Guaranteed Minimum Income and Fertility

[Very preliminary draft]

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Abstract: *This paper addresses the effect of minimum income schemes on fertility decisions. We exploit the introduction in 2019 of the Italian "Reddito di Cittadinanza," which provided a minimum income to all individuals with a level of income below a given threshold. Using administrative data from the Italian Social Security Institute for 2019-2021 and a Fuzzy Regression Discontinuity Design, we find no effect for women in the Centre-North and a positive effect for women in the South. In the South, recipients have on average a 1.4-percentage points higher probability of having a child within two years compared to non-recipients. This implies an increase of 17% in mean fertility A battery of robustness checks confirms this finding. The effect is largest for younger women, women living in rented houses, women with pre-existing children, and those previously employed. Our findings suggest that guaranteed minimum income programs, while designed to contrast poverty, might have indirect positive effects on fertility. This is especially relevant for the policy-making of Southern European countries currently plagued by low fertility and high poverty rates.*

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Introduction

Raising children is expensive. According to the 2015 *Expenditures on Children by Families* report of the U.S. Department of Agriculture (USDA), the cost of raising a child from birth through age 17 for a middle-income married family is $233,610 ($13,742 per year).[1] Thus, the decision to have children crucially depends on household economic conditions. In this paper, we study the extent to which fertility decisions respond to changes in household income. We exploit the introduction of a guaranteed minimum income in Italy in 2019, the so-called *Reddito di Cittadinanza* (*RdC*), and estimate its impact on conceptions, using administrative individual-level data from the Italian Social Security Institute on the universe of RdC applicants for the years 2019 to 2021.

Identifying the causal impact of income on fertility is econometrically challenging. There are three types of problems. First, reverse causation: the presence of children can negatively affect the ability to generate income. Second, there might be uncontrolled unobserved factors influencing both the level of income and the decision to have children. Third, it is complicated to evaluate the effect produced by income support policies like the *RdC* because finding a plausible counterfactual for treated individuals is made it difficult by the fact that recipients are characterized by more vulnerable socio-economic conditions than non-recipients.

To overcome these issues, in our analysis we use a Regression Discontinuity Design (RDD), which exploits the fact that individuals are eligible for the *RdC* only if their household economic conditions are below certain thresholds. In fact, in addition to the residence and citizenship requirements, the income and wealth levels of applicants must not exceed certain values. Except for household income, which is subject to a series of spin-offs and adjustments, the ex-ante verification of the fulfilment of the other requirements is quite easy. Unsurprisingly, indeed, the vast majority of applications received meet such requirements.

Therefore, in our analysis we consider household income as a discriminating factor (73% of the applications met the threshold) and focus only on those applications whose acceptance or rejection outcome was determined on the basis of the household income requirement (90% of the applications). We also exclude all the applications that were rejected because they did not meet the residence and citizenship requirements or the other economic and wealth requirements (3% of the applications). As eligibility requirements were unknown before the introduction of the measure, we further restrict our

[1] This cost is for a child born in 2015 and includes the expenses for housing (29%), food (18%), child care and education (16%), transportation (15%), health care (9%), clothing (6%), and other miscellaneous child-rearing necessities (7%). The estimate assumes an average inflation rate of 2.2% and does not include pregnancy-related expenses or college costs.

analysis to applicants in the first three months since the introduction of the program (April-June 2019), therefore limiting the possibility for manipulation.

However, as initial recipients can be excluded from the program later on due to subsequent administrative controls or changes in their economic conditions, while those who were initially rejected can re-apply and be admitted afterwards, we adopt a Fuzzy RDD and use a dummy variable for individuals meeting the household income relative threshold by June 2019 as an instrument for being an effective beneficiary of the program. We define effective recipient only individuals who received the income support for at least 6 months since the notification of the application outcome. Finally, as our main objective is to estimate the impact of RdC on fertility, in the empirical analysis we focus on women of childbearing age, that we define as women aged 16-45.

We find that overall the RdC has no effect on fertility. Yet, the null effect we find in our full sample masks highly heterogeneous effects across different regions of the country. In particular, while there is no effect in the Centre-North, we find a positive and significant effect in the South. This might be explained by significant differences in social norms between people in the South and the Centre-North of the country, which make the former more prone to have children and also more responsive to improvements in their living conditions. As for the economic magnitude of the effect in the South, our main estimates suggest that RdC recipients have a 1.4-percentage point higher probability of conceiving a child within two years than non-recipients. This corresponds to an increase in the average (biennial) fertility rate by 17%. The positive effect on fertility of the *RdC* is largest for younger women, women in rented houses, women with at least one pre-existing child, and those who were previously employed.

The effect that we estimate captures the treatment effect at the threshold income, that is, the impact of receiving a small income support (given that the amount received is computed as a difference from the income threshold). Hence, our results suggest that the positive fertility effect we document here might be attributable not only to the increased income level, but also, and more importantly, to the reduced uncertainty deriving from being part of a welfare program or the increased level of self-confidence. Note however that the effect we estimate is not generalizable to all *RdC* recipients. From a theoretical perspective, the fertility response of recipients with poorer conditions might well be larger because they receive a larger amount, but it might also be smaller given that they tend to live at the margins of the society.

Understanding to what extent the demand for children reacts to income changes is theoretically interesting. One key hypothesis of Becker's model (Becker, 1960) is that the demand for children mainly responds to changes in the price (or cost) of the marginal child (i.e. the price effect), while the

effect of income changes on fertility (i.e. the income effect) is predicted to be limited. This is because, following an income increase, the demand for children can increase or decrease depending on whether children are considered as normal or inferior goods. This ambiguity is also confirmed by the fact that the established negative income-fertility link estimated both across countries and within country has recently flattened (Bar et al., 2018) and in some cases reversed, with high-income families having more children than their low-income counterparts (Doepke et al., 2022). Thus, whether an increase in income leads to higher or lower fertility is still an open question. We empirically test this conjecture using the Italian RdC as an exogeneous variation in household income.

Addressing the impact of income support on fertility is also relevant from a policy perspective. According to 2021 World Bank population estimates, fertility is below the replacement level in almost all advanced economies, especially in Europe, where no country has a value above 2. Among European countries, Italy is the country with the lowest fertility rate (1.3) and the highest mean age for first-time mothers (32). This is, to some extent, the result of the interplay between women improved labour market opportunities and pre-existing social norms that places on their shoulders the majority of child care and household production (Feyrer et al. 2008; Sevilla-Sanz, 2010). As shown by Doepke and Kindermann (2019), in low-fertility countries women are more likely than men to disagree with having another child.

However, another important reason why women in Europe as well as in the U.S. postpone fertility until later age is that they are not financially ready to raise a child. In addition, the recent surge in inflation and the increased labour market insecurity caused by the covid-19 pandemic made fertility decisions increasingly daunting for prospective parents. Hence, providing evidence on the fertility effects of means-tested household income support schemes is of utmost importance for the policy-making of many countries in Europe and elsewhere, concerned by the long-term sustainability of their population. Low fertility rates have in fact important social and economic implications, e.g. aging population, shrinking workforce, and declining economic growth.

This paper expands upon an existing literature on the relation between income support and fertility in high-income countries. Most of the existing literature focuses on the effect of family policies, such as child subsides, child-related welfare benefits and parental leaves (Olivetti and Petrongolo, 2017). From a theoretical point of view, these benefits reduce the price for children and should therefore increase fertility. Consistently, many studies show that fertility increases with child-related benefits (Cohen et al., 2013; González, 2013; González and Trommlerová, 2023; Sandner and Wiynck, 2023) as well as with increased maternity leave benefits (Raute, 2019).

