*Pre-analysis plan*

# Adoption and Effects of Free Contraception Programs in Finland *

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**Abstract**

This pre-analysis plan outlines a study that will examine the effects of improved access to birth control on births, abortions, mental and physical health, and socioeconomic outcomes such as education and earnings. We exploit quasi-experimental variation in access to contraception created by differential timing and eligibility criteria of municipal-level free-of-charge birth control programs for under 25-year-olds, implemented between 2014 and 2023 in Finland. We use individual-level register data on health and socioeconomic characteristics combined with novel survey data on municipalities' program practices, and modern difference-in-difference methods to estimate causal effects of programs.

**JEL Codes: I12, I14, I18, J13, J18, J24**
**Keywords:** Contraception, unintended pregnancy, teen pregnancy, fertility, sexual health, mental health, indirect costs of motherhood

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# 1 Introduction

Unwanted and mistimed pregnancies reflect barriers to women's access to sexual health and reproductive services and information, and can have profound consequences on women's capacity to plan their lives. Reproductive autonomy has become an essential question in relation to women's health, educational attainment, labor market outcomes, and overall well-being globally. Despite the widespread availability of modern contraceptive methods, access has remained unequal even in developed countries, particularly for low-income and young individuals. Even in a welfare society such as Finland, socioeconomic disadvantage and place of residence, and living in rural areas in particular, are associated with higher rates of teen pregnancies and poor obstetric outcomes (Leppälahti et al. 2013).

This pre-analysis plan outlines a study of the adoption and effects of programs offering free-of-charge contraception and sexual health counseling, with particular attention to their impact on contraceptive uptake, fertility, mental and physical health, and socioeconomic outcomes of women. Understanding the effectiveness of these programs is essential for designing sexual health policies and ensuring equal access to care.

We study the effects of free contraception programs in Finland, where the number of teen births has historically been higher and a smaller share of unintended pregnancies have resulted in termination[1] than in comparable countries such as Sweden and Denmark (see e.g. Hognert et al. 2018; Guttmacher Institute 2022), indicating the need for sexual health services for young women has been unmet. This unmet need has persisted in part because of administrative, informational, and financial barriers that have limited equitable access to contraception and sexual health services.

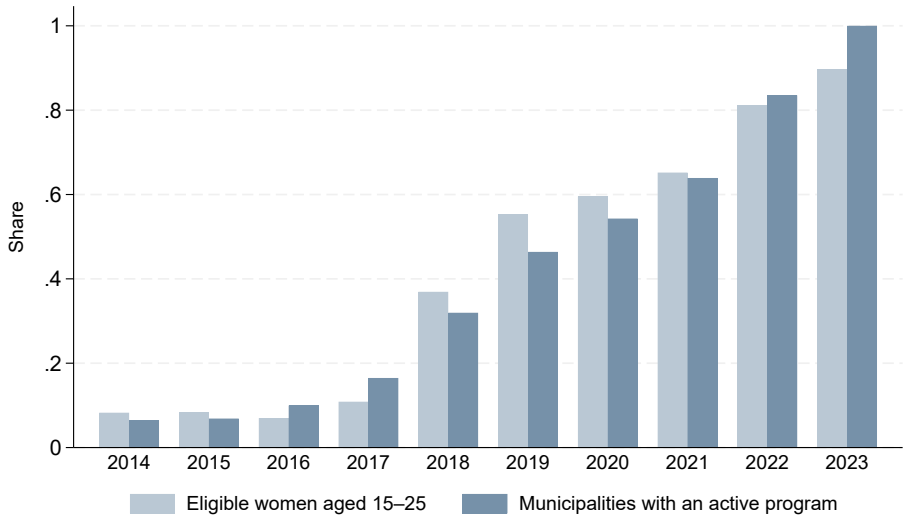
Administrative and informational barriers have played a role in hindering access to contraception and sexual health services. In many municipalities, contraceptive counseling and supplies have been available with varying appointment procedures and service quality and free-of-charge with varying eligibility criteria. Young women may face uncertainty about their entitlement to services, lack awareness of options, or encounter stigma when seeking contraception. Moreover, the costs of contraception can be prohibitive for adolescents and low-income individuals. In the Finnish system, contraceptives are generally not reimbursed, and certain methods, such as long-acting reversible contraceptives (LARCs), are also associated with relatively large upfront costs. Switching between methods can also be costly.

