The Effects of a Conditional Transfer Program on the Labor Market: The *Human Development Bonus* in Ecuador

Martin Gonzalez-Rozada
Universidad Torcuato Di Tella
mrozada@utdt.edu

Freddy Llerena Pinto
Centro Integral de Investigaciones Sociales, Financieras, Económicas y de Población
freddy.llerena@gmail.com

This version: April 20, 2011

Abstract[1]

In this paper we estimate the impact of a conditional transfer program, the Bono de Desarrollo Humano, over several labor market outcomes in Ecuador. We use the BDH's targeting mechanism and rely on a regression discontinuity (RD) strategy to isolate the causal effects of the program over the duration of unemployment, the probability of transiting from unemployment to informal employment and the probability of separation from formal employment. We find that (i) mothers with BDH benefits and workers living in households having the BDH program experience a longer duration in unemployment than the comparable group of workers that do not have those benefits; (ii) the program does not had distortive effects on the finding probability of an informal job for mothers and workers living in households with BDH benefits while it seems to have financed the search process for workers living in households with benefits during the period 2005-2006; and (iii) the BDH program increases the probability of separation for mothers having the benefits with respect to the comparable group of mothers that do not have those benefits. These impacts suggest that the government has some room to intervene in the labor market to try to eliminate or at least reduce the negative effects of the program.

JEL Classification: I28, I38, J64, J68.
Keywords: Cash transfer programs, regression discontinuity, duration models, Logit and multinomial Logit models.

[1] We gratefully acknowledge the excellent research assistance of Cristian Alonso. This version has been benefited with the comments of David Kaplan and the participants at the seminar *Diálogo Regional de Política Laboral y Seguridad Social* held on April 8 at the IDB Headquarters in Washington DC. Authors gratefully acknowledge financial support from the IDB.

1 Introduction

The Human Development Bonus (Bono de Desarrollo Humano or BDH) is the most important conditional cash transfer program in Ecuador. The program attempts to accomplish a reduction in demand-side income inequality through cash transfers while it establishes co-responsibilities with poor people to keep their children in school and to keep their children regularly visiting health services institutions, by using the incentive of cash transfers to their households. The BDH basically consists of a monetary compensation to vulnerable groups such as elderly, disabled and mothers whose families fall below the poverty line. The program has a budget of USD 624 millions and it pays a monthly benefit of USD 35. As for December 2010 there were 1.76 million of people getting the subsidy. 67% of the beneficiaries are mothers. Recalling that total population in Ecuador is about 14.27 million, impact of the policy cannot be negligible.

Llerena Pinto (2009) analyzes the effect of the BDH on school attendance and poverty level as the compensation for mothers request them to send their children to school. The author finds evidence suggesting the plan has a positive and significant impact on the education variable. This impact seems to be slightly higher for families inhabiting rural areas than for those in urban areas. On the other hand, Ponce and Bedi (2010) study the impact of the program on students cognitive achievements finding no impact of the program on test scores and suggesting that attempts at building human capital, as measured by cognitive achievement, require additional and alternative interventions. Additionally, Turner (2006) focuses in the program impact over education levels and food consumption. The main conclusion of this paper is that the bonus increased food expenditure by 25% and also the amount spent on education, though cognitive ability did show neither a positive nor a negative variation.

Economic theory suggests there are also potential consequences over the labor market, specially in the case of women and/or individuals living in a beneficiary household. As households are getting a sum-lump transfer, there is a positive income effect that induces people to consume both more physical goods and more leisure. Thereby, the labor supplied falls. Following the same reasoning, there would be an impact over unemployment too. Unemployed women or workers living in households receiving the transfer have fewer incentives to change their occupational status, i.e. to get a job in the formal or even in the informal sector of the economy, extending their unemployment duration. This effect is similar to the one produced by an unemployment insurance (UI) system. In the UI literature, emphasis has been on the "moral hazard effect" where the benefit is view mainly as a distortion given that workers receive it only if they are unemployed, and this distortion could increase the finding probability of informal jobs. For the BDH conditional transfer program this moral hazard effect could also be in place. The program could also affect employment. In particular, a generous BDH transfer could increase separations: effort on the job could be reduced given that the conditional transfer is available.

The objective of this paper is to enhance comprehension about the impact of the BDH over the labor market in Ecuador by estimating the effects of the program on the duration of unemployment, the transiting probability from unemployment to informality and the separation probability from a formal job. The results may eventually allow for a better design of the program by reducing inefficiencies on the labor market and improving the government's redistribution policy.

The rest of the paper is organized as follows. Next section characterizes the BDH program. Section 3 describes the data used to estimate the effects of the program. Section 4 presents the methodology we use to analyze the impact of the BDH program on the labor market outcomes. Section 5 shows and analyze the main results of the paper and Section 6 presents alternative estimations in order to provide some robustness to our analysis. Finally, Section 7 concludes the paper.

2 The BDH Program in Ecuador

The BDH was created to consolidate two previous programs in Ecuador. An unconditional cash transfer program called The Bono Solidario and two conditional cash transfer programs: the Beca Escolar, aimed at increase school attendance and the Programa de Alimentación Escolar, a meal program. The idea behind the BDH was to fix known gaps in targeting while expanding coverage to the poorest citizens, as a reformist improvement over the older, outdated programs.

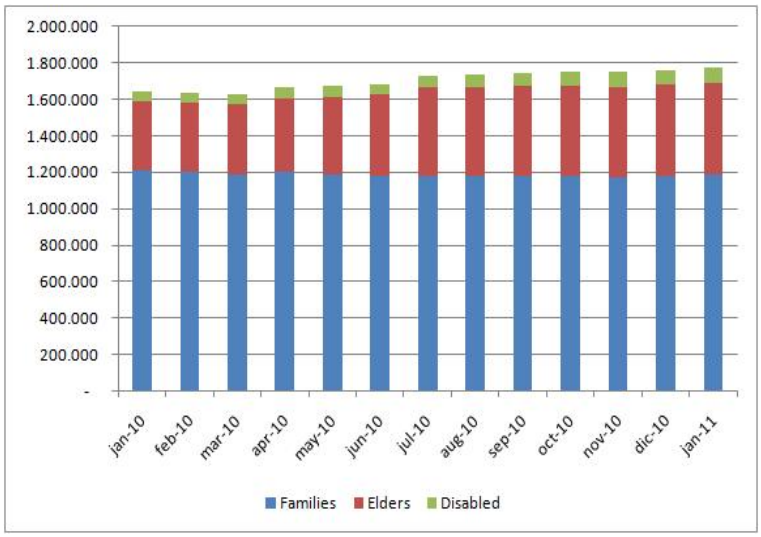
As a conditioned cash transfer program, the BDH requires families to invest resources in human capital for their next generations. In particular, families are asked to register their children between the ages of 5 to 18 at school whose attendance to class is required to exceed 75%. Control of this requirement of the program, even when it was stated since their creation, became effective only since 2007.

The monetary transfers provided by the program have increased over time. Its precursor, the Bono Solidario, began with a 7 dollar transfer for each family, that with the creation of BDH in 2003, increased to 15 dollars per family and 11.5 dollars for elder and disabled people. In January 2007, it was raised to 30 dollars per family. Finally, in July 2009 it was raised to 35 dollars.

The BDH has three types of recipients. The largest of all are families, comprising 1.19 million, whose representative is the mother. The other types of recipients are elder people and disabled people, with about 501 and 86 thousand of beneficiaries, respectively, as of January 2011 (see Figure 1).

To analyze the effects of the program on the labor market, only families will be considered as the other types of recipients do not participate in the labor force. Considering that Ecuador has a population of approximately 14 million, the program reaches a significant proportion of the country's families making the analysis of its impact on the labor market a relevant one.

Figure 1: Beneficiaries of the BDH in Ecuador, January 2010 to January 2011.



Source: Authors calculations using data from the Ministerio de Inclusión Económica y Social.

3 Data

We use the Encuesta Nacional de Empleo, Desempleo y Subempleo (ENEMDU, or National Survey on Employment, Unemployment and Underemployment) for our analysis. The ENEMDU is a household survey conducted quarterly in urban areas. In the fourth quarter of the year, data also covers rural areas, i.e. towns with less than 2,000 inhabitants. The questionnaire basically collects personal, labor and income information. Micro data is available from 2004 to 2010 at $http://www.inec.gov.ec/web/guest/descargas/basedatos/inv\_socd/emp\_sub\_des$.

We work with data from the third quarter of 2005 to the fourth quarter of 2010. The ENEMDU interviews each urban household for four quarters, which allow us to construct a panel with four observations for each household. The survey follows a 2-2-2 scheme; that is, within the sample, a household is visited two consecutive quarters, and after two periods of rest, it is interviewed for two additional quarters. This feature of the survey allows having information of a family (and of each person in that family) over a period of six quarters. That way, ENEMDU not only provides a static picture of the labor market, but it is also useful for understanding the transition matrix.