In addition to policies directly aimed at affecting fertility, other policies may influence the decision to have a child. Welfare policies aimed at sustaining poor families have attracted the greatest attention. The early literature on this topic (see e.g. Moffit, 1993, 1998) mainly focused on the US Aid to Families with Dependent Children (AFDC) measure, which has been found to be sensitive to data and methodologies. More recent studies estimate the impact of incremental support deriving from welfare benefits increasing with the birth of an additional child and find modest effects (Grogger and Bronars, 2001). Examining the effects of a UK welfare reform on fertility, Brewer et al. (2012) find no increase in births among single women and an increase in births among coupled women, while Francesconi and Van der Klaauw (2007) find instead a reduction in fertility of single mothers.

Mixed results emerge also from the existing literature on the fertility effects of family cap policies that deny additional cash assistance to recipients who have children while on welfare: some works find no effect on births (Wallace, 2009; Levine, 2002; Kearney, 2004), whereas other studies document a reduction in births (Camasso, 2004; Horvath-Rose et al., 2008; Jagannathan et al., 2004, Sabia, 2008).

Tax deductions and credits represent another tool for encouraging fertility. Much of the existing evidence focuses on the US and exploits the expansion of these system as an exogenous variation in the price of childbearing. For instance, Baughman and Dickert-Conlin (2003, 2009) use US state-level data on birthrates and exploit variation in state tax credit programs between 1990 and 1999. They do no find evidence of positive effects on fertility. A positive effect on white married mothers with only one child is instead found by Duchovny (2001).

Our paper is also related to the works that address how income changes affect fertility, using variation in employment and more generally in economic conditions (Adzera, 2005; Autor et al., 2019; Currie and Schwandt, 2014; Giuntella et al., 2022; Lindo, 2010; Kearney and Wilson, 2018; Keller and Utar, 2022; Schaller, 2016) or in the housing market (Daysal et al., 2021; Dettling and Kearney, 2014; Lovenheim and Mumford, 2013) or in mortgage real interest rates (Cumming and Dettling, 2023).

Finally, our work speaks to the literature on the effects of cash transfers on fertility. While several studies document a negative effect of cash transfers on fertility in developing countries, mainly driven by a reduction in teen fertility, the empirical evidence for developed countries is mixed (see Gouthier, 2007, for a review). A few studies for European countries, the U.S. and Canada find positive, though small effects of cash transfers on fertility. Yonzan et al. (2020) investigate the impact of a universal and unconditional cash transfer, the Alaska Permanent Fund Dividend, on fertility. Using a synthetic control approach to generate appropriate comparison groups, they find a positive effect, mainly driven by women in the 20-44 year age group.

1. Institutional setting

The Italian RdC is a guaranteed minimum income scheme, designed to contrast poverty. Since its introduction in March 2019 with the Law decree 4/2019 (subsequently converted into the law 26/2019), the program has benefited about 3 million individuals to date, with an average monthly benefit of about €500.

The RdC not only provides financial support to households under a certain income threshold, but it also consists of an active labor market policy (ALMP) requiring the active participation of beneficiaries in job search or in a program of social inclusion. However, the ALMP was only partially implemented so far.[2]

Eligibility to the RdC is subject to a number of requirements. On the one hand, households must meet four income and wealth-related requirements:[3] *(a)* household taxable income should not exceed €6,000 (€9,360) for households in rented (non-rented) accommodation; *(b)* financial assets must be lower than €6,000; *(c)* real estate assets, excluding the main residence house, cannot be higher than €30,000; *(d)* the value for the Indicator of the Equivalized Economic Situation (ISEE) must be lower than €9,360.[4] Table 1 summarizes the requirements (and the relative thresholds) for RdC eligibility for single-person households. For multi-person households, the household taxable income threshold is incremented by the RdC equivalence scale, which takes into account the size and composition of the households. Also, the financial asset threshold is increased by €2,000 for each extra-member up to €10,000.

An additional wealth requirement (requirement *e*) concerns the ownership of luxury vehicles or boats. In particular, eligibility is incompatible with owing vehicles registered during the 6 months before

[2] ANPAL (2021) documented that among the beneficiaries eligible to ALMP, the take-up rate of the participation to the program was 45.6 percent. It has to be taken into consideration that one of the requirements related to the participation to ALMP of unemployed beneficiaries was the acceptance of at least one of three adequate job offers provided by the Italian employment centers. This requirement turned out to be quite slack in practice, as the definition of adequacy of the job offer was "within 200 km" for the first one, "within 100 km" for the second one in case the first is refused and anywhere for the third one in case the second is refused; after 12 months a job offer is considered adequate within 250 km. The extent of success of this policy has been documented in ANPAL (2021), where it turns out that only the 10.8 percent of those who have participated to the ALMP reached a stable occupation in the years 2019-2021.

[3] These conditions are self-declared in the "DSU" ("Dichiarazione Sostitutiva Unica") form to be filled at a tax assistance centre before or at the same time of the application. All values reported in the DSU refer to year *t-2* with respect to the declaration, except for household income, whose eventual higher recent values must be updated in the declaration.

[4] ISEE is a composite indicator weighting household income, real estate, financial wealth and household composition. The analytical formula to retrieve ISEE value is $\frac{ISR+0.2\times ISP}{ISEE\ equivalence\ scale}$, where ISR (Indicator of the household income situation) is the total amount of household income in *t-2*, ISP (Indicator of the household wealth situation) is the total amount of financial and real estate assets in *t-2* and the ISEE equivalence scale is as follows: 1 (1 component); 1.57 (2 components); 2.04 (3 components); 2.46 (4 components); 2.85 (5 components); these values are incremented by 0.35 in case of each further component, by 0.2 in case of 3 children, by 0.35 in case of 4 children and by 0.5 in case of 5 children; these values are further incremented by 0.2 and by 0.3 for the presence of children under the age of 18 and 3, respectively.

the application or high-powered automobiles registered over the previous two years as well as with owing ships or ("pleasure") boats.

Table 1. Requirements and thresholds for eligibility of single-person households

	Household in non-rented accommodation	Household in rented accommodation
a. Household taxable income	€9,360	€6,000
b. Financial assets	€6,000	€6,000
c. Real estate (excluding main residence)	€30,000	€30,000
d. ISEE value	€9,360	€9,360
e. Luxury vehicles or boats	NO	NO
f. Residency-citizenship	YES	YES
g. Participation to ALMP if unemployed	YES	YES

On the other hand, individuals must have Italian or EU citizenship, or being close relatives of an Italian or EU citizen (requirement *f*). Alternatively, they must have permanent residency, or have resided continuously in Italy for at least 10 years. A final requirement is participation to ALMP if unemployed (requirement *g*).

Eligibility criteria slightly differ for households with all members aged 67+ (the so-called "Pensione di Cittadinanza"). In such case, the same criteria described in Table 1 hold, except for households in non-rented accommodation, whose household taxable income threshold is € 7,560 (instead of € 6,000) multiplied by RdC equivalence scale.

The duration of the benefit is 18 months. While renewal is possible after a 1-month break, there is no explicit limit to the number of renewals. The financial support consists of two components: 1) a cash transfer aimed at complementing household income up to a threshold, and 2) a contribution towards rent or mortgage payments, up to a yearly cap of €3,360 for tenants and €1,800 for mortgagers, respectively. For a single-member household, the first component tops up annual income to €6,000. The amount of the cash transfer has a minimum of €480 and increases with family size, by topping up household income according to the RdC equivalence scale up to a maximum value of €20,592.