[1]Finland's relatively low termination rate may reflect its historically strict abortion law, which required one or two physicians' approval and acceptable health, economic, or "social" reasons. While abortions were widely accessible in practice, the law gave medical practitioners discretion and likely influenced social norms and stigma around pregnancy termination (see e.g. Lane et al. 2023). Since September 1st 2023, abortion on demand has been available for pregnancies under 12 weeks (Ministry of Social Affairs and Health 2023).

Acknowledging these barriers in access to sexual and reproductive healthcare and rights, The Finnish Institute for Health and Welfare (THL) and the Ministry of Social Affairs and Health have since 2006 recommended providing sexual and reproductive health counseling and contraception free-of-charge for young people (Klemetti and Raussi-Lehto 2013).[2] Gradually, starting in the early 2010s, an increasing number of municipalities in Finland adopted a policy aimed at improving access to sexual health counseling and contraception, and by 2021, more than 60% of municipalities had such a program in place. These programs vary in their eligibility criteria, most importantly age limits, residency requirements, and the methods and products available. Figures 1 and 2 illustrate the timing of adoption and the age limit differences between these programs.

A nationwide pilot program aimed at providing free-of-charge contraception to all under 25-year-olds irrespective of their place of residence was carried out in 2021–2023 as part of the Future Health and Social Services Centre Programme.[3] In 2023, all municipalities had an active program —albeit with slightly varying age thresholds— resulting in around 90% of women in the 15–25 age group being eligible for free contraceptives.

Figure 1. The share of eligible women and municipalities with an active program

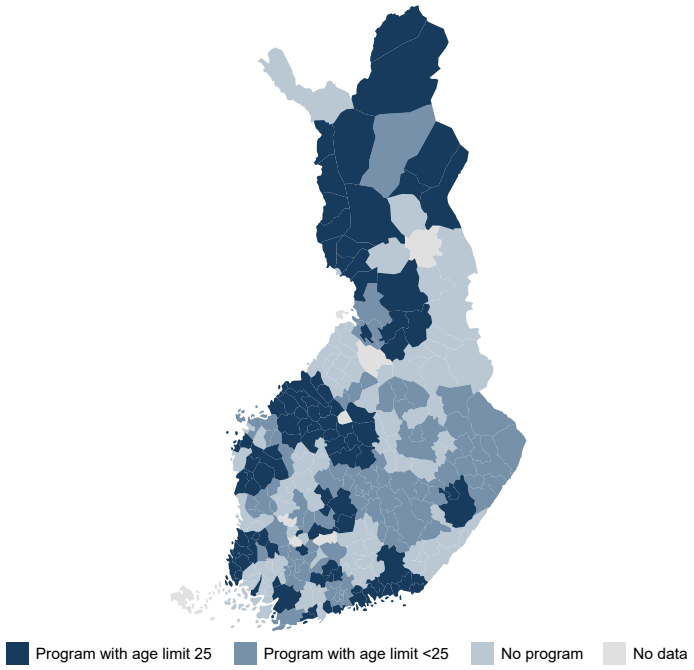



Notes: The graph depicts the share of Finnish municipalities with a free-of-charge contraception program and the share of eligible women in the 15–25 age group during 2014–2023. Data source: data collected by research team (see Section 2.1) and Statistics Finland (2025).

The objectives of free contraception programs are to empower individuals to make informed choices about their contraception and reproduction, to prevent unwanted pregnan-

[2]See also the recommendations in the Current Care Guidelines (Duodecim 2025).
[3]The trial evaluation is reported in Vasankari and Klemetti (2024).

Figure 2. Municipalities with a free-of-charge contraception programme in 2021 by age eligibility criteria




Notes: The graph depicts Finnish municipalities with a free-of-charge contraception programme in 2021 by eligibility criteria defined by age. Data source: data collected by research team (see Section 2.1).

cies, and to promote sexual well-being. Studies on the early diffusion of the birth control pill suggest removing barriers to contraception can have long-lasting socioeconomic effects and shape womens' life trajectories (Goldin and Katz 2002; Bailey et al. 2012). A growing body of literature from modern times also suggests that improved access to contraception can lead to significantly better health and social outcomes. Programs offering better access have been documented to decrease the number of unwanted pregnancies and abortions as well as teen births (Fisher et al. 2019; Gyllenberg 2020). Kearney and Levine (2009) find that income-based expansions of publicly funded free programs reduce teen births by approximately 4 %. Lindo and Packham (2017) show that strengthening the Title X provider network and elimination of user fees for long-acting reversible contraceptives reduces teen birth rates by 6 % in five years, with particularly strong effects in counties with a high poverty rate.