3.1 Datasets to Study the Impact of The BDH Program over Unemployed Workers

Using the ENEMDU surveys we construct two panel data samples to analyze the impact of the BDH program over the duration of unemployment and over the transition from unemployment to informality. The first panel includes households interviewed in the third quarter of 2005 and fol-

lowed through the fourth quarter of 2005 and the third and fourth quarters of 2006 and households interviewed in the fourth quarter of 2005 and followed through the first quarter of 2006, the fourth quarter of 2006 and the first quarter of 2007. The second panel includes households interviewed in the third quarter of 2007 and followed through the fourth quarter of 2008, the third quarter of 2008 and the fourth quarter of 2009; households interviewed in the fourth quarter of 2007 and followed through the first and fourth quarters of 2008 and the first quarter of 2009 and finally, households interviewed in the third quarter of 2009 and followed through the fourth quarter of 2009 and the third and fourth quarters of 2010. We called the first sample the "2005-2006 panel sample" and the second sample "2007-2010 panel sample".

We can not merge these samples because in June 2007 there was a methodology change in the ENEMDU surveys. The new household survey changed, among other things, the period of reference for the question about unemployment. Before the reform the question asked if the individual searched for a job in the last five weeks while after June 2007 this question ask if the person is searching for a job in the last four weeks. Therefore it is not possible to compare the unemployment as measured by the new survey with the unemployment computed with the old methodology.

In the 2005-2006 panel sample there are 561 unemployed workers representing $179,852$ individuals when using the expansion weights of the ENEMDU sample while in the 2007-2010 panel sample there are 786 unemployed workers, representing $252,829$ individuals when using the weights of the ENEMDU sample. In the 2005-2006 panel sample there are 266 unemployed mothers while in the second panel sample there are 287, representing $85,343$ and $94,294$ respectively, when the weights of the sample are used. Throughout this paper we call mothers to any female head or spouse of a male head in a household with children and to any female daughter of the head or spouse older than 15 years of age in a household with grandchildren. 22% of the unemployed workers in the 2005-2006 panel sample belong to families receiving BDH benefits. This figure is about 20% in the panel sample constructed after the methodological change. 6.7% of the unemployed workers in the 2005-2006 panel sample and 4.8% in the 2007-2010 panel sample are mothers receiving BDH benefits.

For unemployed workers in both panel samples we compute the duration of unemployment in weeks. In order to do this we compute the incomplete duration of unemployment the first time the individual appears as unemployed in the survey using the question of "how long has been unemployed". Then we follow the individual in the rest of the surveys of the corresponding panel sample and compute the time she remains in unemployment. The complete duration of unemployment is computed adding to the incomplete duration of unemployment, the time the individual remained in unemployment. The median unemployment duration in the 2005-2006 panel sample is around 20 weeks while in the 2007-2010 panel sample this figure is about 30

weeks. Part of this increment in median duration between both panel samples could be due to the methodological change of June 2007.

3.2 Datasets to Study the Impact of The BDH Program over Employed Workers

For the analysis of the impact of the BDH program over employed workers we construct two pooled cross-section samples. We take all formal workers in the 2005-2006 panel sample. First, we identify those formal workers in the third quarter of 2005 (2006) and follow them through the fourth quarter of 2005 (2006). Then, we take all formal workers in the fourth quarter of 2005 (2006) and follow them through the first quarter of 2006 (2007). Finally, we pooled this two cross-section samples over time creating what we called the 2005-2006 pooled cross-section sample. For workers in this sample we generate a binary indicator for a change in the labor condition from the third quarter of 2005 (2006) to the fourth quarter of 2005 (2006) and from the fourth quarter of 2005 (2006) to the first quarter of 2006 (2007). In particular, this variable that we called *separation* adopts the value one if the individual goes from formal employment in the third quarter of 2005 (2006) to be unemployed, inactive or informal worker during the fourth quarter of 2005 (2006); and when the individual changed her status from formal employment in the fourth quarter of 2005 (2006) to unemployment, informal employment or out of the labor force in the first quarter of 2006 (2007). The variable adopts the value zero when the worker remains in the same formal job. We repeat this procedure using the 2007-2010 panel sample generating a new pooled cross-section sample. In this case the separation variable adopts the value one if the worker goes from formal employment in the third quarter of 2007 (2008) to be unemployed, inactive or informal worker during the fourth quarter of 2007 (2008). This variable also adopts the value one if the worker goes from formal employment in the fourth quarter of 2007 (2008) to be unemployed, inactive or informal worker during the first quarter of 2008 (2009). Finally, the variable adopts the value one if the worker goes from formal employment in the third quarter of 2009 (2010) to be unemployed, inactive or informal worker during the fourth quarter of 2009 (2010).

In the 2005-2006 pooled cross-section sample there are $7,771$ workers representing $2,325,320$ individuals when considering the sample weights while in the pooled cross-section sample of 2007-2010 there are $24,636$ workers representing $5,469,956$ individuals using weights. In both pooled cross-section samples there are around 17% formal workers belonging to families receiving BDH benefits. 3% of the mothers in the first sample have the BDH program while this figure is 4.5% in the 2007-2010 pooled cross-section sample. 11% of the workers in the pooled cross-section sample of 2005-2006 and 13% of the workers in the second pooled cross-section sample changed its labor condition from formal employment to unemployment, informal job or go out of the labor force. 58% of the workers in the first pooled cross-section and 54% of the workers in the second pooled cross-section sample are males.

4 Impact Evaluation Methodology

The empirical strategy rests on exploiting a regression discontinuity (RD) design (see Thistlewaite and Campbell (1960) and Imbens and Lemieux (2008)) to isolate the effects of the BDH program on several labor market outcomes. We address the effects of the BDH program over the duration of unemployment and over the transition from unemployment to informality for unemployed workers and over the separation rates from a formal job for employed workers.

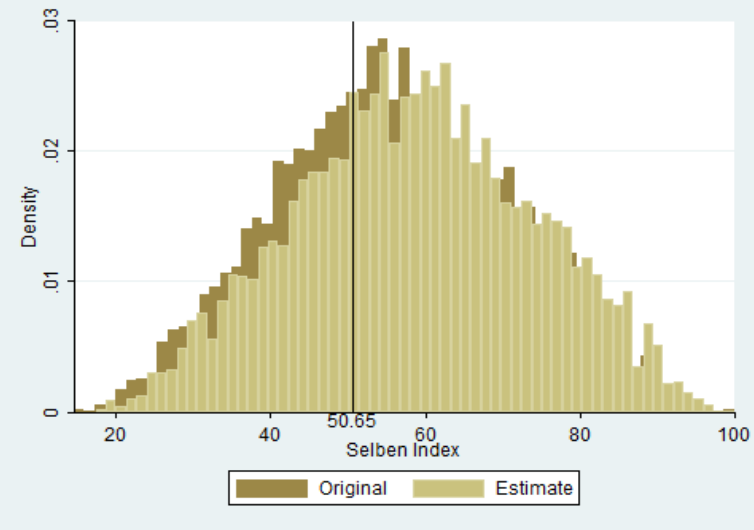
4.1 Identification Strategy

Participation for receiving the conditional cash transfer is based on the Selben (system of selection of beneficiaries of social programs) index computed using the 1999 Living Standards Measurement Survey (LSM) until January 2007. After that date the index is computed using the new LSM survey of 2006 and in 2009 the LSM survey is replaced by the Social Registry survey. For example, until January 2007 families in quintiles 1 and 2, that is, families with a Selben score of less than 50.65 points were eligible to participate in the BDH program. The Selben index is constructed using nonlinear principal components analysis over a combination of 27 variables. These variables can be classified into the following groups: infrastructure (six variables), demographic characteristics of household members (nine variables), educational characteristics of household members (four variables), and household assets (eight variables). The index is scaled from 0 to 100. As mentioned above, families scoring below 50.65 were eligible to receive the benefit. That is, at the cutoff point of 50.65 the probability of participation in the BDH program jumps from zero to one. Those households scoring above the cutoff point are not eligible to participate in the program. In this case a sharp RD approach can be used to isolate the causal effects of the program. Under ideal circumstances, there would be a sharp cutoff around 50.65 points so we can define treatment and control groups with families scoring above and below that cutoff point, respectively. However, it is possible that households could manipulate their Selben index score by, for example, underreporting their assets in the LSM survey. If households are able to do this and by doing it increase their chances of getting the BDH program then we can expect a fair degree of "fuzziness" around the cutoff point. In this case an instrumental variable approach should be implemented.

