Conditional Cash Transfers, Household Time Allocation and Bargaining Power: The Human Development Bonus in Ecuador*

José L. Casco†

The Bank of Mexico

The most recent version is available here.

Abstract

Many developing countries provide cash transfers to low-income families. Exogenous changes in the household income coming from a cash transfer program may alter the bargaining power of the recipient and the allocation of time within the family. Using a large-scale living standards measurement survey from Ecuador, I implement a fuzzy regression discontinuity design to show that conditional cash transfers affect the women's freedom to decide (bargaining power) as well as women's time allocation to certain activities. To complement the empirical results, I propose an intra-household decision-making model to study how heterogeneity in preferences over child quality induced by the conditionality of the transfer and differences in female income relative to male income affect the optimal decisions of household members related to time allocation and home production. In a further quantitative exercise, I compare how a household behaves in a scenario without a transfer versus a scenario with a cash transfer equivalent to the amount provided by the program.

JEL Classification: D13, I38, J22, O12.

Keywords: Cash transfer programs, regression discontinuity, time use, bargaining power.

*The views and conclusions presented in this paper are the authors' exclusively and do not necessarily reflect those of Banco de México and its Board of Governors. I am grateful to Paul Glewwe, Joseph Ritter, Aaron Sojourner, Jason Kerwin, Julieth Santamaria, Salomon Garcia, Monika Fellmer and seminar participants at the Economic Development Seminar at the University of Minnesota, the Midwest International Economic Development Conference at the University of Wisconsin-Madison and the Development Economics and Policy Conference of the Research Group on Development Economics of the German Economic Association.

†Economics Research Division, The Bank of Mexico, jose.casco@banxico.org.mx.

1 Introduction

The main reason many governments in developing countries implement Conditional Cash Transfer (CCT) programs is to alleviate poverty by boosting the incomes of the poor. Over the last twenty years, these types of safety net programs have become an increasingly important part of the social policy in many Latin American countries and have expanded to multiple developing countries around the world.[1] By influencing the amount of resources available to poor households, these programs intend to promote desirable social outcomes such as better childhood education and health, productive activities and gender empowerment. To attain these goals, most countries that have launched CCT programs have stipulated that the beneficiary of the transfer had to be the female head or the spouse of the male head of a household. This recurrent feature is based on the assumption that women care more about children's education and health, and therefore, an increase in the economic resources controlled by the woman in the household will translate into a higher women's bargaining power, leading to better outcomes for women's children.[2]

However, this targeting mechanism poses some questions that remain unanswered and, thus, require further analysis. A gender-based CCT could have unintended effects such as behavioral changes in terms of intra-household time use (allocation of time) and intra-household distributional effects (bargaining power). The aim of this paper is to contribute towards filling this gap in the literature by studying individuals in households that consist of married couples and analyzing the extent to which a CCT program in Ecuador that is targeted to women—*Bono de Desarrollo Humano* (Human Development Bonus, BDH)—affects time use and bargaining power of both members of the couple within the household. Specifically, this paper studies the impact of the program on women's and men's hours devoted to paid work, housework, community activities and leisure. In the same vein, it studies whether resource transfers to women through the BDH program are effective in improving women's positions within the household, as measured by several questions about the decision-making power. By examining these behavioral responses of couples inside the household to the CCT program, this paper provides a better picture of different unintended consequences that CCT programs might lead to, which could carry important implications for designing new policies.

[1] In Latin America, CCT programs were launched in 1995 in Brazil, followed by Mexico in 1997. Soon after, many other Latin American countries, such as Argentina, Chile, Colombia, Costa Rica, Ecuador, Honduras, Jamaica, Nicaragua and Uruguay, also implemented these types of social assistance programs. Currently, there are over 40 countries around the world where these type of social policy have been adopted (Fiszbein et al. 2009a).

[2] There is an important body of empirical literature that shows the positive effect of CCT programs on outcomes such as school attendance, health, and child nutrition (see, for instance, Paxson and Schady 2010; Behrman et al. 2005; Gertler 2004). Also, Thomas (1990), Duflo (2003), Duflo (2011) and Doepke and Tertilt (2011) are important studies on intra-household resource allocation and female empowerment.

With the rise in popularity of CCT programs and the introduction of these policies across many developing countries, a lot of efforts have been made to measure the effects of such transfers on recipients' well-being. For instance, Fiszbein et al. (2009a) have shown that CCT programs have led to important declines in poverty rates, Gertler (2004) and Barham (2011) show that they improved nutrition and health, and Glewwe and Kassouf (2012) have studied the effects of CCT programs on improvements in education. In terms of unintended effects on labor market outcomes, research has also revealed, for example, that CCT programs seem to have little effect on paternal and maternal labor supply and that this effect depends on the distribution of power in the household (Alzua et al., 2013). However, Garganta and Gasparini (2015) concluded that these programs may have an impact on transitions from formal towards informal employment, Gonzalez-Rozada and Llerena-Pinto (2011) showed that receiving a CCT prompts beneficiary mothers to experience longer periods of unemployment and Bergolo and Cruces (2016) found evidence that CCT programs have a negative impact on labor formality.

Many studies that analyze the effect of CCT programs on labor market outcomes use labor market participation and hours devoted to paid work in the market as the variables of interest, leaving aside many other activities dedicated to personal issues, family and social well-being. This comes as no surprise since there has been relatively few surveys that document the use of time in developing countries, and more importantly there are several limitations in linking existing time-use surveys with other relevant socioeconomic data. It is now broadly recognized that unpaid work and leisure are important parts of the organization of the society and the economy, and, therefore, it is hard to understand the functioning of an economy or a society comprehensively without understanding the role of these important activities (Aguirre and Ferrari, 2013 and Hirway, 2010). In the present study, I contribute to a better understanding of the mechanism of intra-household allocation of time by taking advantage of time-use data collected by the Living Standards Measurement Study survey in Ecuador. This data set allows me to measure the effect of the CCT program on the allocation of time to different activities.

Many studies have analyzed the behavioral effects of CCT programs under the assumption that households act as a single rational unit in which the benefits of a social program are distributed in equal proportion among all family members. However, there is insufficient evidence of the effects of CCT programs on intra-household outcomes in an environment where the decision-making power of different members of the household changes, especially when the benefits of a social program are assigned to a specific adult within a household. In particular, it is not clear whether the improvement of a woman's utility outside of the marriage unambiguously enhances her relative position in the household (bargaining power),

or how the enhancement of available monetary resources affects the incentives for time allocation of the spouses. This paper also contributes to the discussion of these two important issues.

There are several channels through which CCTs could affect women's decision-making power. In a Nash bargaining framework, an exogenous increase in women's resources leads to a higher reservation utility for exiting a partnership, which implies a higher relative bargaining power, granting the woman a more important role in decision-making. This framework implicitly assumes that a CCT given to the woman is kept under her control. The participation in a CCT program could also affect women's labor supply. For instance, a woman may increase or decrease her labor supply depending on the intra-household availability of resources. It is also possible that an increase in available household resources due to the CCT could lead to an increase in specialization within the household, implying more responsibility for women in decision-making in certain spheres.

But, a CCT to women does not always translate into a higher women's control over household resources. Some studies have found that providing transfers to women may not mean that women are allowed to have control over these resources by their partners (Handa et al., 2009). In addition, if a woman's access to resources depends on her partner before she becomes a beneficiary of the program, a CCT may only generate a crowding-out effect on these intra-household transfers, which implies that resources under the control of women will continue to be limited. Moreover, the conditionality associated with these types of programs could lead to a change in women's time allocation in order to fulfill the program requirements, and may negatively impact women's decisions to assign time to earn labor income, which may also cause a reduction in the amount of resources under women's control.

Several qualitative studies in the literature have found that CCT programs that assign cash to female beneficiaries raise women's intra-household decision-making power (Adato and Roopnaraine, 2010). However, quantitative studies of the effect of CCTs on female decision-making power are still inconclusive. Many quantitative studies have been conducted using data from Mexico. This literature provides a mixed picture in terms of the impact of CCT programs, such as "PROGRESA", on women's decision-making power. For example, Adato et al. (2000) found no evidence of a direct effect of the CCT on women's decision-making, while Attanasio and Lechene (2002) shows that there is evidence of minor changes in the decision-making structure in certain intra-household decisions, from a structure unilaterally led by men to a joint decision-making process led by both men and women, and Handa et al. (2009) found no evidence of an effect of the CCT on women's decision-making power other than the ability to spend their own cash. In the same line, some papers have shown that the exogenous impact of CCTs on a household members' income leads to reactions

in terms of household expenditure behavior or other behaviors due to changes to intra-household decision-making power (Angelucci, 2008; Attanasio and Lechene, 2010; Bobonis, 2009; Djebbari, 2005; Rubalcava et al., 2009). Moreover, many comprehensive reviews of CCT programs exclude any quantitative studies of the impact of CCTs on intra-household decision-making (see, for instance, Fiszbein et al., 2009a; Holmes and Jones, 2010; Molyneux and Tabbush, 2008) and others, such as the review by Yoong (2012), reached no consensus on whether CCTs increase women's decision-making power.

The current literature provides some insights into the impacts that CCTs have on women's decision-making and time allocation; however, the evidence is limited, narrow in coverage, and lacking in insight into how impacts might differ in distinct contexts. In this paper, I contribute to the literature by studying how decision-making and the time allocation of spouses inside the household respond to cash transfers to women. To this end, I first implement an empirical analysis using a large-scale household living standards survey. I perform a two-stage strategy to study the effect of BDH on intra-household time allocation and decision-making power. First, I reconstruct the eligibility index to identify the potential beneficiaries of the program using a methodology from the Ministry of Social Inclusion of Ecuador that allows me to replicates the original eligibility index used by the governmental authorities to classify the beneficiaries of the program. Second, I use a fuzzy regression discontinuity design methodology to estimate the effect of the program on the outcomes of interest. My identification strategy relies on the fact that at the threshold of eligibility, the beneficiaries and non-beneficiaries are very similar. Then, to further understand the channels through which CCTs might affect time allocation decisions and the distribution of power within the household, I develop a static intra-household bargaining model under cash transfers in which the husband and the wife have different preferences. Building on Basu (2006), Iyigun and Walsh (2007) and Chiappori and Mazzocco (2017), the model assumes that a household is composed of a female and a male who derive utility from two public goods. The first public good is a consumption good that can be acquired in the market. The second public good is a home produced good that requires female labor and a market acquired good as inputs of production. In this model, the cash transfer plays an important role in shifting the bargaining power of the female and affects the stream of available resources. The model considers the household as a space of cooperation. However, there is possibility for disagreement, especially related to the preferences over the home good (child quality). Since there are differences in the spouses' preferences, it is assumed that women and men have different preferences for the home produced good. I estimate the model and perform simulations to analyze how optimal decisions of household members in beneficiary households respond when there are changes in the female's preference for the home good and

the female's relative wage. Then, I perform a counterfactual analysis to examine a situation where there is no cash transfer versus an scenario in which there is a cash transfer equivalent to 20 percent of the male income.

In Section 2, I present the most important features of the CCT program in Ecuador. Section 3 contains the estimation and results of the fuzzy regression discontinuity design. Section 4 presents the model, the estimated parameters, as well as the policy experiment. Finally, Section 5 concludes.

2 Cash Transfer Program in Ecuador

The cash transfer program in Ecuador was initially called *Bono Solidario*. It emerged in 1998 as a direct transfer to compensate the poorest households for the elimination of subsidies and did not require any specific behavior from the beneficiaries of the program. After five years, in 2003, the program was restructured in order to consolidate two previous programs in Ecuador: The *Bono Solidario* program and the *Beca Escolar* program (a transfer of 5 USD per child for up to two children per household, conditional on those children's enrollment in school and a 90% attendance rate). This new cash transfer program was called *Bono de Desarrollo Humano* (BDH) and had an open enrollment process that based the identification of beneficiaries by relying on local priests, who were considered to have reliable knowledge of poor people in their local communities. The BDH program followed a human development approach, trying to implement the recommendations of international organizations. This was the the first program to use a proxy means test (PMT) to target the poorest families in Ecuador. The main objective of this new program was to improve the effectiveness of the targeting mechanism of this social policy, as well as contributing to the human capital formation (Carrillo and Ponce Jarrin, 2009). The change in the structure of the program required beneficiary families to enroll their children between the ages of 5 to 18 at school and maintain an attendance rate higher than 75%. Even though the co-responsibility of the program was imposed since the creation of the BDH, the enforcement of these requirements became partially effective only since 2007.

Starting in 2007, a process of reconfiguration of the BDH program began, within the framework of the constitutional and political transformations of Ecuador. The process of identifying the beneficiaries of the BDH has been modified over time, with important changes in 2009 and 2013. Each time the definition of the target population and the mechanism used to carry out the targeting have been modified. It is also worth mentioning that, in contrast to the Bono Solidario, which used self-targeting mechanism, the BDH has always used a PMT to target potential beneficiaries. Table 1 summarizes the evolution of the beneficiary

identification process.

The first phase of the BDH program started in 2003, targeting women with children aged 0-18 years using a compound index named *Sistema de Seleccion de Beneficiarios* (SELBEN). The main purpose of the introduction of the SELBEN index was the improvement in the identification of nuclear families in poverty conditions.[3] When the BDH program was launched in 2003, the monthly cash transfer for individuals with families in the bottom 20% (Quintile 1) of the SELBEN index distribution was fixed at 15 USD (12% of the minimum wage), and for individuals with families in the next 20% (Quintile 2) of the distribution was fixed at 11.50 USD (9% of the minimum wage). Since the launch of the program, the targeting mechanism as well as the amount of the cash transfer has been modified over time. In 2007, the transfer was raised to 30 USD (18% of the minimum wage) for individuals with families in the bottom 40% (Quintile 1 and 2) of the SELBEN index distribution i.e. women with children aged less than 18 years old scoring less than 50.65 points of the SELBEN index (Ponce and Bedi, 2010).

Table 1: Evolution of the Process of Beneficiary Identification

	Bono Solidario 1998	BDH 2003	BDH 2009	BDH 2013
Eligibility Criteria	Self-identification	SELBEN index	RS index	RSII index
Survey Used	None	1999 ECV	2006 ECV	2012 ESSHO
Eligibility Threshold	-	Q1$[0, 42.87]$ Q2$(42.87, 50.65]$	EP$[0, 25.60]$ P$(25.60, 36.60]$	EV$[0, 24.09]$ VPB$(24.09, 28.20]$
Targeted Population	Households in poverty	Households in poverty	Households in poverty	Households in extreme poverty

Notes: The table shows the evolution of the eligibility criteria for assigning the conditional cash transfer as well as other important associated characteristics such as the survey used for the targeting mechanism, the eligibility threshold to determine beneficiary households and the population that was targeted by the governmental authorities. Q1=Quintile 1; Q2=Quintile 2; EP=Extreme poverty; P=Poverty; EV=Extreme vulnerability; VPB=Vulnerability protection band. Information comes from the Ministry of Social Development.

The second phase initiated in 2009 by tracking and monitoring potential beneficiaries with a process of registering families located in areas with high poverty levels according to the 2001 Census. In this new phase the governmental authorities updated the targeting mechanism

[3]The SELBEN index, correctly predicts that 95% of households in the poorest quintile are eligible for the benefits and erroneously excludes 5% of them (Fiszbein et al., 2009).

with the implementation of a new database called *Registro Social* (RS) and the construction of a new index that was called *Indice de Bienestar* (RS index). This targeting structure was used from August 2009 until March 2013. This new targeting mechanism also implied another increase in the payment, with a the cash transfer fixed to 35 USD (16% of the minimum wage) for individuals with families with a score less or equal than 36.5 points in RS index (Buser, 2015). However, another change in the eligibility rule happened on March 2013, when the beneficiaries whose score was between 32.5 and 36.5 points were excluded from the program.[4]

The third phase started in 2013 with new update in the database of the registry and the construction of a new index which was renamed as *Registro Social II* (RSII). Under this new structure the cash transfer was fixed at 50 USD (16% of the minimum wage) for individuals within families that score less or equal than 28.2 points in the RSII index, which is defined to be a vulnerability protection band. Over time, the program main objectives have remained similar through the different phases[5] becoming an important tool to fight poverty. A detailed map at the province level, showing the association between the unsatisfied basic needs poverty rates, consumption poverty rate and program beneficiaries are displayed in Figure A.1. Provinces with higher rates of poverty are also the ones with higher presence of the program participants, which suggest a reasonable good implementation of the program.

3 Empirical Evidence

This section provides empirical evidence on how male and female time allocation and decision-making power respond to an exogenous income shock, namely a cash transfer from the government.

3.1 Data Description and Variable Definitions

Data

This study uses the Ecuadorian "Encuesta de Condiciones de Vida" that I will denote as the Living Standards Measurement Study Survey (LSMS) database, which is collected by the National Institute of Statistics and Census (INEC). The LSMS is a household survey that collects information on income and expenditure, household production, housing, health, assets, public services access, education, time use, and other information. Ecuador's four

[4] According to the ministerial agreement No. 197 of the 28 March 2013, governmental authorities decided to change the cutoff point for potential beneficiaries to 32.5.

[5] In the different phases the program seeks to guarantee families a minimum level consumption, decrease the prevalence of stunting and improve health for children under 5, promote school attendance between ages 6 and 18, and protect the elderly and persons with disabilities (Rosero and Martinez, 2007).

regions, 24 provinces, nine planning zones and four main cities are all represented in the survey. The overall sample includes 28,970 households and 109,694 individuals.[6] From this survey it is possible to identify the recipients of the Ecuadorian conditional cash transfer program. Information about receipt of BDH transfers is collected in section seven of the household questionnaire under "Transfers and Monetary Assitance". The type of transfer, the frequency, the amount, and the co-responsibilities of the program, among other topics, are also asked in this section.

In terms of the BDH characteristics, in 2014, we observe that around 1.12 million households (25.8% of total households) receive the CCT; this represents around 4.73 million individuals (29.7% of the total population) who benefit from the program. Disaggregating by type of recipient, we observe that around 0.67 million households (15.5% of total households) receive the CCT that is targeted to mothers; this represents around 3.37 million individuals (21.1% of the total population) who benefit from this branch of the program. If we compare the reported numbers of BDH beneficiaries' coverage reported by the Coordinating Ministry of Social Development (MCDS) and the results obtained from the LSMS, the results are very similar. For the process of replication of the targeting index, this study uses all the individuals in the LSMS in order to reproduce the living conditions of the Ecuadorian population. However, for the econometric analysis it is necessary to limit the sample. First, I drop from the sample households that declared that they received BDH benefits for elderly and disabled. That is, only the households that report being non-beneficiaries or mother-type beneficiaries. Then, I selected only the households that were interviewed from April 2014, as this is when the application of the RSII index began. Lastly, I select households in which a woman head or spouse is living or cohabitating with a men head or spouse. The final sample is composed of 9,985 households.

Bargaining Power Variables

Using the "Social Capital" section of the LSMS questionaire, I selected a set of questions that allow me to obtain information on the intra-household decision-making process. This questions were asked separately of the household head and of the spouse, and they cover several distinct decision domains. Specifically, the survey questions requests information on which person in the household decides: "whether to work or not"; "how many hours to work"; "where to work"; "on what to work"; "who stays at home doing household chores"; "until

[6] For more information see: INEC, 2014 and INEC, 2015.

what educational level the children study"; "what to do if a child gets sick"; "expenses for children"; "personal expenses"; "how to use the income from your work"; "large purchases (cars, housing)"; "how you dress" and "what to do with your free time". Response options in the survey included: "myself"; "my spouse or partner"; "decisions are made jointly" and "decisions are made by others". Using this questionnaire provides the advantage of identifying the effect of the CCT program in many important areas of intra-household decision-making. Since there are a variety of decision domain outcomes, using each individual outcome could overstress the significance of impacts due to chance. Therefore, I construct two different types of indices of decision making that condense the underlying information of each of these domains. First, I generate an index through a categorical principal component analysis procedure.[7] This procedure is useful as I am able to implement an optimal scaling procedure that allows the choice of both, measurement level and a number of sets[8]. This specification lead to an index that ranges from 0 to 10. I also construct a simple composite index. To do this, I first create a binary indicator for each decision-making domain in which the indicator equals 1 if the woman respondent report making the decisions "myself" or "decisions are made jointly" and 0 otherwise. Then, I assign 1 point for each time the woman indicates having sole or joint decision-making power across all applicable domains. These composite index ranges from 0 to 13.