Free contraception programs have indeed emerged as a policy tool to eliminate the cost barrier of contraception and promoting better access to care. According to literature, the role financial barriers play in limiting access is substantial. For example, a randomized controlled trial at Title X clinics in the US offering fully subsidized long-acting reversible

contraceptives led to a 40 % increase in the use of any contraceptive method, along with an increased uptake of long-duration methods, whereas a partial subsidy produced much smaller effects in uptake (Bailey et al. 2023).

In the Finnish programs, eliminating the cost barrier was not the sole objective of the programs: municipalities also wished to increase awareness and availability of sexual and reproductive health services. Reforms targeting informational and logistical barriers also appear to affect contraceptive behavior: Luca et al. (2021) study a more personalized counseling method and find increases in LARC uptake and reduced unwanted pregnancies within a group of Medicaid-covered young mothers despite no changes in coverage or cost-sharing. Relatedly, statewide initiatives that included provider training and public education campaigns have been found to increase contraceptive use even among privately insured individuals who did not face cost changes (Yoder and Boudreaux 2023). The results highlight the informational aspect of access to care: while affordability is an important factor in contraceptive uptake and use, improvements in service delivery, awareness and provider capacity also matter.

In addition to take-up, fertility and social outcomes, the mental health implications of hormonal contraceptive methods have received growing attention in economic and medical research. Register-based studies from Denmark find that use of hormonal contraception to be positively correlated with subsequent depression diagnoses (Skovlund et al. 2016) as well as suicide attempts and suicide (Skovlund et al. 2018). Similarly, Worly et al. (2018) report that hormonal contraceptive use, especially among adolescents, is associated with subsequent use of antidepressants and first diagnoses of depression. More recently, Costa-Ramón et al. (2023) present causal evidence that prescriptions of birth control pills increase the likelihood of depression diagnoses among young girls in Denmark. However, the evidence remains mixed: A recent randomized controlled trial from Sweden found a significant decrease in the general well-being among birth control pill users, although they do not detect changes in diagnosed depression (Zethraeus et al. 2017). A free contraception program offering hormonal contraceptives could influence mental health both directly through physiological effects of hormonal contraception and indirectly through reduced stress or anxiety over sexual and contraception matters.

Our contribution to the existing literature is threefold. First, we study the effects of free-of-charge contraception in a context where the target group comprises of all girls and young women nationwide, as all Finnish municipalities gradually implement the program. In contrast, the existing literature, largely focusing on the United States, examines state-specific reforms or policy changes that expand insurance coverage to selected population groups.

Second, we study a rich set of immediate and possibly longer-term outcomes in the same institutional setting with individual-level administrative data covering the entire Finnish population. We are the first to evaluate effects of a free contraception policy from the viewpoints of physical and mental health as well as socioeconomic outcomes.

Third, to our knowledge, we are the first to compile nationwide municipality-year-level panel data on the implementation and characteristics of free contraception programs in Finland. The Finnish programs have not been studied extensively as previous research on the municipal-level programs have mainly been descriptive, or evaluated the relationship between free-of-charge birth control policies and certain health outcomes in individual cities such as Vantaa (see e.g. Gyllenberg 2020; Jalanko 2022). Our study can offer policy-relevant insights into the widespread effects of such programs.

This pre-analysis plan proceeds as follows. In the second section, we introduce the data sets intended for use in the analysis. The third section depicts a list of possible outcomes to study. The fourth section lays out a preliminary empirical strategy and concludes the plan.

## 2 Data

Comprehensive and detailed municipal level data on the adoption and implementation of free-of-charge birth control policies in Finnish municipalities had not been collected. We therefore constructed a novel data set containing the exact timing of policy adoption, eligibility criteria, including age, residential and student status requirements, as well as the particular offering of contraceptive products. The data was collected using semi-structured email surveys and publicly available data sources such as municipal information sources and press releases. These were sometimes complemented with online interviews or more informal discussions. This data set will be made publicly available.[4]

This municipality-level data (Hägg et al. 2025) will be linked to individual-level register data administered by Statistics Finland, the Finnish Institute for Health and Welfare (THL) and Social Insurance Institution (KELA) as described in Section 2.2.