Our strategy was, first, to use the 1999 Living Standards Measurement Survey (LSM) to reproduce the Selben Index using a linear combination of the 27 variables that compose the index and the coefficients obtained by the nonlinear principal component analysis. Then, we identified the variables used to construct the Selben Index that were common to both, LSM and ENEMDU surveys. Of the 27 variables used in the LSM survey only 20 variables are available in the ENEMDU survey. Using the LSM survey, we regress the Selben index on these common variables and obtained the ordinary least squares (OLS) coefficient estimates. These coefficients were used

as the new weights to construct an estimated Selben index. Figure 2 shows histograms for both indexes.

Figure 2: Original and Estimated Selben Index Histograms.

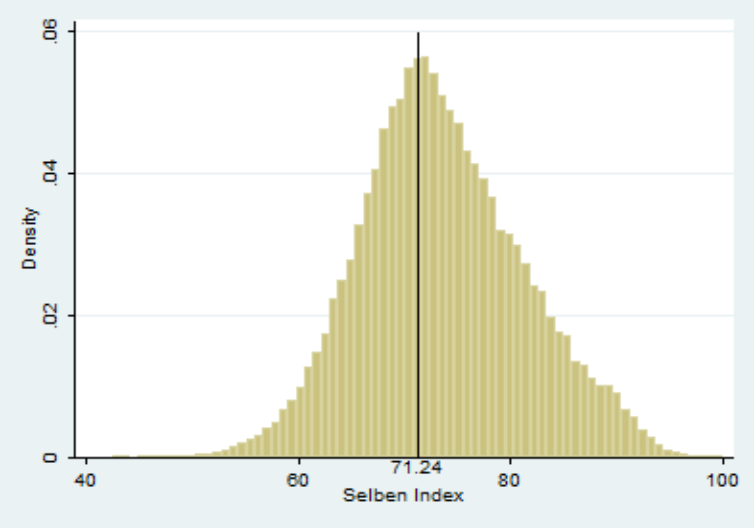


Source: Authors calculations using data from the 1999 Living Standards Measurement Survey.

As it can be seen from the figure both histograms are very similar. The histogram of the estimated index is a little bit to the right of the histogram of the original index implying that the cutoff point for the first two quintiles using the estimated index is above the 50.65 showed in the figure. Next, we reproduce the Selben index for the households in both panel ENEMDU surveys applying the estimated OLS coefficients obtained from the 1999 LSM survey regression. For the 2005-2006 panel survey we use the variables in the fourth quarter of 2005 to attach a Selben score to each household in the panel while for the 2007-2010 panel sample we use the variables in the fourth quarter of 2007 and fourth quarter of 2009. Once each household have a Selben index estimated score we append both panel samples only to show some descriptive statistics for this index. The histogram of the estimated Selben index is depicted in Figure 3 along with the cutoff point of 71.24 corresponding to the first two quintiles of the distribution.

Theoretically, families scoring in the estimated Selben index above 71.24 points are not eligible to receive the BDH program. However, since we only have an estimated Selben index there is some degree of fuzziness around the cutoff point. Some families scoring less than 71.24 points does not receive benefits while some families scoring above the cutoff point receive BDH benefits. This implies that the probability of participation in the BDH program does not jump from 0 to 1 at the cutoff point and we have some degree of fuzziness around 71.24.

Figure 3: Estimated Selben Index Histogram for the ENEMDU Surveys.



Source: Authors' calculations using the panel ENEMDU sample from 2005 to 2010.

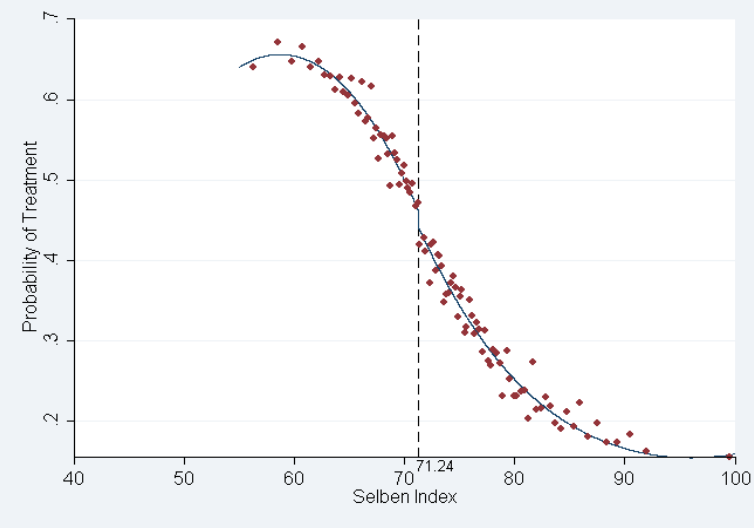
As mentioned above, we reproduced the Selben index with the variables in the ENEMDU surveys to exploit the BDH's targeting mechanism and rely on a regression discontinuity (RD) strategy to isolate the causal effects of the program. Figure 4 shows the estimated probability of receiving the BDH program as a function of the estimated Selben Index. This figure was constructed by estimating two separated Logit models on either side of the Selben cutoff point of 71.24 (as in Lee (2008)) using a second degree polynomial in the Selben index as explanatory variables. Each point is a local average of the indicator variable for receiving BDH benefits for each interval, which is 0.17 wide.

There is a jump of about 12% in the probability of selection at the cutoff point of 71.24. Since there is no reason for households in the ENEMDU surveys to lie about their socioeconomic characteristics to manipulate the Selben index, and assuming that observed and unobserved characteristics vary continuously around the cutoff point,[2] Figure 4 suggests that a RD strategy could be used to identify the effects of the BDH program.

The estimation strategy consists in defining treatment and control groups as those households scoring just below and just above the cutoff point of 71.24, respectively. The assumption underlying this strategy is that individuals living in households lying within a small interval around the cutoff point are likely to have similar observed and unobserved characteristics. Since, as mentioned above, there is some degree of fuzziness around the cutoff point we use an instrumental

[2] see Appendix A for further evidence suggesting the validity of the RD approach.

Figure 4: Predicted Probability of Receiving the BDH program.



Source: Authors' calculations using the panel ENEMDU sample from 2005 to 2010.

Note: The figure was obtained from a Logit estimation of a binary indicator of receiving the BDH program on a second degree polynomial in the estimated Selben index. We estimated two separated Logit models on either side of the cutoff point of 71.24. The predicted probabilities from both models were plotted against the estimated Selben index. Each point in the graph is a local average of the binary indicator of receiving the BDH program.

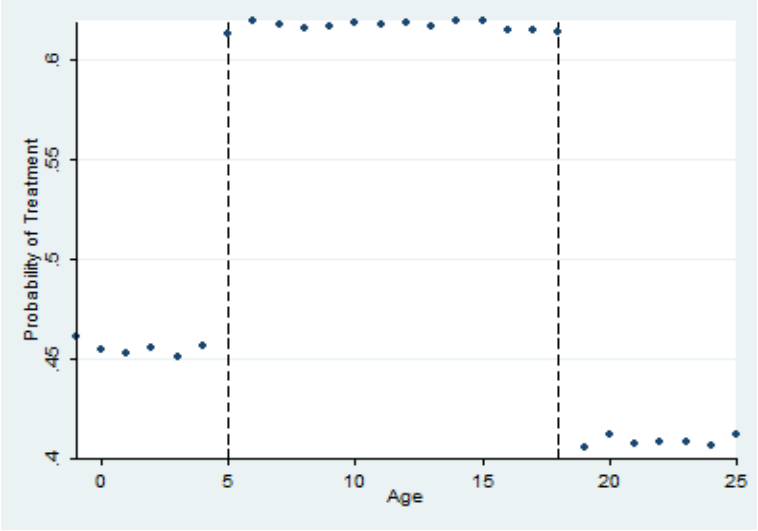
variable estimation. We define an instrumental variable, $z_{i,t}$, for the BDH participation as an indicator variable adopting the value one for those households, i, in the ENEMDU survey period t scoring less than or equal to 71.24 in our estimated Selben index.

We implement a second and related RD approach to check the robustness of some of our results. In practice, before 2007, due to administrative constraints, the authorities did not monitor the educational requirements of the BDH program (see Schady and Araujo (2006)). In particular, some families with no children or with children with ages outside the range considered in the educational requirement of the program got BDH benefits. Using this fact we construct treatment and control groups looking at these educational requirements. The education component requires children between 5 and 18 years old to enroll in school and attendance to class is required to exceed 75 percent. The lack of control of this requirement before 2007 also generates an RD strategy to isolate the effects of the program. We define two groups of households eligible to receive the BDH program as classified by the SELBEN index (i.e. with less than 71.24 points in the SELBEN index). One group of families with children between 5 and 18 years old (the treatment group) and

other group of families without children or with children less than 5 years old or with children between 19 an 25 years old that are not eligible to receive the BDH.

