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Do unconditional cash transfers increase fertility? Lessons from a large-scale program

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Abstract

We examine the impact of unconditional cash transfers (UCTs) on fertility. We develop a theoretical model that demonstrates how UCTs affect fertility decisions, time allocations for leisure, labor and childrearing, and child health through health spending. We then empirically examine the impact of UCTs on fertility in Pakistan. Our theoretical model suggests that under certain conditions, UCTs are likely to increase fertility if UCTs increase child health regardless of how they affect parental leisure, labor and childrearing time. The empirical results suggest that UCTs have a positive effect on fertility.

KEYWORDS

BISP, cash transfer, fertility, Pakistan

JEL CLASSIFICATION

J13, J22, O15

1 | INTRODUCTION

Social protection programs have received increased attention in developing countries. In the past 2 decades, cash transfer programs have been extensively used as policy interventions to achieve myriad development goals (Angeles et al., 2019; Barrera-Osorio et al., 2019; Barrientos & DeJong, 2006; Daidone et al., 2019; Fiszbein & Schady, 2009; Galiani & McEwan, 2013; Glewwe & Kassouf, 2012). The programs can typically take one of two designs: conditional cash transfers (CCTs) or unconditional cash transfers (UCTs). In contrast to UCTs, which are not conditioned (Arnold et al., 2011; Khan et al., 2016), CCTs provide cash transfers to individuals or households in vulnerable communities to finance various development needs. The receipt of such transfers is conditional on recipients meeting multiple conditions such as child enrollment, use of specific agricultural technology, and use of health services and business start-ups (Fiszbein & Schady, 2009). Although some studies show that cash transfers tend to reduce poverty and improve school outcomes, household income and consumption (see Hagen-Zanker et al., 2011; Manley et al., 2012; Yoong et al., 2012), others suggest that cash transfer programs can be detrimental to development outcomes (see Kabeer et al., 2012).[1] However, the evidence on the effectiveness of cash transfer programs has focused mainly on Latin America and Africa (Bastagli et al., 2016).

Abbreviations: BISP, Benazir Income Support Programme; RDD, regression discontinuity design; UCTs, unconditional cash transfers.
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We contribute to the literature on the effectiveness of cash transfers by examining the impact of Pakistan's Benazir Income Support Programme (BISP) on fertility. An established body of literature suggests that high fertility rates in Pakistan are linked with low status of women, and that the economic empowerment of women should aid in reducing fertility (Abadian, 1996). Other studies also associate high fertility with the sociocultural preference for male offspring in Pakistan (Chaudhry et al., 2021), as well as religious opposition to family planning (Ataullahjan et al., 2019). Undeniably, while there is evidence to suggest that these factors are important determinants of fertility, the design of UCTs, which makes families with children the target of transfers, raises concerns about UCTs providing an incentive for greater fertility (Wilcox et al., 1996). While UCTs have the potential to encourage childbirth, they are also likely to decrease fertility through a number of channels including through human capital improvement within the quantity-quality trade-off framework as suggested in the economic model of fertility (Becker & Lewis, 1973).

We first present a simple theoretical model to motivate the empirical analysis. We model how UCTs affect parents' decisions regarding fertility, allocations of time between leisure, work and childrearing, and child health through parental health spending. Our model shows that UCTs are likely to increase fertility if: (i) UCTs increase the marginal benefit of having a child by spending more to improve the health of a child; and (ii) if UCTs reduce parental leisure and increase parental labor and childrearing time or UCTs increase parental leisure and reduce parental labor and childrearing time but these effects are small. Applying a regression discontinuity design (RDD), we find that UCTs from the BISP have a positive effect on fertility. Given predictions from our theoretical model, we also examine the mediating effects of parental working hours, parental leisure time and child health, and find that working hours and child health are channels through which UCTs influence fertility. This is consistent with other empirical findings that UCTs improve child health (Baird et al., 2019) but reduce adult work (Banerjee et al., 2017).

By examining the impact of the BISP on fertility, we contribute to the very scant literature on the impact of UCTs on fertility in Pakistan. Understanding the impact of cash transfers on fertility is important and has various policy implications. A general assumption among policymakers suggests that social security programs, including UCTs, are likely to increase fertility, and thus, despite potential benefits of cash transfers discussed in the literature (see, e.g., Hagen-Zanker et al., 2011; Manley et al., 2012; Yoong et al., 2012), some objections have been raised about the suitability of UCTs based on fears of increased fertility (Palermo et al., 2016). However, evidence on the effects of cash transfers on fertility is scant; this is more so the case for UCTs, which have been largely criticized based on fertility fears. What we know about the impact of cash transfers on fertility is largely based on the Latin American experience (Garganta et al., 2017; Olson et al., 2019; Stecklov et al., 2007; Todd et al., 2012). Stecklov et al. (2007) examine the impact of three CCTs in Honduras, Nicaragua and Mexico on fertility. They report significant positive effects of CCTs on fertility in Honduras—a finding they link with the program design of the Honduran Programa de Asignación Familiar, which allowed for an increase in transfer because of childbirth. In contrast, CCTs had no effects on fertility in Nicaragua and Mexico. Todd et al. (2012) also focus on Nicaragua and on birth spacing as a short-term indicator of fertility. They find that CCTs are associated with an increase in birth spacing. Garganta et al. (2017) report positive effects of CCTs on fertility in Argentina, while Olson et al. (2019) report a negative effect of CCTs on teen fertility in Brazil. We differ from these studies given that we focus on a country outside of Latin America.

Our study relates to the literature that has examined the impact of cash transfers on cognate outcomes such as contraceptive use, early marriage and female empowerment (see, e.g., Dake et al., 2018; Khan et al., 2016; Molyneux & Thomson, 2011; Waqas & Awan, 2019; Zavier & Santhya, 2013). Although some of these outcomes focus on pregnancy, the studies tend to explore why cash transfers are likely to influence fertility; but are less able to speak to the direct effects of cash transfers on fertility. Our study is also closely related to those in the literature that examine the impact of the BISP on various outcomes, including food, nutrition, energy choices, poverty, health, child labor, education and female empowerment (see, e.g., Ambler & Brauw, 2023, 2019; Awaworyi Churchill et al., 2021; Mumtaz et al., 2014; Nawaz & Iqbal, 2020; Tahir et al., 2018; Waqas & Awan, 2019). The evidence from this literature suggests that the BISP is associated with: (1) an increase in household food consumption (Ambler & Brauw, 2023), (2) better nutrition outcomes for girls but not boys (Ambler & Brauw, 2023), (3) improvement in female empowerment including increased access and mobility (Ambler & Brauw, 2023; Mumtaz et al., 2014), (4) an improvement in school enrollment but no impact on school dropout rates (Awaworyi Churchill et al., 2021), and (5) an improvement in the use of cleaner fuel choices (Nawaz & Iqbal, 2020).

The closest in the literature to our study is Palermo et al. (2016), who find that the Zambian Child Grant Programme had no effects on fertility. Our study relates to Palermo et al. (2016) given they also focus on a UCT program. However, we differ from Palermo et al. (2016) in at least two regards. First, our evidence is for the BISP, which is the largest social protection program in South Asia, and the flagship program of Pakistan. Besides the scale of the BISP of being different from the Zambian Child Grant Programme, the focus on Pakistan is unique and likely to yield different results given the dynamics around fertility which includes sociocultural preference for male offspring (Chaudhry et al., 2021), and religious opposition to family planning (Ataullahjan et al., 2019). Second, we also contribute to the theoretical literature on the relationship between cash transfers and fertility. Third, guided by our theoretical model, in addition to fertility, we also examine the mediating effect of working time, leisure time and per child health.

2 | A SIMPLE THEORETICAL MODEL OF UNCONDITIONAL CASH TRANSFERS AND FERTILITY

To motivate our empirical exercise, this section presents a simple model to illustrate how, in a household setting consistent with our context, unconditional cash transfers (UCTs) affect fertility through channels given by parental spending on child health and parental time allocations for leisure, labor, and childrearing.