### 2.1 Municipality-level data

Data on the adoption and implementation of free birth control programs were collected in two separate stages. In the first stage, one of the authors approached health care service providers to gather information on the year the program started, the age limit, and the

[4]The original records of the data collection, including the email correspondence and other communications with the responsible healthcare professionals and providers, are retained by the authors and available only upon request.

methods included. The first stage was conducted in the summer of 2022.

In the second stage, three of the authors approached the same municipalities to validate and complement the data gathered earlier. The authors had access to the contact information of the health care personnel the first email survey was sent out to, but this was used only in cases where extensive efforts to find another contact were unsuccessful. In the second stage, the survey included additional questions about the program. The second stage was conducted between 2024–2025.

The resulting data set covers the years 2014–2024 and data for 291 of mainland Finland's 293 municipalities. For each year, the data set indicates

- whether there has been an active program
- methods available
- age limit
- possible restrictions in the length of the program
- additionally available methods to overage individuals, such as a first IUD
- eligibility of non-resident students
- electronic prescription status
- products available
- other relevant information.

We define a municipality as having a free-of-charge contraceptive program if it offers at least one short-acting contraceptive method (such as birth control pills, a patch, or a vaginal ring) free of charge for more than 6 months. We use this definition because many municipalities provided free 'test packages' for only 3 to 6 months, and / or covered the first long-acting reversible contraceptive, before introducing programs providing free contraception for a longer term.

### 2.2 Register data sources

Our primary data consists of HILMO and AVOHILMO modules from the Finnish Institute for Health and Welfare. The HILMO medication module contains information on medications[5] used by individuals and provided directly by public healthcare centres. This module

[5]The relevant ATC5 codes for birth control pills are G03AA07, G03AA09, G03AA10, G03AA12, G03AA14, G03AA16, G03AA18, G03AB08, G03AC01, G03AC10, G03AC09 and G03HB01. For patches it is G03AA13. For rings it is G02BB01.

serves as the primary data source for identifying individuals who seek contraception through public healthcare. From the HILMO and AVOHILMO procedure modules, we identify IUD insertions, abortions, and diagnoses or tests for sexually transmitted diseases (STDs). AVOHILMO statistics on primary health care also include data on outpatient visits, follow-up care, and check-ups to promote the health of children, young individuals and pregnant women. Births are observed through the Medical Birth Register, also provided by the Finnish Institute for Health and Welfare.[6]

We complement this data with additional health datasets from the Finnish Social Insurance Institution: Data on reimbursed prescription drug purchases (from retail pharmacies) and sickness absences allow us to study individuals' health outcomes in greater detail, particularly those related to mental health.

In addition, we use the FOLK and EDUC modules from Statistics Finland. The FOLK modules provide information on individuals' demographic and socioeconomic background characteristics, including age, home municipality, family type, immigration status and annual income. The EDUC modules offer data on individuals' enrollment in secondary and tertiary education, as well as the status and timing of degree completion. We are able to link individuals to their parents and observe the same information for them.

### 2.3 Additional data sources

We intend to complement these individual-level data sets with regional-level sales data on purchases of emergency contraceptives[7], which have been available over-the-counter since 2003 for individuals 15 years or older, and without age limit since 2015. However, gaining access to this data at the municipality or regional level is not certain.

We will also apply for access to the Finnish School Health Promotion Study survey data. The survey is conducted every other year, and aims to include all students in grades 4 and 5, and grades 8 and 9 in basic education, as well as first- and second-year students in upper secondary schools and vocational institutions and can be analyzed at the school level. The survey collects information on children's and adolescents' well-being, health, and access to help and services. We will use survey items concerning self-reported sexual behaviors, contraception usage and knowledge of available sexual and reproductive health services, among others.

These data will be used in exploratory analyses. We intend to examine if, and how, the municipal level programs' objectives of improved accessibility and knowledge concerning

[6]The Medical Birth Registers includes data on all live births and on all stillbirths of foetuses with a birth weight of at least 500 g or with a gestational age of at least 22 weeks, as well as data on the mothers. Children can be linked to their fathers with a separate module.

[7]ATC5 codes for emergy contraceptives are G03AD01 and G03AD02.

sexual health and services are reflected in these survey data.

# 3 Sample and analysis

## 3.1 Outcomes

The outcomes of interest are divided thematically and chronologically into three work packages. These packages dictate the order in which we proceed with analysis and provide an outline of the different themes in outcomes of interest. Table 1 summarizes the contents of each work package.