Figure 5 shows the average probability of receiving the BDH program by children's age. This figure was constructed by estimating three separated Logit models one for families without children and with children less than 5 years old, one for families with children between 5 and 18 years old and a third model for families with children older than 18 years old. In all cases only those households scoring less than 71.24 points in the SELBEN index were used in the estimation. The dependent variable was a binary indicator of receiving the BDH program and the independent variable was the Selben index. After the estimation the average predicted probabilities by age were computed.

Figure 5: Average Predicted Probability of Receiving the BDH program by age.



Source: Authors' calculations using the panel ENEMDU sample from 2005 to 2010.

Note: The figure was obtained from a Logit estimation of a binary indicator of receiving the BDH program on the estimated Selben index. We estimated three separated Logit models on the three regions delimited by the age cutoff points of 5 and 18 and for those households scoring less than 71.24 points in the SELBEN index. The predicted probabilities were averaged by age. Age zero represents families with children less than one year old and the first point in the graph is for families with no children.

There is a clear jump in the probability of receiving the BDH program for those families scoring less than 71.24 points in the SELBEN index around the age cutoff points of 5 and 18. The jump is about 37% from the average probability of receiving the BDH program for families with children less than 5 years old to the average probability of receiving BDH benefits for families with children between 5 and 18 years old. Then, there is another jump in the probability of treatment

after the age 18, with the average probability of receiving the program going from 63% for those families with children between 5 and 18 years of age to around 41% for those families with children older than 18 years of age.

In this case, our estimation strategy is similar to the one mentioned above. We define treatment and controls groups using the educational requirements of the program. That is, families scoring less than 71.24 points in the Selben index and with children between 5 and 18 years old compose the treatment group and families scoring less than 71.24 points in the Selben index and without children or with children less than 5 years old or with children between 19 an 25 years old compose the control group. For the estimation we define an instrumental variable (IV) for the BDH participation as an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in our estimated Selben index and having children with ages between 5 and 18 years old.

4.2 Effects on Unemployed Workers

The first and most obvious outcome is the impact of this active labor policy on the **duration of unemployment**. The literature has focused mainly on unemployment protection programs such as unemployment insurance and severance payment programs stressing a "moral hazard effect". This denomination is related to the principal-agent problem inherent to optimal unemployment insurance, in which the government faces the trade-off of providing liquidity and insurance to workers but with the welfare cost of reducing search effort. Meyer (1990) and Katz and Meyer (1990) are main references in this line. In this approach, the UI is viewed mainly as a distortion: given that workers receive UI only if they are unemployed, this transfer reduces the income gain of being employed, generating a substitution effect. Nevertheless, unemployment insurance does not only increase the duration of unemployment because of disincentives to search but also because of liquidity provision: if workers increase their liquidity due to the UI transfer they would search with less effort (and their reservation wages would increase).

In the BDH case, as households are getting a lump-sum transfer, there is a positive income effect that induces people to consume both more physical goods and more leisure. Thereby, the labor supplied falls. Following the same reasoning, there could also be an impact over unemployment. Unemployed workers receiving the transfer have fewer incentives to change their occupational status, i.e. to get a job in the formal or even in the informal sector of the economy or they could extend their unemployment duration in an effort to find a better job.

We estimate a **Cox proportional hazard model** for the duration of unemployment in which we include policy variables and covariates. Covariates, x, are a polynomial on age, gender, formal education and time dummies. The policy variable is an indicator variable, $I(BDH = 1)$, adopting the value one for those workers belonging to a household receiving BDH benefits and zero otherwise. Then, the model is:

$$\theta(t_u|x) = \lambda(t_u)\exp[x\,\beta + \gamma\, I(BDH = 1)] \tag{1}$$

where $\theta(t_u|x)$ is the hazard of leaving unemployment; $\lambda(t_u)$ is the baseline hazard, the exit probability from unemployment, that is unspecified and can take any form. This differences Cox model from other methods (such as Weibull PH model) in which $\lambda(t_u)$ is assumed to have an specific distribution; If, as explained above in 4.1, the BDH's targeting mechanism produces a jump in the probability of receiving benefits at the Selben cutoff point and the observed and unobserved individuals' characteristics vary continuously around it, γ will measure the causal effect of the BDH program on the duration of unemployment.

This estimation strategy is related to both Card, Chetty, and Weber (2007) and to Lalive, van Ours, and Zweimueller (2004). In the first case, a regression discontinuity approach is followed and a flexible baseline hazard applied. The second case, is a difference-in-differences approach in which treatment variables are included in the baseline hazard.

Since our identification strategy suggests a fuzzy RD approach we instrument the $I(BDH = 1)$ variable in the Cox proportional hazard model with $z_{i,t}$ defined above. In order for the IV procedure to consistently estimate γ in equation (1) a parametric or non-parametric function of the Selben index has to be included in the estimation (see van der Klaauw (2002), Hahn, Todd, and Van der Klaauw (2001) and Lee and Card (2006)). In a small enough neighborhood around the cutoff point this will not be necessary but in practice one rarely has enough data points around the cutoff to estimate γ with precision. Therefore, following Urquiola and Verhoogen (2009) in addition to the IV variable we control for a piecewise linear spline in the Selben index with a kink at the cutoff point of 71.24. Then, the instrumental variable Cox model to be estimated is,

$$\theta(t_u|x) = \lambda(t_u)\exp[x\,\beta + \gamma_1\, z_{i,t} + \gamma_2\,\text{Selben} + \gamma_3\,\text{Selben} \times z_{i,t}] \tag{2}$$

where γ_1 will measure the causal effect of the BDH program on the duration of unemployment.

The second outcome, for unemployed workers, is the **probability of transiting from unemployment to informality**. In this case, it is important to analyze if the BDH is a distortive policy, in the sense of increasing the finding probability of informal jobs or it has an income improving effect, related to the fact that the BDH could finance the search process so that workers can wait to meet a suitable formal job opening. In this case, both effects go in inverse direction: income improving effect implies a higher probability of finding a formal job, while "substitution effect" reduces this probability.

We implement a multinomial Logit model estimation, addressing the probability of transition from unemployment to different types of jobs (states): formal employment, informal employment and out of the labor force. The dependent categorical variable, y, adopts the value zero

for those workers remaining in unemployment after the four waves of the panel sample. $y = 1$ if the worker gets a formal employment at some point in the sample; $y = 2$ if the worker goes from unemployment to informal employment and $y = 3$ if the worker goes out of the labor force. The explanatory policy variable, $I(BDH = 1)$, is instrumented by $z_{i,t}$ as before and the same covariates are used as controls in this estimation. That is, the probability that worker i goes from unemployment to state j is

$$Pr[y_i = j] = \frac{e^{x\,\beta_j + \gamma_{1,j}\,z_{i,t} + \gamma_{2,j}\,\text{Selben} + \gamma_{3,j}\,\text{Selben}\times z_{i,t}}}{1 + \sum_{l=1}^{3} e^{x\,\beta_l + \gamma_{1,l}\,z_{i,t} + \gamma_{2,l}\,\text{Selben} + \gamma_{3,l}\,\text{Selben}\times z_{i,t}}}, \;\; j = 1,\, 2,\, 3. \tag{3}$$

where $y = 0$ is the base category. For example, $Pr[y_i = 2]$ is the probability of transition to an informal job. In this case, the relative risk ratio, $e^{\gamma_{1,2}}$, measures how much likely is to go from unemployment to informality than to remain unemployed when comparing workers having benefits and workers with no benefits.

To sum up, the approach described in this section, a regression discontinuity design combined with an estimation methodology of duration and multinomial Logit models, is used to identify the causal effects of the BDH program on the unemployed.

4.3 Effects on Employed Workers

An additional impact of this conditional cash transfer program is on the **separation probability** from a formal employment. In particular, a generous BDH transfer could increase separations: effort on the job could be reduced given that the conditional transfer is available. While this is perhaps of second order in the analysis of the BDH program, it could be important to identify its effect.

In this case, we estimate the separation probability using a Logit model. The dependent variable, as described in 3.2, is a binary indicator adopting the value one if a formal worker change its labor condition during the period analyzed. The policy variable is an indicator variable, $I(BDH = 1)$, adopting the value one if the worker has BDH benefits. The identification approach is similar to the one presented before and described in 4.1. We define an interval around the BDH cutoff point and using a RD approach estimate the impact of the program over the separation probability using a Logit estimation. Letting $Pr[\text{Separation}_{i,t} = 1]$ denote the probability that worker i separates from a formal employment in period t the model is:

$$Pr[\text{Separation}_{i,t} = 1] = \frac{1}{1 + e^{-x\,\beta_2 - \gamma_1\,z_{i,t} - \gamma_2\,\text{Selben} - \gamma_3\,\text{Selben}\times z_{i,t}}}, \tag{4}$$

where γ_1 measures the causal effect of the BDH program on the separation from a formal employment.