Furthermore, to mitigate the adverse effects on labour supply, the cash transfer is temporarily and partially provided for an extra year after a beneficiary enters the labour market or increases her labour supply. More specifically, the extra labour income contributes by 80% in the updated household taxable income requirement within one year.[5] After one year, the benefit expires if household income is above the eligibility threshold. This is equivalent to a marginal implied tax for labor supply of 80% within one year, which rises to 100% afterwards.

[5] As the benefit is a complement to a threshold, a reduction in taxable income reflects an increase in the benefit amount.

2. Data and descriptive statistics

We rely on various data sources provided by the Italian Social Security Institute. To identify applicants and beneficiaries of the program under investigation, we use data on the universe of RdC applications that were accepted or rejected by June 2019, namely 2,828,767 individuals. Next, we only select applications that were either accepted or rejected on the basis of the household income eligibility requirement (requirement *a* in Table 1). As shown in Table 2, the bulk of rejections is in fact decided on the basis of this requirement (with a rejection rate of about 27%), which was in fact more difficult to compute as, according to the rules stated in the law, it is given by the sum of all the incomes gained in year t-2 by all household earners minus all the welfare benefits relative to previous years plus all those pertaining to the current year. By contrast, all the remaining economic and wealth conditions (requirements *b-f* in Table 1) are more easily predictable and typically individuals who ex-ante know being above the required thresholds do not apply. We therefore exclude all applications that were rejected because they did not meet requirements *b-f* (2,582,840 individuals). As shown in Table 2, the percentage of applications meeting requirements *b-f* is equal to 90.2%[6], while 70.2% of applications met all thresholds, including requirement *a*.

Table 2. RdC fulfilled requirements distribution

Requirement	Fulfilled requirement	
	N	%
a. Household income	4,108,165	73.6
b. Financial assets	5,177,167	92.7
c. Real estate	5,473,675	98.0
d. ISEE value	5,493,954	98.3
e. Luxury vehicles	5,582,073	99.9
f. Residency-Citizenship	5,441,751	97.4
Requirements b-f	5,038,235	90.2
Requirements a-f	3,920,244	70.2

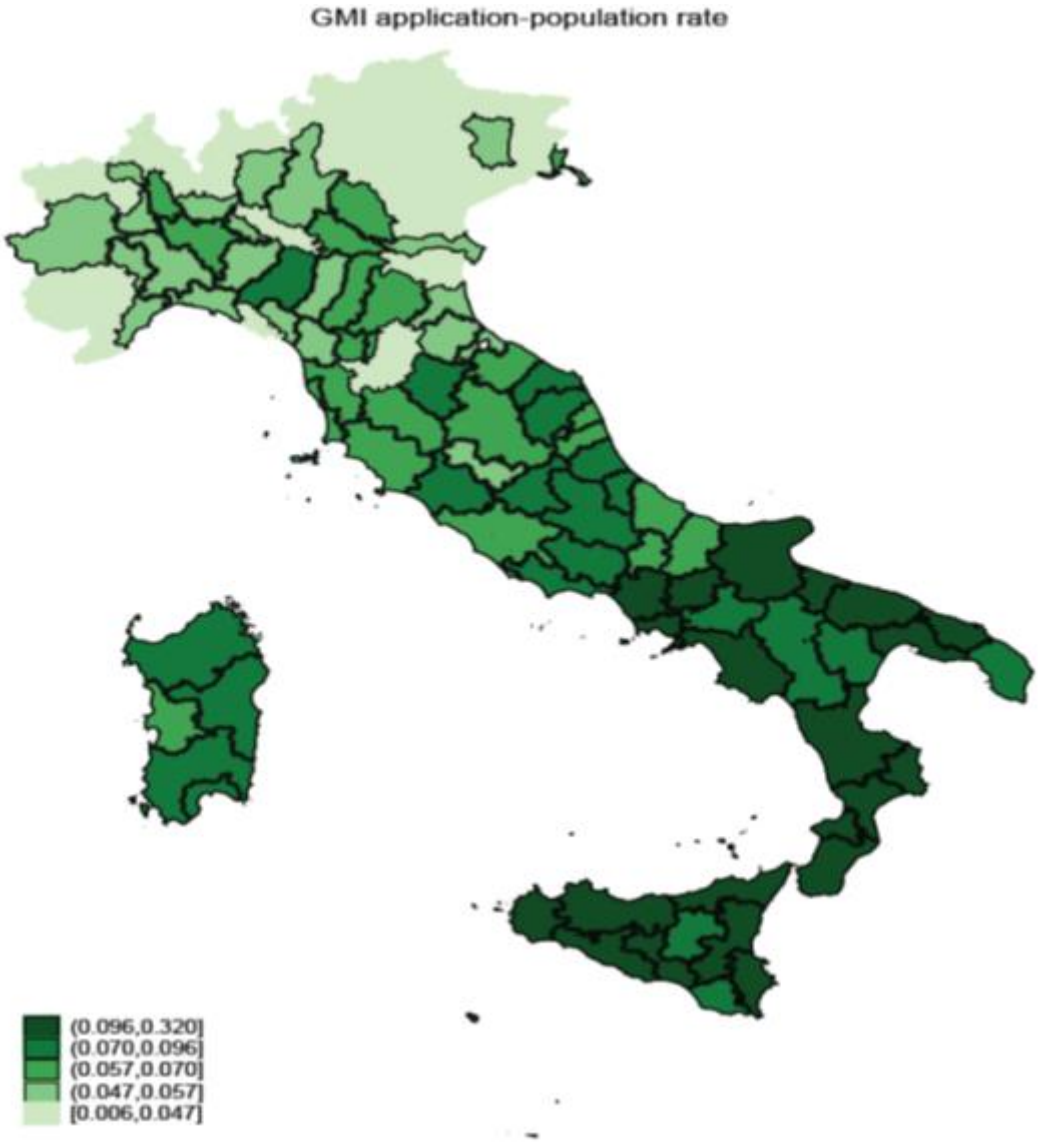
Source: INPS data, universe of 5,584,393 applicants to RdC, April 2019-April 2021.

We further restrict our sample to focus exclusively on women of childbearing age (between 16 and 45 years), that constitutes 20% of the sample. This further selection leaves us with a sample of 532,430 women.

[6] Thresholds *c*, *d*, *e* and *f* were met by 98%, 98.3%, 99.9% and 97.4% of applicants respectively. The share of applications meeting threshold *b* (the financial asset requirement) is smaller (92.7%) but still quite high.

Figure 1 presents the geographical distribution of applicants included in this sample. The map shows a clear North-South divide, with the majority of applicants residing in the Southern regions of the country, which is the poorest part of Italy.

Figure 1: Share of RdC applicants in April-June 2019 by province.



As shown in Table 3, where we report some descriptive statistics, about 61% of them live in the Southern part of the country. They belong to households composed on average by about four members, with an average number of children (below 18 years old) of 1.5 and an average number of disabled people in the household of 0.2. About 25% of applicants in our sample are from an immigrant background and about 45% of them live in a non-rented house.

We define our treatment variable *RdC* as a dummy taking the value of one for women who have been admitted to the program from April 2019 to December 2019 and benefitted for at least 6 months since start. Based on this definition, 74% of women in our sample are considered as effective beneficiaries.