Our model differs from the existing theoretical literature that mainly examines the effects of government transfers in the context of developed economies. For example, there is a large body of literature examining the impacts of unfunded social security, a very common government transfer from workers to retirees in developed economies (see, e.g., Barro, 1974; Ehrlich & Lui, 1998; Feldstein, 1974; Zhang, 1995). Specifically, Zhang (1995) shows that social security may reduce fertility and increase human capital. Our model also complements a small theoretical literature that examines the effect of cash transfer or fertility determinants in the context of developing economies (see, e.g., Awaworyi Churchill et al., 2021; Eswaran, 2002; Ferreira Francisco et al., 2017). Awaworyi Churchill et al. (2021) provide a conceptual link between UCTs, child labor and schooling; Ferreira Francisco et al. (2017) focus on the effect of a child-specific conditional cash transfer program; Eswaran (2002) focuses on the effect of women's empowerment on fertility and shows that women's empowerment reduces fertility. Our model contributes to the existing theoretical literature by including endogenous fertility, child health via parental health spending and leisure-labor-childrearing time to analyze the effects of UCTs that target poor families in low-income countries such as Pakistan. We abstract from schooling and women's empowerment as potential channels through which UCTs affect fertility, in line with the empirical evidence that there can be no schooling channel operating on marriage and pregnancy for UCTs (Baird et al., 2011) and that earned income tends to be more important than unearned income such as cash transfers in empowering women (Anderson & Eswaran, 2009).

The economy has two overlapping generations: children and parents.[2] Children do not make decisions, but each child faces a probability of being healthy $p(m_t) \in (0, 1)$ which rises with parental expenditure on the child's health m_t, such as nutrition, medicines, medical examinations and other healthcare expenses, at a diminishing rate:

$$p(m_t) = \frac{a + m_t}{1 + (a + m_t)b} \tag{1}$$

with parameters $b \geq 1 > a > 0$. Parameter b describes the effect of external factors such as pollution and extreme weather that reduce the child health status. Hence, the lowest probability for a child being healthy is when $m_t = 0$, that is, $p = a/(1 + ab)$ which is less than one half. Each parent derives utility from consumption for the family c_t, his or her own leisure time z_t, the number of children n_t and the child health status $p(m_t)$ as follows:

$$U_t = \ln c_t + \eta \ln z_t + p(m_t)\rho \ln n_t \tag{2}$$

where $\eta > 0$ represents parental preference for leisure time and $\rho > 0$ represents parental preference for children. The terms $p(m_t)\rho \ln n_t$ in (2) represent parental preference for both the quality and quantity of children.[3]

Raising a child requires $0 < v < 1$ fixed units of time. Given wage rate w_t, each poor parent receives UCTs from the government T_t and allocates one unit of time endowment to rearing children vn_t and leisure z_t, and hence labor is $l_t = 1 - vn_t - z_t$. The parent allocates resources to consumption c_t and the health of children $m_t n_t$ as follows:

$$c_t = (1 - vn_t - z_t)\, w_t + T_t - m_t n_t \tag{3}$$

Given w_t and T_t, the parent maximizes utility in (2) subject to the budget constraint in (3). Using the first-order conditions with respect to n_t, z_t and m_t, the result for m_t is given by:

$$p(m_t) = (vw_t + m_t)p'(m_t)\ln\left\{\frac{\rho p(m_t)(w_t + T_t)}{(vw_t + m_t)[1 + \eta + \rho p(m_t)]}\right\} \tag{4}$$

where $p(m_t)$ is given by (1) and $p^{'}(m_t)$ is the derivative of $p(m_t)$ with respect to m_t. Child health spending m_t is implicitly determined by the solution to (4) and is affected by UCTs T_t. Intuitively, higher T_t may increase or decrease parental spending on child health m_t and the child health status $p(m_t)$, depending on the marginal benefit and cost of spending more on child health. An important factor that determines the marginal benefit of spending more on child health is parameter b in (1) that describes the effect of external factors that reduce the child health status. The marginal benefit of spending more on child health is higher when the effect of external factors that reduce the child health status is larger, ceteris paribus.[4]

The solutions for z_t and n_t are given as follows:

$$z_t = \frac{\eta(w_t + T_t)}{w_t[1 + \eta + \rho p(m_t)]} \tag{5}$$

$$n_t = \frac{\rho p(m_t)[(1 - z_t)w_t + T_t]}{(vw_t + m_t)[1 + \rho p(m_t)]} \tag{6}$$

In (5), UCTs T_t have a direct positive income effect on parental leisure. However, UCTs also have an indirect substitution effect on parental leisure through the child health status $p(m_t)$. If UCTs increase child health by raising parental health spending per child m_t, the overall effect of UCTs on parental leisure is uncertain, depending on whether the income effect or the substitution effect dominates. In (6), the fertility choice n_t is affected directly by the income received by the parent, that is, wage rate w_t and UCTs T_t, as well as child health spending m_t, the child health status $p(m_t)$ and parental leisure z_t, or equivalently, parental non-leisure time $1-z_t$ which is the sum of labor and childrearing time. Since m_t and z_t are affected by T_t, as shown by (4) and (5), n_t is also affected indirectly by T_t through m_t, $p(m_t)$ and z_t. Hence, UCTs T_t have both the income and substitution effects on fertility.

To determine how UCTs T_t affect fertility n_t, we differentiate n_t in (6) with respect to T_t:

$$\frac{\partial n_t}{\partial T_t} = \frac{\rho}{\{w_t(vw_t + m_t)[1 + \rho p(m_t)]\}^2}\left\{p(m_t)(vw_t + m_t)(1 + \rho p(m_t)) \times \left(1 - w_t\frac{\partial z_t}{\partial T_t}\right) + [(1 - z_t)w_t + T_t]\frac{\partial m_t}{\partial T_t}\Upsilon_{1,t}\right\} \tag{7}$$

where

$$\frac{\partial z_t}{\partial T_t} = \frac{\eta\left[(1 + \eta + \rho p(m_t)) - \rho(w_t + T_t)p'(m_t)\frac{\partial m_t}{\partial T_t}\right]}{w_t[1 + \eta + \rho p(m_t)]^2} \tag{8}$$

$$\frac{\partial m_t}{\partial T_t} = \frac{p'(m_t)p(m_t)[1 + \eta + \rho p(m_t)][1 + (a + m_t)b]^4}{(w_t + T_t)\Upsilon_{2,t}} \tag{9}$$

$$\Upsilon_{1,t} \equiv p'(m_t)(vw_t + m_t) - p(m_t)(1 + \rho p(m_t)) \tag{10}$$

$$\Upsilon_{2,t} \equiv p(m_t)[1 + \eta + \rho p(m_t)][1 + (a + m_t)b] \times \left\{2b\ln n_t + \frac{[1 + (a + m_t)b](2 - \ln n_t)}{(vw_t + m_t)}\right\} - (1 + \eta). \tag{11}$$

In (7) and (10), the sign of $Y_{1,t}$ tends to be positive when the time and expenditure costs of rearing a child $(vw_t + m_t)$ are sufficiently large. In (8), when higher unconditional cash transfers increase parental health spending per child, that is, when $\partial m_t/\partial T_t > 0$, UCTs T_t increase parental leisure z_t and reduce parental labor and childrearing time $1-z_t$ if the preference for children ρ is sufficiently low compared with the preference for leisure η, that is, if the income effect dominates the substitution effect of cash transfers on parental leisure. In (9), UCTs T_t raise health spending per child m_t if the sign of $Y_{2,t}$ is positive, which tends to hold when the effect of external factors that reduce the child health status b is sufficient large. We summarize the main results in the following propositions:

Proposition 1 *Holding all other factors constant, if the effect of external factors that reduce the child health status is sufficiently large (small), higher unconditional cash transfers increase (reduce) parental health spending per child.*

Proposition 2 *Suppose higher unconditional cash transfers increase parental health spending per child. Then, holding all other factors constant, if the preference for children ρ is sufficiently low (high) compared with the preference for leisure η, higher unconditional cash transfers increase (reduce) parental leisure and reduce (increase) parental labor and child-rearing time.*

Using results in Propositions 1 and 2, we obtain the following Corollary that provides the effect of UCTs on fertility through the channels given by child health determined by parental health spending and parental leisure-labor-childrearing time.