5 Results

In this section we present the estimated impact of the BDH program over employed and unemployed workers. We analyze if having access to the BDH program affects labor market outcomes, such as duration of unemployment, probability of transiting from unemployment to informality and separation probabilities, for two group of workers: mothers having BDH benefits and individuals living in households that have the BDH program.

5.1 Impact of the BDH Program over the Unemployment Duration

Table 1 shows the estimated impact of the BDH program over the duration of unemployment for mothers. Columns (3) and (6) present the estimation of equation (2) using a sample of households scoring between 66.24 and 76.24 on the estimated Selben index and include a piecewise linear spline in the Selben index with a kink at the cutoff point as controls. These are our preferred specifications. Columns (1) and (2) [(4) and (5)] focus more narrowly around the discontinuity (as in van der Klaauw (2002) and Urquiola and Verhoogen (2009)) using a sample of households scoring in an interval of ± 3 points around the cutoff point of the Selben index. Columns (1) and (4) show estimation of equation (1) while columns (2) and (5) show the estimation of equation (2). In these cases, both sets of estimations omit the piecewise spline in the Selben index.

The dependent variable in all specifications is the duration of unemployment measured in weeks. Exogenous control variables include age and its squared, two educational attainment variables and time dummies.

All the specifications estimated using the IV procedure show a negative effect of the BDH program on the hazard of leaving unemployment. In particular, columns (3) and (6) show a statistically significant negative effect in both panel samples. In the 2005-2006 panel sample, the BDH program has the effect of reducing the log hazard of leaving unemployment around 0.99 (column (3)) while this effect is around -1.17 in the 2007-2010 panel sample (column (6)). These estimations imply that having BDH benefits decrease the hazard of leaving unemployment between 63 and 69%, respectively. This evidence suggest that beneficiaries' mothers experience a longer duration of unemployment than mothers with similar characteristics but that do not receive BDH benefits. Figure 6 shows the unemployment survival curves for those mothers receiving BDH benefits (solid line) and for those that do not receive it (dashed line) using estimations of column (3). As it can be seen from the figure, the median unemployment survival time for mothers with no BDH benefits is around 12 weeks while for those mothers that receive the cash transfer this median time is around 24 weeks. This implies that the median mother with BDH benefits remain in unemployment around three months longer than the comparable median mother with no benefits.

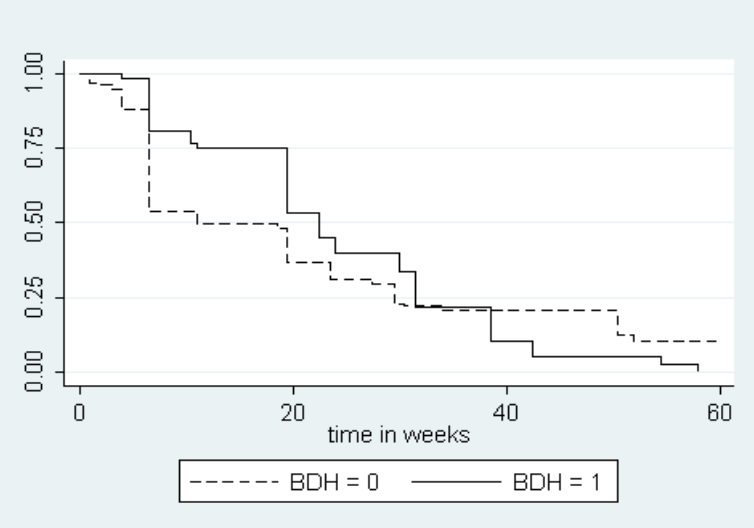
Table 1: Effect of the BDH Program over the Duration of Unemployment of Mothers

Dependent variable:	2005 - 2006			2007 - 2010		
Duration in weeks	(1)	(2)	(3)	(4)	(5)	(6)
$I(BDH = 1)$	0.092	-0.743*	-0.989*	-0.580	-0.696*	-1.172*
	(0.438)	(0.351)	(0.447)	(0.425)	(0.336)	(0.572)
Age	0.005	0.047	-0.001	-0.125	-0.132	-0.188**
	(0.076)	(0.087)	(0.071)	(0.088)	(0.081)	(0.071)
Age^2	0.000	-0.000	0.000	0.002	0.002	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Selben Index			-0.134			-0.069
			(0.127)			(0.109)
Selben Index $\times z_{i,t}$			0.057			-0.265
			(0.180)			(0.190)
Education						
Complete Primary (or less)	-0.764*	-0.342	-0.591*	0.362	0.473	0.275
	(0.338)	(0.429)	(0.293)	(0.453)	(0.494)	(0.335)
Incomplete or Complete Secondary	-1.319***	-1.234**	-1.392***	0.186	0.095	0.025
	(0.380)	(0.434)	(0.335)	(0.373)	(0.359)	(0.277)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59	59	82	100	100	157

Source: Authors' calculations using the 2005-2006 and 2007-2010 panel samples.

Note: Columns (1) and (2) [(4) and (5)] show estimation of a Cox and IV Cox proportional hazard model using a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point for the 2005 to 2006 panel [2007 to 2010 panel], respectively. Column (3) [(6)] shows the estimation of an IV Cox proportional hazard model using an interval of ± 5 points around the Selben cutoff point for the 2005 to 2006 panel [2007 to 2010 panel]. In columns (2), (3), (5) and (6) $I(BDH = 1)$ was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. Figures in parentheses are robust standard errors. Estimations use the ENEMDU probability weights. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Figure 6: Unemployment Survival Curves for Mothers with and without BDH benefits.



Source: Authors calculations using the 2005-2006 panel sample.

Note: The figure was obtained using the estimations in column (3) of Table 1.

Results are similar when analyzing the impact of the BDH program over the duration of unemployment for individuals living in households receiving BDH benefits. Table 2 shows the estimation of a Cox proportional hazard model. The structure of the table is similar to the one presented in Table 1. All specifications that instrument the BDH variable show a statistically significant negative effect of the program over the hazard of leaving unemployment for those workers living in households receiving the cash transfer. The impact of the BDH program seems to be larger, in absolute value, for the 2005-2006 panel sample than for the 2007-2010 panel sample. The effects of the BDH program over the duration of unemployment hold when focusing on a narrow interval around the cutoff point. These estimations imply that individuals living in households that receive the cash transfer experience a longer duration of unemployment than the comparable group of workers living in households that do not have BDH benefits. The empirical evidence in the table suggests that in the 2005-2006 panel sample, the BDH program has the effect of reducing the log hazard of leaving unemployment around 1.46 (column (3)) while the program reduces the log hazard of leaving unemployment in about 1.01 in the 2007-2010 panel sample (column (6)). These estimates imply that workers living in a household with BDH benefits face a hazard of leaving unemployment that is between 64 and 77% lower than for those workers living in households without benefits.

Overall, the evidence presented so far suggests that mothers with BDH benefits and workers living in households having the BDH program experience a longer duration of unemployment than

the comparable group of workers that do not have those benefits. In other words, it seems that the Human Development Bonus could have negatively influenced labor search among those workers receiving the benefit.

5.1.1 Effects over the transition from unemployment to informality

So far the duration estimations focused on the time in an unemployment spell, analyzing only transitions into employment. Here we implement a multinomial Logit estimation distinguishing four different destination states: remaining in unemployment, formal employment in the first postdisplacement job, informal employment in the first postdisplacement job and out of the labor force. The results for unemployed mothers are presented in Table 3 for the 2005-2006 panel sample and in Table 4 for the 2007-2010 panel sample. The baseline category is remaining in unemployment.

Multinomial Logit specifications 1 and 2, in both tables, use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point, while Multinomial Logit specification 3 uses a sample composed by households scoring in an interval of ± 5 points around the Selben cutoff point. This last specification controls for a piecewise linear spline in the Selben index with a kink at the cutoff point and is our preferred specification. The first column in each specification in both tables shows the estimation of the probability of leaving unemployment towards formal employment, the second column shows the estimation of the probability of leaving unemployment towards informal employment and the third column in each specification presents the estimation of the probability of leaving unemployment towards inactivity.