This percentage is slightly smaller compared to the share of women (76%) who by June 2019 had a household income below the relative household income threshold, which defines our instrumental variable, denoted as *Below*. This is because some individuals (4.905) who were initially excluded from the benefit because of a household income above the required threshold have been admitted afterwards, while some others initially admitted have been soon excluded (14.479) ending up with less than 6 months of support during the period covered by our analysis.

Table 3: Descriptive statistics.

Variable:	Full sample		South	
	Mean	SD	Mean	SD
Birth	0.079	0.270	0.082	0.275
RdC (recipient)	0.744	0.437	0.825	0.380
Below (relative threshold)	0.762	0.426	0.837	0.369
Distance (from relative HH income cut-off)	4,930	7,099	6,234	6,323
South	0.613	0.487	1	0
Age	31.092	8.996	30.833	8.859
Household size	3.887	1.542	3.887	1.542
Migrant	0.245	0.430	0.083	0.276
No. of minors	1.468	1.191	1.365	1.134
No. of disabled	0.188	0.466	0.191	0.472
Rented house	0.448	0.497	0.448	0.497
Months worked in 2017-18	2.433	5.990	1.832	5.176

Notes: Sample includes women aged 16-45. Observations are 532,430 in the full sample and 326,622 in the South sub-sample.

We build a variable *Distance from household income threshold* as the difference between the household income declared by each woman when applying for the RdC and the threshold defined by the law as the requirement to be met by the specific household she belongs to (the threshold varies according to the size and composition of the family and according on whether the household lives in a rented or a non-rented house). This variable takes on average a value of 4,930 euros.

To measure fertility, we exploit data from a universal child benefit measure called *Universal Child Allowance*, introduced in 2022 and targeted to all families with children under the age of 21.[7] Thanks to the very high take-up (about 98% for children born in the period 2019-2021), we can consider applications to this benefit as a rather faithful register of the birth rate in Italy over the sample period under scrutiny. Using these data, we build our dependent variable *Birth* as an indicatorfor individuals who conceived a child within two years since notification of the application outcome (until the end of June 2021). As shown in Table 3, about 8% of women in the sample gave birth in the almost two

[7] Alternatively, we use data on applicants to a universal child benefit called "Bonus Mamma Domani", which provided a birth bonus of €800 to women in pregnancy (from the seventh month of pregnancy) and women with a child younger than 1, regardless of their economic conditions. This benefit was in place from January 2019 and December 2021 and was substituted by the Universal Child Allowance.

years considered in our analysis.[8] A similar share is found also for the sample of women living in the South part of the country.

Finally, we use matched employer-employee data that include all private-sector, non-agricultural firms with at least one employee to calculate the number of months worked by each women included in our sample from January 2017 to December 2018.[9] This variable, which we use as a control variable in our analysis of the impact of RdC on fertility, takes an average value of 2.4, pointing to the very low labour market participation characterizing low skilled women in Italy. Moreover, we use these data to build an additional outcome variable aimed at investigating the effects of the RdC on labour supply, which might represent an important mechanism behind the impact of fertility (in progress).

On the sample of 532,430 women previously described we apply the MSE optimization criterion to select the optimal sample to be used in the empirical analysis. We use an asymmetric bandwidth because applicants are asymmetrically distributed between recipients (much more) and non-recipients. In our preferred specification, this includes applications accepted and rejected for a difference from the threshold equal to -€3,117 and +€3,893 in the full sample and -€2,262 and +€4,827 in the South sub-sample. The final sample consists of 144,233 women, of which 74% are RdC recipients.

Table 4 reports the summary statistics of women in the sample analysed. The average probability of conceiving a child in the sample period is 8% (respectively 8.1% for recipient women and 7.9% for non-recipient one). Importantly, this is similar to the average probability of conceiving a child in the initial sample of 532,430 women (7.9%). The mean age is 31 years, and the average household size is 3.8. In our sample, 58% are resident in the South, 17% have a minor disabled person in the household.

[8] Considering that we focus on births occurring from June 2019 to December 2021 (almost two years), this share is slightly higher than that found by De Paola et al. (2021), who use data from the Italian Labor Force Survey and measure fertility on the basis of employees' declaration of having been absent from work due to Compulsory Maternity Leave. About 3.7% of women in their sample were on Maternity leave during a year.

[9] These data cover the universe of labor contracts from the UNIEMENS modules that all Italian firms must fill in and communicate to the Social Security Institute. For each worker-firm record we observe yearly information on: start and end date of the contract, type of contract (permanent vs. temporary, full-time vs. part-time), type of occupation (blue-collar, white-collar or manager), annual earnings, number of days worked, motivation for termination (e.g., layoff, resignation).

Table 4: Descriptive statistics in the optimal bandwidth sample.

Variable:	Full sample		South	
	Mean	SD	Mean	SD
Birth	0.079	0.270	0.081	0.273
RdC (recipient)	0.743	0.437	0.774	0.418
Below (relative threshold)	0.688	0.463	0.731	0.444
Distance (from relative HH income cut-off)	1621.386	2016.174	1799.311	1983.614
South	0.582	0.493	1.000	0.000
Age	31.394	8.897	31.202	8.730
Household size	3.762	1.528	3.746	1.466
Migrant	0.269	0.444	0.086	0.281
No. of minors	1.382	1.168	1.256	1.103
No. of disabled	0.168	0.440	0.174	0.448
Rented house	0.411	0.492	0.230	0.421
Months worked in 2017-18	3.425	7.062	2.877	6.505

Notes: Sample includes women aged 16-45. Observations are 144,233 in the full sample and 83,911 in the South sub-sample.

3. Identification strategy

To investigate the effect of the RdC program on fertility we adopt a Fuzzy Regression Discontinuity Design and exploit the threshold-based setting of the scheme. More precisely, we instrument the effective treatment indicator, i.e. being recipient of the RdC, with a dummy for individuals whose household income as of June 2019 was below the relative threshold. Then, we consider as running variable the household income and compare those households whose application was rejected or accepted at the very proximity of the household income threshold (requirement *a* in Table 1), given that all other requirements were fulfilled. We estimate the following model:

$$Birth_i = \beta_0 + \beta_1 RdC_i + \beta_2 f(Distance_i) + \beta_3 RdC_i * f(Distance_i) + \beta_4 X_i + \varepsilon_i \quad (1)$$

$$RdC_i = \alpha_0 + \alpha_1 Below_i + \alpha_2 f(Distance_i) + \alpha_3 Below_i * f(Distance_i) + \alpha_4 X_i + \mu_i \quad (2)$$

where equation (1) is the main outcome equation and equation (2) is the first stage. $Birth_i$ is a dummy variable taking the value of one for individuals who conceived a child from June 2019 to the end of June 2021. RdC_i is a binary variable taking the value of one for RdC-recipient individuals, i.e. those who obtained the income support for at least 6 months since notification of the application's outcome, and zero otherwise; $f(Distance_i)$ is a flexible functional form relating the distance of the household income from the relative threshold to the probability of having a child. We also include the interaction term between RdC_i and the running variable $f(Distance_i)$ to allow for different functional forms of the two sides of the cut-off. $Below_i$ is a dummy for individuals who, by June 2019, have a household

income below the relative threshold, i.e., they were eligible for the RdC, which we use as an instrumental variable for RdC_i. X_i is a vector of individual characteristics that includes age, age squared, the presence of children, family size, number of children under the age of 18, employment status in previous two years, migration status, number of disabled family members, as well as a full set of macro-regional dummies (North-East, North-West, Center, South, Islands) to capture any difference across geographical areas; ε_i and μ_i are the error terms in equation (1) and (2), respectively. We cluster standard errors at the level of the running variable.