Time Use Variables

The time use module of the LSMS household questionaire collects information on a range of activities, including time spent in labor market activities, household chores, childcare, elderly care, grocery purchases, free time activities, sports, sleep and community work activities. From these set of variables, it is possible to identify the number of hours that each member of the household older than 12 years has devoted to different activities such as housework, paid work, community activities and leisure. As is common in many time use surveys, the declared time allocated to the different activities, with the exception of paid work, are estimates and approximations of the informant. Therefore the sum of time for the different activities in a week does not necessarily equal to 168 hours. I use this information with the sample of 9,985 households previously defined in order to construct the complete database for the empirical analysis.

[7] In relation to the common principal component analysis, this method does not rely on the assumptions of linear relationships between numerical variables nor the multivariate normality of the data.

[8] This allows to take into consideration that variables can be categorical, nominal, or ordinal and also allows to specify how many groups of variables are to be compared with other groups of variables.

Descriptive Statistics

Table A.2 presents selected descriptive statistics of household characteristics, and Table A.3 shows descriptive statistics of time allocation and bargaining power variables. All the numbers are based on the sample used for the analysis, as they are shown separately for the beneficiary and non-beneficiary households. It is important to note that if I refer to woman it can be a female household head or spouse and similarly if I refer to man it can be a male household head or spouse. All the households in the analysis are composed by a couple. From Table A.2 shows that women and men in beneficiary household are younger, less educated and have more children than women and men in non-beneficiary households. Additionally, beneficiary men and women have lower income, tend to live in a poorer district and have a higher number of disabled adults living in the household compared to non-beneficiary men and women.

In Table A.3, reveals important differences in the allocation of time to different activities by beneficiary status. Compared to woman non- beneficiaries, women beneficiaries allocate more hours to paid work (around 0.4 more hours), housework activities (around 5.0 more hours) and community activities (around 0.5 more hours), and fewer hours to leisure activities (around 5 less hours). Regarding men beneficiaries, they reported that they allocate more hours to paid work activities (around 0.7 more hours), housework activities (around 0.7 more hours) and community activities (around 0.6 more hours), and less hours to leisure activities (around 4.4 less hours), as compared to non-beneficiary men. For both, women and men, the differences in hours allocated to housework, leisure and community activities among beneficiaries and non-beneficiaries are statistically significant.

Table A.3, also reports differences in women's decision making power in several domains, as well as differences in the overall bargaining power indices among beneficiary and non-beneficiary households. Women in beneficiary households tend to have higher bargaining power in domains related household chores and child care relative to women in non-beneficiary households. For the bargaining index constructed using a categorical principal component analysis (Women's Bargaining Power I in Table A.3), the overall index shows that women in beneficiary households tend to have higher bargaining power relative to non-beneficiary women. Using the same metric of bargaining power, women in beneficiary households have a higher women's bargaining index in decision domains related to work activities, home and personal activities and purchases. A similar situation is observed when I use the composite bargaining index (Women's Bargaining Power II in Table A.3), with the exception that index related to work activities, which shows no difference among beneficiary and non-beneficiary households.

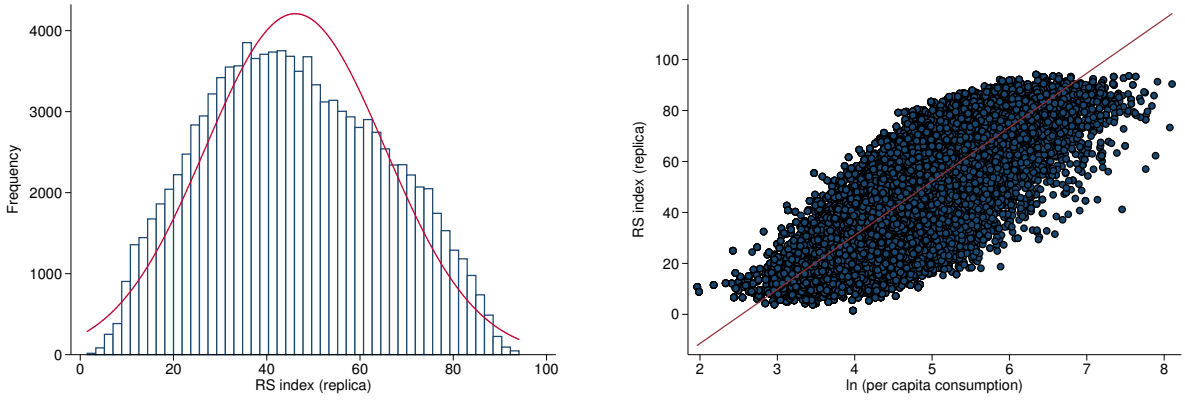
These differences observed in the descriptive statistics tables are consistent with the targeting strategy of the program and suggest that a simple comparison of the variable of interest, such as the hours allocated to the different activities as well as the women's bargaining power related to different decisions, among beneficiary and non-beneficiary households is unlikely to yield credible program estimates. Therefore, it is necessary to control for differences in observable and unobservable characteristics between program beneficiaries and non-beneficiaries—as with the fuzzy regression discontinuity approach—in order to obtain credible program estimates.

3.2 Eligibility Index Replica

An important issue for the empirical identification strategy is the reconstruction of the targeting mechanism of the BDH. To implement the regression discontinuity design, I need to have information on the RSII index which is essential for determining the program eligibility. However, the available database has only information on the outcomes of interest, characteristics of household members as well as information about the participation in the program. However, in the data set I do not observe the household score on the RSII index. Therefore, in order to replicate the assignment process the first step is to replicate the RSII index using our available data set. The eligibility criteria index is constructed using a restricted methodology and database from the Coordinating Ministry of Social Development (MCDS) called "Registro Social". With this database, the Technical Secretariat Unit of the MCDS generates an index .This type of index is a proxy means test index which is expected to be related to the consumption poverty, but with a multidimensional perspective based on Bourguignon and Chakravarty (2003). The RSII is a 0 to 100 index and is constructed using Nonlinear Principal Component Analysis (NLPCA) with the combination of 34 variables. These variables can be classified into the following groups: asset possession (12 variables), dwelling and household characteristics (15 variables) and individual characteristics (7 variables).

Figure 1: Replication of the Eligibility Index (RSII index) using the the ECV Survey

(a) Index Distribution (full sample) **(b)** Correlation RS Index and Consumption



Notes: In the left panel I show the distribution of the replicated index (eligibility tool) for the entire sample. In the right panel, I show the correlation between the RS index and per capita consumption, which is approximately 0.60. The original index has a correlation of 0.62. The obtained index is very close to original instrument used by government to classify beneficiaries.

These set of variables allow one to classify households according to their eligibility status on the basis of a cutoff (Fabara, 2009). As described in Section 2, families that score 28.2 points or lower on the RSII index were eligible to receive the benefits of the program, while families scoring above this threshold were disqualified. While the RSII index is constructed using 34 variables, the available database contain information on 33 of the 34 variables.

To replicate the index, I use the available information in the LSMS data. Using the same statistical procedure[9] to construct the original index, I calculate the weights for the restricted set of 33 variables and create a quasi-RSII index. Figure 1 shows a histogram of the frequency of households by the created index. The distribution of RSII index is close to a normal distribution. The 2-dimension specification accounted for 37.6% (the original accumulated 33.7%) of the total variances, and had a 60% correlation with, the monthly per capita aggregate consumption (formerly 62.4%). The summary results of the categorical principal component procedure are reported in Figure A.2 and Tables A.4 and A.5. The cutoff choice was originally obtained by selecting values of the index that represented households with extreme consumption poverty. For the RSII index, the eligibility criterion was calculated by estimating an OLS model of the RSII index and the logarithm of the aggregate per capita consumption. The critical value was obtained by mapping the extreme poverty line, plus a vulnerability protection band, into the index units using the estimated OLS equation. The official threshold obtained by the Technical Secretariat Unit of the MCDS was 28.2. I

[9]With the available input from the LSMS, I run the CATPCA algorithm attempting to replicate the index as close to the original.

followed the same procedure and obtained a critical cutoff value of 34.04. The scatter plot of the regression of RSII index and the logarithm of the aggregate per capita consumption can be seen in Figure 1.

3.3 Regression Discontinuity

As discussed above, while there is a lot of evidence on the effect of CCT programs such as the BDH on intended outcomes, the influence of these types of programs on unintended outcomes such as the adult time allocation and adult intra-household decision-making are still unclear. The goal of this study is to exploit the discontinuity in the program assignment mechanism, to identify the local causal effect of receiving the BDH on the outcomes of interest. To isolate the effect of the program, I begin with the following model:

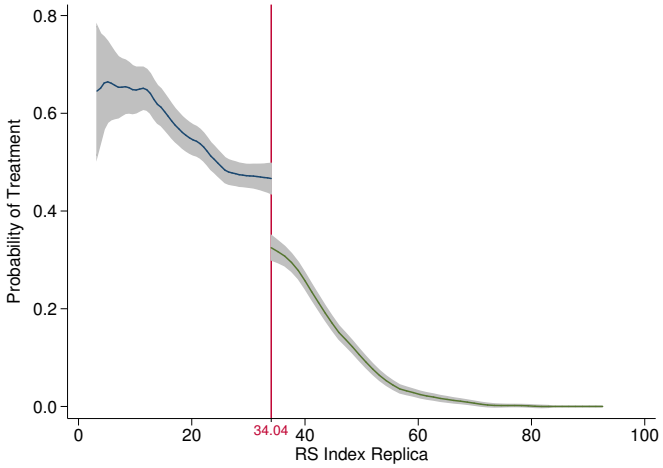
$$Y_i = \alpha T_i + f(R_i) + \mathbf{X}_i'\beta + \varepsilon_i \tag{1}$$

where Y_i is the outcome variable, e.g. time use or decision-making variables, T_i is a treatment indicator that takes the value of $T_i = 1$ if an individual lives in a household that receives the BDH (treated), and 0 otherwise (untreated), R_i is the running or forcing variable, which in this case is the household RSII index score, $f(R_i)$ is a flexible function (polynomial) of the RSII index[10], X_i is a vector of individual and household characteristics and ε_i is an error term. Given that program participation is not random and intendedly focus on the poor, T_i can be correlated with the error term ε_i. Therefore, if I estimate Equation 1 through OLS, the estimate of α is probably biased. To overcome this problem, I take advantage of the program targeting mechanism and rely on a regression discontinuity (RD) strategy to isolate the causal effect of the program (Thistlethwaite and Campbell, 1960; Imbens and Lemieux, 2008). The participation on the program depends on the RSII index score that a household obtains. The program tries to target only families with an score below 28.2 (in our case 34.04)[11]. This mechanism generates a relationship between treatment status and the RSII index.

[10] $f(R_i)$ is a polynomial function of the RSII index score R_i, which is specified as: $f(R_i) = \sum_{k=1}^{n} \left((R_i - c)^k + T_i (R_i - c)^k \right)$, where n is an order of polynomial and c is the cut-off value of 34.04. It is important to note that a regression discontinuity design assumes that the relationship between the outcome variable and the variable that determines treatment is known. Wrongly specifying the functional form can bias the estimates because of model misspecification. Therefore, it is important to implement several specification checks.

[11] This design implies that assignment to the program depends on the value of an observed continuous variable (RSII index) relative to a given cutoff point.

Figure 2: Discontinuity in Probability of Treatment at Cutoff 34.04



Notes: The plot shows the existence of a discontinuity in the probability of treatment. Specifically, there is a decrease of approximately 10% in the probability treatment, at the discontinuity cutoff 34.04, given a local polynomial smoothed fit of the RS Index Replica score.

Figure 2 illustrates the negative relation between the RSII index and the probability of being treated. In general as the RSII index raises the probability of getting the treatment decreases. Moreover, there is an important decline at the cutoff point of 34.04. Households with a RSII index of slightly less than 34.04 are about 10 percentage points more likely to be in the treatment group relative to households that have a RSII index slightly above this cutoff.

As illustrated in Figure 2, the relationship between the RSII index and the probability of getting treated provides exogenous variation in treatment status which may be used to identify the causal effect of the program. Figure A.3 complements Figure 2 with two additional plots showing the discontinuity in the probability of treatment using data-driven choices of the number of the evenly spaced bins (see Calonico et al. 2015). These plots exhibit a similar pattern as Figure 2, and reveal the existence of a discontinuity in the probability of treatment that oscillates between 9 and 10 percent.

Households were not assigned to the program based on the RSII index.[12] As can be observed in Table A.1, there is a fair degree of fuzziness in program assignment. For roughly 80 percent of the sample, eligibility and program status match, but there are around 11 percent who are eligible but do not receive the program and around 7 percent who are not eligible but do receive the program.[13] Thus, assignment to treatment status depends on the RSII index

[12]That is, the data do not show that all the households below the cutoff point $c = 34.04$ receive the treatment ($R_i \leq c \Rightarrow T_i = 1$) and that all the households above $c = 34.04$ do not receive the treatment ($R_i > c \Rightarrow T_i = 1$). Therefore, T is not a deterministic function of the RSII index score.

[13]A possible explanation for this non strict compliance is that after the implementation of a program

in a probabilistic manner. As we are dealing with a fuzzy regression discontinuity, instead of a deterministic assignment rule, there is a change in the probability of treatment at the cutoff point given by:

$$P\left(T_i = 1 \mid R_i\right) = \begin{cases} f_1\left(R_i\right) & if \quad R_i \leq c \\ f_0\left(R_i\right) & if \quad R_i > c \end{cases} \tag{2}$$

with $f_1(c) \neq f_0(c)$ and $c = 34.04$. Equation 2 formalize what we observed in Figure 2 and can be interpreted as the discontinuity in the probability of getting the treatment at the threshold. Given that I have information on the RS index (running variable), the exogenous threshold of program assignment (34.04 points), the treatment indicator of receiving the BDH and information on the outcomes of interest, the fuzzy regression discontinuity (RD) design allows me to isolate a local average treatment effect (LATE) of the BDH, by associating a jump in mean outcome with a jump in the probability of treatment, when the running variable crosses the threshold (Thistlethwaite and Campbell, 1960; Imbens and Lemieux, 2008). I can create a binary instrumental variable defined as:

$$Z = 1\left\{R_i \leq 34.04\right\} \tag{3}$$

Then, using the stochastic relationship between the RSII index and the probability of the treatment, and following Imbens and Lemieux (2008), and Hahn et al. (2001), the fuzzy regression discontinuity estimate can be obtained as a non-parametric ratio of the difference in the mean response at the cutoff to the difference in the probability of treatment at the cutoff[14]:

$$\alpha_{FRD} = \frac{\lim_{r \downarrow c} E\left[Y_i \mid R_i = r\right] - \lim_{r \uparrow c} E\left[Y_i \mid R_i = r\right]}{\lim_{r \downarrow c} E\left[T_i \mid R_i = r\right] - \lim_{r \uparrow c} E\left[T_i \mid R_i = r\right]} \tag{4}$$

Equation 4 represents the LATE.[15] Following Angrist and Pischke (2009) and Hahn et al. (2001), a fuzzy RD can be implemented using an instrumental variable approach. Program participation, or the first stage equation, is treated as a function of an instrument (Z), the

debugging that the Ecuadorian government began in January 2013, eligible households who were unable to report its living conditions at the time the government was collecting information for the calculation of the RSII index, although eligible, do not receive the BDH. On the other hand, the debugging process was probably not be perfect and some households that used to receive the program under earlier structures continue to receive the benefits through the new BDH program design, even though the new RSII index score shows that these household were not eligible anymore.

[14]This expression can also be expressed as: $\alpha_{FRD} = \frac{E[Y_i|Z=1]-E[Y_i|Z=0]}{E[T_i|Z=1]-E[T_i|Z=0]}$

[15]The estimate of α_{FRD} local because is estimated for the compliers and also because it applies only to those around a specific vicinity seeAngrist and Pischke (2009).

RSII index (R) and the vector of individual and household characteristics (X). This first stage equation can be expressed as:

$$T_i = \gamma Z_i + f(R_i) + \mathbf{X}_i'\delta + \mu_i \tag{5}$$

As seen in Figure 2, the assignment rule is correlated with the probability of treatment, consequently as the instrument Z is based on the assignment rule it is likely to be highly correlated to program participation. Additionally, it is necessary to assume that any unobserved characteristics that determine individuals time use or decision-making are not correlated with the instrument, i.e., we assume, $E[Z_i\varepsilon_i \mid X_i, R_i] = 0$. If this assumption holds then consistent estimates of the CCT program can be obtained by estimating:

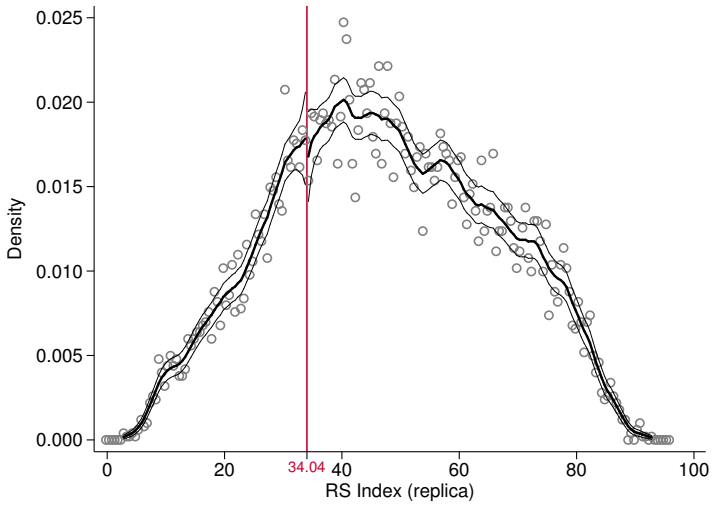
$$Y_i = \alpha\hat{T}_i + f(R_i) + \mathbf{X}_i'\beta + \varepsilon_i \tag{6}$$

where $\hat{T}$ is obtained from Equation 5. This paper, will estimate several specifications[16] of Equation 6.

As with many social programs, the CCT program in Ecuador is subject to the possibility of manipulation of the beneficiary selection rules. An important condition for identification in the regression discontinuity design is the continuity of the conditional expectation of the counterfactual outcomes in the running variable. This continuity assumption may not be credible if individuals are able to influence the rule that determines assignment to treatment, specifically their position in the RSII index relative to the cutoff. In the present study, this should not be a problem as families do not have any control over the calculation of the RSII index or information about the scoring procedure. Moreover, the survey data that I use in this study were not used to select beneficiary families, so there is not an incentive for the household members to misreport this information in the survey. However, one should formally test that there is no manipulation in the running variable, so I perform a test of the presence of manipulation related to the running variable. Proposed by McCrary (2008).

[16]Specifically, I will run linear and quadratic specifications to check the robustness of the results and I will also show results at different bandwidths to check for the stability of parameters.

Figure 3: McCrary Manipulation Test for the Eligibility Index



Notes: The plot is a finely-gridded smoothed histogram showing that there is no apparent difference in density around the 34.04 threshold. Specifically, the McCray manipulation test is t=-0.627 with a p-value of 0.531. Therefore, there is no statistical or visual evidence of systematic manipulation of the running variable (RS Index). The plot is constructed with a binsize of 0.5 and a bandwidth of 3.