Estimations in both instrumental variables specifications in Table 3 suggest that it is more likely that mothers having the BDH program leave unemployment towards an informal job and it is less likely to leave towards a formal job and towards inactivity than the comparable group of mothers without those benefits. This empirical evidence implies that for mothers having BDH benefits, with respect to mothers with no benefits, the relative risk of leaving unemployment towards an informal job would be expected to increase while the relative risks of leaving unemployment towards a formal job or towards inactivity would be expected to decrease. However, since the only coefficient, on the policy variable, that is statistically significant is the one in column (5) the evidence is weak. The estimated coefficient on the policy variable in column (5) suggest that the relative risk of leaving unemployment towards an informal job would be expected to increase by a factor of 38.7 for mothers having BDH benefits with respect to mothers with no benefits. In the 2007-2010 panel sample results change. All coefficients in both instrumental variable specifications are positive but not statistically significant. Therefore, the evidence suggesting that during this time period mothers with BDH benefits were more likely to leave unemployment than to remain unemployed than the comparable group of mothers without benefits is only weak.

Overall, the empirical evidence presented in both tables seems to suggest that for mothers, the BDH program is not a distortive policy that increase the finding probability of informal jobs

Table 2: Effect of the BDH Program over the Duration of Unemployment of Individuals Living in Households with BDH

Dependent variable:	2005 - 2006			2007 - 2009		
Duration in weeks	(1)	(2)	(3)	(4)	(5)	(6)
$I(BDH = 1)$	-0.221	-1.666***	-1.456*	0.006	-0.634*	-1.011*
	(0.315)	(0.362)	(0.577)	(0.272)	(0.291)	(0.466)
Age	-0.171*	-0.249**	-0.114*	-0.079	-0.092	-0.058
	(0.074)	(0.089)	(0.058)	(0.051)	(0.050)	(0.043)
Age^2	0.002*	0.003**	0.001*	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Gender ($male = 1$)	-0.610	-1.064**	-0.996**	-0.385	-0.268	-0.384
	(0.357)	(0.378)	(0.314)	(0.343)	(0.342)	(0.282)
Selben Index			-0.191			-0.155
			(0.124)			(0.119)
Selben Index $\times z_{i,t}$			0.128			0.141
			(0.216)			(0.187)
Education						
Complete Primary (or less)	0.961	1.398*	0.728	0.491	0.674	0.884*
	(0.698)	(0.641)	(0.552)	(0.444)	(0.452)	(0.394)
Incomplete or Complete Secondary	0.655	0.400	0.346	0.395	0.463	0.524
	(0.670)	(0.621)	(0.476)	(0.376)	(0.376)	(0.308)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111	111	170	152	152	223

Source: Authors' calculations using the 2005-2006 and 2007-2010 panel samples.

Note: Columns (1) and (2) [(4) and (5)] show estimation of a Cox and IV Cox proportional hazard model using a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point for the 2005 to 2006 panel [2007 to 2010 panel], respectively. Column (3) [(6)] shows the estimation of an IV Cox proportional hazard model using an interval of ± 5 points around the Selben cutoff point for the 2005 to 2006 panel [2007 to 2010 panel]. In columns (2), (3), (5) and (6) $I(BDH = 1)$ was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. Figures in parentheses are robust standard errors. Estimations use the ENEMDU probability weights. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

but it does not have an important income improving effect either. It seems that both, income and substitution effects cancel out.

Tables 5 and 6 show the estimated impact of the BDH program over the transition probability into formal and informal employment and out of the labor force for workers living in households with BDH benefits. The structure of these tables is similar to Tables 3 and 4.

Results from multinomial Logit specifications 2 and 3 in Table 5 suggest that for individuals living in households with BDH benefits the relative risk of transiting from unemployment towards a formal job would be larger than for those workers of similar characteristics but living in households with no benefits. Columns (4) and (7) suggest that the relative risk of going into an formal job would increase by a factor between 14 and 25 for workers living in households with the BDH program with respect to individuals living in households with no BDH benefits. The effect over the transition from unemployment towards an informal job is similar to the impact found for mothers. Coefficients over the policy variable in columns (5) and (8) are positive indicating that the relative risk of going from unemployment towards an informal job would be larger for workers living in households receiving the cash transfer. However only the coefficient in column (5) is statistically significant suggesting a weak evidence for this effect. Specifically, the relative risk of going into an informal job would increase by a factor of 7.7 for workers living in households with the BDH program with respect to individuals living in households with no BDH benefits.

The empirical evidence presented in Table 5 disappears for the period 2007-2010. Even when all coefficients in Multinomial Logit specifications 2 and 3 of Table 6 are positive, suggesting that workers living in households with BDH benefits have a larger relative risk of moving out from unemployment than workers living in households with no benefits, they are not statistically significant. Therefore, for workers living in households with BDH benefits we do not find evidence that the program increases the finding probability of informal jobs. If any, the results of Table 5 suggest that the BDH program has an income improving effect related to the fact that the BDH could have financed the search process for those workers living in households with BDH benefits.

Overall, the empirical evidence presented in this section supports the view that the BDH program does not had distortive effects on the finding probability of an informal job for mothers and workers living in households with BDH benefits. Results suggest that the BDH program appears to have financed the search process for workers living in households with benefits during the period 2005-2006.

The impact of the BDH program over unemployed workers can be summarized as follows. Mothers with BDH benefits and workers living in households having the BDH program experience a longer duration of unemployment than the comparable group of workers that do not have access to those benefits. For the group of workers living in households receiving the cash transfer, the program appeared to have financed their search process during 2005-2005.

Table 3: Effect of the BDH over the Transition Probabilities out of Unemployment, 2005-2006

Dependent variable:	Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3		
Transition Probability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I(BDH = 1)$	-0.771	-0.126	-1.754	-0.229	3.655**	-0.694	-0.731	4.270	-0.733
	(1.057)	(1.351)	(1.063)	(1.150)	(1.415)	(1.084)	(1.321)	(2.774)	(1.295)
Age	-0.764	-0.677	-0.793	-0.829	-0.656	-0.906*	-0.233	0.039	-0.468
	(0.468)	(0.551)	(0.429)	(0.481)	(0.549)	(0.452)	(0.252)	(0.407)	(0.212)
Age^2	0.009	0.007	0.009	0.010	0.007	0.011	0.002	-0.002	0.006
	(0.006)	(0.007)	(0.005)	(0.006)	(0.007)	(0.006)	(0.003)	(0.005)	(0.003)
Selben Index							-0.328	0.242	-0.088
							(0.398)	(0.827)	(0.270)
Selben Index $\times z_{i,t}$							0.417	0.041	0.080
							(0.539)	(1.034)	(0.477)
Complete Primary	-0.601	-0.500	1.209	-0.695	-2.636	1.196	-0.283	-2.771	0.996
(or less)	(1.186)	(1.065)	(0.994)	(1.248)	(1.513)	(1.124)	(0.859)	(1.418)	(0.788)
Intercept	16.857	14.011	16.994*	17.705	10.470	18.701*	29.794	-20.500	15.993
	(9.113)	(9.852)	(8.668)	(9.116)	(10.500)	(8.662)	(29.020)	(65.099)	(19.264)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59	59	59	59	59	59	82	82	82

Source: Authors' calculations using the 2005-2006 panel sample.

Note: Multinomial Logit specifications 1 and 2 use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point. Multinomial Logit specification 3 uses a sample composed by households scoring in an interval of ± 5 points around the Selben cutoff point. In columns (4) to (9) the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. In all estimations remaining in unemployment is the base category. In the three specifications the first column shows the estimation for formal employment; the second column shows the estimation for informal employment; and the third column shows the estimation for out of the labor force. Estimations use the ENEMDU probability weights. Figures in parentheses are robust standard errors. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 4: Effect of the BDH over the Transition Probabilities out of Unemployment, 2007-2010

Dependent variable:	Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3		
Transition Probability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I(BDH = 1)$	-0.146	-0.276	-0.058	0.231	0.805	0.199	1.606	1.831	0.874
	(0.797)	(0.839)	(0.755)	(0.769)	(0.796)	(0.685)	(1.210)	(1.252)	(1.153)
Age	-0.078	0.027	-0.164	-0.063	0.051	-0.153	0.017	0.190	-0.102
	(0.184)	(0.220)	(0.180)	(0.190)	(0.219)	(0.184)	(0.160)	(0.199)	(0.142)
Age^2	0.001	-0.000	0.003	0.001	-0.001	0.003	0.000	-0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
Selben Index							0.076	0.140	-0.016
							(0.342)	(0.315)	(0.295)
Selben Index $\times z_{i,t}$							0.737	0.578	0.379
							(0.439)	(0.435)	(0.415)
Complete Primary	0.453	0.441	-0.076	0.412	0.203	-0.111	0.791	0.825	0.409
(or less)	(0.818)	(0.815)	(0.794)	(0.844)	(0.909)	(0.760)	(0.743)	(0.772)	(0.666)
Intercept	0.280	-1.415	2.140	-0.122	-2.294	1838	-7.050	-15.284	2,157
	(3.106)	(3.676)	(3.075)	(3.306)	(3.732)	(3.199)	(25.301)	(23.938)	(21.688)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	100	100	100	100	100	100	157	157	157

Source: Authors' calculations using the 2007-2010 panel sample.