We estimate our model using a Local Linear Regression (LLR) approach in the neighbourhood of the MSE-optimal bandwidth around the cut-off, as proposed by Calonico, Cattaneo and Farrell (2020). We also estimate separate functions on both sides of the cut-off point by controlling for interaction terms between the forcing variable $f(Distance_i)$ and RdC_i that we instrument with the interaction term between $f(Distance_i)$ and $Below_i$.

Under the assumption that the relationship between fertility and our indicator of economic conditions (household income) is continuous nearby the cutoff point, the treatment status can be rated as good as random (Lee and Lemieux, 2010) and any jump in the outcome variable can be interpreted as a causal effect of the program.

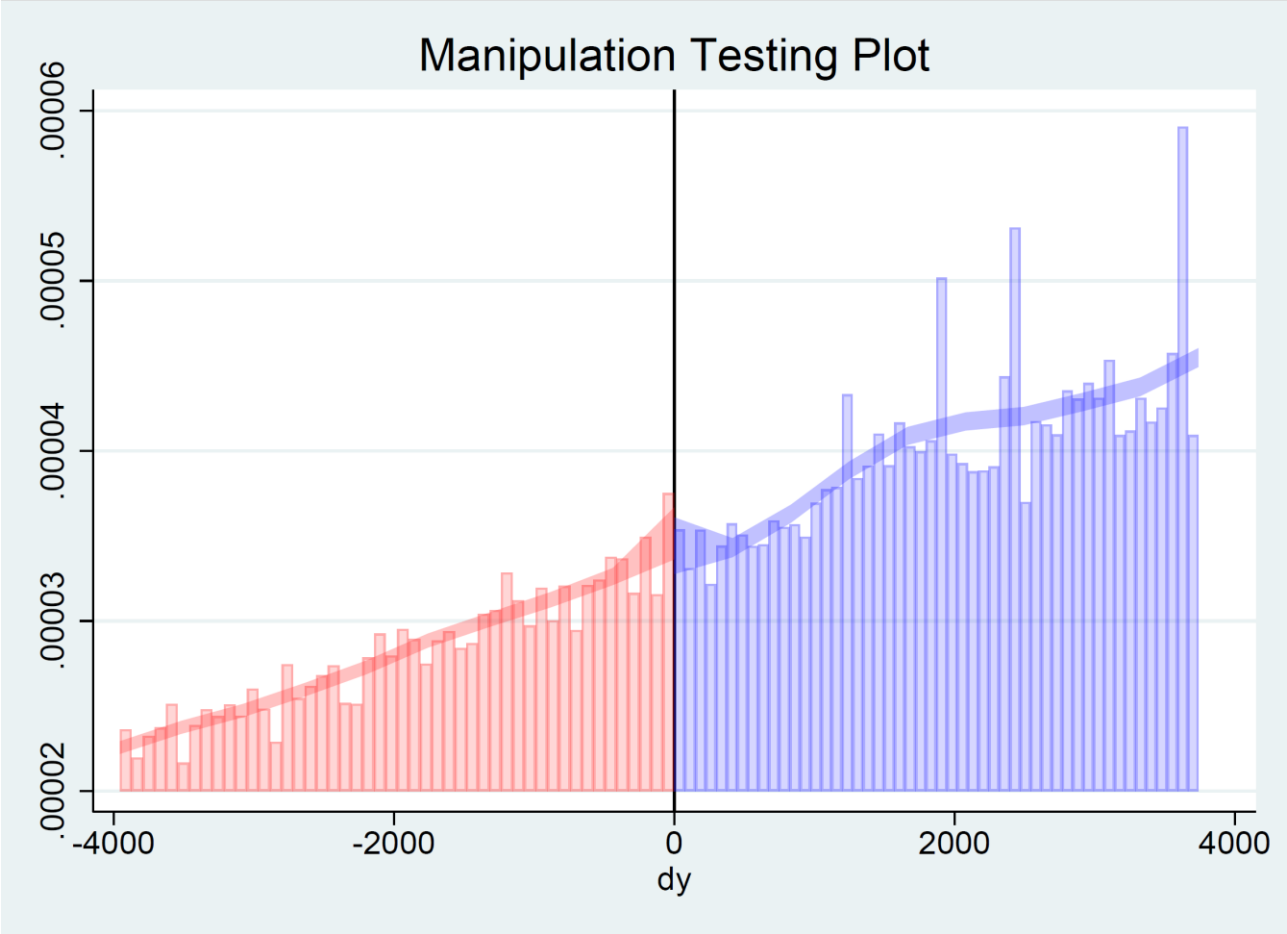
3.1. RDD validity checks

Before presenting our results, we discuss the main assumption on which the estimation strategy relies. We first present the McCrary test for the continuity of the forcing variable (Household Income) by running a kernel local linear regression of the log of the density separately on both sides of the threshold (McCrary, 2008). If there is a discontinuity in the forcing variable at the cut-off point, RdC applicants are expected to manipulate their Household Income and sort below the threshold for the inclusion in the program. It could be, for instance, that in order to be included in the program, individuals reduce the number of hours worked and try to reach a Household Income below the threshold. However, this behaviour is unlikely to have occurred in our context as for applications presented in 2019 the Household Income considered for eligibility was that of two years before.

The RdC was the centrepiece of the electoral campaign of the « 5 Star Movement » in the 2018 elections, however individuals could not be able to anticipate the technical details and know the eligibility conditions in advance. Results of the McCrary test corroborate our expectations. As highlighted in Figure 2, the log of the frequency of the household income to the right and to the left of the threshold shows no discontinuity in the neighbourhood of the threshold (t-stat 0.5753 p-value

0.5651). Consequently, we fail to reject the null hypothesis that the jump at the density of Household Income at the threshold is zero. These results reassure us that households did not manipulate the forcing variable to obtain access in the program.

Figure 2. Manipulation of the forcing variable at the cut-off.



We have also assessed the continuity of the distribution of the observable characteristics that we use as covariates in our RDD at the cut-off point. We regressed each covariate on a first or second-order polynomial of the forcing variable along with a dummy for the treatment status: a statistically insignificant coefficient for the treatment dummy is taken as evidence in favor of local random assignment (see, among others, Caughey and Sekhon, 2011; Lee, 2008).

The estimates reported in Table 4, show that our treatment is not significantly associated with all the covariates used in the model, except for age and previous employment status: they are not a smooth function of Household income and change at the threshold required for admission in the program. Yet, while these changes are statistically significant they are small in magnitude: we find that recipients are on average 4 months younger and have worked 1.3 months more over the period 2017-

2018 than non-recipients. Overall from these balance checks, we are reassured that individuals' characteristics do not change sharply at the cutoff point.