Corollary 1 *Suppose the sign of $Y_{1,t}$ is positive. Higher unconditional cash transfers have a positive (negative) effect on fertility if higher unconditional cash transfers increase (reduce) health spending per child and the sign of $1 - w_t \frac{\partial z_t}{\partial T_t}$ is positive (negative).*

Intuitively, fertility increases with UCTs if (i) UCTs increase the marginal benefit of having a child by spending more on the health of a child, and (ii) UCTs reduce parental leisure and increase parental labor and childrearing time, or UCTs increase parental leisure and reduce parental labor and childrearing time but these effects are small such that the magnitude of $\partial z_t / \partial T_t$ is small so the sign of $1 - w_t \frac{\partial z_t}{\partial T_t}$ is positive. These results suggest that under these conditions, UCTs are likely to increase fertility if UCTs increase child health regardless of how UCTs affect parental leisure, labor, and childrearing time. These predictions are consistent with the empirical evidence which finds that government transfers may reduce adult work (Bastagli et al., 2016) or have no or little effect on adult work (Baird et al., 2018; Bastagli et al., 2016). Conceptually, UCTs may have little effect on parental leisure, labor and childrearing time when the opposing income and substitution effects of UCTs cancel each other out. In our theoretical model, UCTs increase parental leisure and reduce parental labor and childrearing time through the positive income effect, while UCTs reduce parental leisure and increase parental labor and childrearing time through the negative substitution effect when parents substitute child health for own leisure, as shown by Equation (5).

We find supporting evidence for some theoretical predictions given above. Our empirical results show positive and statistically significant impacts of UCTs on the fertility rate, child health and parental leisure, a negative and statistically significant impact of UCTs on parental working time, which may be explained by the theoretical predictions discussed above.

3 | PROGRAM DESIGN AND DATA

The Pakistan government launched the BISP in 2008 as a social protection program that makes cash payments to eligible families to help them: hedge against food crizes; increase their access to education; and eliminate poverty and empower women (Ambler & Brauw, 2023; GoP, 2020; Saleem, 2019; Watson et al., 2017). The BISP uses proxy means test (PMT) to identify eligible families drawing on information from the National Socio-Economic Registry (NSER), a survey conducted between 2010 and 2012. The UCT program, which transfers PKR 6000 (approximately USD 37) per quarter to each ultra-poor beneficiary family, covers about 5 million families across Pakistan. It focuses on women as the main beneficiaries, and therefore, eligible households need to include a woman who is currently married or has been married in the past (Nawaz & Iqbal, 2020; Saleem, 2019; Watson et al., 2017).

The program comprises two types of cash transfer schemes: (1) the UCT program and (2) the recently introduced CCT program that seeks to ensure eligible children between the ages of 5 and 12 years, who are currently studying, have increased access to education. Using data on more than 27 million Pakistan households from the NSER, the BISP employs the PMT to identify the eligible beneficiaries.[5] To make the cash payments to the beneficiaries, the BISP uses one of three options including: (1) mobile money, (2) Biometric Verification System (BVS) (i.e., systems that collect the beneficiary's biometric information), and (3) Debit card system, where a beneficiary is provided with a Benazir debit card to withdraw funds from either an ATM or other platform. The BISP's partner banks facilitate the disbursement of these cash payments using several agents, including retailers, mobile phone companies and other networks. When collecting their installments, the beneficiaries' Computerized National Identify Cards are scanned against their biometric information (Watson et al., 2017).

We employ household data on beneficiaries and non-beneficiaries of the BISP collected by Oxford Policy Management (OPM) on behalf of BISP.[6] The baseline, first round, second round and third round surveys were conducted in 2011, 2013, 2014 and 2016, respectively. Our main analysis is based on the fourth round of data collected in 2019, which is able to provide us with the most up-to-date information on fertility.[7] Data collection was based on a multistage sampling strategy with the baseline survey conducted in 488 clusters from 90 districts located in four provinces: Punjab, Khyber Pakhtunkhwa, Sindh and Balochistan. In the first stage of the multistage sampling strategy, stratified primary sampling units were chosen at provincial and rural-urban levels using a simple random sampling strategy based on information from the Pakistan Social and Living Standards Measurement (PSLM). The second stage involved the creation of a household listing that was used in a sampling framework in the selected primary sampling units. From the household listing, an average of 100 households were selected from each primary sampling unit (PSU) using a simple random sampling strategy. The survey was conducted between March 2019 and May 2019 to cover 12,557 households across Pakistan (see Appendix A, Table A1). Female and male questionnaires were used to collect information on fertility and other socioeconomic indicators.

3.1 | Fertility outcomes

We use multiple indicators of fertility consistent with the literature (see, e.g., Abadian, 1996; Awaworyi Churchill et al., 2022; Mishra & Awaworyi Churchill, 2020; Olson et al., 2019; Todd et al., 2012). We use information on child births at least one year after the baseline wave of the BISP cash transfers program—in this case, child births after 2012. The first indicator of fertility is a binary variable, which captures whether a child was born after 2012. Thus, we use a dummy variable that equals to 1 if a woman has any children born after 2012 and 0 if she does not. Table A2 shows that about 43% of households reported having a newborn after the cash transfers program. Second, as opposed to a dummy variable that captures fertility, we also use the count of newborns after 2012. The descriptive statistics in Table A2 show that since 2012, there has been an average 0.86 newborns with standard deviation of 1.21 (Table A2).

3.2 | Covariates

We include various covariates to control for the role of socioeconomic factors in explaining our outcome variables. Consistent with the literature, the covariates we control for include age of household head and spouse (in years), gender of household head (dummy variable, 1 for male and 0 for female) and household size. The summary statistics presented in Table A2 show that the average household size is 7.3 members per household; the average age of the household head is 49.7 years, while the average age of the household head's spouse is 44.4 years.

3.3 | Mediators

Following the predictions from our theoretical model, working hours, leisure time and child health as potential channels.[8] To measure child health, we use three indicator variables that capture if a child in the household is wasted, underweight or had diarrhea in the last 30 days. We also consider contraceptive use as a potential channel. The summary statistics in Table A2 show that the average daily working hours per household is 5.2 h while the average daily leisure hours per household is 7.2 h.

4 | IDENTIFICATION STRATEGY

To examine the impact of the BISP on fertility, we use an RDD approach. The RDD approach is commonly used in the literature to examine the impact of cash transfer and other social protection programs (Ambler & de Brauw, 2019; Awaworyi Churchill et al., 2021; Barrientos & Villa, 2015; Bergolo & Galván, 2018; Nawaz & Iqbal, 2020). Based on a set of eligibility criteria, in our case the PMT scores, the RDD approach addresses selection bias by introducing a discontinuity in the model around the eligibility cut-off (Calonico et al., 2014, 2018b; Hahn et al., 2001; Lee & Lemieux, 2014; Thistlethwaite & Campbell, 1960). The eligibility criteria for the BISP, which is based on PMT scores that range from 0 to 100, is used to identify the beneficiaries. Households with PMT scores that are less than or equal to 16.17 are eligible to become beneficiaries of the cash transfers program. Thus, our treatment and control groups are defined by the PMT threshold score of 16.17.

In the context of our research question, we estimate the following RDD model:

$$F_i = \beta_0 + \beta_1 T_i + f(\text{PMT}) + \sum \beta_i X_i + \mu_i \tag{12}$$

where F_i is the outcome variable, fertility, for household i; T_i is a binary variable equal to 1 if the household belongs to the treatment group (i.e., has a PMT score below 16.17) and 0 if the household belongs to the control group; X_i represents a set of covariates; μ_i is an error term; and (PMT) is a flexible running variable that captures the PMT scores. Our parameter of interest is β_1, which captures the impact of the BISP. We estimate Equation (12) using the bias-corrected variance estimator following Calonico, Cattaneo, and Farrell (2018).

Within the RDD framework, we are able to make comparisons between households just below the cut-off (i.e., beneficiaries) and those households that are just above the cut-off (i.e., non-beneficiaries). Thus, in the context of our analysis, the RDD calculates an average treatment effect of the BISP cash transfers by comparing outcomes on both sides of the eligibility threshold. Given that households just below and above the eligibility cut-off are compared in the RDD approach, the selection of a bandwidth, which is defined as the range of scores to either side of the threshold point, is essential to attaining robust estimates. In our empirical analysis, we use an optimal bandwidth, which we determine following Calonico et al. (2014). In further checks, we follow the existing literature that has examined the impact of the BISP and select the commonly used bandwidth of five (see, e.g., Ambler & de Brauw, 2019; Nawaz & Iqbal, 2020). We also examine the robustness and sensitivity of our results to a bandwidth of three.

The RDD Is not without It challenges, and thus there are some potential threats to identification. First, a key identification assumption in the implementation of the RDD is that differences between fertility of the treatment and control groups is attributable to the BISP. For this assumption to hold, it is important that the systematic differences between the beneficiaries and non-beneficiaries do not vary discontinuously at the PMT cut-off score of 16.17. This assumption is likely to be violated if other social security programs in Pakistan employ the same threshold for eligibility. However, we do not have this problem since no other social security program in Pakistan uses the same threshold to determine eligibility (Cheema et al., 2016).