Figure 3 shows that there is no significant discontinuity around the cutoff 34.04 in the local density function of the households according to their RSII eligibility index. This is also formally confirmed in Table A.6 in which I perform a regression discontinuity manipulation test using local polynomial density estimation and found that it is not possible to reject the null hypothesis of no statistically significant discontinuity in the density around the threshold.

Finally, one of the challenges of implementing an RD design is the choice of the bandwidth. There is an important trade-off between smaller bandwidth (less bias but higher variance) and a larger bandwidth (more bias but less variance). Recent developments in the empirical literature have provided a data-driven local polynomial RD methodology (Calonico et al., 2014a,b, 2018b). This approach offers an array of data-driven nonparametric inference procedures to obtain point estimators and bias-corrected confidence intervals. This study will use these complementary estimation tools.[17]

[17]To perform this procedure I use the following user-written Stata commands: rdrobust, rdwselect and rdplot. The rdrobust helps us to implement the bias-corrected inference procedure proposed by (Calonico et al., 2014b), which is robust to "large" bandwidth choices. This implementation offers robust bias-corrected confidence intervals for average treatment effects at the cutoff for our fuzzy RD design. The second command, rdbwselect, provides different data-driven bandwidth selectors based on the recent work of Imbens and Kalyanaraman (2012) and Calonico et al. (2018c). Finally, the rdplot command implements the results described in Calonico et al. (2015), offering several data-driven choices of the number of bins in evenly spaced and quantile-spaced RD plots.

3.4 Results

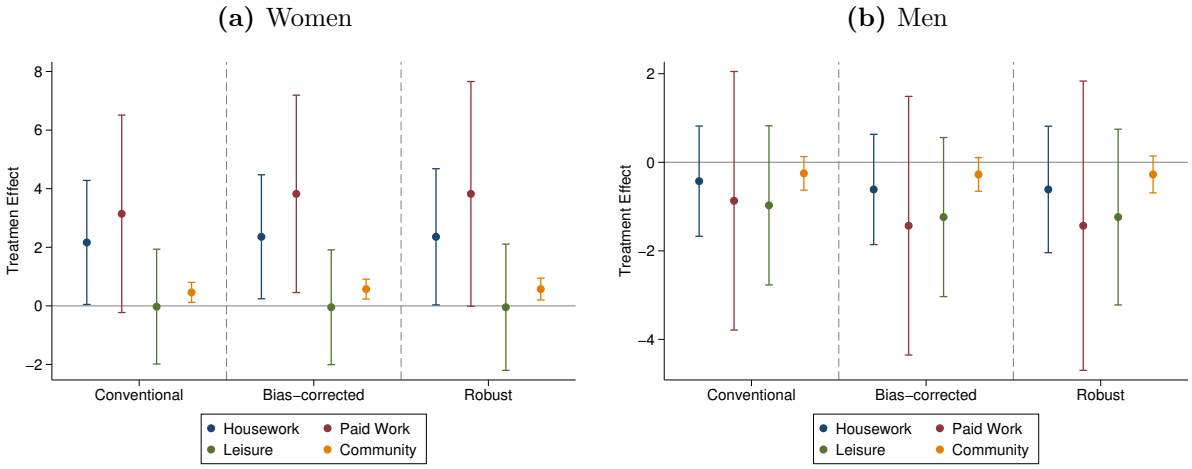
Intra-household Time Allocation

Instrumental variable estimates of the effect of BDH program on time use for men and women are provided in Table A.7. In all the models, I find that living in a household with a RSII index score below 34.04 increases the probability of receiving the CCT program by 10.2 to 10.8 percent. In relation to the relevance of the instrument, in these 1st-stage regressions the F-statistics for the null hypothesis that the instrument does not induces significant variation, range from 23.25 to 25.79 (all with an associated p-value lower than 0.01). These F-statistics are higher than the suggested minimum of 13 for non-weak instruments (Stock et al. 2002). The IV estimates (second stage) indicate that the BDH program has an effect on the allocation of time of women whereas for men the effect of the program is statistically insignificant. We observe that receiving the CCT increases women's time allocated to housework (1.95 hours per day), paid work (3.34 hours per day) and community activities (0.39 hours per day).

In Table A.8, I show the non-parametric estimates using the methodology developed by Calonico et al. (2014a), Calonico et al. (2014b) and Calonico et al. (2018b). This approach is useful because it provides data driven bandwidths particularly calculated for each specification. Table A.8 compares the conventional estimates employing the conventional variance estimators with the conventional but bias-corrected and bias-corrected robust non-parametric estimators. Given that each specification has a particular bandwidth, the sample size (effective number of observations) varies for each model. The estimated effects are synthesized in Figure 4. Consistent with the result of the IV estimation, the plot for women shows a positive effect of the CCT on the time devoted to housework, paid work and community activities. On the other hand, in the plot for men we observe that the BDH program reduces the number of hours allocated to the different activities, however the estimated effect are not statistically significant. As shown in Table A.8, on average, women on BDH beneficiaries households assign about two more hours to housework activities, three hours more to paid work activities and half of an hour more to community activities in relation to women in non-beneficiaries households. While there is no statistically significant effect of the cash transfer on men's time allocation, estimates on Table A.8, suggest that men in beneficiary households spent about 0.4 hours less in housework activities, 0.8 hours less in paid work activities and 0.2 hours less in community activities in relation to men in non-beneficiaries households. It is important to mention that consistent with Figure 2, across the different specifications there is a clear effect of eligibility on program participation. In all the regressions, program eligibility is associated with a nine to eleven percentage point increase in the

probability of receiving the program.

Figure 4: Estimated Effects of the BDH Program on Intra-household Time Allocation



Notes: The figure shows the estimated effects of the cash transfer program on time allocation to housework, paid work, leisure and community activities. The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in hours per day and each come from a fuzzy regression discontinuity. Including covariates are: head and spouse education and race, number of kids below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household and average home hours of all the household members except the woman or man head or spouse.

In Table A.9, I perform a robustness check employing a quadratic specification for each of the regressions related to women's time allocation. Using the quadratic specification, only women's time devoted to housework and community activities remained statically significant at the 10 percent level. In terms of the magnitude of the effects under the quadratic specification, receiving the BDH program raise the time spent in housework in 2.8 hour per day and time spent incommunity activities in 0.6 hours per day. Finally, in Figure A.4, we check how sensitive these estimates are to bandwidth choice. Consistent with the results in Table A.7, A.8 and A.9, Figure A.4, shows that the point estimates of the regression discontinuity LATE at varying bandwidths are stable.

Bargaining Power

Bargaining power indexes have been standardized since the constructed indices do not have a natural scale, therefore the effects of the program are going to be interpreted as standard deviation effects. Table A.10 reports the instrumental variable estimates for the overall women's bargaining power index as constructed using categorical principal component analysis as well as for each of the specific decision-making domains. Results indicate a positive

impact of the BDH program on women's decision-making power. On average, women in beneficiary households experience a 1.9 standard deviation increase in the overall index, a 2.1 standard deviation raise in the index related to home and personal decisions, and a 1.2 standard deviations increase on the index for purchases decisions. These results represent increases of 30, 42 and 22 percentage points over baseline mean values, respectively. Turning to the robust non-parametric estimates, in Figure 5 we observe a positive and significant program impact in two of the four indices.

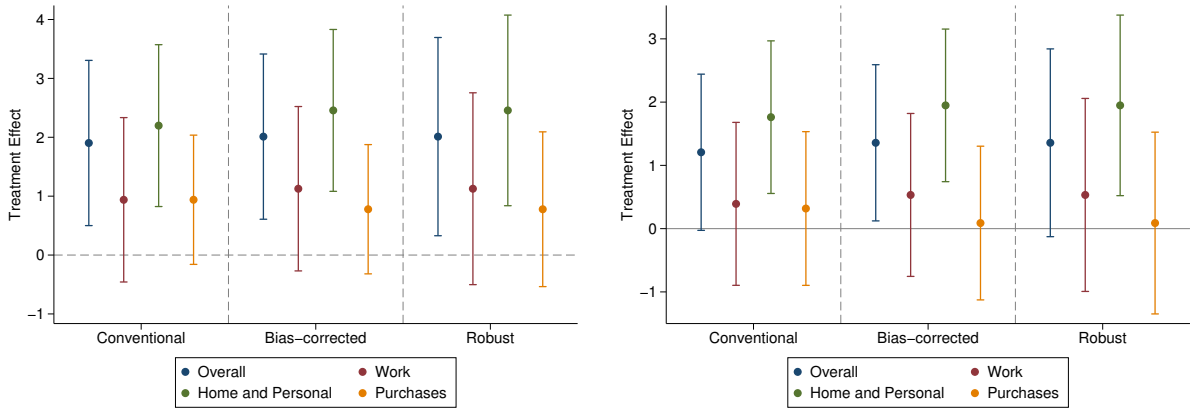
Table A.11 demonstrates that receiving the BDH program improves the overall women's decision-making index by 2 standard deviations and also the index related to decisions in home and personal activities rise in 2.5 standard deviations. Both effects are robust to a change in the polynomial degree of the specification.

Specifically, using a quadratic specification, the effect of the BDH program on the overall index is 1.7 standard deviations, whereas in the case of the home and personal decisions index the effect is 2.6 standard deviations. On other hand, even though the CCT program positively influences the indices related to work and purchase decisions, these coefficients are not statistically significant. In relation to the sensitivity of these estimates, Figure A.5 confirms the stability of estimated effects to bandwidth choice.

I have also created another measure of bargaining power using a composite index that ranges from 0 to 13. The results of the effect of the CCT program on these indices are presented in Table A.12. As expected, the composite measure also shows a positive impact of BDH program on the number of decisions domains a woman is involved in, by a magnitude of 1.2 standard deviations, representing a 27 percent increase over baseline mean values. Similarly, the CCT program has a positive effect of 1.7 standard deviations on home and personal decisions index, representing a 44 percent rise over baseline mean values. These two effects are statistically significant at conventional levels.

Figure 5: Estimated Effects of the Impact of the BDH Program on Women's Decision-Making

(a) Women's Decision Making (NLPCA Index) **(b)** Women's Decision Making (Composite Index)



Notes: The figure shows the estimated effects of the cash transfer program on time allocation to housework, paid work, leisure and community activities. The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in hours per day and each come from a fuzzy regression discontinuity. Included covariates are: head and spouse education and race, number of children below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household, and average home hours of all the household members other than the woman or man head or spouse.

Turning to the robust inference, the estimated effects using the non-parametric approach are synthesized in Figure 5. Consistent with the result of the IV estimation, the plot shows that the program has an effect on the overall index and on the home and personal decisions index, although the overall index is only weakly significant.

Table A.13 demonstrates that receiving the BDH program increases the overall women's decision-making index by 1.3 standard deviations and also raises by 1.95 standard deviations the index related to decisions in home and personal activities. In Table A.13, I also perform a robustness check employing a quadratic specification for each of the regressions for the different domains of decision-making power. Using the quadratic specification, only the index related to home and personal decisions remained statically significant at the 5 percent level. Finally, consistent with the results in obtained before, Figure A.6, shows that the point estimates of the regression discontinuity LATE at varying bandwidths are stable.

4 A Model of Intra-household Bargaining under Cash Transfers

Although the empirical evidence provided in the previous section is very informative in terms of looking at the effect of receiving the cash transfer, it is not enough to provide an explanation of the mechanism that operates behind the relationship between cash transfer, bargaining power and intra-household time allocation. In this section I construct and estimate an intra-household bargaining model that helps to clarity the channels through which CCTs might affect time allocation decisions and the distribution of power within the household. I will perform simulations of the model and analyze how optimal decisions of household members in beneficiary households respond when there are changes in women's preferences for the home good and in women's relative wages. Then, I implement a counterfactual analysis to examine a situation in where there is no cash transfer versus an scenario in which there is a cash transfer equivalent to the 20 percent of the male income.

4.1 Model Setup

To explain the effect of the CCT program on the bargaining power and time allocation of married women, I propose a parsimonious collective household behavior model following Basu (2006), Iyigun and Walsh (2007) and Chiappori and Mazzocco (2017).

Agents and Preferences

Consider a household formed by two agents $s \in \{♀, ♂\}$. I assume that all households are composed of one female (♀) and one male (♂) i.e. all men and women live in couple households, formed by one woman ('wife') and one man ('husband'). Each individual is endowed with one unit of time. In this model, the woman allocates her time endowment between home production ($h_♀$), the labor market ($l_♀$) and leisure. In contrast, the man allocates his time endowment only between the labor market ($l_♂$) and leisure. Both agents, derive utility from a public consumption good purchased in the the market denoted by q, a public home produced good denoted by Q, and from leisure time.[18] Female and male have different preferences, represented by $U^♀(Q, q, h_♀, l_♀)$ and $U^♂(Q, q, l_♂)$, respectively. For simplicity, I assume that preferences are additively separable and given by:

[18]Note that leisure time for female is the time spent neither working in the labor market ($l_♀$) or at home ($h_♀$), whereas for male is the the time spent not working in the labor market ($l_♂$).

$$U^{♀}\left(Q,q,h_{♀},l_{♀}\right)=\log\left(q\right)+\phi_{Q}\frac{Q^{1-\sigma}-1}{1-\sigma}+\phi_{l}\frac{\left(1-h_{♀}-l_{♀}\right)^{1-\eta}-1}{1-\eta} \tag{7}$$

$$U^{♂}\left(Q,q,l_{♂}\right)=\log\left(q\right)+\frac{Q^{1-\sigma}-1}{1-\sigma}+\phi_{l}\frac{\left(1-l_{♂}\right)^{1-\eta}-1}{1-\eta} \tag{8}$$

In this model setup, individuals derive the same utility from the public consumption good purchased in the market and from leisure. However, the woman and the man have different preferences for the home good.

Government Cash Transfer

The government gives a transfer to the woman in cash, denoted by t. This transfer increases the reservation utility of the woman. Let $\bar{w}_{♀}=\frac{w_{♀}}{w_{♂}}$ be the potential income that the woman could have outside the couple, relative to the income of the male. In this model I assume that the relative bargaining power (weight) of the woman in the household decision-making process is a function of her potential income and the cash transfer t, therefore, $\mu\left(\bar{w}_{♀},t\right)$. In addition, the cash transfer affects the household budget constraint as it provides an exogenous source of resources.

Home Production

Child-care Q requires more home production, which for simplicity is assumed to be done only by the woman. A further input to home production are goods acquired in the market. Therefore, the production of the home good requires two inputs: a market input which is represented by d and female labor denoted by $h_{♀}$. Q can be understood as a (continuous) quality measure of own biological offspring. Therefore, home good production function is given by:

$$Q=e^{z}F\left(d,h_{♀}\right) \tag{9}$$

where e^{z} is the home good productivity. I also assume that the home good is produced according to a Cobb-Douglas technology with parameter θ, so $F\left(d,h_{♀}\right)=d^{\theta}h_{♀}^{1-\theta}$.

Couple Household's Optimization

The problem of the household is to maximize the sum of the woman's and man's utilities.[19] The household can earn a labor income $e^{\gamma(b)} l_{\female} w_{\female} + l_{\male} w_{\male}$, where $e^{\gamma(b)}$ is the woman's labor market productivity, which depends on the characteristic b, $w_{\female}$ is the female wage and $w_{\male}$ the male wage, which can be used to purchase a public consumption good q, and home production input, d. I assume that the market good and the market input have the same price, normalized to 1. In this framework, the household choose the woman's and man's hours devoted to labor market activities, woman hours of home production and the quality of the children they want to have. The representative couple's maximization problem is therefore given by:

$$\begin{aligned} \max_{q, l_{\female}, l_{\male}, h_{\female}, Q} \quad & \mu\left(\bar{w}_{\female}, t\right) U^{\female}\left(Q, q, h_{\female}, l_{\female}\right) + \left(1 - \mu\left(\bar{w}_{\female}, t\right)\right) U^{\male}\left(Q, q, l_{\male}\right) \\ \text{subject to :} & \\ & q + d = e^{\gamma(b)} l_{\female} w_{\female} + l_{\male} w_{\male} + t \\ & Q = e^{z} d^{\theta} h_{\female}^{1-\theta} \\ & l_{\female} + h_{\female} \leq 1 \\ & l_{\female} \geq 0, h_{\female} \geq 0, l_{\male} \geq 0 \end{aligned} \tag{10}$$

The first and second constraints represent the household budget constraint, and the relationship between the home good and the required amount of home production inputs, respectively. Note that the cash transfer enters directly into the budget constraint, implying that the household has more resources to allocate among the consumption good purchased in the market and the home production input. Since woman and man have different preferences over the home good and the market good, the intra-household bargaining process will define the shift of the household allocation towards the most preferred good. The third constraint limits the woman's total time working in the market and at home to be no larger than the time endowment. Given the structure of preferences, as leisure approaches zero the marginal utility of leisure approaches infinity, therefore this constraint will hold with inequality. Finally, the last inequalities are non-negativity conditions on the woman's time spent working in the market and at home and the man's time spent working in the market. As the home production function uses the woman's home hours as an input, optimality requires that $h_{\female}$ be positive and the associated constraint never bind. Technically, non-negativity constraints on market hours could bind, however I will concentrate on a representative couple that capture features observed in the Ecuadorian data and therefore I will choose parameter values

[19] This is a type of Pareto maximization program with relative weights μ attached to the woman's and $1 - \mu$ to the man's utility.

that make l_{φ} and l_{σ} positive. Therefore, all time constraints will be slack in equilibrium and I will focus throughout on interior solutions. Also, note that since I am focusing on a representative couple, the household can choose any non-negative continuous quantity of Q.