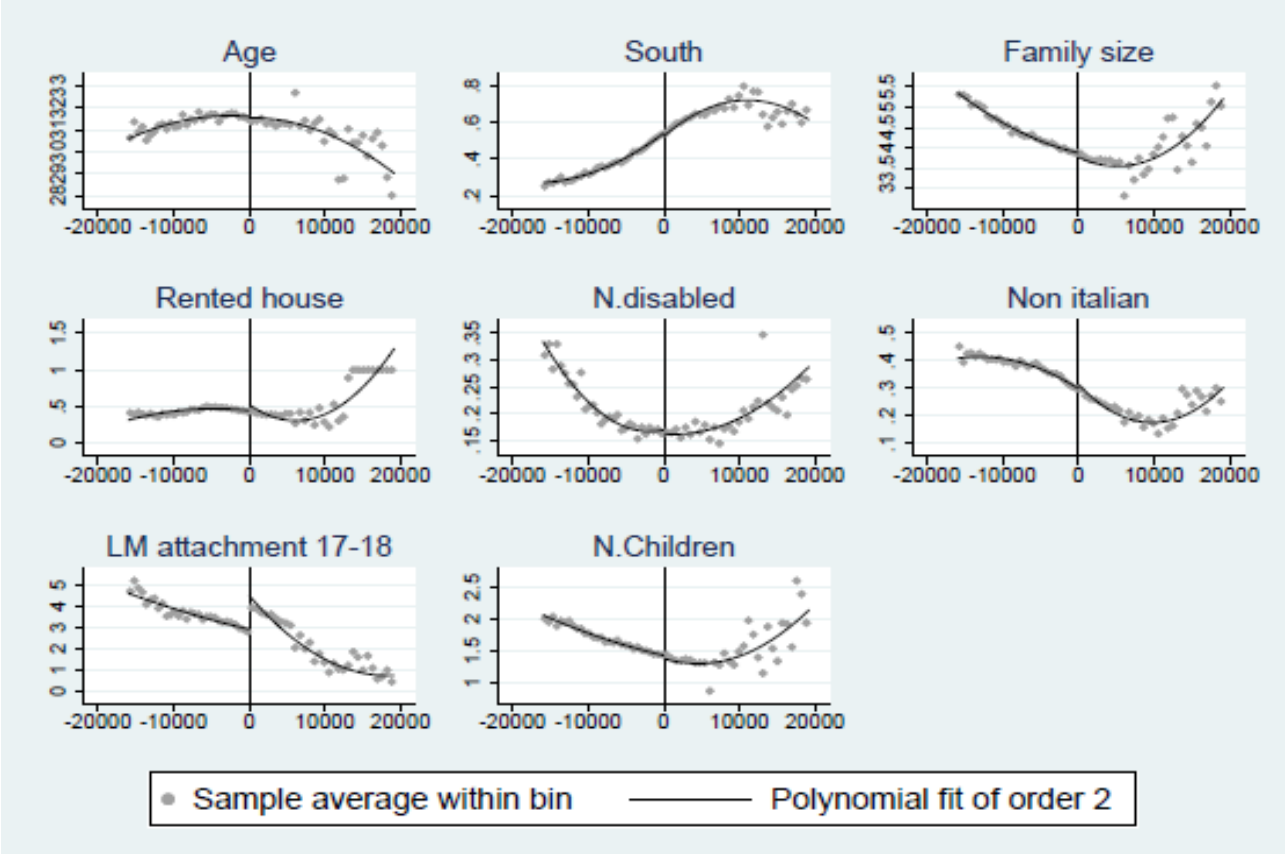
Table 5: Balance checks.

	(1)	(2)	(3)
Dependent Variable:	Full sample	Centre-North	South
South	-0.0058		
	(0.0054)		
Age	-0.3473***	-0.3923***	-0.3352***
	(0.0923)	(0.1359)	(0.1312)
Migrant	0.0072	0.0141	0.0007
	(0.0048)	(0.0088)	(0.0050)
Household size	0.0088	-0.0024	0.0074
	(0.0191)	(0.0239)	(0.0275)
No. of minors	0.0043	0.0040	0.0293
	(0.0129)	(0.0178)	(0.0186)
No. of disabled	0.0037	-0.0047	-0.0014
	(0.0059)	(0.0087)	(0.0089)
Rented house	-0.0012	0.0019	-0.0086
	(0.0076)	(0.0104)	(0.0096)
Months worked in 2017-18	1.2702***	1.2035***	1.3641***
	(0.0829)	(0.1272)	(0.1113)
Observations	132,198	56,688	83,911

Notes: Sample includes women aged 16-45. Reported are coefficients of the effect of RdC on the 8 different variables listed in the "Dependent variable" column. The treatment variable in each regression is RdC, a dummy taking value 1 for RdC recipients. Controls are 1st order polynomial of the running variable and its interaction with RdC. Standard errors in parentheses are clustered at the running variable level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

For visual inspection, in Figure 3 we also present some descriptive graphs of the predetermined characteristics plotted against the Household income nearby the threshold. Each panel shows the assignment variable cell means of the predetermined characteristics in the proximity of the ranking score threshold along with the fitted values of a locally weighted regression of the second order that is calculated within each segment. Overall, Figure 2 confirms that covariates do not exhibit any significant jump around the cut-off.

Figure 3. Continuity of the observable characteristics at the cut-off.



4. Results

Table 6 reports the first stage results obtained by estimating equation 2 in Section 3. The estimates suggest that having a household income below the relative threshold as of June 2019 strongly predicts the probability of being a beneficiary of the RdC program. This holds true both in the full sample and in the Centre-North and South sub-samples. More thoroughly, we find that individuals who initially met the income requirement have a 73-percentage point higher probability of receiving the income support than those whose initial household income was above the relative threshold.

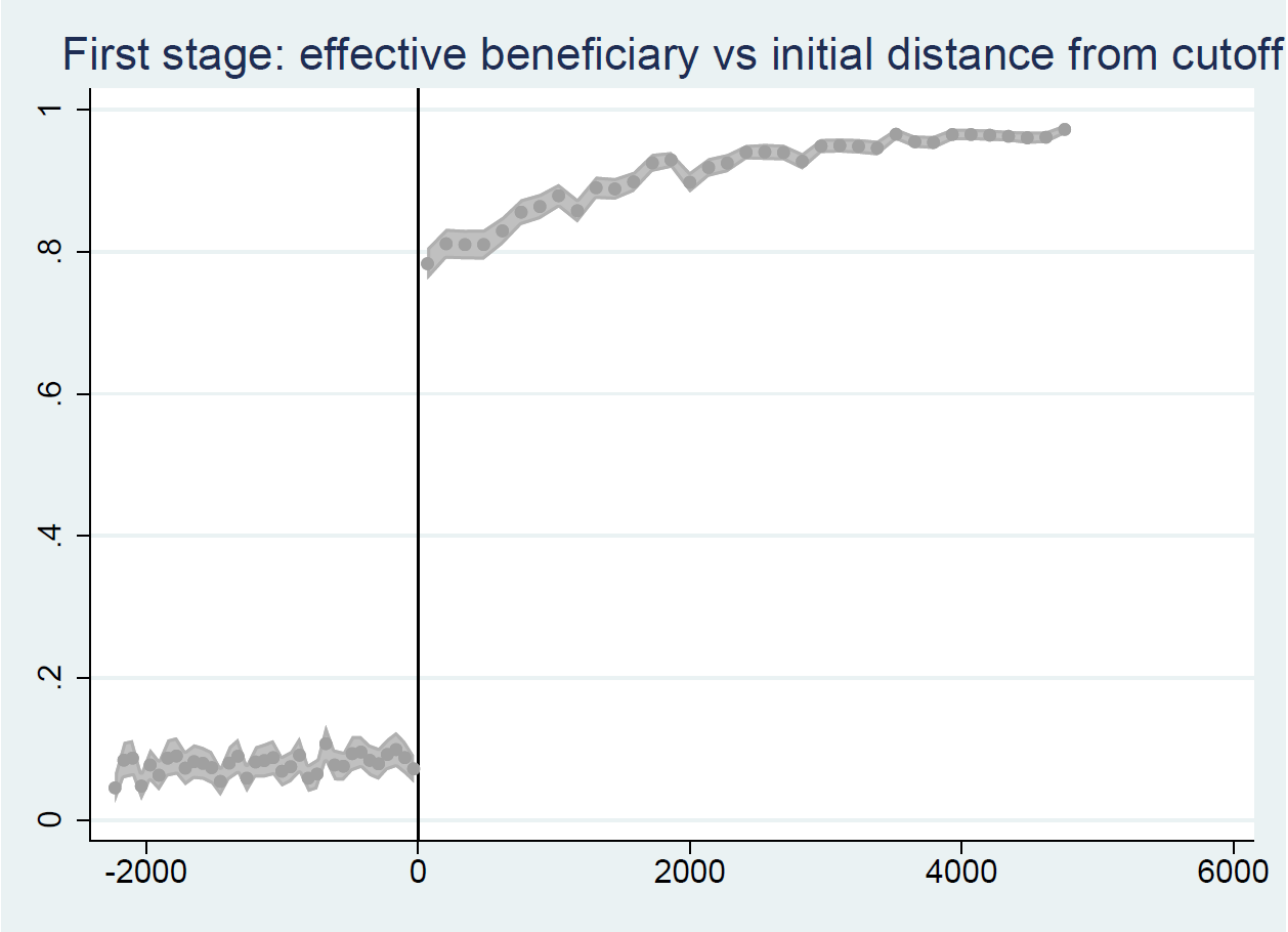
Table 6: First stage estimates.