Second, it is important to demonstrate discontinuity, and therefore we need to provide confirmation of whether the BISP targeting is intended. The application of the RDD using the 16.17 eligibility cut-off is not valid if targeting is not intended. Although it is generally known that the cash transfers from the BISP are intended because transfers only go to eligible households determined using the PMT scores, we also visually inspect this in our data. A plot of the probability of receiving cash transfers against the PMT scores, as shown in Figure A1, demonstrates the existence of discontinuity.

Third, another threat to identification that will invalidate the RDD emerges if households are able to manipulate their PMT scores to attain lower scores to become eligible for transfers. However, this seems implausible given that PMT scores are constructed using information on 23 indicators, none of which can be manipulated given the credibility of the various sources from which the relevant information is drawn. Thus, in general, while some individuals may be able to present themselves as poor, the level of manipulation or forgery required to come close enough to the eligibility cut-off is implausible. We confirm the absence of manipulation around the cut-off using various tests. Figure A2 reports a histogram of the PMT scores, which show no visible pattern to suggest that a mass exists directly to the left of the discontinuity. From Figure A2, although there are some obvious spikes in the PMT scores, there is no visible pattern that suggests manipulation at the cut-off. We also apply a formal test for manipulation based on the density discontinuity, which is constructed using local-polynomial density estimators (Calonico, Cattaneo, Farrell, et al., 2018). The formal manipulation test is based on the idea that in the absence of systematic manipulation of the unit's index around the eligibility cut-off, the density of units should be continuous near the cut-off value. Thus, the test seeks to determine whether there is evidence of a discontinuity in the density of units at the cut-off point. Evidence of discontinuity in this context is interpreted as evidence of non-random sorting of units or self-selection into treatment and control groups. The results of the test by Calonico, Cattaneo, Farrell, et al. (2018), which are presented in Figure A3, show no evidence of systematic manipulation of the PMT scores. This finding is consistent with other studies that have applied the BISP data, and thus substantiates the validity of the RDD approach (Ambler & Brauw, 2023).

Last, the validity of the RDD rests on the assumption that observed predetermined characteristics of households on both sides of the cut-off would have identical distributions as the bandwidth narrows. Thus, the expectation is that the observables, for instance, household characteristics, should have no discontinuities, and this is crucial to ensure that the RDD is capturing the impact of only the BISP on the outcome variables. We confirm these discontinuities by examining the impact of the BISP on household characteristics at baseline. The results reported in Table A3 and Figure A4 show that the BISP intervention has no significant impact on household characteristics.

5 | EMPIRICAL RESULTS

Figure A5 presents graphical evidence on the impact of the BISP cash transfers on fertility while Table 1 presents regression estimates. Panel A of Table 1 presents results for effects on fertility as a binary variable reflecting whether the household has had any children after the BISP intervention. Panel B reports results for effects on fertility using total number of children after the intervention. Results in Column (1) are based on a parsimonious model that does not include the relevant control variables and provincial fixed effects. Column (2) builds on the first model by controlling for provincial fixed effects. In Column (3), we report results that control for relevant covariates but not provincial fixed effects. In Column (4), we report results from the most complete model that controls for all covariates and provincial fixed effects. In all regressions, we cluster our standard errors at the PSU level.

From Column (1) of Panel A, we find that the BISP intervention is associated with a higher probability of having a child following the intervention. Specifically, the UCT is associated with a 10.8% higher probability of households in the treatment group having a child compared to the control group. This effect remains significant across all columns as we add on different fixed effects and the relevant covariates, albeit with a decline in magnitude. In Column (4), when we control for socioeconomic characteristics, we find that the UCT is associated with a 6.7% higher probability of households in the treatment group having a child compared to the control group. From Panel B, we find that the BISP intervention is associated with an increase in the number of children born following the intervention. Thus, the total number of children for BISP beneficiaries increases compared to non-beneficiaries. Specifically, we find that the BISP intervention is associated with an increase of between 0.20 and 0.31 in the number of children born following the intervention.

TABLE 1 Impact of cash transfers on childbirth.

	(1)	(2)	(3)	(4)
Panel A: Childbirth dummy variable				
Cash transfers	0.108***	0.092**	0.058*	0.067*
	(0.037)	(0.042)	(0.031)	(0.037)
Optimal BW	1.223	0.912	1.210	0.856
Effective observations	2488	1931	2000	1495
Panel B: Total number of child births				
Cash transfers	0.313***	0.235**	0.203**	0.259**
	(0.111)	(0.095)	(0.084)	(0.101)
Optimal BW	0.883	1.009	1.158	0.728
Effective observations	1877	2121	1935	1282
Covariates	No	No	Yes	Yes
Provincial dummy	No	Yes	No	Yes
Cluster (PSU)	Yes	Yes	Yes	Yes

Note: RDD estimates are bias-corrected and based on 2019 survey data using optimal bandwidths and a uniform kernel. Control variables include household size, gender of household head, age of household head, age of spouse and log monthly household expenditures. We report standard errors clustered at the primary sampling unit.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

Overall, the conclusions emerging from Panels A and B of Table 1 suggest that the BISP intervention is significantly associated with the probability of having a child post intervention. The findings that cash transfers have a positive effect on fertility is consistent with the fertility fears argument suggesting the UCTs can provide incentives for fertility. This is in contrast to the literature that has reported no effects on fertility for CCTs and UCTs. Stecklov et al. (2007), for instance, find that CCTs had no effects on fertility in Nicaragua and Mexico while Palermo et al. (2016) focus on Zambia and find that UCTs had no effects on fertility.

6 | FURTHER ANALYSIS AND SENSITIVITY CHECKS

In this section, we conduct a serious of checks to examine the robustness of our results. We focus on alternative estimation strategies, alternative bandwidth, the impact of the BISP intervention over time and a set of heterogeneity analysis.

6.1 | The hazard model: An alternative identification strategy

The hazard model allows us to estimate the probability that a birth will occur for an individual in each time period, conditional on the event (i.e., birth) not occurring in a previous time period. Thus, in the context of our study, the hazard model will allow us to estimate the period-specific child birth probabilities. Contrary to the RDD, which utilizes information relating to a fixed bandwidth and therefore does not use all observations but rather a specified number of participants around the PMT threshold, the hazard model utilizes all available information to evaluate the impact of BISP cash transfer on fertility. Thus, we follow the existing literature that has applied hazard models to analyze the timing and spacing of births in different contexts to estimate the impact of the BISP cash transfer on fertility rate (see, e.g., Heckman & Walker, 1991; Newman & McCulloch, 1984; Todd et al., 2012).

The empirical specification of the hazard model Is given as follows:

$$h_i(t) = \Pr(T_i = t | T_i \geq t, X_{it}) \tag{13}$$

where h is the hazard rate of birth for i in risk period t. X represents a set of covariates while T is a period in which the event happened. We apply the Cox proportional hazards estimation approach, which is a semi-parametric model that allows the baseline hazard function to be nonparameterized while the other covariates are parameterized.

Given our research question and the focus on the BISP intervention, the specified hazard model can be expressed as:

$$h_i(t) = h_{0s}(t)\exp(\lambda \text{BISP}_i + \beta X_i + \alpha R_i + \sigma P_i) \tag{14}$$

where, as before, h is the hazard rate of birth, BISP is a dummy variable capturing whether a respondent is a beneficiary or not; X is vector of covariates; R is a vector of dummy variables indicating the periods in which risk started; and P is vector of dummy variables that controls for provincial fixed effects. This model allows us to estimate the impacts of BISP cash transfer on the hazard rate of birth for the beneficiaries relative to the control groups (i.e., non-beneficiaries).

The results from the hazard model are presented in Table 2 with hazard ratios reported in square brackets. We follow a similar approach to Table 1 and report four different models that represent the control of different fixed effects and covariates. Across all columns, the results from Panel A suggest that the BISP intervention has a positive and significant impact on total number of child births. The most complete model from Column (4) show that the estimated coefficient is 0.049, which translates into a hazard ratio of 1.05 and thus suggests that BISP cash transfers increase the hazard of a birth occurring by approximately 5% points. Thus, relative to non-beneficiaries, beneficiaries of the UCTs tend to have relatively more children.

6.2 | Alternative specifications

Our main results are based on an optimal bandwidth, which is determined using the test proposed by Calonico et al. (2014). We examine the robustness of our results to the choice of bandwidth by using alternative bandwidths of

TABLE 2 Impact of cash transfers on fertility (hazard model).