In this problem, it is possible to combine the first two restrictions, to generate the effective budget constraint used in the maximization problem of the couple household, which is given by:

$$q + \left[\frac{Q}{e^{z} h_{\varphi}^{1-\theta}}\right]^{\frac{1}{\theta}} = e^{\gamma(b)} l_{\varphi} w_{\varphi} + l_{\sigma} w_{\sigma} + t \tag{11}$$

Let λ be the Lagrange multiplier for the effective budget constraint. The first order conditions for q, l_{φ}, l_{σ}, h_{φ}, and Q can be described as follows:

$$\mu \frac{1}{q} + (1-\mu)\frac{1}{q} = \lambda \tag{12}$$

$$\mu \phi_l \left(1 - h_{\varphi} - l_{\varphi}\right)^{-\eta} = \lambda e^{\gamma(b)} w_{\varphi} \tag{13}$$

$$(1-\mu)\,\phi_l \left(1 - l_{\sigma}\right)^{-\eta} = \lambda w_{\sigma} \tag{14}$$

$$\mu \phi_l \left(1 - h_{\varphi} - l_{\varphi}\right)^{-\eta} = \lambda \frac{1-\theta}{\theta} \left[\frac{Q}{e^{z} h_{\varphi}}\right]^{\frac{1}{\theta}} \tag{15}$$

$$\mu \phi_Q Q^{-\sigma} + (1-\mu)\, Q^{-\sigma} = \lambda \frac{1}{\theta} \left[\frac{Q^{1-\theta}}{e^{z} h_{\varphi}^{1-\theta}}\right]^{\frac{1}{\theta}} \tag{16}$$

These set of equations allow me to characterize the couple's utility maximizing choices. Let's first obtain an expression for λ which measures the marginal utility of income, i.e. the rate of increase in maximized utility as income is increased. From Equation 12 we have that:

$$\frac{1}{q} = \lambda \tag{17}$$

Taking the ratio between Equation 13 and Equation 15 yields:

$$h_{\varphi} = \left(\frac{1-\theta}{\theta}\right)^{\theta} \frac{Q}{w_{\varphi}^{\theta} e^{z + \theta\gamma(b)}} \tag{18}$$

Combining Equations 13 and 17 and Equations 14 and 17 yields:

$$l_{\varsigma} = 1 - h_{\varsigma} - \left(\frac{\mu \phi_l q}{w_{\varsigma} e^{\gamma(b)}} \right)^{\frac{1}{\eta}} \tag{19}$$

$$l_{\sigma} = 1 - \left(\frac{(1-\mu)\,\phi_l q}{w_{\sigma}} \right)^{\frac{1}{\eta}} \tag{20}$$

Finally, plugging Equations 17 and 18 in Equation 16 yields:

$$Q^{-\sigma} \left[\mu \left(\phi_l - 1 \right) + 1 \right] = \frac{1}{\theta q} \frac{w_{\varsigma}^{1-\theta}}{\left(\frac{1-\theta}{\theta} \right)^{1-\theta} \left(e^{\gamma(b)} \right)^{\theta}} \tag{21}$$

When choosing the quality of the children, the couple is outweighing benefits and costs. The left-hand side in Equation 21 is the marginal benefit of having an additional unit of child quality, which at the optimum has to equal the marginal cost (in utility terms), the right-hand side. From this relation it is possible to obtain the optimal Q, which is given by Equation 22.

$$Q = \left[\frac{\left[\mu \left(\phi_l - 1 \right) + 1 \right] \theta q \left(\frac{1-\theta}{\theta} \right)^{1-\theta} e^{z - \gamma(b) + \theta \gamma(b)}}{w_{\varsigma}^{1-\theta}} \right]^{\frac{1}{\sigma}} \tag{22}$$

Equations 18 to 22 together with Equation 11 fully characterize the couple's utility maximizing choices. Equation 18 determines optimal female home hours whereas Equations 19 and 20 describe the optimal female and male time spent working in the labor market. The marginal benefit from an additional unit of child quality arises from higher felicity of the couple, the left-hand side of Equation 21. This marginal benefit depends on the relative bargaining power since the woman and the man disagree on their preferences over the home good. On the other hand, the marginal cost of an additional unit of child quality demands more home production. To satisfy this requirement, either the woman needs to devote more time to home labor or the couple must purchase more market inputs. Any of these adjustments decrease consumption of the parents. Notice, from Equation 21 that the marginal cost is increasing in the female wage rate as w_{ς} represents the opportunity cost of the woman's home labor. Therefore, if the female allocates more time to home production, labor income will fall and thereby there is a reduction in consumption. Finally, the associate cost to sacrifice consumption depends negatively on the original consumption level, consequently the right-hand side of Equation 21 is decreasing in q.

4.2 Identification of Parameters

To quantitatively assess the effect of changing the magnitude of the cash transfer on female time allocation, I calibrate the model presented in the previous section. To bring the model to the data, I will use the optimality condition from the couple household optimization problem in which the household has to decide how much to spend on the market input, female and male hours devoted to labor market activities and female hours devoted to home production. The solution of this problem is the same as the one described in the previous section. However, the advantage of structuring the optimization problem in this way is that it allows me to econometrically recover the parameters of the home production function. After recovering these parameters, I will assign a functional form to the bargaining power in order to estimate the effect of changes in cash transfer on the woman's intra-household decision power. Finally, I choose the remaining utility parameters using a minimum distance estimation, which essentially finds the parameter values such that a set of moment conditions generated from the model matches the features of the Ecuadorian data for married couples.

Home Production Parameters

The representative couple's maximization problem is therefore given by:

$$\begin{aligned} \max_{d,l_{\varphi},l_{\sigma},h_{\varphi}} \quad & \mu\left(\bar{w}_{\varphi},t\right)U^{\varphi}\left(Q,q,h_{\varphi},l_{\varphi}\right)+\left(1-\mu\left(\bar{w}_{\varphi},t\right)\right)U^{\sigma}\left(Q,q,l_{\sigma}\right) \\ \text{subject to :} & \\ & q+d=e^{\gamma(b)}l_{\varphi}w_{\varphi}+l_{\sigma}w_{\sigma}+t \\ & Q=e^{z}d^{\theta}h_{\varphi}^{1-\theta} \\ & l_{\varphi}+h_{\varphi}\leq 1 \\ & l_{\varphi}\geq 0,h_{\varphi}\geq 0,l_{\sigma}\geq 0 \end{aligned} \tag{23}$$

For recovering the desired parameters, the relevant first order conditions are the ones related to a) the the market input d, b) how much time the female spends at home h_{φ}, and c) female time devoted to labor market activities l_{φ}, which are given by:

$$\frac{\partial Q}{\partial d}\left[\mu\frac{\partial U^{\varphi}}{\partial Q}+\left(1-\mu\right)\frac{\partial U^{\sigma}}{\partial Q}\right]=\frac{\partial q}{\partial d}\left[\mu\frac{\partial U^{\varphi}}{\partial q}+\left(1-\mu\right)\frac{\partial U^{\sigma}}{\partial q}\right] \tag{24}$$

$$\frac{\partial Q}{\partial h_{\varphi}}\left[\mu\frac{\partial U^{\varphi}}{\partial Q}+\left(1-\mu\right)\frac{\partial U^{\sigma}}{\partial Q}\right]=\mu\phi_{l}\left(1-h_{\varphi}-l_{\varphi}\right)^{-\eta} \tag{25}$$

$$\frac{\partial q}{\partial l_{\varphi}}\left[\mu\frac{\partial U^{\varphi}}{\partial q}+\left(1-\mu\right)\frac{\partial U^{\sigma}}{\partial q}\right]=\mu\phi_{l}\left(1-h_{\varphi}-l_{\varphi}\right)^{-\eta} \tag{26}$$

Equations 24, 25 and 26 require that the marginal benefit from devoting resources to the inputs of home production equals the opportunity cost of not spending the resources on the consumption good purchased in the the market.

Rearranging the terms of Equations 24, we obtain:

$$\frac{\frac{\partial Q}{\partial d}}{\frac{\partial q}{\partial d}} = \frac{\left[\mu \frac{\partial U^{\text{♀}}}{\partial q} + (1-\mu)\frac{\partial U^{\text{♂}}}{\partial q}\right]}{\left[\mu \frac{\partial U^{\text{♀}}}{\partial Q} + (1-\mu)\frac{\partial U^{\text{♂}}}{\partial Q}\right]} \tag{27}$$

Similarly, from Equations 25 and 26 we can obtain:

$$\frac{\frac{\partial Q}{\partial h_{\text{♀}}}}{\frac{\partial q}{\partial l_{\text{♀}}}} = \frac{\left[\mu \frac{\partial U^{\text{♀}}}{\partial q} + (1-\mu)\frac{\partial U^{\text{♂}}}{\partial q}\right]}{\left[\mu \frac{\partial U^{\text{♀}}}{\partial Q} + (1-\mu)\frac{\partial U^{\text{♂}}}{\partial Q}\right]} \tag{28}$$

Using Equation 27 and Equation 28, we can infer that the left hand side is the ratio between the marginal productivity of the input of production and its marginal cost. On the other hand, the right hand side is the ratio between the household willingness to pay for the market good and the marginal willingness to pay for the home good. Combining Equation 27 and Equation 28 we obtain:

$$\frac{\frac{\partial Q}{\partial d}}{\frac{\partial q}{\partial d}} = \frac{\frac{\partial Q}{\partial h_{\text{♀}}}}{\frac{\partial q}{\partial l_{\text{♀}}}} \tag{29}$$

Equation 29 defines the equality of the marginal rate of technical substitution between the market input and the female labor and the relative marginal cost.

Given that I assumed that the home good is produced according to a Cobb-Douglas technology given by $Q = e^{z}\left(d\right)^{\theta}\left(h_{\text{♀}}\right)^{1-\theta}$, Equation 29 becomes:

$$\frac{1-\theta}{\theta}\frac{d}{h_{\text{♀}}} = w_{\text{♀}} e^{\gamma(b)} \tag{30}$$

where $\frac{\partial q}{\partial d} = 1$ by normalization and $\frac{\partial q}{l_{\text{♀}}} = w_{\text{♀}} e^{\gamma(b)}$. Now, let's take logarithms and rearrange Equation 30 to get:

$$\log\left(\frac{d}{h_{\text{♀}} w_{\text{♀}}}\right) = \log\left(\frac{\theta}{1-\theta}\right) + \gamma\left(b\right) \tag{31}$$

If there is a random error in the measurement of the inputs of household production, I can estimate:

$$\log\left(\frac{d_i}{h_{♀,i}w_{♀,i}}\right) = \log\left(\frac{\theta}{1-\theta}\right) + \gamma\left(b_i\right) + \varepsilon_i \tag{32}$$

where the sub-index i denotes a household. With this equation we are able to recover θ and $\gamma\left(b_i\right)$. The parameter θ is identified as a transformation of the constant term of Equation 32. The functional form $\gamma\left(b_i\right)$ can be directly identified from the relation of the relative demand for the inputs of production and number of kids, b_i. The underlying assumption for identification is that the measurement error is uncorrelated with b_i. If this is the case, θ and $\gamma\left(b_i\right)$ enable me to recover the home good (Q) using observations of the household food expenditure (d) and female labor devoted to home production $h_{♀}$.

Using data on household food expenditure (d_i), female homework hours $(h_{♀,i}\ )$, and female relative wages $(\ \frac{w_{♀,i}}{w_{♂,i}})$, I estimate the technology of the home production $(\hat{\theta})$ and $(\hat{\gamma})$ through an OLS regression:

$$\log\left(\frac{d_i + t}{h_{♀,i}w_{♀,i}}\right) = \beta_0 + \beta_1 b_i + \beta_2 b_i^2 + \ldots + \varepsilon_i \tag{33}$$

As this equation comes from the interior solution, I estimate it only for the set of households where the female works in the labor market. Technology parameter θ is identified from the following transformation of the constant β_0 of Equation 33:

$$\hat{\theta} = \frac{\exp\left(\hat{\beta}_0\right)}{1 + \exp\left(\hat{\beta}_0\right)} \tag{34}$$

Once $\hat{\theta}$ is recovered, I can back out $\hat{\gamma}\left(b_i\right)$ by subtracting the constant $\hat{\beta}_0$ from the linear prediction of Equation 33. Based on the estimated values of $\hat{\theta}$ and $\hat{\gamma}\left(b_i\right)$, and the data on d_i and $h_{♀,i}$, I compute the predicted home good, $\hat{Q}_i$. The corresponding standard errors for each of these parameters will be obtained by bootstrapping.

Using the information available in Ecuadorian LSMS database, the predicted functional form for $\gamma\left(b\right)$ is:

$$\hat{\gamma}\left(b_i\right) = -0.2b + 0.01b_i^2 \tag{35}$$

Several other degrees of the polynomial were considered. The final specification is the one with the highest adjusted R^2 preserving the concavity of $\gamma\left(b\right)$.

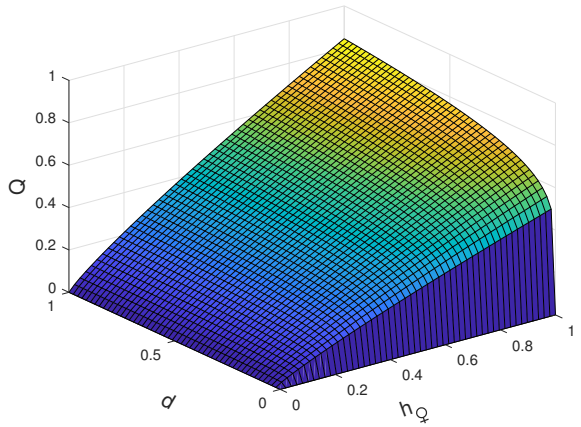
From the constant β_0 of Equation 33, I recover the associated technology parameter θ, which has mean 0.86 and standard error 0.02. The predicted technology of the home production is of the form:

$$\hat{Q}_i = e^{-0.012} \left(d_i\right)^{0.86} \left(h_{♀,\mathrm{i}}\right)^{0.14} \tag{36}$$

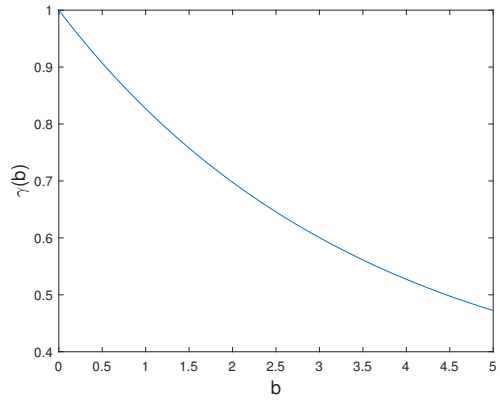
Figure A.1 shows the structure of the estimated technology of the home production. From Equation 36, we know that on average, an increase on the number of children decreases female labor productivity, and as the number of children increases, it can reduce almost half of female labor productivity. This relation can be observed in the left panel of Figure 6.

Figure 6: Estimated Home Production Function

(a) Predicted Technology of the Home Production



(b) Productivity Cost of having Children



Notes: In the left panel I show the predicted technology of the home production using the estimated parameters. In the right panel, I show the productivity cost function of having children using the estimated equation recover using the Ecuadorian LSMS data.

Bargaining Power

To estimate the effect that change in cash transfer has on the bargaining power of the woman, I need to assign a functional form to the weight $\mu\left(\bar{w}_♀, t\right)$. Therefore, following Lise and Yamada (2014), I define a parametric structure for the bargaining power which is given by:

$$\mu\left(\bar{w}_♀, t\right) = \frac{e^{(\alpha_0 + \alpha_1 \bar{w}_{♀\mathrm{i}} + \alpha_2 t_i)}}{1 + e^{(\alpha_0 + \alpha_1 \bar{w}_{♀\mathrm{i}} + \alpha_2 t_i)}} \tag{37}$$

Taking logarithms, and if there is a random error in the measurement of wages and the cash transfer, I can estimate Equation 37 through an OLS regression:[20]

[20]The estimation of this equation is possible as I have information in the intra-household decisions in the LSMS, specifically information related to the liberty to decide reported by the household head and spouse separately.

$$\log\left(\frac{\mu}{1-\mu}\right) = \alpha_0 + \alpha_1 \bar{w}_{\text{♀i}} + \alpha_2 t_i + \varepsilon_i \tag{38}$$

From this regression I can identify $\hat{\alpha}_0$, $\hat{\alpha}_1$ and $\hat{\alpha}_2$. Using the information available in Ecuadorian LSMS database, the predicted functional form for $\mu\left(\bar{w}_{\text{♀}}, t\right)$ is:

$$\mu\left(\bar{w}_{\text{♀}}, t\right) = \frac{e^{(0.437+0.003\bar{w}_{\text{♀i}}+0.078t_i)}}{1+e^{(0.437+0.003\bar{w}_{\text{♀i}}+0.078t_i)}} \tag{39}$$

Preference Parameters

Finally, the four parameters that I still need to recover are the ones that characterize the female an male utility functions. Two parameters, ϕ_l and η, relate to the preference for leisure, and two parameters, ϕ_Q and σ, are key for the choice of the quality of the children. In the model, female and male time allocation to the labor market are the solution to Equations 19 and 20, where q solves Equation 11 and μ is given . Therefore I try to replicate female and male time in paid employment, as function of the time endowment of one, by choosing the leisure preference parameters.

Table 2: Model Parameters

Parameter	Description	Value
θ	technology parameter of home production	0.86
$\gamma\left(b_i\right)$	female productivity on the labor market	$-0.2b + 0.01b_i^2$
$[\alpha_0, \alpha_1, \alpha_2]$	bargaining power parameters	$[0.437, 0.003, 0.078]$
ϕ_l	weight on utility from leisure	0.32
η	curvature of leisure in utility	10
ϕ_Q	weight on female utility from children quality	18.16
σ	curvature of children quality in female utility	2.67
z	productivity of home good	-0.012

Notes: The table shows the recovered parameters from the calibration process of the intra-household bargaining model using the Ecuadorian data.

Now, the other two parameters characterizing the utility related to the quality of the children have to be chosen. While ϕ_Q captures the relative weight the female attaches to children quality (compared to consumption), σ essentially captures the curvature, which is important for the magnitude by which the quality of children responds to changes in the amount of available resources. Since the average child quality is only one target, I need to add a second one. I restrict the calibration by choosing σ such that the highest child quality the model generates in response to changes in available resources is equal to the highest child quality

observed in the data. Conditional on a value for σ, I calibrate ϕ_Q to the observed child quality data. Then I solve the model's transition in response to a catching up of women's relative income. If the implied maximum child quality is different from the observed one, I update the guess for σ until this target is met. The estimation results are reported in Table 2.

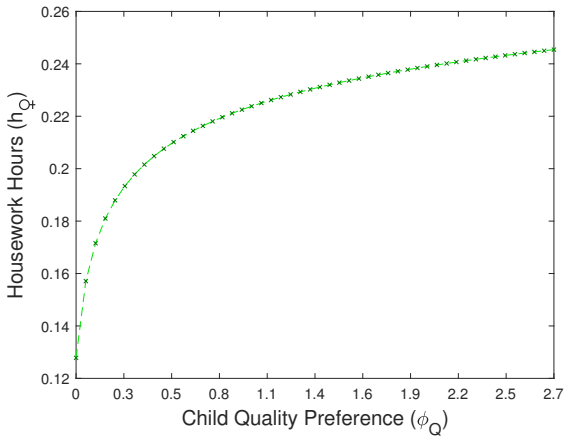
4.3 Model Simulations

Now that I have placed values on the parameters of the model, I will perform different simulations. As a comparative statics exercise, I will evaluate of how the choice variables vary with changes in female's relative preferences over Q and changes in female's wage gap.

Simulation I: Change in Female's Preference for the Home Good

In Ecuador, the BDH cash transfer program is given to women that are mothers, and it imposes co-responsibilities intended to improve children's human capital formation. However, unlike other programs, the BDH has not effectively verified compliance with co-responsibilities in education and health on a regular basis and, as a result, households that do not comply with these requirements are not penalized. However, the program has promoted investment in education and health of its beneficiaries through information campaigns. Therefore, the CCT program in Ecuador includes information about the correct use of resources which send a signal to mother beneficiaries. This signal could change woman's preferences over the home good. In this context, it is important to analyze the effect of a change in female relative preferences for child quality, ϕ_Q, on the main household choice variables. The Parameter ϕ_Q can be also understood as a disagreement parameter for the woman and the man preferences over the home good. Figures 7, 8 and 9 plot how the choice variables change with the extent of disagreement parameter. In each figure, I analyze a scenario in which there is a cash transfer equivalent to 20 percent of the male wage. In the x-axis I plot the disagreement in the preference parameter. The x-axis range represents a proportional change in relation to the benchmark parameter calibrated for Ecuador.