**Work package 1** analyzes the takeup of the programs and their effects on short-term outcomes. These outcomes include births, terminations and sexually transmitted diseases (STDs). For STDs, we will focus on chlamydia, human papillomaviruses (HPVs), and genital herpes, as these are the most prevalent STDs in Finland.

**Work package 2** analyzes the relationship between free contraception programs and mental health outcomes. Increased uptake could result in increased mental health diagnoses. On the other hand, forming new care contacts through the programs could also increase the likelihood of seeking help for mental health issues. The question is multifaceted and is thus separated into its own work package.

**Work package 3** focuses on long-term outcomes. We study educational outcomes such as having completed an upper secondary school diploma, obtaining the diploma within target time and enrolling in tertiary education. As a secondary outcome, we study labor market outcomes, such as earned income at age 25. Work packages 1 & 2 will give indications of whether package 3 can be completed. Generally, long-run effects can only be expected in the presence of short-run effects.

In addition to the above listed outcomes, we will also study other outcomes as part of exploratory analyses and robustness checks. All exploratory analyses will be labeled as such in final analyses to distinguish them from primary and secondary outcomes.

Table 1. Outcome definitions

| | Type | Outcome | Definition |
|---|---|---|---|
| **I** | | | |
| | Primary | Take-up of contraception | Indicator for having received contraceptives from public health care |
| | Primary | Births | Indicator for having given birth |
| | Primary | Terminations | Indicator for having had an abortion |
| | Secondary | STD testing | Indicator for having been tested for an STD. |
| | Secondary | Incidence of STDs | Indicator for having been diagnosed with an STD. |
| **II** | | | |
| | Primary | Mental health | Indicator for mental health related visit |
| | Secondary | Mental health | Indicators for depression or anxiety diagnosis |
| | Secondary | Mental health | Indicator for antidepressant prescription |
| **III** | | | |
| | Primary | Secondary education | Indicator for having completed secondary education by age 21 |
| | Primary | Completion time | Indicator for having completed secondary education within the target time (3 years). |
| | Primary | Tertiary education | Indicator for having enrolled in tertiary education by age 25 |
| | Secondary | Labor market outcomes | Income at age 25 |

Notes: The table lists the primary and secondary outcomes.

### 3.2 Sample restrictions

In our baseline analysis, the observation period spans from 2013 to 2023 (or to the latest available year in the data). Our current understanding is that municipalities increasingly began implementing free-of-charge contraception programs starting in 2016, and therefore our primary interest lies in the period after 2016. However, the earlier years serve as the necessary pre-treatment period for our difference-in-differences estimation.

In each observation year, we include girls and young women aged 15 to 25 years. Accordingly, the oldest cohort in our analysis consists of those born in 1988 (i.e., those who were 25 years old in 2013), and the youngest cohort comprises those born in 2008 (i.e., those who were 15 years old in 2023).

In the latter part of our empirical analysis, where we examine educational and labor market outcomes that are observable only once at a specific age, we further restrict our sample. Most of these outcomes are measured in the year individuals turn 21 or 25, and we therefore include only those whom we can observe up to that age.

### 3.3 Heterogeneity and robustness analysis

As mentioned, effects of creating better access to care may have differing effects on different groups in the population. To evaluate these effects, we perform heterogeneity analyses.

As a primary analysis, we analyze the outcomes in different socioeconomic groups. These groups may be characterized by differing (parental) income, educational background (general or vocational upper secondary education) as well as educational background of parents.

As a primary analysis, we also analyze whether outcomes differ by region. We compare effects of programs in rural and city-like regions.

As an exploratory analysis, we consider analyzing how age at treatment and exposure to treatment affect outcomes. The nature of the treatment, where individuals may first become treated at any age below the age limit, allows us to observe individuals being treated at different ages and for different time periods.

Finally, as robustness checks, we use alternative definitions of the treatment variable to ensure that our results do not depend on the baseline definition of the free-of-charge program. For example, we may adopt a stricter definition by requiring the municipality to provide all short-acting contraceptive methods for free. Alternatively, we may increase the minimum duration of free access to short-acting contraceptives - for example, to one year.

# 4 Empirical strategy

We assess the impact of free-of-charge birth control programs on the outcomes, listed in Table 1, using various approaches. We use two complementary difference-in-difference estimation strategies tailored to the nature of the outcome variable in question. For outcomes that are observed annually, we use a modern differences-in-differences approach accommodating staggered adoption and heterogeneous treatment effects. For outcomes that are only measured once, for example at a specific age, we implement a repeated cross-section difference-in-differences design. This design compares cohorts exposed to the treatment at different ages to unexposed control cohorts. It exploits variation in the timing of treatment implementation across birth cohorts and municipalities, as well as differences in the duration of exposure to the treatment.