	(1)	(2)	(3)	(4)
Panel A: Total number of child births				
Cash transfers	0.052 [1.053]	0.054 [1.055]	0.046 [1.047]	0.046 [1.048]
	(0.019)***	(0.019)***	(0.020)**	(0.020)**
Covariates	No	No	Yes	Yes
Provincial dummy	No	Yes	No	Yes
Cluster (PSU)	Yes	Yes	Yes	Yes

Note: Hazard ratios are reported in square brackets. Full set of covariates are consistent with Table 1. Standard errors in parentheses.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

TABLE 3 Impact of cash transfers on fertility: Alternative bandwidth.

	(1)	(2)	(3)	(4)
Panel A: Childbirth dummy variable				
Bandwidth 3				
Cash transfers	0.095***	0.075***	0.049***	0.051***
	(0.023)	(0.022)	(0.019)	(0.018)
Effective observations	6587	6587	5345	5345
Bandwidth 5				
Cash transfers	0.093***	0.081***	0.035**	0.036**
	(0.018)	(0.017)	(0.015)	(0.014)
Effective observations	10,278	10,278	8402	8402
Panel B: Total number of child births				
Bandwidth 3				
Cash transfers	0.288***	0.216***	0.200***	0.179***
	(0.061)	(0.055)	(0.051)	(0.049)
Effective observations	6587	6587	5345	5345
Bandwidth 5				
Cash transfers	0.279***	0.235***	0.170***	0.158***
	(0.048)	(0.044)	(0.039)	(0.038)
Effective observations	10,278	10,278	8402	8402
Covariates	No	No	Yes	Yes
Provincial dummy	No	Yes	No	Yes
Cluster (PSU)	Yes	Yes	Yes	Yes

Note: RDD estimates are bias-corrected and based on 2019 survey data using bandwidths 3 and 5 and a uniform kernel. Control variables include household size, gender of household head, age of household head, age of spouse and log monthly household expenditures. We report standard errors clustered at the primary sampling unit.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

three and five, which is consistent with the literature that has examined the impact of the BISP. The results for alternative bandwidth reported in Table 3 are generally consistent with our main results.

Our main results are estimated using the bias-corrected variance estimator. In Table 4, we examine the robustness of our results to the biased-corrected robust RDD estimates, which have been shown to yield unbiased standard errors

TABLE 4 Impact of cash transfers on fertility (bias-corrected with robust variance estimator).

	(1)	(2)	(3)	(4)
Panel A: Childbirth dummy variable				
Cash transfers	0.108**	0.092*	0.058	0.067
	(0.044)	(0.053)	(0.040)	(0.047)
Optimal BW	1.223	0.912	1.210	0.856
Effective observations	2488	1931	2000	1495
Panel B: Total number of child births				
Cash transfers	0.313**	0.235*	0.203*	0.259**
	(0.143)	(0.123)	(0.110)	(0.128)
Optimal BW	0.883	1.009	1.158	0.728
Effective observations	1877	2121	1935	1282
Covariates	No	No	Yes	Yes
Provincial dummy	No	Yes	No	Yes
Cluster (PSU)	Yes	Yes	Yes	Yes

Note: RDD estimates are robust and based on 2019 survey data using optimal bandwidths and a uniform kernel. Control variables include household size, gender of household head, age of household head, age of spouse and log monthly household expenditures. We report standard errors clustered at the primary sampling unit.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

(Calonico et al., 2020; He & Bartalotti, 2020). We find that the results are generally consistent with our main results. Specifically, the BISP cash transfers have a positive and significant impact on the number of child births after cash transfers. We also examine the robustness of our RDD results to the use of different polynomial functions. The results, which are reported in Table A4, are consistent with our main findings.

In Table A5, we examine the robustness of our results to the exclusion of districts in which the CCT program was operational. In 2013, the BISP initiated the Waseela-e-Taleem (WeT) program, a CCT program aimed at providing financial assistance to beneficiaries to improve primary education. The WeT program launched as a pilot in five districts and extended to an additional 27 districts in 2015 (Cheema et al., 2016). By 2019, the program had been launched in 50 districts nationwide although it was fully operational only in 32 districts (Cheema et al., 2020). In additional checks, we exclude these districts from our sample to ensure that our results are not capturing potential effects from the CCT. The results presented in Table A5 reinforce the findings of positive effects of the UCT on total number of child births with weaker support for the probability of childbirth.

In Table A6, we examine the robustness of our results to the exclusion of all contemporaneous covariates. It is likely that the contemporaneous covariates are affected by the treatment over time, and thus, we exclude all post-treatment covariates from the model. We find that our results remain robust.

6.3 | Effects over time and other checks

Our main estimates are based on an analysis of the latest round of survey data collected for the BISP program. Although this presents us with a good overview and most recent evidence on whether the BISP intervention has influenced fertility decisions, it is less able to speak to how effects have evolved over time. Thus, in further checks, we examine the impact of the intervention at different time intervals by focusing on the 2013 (first round) and 2016 (second round) surveys. The results, which are reported in Table 5, show that the impact of the BISP intervention is mostly statistically insignificant using the first-round data (2013). This implies that cash transfers do not induce fertility changes in the short term. In contrast, the analysis of the second-round data (2016) shows that there is evidence to suggest BISP cash transfers have significant effects on total number of child births with statistical significance at a higher level. Viewed

TABLE 5 Impact of cash transfers on fertility in 2013 and 2016.

	(1)	(2)	(3)	(4)
Panel A: Childbirth dummy variable				
Round 2016				
Cash transfers	0.004	0.002	0.009	0.011
	(0.016)	(0.016)	(0.014)	(0.014)
Effective observations	9611	9611	7897	7897
Round 2013				
Cash transfers	−0.000	−0.001	−0.000	−0.001
	(0.021)	(0.020)	(0.019)	(0.019)
Effective observations	2402	2402	2080	2080
Panel B: Total number of child births				
Round 2016				
Cash transfers	0.073**	0.065**	0.099***	0.095***
	(0.032)	(0.032)	(0.029)	(0.029)
Effective observations	9611	9611	7897	7897
Round 2013				
Cash transfers	0.054	0.051	0.061*	0.059*
	(0.034)	(0.034)	(0.032)	(0.032)
Effective observations	2402	2402	2080	2080
Covariates	No	No	Yes	Yes
Provincial dummy	No	Yes	No	Yes
Cluster (PSU)	Yes	Yes	Yes	Yes

Note: RDD estimates are bias-corrected and based on 2013 and 2016 survey rounds data using bandwidth 5 and a uniform kernel. Control variables include household size, gender of household head, age of household head and age of spouse. We report standard errors clustered at the primary sampling unit.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

together with the results from our main analysis, which focuses on the third-round survey (2019), our results imply that impact of the BISP on fertility evolves over time.

6.4 | Heterogeneity analysis

In additional checks, we conduct a series of heterogeneity analyses to examine which groups of individuals or households are driving our results. We consider if there are differences across the gender, age, and literacy level of the household heads. We also consider the working status of the mothers. The results for our heterogeneity analysis are presented in Tables A7.

For age, given that the odds of fertility significantly decline after the age of 40, we consider two sub-samples that focus on those above 45 years and those up to the age of 45 years. The results show that the positive effect of cash transfers on fertility is mostly driven by households with relatively younger heads. Our findings also demonstrated that the positive effects of cash transfers on fertility are driven by households with heads that are illiterates as well as those with heads that are female. We also find that the impact of cash transfers on fertility are more pronounced for non-working mothers compared to working mothers, in line with empirical evidence that cash transfers might have little effect on adult work (Baird et al., 2018; Bastagli et al., 2016) or the theoretical prediction that the fertility effect of working time might be negligible.

TABLE 6 Impact of cash transfers on potential mediators (potential channel analysis).

