as $1-(1-q)^4$, assuming a constant quarterly hazard and eligibility until sterilization. Annual percentage changes are based on annual incidence, not quarterly shares.

Table 14: Method-Specific Out-of-Pocket Prices and Full Costs

Method	Mean out-of-pocket ($)	Full cost ($)
Pill	7.11	126.75
Patch	3.97	381.81
Ring	8.10	461.85
Injectable	1.80	90.76
IUD	4.06	889.05
Implant	34.74	1,353.92
Female sterilization	107.90	4,038.19
Vasectomy	209.06	969.07

Notes: Full costs are taken from the full allowed amount observed in claims data. For pill, patch, ring, and injectable contraception, full costs are annualized from the underlying daily amounts; out-of-pocket entries are assigned choice-menu prices and are not annualized. IUD, implant, and sterilization costs are for a one-time episode.

Table 15: Counterfactual Removal of Insurance Coverage: Predicted Choice Shares

	Main specification		Life-cycle specification	
Method	Baseline (%)	Full cost (%)	Baseline (%)	Full cost (%)
Outside option	85.3903	90.6965	85.4068	91.0681
Pill, patch, and ring	12.8540	8.6151	12.8607	8.2648
Injectable	0.3298	0.4601	0.3318	0.3814
IUD	0.6990	0.0790	0.7036	0.1114
Implant	0.1286	0.0500	0.1242	0.0622
Female sterilization	0.2020	0.0007	0.1938	0.0012
Vasectomy	0.3964	0.0988	0.3791	0.1109

Notes: Shares are percentages of couple-quarter choices. Full cost replaces each method's assigned out-of-pocket price with its allowed amount; the outside option remains at zero. The combined pill, patch, and ring row is the sum of the three predicted method shares. Small discrepancies in column totals reflect rounding.

Table 16: Sources of Additional Vasectomies After Eliminating Cost Sharing

Previous predicted choice	Main (%)	Life-cycle (%)
Outside option	52.6	70.5
Short-acting methods	43.8	27.1
Long-acting reversible methods	2.75	1.7
Female sterilization	0.9	0.7

Notes: Diversion is the share of the increase in predicted vasectomy choice offset by reduced demand for the indicated alternatives. Short-acting includes pill, patch, ring, and injectable; long-acting reversible includes IUD and implant. Entries may not sum to 100 because of rounding.

Table 17: Life-Cycle Contraceptive Adoption and Unintended Fertility Outcomes

	Observed prices	Free vasectomy	No coverage	Difference from observed: Free vasectomy	Difference from observed: No coverage
Contraceptive adoption and use					
Cumulative vasectomies (couples)	1,197,215	1,810,066	433,174	+612,851	-764,041
Cumulative vasectomy adoption (%)	8.42	12.73	3.05	+4.31 pp	-5.37 pp
Cumulative female sterilization (%)	4.30	4.02	0.03	-0.28 pp	-4.27 pp
Cumulative LARC selections per couple	0.199	0.190	0.050	-0.009	-0.150
Short-acting use (% of couple-quarters)	9.74	9.29	7.56	-0.46 pp	-2.18 pp
Outside-option use (% of couple-quarters)	63.05	60.24	79.66	-2.81 pp	+16.61 pp
Fertility outcomes					
Expected conceptions per couple	1.481071	1.415436	1.830715	-0.065635	+0.349644
Expected live births per couple	0.733130	0.700641	0.906204	-0.032489	+0.173074
Total unintended conceptions	21,062,387	20,128,992	26,034,692	-933,395	+4,972,305
Total live births	10,425,882	9,963,851	12,887,173	-462,031	+2,461,291

Notes: Results are from the life-cycle demand simulation, which treats each of the 14,221,050 couple-quarter observations in the estimation sample as a separate simulated couple. Couples are initialized in 20 age-by-parity cells and followed through age 45. Under this scenario, all conceptions result from contraceptive failure or nonuse rather than attempts to conceive. The probability of a live birth following conception is 49.5 percent, derived from the pregnancy and birth rates in Kost et al. (2023). Births change parity and trigger three quarters outside the contraceptive choice set. Cumulative sterilization adoption counts couples undergoing a permanent procedure, while cumulative LARC selections count procedures and may include repeat selections by the same couple. Short-acting and outside-option use are measured as shares of simulated couple-quarters. Differences are calculated from unrounded outputs; aggregate totals are rounded to the nearest whole number.