Note: Multinomial Logit specifications 1 and 2 use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point. Multinomial Logit specification 3 uses a sample composed by households scoring in an interval of ± 5 points around the Selben cutoff point. In columns (4) to (9) the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. In all estimations remaining in unemployment is the base category. In the three specifications the first column shows the estimation for formal employment; the second column shows the estimation for informal employment; and the third column shows the estimation for out of the labor force. Estimations use the ENEMDU probability weights. Figures in parentheses are robust standard errors. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 5: Effect of the BDH over the Transition Probabilities out of Unemployment, 2005-2006

Dependent variable:	Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3		
Transition Probability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I(BDH = 1)$	0.671	-0.327	-0.697	2.685**	2.046*	0.190	3.232*	1.673	0.617
	(0.735)	(0.785)	(1.203)	(0.932)	(0.850)	(0.888)	(1.319)	(1.266)	-1.396
Age	0.148	0.208	-0.321	0.163	0.225	-0.352*	0.053	0.059	-0.382**
	(0.159)	(0.143)	(0.131)	(0.150)	(0.151)	(0.160)	(0.129)	(0.114)	(0.141)
Age^2	-0.002	-0.002	0.004	-0.002	-0.002	0.005*	-0.001	-0.000	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
Gender ($male = 1$)	-0.366	-0.328	-1.334	0.812	0.678	-1.061	0.648	0.619	-0.892
	(0.734)	(0.809)	(0.976)	(1.021)	(1.028)	(1.012)	(0.685)	(0.681)	(0.825)
Selben Index							0.288	0.089	-0.124
							(0.245)	(0.246)	(0.300)
Selben Index $\times z_{i,t}$							0.150	0.087	0.427
							(0.402)	(0.412)	(0.494)
Complete Primary	1.461	1.491	2.006	0.558	0.695	1.830	1.227	1.123	1.493
(or less)	(1.182)	(1.205)	(1.357)	(1.276)	(1.213)	(1.463)	(0.853)	(0.817)	(0.942)
Intercept	-1.944	-3.570	5.816	-4.190	-5.468	5.955*	-22.761	-8.511	15.788
	(2.560)	(2.656)	(2.164)	(2.511)	(2.868)	(2.725)	(18.244)	(18.348)	(22.456)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111	111	111	111	111	111	170	170	170

Source: Authors' calculations using the 2005-2006 panel sample.

Note: Multinomial Logit specifications 1 and 2 use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point. Multinomial Logit specification 3 uses a sample composed by households scoring in an interval of ± 5 points around the Selben cutoff point. In columns (4) to (9) the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. In all estimations remaining in unemployment is the base category. In the three specifications the first column shows the estimation for formal employment; the second column shows the estimation for informal employment; and the third column shows the estimation for out of the labor force. Estimations use the ENEMDU probability weights. Figures in parentheses are robust standard errors. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 6: Effect of the BDH over the Transition Probabilities out of Unemployment, 2007-2010

Dependent variable:	Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3		
Transition Probability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I(BDH = 1)$	-0.870	-1.246	-1.033	1.117	0.863	0.341	1.570	1.113	0.664
	(0.695)	(0.654)	(0.774)	(0.598)	(0.569)	(0.647)	(0.816)	(0.810)	(0.958)
Age	0.102	-0.006	-0.441***	0.144	0.037	-0.421***	0.020	-0.039	-0.460***
	(0.116)	(0.091)	(0.119)	(0.116)	(0.096)	(0.124)	(0.099)	(0.084)	(0.113)
Age^2	-0.002	-0.000	0.005***	-0.002	-0.001	0.005***	-0.001	0.000	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Gender ($male = 1$)	-0.569	1.140	-0.243	-0.642	1.084	-0.166	-0.323	0.956	-0.339
	(0.727)	(0.884)	(0.768)	(0.745)	(0.880)	(0.796)	(0.591)	(0.690)	(0.648)
Selben Index							0.378	0.395*	0.254
							(0.198)	(0.201)	(0.269)
Selben Index $\times z_{i,t}$							-0.445	-0.700*	-0.259
							(0.321)	(0.308)	(0.368)
Complete Primary	0.625	0.646	0.288	0.064	0.029	-0.247	-0.251	-0.279	-0.157
(or less)	(0.651)	(0.719)	(0.803)	(0.680)	(0.748)	(0.790)	(0.574)	(0.623)	(0.682)
Intercept	-1.908	-0.584	7.544***	-3.254	-1.933	6.773**	-29.040	-30.166*	-11.541
	(2.264)	(1.842)	(2.160)	(2.254)	(2.017)	(2.188)	(14.971)	(15.231)	(20.577)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	152	152	152	152	152	152	223	223	223

Source: Authors' calculations using the 2007-2010 panel sample.

Note: Multinomial Logit specifications 1 and 2 use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point. Multinomial Logit specification 3 uses a sample composed by households scoring in an interval of ± 5 points around the Selben cutoff point. In columns (4) to (9) the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. In all estimations remaining in unemployment is the base category. In the three specifications the first column shows the estimation for formal employment; the second column shows the estimation for informal employment; and the third column shows the estimation for out of the labor force. Estimations use the ENEMDU probability weights. Figures in parentheses are robust standard errors. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

5.2 Impact of the BDH Program over the Separation Probability

In this section we analyze the impact of the BDH program over the separation probability from a formal employment. As explained in 3.2, we constructed two pooled cross-section samples and define in each one a binary variable, *separation*, adopting the value one if the worker changes its labor condition. That is, if the worker goes from formal employment to unemployment, informal employment or goes out of the labor force. Tables 7 and 8 show the Logit estimation. Explanatory variables include a policy variable, either a binary indicator that the mother receives the cash transfer or a binary variable adopting the value one if the worker lives in a household that has the BDH program and zero otherwise, and exogenous control variables such as age and its square, educational attainment variables and gender. Table 7 shows the Logit estimation using the 2005-2006 pooled cross-section sample while table 8 shows the estimation using the sample defined after the methodological change in the ENEMDU surveys.

Columns (1) to (3) in both tables show the estimation of a Logit model for mothers that had a formal employment, while columns (4) to (6) show the same estimations but for formal workers. Estimations in columns (1), (2), (4) and (5) of both tables use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point, while estimations in columns (3) and (6) use a sample composed by households scoring in an interval of ± 5 points around the Selben cutoff point. These are our preferred estimations. In columns (2), (3), (5) and (6) of both tables the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index.

In the pooled cross-section sample of 2005-2006, the estimated coefficient on the policy variable in all specifications for the group of mothers having formal employment has a positive sign indicating that the BDH program induced an increase in the probability of separation from a formal employment. The average probability of separation is about 12% and the estimated coefficient in column (3) of Table 7 suggests that mothers receiving BDH benefits have, on average, a probability of changing its labor conditions of around 0.24 compared with the group of mothers that do not have those benefits. The odds ratio implied by this estimation is about 3 implying that mothers having BDH benefits have three times more chances of leaving a formal job than the comparable group of mothers with no benefits. However, this effect becomes negligible, in absolute value and statistically, in the pooled cross-section sample of 2007-2010 (see column (3) in Table 8).

The program has a less clear effect over the probability of separation from a formal job for workers living in households that receive the BDH program. Even when the coefficients in columns (5) and (6) in Tables 7 and 8 are positive, suggesting that workers living in households with the BDH program have a higher probability of leaving a formal job than the comparable group of workers living in households with no benefits, they are not statistically significant.

Overall, the empirical evidence presented in this section suggests that the BDH program would had increased the probability of separation from a formal job for mothers having the benefits during the 2005-2006 period but it seems that this effect disappeared through time. There is also a less clear cut effect for workers living in households that receive the BDH program. These findings are not very surprising since from the theoretical point of view these effects are suppose to be of second order.

6 Robustness of the Estimates

In this section we present alternative estimations of the effects of the BDH program over the duration of unemployment, transition into informality and separation probabilities from a formal employment with the objective of checking the robustness of our results. The idea is to reformulate treatment and control groups using the educational requirements of the program. As mentioned in section 4.1 the educational component of the BDH requires that children from the ages of 5 to 18 to enroll in school and and attendance to class is required to exceed 75 percent. At the beginning of the program the authorities of the Ministry of Economic and Social Inclusion (Ministerio de Inclusión Económica y Social in spanish) did not control whether this requirement was met or not and as a consequence some families with no children or with children in ages outside the schooling range required by the program got BDH benefits. This lack of control allow us to use another RD strategy to isolate the effects of the program.