	Parental working hours	Parental leisure	Diarrhea	Wasting	Underweight	Contraception
Cash transfers	−0.162***	0.105***	−0.082***	−0.077***	−0.067***	−0.168***
	(0.050)	(0.012)	(0.030)	(0.029)	(0.020)	(0.026)
Effective observations	7497	8402	8402	8402	8402	8402
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Provincial dummy	Yes	Yes	Yes	Yes	Yes	Yes
Cluster (PSU)	Yes	Yes	Yes	Yes	Yes	Yes

Note: RDD estimates are bias-corrected and based on 2019 survey rounds data using bandwidth 5 and a uniform kernel. Control variables include household size, gender of household head, age of household head and age of spouse. We report standard errors clustered at the primary sampling unit.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

7 | POTENTIAL CHANNEL ANALYSIS

We consider parental working hours, child health, contraceptive usage and parental leisure as potential channels through which UCTs influence fertility. Here, we examine if each of the potential channel variables are correlated with the cash transfers variable. Table 6 present results for the impacts of the BISP intervention on parental working hours, parental leisure, contraceptive usage and child health outcomes including the prevalence of diarrhea, wasting and underweight. The findings from Table 6 demonstrate that cash transfers are associated with an improvement in child health. Specifically, the BISP intervention is associated with a decline in the probability that a child will have diarrhea, be wasted or underweight. Given the trade-offs between parental working hours and leisure time, the expectation is that if households are spending more time on labor, then they forgo leisure. Our empirical results suggest that the BISP has a negative effect on working hours and a positive effect on leisure time. This finding is consistent with the dependency hypothesis that cash transfers discourage adult work (Banerjee et al., 2017). We also find that cash transfers is associated with a decline in contraceptive usage, which could explain the increase in fertility. Additionally, the findings from Table 6 provide suggestive evidence that by reducing parental working hours and the probability of a child being ill, cash transfers increase fertility, which is consistent with our theoretical predictions.

8 | CONCLUSION

Increase in fertility is often argued as an unintended consequence of cash transfer programs given that such programs are usually targeted at households with children, and thus could be seen as an incentive for more children (Wilcox et al., 1996). These concerns around fertility are reflected in the fact that fertility is not just an independent development outcome, but is also considered an important factor that influences several outcomes including health and human capital accumulation (see, e.g., Bhalotra & Clarke, 2019; Chu et al., 2013; Lee & Mason, 2010). For Pakistan, persistent annual growth in population, which has been accompanied by many development issues, is often linked to high levels of fertility. Despite sustained efforts to reduce fertility, including the introduction of a national family planning initiative that dates back to the 1960s, the average fertility rate remained above six children per woman for several decades (Robey, 1991) until more recently, when this declined to an average of 3.8 births per woman (Chaudhry et al., 2021; Hardee & Leahy, 2008).

We examined if Pakistan's nation-wide social security program, the BISP, has contributed to increasing fertility. We first presented a simple theoretical model in which we show how UCTs affect parents' decisions on fertility, leisure-labor-childrearing time, and child health. Our theoretical model demonstrated that fertility increases with UCTs: if (i) UCTs increase the marginal benefit of having a child by spending more on the health of a child, and (ii) UCTs reduce parental leisure and increase parental labor and childrearing time, or UCTs increase parental leisure and reduce parental labor and childrearing time but these effects are small. These results suggest that under these conditions, UCTs are likely to increase fertility if UCTs increase child health spending regardless of how UCTs affect parental leisure, labor, and childrearing time. We further applied an RDD approach to administrative data on the BISP cash transfer program and empirically examined the impact of UCTs on the probability of childbirth and total number of child births. Following the predictions of the theoretical model, we also examined working time, leisure and child health as potential channels. We find that UCTs have a positive effect on fertility. We also find that the positive effects of UCTs can be explained by the mediating effects of parental working hours, and primarily, child health. Our empirical results imply that despite causing a higher fertility rate, the BISP increases parental leisure and promotes child health. We also observe that the positive effects of the BISP intervention on fertility only becomes significant overtime, and regardless, the effect sizes are relatively small.

Our findings yield some policy implications. The positive effects of BISP on parental leisure and child health tend to improve the wellbeing of UCTs recipients as well as children born to UCTs recipients. Furthermore, improvements in child health may increase children's life expectancy and future productivity, leading to longer working life and higher lifetime income and consumption. In the long run, the positive effect of a healthier labor force may counteract the negative effect of higher fertility on the average standard of living at the aggregate level.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the Benazir Income Support Programme (BISP). Restrictions apply to the availability of these data, which were used under license for this study. Data are available directly from the BISP. The data (i.e., replication materials and instructions on data access) is also openly available in the openICPSR Western Economic Association International Data and Code Repository at https://doi.org/10.3886/E193101V5.

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ENDNOTES

[1] See also reviews by Parker et al. (2007), Fiszbein and Schady (2009), Bastagli et al. (2016) and Garcia and Saavedra (2017).

[2] We assume agents within the same generation are identical.

[3] This parental preference is consistent with the literature on the quantity and quality of children (e.g., Azarnert, 2010; Becker & Lewis, 1973; De la Croix & Doepke, 2004).

[4] We summarize this result later in Proposition 1.

[5] Details on NSER are available at http://bisp.gov.pk/cash-grant/#objective946d-4435.

[6] More information on OPM is available at https://www.opml.co.uk/our-locations/pakistan.

[7] In robustness checks, we also examine the impact of the BISP intervention on fertility over time, and thus, we use data from the first and second round surveys as well. Although the BISP was launched in 2008, the baseline survey was conducted in 2011, and thus for the purposes of our analysis, we consider children born after 2011.

[8] We do not have data on childrearing time and expenditure on child health.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX A

TABLE A1 Distribution of sample (fourth round survey).

Province/region	Non-beneficiaries (control)	Beneficiaries (treatment)	Total
Punjab	1458	1647	3105
Sindh	1494	1946	3440
Khyber Pakhtunkhwa	1124	1408	2532
Baluchistan	595	688	1283
GB	667	738	1405
FATA	392	386	778
Total	5730	6813	12,543

Source: (GoP, 2020).

TABLE A2 Summary statistics.

Variables	Beneficiaries Mean	Beneficiaries SD	Non-beneficiaries Mean	Non-beneficiaries SD	Full sample Mean	Full sample SD
Fertility measures						
Has childbirth after CT	0.435	0.496	0.436	0.496	0.435	0.496
Total number of child births after CT	0.851	1.188	0.888	1.228	0.868	1.206
Mediators						
Family working hours per day (hours)	4.307	0.706	4.241	0.682	4.277	0.696
Leisure time (hours)	5.288	0.176	5.29	0.167	5.289	0.172
Diarrhea	0.199	0.399	0.207	0.405	0.203	0.402
Underweight	0.129	0.336	0.142	0.349	0.135	0.342
Wasting	0.066	0.248	0.075	0.264	0.07	0.255
Use of contraceptive	0.354	0.478	0.35	0.477	0.352	0.478
Covariates						
Gender of head (1 if male)	0.853	0.354	0.858	0.349	0.855	0.352
Age of head (years)	50.199	11.588	49.268	12.73	49.773	12.132
Age of spouse (years)	45.118	10.076	43.75	11.508	44.5	10.767
Employed head	0.657	0.475	0.669	0.471	0.662	0.473
Household size (continuous)	7.79	3.199	7.119	3.057	7.484	3.152
Log consumption expenditure	10	0.408	9.935	0.445	9.97	0.426

Abbreviation: CT, cash transfer.

Source: Author's formulation based on survey data.

TABLE A3 Household demographic indicators at baseline.

Variables	(1) Male headed HH	(2) Age of head	(3) Age of spouse	(7) HH size
Bandwidth—5	0.033	−0.477	−1.481	−0.002
	(0.021)	(1.016)	(0.901)	(0.240)
Obs	2293	2293	2053	2293
BW	5.00	5.00	5.00	5.00
Bandwidth—3	−0.010	−1.815	−0.811	−0.230
	(0.026)	(1.281)	(1.167)	(0.293)
Obs	1488	1488	1337	1488
BW	3.00	3.00	3.00	3.00
Bandwidth—optimal	−0.016	−3.662*	−1.675	−0.043
	(0.040)	(1.940)	(1.716)	(0.512)
Obs	605	649	624	459
BW	1.22	1.36	1.48	0.90

Note: HH denotes household. RDD estimates are bias-corrected and based on 2019 survey rounds data and a uniform kernel. We report standard errors clustered at the primary sampling unit.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

TABLE A4 Impact of cash transfers on fertility: Different polynomial functions.