Table 18: Life-Cycle Contraceptive Adoption and Fertility Outcomes Including Intended Conceptions

	Observed prices	Free vasectomy	No coverage	Difference from observed: Free vasectomy	Difference from observed: No coverage
Contraceptive adoption and use					
Cumulative vasectomies (couples)	1,285,677	1,939,372	469,154	+653,695	-816,523
Cumulative vasectomy adoption (%)	9.04	13.64	3.30	+4.60 pp	-5.74 pp
Cumulative female sterilization (%)	4.62	4.31	0.04	-0.31 pp	-4.59 pp
Cumulative LARC selections per couple	0.183	0.174	0.045	-0.009	-0.137
Short-acting use (% of couple-quarters)	8.94	8.48	6.93	-0.46 pp	-2.01 pp
Outside-option use (% of couple-quarters)	57.90	55.12	73.02	-2.79 pp	+15.11 pp
Fertility outcomes					
Expected conceptions per couple	2.197932	2.092464	2.734082	-0.105468	+0.536150
Expected live births per couple	1.390683	1.323898	1.735090	-0.066785	+0.344407
Total conceptions	31,256,899	29,757,031	38,881,511	-1,499,868	+7,624,612
Total live births	19,776,976	18,827,218	24,674,798	-949,757	+4,897,822

Notes: Results use the life-cycle demand simulation and the same 14,221,050 simulated couples as Table 17, followed through age 45. The scenario includes intended conceptions in addition to unintended conceptions. The outside-option annual conception probability is 38.01 percent and the conception-weighted outside-option live-birth probability is 63.73 percent. The assumed live-birth probability is 90 percent for intended conceptions, informed by evidence on early pregnancy loss (American College of Obstetricians and Gynecologists, 2018), and 49.5 percent for unintended conceptions. Births update parity and remove couples from contraceptive choice for three quarters. Cumulative sterilization adoption counts couples undergoing a permanent procedure, whereas LARC selections may include repeat procedures. Short-acting and outside-option use are shares of simulated couple-quarters. Differences are calculated from unrounded outputs; aggregate totals are rounded to the nearest whole number.

Table 19: Robustness of the Vasectomy Price Response

Specification	Vasectomy own-price elasticity	Price coefficient
Panel A. Instrument specifications		
Preferred	−0.561	−0.001782
Without insurance generosity in control function	−0.551	−0.001740
Without Hausman instruments	−1.422	−0.004376
Panel B. Alternative market fixed effects		
No market fixed effects	−0.535	−0.002052
Plan type	−0.522	−0.001379
Quarter	−0.522	−0.001440
Plan type + quarter	−0.457	−0.001124
Year-quarter	−0.487	−0.001431
Plan type + year-quarter	−0.423	−0.000847
Plan type × quarter	−0.563	−0.001794

Notes: Panel A varies the excluded instruments entering the control function, holding market fixed effects at plan type interacted with quarter. Panel B varies the market fixed-effects structure while retaining the preferred instrument set. All specifications use the same sample of 14,221,050 couple-quarter observations and the same nesting structure. Elasticities are calculated from changes in aggregate predicted demand at a mean vasectomy out-of-pocket price of $209.06. The preferred estimate in Panel A and the plan-type-by-quarter estimate in Panel B come from separate estimation runs.

Table 20: Excluding Couples Possibly Sterilized Before Panel Entry

	Preferred sample	NSFG-adjusted sample
Couple-quarters	14,221,050	12,039,440
Price coefficient	−0.001782	−0.001738
Vasectomy own-price elasticity	−0.561	−0.537
Female sterilization own-price elasticity	−0.313	−0.304
Increase in vasectomy uptake with free vasectomy	88.0%	82.1%

Notes: The adjusted sample excludes observations flagged as likely previously sterilized using NSFG age-by-parity prevalence targets.

Table 21: Observed and Predicted Contraceptive Nest Shares

	Observed (%)	Main (%)	Life-cycle (%)
Outside option	85.4043	85.3903	85.4068
Short-acting	13.1984	13.1837	13.1925
LARC	0.8277	0.8276	0.8278
Female sterilization	0.1950	0.2020	0.1938
Vasectomy	0.3747	0.3964	0.3791
Nest-level RMSE (pp)	–	0.0137	0.0035
Nest-level MAE (pp)	–	0.0115	0.0028

Notes: Observed shares are from the 2015–2017 MarketScan® estimation sample of 14,221,050 couple-quarters; predicted shares use the estimated nested-logit probabilities. RMSE and MAE are calculated across the five mutually exclusive categories shown, in percentage points. Both specifications match the combined short-acting category closely, although their predictions for individual short-acting methods differ from observed method shares.

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A Data Construction

A.1 Sample and Contraceptive Choice

Enrollment and spouse linkage. I construct quarterly observations from the MarketScan® enrollment files and linked outpatient, inpatient, and pharmaceutical claims for 2015–2017. The enrollment records identify each individual's age, sex, insurance plan type, state of residence, coverage, and relationship to the policyholder. I link a woman to her male spouse using a shared family identifier and complementary employee–spouse enrollment relationships. Both partners must be enrolled throughout the quarter, and the woman must be aged 20–45. The resulting unit of observation is a couple-quarter; a couple may contribute multiple eligible quarters. I group women into five-year age bands and measure children using the number of dependents enrolled on the insurance policy.