## 4.1 Difference-in-differences: annually observable outcomes

We use the variation in roll-out and eligibility criteria to identify the causal effects of providing free contraceptives to youth by applying the difference-in-differences method. Treatment group includes those adolescents and young adults that are eligible for the free of charge contraceptives based on their age and residence, whereas control group includes those that are not eligible. To study the effects of the reform on annually observed outcomes, our baseline estimable equation is

$$Y_{imt} = \alpha_i + \lambda_{ct} + \gamma_m + \delta \cdot \text{Treat}_{imt} + X'_{imt}\psi + \varepsilon_{imt}, \tag{1}$$

where $Y_{imt}$ is the outcome variable for the individual $i$ of the birth cohort $c$ residing in the municipality $m$ in year $t$. As outcomes we use an indicator for having received contraceptives from public healthcare as well as indicators for births, terminations, mental health, and STDs. $\alpha_i$ are individual fixed effects, $\lambda_{ct}$ cohort-time fixed effects and $\gamma_m$ municipality fixed effects. $X'_{imt}$ is a vector of possible individual and municipal level control variables.

The coefficient of main interest in equation (1) is $\delta$, where the treatment indicator $\text{Treat}_{imt}$ equals 1 starting in the first year an individual becomes eligible based on age and municipality policy (intention to treat, ITT), and remains 1 in all subsequent years.

$$\text{Treat}_{imt} = \begin{cases} 1 & \text{if individual } i \text{ was ever eligible by age and residence before or during } t, \\ 0 & \text{otherwise} \end{cases}$$

To study dynamic effects, we run the following event-study regression:

$$Y_{imt} = \alpha_i + \lambda_{ct} + \gamma_m + \sum_{k=-5, k\neq -1}^{5} \beta_k \cdot D_{imt}^k + X'_{imt}\psi + \varepsilon_{imt}, \tag{2}$$

where $k = 0$ is the first year at which individual $i$ is treated. $D_{imt}^k$ is equal to one if individual $i$ became eligible (according to age and municipality) $k$ years ago.

In the empirical analysis, a staggered rollout and potential heterogeneity in treatment effects must be carefully considered. A standard two-way fixed effects model can yield biased estimates in this context due to the aforementioned two reasons. When treatment adoption varies across units and periods, a traditional TWFE estimator effectively compares early-treated units with later-treated ones, potentially conflating treatment effects at different horizons and not allowing for a causal interpretation. To address these concerns, we incorporate modern differences-in-differences estimators introduced in Callaway and Sant'Anna (2021) and Borusyak et al. (2024). The robust estimators ensure that estimates are unbiased and provide an accurate and policy-relevant understanding of the treatment's dynamic effects.

### 4.2 Difference-in-differences: outcomes observable at a specific age

To study education and labor market outcomes that are not observed annually but only at specific ages for each individual, we use a modified version of our baseline dynamic difference-in-differences model. Specifically, we estimate the following model:

$$Y_{it} = \alpha_g + \psi_t + \sum_{e=-5}^{-2} \delta_e \cdot D_{it}^e + + \sum_{e=0}^{5} \beta_e \cdot D_{it}^e + \nu_{it}, \tag{3}$$

where $Y_{it}$ is the outcome variable ——for example, an indicator for whether individual $i$ has completed secondary education by age 20. Municipality fixed effects are captured by $\alpha_g$ and cohort fixed effects by $\psi_t$. Note that, for individuals within the same cohort, the outcome variable is observed in the same calendar year and therefore, the year fixed effect essentially corresponds to a cohort fixed effect in this context. $D_{it}^e$ are indicators for individual $i$ being $e$ years away from the implementation of the free-of-charge contraception program.

The coefficients of interest, $\beta_e$, measure the effect of exposure to the program at different durations since its implementation. The coefficients reflect a comparison across groups of individuals who have been exposed to the program for different lengths of time by the time their outcome is measured: for example, $\beta_1$ corresponds to individuals exposed for one year, $\beta_2$ for those exposed for two years, and so on. The lead coefficients, $\delta_e$, capture pre-treatment trends and serve as a test for the parallel trends assumption.

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