	Childbirth dummy variable (1)	Total number of child births (2)
Panel A: Polynomial order 2 ($p = 2$)		
Cash transfers	0.093**	0.226**
	(0.043)	(0.114)
Effective observations	8402	8402
Panel B: Polynomial order 3 ($p = 3$)		
Cash transfers	0.018	0.505***
	(0.059)	(0.159)
Effective observations	8402	8402
Covariates	Yes	Yes
Provincial dummy	Yes	Yes
Cluster (PSU)	Yes	Yes

Note: RDD estimates are bias-corrected and based on 2019 survey data using bandwidth 5 and a uniform kernel. Control variables include household size, gender of household head, age of household head, age of spouse and log monthly household expenditures. We report standard errors clustered at the primary sampling unit.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

TABLE A5 Impact of cash transfers on childbirth (sensitivity to dropping of conditional cash transfers [CCTs] districts).

	(1)	(2)	(3)	(4)
Panel A: Childbirth dummy variable				
Cash transfers	0.097*	0.070	0.041	0.049
	(0.055)	(0.050)	(0.037)	(0.037)
Optimal BW	1220	1240	1514	1405
Effective observations	0.097*	0.070	0.041	0.049
Panel B: Total number of child births				
Cash transfers	0.404**	0.258*	0.251**	0.225**
	(0.165)	(0.139)	(0.113)	(0.103)
Optimal BW	1002	1055	1282	1260
Effective observations	0.404**	0.258*	0.251**	0.225**
Covariates	No	No	Yes	Yes
Provincial dummy	No	Yes	No	Yes
Cluster (PSU)	Yes	Yes	Yes	Yes

Note: RDD estimates are bias-corrected and based on 2019 survey data using optimal bandwidths and a uniform kernel. Control variables include gender of household head, age of household head and age of spouse. We report standard errors clustered at the primary sampling unit in parentheses.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

TABLE A6 Impact of cash transfers on childbirth (excluding household size and expenditures).

	(1)	(2)
Panel A: Childbirth dummy variable		
Cash transfers	0.053	0.072*
	(0.035)	(0.038)
Optimal BW	1.046	0.847
Effective observations	1766	1479
Panel B: Total number of child births		
Cash transfers	0.204**	0.176*
	(0.091)	(0.099)
Optimal BW	1.078	0.872
Effective observations	1836	1503
Covariates	Yes	Yes
Provincial dummy	No	Yes
Cluster (PSU)	Yes	Yes

Note: RDD estimates are bias-corrected and based on 2019 survey data using optimal bandwidths and a uniform kernel. We report standard errors clustered at the primary sampling unit in parentheses.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

TABLE A7 Impact of cash transfers on fertility (heterogeneity analysis).

	Childbirth dummy variable		Total number of child births	
	(1)—Female	(2)—Male	(3)—Female	(4)—Male
Panel A: Gender of household head				
Cash transfers	0.144***	0.083***	0.291***	0.275***
	(0.040)	(0.019)	(0.088)	(0.052)
	(1)—Illiterate	(2)—Literate	(3)—Illiterate	(4)—Literate
Panel B: Literacy level				
Cash transfers	0.141***	0.038	0.426***	0.102
	(0.023)	(0.026)	(0.056)	(0.067)
	(1)—Age > 45	(2)—Age ≤ 45	(3)—Age > 45	(4)—Age ≤ 45
Panel C: Age of household head				
Cash transfers	−0.007	0.131***	0.011	0.424***
	(0.018)	(0.022)	(0.036)	(0.073)
	(1)—Worker	(2)—Non-worker	(3)—Worker	(4)—Non-worker
Panel D: Working status				
Cash transfers	0.051**	0.101***	0.194***	0.293***
	(0.026)	(0.022)	(0.059)	(0.061)
Covariates	Yes	Yes	Yes	Yes
Provincial dummy	Yes	Yes	Yes	Yes
Cluster (PSU)	Yes	Yes	Yes	Yes

Note: RDD estimates are bias-corrected and based on 2019 survey data using 5 bandwidths and a uniform kernel. We report standard errors clustered at the primary sampling unit in parentheses.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Author's formulation based on survey data.

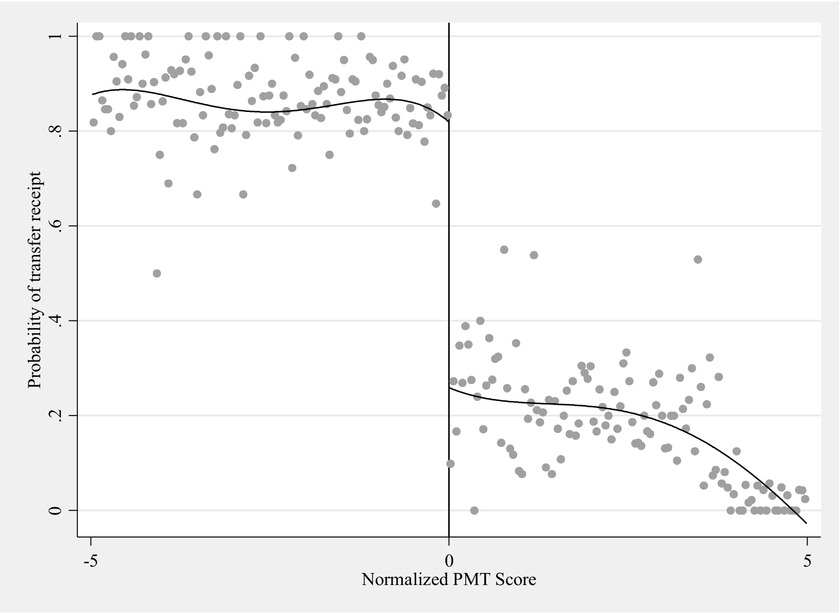

FIGURE A1 Discontinuity test. *Source*: Author's formulation based on survey data.

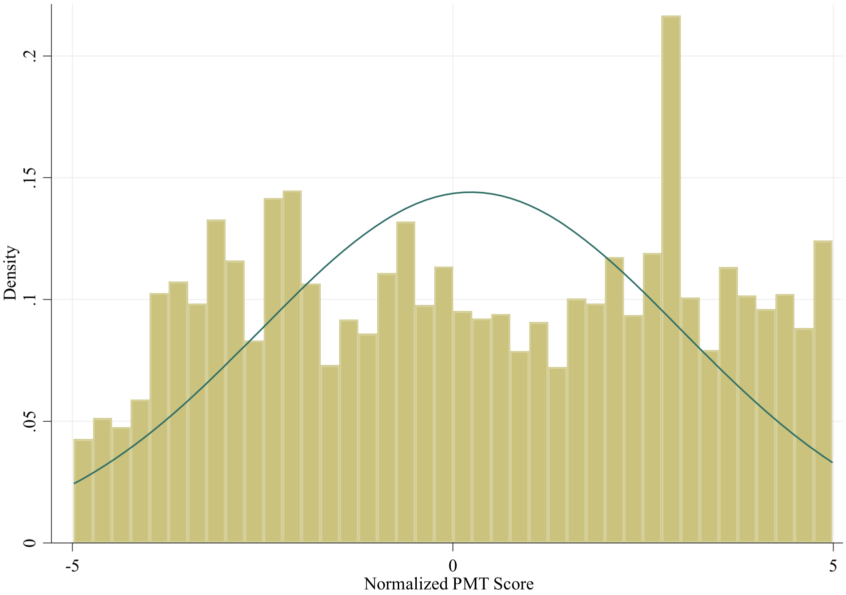

FIGURE A2 Histogram proxy means test (PMT) score. *Source*: Author's formulation based on survey data.

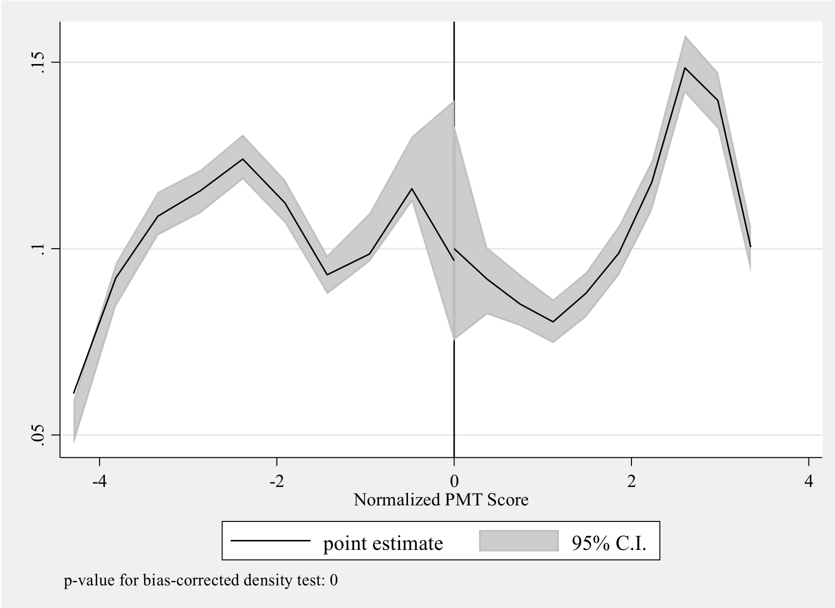

FIGURE A3 Manipulation test plot. *Source*: Author's formulation based on survey data.