Figure 7: Female Housework Hours

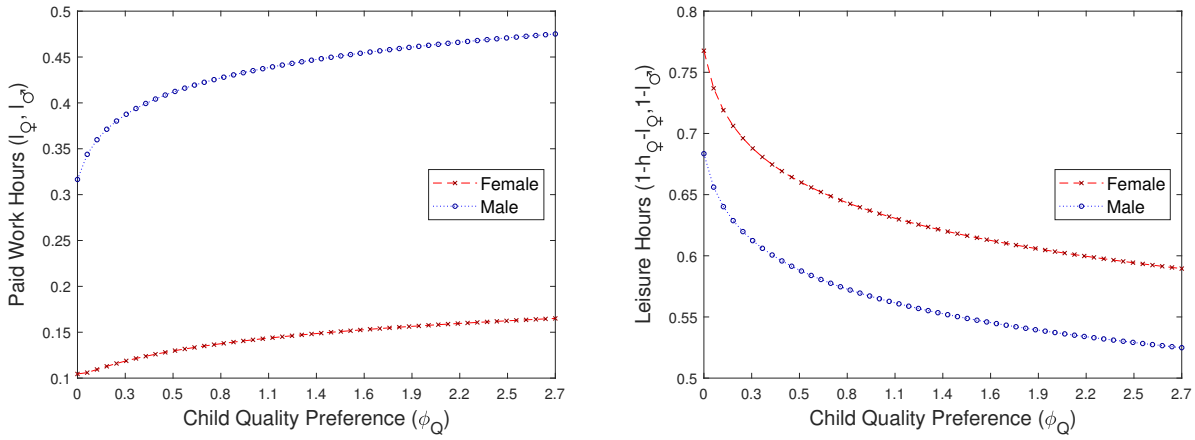


Notes: The plot shows the effect of a change in female relative preferences from children quality on the female's housework time under a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

Figure 8: Female and Male Paid Work Hours and Leisure Hours

(a) Female and Male Labor

(b) Female and Male Leisure



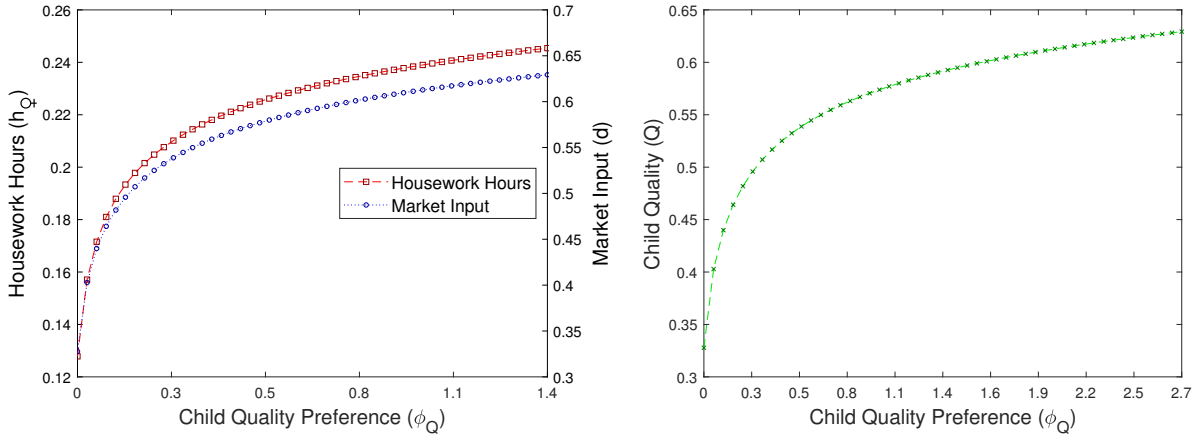
Notes: The left panel depicts the effect of a change in female relative preferences from children quality on the allocation of paid work hours of the female and male under a cash transfer scenario The right panel depicts the effect of a change in female relative preferences from children quality on the allocation of leisure time of the female and male under a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

In Figures 7 and 8, we observe the decisions related to allocation of time of household members. In Figure 7, we see that when female's preference for the home good Q is lower, the wife allocates less hours to housework. However, as wife's preference for Q increases, she become more aware of child quality, and therefore, she starts devoting more time to housework activities. Figure 8 plots how female and male labor supply and leisure change

with female relative preferences for the home good. As female's preference for Q goes up, the female wants to allocate more inputs to the child. Also, there is more disagreement related to child quality. Therefore, the wife substitutes leisure time with time devoted to housework and labor market activities. However, as female's preference for Q rise, her opportunity cost of devoting her time to the labor market rather than to the home good production also increases. Therefore, she allocates most of the substituted leisure time to housework activities. Also, as the level of disagreement goes up, the wife wants to allocates most of household resources to the child. The male does not like this shift as it reduces his consumption of market good q. Therefore, he also substitutes leisure and increases his labor supply to obtain additional resource in order to afford more consumption of the market good q.

Figure 9: Home Good Production

(a) Home Good Inputs **(b)** Quality of Home Good



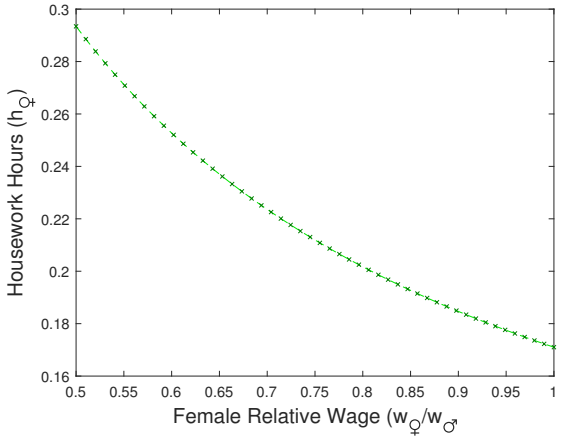
Notes: The left panel depicts the effect of a change in female relative preferences from child quality on the choice of inputs of home production under a cash transfer scenario. The right panel depicts the effect of a change in female relative preferences from child quality on the quality of home good under a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

The inputs of home production d and h_{φ}, and the quality of good are depicted in Figure 9. When the preferences for the home good are low, there is little disagreement among wife and husband which leads to lower demand of home inputs. However, as wife's preference for Q rise, she become more aware of child quality and therefore there is an increase on both inputs. These effects are translated into the home good production. As female's preference for Q increases, the quality of home good also goes up.

Simulation II: Change in Female's Relative Wage

In the model, households differ in the extent of the disagreement over child quality and in the female relative wages. Since relative wages determine specialization within the households and also affect female's bargaining power, it is worth examining what are the effects of a change in female's relative wage in the household choice variables.

Figure 10: Female Housework Hours

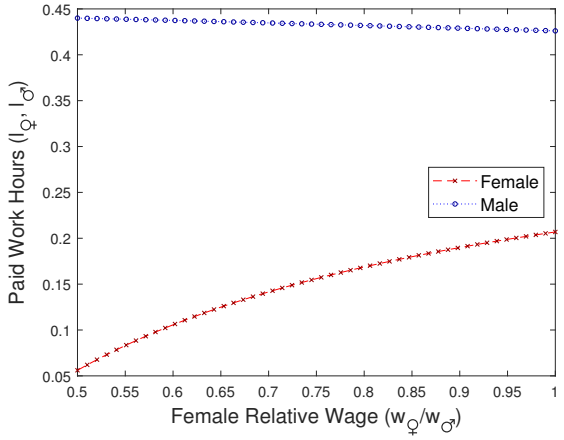


Notes: The plot shows the effect of a change in the female wage gap on the female's housework time under a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

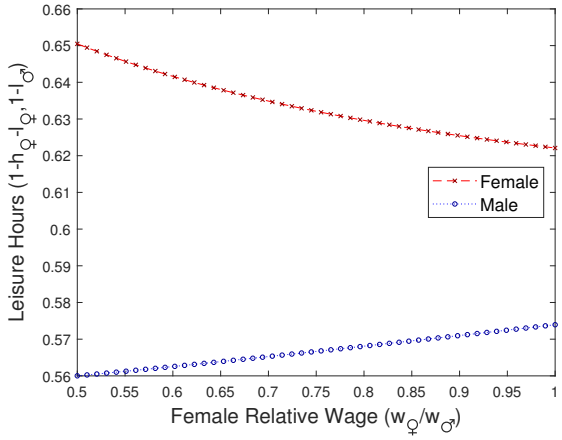
In Figures 10 and 11 we observe the decisions related to allocation of time of household members. Again, in each figure, I analyze an scenario in which there is a cash transfer equivalent to 20 percent of the male income. In the x-axis I plot the female relative wage. When female relative wages are low, the couple household is specialized. Based on comparative advantage, the wife devotes more time to housework activities (see Figure 10), and devotes less time to paid employment (see Figure 11). As female relative wage increases, her opportunity cost of devoting her time to housework activities rather than to the labor market start to goes up. Improvements in female wages therefore raise the couple's opportunity cost of the child quality. This situation makes the wife willing to change her time allocation, and incentive her to devote lees hours to housework activities and more hours to the labor market.

Figure 11: Female and Male Paid Work Hours and Leisure Hours

(a) Female and Male Labor



(b) Female and Male Leisure



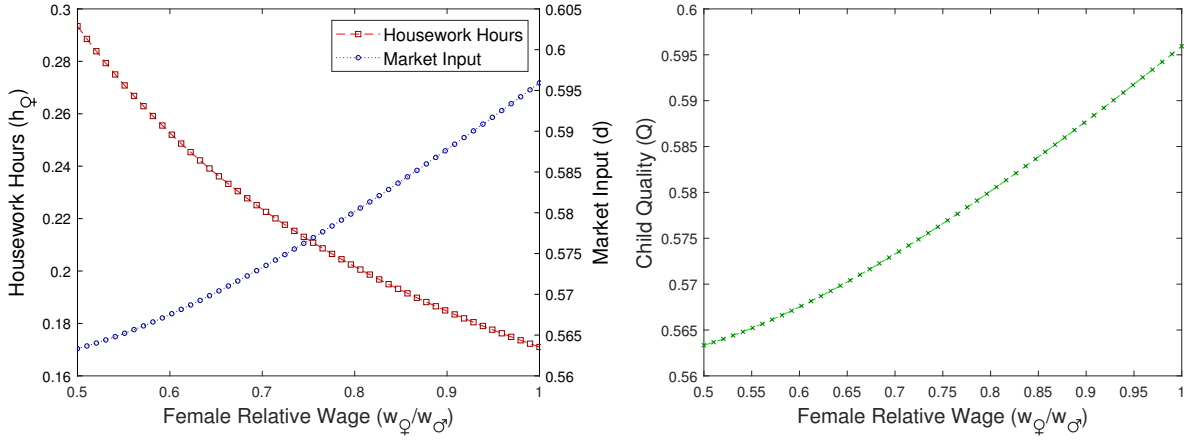
Notes: The left panel depicts the effect of a change in the female wage gap on the allocation of paid work hours of the female and male under a cash transfer scenario The right panel depicts the effect of a change in the female wage gap on the allocation of leisure time of the female and male under a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

The man time devoted to paid employment slightly decreases. This is due to the availability of additional resources for the purchase of the market input of home production as well as more home hours devoted by the wife, which allows the husband to substitute some labor with leisure. It is important to note that with low female relative wages, the male will have more bargaining power and will influence more strongly the allocation of resources. As female's relative wages start to increase the the household has more income and at the same time the wife has more bargaining power to influence the intra-household allocation of resources.

Consequently, the model suggests that when wife's relative wages are low and start rising, higher opportunity costs become an important driver of the female time allocation decisions. In this context, the income effect is dominated by the substitution effect, and therefore the female allocates less hours to housework activities.

Figure 12: Home Good Production

(a) Home Good Inputs **(b)** Quality of Home Good



Notes: The left panel depicts the effect of a change in the female wage gap on the choice of inputs of home production under a cash transfer scenario. The right panel depicts the effect of a change in the female wage gap on the quality of home good under a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

The changes in inputs of home production d and $h_♀$, and the quality of good, Q, are depicted in Figure 12. As female relative wages start to increase, the opportunity cost of having children goes up. In this context, the wife's income begins to represent a larger fraction of family income. This translates in higher female's bargaining power and allows for larger substitution of female housework time with purchased market inputs (see Figure 12). This translate into a new combination of inputs of home production, as female relative wages start to rise. Overall the child quality improves as the female relative wage increases, as the stream of available resources allows the parent to purchase more market inputs.

4.4 Counterfactual Policy Analysis: No Transfer versus Cash Transfer

This section presents a policy experiment trying to quantify the effect of a situation in where there is no CCT program. As before, I will examine how the choice variables vary with changes in female's relative preferences over Q and changes in female's wage gap under two scenarios a cash transfer scenario versus a no transfer scenario. In each figure, the blue line represents a situation where there is no CCT program and the red line depicts an scenario in where there is a cash transfer equivalent to 20 percent of the male income.

Counterfactual Results I: Change in Female's Preference for the Home Good

Figures A.7, A.8, A.9 and A.10 plot how the choice variables change with the extent of disagreement parameter under a cash transfer versus a no transfer scenario. In the x-axis I plot the disagreement in preference parameter. The x-axis range represent a proportion change in relation to the benchmark parameter calibrated for Ecuador.

When a household receive a cash transfer, the increase in available resources influence the optimal decision of household member. The CCT partially alleviate the tension in the family related to the allocation of resources. As female's preference for Q rise, her opportunity cost of devoting her time to the labor market rather than to the home good production also goes up, and since now there are exogenous resources available, the wife allocates more time to housework activities and less time to the labor market (See Figure A.7 and A.8) . Since there is an increase in the available inputs for the home good production (more female time and exogenous resources to purchase the market input), this release some of the household resource for the consumption of market good q. This alleviates the necessity of the the male to obtain additional resource, and therefore he is able to substitutes some labor market hours with leisure (See Figure A.8 and A.9).

The inputs of home production d and h_{φ}, and the quality of good are depicted in Figure A.10. When the preferences for the home good are low, the disagreement in the allocation of resources among female and male is small, which leads to lower demand of home inputs. As wife's preference for Q increases, she become more aware of child quality and therefore there is a rise on both inputs. When a household receive a cash transfer, the exogenous increase of resources is translated into more market input and more female time, since as we have seen before, the wife allocates more time to housework activities. In addition, the exogenous source of resource received by the female, help her improve her bargaining power inside the household and allows her to shift the household allocation toward her preferred good, which is Q (See Figure A.10). Moreover, under the cash transfer scenario the home good production increase in comparison to a no cash transfer scenario, as there is a raise in available inputs for home production.

To better understand the mechanism, think about a household deriving utility from a brand-new stereo q and a wholesome children Q. Although both husband and wife enjoy having the latest technology stereo and a wholesome child; the wife cares relatively more about the children well-being. In order to have a wholesome child, the couple needs to buy food and provide some mother's attention (wife's time) to the child. Therefore, when the resources are scarce, the wife would prefer a modest stereo and spend more money on food. When this type of disagreement takes place, households in where the husband has higher bargaining

power i.e. the wife's say is lower, will decide to get a better technology stereo at the cost of losing child quality due to the reduction on food input. However, when the wife receives a cash transfer there is not only additional resources to spend among the purchase of food and the stereo but also there is an increase in the bargaining power of the wife which leads to a shift in the allocation of resources within the household since they have different preference over the home good Q.

Counterfactual Results II: Change in Female's Relative Wage

Figures A.11, A.12, A.13 and A.14 plot how the choice variables change with changes in female's relative wage under a cash transfer versus a no transfer scenario. In the x-axis I plot the female relative wage.

Households in which the female relative wage is low present a high degree of specialization. Based on comparative advantage, the wife allocates more time to housework activities. When a household receive a cash transfer, the increase in available resources makes the wife devote even more time to housework activities, especially when the household is very specialized due to the low female relative wage (see Figure A.11). In this scenario, female time devoted to the labor market decreases, as the female wage is low and now she has available exogenous resources coming from the cash transfer program (See Figure A.12). When there is no cash transfer program, the lack of exogenous resources makes the wife allocate more time to paid work activities in order obtain resources. In both scenarios, as wife's relative wages start increasing, she will substitute housework hours with labor market hours, as her opportunity cost of devoting time to housework activities rather than to the labor market starts to goes up. When there is no cash transfer, the male time devoted to paid employment rise. Since there is no stream of exogenous resources and the female wage is low, the male has to devote more hours to the labor market in order to obtain resources to maintain the level of consumption. In this situation, the female has low bargaining power, since she has a low relative wage and there is no source of exogenous income that helps her improve her position within the households. Therefore, the male will have a higher say in deciding the allocation of resources towards the preferred good.

As female relative wages start to increase, the wife will start to substitute housework activities with paid work activities, as the opportunity cost of devoting her time to housework activities rather than to the labor market also goes up. If there is no cash transfer she will allocate more hours to the labor market and substitute female home hours input with market good input in the production of the home good. The cash transfer helps to balance this effect and will make the women to reallocate some hours to housework activities (See

Figure A.14). When the female relative wages start to increase, and the household receives a cash transfer, the household enjoys additional resources for the purchase of the market input of home production as well as the additional hours of wife housework, which allows the husband to substitute some labor with leisure. We know that, as female relative wages start to raise, the opportunity cost of having children also increases. In this context, the wife's income begins to represent a larger fraction of family income and therefore she start to having more bargaining power and higher degree of decision-making in the allocation of resources within the household.We observe in Figure A.14, that if we compare a no transfer with a cash transfer scenario, there are more inputs of home production under the cash transfer scenario. This translates into having a higher level of home production (child quality), Q, when a household benefits from a cash transfer.

5 Conclusion

In this paper, I study how intra-household time allocation and bargaining power respond to cash transfers. Exploiting the program structure and the targeting mechanism, I used a fuzzy regression discontinuity design to show that the CCT program in Ecuador has an impact on female time allocation as well as on female's bargaining power.

Then, to further understand the channels through which CCTs might affect time allocation decisions and the distribution of power within the household, I construct and estimate an intra-household bargaining model in which the cash transfer plays an important role in shifting the bargaining power of the female and affecting the stream of available resources. This model conceptualizes the household as a space of cooperation where there is a possibility for disagreement, especially related to the valuation of home good (child quality). I simulate the model and analyze how optimal decisions of household members in beneficiary households respond when there are changes in the woman's preferences for the home good and in the woman's relative wages. I find that an increase in the wife's preferences for the home good make her allocate more time to housework activities, as she becomes more aware of child quality. This situation allows the household to increase the quantity of inputs of home production. These effects are translated into the home good production. As the female's preference for the home good increases, the child quality improves. In the second simulation, I find that an increase in female's relative wage will change the female household specialization. As female relative wage increases, her opportunity cost of devoting her time to housework activities rather than to the labor market starts to go up. Improvements in female wages, therefore, raise the couple's opportunity cost of the children quality. In this context, the wife's income begins to represent a larger fraction of family income. This translates in

higher female's bargaining power and allows for larger substitution of female housework time with purchased market inputs for home production. This new combination of inputs of home production results in an overall improvement of the child quality.

Finally, I perform a counterfactual analysis that examines the responses of household members under two scenarios: a cash transfer scenario versus a no transfer scenario. I found that in the absence of a cash transfer, the female must increase her time allocated to labor market activities and must reduce the allocation of time to housework. As the female's preference for the home good increases, her opportunity cost of devoting her time to the labor market rather than to the home good production also goes up, and in the cash transfer scenario, the wife allocates more time to housework activities and less time to the labor market. In addition, the exogenous source of resources received by the female helps her improve her bargaining power inside the household and allows her to shift the household allocation toward her preferred good, which is the home good. Therefore, under the cash transfer scenario, the home good production increases in comparison to a no cash transfer scenario, as there is a rise in available inputs for home production. Lastly, I found that in both scenarios, as female relative wages start to increase, the opportunity cost of having children rise. In this context, the wife's income begins to represent a larger fraction of family income and, therefore, she starts to gain more bargaining power and higher degree of decision in the allocation of resources within the household. If there is no cash transfer, the female must substitute some housework activities with paid work activities. Moreover, if we compare a no transfer with a cash transfer scenario, there are more inputs of home production under the cash transfer scenario. Again, this translates into having a higher level of home production (child quality), when a household benefits from a cash transfer. Overall, cash transfers seem to influence the allocation of time of females and positively influence the production of home good (child quality).

References

Adato, M., De la Briere, B., Mindek, D., and Quisumbing, A. (2000). The impact of progresa on women's status and intrahousehold relations. *Final Report, International Food Policy Research Institute, Washington DC*.

Adato, M. and Roopnaraine, T. (2010). Women's status, gender relations, and conditional cash transfers. *Conditional cash transfers in Latin America*, page 284.

Aguirre, R. and Ferrari, F. (2013). Surveys on time use and unpaid work in latin america and the caribbean: Experience to date and challenges for the future.