	(1)	(2)	(3)
		RdC	
	Full sample	Centre-North	South
Below	0.7346***	0.7275***	0.7537***
	(0.0045)	(0.0061)	(0.0060)
Observations	131,009	57,178	85,070

Notes: Sample includes women aged 16-45. Dependent variable is *RdC*, a dummy taking value 1 for RdC recipients. *Below* is a dummy taking value 1 for individuals who by June 2019 have an household income below the relative threshold. Standard errors in parentheses are clustered at the running variable level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In figure 4 we plot the probability of receiving the RdC against the distance of the household income from the relative threshold. While the probability is less than 10% for applicants with household income above the relative threshold, this probability jumps to 80% for applicants with household income just below the relative threshold and further increases up to almost 100% for those who were well below threshold to begin with.

Figure 4: Probability of being RdC recipient against distance from relative income cut-off.



Tables 7 reports the main results of our analysis for the full sample (panel A) as well as for the Centre-North (panel B) and the South sub-samples (panel C). Column 1 shows the estimates obtained from a specification without controls. In column 2 we include demographic controls such as age, age squared and migration status. In column 3 we add household-related controls, e.g. household size, number of minor components, number of disabled components and a binary variable indicating whether the household live in a rented house. In column 4 we also control for previous labor market attachment, as measured by the number of months worked over the period 2017-18, that is in the two years before the application to the RdC program. Finally, in column 5 we also include macro-region

dummies to account for differences in fertility attitudes across individuals living in different regions of the country.

We find no effect of RdC on fertility both in the full sample and in the Centre-North sub-sample, but we detect a significant positive effect in the South. Based on the estimates in column 4, our preferred specification, we find that RdC recipients in the South have around a 1.4-percentage-point higher probability of conceiving a child in the two years after the receipt of the income support than non-recipients. This finding indicates that income support can lead to an increase in fertility for poorer households, therefore suggesting that household reproductive behavior strongly react to income changes.

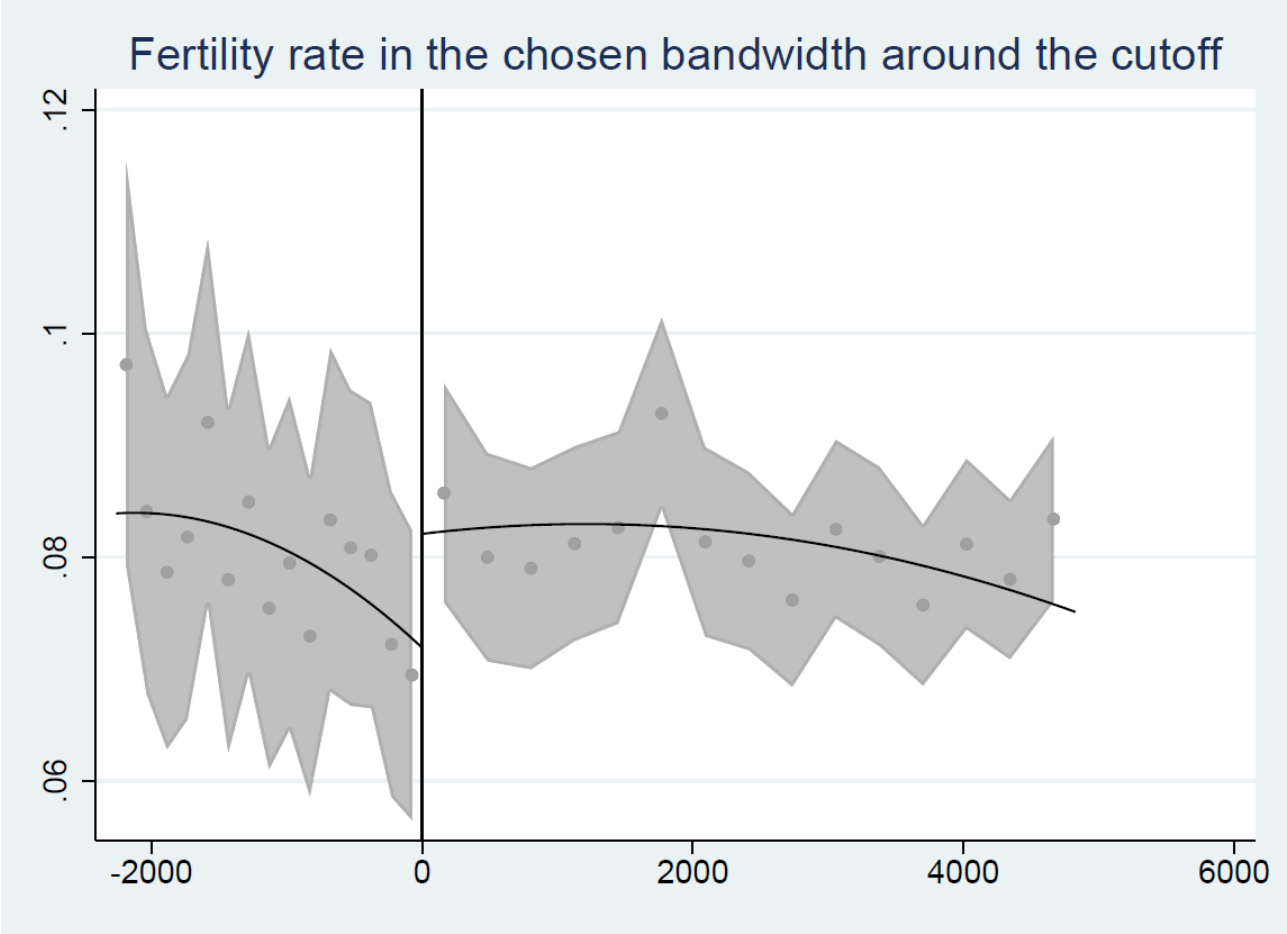
Table 7: Fuzzy RDD estimates of the effect of RdC on fertility.