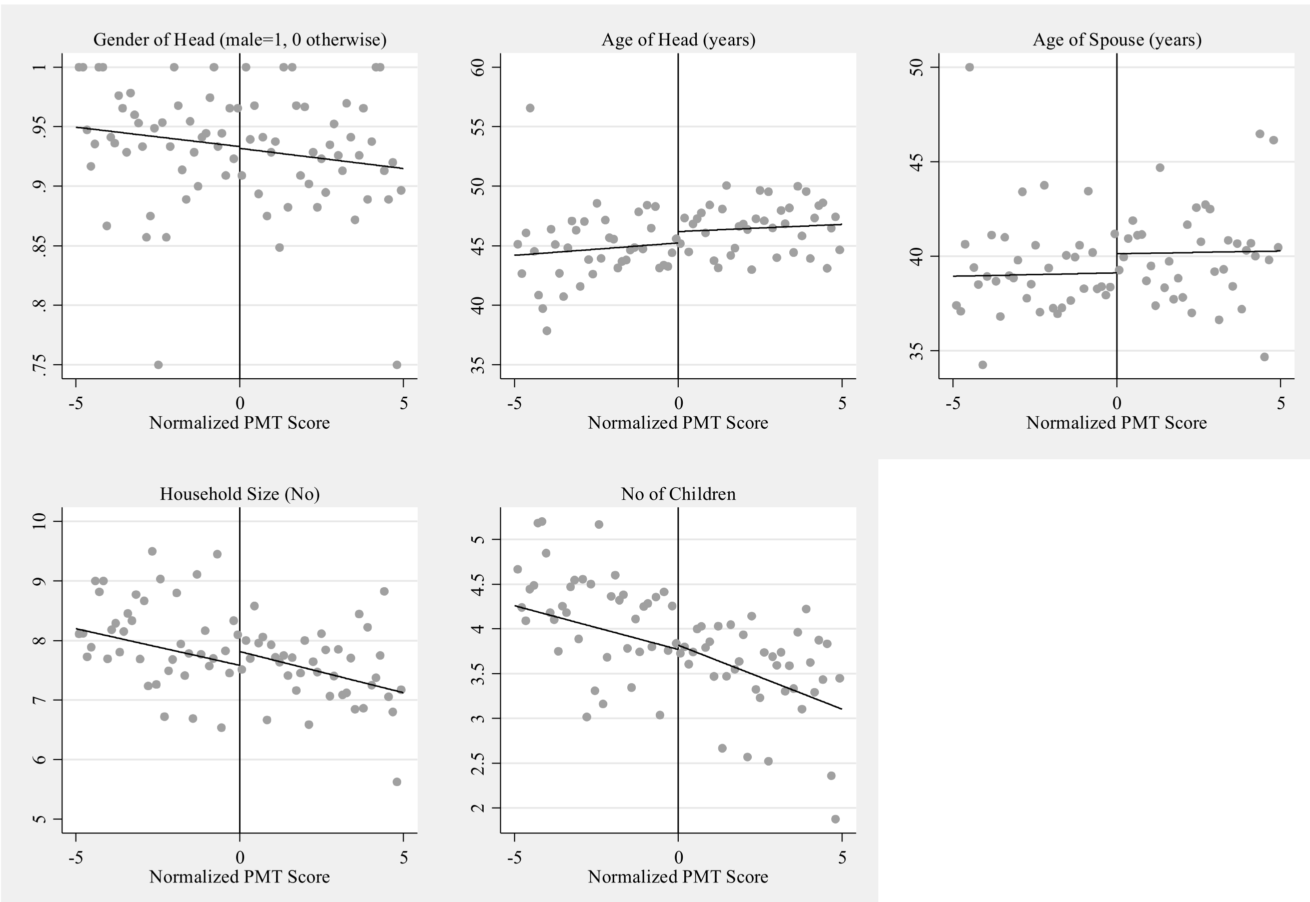

FIGURE A4 Household demographic indicators (baseline survey): Regression Discontinuity (RD) plot. *Source*: Author's formulation based on survey data.

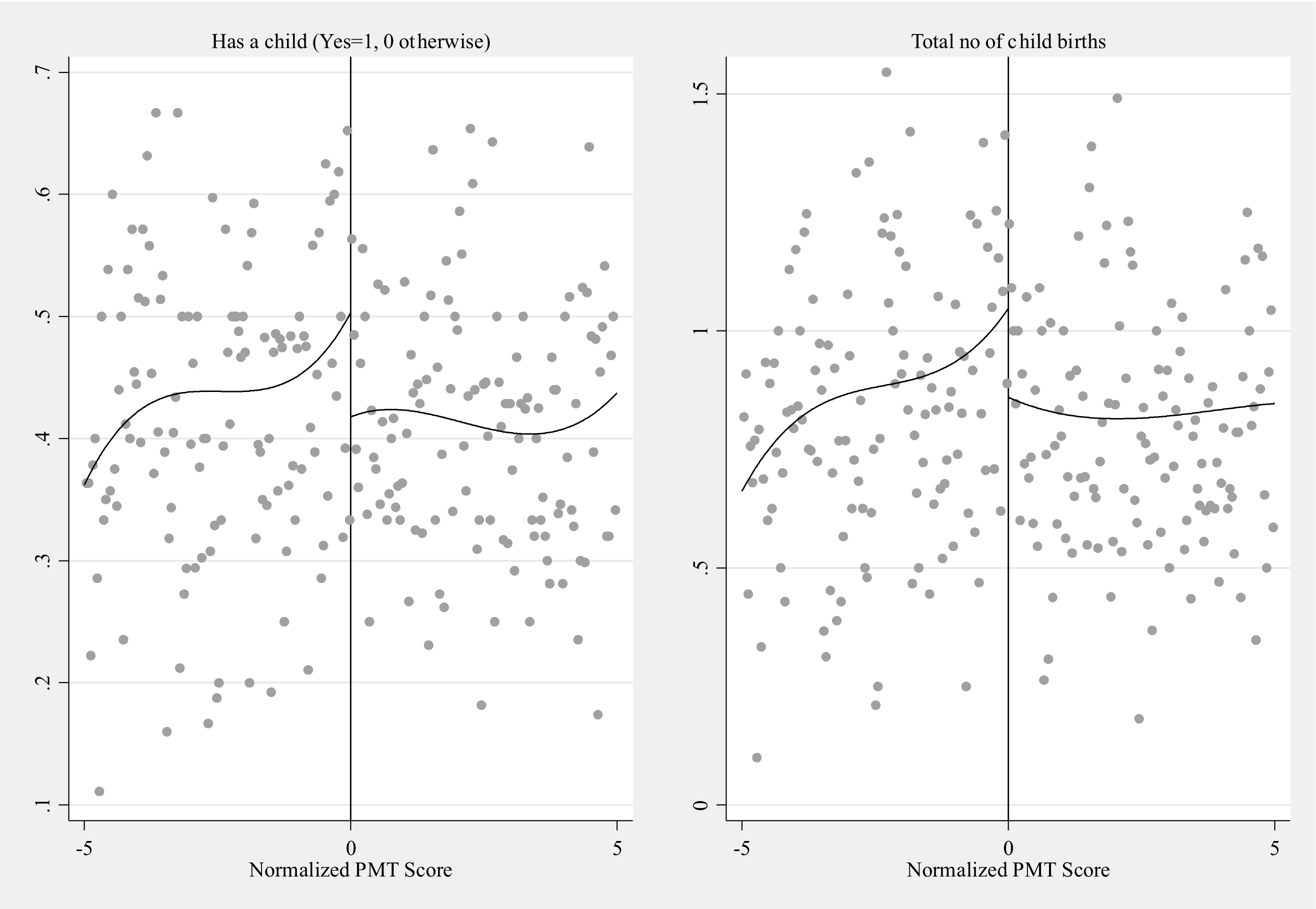

FIGURE A5 Impact of cash transfers on child births (RD Plot). *Source*: Author's formulation based on survey data.