Alzua, M., Cruces, G., and Ripani, L. (2013). Welfare programs and labor supply in developing countries: experimental evidence from latin america. *Journal of Population Economics*, 26(4):1255–1284.

Angelucci, M. (2008). Love on the Rocks: Domestic Violence and Alcohol Abuse in Rural Mexico. *The B.E. Journal of Economic Analysis & Policy*, 8(1):1–43.

Angrist, J. and Pischke, J.-S. (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press, 1 edition.

Attanasio, O. and Lechene, V. (2002). Tests of Income Pooling in Household Decisions. *Review of Economic Dynamics*, 5(4):720–748.

Attanasio, O. and Lechene, V. (2010). Conditional cash transfers, women and the demand for food. Technical report, IFS working papers.

Barham, T. (2011). A healthier start: The effect of conditional cash transfers on neonatal and infant mortality in rural Mexico. *Journal of Development Economics*, 94(1):74–85.

Basu, K. (2006). Gender and Say: a Model of Household Behaviour with Endogenously Determined Balance of Power. *Economic Journal*, 116(511):558–580.

Behrman, J. R., Sengupta, P., and Todd, P. (2005). Progressing through PROGRESA: An Impact Assessment of a School Subsidy Experiment in Rural Mexico. *Economic Development and Cultural Change*, 54(1):237–275.

Bergolo, M. and Cruces, G. (2016). The anatomy of behavioral responses to social assistance when informal employment is high.

Bobonis, G. J. (2009). Is the Allocation of Resources within the Household Efficient? New Evidence from a Randomized Experiment. *Journal of Political Economy*, 117(3):453–503.

Bourguignon, F. and Chakravarty, S. R. (2003). The measurement of multidimensional poverty. *The Journal of Economic Inequality*, 1(1):25–49.

Buser, T. (2015). The Effect of Income on Religiousness. *American Economic Journal: Applied Economics*, 7(3):178–195.

Calonico, S., Cattaneo, M. D., and Farrell, M. H. (2018a). Coverage error optimal confidence intervals.

Calonico, S., Cattaneo, M. D., and Farrell, M. H. (2018b). On the effect of bias estimation on coverage accuracy in nonparametric inference. *Journal of the American Statistical Association*, pages 1–13.

Calonico, S., Cattaneo, M. D., and Farrell, M. H. (2018c). Optimal Bandwidth Choice for Robust Bias Corrected Inference in Regression Discontinuity Designs. Papers 1809.00236, arXiv.org.

Calonico, S., Cattaneo, M. D., Farrell, M. H., and Titiunik, R. (2018d). Regression discontinuity designs using covariates. *Review of Economics and Statistics*, Forthcoming.

Calonico, S., Cattaneo, M. D., and Titiunik, R. (2014a). Robust data-driven inference in the regression-discontinuity design. *Stata Journal*, 14(4):909–946.

Calonico, S., Cattaneo, M. D., and Titiunik, R. (2014b). Robust Nonparametric Confidence Intervals for Regression Discontinuity Designs. *Econometrica*, 82:2295–2326.

Calonico, S., Cattaneo, M. D., and Titiunik, R. (2015). Optimal Data-Driven Regression Discontinuity Plots. *Journal of the American Statistical Association*, 110(512):1753–1769.

Carrillo, P. E. and Ponce Jarrin, J. (2009). Efficient delivery of subsidies to the poor: Improving the design of a cash transfer program in Ecuador. *Journal of Development Economics*, 90(2):276–284.

Cattaneo, M., Jansson, M., and Ma, X. (2018). Manipulation testing based on density discontinuity. *Stata Journal*, 18(1):234–261.

Chiappori, P.-A. and Mazzocco, M. (2017). Static and Intertemporal Household Decisions. *Journal of Economic Literature*, 55(3):985–1045.

Djebbari, H. (2005). The Impact on Nutrition of the Intrahousehold Distribution of Power. IZA Discussion Papers 1701, Institute for the Study of Labor (IZA).

Doepke, M. and Tertilt, M. (2011). Does Female Empowerment Promote Economic Development? IZA Discussion Papers 5637, Institute for the Study of Labor (IZA).

Duflo, E. (2003). Grandmothers and granddaughters: Old-age pensions and intrahousehold allocation in south africa. *The World Bank Economic Review*, 17(1):1–25.

Duflo, E. (2011). Women's Empowerment and Economic Development. NBER Working Papers 17702, National Bureau of Economic Research, Inc.

Fabara, C. (2009). Reformulacion del indice de clasificacion socioeconomica del registro social.

Fiszbein, A., Schady, N., Ferreira, F., Grosh, M., Keleher, N., Olinto, P., and Skoufias, E. (2009a). *Conditional Cash Transfers: Reducing Present and Future Poverty*. The World Bank.

Fiszbein, A., Schady, N., Ferreira, F., Grosh, M., Keleher, N., Olinto, P., and Skoufias, E. (2009b). *Conditional Cash Transfers: Reducing Present and Future Poverty*. The World Bank.

Garganta, S. and Gasparini, L. (2015). The impact of a social program on labor informality: The case of AUH in Argentina. *Journal of Development Economics*, 115(C):99–110.

Gertler, P. (2004). Do Conditional Cash Transfers Improve Child Health? Evidence from PROGRESA's Control Randomized Experiment. *American Economic Review*, 94(2):336–341.

Glewwe, P. and Kassouf, A. L. (2012). The impact of the Bolsa Escola/Familia conditional cash transfer program on enrollment, dropout rates and grade promotion in Brazil. *Journal of Development Economics*, 97(2):505–517.

Gonzalez-Rozada, M. and Llerena-Pinto, F. (2011). The Effects of a Conditional Transfer Program on the Labor Market: The Human Development Bonus in Ecuador. Department of Economics Working Papers 2011-04, Universidad Torcuato Di Tella.

Hahn, J., Todd, P., and der Klaauw, W. V. (2001). Identification and estimation of treatment effects with a regression-discontinuity design. *Econometrica*, 69(1):201–209.

Handa, S., Peterman, A., Davis, B., and Stampini, M. (2009). Opening up pandora's box: The effect of gender targeting and conditionality on household spending behavior in mexico's progresa program. *World Development*, 37(6):1129–1142.

Hirway, I. (2010). Time-use surveys in developing countries: An assessment. In *Unpaid Work and the Economy*, pages 252–324. Springer.

Holmes, R. and Jones, N. (2010). Rethinking social protection using a gender lens.

Imbens, G. and Kalyanaraman, K. (2012). Optimal Bandwidth Choice for the Regression Discontinuity Estimator. *Review of Economic Studies*, 79(3):933–959.

Imbens, G. W. and Lemieux, T. (2008). Regression discontinuity designs: A guide to practice. *Journal of Econometrics*, 142(2):615–635.

Iyigun, M. and Walsh, R. P. (2007). Endogenous Gender Power, Household Labor Supply and the Demographic Transition. *Journal of Development Economics*, 82(1):138–155.

Lise, J. and Yamada, K. (2014). Household sharing and commitment: Evidence from panel data on individual expenditures and time use. Technical report, IFS Working Papers.

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics*, 142(2):698–714.

Molyneux, M. and Tabbush, C. (2008). Conditional cash transfers and women's empowerment: Annotated bibliography. *Institute for the Study of the Americas School of Advanced Study, University of London*, pages 2–3.

Paxson, C. and Schady, N. (2010). Does money matter? the effects of cash transfers on child development in rural ecuador. *Economic Development and Cultural Change*, 59(1):187–229.

Rubalcava, L., Teruel, G., and Thomas, D. (2009). Investments, Time Preferences, and Public Transfers Paid to Women. *Economic Development and Cultural Change*, 57(3):507–538.

Stock, J., Yogo, M., and Wright, J. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business and Economic Statistics*, 20:518 – 529.

Thistlethwaite, D. L. and Campbell, D. T. (1960). Regression-discontinuity analysis: An alternative to the ex post facto experiment. *Journal of Educational Psychology*, 51(6):309.

Thomas, D. (1990). Intra-Household Resource Allocation: An Inferential Approach. *Journal of Human Resources*, 25(4):635–664.

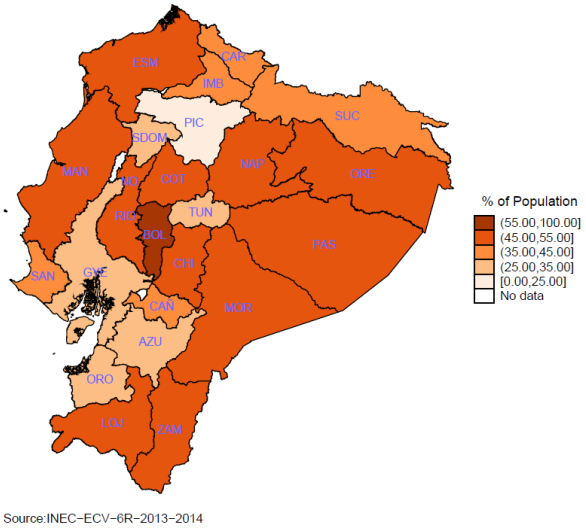
Yoong, J. (2012). The impact of economic resource transfers to women versus men: a systematic review.

Appendix

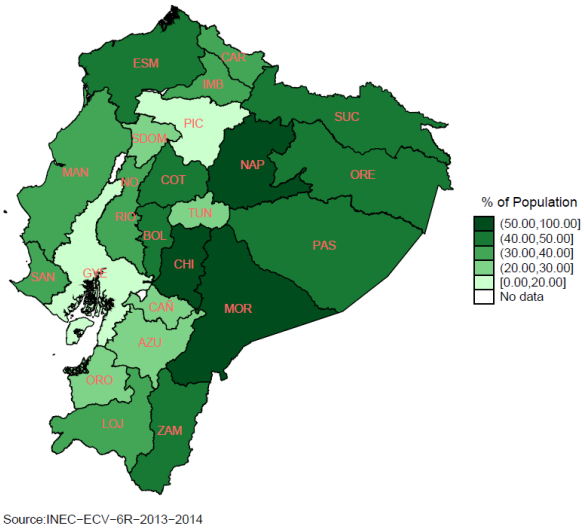
AI. Descriptive Tables and Plots

Figure A.1: BDH and Poverty

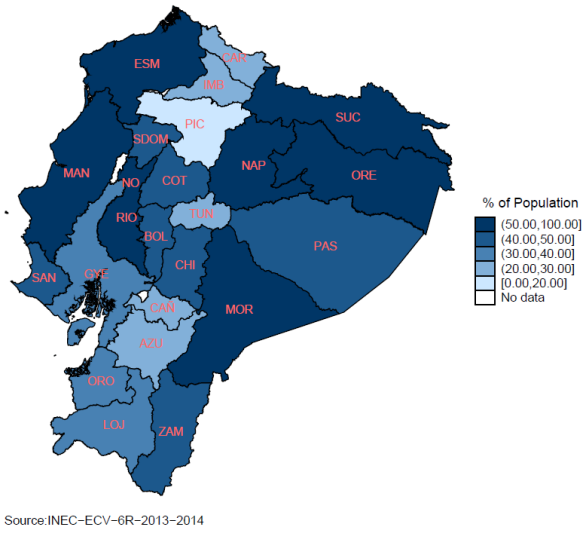
(a) BDH Beneficiaries



(b) Consumption Poverty



(c) NBI Poverty



Notes: The plot shows the geographic distribution of the conditional cash transfer beneficiaries as well as the poverty rates measured via consumption and unsatisfied basic needs.

Table A.1: BDH Household Compliance

	RSII Index Score (Z)		
	$\leq$ 34.04	>34.04	
	(1)	(0)	Total
Treatment Status (T)			
Non-beneficiaries (0)	1,183	6,664	7,847
	15.08%	84.92%	100%
	46.05%	89.86%	78.59%
Beneficiaries (1)	1,386	752	2,138
	64.83%	35.17%	100%
	53.95%	10.14%	21.41%
Total	2,569	7,416	9,985
	25.73%	74.27%	100%
	100%	100%	100%

Notes: The table shows a cross-tabulation of the treatment status of households and its eligibility status based in the RSII index. From the table it is possible to calculate the percentage of compliers in the sample by computing: (T=1/Z=1) - (T=1/Z=0) = 53.95%-10.14%=43.81%

Table A.2: Descriptive Statistics of Household Characteristics

	Total Sample (N=9,985)		Beneficiaries[a] (N=2,138)		Non-beneficiaries[b] (N=7,847)		Difference (N=9,985)
	Mean	SD	Mean	SD	Mean	SD	$a-b$
Household Characteristics							
Women Age	41.16	14.71	36.87	9.71	42.33	15.60	-5.46***
Men Age	44.81	15.08	40.42	10.68	46.01	15.86	-5.59***
Woman Years of Education	8.94	4.75	6.54	3.26	9.60	4.88	-3.06***
Men Years of Education	9.11	4.64	6.93	3.30	9.70	4.78	-2.77***
Number of Children <5	0.53	0.75	0.81	0.89	0.46	0.69	0.36***
Number of Children	1.69	1.50	2.98	1.56	1.34	1.27	1.64***
Mean NBI Poverty at District	2.17	1.39	1.27	0.68	2.42	1.44	-1.15***
Household Average Income	245.26	335.66	106.31	85.94	283.12	366.97	-176.81***
Woman Income	190.00	420.47	86.14	164.46	218.29	462.45	-132.15***
Man Income	613.41	858.95	365.59	274.20	680.93	947.14	-315.34***
Number of Adults with Disability	0.11	0.35	0.07	0.26	0.12	0.37	-0.05***

Notes: The table shows a set of important characteristics of the households used for the analysis. A woman is a female head of household or spouse and similarly a men is a male head of household or spouse. *significant to 10%; **significant to 5%; ***significant to 1%.

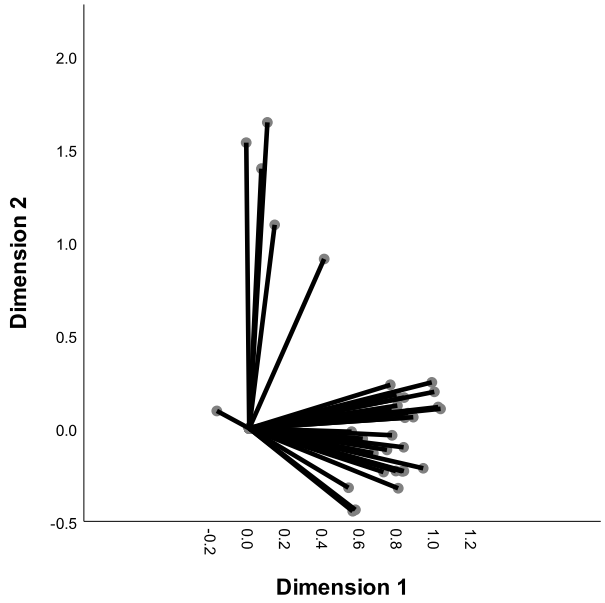
Table A.3: Descriptive Statistics of Time Allocation and Bargaining Power Variables

	Total Sample (N=9,985)		Beneficiaries[a] (N=2,138)		Non-beneficiaries[b] (N=7,847)		Difference (N=9,985)
	Mean	SD	Mean	SD	Mean	SD	$a-b$
Women's Time Allocation							
Paid Work Hours	20.81	20.34	21.09	18.55	20.73	20.80	0.37
Housework Hours	31.74	13.60	35.69	12.88	30.66	13.60	5.03***
Leisure Hours	80.85	14.35	76.95	11.73	81.91	14.81	-4.96***
Community Hours	0.30	1.50	0.70	2.29	0.19	1.18	0.51***
Men's Time Allocation							
Paid Work Hours	42.85	18.85	43.37	15.72	42.72	19.61	0.65
Housework Hours	6.81	7.14	7.35	7.23	6.66	7.10	0.69***
Leisure Hours	80.62	14.32	77.15	11.66	81.57	14.82	-4.42***
Community Hours	0.42	1.89	0.86	2.58	0.30	1.64	0.55***
Women's Decision							
Whether to Work or Not	0.83	0.38	0.83	0.38	0.83	0.38	0.00
How Many Hours to Work	0.79	0.41	0.82	0.39	0.79	0.41	0.03**
Where to Work	0.81	0.39	0.82	0.38	0.81	0.39	0.01
On What to Work	0.82	0.39	0.83	0.37	0.81	0.39	0.02*
Who Does Household Chores	0.72	0.45	0.90	0.30	0.68	0.47	0.23***
Education of Children Study	0.73	0.44	0.93	0.25	0.68	0.47	0.25***
What to Do if Child Gets Sick	0.76	0.43	0.96	0.20	0.70	0.46	0.26***
Expenses for Children	0.72	0.45	0.91	0.29	0.67	0.47	0.24***
Personal Expenses	0.91	0.28	0.91	0.28	0.91	0.28	0.00
Use of Work Income	0.70	0.46	0.70	0.46	0.71	0.46	-0.01
On Large Purchases	0.90	0.30	0.88	0.32	0.90	0.30	-0.02*
How you Dress	0.97	0.17	0.97	0.18	0.97	0.16	-0.01
About Using Free Time	0.97	0.18	0.97	0.18	0.97	0.18	-0.00
Women's Bargaining Power I							
Overall	8.78	1.71	9.56	0.94	8.57	1.81	0.98***
Work Activities	8.78	2.52	9.07	1.95	8.70	2.64	0.37***
Home and Persona Activities	8.68	2.37	9.88	0.74	8.35	2.55	1.53***
Purchases Bargaining	8.55	1.83	9.14	1.30	8.38	1.92	0.76***
Women's Bargaining Power II							
Overall Bargaining	10.64	2.77	11.44	2.35	10.43	2.83	1.01***
Work Activities Bargaining	3.25	1.45	3.30	1.39	3.23	1.46	0.07
Home and Persona Activities	4.15	1.30	4.73	0.75	4.00	1.37	0.73***
Purchases Bargaining	3.24	0.98	3.41	0.94	3.20	0.99	0.21***

Notes: The table shows the set of variables that are used as dependent variables in the analysis. A woman is a female head of household or spouse and similarly a men is a male head of household or spouse. Variables under Women's Bargaining Power I refer to indices calculated using a categorical principal component analysis whereas variables under Women's Bargaining Power II refer to composite indices. *significant at 10%; **significant at 5%; ***significant at 1%.

AII. Categorical Principal Component Analysis

Figure A.2: CATPCA Components for the RSII Replica



Notes: The plot shows the decomposition of the variables into two component loadings, produced after implementing the categorical principal components analysis algorithm.

Table A.4: Iteration History of the CATPCA for RSII replica

	Variance Accounted For		Loss		
	Total	Increase	Total	Centroid Coordinates	Restriction of Centroid to Vector Coordinates
Iteration Number					
0^a	12.167396	0.000006	53.832604	53.436544	0.396059
7^b	12.410695	0.000007	53.589305	53.385954	0.203350

Notes: The table shows iteration history of the principal component analysis for categorical data used to replicate the eligibility index. a. Iteration 0 displays the statistics of the solution with all variables, except variables with optimal scaling level Multiple Nominal, treated as numerical. b. The iteration process stopped because the convergence test value was reached.