Insurance plan categories. I group the MarketScan® plan indicator into four categories: (i) health maintenance organizations, exclusive provider organizations, and capitated point-of-service plans (`PLANTYP` 3, 4, and 7); (ii) non-capitated point-of-service plans (5); (iii) basic major-medical, comprehensive, and preferred provider organization plans (1, 2, and 6); and (iv) consumer-directed and high-deductible health plans (8 and 9). The average patient share of noncontraceptive medical spending is 11.3, 15.2, 16.8, and 24.9 percent across these four groups, respectively. I use the same categories in defining markets for contraceptive price menus.

Method identification. I identify oral contraceptives, transdermal patches, and vaginal rings in pharmacy claims using National Drug Codes (NDCs), linked to Red Book information on therapeutic class, route, and active ingredient. Injectable contraception is identified through pharmacy claims and outpatient administration codes. I identify IUDs and implants using insertion and device codes, and male and female sterilization using Current Procedural Terminology (CPT), Healthcare Common Procedure Coding System (HCPCS), and the corresponding inpatient and facility procedure codes. These include ICD-9-CM procedure codes before the 2015 coding transition and ICD-10-PCS codes thereafter. Facility codes are important for identifying sterilizations during inpatient admissions, including procedures performed at delivery. I aggregate brands, formulations, devices, and coding variants into eight priced methods: pill, patch, ring, injection, IUD, implant, female sterilization, and vasectomy. Female sterilization combines interval procedures and procedures performed during delivery. Table 22 summarizes the principal code families.

Assigning a quarterly choice. A sterilization procedure takes precedence over other contraceptive claims recorded in the same quarter, followed by a long-acting reversible method insertion and then the modal short-acting method. I identify vasectomy on the male spouse's claims and assign it to the couple's choice record. A couple without an observed prescription or procedural contraceptive method is assigned the outside option, which includes over-the-counter and behavioral methods, abortion, no contraception, and abstinence.

Pregnancy and attempts to conceive. I exclude quarters during pregnancy but retain the quarter in which a woman delivers to capture sterilization performed during childbirth. Pregnancy is identified using delivery records, pregnancy-related diagnoses, and prenatal claims. Pregnancy intervals are reconstructed by dating backward from observed outcomes, including deliveries, miscarriages, and ectopic pregnancies. Abortion does not itself remove a quarter from the choice sample and remains within the outside option when no other method is observed. I identify attempts to conceive using assisted reproductive procedures, fertility-treatment diagnoses, fertility medications, and sterilization reversals. Following an indication of attempted conception, quarters without an observed contraceptive method are excluded until contraceptive use resumes.

Prior procedures and existing protection. I exclude couples with evidence of prior sterilization, hysterectomy, or infertility, using procedure records and relevant status or diagnosis codes. A couple selecting sterilization remains in the procedure quarter but leaves the sample thereafter. A couple selecting an IUD or implant is excluded for the method's protection period. I also exclude women receiving salpingectomy, which may be performed for noncontraceptive indications. Finally, I remove observations in Puerto Rico, observations without an assigned geographic location, and observations without a recorded plan type. The final sample contains 14,221,050 couple-quarters from 2,435,015 couples. Table 1 summarizes the sample construction.

A.2 Out-of-Pocket Price Construction

Claim-level cost sharing. Out-of-pocket payments equal the sum of copayments, coinsurance, and deductible payments. Insurer voids and adjustments can appear as negative claim lines on the same service date as the original claim. I net matched reversals against the original claim using service dates and the relevant procedure or revenue codes, then floor any residual negative payment at zero. I avoid double-counting duplicate or resubmitted claim lines when assembling procedure episodes.

Short-acting methods. For the pill, patch, ring, and pharmacy-dispensed injection, I sum out-of-pocket cost sharing within each fill, netting same-date adjustments and reversals. I use reported days supplied when available. When days supplied are missing or nonpositive, I infer duration from the number of units dispensed: one day per pill, seven days per patch, 28 days per ring, and 90 days per injection. If quantity is also unavailable, I use the method's standard dosing interval: 28 days for the pill, patch, and ring and 90 days for the injection. I cap days supplied at 90, calculate the out-of-pocket payment per day supplied across a couple's fills for a method, and multiply by 90 to express its price as a full quarter of use. I weight the couple's exposure by total days supplied relative to a full quarter, capped at one. These steps apply the same standardization and exposure-weighting procedure used in the earlier annual construction to quarterly observations.