	(1) No Covariates	(2) +Demographic controls	(3) +Household controls	(4) +Labor supply in 2017-18	(5) +Macro-areas dummies
Panel A: Full sample					
RdC	0.0050	0.0053	0.0033	0.0051	0.0045
	(0.0047)	(0.0041)	(0.0040)	(0.0042)	(0.0042)
Control mean	0.0811	0.0815	0.0814	0.0815	0.0816
Left bandwidth	-2855	-3077	-3052	-3070	-3117
Right bandwidth	3076	4081	5004	3796	3893
Observations	109,423	136,259	159,132	129,306	132,198
Panel B: Centre-North					
RdC	-0.0028	-0.0064	-0.0067	-0.0066	
	(0.0065)	(0.0065)	(0.0059)	(0.0064)	
Control mean	0.0816	0.0811	0.0810	0.0810	
Left bandwidth	-2919	-2708	-2753	-2792	
Right bandwidth	4082	3983	5837	3985	
Observations	58,436	56,032	72,950	56,688	
Panel C: South					
RdC	0.0148**	0.0158**	0.0134**	0.0137**	
	(0.0069)	(0.0063)	(0.0060)	(0.0060)	
Control mean	0.0802	0.0802	0.0800	0.0801	
Left bandwidth	-2295	-2259	-2240	-2262	
Right bandwidth	2681	3723	4707	4827	
Observations	51,070	66,060	81,614	83,911	

Notes: Sample includes women aged 16-45. Dependent variable is *Birth*, a dummy taking value 1 for individuals who conceived a child since June 2019 to June 2021. RdC is a dummy taking value 1 for RdC recipients. Standard errors in parentheses are clustered at the running variable level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 4 provides a visual inspection of the estimated effect of RdC on fertility we detect in Panel C, column 4 for individuals in the South.

Figure 4: RD plot for individuals in the South.



In Table 8 we probe the robustness of our main results for the South in several ways. First, we augment our main specification to account for regional differences across applicants in the South (column 1).

Table 8: Robustness checks: Fuzzy RDD estimates of the effect of RdC on fertility, South.

	(1) + Region dummies	(2) Using MSE symmetric bandwidth	(3) Non-parametric Conventional	(4) Non-parametric Bias-corrected	(5) Non-parametric Robust
RdC	0.0152**	0.0112*	0.0126**	0.0116**	0.0116
	(0.0062)	(0.0068)	(0.0057)	(0.0057)	(0.0085)
Control mean	0.0801	0.0807	0.0883	0.0883	0.0883
Left bandwidth	-2257	-2388	-2262	-2262	-2262
Right bandwidth	4053	2388	4827	4827	4827
Observations	70,976	47,587	326,622	326,622	326,622

Notes: Sample includes women aged 16-45. Dependent variable is *Birth*, a dummy taking value 1 for individuals who conceived a child since June 2019 to December 2021, and 0 otherwise. RdC is a dummy taking value 1 for RdC recipients. Controls are 2nd order polynomial for age, South dummy, n. of household components, n. of disabled components, 1st order polynomial of the running variable and its interaction with beneficiary dummy. Standard errors in parentheses are clustered at the running variable level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Second, we re-estimate our model using a symmetric bandwidth (column 2). Finally, we estimate the model non parametrically using conventional, bias-corrected and robust in column 3, 4 and 5, respectively. Reassuringly, the results in Table 8 are remarkably similar to those obtained in our main specification in Table 7, panel C.

4.1. Heterogeneous responses

In this section we explore the heterogeneous effects of RdC on fertility by individual and household characteristics. We focus on the South subsample as shown in the previous section this is the only part of the country where we detect a significant effect.

In Table 8 we first test whether our main effect varies in magnitude across individuals with different age and different parity levels. Reading across the estimates in columns 1-4, our findings suggest that the positive effect of RdC on fertility is mostly driven by older women and women with pre-existing children. This point to the conclusion that income support may boost higher-order births, but it does not affect the decision to enter motherhood for younger women.

Table 9: Heterogeneous effects by age and parity, South

	(1) Age<=32	(2) Age>32	(3) No children	(4) Children>=1
RdC	0.0061	0.0210**	0.0025	0.0162**
	(0.0082)	(0.0083)	(0.0101)	(0.0072)
All controls	Yes	Yes	Yes	Yes
Control mean	0.0905	0.0683	0.0751	0.0822
Left bandwidth	-2718	-2151	-2084	-2531
Right bandwidth	4451	4228	4019	4612
Observations	42,681	34,373	20,272	57,798

Notes: Sample includes women aged 16-45. Dependent variable is *Child*, a dummy taking value 1 for individuals who conceived a child since June 2019 to December 2021, and 0 otherwise. RdC is a dummy taking value 1 for RdC recipients. Controls are 2nd order polynomial for age, household size, n. of disabled components, 1st order polynomial of the running variable and its interaction with RdC. Standard errors in parentheses are clustered at the running variable level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In Table 10, we further investigate whether the effect depends on prior employment status and on whether the household live in a rented vs owned house. The results in columns 1-2 show significant fertility effects of the RdC program for both individuals who were previously employed and unemployed, though the magnitude is substantially larger for the former. This seems to suggest that changes in income may encourage women to have children, but the more so for those with some career prospects to begin with. Finally, results in columns 3-4 indicate that income support is particularly relevant in promoting fertility for those perceiving a higher economic uncertainty.

Table 10: Heterogeneous effects by prior employment status and home ownership, South

	(1) Employed in 2017-18	(2) Unemployed in 2017-18	(3) Owned house	(4) Rented house
RdC	0.0238*	0.0147**	0.0074	0.0226*
	(0.0133)	(0.0068)	(0.0076)	(0.0135)
All controls	Yes	Yes	Yes	Yes
Control mean	0.0917	0.0780	0.0795	0.0835
Left bandwidth	-2281	-2353	-2436	-2020
Right bandwidth	4626	4233	2360	5380
Observations	19,652	56,416	36,770	21,612

Notes: Sample includes women aged 16-45. Dependent variable is *Child*, a dummy taking value 1 for individuals who conceived a child since June 2019 to December 2021, and 0 otherwise. RdC is a dummy taking value 1 for RdC recipients. Controls are 2nd order polynomial for age, South dummy, n. of household components, n. of disabled components, 1st order polynomial of the running variable and its interaction with beneficiary dummy. Standard errors in parentheses are clustered at the running variable level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5. Conclusions

In this paper, we investigate the effect of a minimum income scheme introduced in Italy in 2019 on a woman's likelihood of having a child in the two years after the receipt of the benefit. We use administrative data on the universe of applicants to the program and compare the fertility decisions of women with household income just below the relative threshold (i.e. recipients) with those of women with household income just above the relative threshold (i.e. non recipients) in a Fuzzy RDD strategy.

Our results show a clear North-South divide: while women in the Centre-North do not change their fertility upon receipt of the income support, for women in the South we find that the benefit strongly encourages their fertility. More specifically, we find that in the South a recipient's probability of conceiving a child within two years increases by 1.4 percentage points. Given that the annual fertility rate is 4% in the South (as well as in whole country), our findings would suggest an increase in mean fertility by almost 35%. Importantly, our analysis shows heterogenous effects across women with different characteristics, with the effect being larger for younger women, women with pre-existing children, women in rented houses and women who were employed before the applications.

Our findings contribute to our understanding of the general equilibrium effects of minimum income schemes in that they suggest that, although designed to help poor families with income support, such policies may have significant positive spillover effects on fertility rates. This is especially relevant for the policy making of Southern European countries, like Italy, where fertility rates are very low and fertility is overall higher among poorer families compared to richer ones.

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