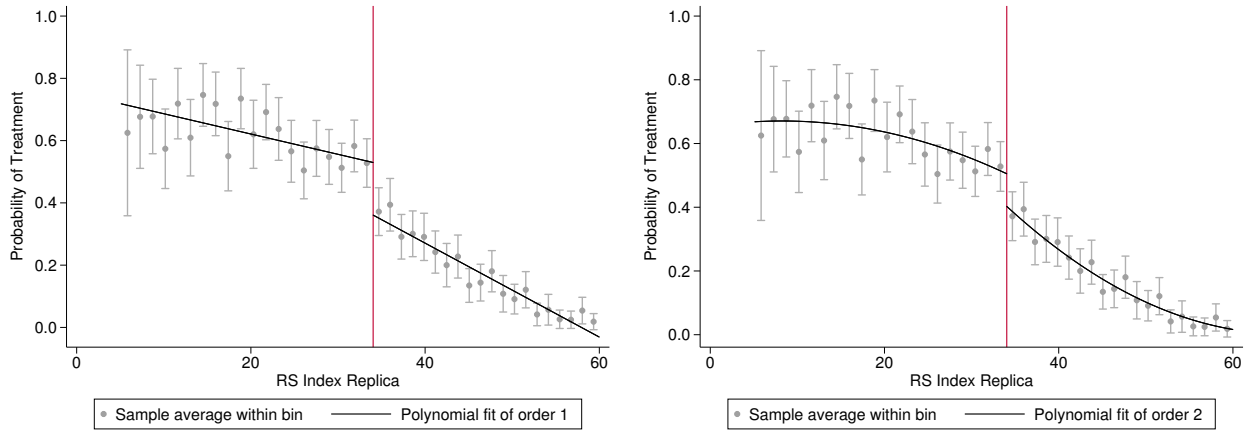
Table A.5: CATPCA for RSII replica Model Summary

	Cronbach's	Variance Accounted For	
Dimension	Alpha	Total (Eigenvalue)	% of Variance
1	0.920	9.246	28.019
2	0.705	3.164	9.589
Total	0.948^a	12.411	37.608

Notes: The table shows the model summary of the principal component analysis for categorical data used to replicate the eligibility index. a. Total Cronbach's Alpha is based on the total Eigenvalue.

AIII. Discontinuity on the Probability of Treatment

Figure A.3: Discontinuity in Probability of Treatment at Cutoff 34.04



Notes: the plot shows the existence of a discontinuity in the probability of treatment. In the left panel there is a decrease of approximately 10% in the probability treatment, at the discontinuity cutoff 34.04, given a linear polynomial. In the left panel, we observe that there is also a decrease of approximately 9% in the probability treatment, at the discontinuity cutoff 34.04, given a quadratic polynomial.

Table A.6: RD Manipulation Test Using Local Polynomial Density Estimation

Method	T	P>T
Conventional	-0.436	0.663
Robust	-0.504	0.614
N	9,985	
Effective N	2,460	

Notes: The table shows the results of the implementation of the manipulation testing procedure using the local polynomial density estimators proposed in Cattaneo et al. (2018). For a review on manipulation testing see McCrary (2008). With a robust bias-corrected local polynomial of order 2 density estimator I obtain a T=-0.504 and an associated p-value of 0.614<0,10, it is not possible to reject the null hypothesis of no statistically significant differences of the densities around the threshold. *significant at 10%; **significant at 5%; ***significant at 1%.

Table A.7: IV Estimates of the Impact of the BDH Program over the Allocation of Time

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Housework Hours	Paid Work Hours	Leisure Hours	Community Hours	Housework Hours	Paid Work Hours	Leisure Hours	Community Hours
	Women				Men			
1st Stage Discontinuity	0.108***	0.102***	0.108***	0.108***	0.109***	0.108***	0.106***	0.106***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
	[23.25]	[25.79]	[23.89]	[23.26]	[25.71]	[23.30]	[23.79]	[23.38]
BDH RD LATE	1.950*	3.386*	-0.0848	0.391**	-0.832	-0.602	-1.338	-0.284
	(1.162)	(1.908)	(0.974)	(0.195)	(0.686)	(1.494)	(1.023)	(0.208)
Polynomial	Linear	Linear	Linear	Linear	Linear	Linear	Linear	Linear
Controls	✓	✓	✓	✓	✓	✓	✓	✓
N	3,369	3,369	3,369	3,369	3,369	3,369	3,369	3,369

Notes: The table shows the estimated effect of being eligible for the BDH cash transfer program on time allocation to housework, paid work, leisure and community activities for women an men head or spouse within the household. The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in hours per day and each come from IV regression. Including covariates are: head and spouse education and race, number of kids below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household, average housework hours of all the household members except the woman or man head or spouse and dummies for the period of the survey. Standard errors in parentheses. *significant to 10%; **significant to 5%; ***significant to 1%.

Table A.8: Robust Estimates of the Impact of the BDH Program over the Allocation of Time

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Housework Hours	Paid Work Hours	Leisure Hours	Community Hours	Housework Hours	Paid Work Hours	Leisure Hours	Community Hours
	Women				Men			
BDH								
Conventional	2.165**	3.142*	-0.026	0.461***	-0.427	-0.870	-0.974	-0.251
	(1.080)	(1.719)	(1.000)	(0.173)	(0.635)	(1.490)	(0.916)	(0.194)
Bias-corrected	2.358**	3.823**	-0.047	0.572***	-0.614	-1.433	-1.238	-0.276
	(1.080)	(1.719)	(1.000)	(0.173)	(0.635)	(1.490)	(0.916)	(0.194)
Robust	2.358**	3.823*	-0.047	0.572***	-0.614	-1.433	-1.238	-0.276
	(1.185)	(1.956)	(1.099)	(0.190)	(0.728)	(1.666)	(1.013)	(0.212)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
N	9,985	9,985	9,985	9,985	9,985	9,985	9,985	9,985
Effective N	4,661	4,158	4,704	4,389	5,198	4,911	4,766	4,749

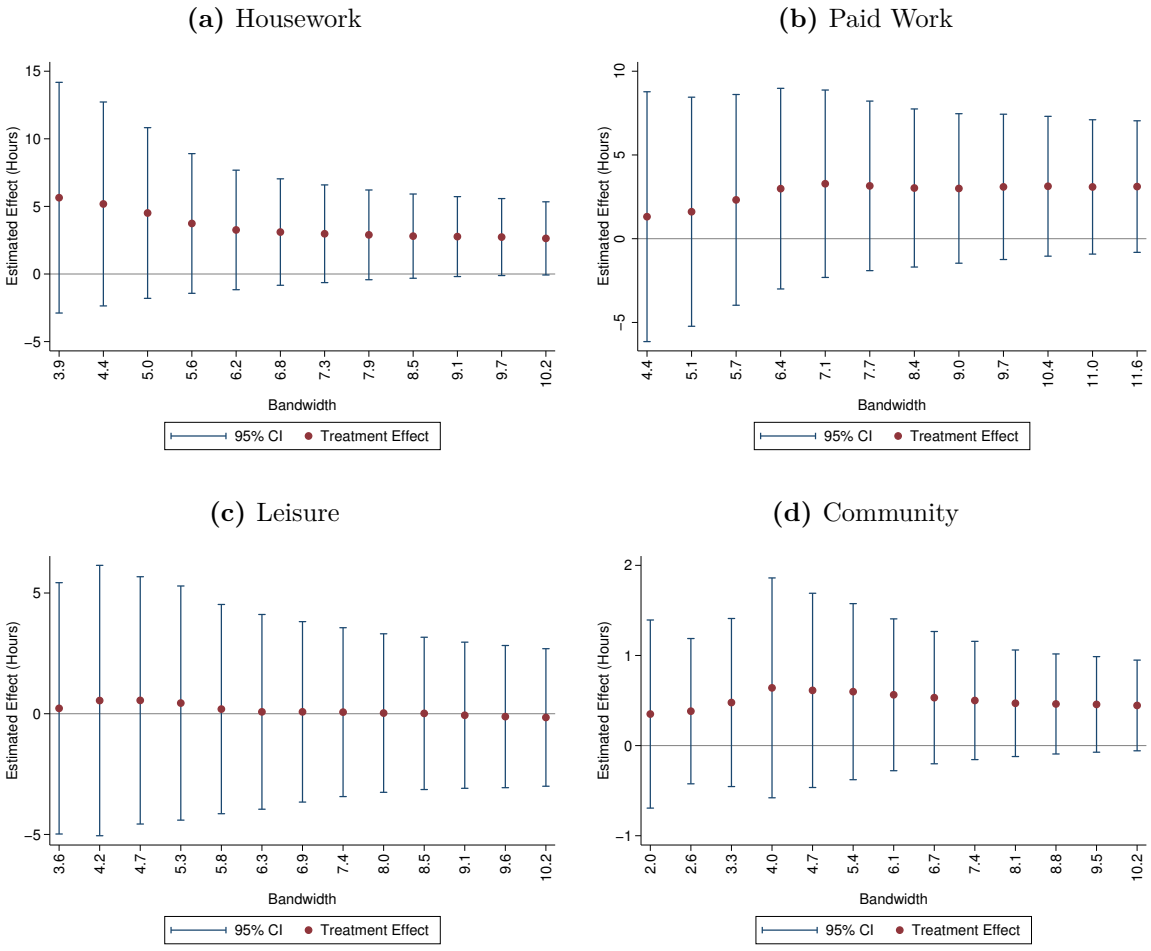
Notes: The table shows the estimated effect of being eligible for the BDH cash transfer program on time allocation to housework, paid work, leisure and community activities for women an men head or spouse within the household. The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in hours per day and each come from a fuzzy regression discontinuity using the methodology proposed by Calonico et al. 2014a and Calonico et al. 2018d. Including covariates are: head and spouse education and race, number of children below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household and average housework hours of all the household members except the woman or man head or spouse. Standard errors in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

Table A.9: Robust Estimates of the Impact of the BDH Program over Women's Allocation of Time

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Housework Hours	Housework Hours	Paid Work Hours	Paid Work Hours	Leisure Hours	Leisure Hours	Community Hours	Community Hours
BDH								
Conventional	2.165**	2.632**	3.142*	3.376	-0.026	0.078	0.461***	0.542**
	(1.080)	(1.307)	(1.719)	(2.085)	(1.000)	(1.557)	(0.173)	(0.273)
Bias-corrected	2.358**	2.832**	3.823**	3.069	-0.047	0.041	0.572***	0.593**
	(1.080)	(1.307)	(1.719)	(2.085)	(1.000)	(1.557)	(0.173)	(0.273)
Robust	2.358**	2.832*	3.823*	3.069	-0.047	0.041	0.572***	0.593*
	(1.185)	(1.475)	(1.956)	(2.321)	(1.099)	(1.750)	(0.190)	(0.311)
Polynomial Terms	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Controls	✓	✓	✓	✓	✓	✓	✓	✓
N	9985	9985	9985	9985	9985	9985	9985	9985
Effective N	4661	5483	4158	5776	4704	3937	4389	4178

Notes: The table shows the estimated effect of being eligible for the BDH cash transfer program on time allocation to housework, paid work, leisure and community activities for women an men head or spouse within the household. Columns 1, 3, 5 and 7 include polynomials of grade 1 (Linear) and columns: 2, 4, 6, 8, include polynomials of grade 2 (Quadratic) of the running variable (eligibility score index). The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in hours per day and each come from a fuzzy regression discontinuity using the methodology proposed by Calonico et al. 2014a and Calonico et al. 2018d. Including covariates are: head and spouse education and race, number of kids below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household, average housework hours of all the household members except the woman or man head or spouse and dummies for the period of the survey. Standard errors in parentheses. *significant to 10%; **significant to 5%; ***significant to 1%.

Figure A.4: Estimates of the Impact of the BDH Program over Women's Allocation of Time for Different Bandwidths



Notes: The plot shows fuzzy regression discontinuity LATE point estimations and confidence intervals over a range of bandwidths. Bootstrap confidence intervals based on 200 replications.

AV. Bargaining Power Results

Table A.10: IV Estimates of the Impact of the BDH Program on Women's Decision Making (NLPCA Index)

	(1)	(2)	(3)	(4)
	Overall	Working Decisions	Home and Personal Activities Decisions	Purchases Decisions
1st Stage Discontinuity	0.116***	0.117***	0.117***	0.115***
	(0.030)	(0.031)	(0.031)	(0.031)
	[18.99]	[18.59]	[18.99]	[19.15]
BDH RD LATE	1.943***	0.914	2.070***	1.199**
	(0.655)	(0.644)	(0.653)	(0.570)
Polynomial Terms	Linear	Linear	Linear	Linear
Controls	✓	✓	✓	✓
N	3369	3369	3369	3369

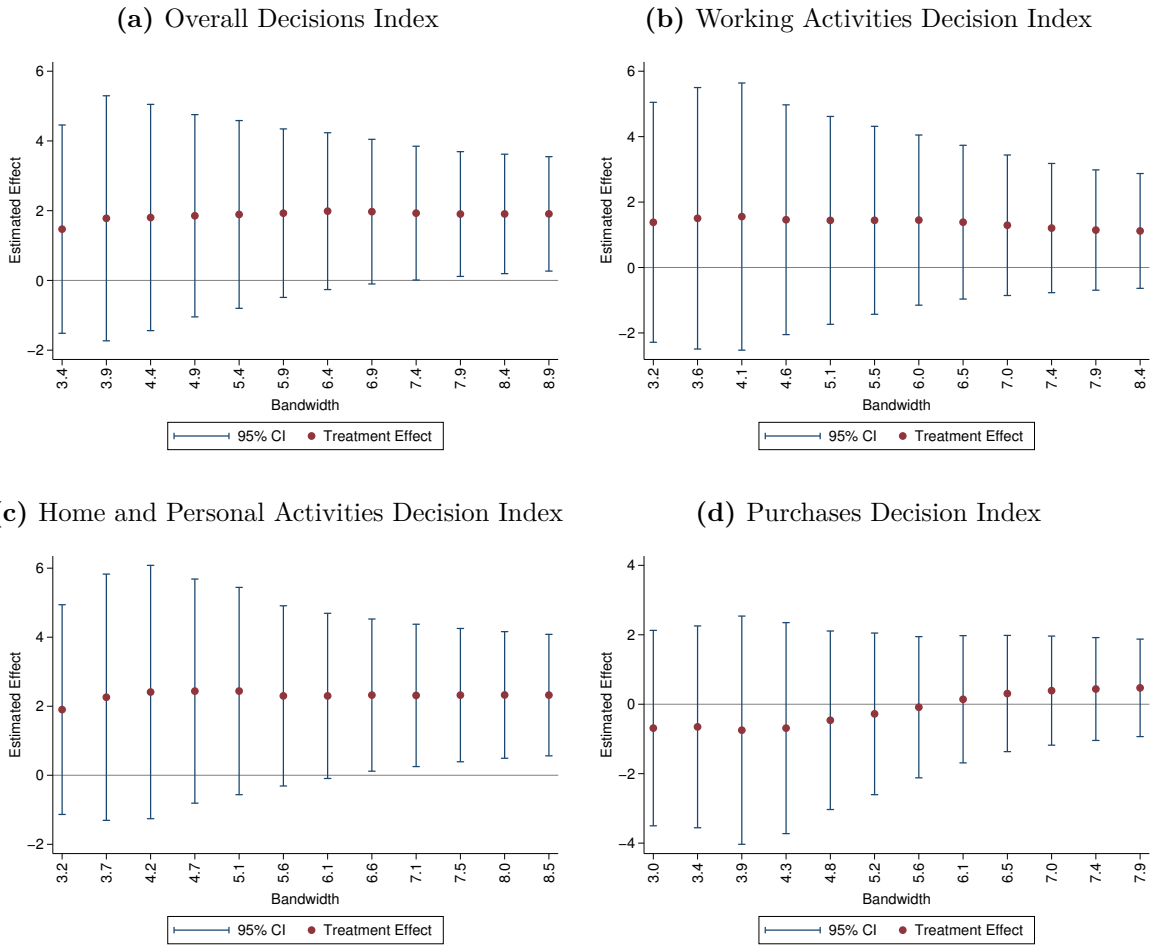
Notes: The table shows the estimated effect of being eligible for the BDH cash transfer program on the overall women's decision making index as well as on the decision making index related to working activities, home and personal activities and purchases. Each index was constructed using categorical principal component algorithm for optimal scaling. The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in standard deviations of the decision making index and each come from IV regression. Including covariates are: head and spouse education and race, number of kids below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household and dummies for the period of the survey. Standard errors in parentheses. *significant to 10%; **significant to 5%; ***significant to 1%.

Table A.11: Robust Estimates of the Impact of the BDH Program on Women's Decision Making (NLPCA Index)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall	Overall	Working Decisions	Working Decisions	Home and Personal Activities Decisions	Home and Personal Activities Decisions	Purchases Decisions	Purchases Decisions
BDH								
Conventional	1.903***	1.871**	0.938	1.140	2.198***	2.597***	0.939*	0.517
	(0.716)	(0.844)	(0.712)	(0.889)	(0.701)	(0.900)	(0.560)	(0.682)
Bias-corrected	2.011***	1.736**	1.126	1.219	2.456***	2.603***	0.778	0.278
	(0.716)	(0.844)	(0.712)	(0.889)	(0.701)	(0.900)	(0.560)	(0.682)
Robust	2.011**	1.736*	1.126	1.219	2.456***	2.603***	0.778	0.278
	(0.859)	(0.969)	(0.831)	(1.008)	(0.826)	(1.002)	(0.670)	(0.777)
Polynomial Terms	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Controls	✓	✓	✓	✓	✓	✓	✓	✓
N	9985	9985	9985	9985	9985	9985	9985	9985

Notes: The table shows the estimated effect of being eligible for the BDH cash transfer program on the overall women's decision making index as well as on the decision making index related to working activities, home and personal activities and purchases. Each index was constructed using categorical principal component algorithm for optimal scaling. The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in standard deviations of the decision making index and each come from a fuzzy regression discontinuity using the methodology proposed by Calonico et al. 2014a and Calonico et al. 2018d. Including covariates are: head and spouse education and race, number of kids below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household and dummies for the period of the survey. Standard errors in parentheses. *significant to 10%; **significant to 5%; ***significant to 1%.

Figure A.5: Estimates of the Impact of the BDH Program over Women's Decision Making (NLPCA) for Different Bandwidths



Notes: The plot shows fuzzy regression discontinuity LATE point estimations and confidence intervals over a range of bandwidths. Bootstrap confidence intervals based on 200 replications.