Procedures and devices. I price IUDs, implants, and sterilizations as procedure episodes rather than isolated claim lines. For a service day with a qualifying procedure, I combine

its own cost sharing with associated same-day anesthesia and facility payments, identifying related institutional lines using the facility-claim identifier. Unrelated same-day services are excluded. I collapse duplicate or resubmitted lines using claim and line identifiers. Where a procedure code appears on more than one service day, I select the encounter with the largest procedure-line cost sharing, breaking ties by the earliest date, to avoid treating a zero-payment follow-up or rebilling as a separate procedure. The same approach is applied to vasectomy claims recorded for the male spouse.

Sterilization at delivery. Sterilization performed during childbirth can be bundled with delivery-related facility and professional charges. I identify these procedures using postpartum-specific procedure codes or a sterilization procedure occurring during the delivery admission. Rather than assigning the full delivery payment to contraception, I estimate the incremental out-of-pocket payment as the difference between mean delivery payments with and without sterilization, separately for vaginal and cesarean deliveries. Negative differences are set to zero. Where the comparison cannot be calculated within the relevant market, the construction uses broader geographic aggregates, ultimately the national comparison. I combine these incremental prices with prices for interval female sterilization when constructing the single female-sterilization alternative.

Quarterly price menus. A claim reveals the payment for the chosen method, not the prices of unchosen methods. Following Ho and Pakes (2014) and Starc and Swanson (2021), I construct a menu for each state × plan group × year × quarter market. For each method, the market price is the mean realized out-of-pocket payment among couples choosing that method in the market. All couples in that market are assigned this price, whether or not they chose the method. When a market contains no chooser of a particular method, I substitute the national mean for that method, calculated across observed choosers; there is no intermediate state-year or year-quarter fallback. The outside option is assigned a price of zero. The estimation sample spans 2,451 markets, with a median of 1,814 couples per market. Among the 113,768,400 couple-quarter–method assignments for the eight priced alternatives, 99.02 percent use an observed own-market mean; 0.98 percent use the national mean.

A.3 Adjustment for Prior Sterilization

Although the baseline sample excludes couples with evidence of prior sterilization in their claims histories, MarketScan® may not identify procedures performed before a couple enters the panel. Consequently, couples who are already sterilized may remain in the outside option despite no longer facing an active contraceptive decision. To assess the sensitivity of the estimates to their inclusion, I construct an alternative sample using sterilization prevalence from the 2015–2017 National Survey of Family Growth (NSFG).

I use the NSFG to estimate the prevalence of prior sterilization among married or cohabiting couples, distinguishing groups by the woman's age and the presence of children. Sterilization includes either female sterilization or a partner's vasectomy. I then assign each MarketScan® couple-year the corresponding age- and parity-specific prevalence target. Be-

cause claims do not identify which couples underwent sterilization before entering the panel, I use these targets to identify potentially previously sterilized couples among those choosing the outside option. The adjustment is implemented through a couple-year exclusion indicator, so that all quarters associated with a flagged couple-year are removed from the estimation sample.

I re-estimate the preferred nested-logit specification on the resulting sample of 12,039,440 couple-quarter observations, compared with 14,221,050 in the baseline sample. All other elements of the estimation specification are held fixed. Table 20 compares the estimated price responses and counterfactual predictions across the two samples.

Appendix: Contraceptive Method Identification Codes

Table 22: Contraceptive Method Identification Codes

Method or claim type	Principal codes and identification approach
Pill, patch, ring	NDCs linked to Red Book therapeutic class, route, and ingredient
Injectable	HCPCS J1050, J1051, J1055; pharmacy NDCs for medroxyprogesterone (intramuscular/subcutaneous)
IUD	CPT 58300; device HCPCS J7296–J7298 and J7300–J7302
Implant	CPT 11981; device HCPCS J7307
Tubal ligation	CPT 58600, 58605, 58611, 58670 (including postpartum-specific codes 58605 and 58611)
Tubal occlusion	CPT 58565, 58615, 58671
Salpingectomy (excluded from sample)	CPT 58661, 58700
Vasectomy	CPT 55200, 55250, 55450
Inpatient/facility procedures	Corresponding ICD-9-CM procedure and ICD-10-PCS families for tubal procedures and vas deferens procedures
Delivery matching	Delivery procedure codes and outcome-of-delivery diagnoses
Anesthesia	CPT 00920–00922, 00924 (vasectomy); CPT 00851 (female sterilization)

Notes: The method-identification codes follow the original claims construction. Female sterilization includes interval and delivery-associated procedures; salpingectomy is excluded from the estimation sample. Professional and facility code families are both used to identify procedures during inpatient admissions.