Table A.12: IV Estimates of the Impact of the BDH Program on Women's Decision Making (Composite Index)

	(1)	(2)	(3)	(4)
	Overall	Working Decisions	Home and Personal Activities Decisions	Purchases Decisions
1st Stage Discontinuity	0.117***	0.117***	0.117***	0.115***
	(0.030)	(0.031)	(0.031)	(0.031)
	[18.99]	[18.99]	[18.99]	[19.15]
BDH	1.206**	0.508	1.695***	0.403
	(0.594)	(0.624)	(0.574)	(0.576)
Polynomial Terms	Linear	Linear	Linear	Linear
Controls	✓	✓	✓	✓
N	3369	3369	3369	3369

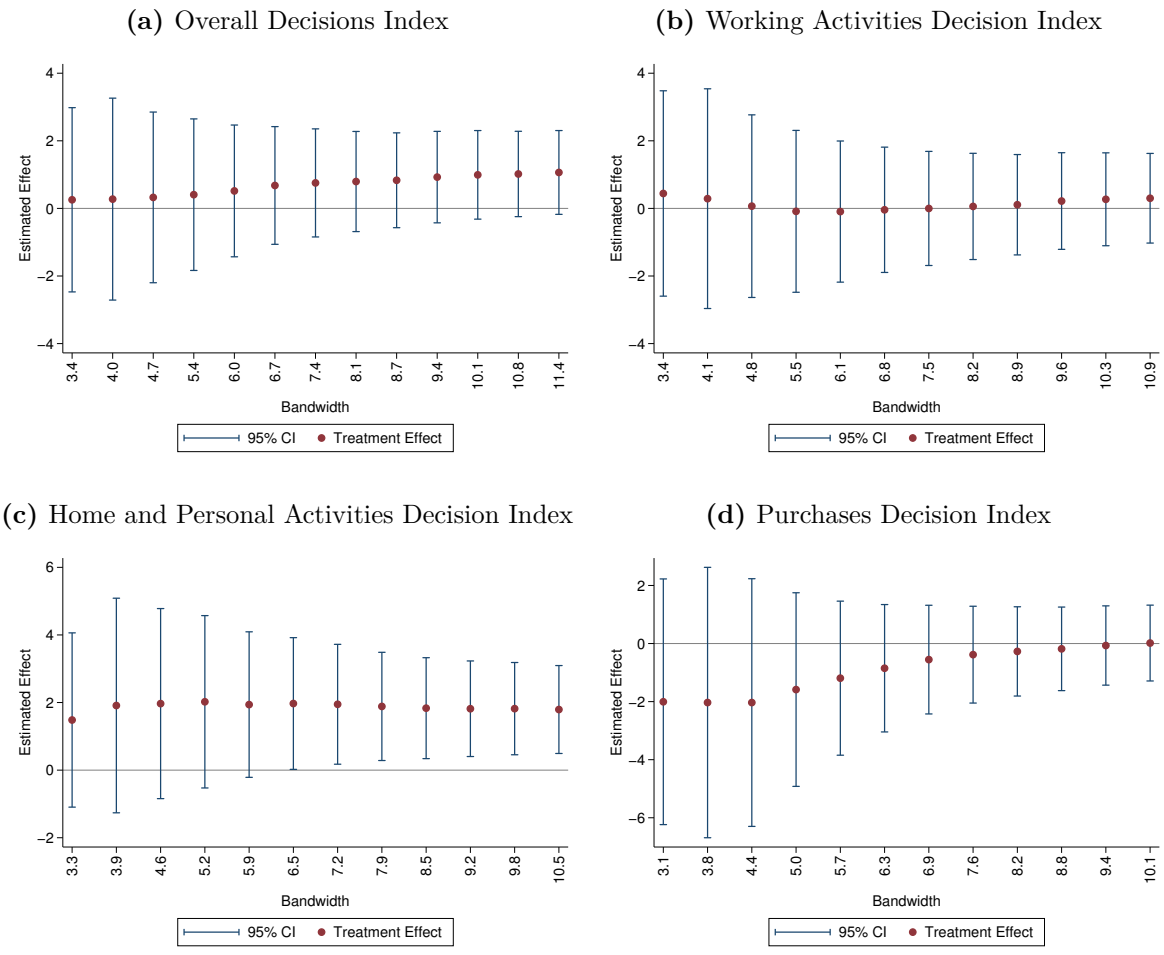
Notes: The table shows the estimated effect of being eligible for the BDH cash transfer program on the overall women's decision making index as well as on the decision making index related to working activities, home and personal activities and purchases. Each index was constructed a composite measure that give 1 point for each time the Woman indicates having sole or sole/joint decision-making power across all applicable domains. The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in standard deviations of the decision making index and each come from IV regression. Including covariates are: head and spouse education and race, number of kids below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household and dummies for the period of the survey. Standard errors in parentheses. *significant to 10%; **significant to 5%; ***significant to 1%.

Table A.13: Robust Estimates of the Impact of the BDH Program on Women's Decision Making (Composite Index)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall	Overall	Working Decisions	Working Decisions	Home and Personal Activities Decisions	Home and Personal Activities Decisions	Purchases Decisions	Purchases Decisions
BDH								
Conventional	1.207*	0.645	0.392	-0.160	1.762***	1.966**	0.318	-0.857
	(0.630)	(0.842)	(0.657)	(1.077)	(0.615)	(0.768)	(0.620)	(1.093)
Bias-corrected	1.357**	0.352	0.533	-0.499	1.948***	1.905**	0.0884	-1.224
	(0.630)	(0.842)	(0.657)	(1.077)	(0.615)	(0.768)	(0.620)	(1.093)
Robust	1.357*	0.352	0.533	-0.499	1.948***	1.905**	0.0884	-1.224
	(0.757)	(0.964)	(0.778)	(1.218)	(0.728)	(0.867)	(0.733)	(1.231)
Polynomial Terms	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Controls	✓	✓	✓	✓	✓	✓	✓	✓
N	9985	9985	9985	9985	9985	9985	9985	9985

Notes: The table shows the estimated effect of being eligible for the BDH cash transfer program on the overall women's decision making index as well as on the decision making index related to working activities, home and personal activities and purchases. Each index was constructed a composite measure that give 1 point for each time the womn indicates having sole or sole/joint decision-making power across all applicable domains. The sample includes two-parent households with individuals older then 18 years of age and children under 18 years old. The treatment effects are measured in standard deviations of the decision making index and each come from a fuzzy regression discontinuity using the methodology proposed by Calonico et al. 2014a and Calonico et al. 2018d. Including covariates are: head and spouse education and race, number of kids below 5 years old, poverty rate at sector level, average household income, number of disabled adults in the household and dummies for the period of the survey. Standard errors in parentheses. *significant to 10%; **significant to 5%; ***significant to 1%.

Figure A.6: Estimates of the Impact of the BDH Program over Women's Decision Making (Composite Index) for Different Bandwidths



Notes: The plot shows fuzzy regression discontinuity LATE point estimations and confidence intervals over a range of bandwidths. Bootstrap confidence intervals based on 200 replications.

AVI. Intra-Household Bargaining Model Results

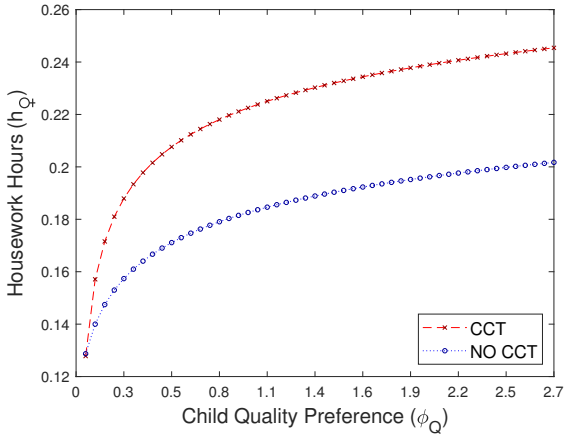
Table A.14: Estimation of the Productivity Cost of Having Children

	(1)
	$\log\left(\frac{d_i}{h_{\varphi,i}w_{\varphi,i}}\right)$
b	-0.204***
	(0.043)
b^2	0.014*
	(0.008)
Constant	-0.225
	(0.050)
R^2	0.0144
N	4,577

AVII. Counterfactual Model Results

Counterfactual Results I: Change in Female's Preference for the Home Good

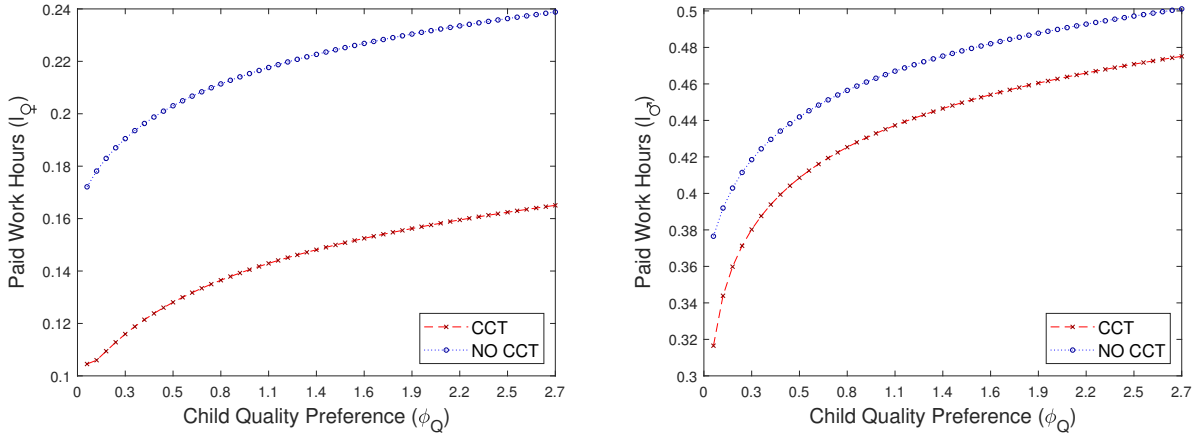
Figure A.7: Female Housework Hours



Notes: The plot shows the effect of a change in female relative preferences from children quality on the female's housework time under no transfer scenario versus a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

Figure A.8: Female and Male Paid Work Hours

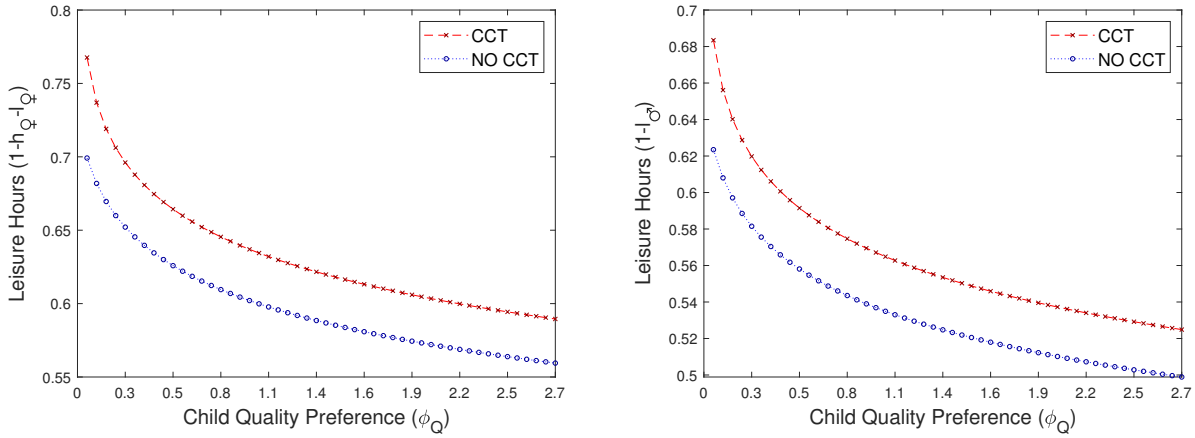
(a) Female Labor **(b)** Male Labor



Notes: The left panel depicts the effect of a change in female relative preferences from children quality on the allocation of paid work hours of the female and male under a no transfer scenario versus a cash transfer scenario The right panel depicts the effect of a change in female relative preferences from children quality on the allocation of leisure time of the female and male under a no transfer scenario versus a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

Figure A.9: Female and Male Leisure Hours

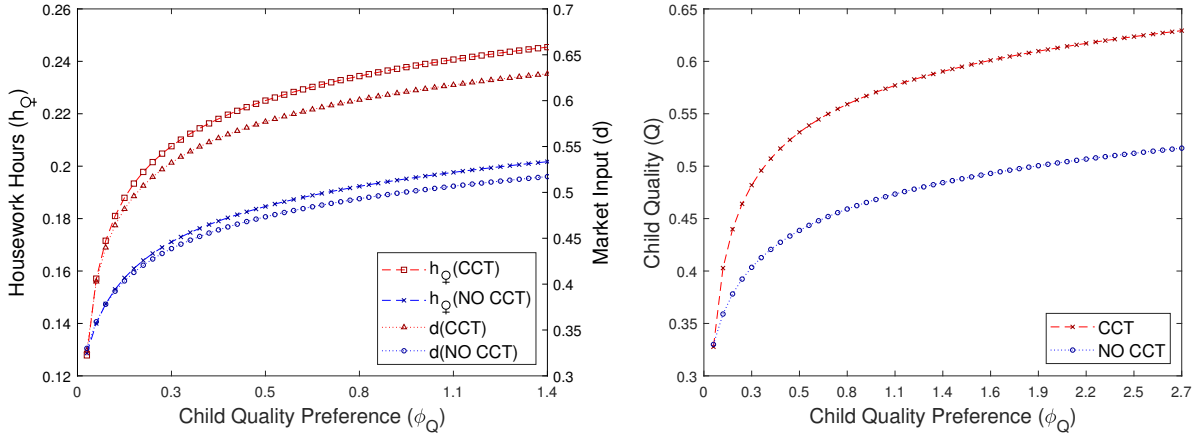
(a) Female Leisure **(b)** Male Leisure



Notes: The left panel depicts the effect of a change in female relative preferences from child quality on the allocation of paid work hours of the female and male under a no transfer scenario versus a cash transfer scenario. The right panel depicts the effect of a change in female relative preferences from children quality on the allocation of leisure time of the female and male under a no transfer scenario versus a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

Figure A.10: Home Good Production

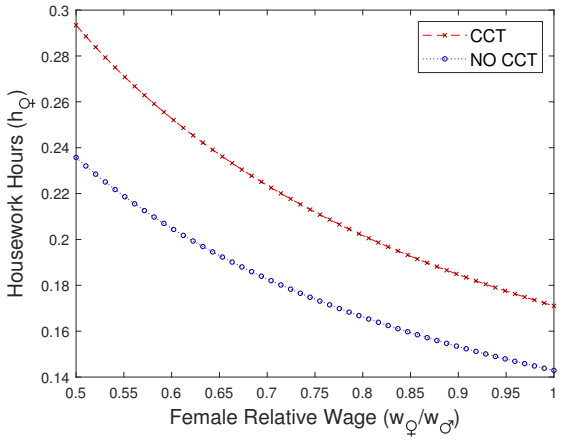
(a) Home Good Inputs **(b)** Quality of Home Good



Notes: The left panel depicts the effect of a change in female relative preferences from children quality on the choice of inputs of home production under a no transfer scenario versus a cash transfer scenario. The right panel depicts the effect of a change in female relative preferences from children quality on the quality of home good under a no transfer scenario versus a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

Counterfactual Results II: Change in Female's Preference for the Home Good

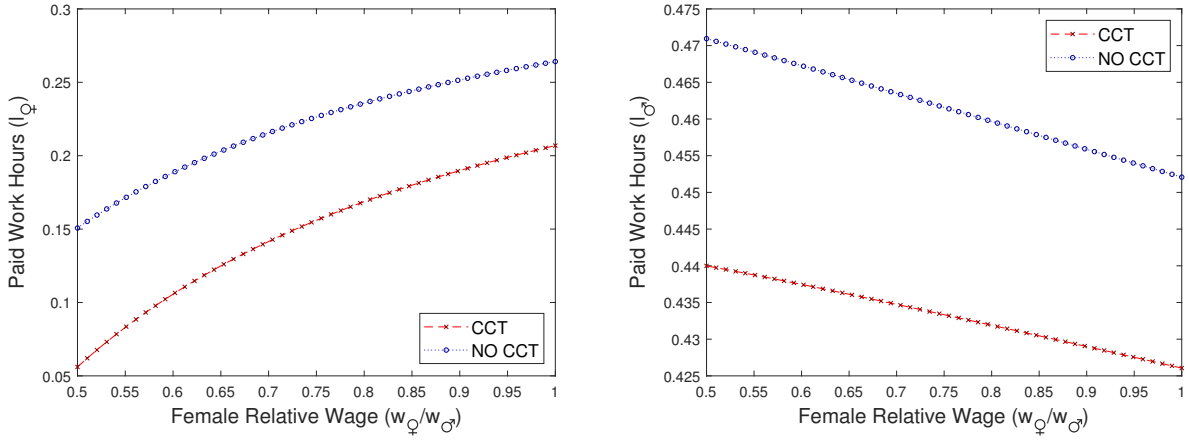
Figure A.11: Female Housework Hours



Notes: The plot shows the effect of a change in female relative preferences from child quality on the female's housework time under a no transfer scenario versus a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

Figure A.12: Female and Male Paid Work Hours

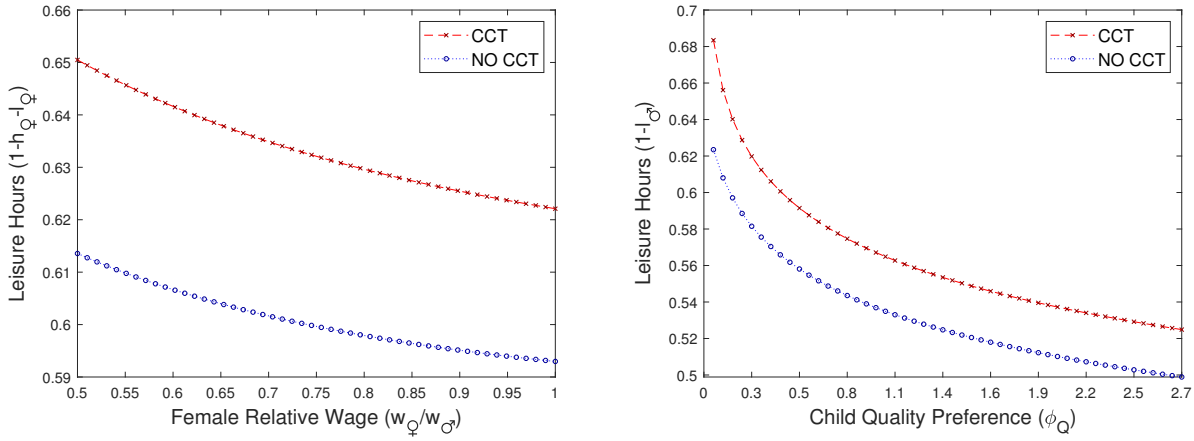
(a) Female Labor **(b)** Male Labor



Notes: The left panel depicts the effect of a change in female relative preferences from children quality on the allocation of paid work hours of the female and male under a no transfer scenario versus a cash transfer scenario. The right panel depicts the effect of a change in female relative preferences from children quality on the allocation of leisure time of the female and male under a no transfer scenario versus a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

Figure A.13: Female and Male Leisure Hours

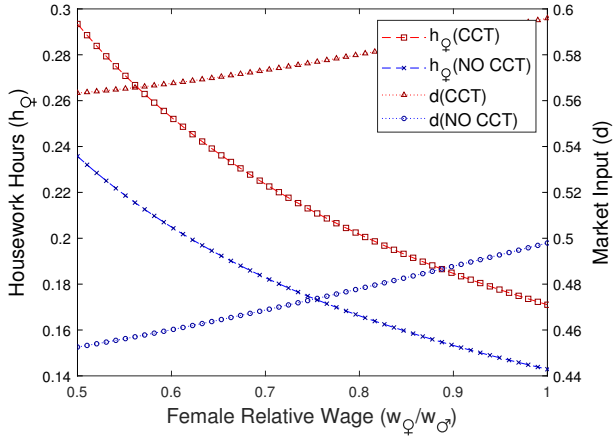
(a) Female Leisure **(b)** Male Leisure



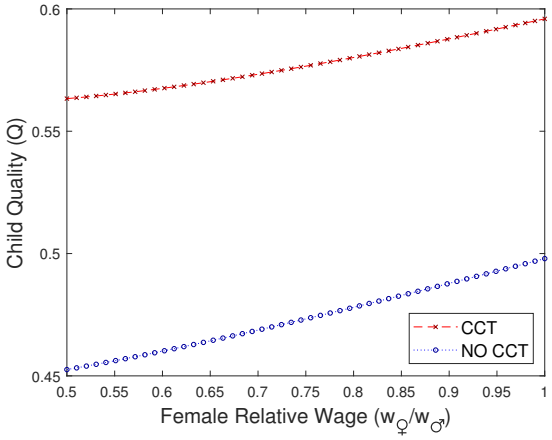
Notes: The left panel depicts the effect of a change in female relative preferences from child quality on the allocation of paid work hours of the female and male under a no transfer scenario versus a cash transfer scenario. The right panel depicts the effect of a change in female relative preferences from children quality on the allocation of leisure time of the female and male under a no transfer scenario versus a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.

Figure A.14: Home Good Production

(a) Home Good Inputs



(b) Quality of Home Good



Notes: The left panel depicts the effect of a change in female relative preferences from children quality on the choice of inputs of home production under a no transfer scenario versus a cash transfer scenario. The right panel depicts the effect of a change in female relative preferences from child quality on the quality of home good under a no transfer scenario versus a cash transfer scenario. The cash transfer is equivalent to 20 percent of the male income.