We work with a panel sample covering the period that goes from 2005 to 2006 when authorities did not monitor the educational requirement. In this sample, we define two groups of households eligible to receive the BDH program as classified by the SELBEN index (i.e. with less than 71.24 points in the SELBEN index). One group of families with children between 5 and 18 years old (the treatment group) and other group of families without children or with children less than 5 years old or with children between 19 an 25 years old that are not eligible to receive the BDH. Using these groups we study the impact of the BDH program on the duration of unemployment, the transition from unemployment to informality and the separation from formal employment.

6.1 Effects on the Duration of Unemployment

Table 9 show the results from estimation of a Cox proportional hazard model for the group of mothers that have BDH benefits and for the group of workers living in households receiving the BDH program. Columns (1) and (4) present the estimation of the Cox proportional hazard model in equation (1) while columns (2), (3), (5) and (6) present the estimation of the IV Cox proportional hazard model in equation (2). In these estimations the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index and having children in schooling

Table 7: Impact of the BDH Program over the Separation Probability (2005-2006).

Dependent variable:	Mothers			Non Mothers		
Separation	(1)	(2)	(3)	(4)	(5)	(6)
$I(BDH = 1)$	1.010**	0.883**	1.109*	0.520*	0.282	0.159
	(0.381)	(0.311)	(0.469)	(0.250)	(0.195)	(0.303)
Age	0.135*	0.125	0.133*	-0.067*	-0.070**	-0.069**
	(0.066)	(0.068)	(0.056)	(0.027)	(0.027)	(0.022)
Age^2	-0.002*	-0.002*	-0.002**	0.001*	0.001**	0.001**
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Gender ($male = 1$)				1.061**	1.091**	0.911**
				(0.388)	(0.386)	(0.307)
Selben Index			0.046			-0.120
			(0.130)			(0.082)
Selben Index $\times z_{i,t}$			0.151			0.185
			(0.172)			(0.110)
Education						
Incomplete or Complete	0.087	-0.055	-0.190	0.044	0.074	-0.335
Secondary	(0.357)	(0.352)	(0.284)	(0.246)	(0.245)	(0.199)
More than Complete	-1.167*	-1.336**	-1.311**	-0.151	-0.124	-0.571*
Secondary	(0.505)	(0.494)	(0.409)	(0.318)	(0.318)	(0.272)
Intercept	-4.087**	-4.051**	-7.313	-1.100	-1.174	8.368
	(1.497)	(1.522)	(10.005)	(0.670)	(0.690)	-6.150
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	444	444	717	936	936	1446

Source: Authors' calculations using the 2005-2006 pooled cross-section sample.

Note: Columns (1) to (3) show the estimation of a Logit model for mothers that had a formal employment during the third and fourth quarters of 2005 and 2006. Columns (4) to (6) show the same estimation but for workers that had a formal employment during the third and fourth quarters of 2005 and 2006. Estimations in columns (1), (2), (4) and (5) use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point. Estimations in columns (3) and (6) use a sample composed by households scoring in an interval of ± 5 points around the Selben cutoff point. In columns (2), (3), (5) and (6) the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. Estimations use the ENEMDU probability weights. Figures in parentheses are robust standard errors. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 8: Impact of the BDH Program over the Separation Probability (2007-2010).

Dependent variable:	Mothers			Non Mothers		
Separation	(1)	(2)	(3)	(4)	(5)	(6)
$I(BDH = 1)$	0.241	0.226	0.416	-0.095	0.108	0.076
	(0.242)	(0.225)	(0.353)	(0.191)	(0.155)	(0.236)
Age	0.180***	0.178***	0.147***	0.053*	0.054*	0.051**
	(0.044)	(0.044)	(0.032)	(0.021)	(0.021)	(0.017)
Age^2	-0.002***	-0.002***	-0.002***	-0.001**	-0.001**	-0.001**
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Gender ($male = 1$)				0.592*	0.595*	0.221
				(0.261)	(0.260)	(0.186)
Selben Index			0.078			-0.035
			(0.096)			(0.062)
Selben Index $\times z_{i,t}$			-0.004			0.048
			(0.130)			(0.087)
Education						
Incomplete or Complete	0.245	0.251	0.146	-0.066	-0.035	-0.048
Secondary	(0.255)	(0.256)	(0.214)	(0.179)	(0.180)	(0.145)
More than Complete	-0.528	-0.553	-0.795*	-0.506	-0.460	-0.439*
Secondary	(0.439)	(0.440)	(0.359)	(0.270)	(0.268)	(0.205)
Intercept	-4.228***	-4.213***	-9.351	-2.919***	-3.042***	0.163
	(0.971)	(0.966)	(7.090)	(0.569)	(0.572)	(4.562)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1667	1667	2589	2378	2378	3753

Source: Authors' calculations using the 2007-2010 pooled cross-section sample.

Note: Columns (1) to (3) show the estimation of a Logit model for mothers that had a formal employment during the fourth quarters of 2007 and 2008 and the first quarters of 2008 and 2009. Columns (4) to (6) show the same estimation but for workers that had a formal employment during the fourth quarters of 2007 and 2008 and the first quarters of 2008 and 2009. Estimations in columns (1), (2), (4) and (5) use a sample composed by households scoring in an interval of ± 3 points around the Selben cutoff point. Estimations in columns (3) and (6) use a sample composed by households scoring in an interval of ± 5 points around the Selben cutoff point. In columns (2), (3), (5) and (6) the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index. Estimations use the ENEMDU probability weights. Figures in parentheses are robust standard errors. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

age (from 5 to 18 years old).[3] In columns (2) and (5) in addition to the instrumental variable we use as a control variable the Selben index while in columns (3) and (6) we control for a second degree polynomial in the Selben index. Socioeconomic controls include age and its square, gender, two educational attainment variables and time dummies.

Results are similar in sign to the ones reported in Table 1 suggesting that mothers with BDH benefits and workers living in households receiving the BDH program experience a longer duration of unemployment than similar workers that do not have access to those benefits. However none of the coefficients are statistically significant. The estimated coefficient in column (3) suggests that the program has the effect of reducing the hazard of leaving unemployment, for mothers receiving the cash transfer, in about 16%. The effect of the BDH program is small over the duration of unemployment for workers living in beneficiary's households. The estimated coefficient in column (6) suggests that for these workers the impact of the program reduces the hazard of leaving unemployment only around 5%.

The findings in this section, although statistically weak, confirm the results presented in Section 5.1 suggesting that mothers receiving the cash transfer and workers living in households that have the BDH program, experience a longer duration in unemployment than the comparable group of workers that do not have those benefits.

6.2 Effects on the Transition from Unemployment to Informality

As before, to measure the effect of the BDH program over the transition from unemployment to informality we estimate a multinomial Logit model distinguishing four different destination states: remaining in unemployment, formal employment in the first postdisplacement job, informal employment in the first postdisplacement job and out of the labor force. The results for unemployed mothers are presented in Table 10 and for those workers living in households having the BDH program in Table 11. The baseline category in all estimations is remaining in unemployment. The first column in each specification in both tables shows the estimation of the probability of leaving unemployment to formal employment, the second column shows the estimation of the probability of leaving unemployment to informal employment and the third column in each specification presents the estimation of the probability of leaving unemployment to out of the labor force. Multinomial Logit specifications 2 and 3 in both tables instrument the $I(BDH = 1)$ variable using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index and having children in schooling age (from 5 to 18 years old).

[3] Here we could not control the estimations using a piecewise spline in the Selben index interacted with the instrumental variable because there are not many observations in our control group. As a consequence the Selben index variable and its interaction with the IV are highly collinear producing estimates of λ_1 that are of the same sign as the ones presented in Table 9 but unusually high in absolute value.

Table 9: Effect of the BDH Program over the Duration of Unemployment

Dependent variable:	Mothers			Non Mothers		
Duration in weeks	(1)	(2)	(3)	(4)	(5)	(6)
$I(BDH = 1)$	-0.352	-0.171	-0.175	-0.010	-0.096	-0.056
	(0.366)	(0.395)	(0.390)	(0.329)	(0.549)	(0.568)
Age	-0.092	-0.100	-0.092	-0.145*	-0.166*	-0.154*
	(0.084)	(0.086)	(0.085)	(0.072)	(0.066)	(0.067)
Age^2	0.001	0.001	0.001	0.002*	0.002**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Gender ($male = 1$)				-0.772	-1.093**	-1.054**
				(0.418)	(0.373)	(0.374)
Selben Index		0.046	1.533		-0.246**	-2.432
		(0.067)	(2.861)		(0.089)	(2.465)
Selben Index squared			-0.011			0.017
			(0.021)			(0.019)
Education						
Complete Primary	-1.408**	-1.400**	-1.388**	0.625	-0.222	-0.036
(or less)	(0.526)	(0.513)	(0.526)	(0.845)	(0.941)	(1.079)
Incomplete or Complete	-1.523**	-1.557**	-1.533**	-0.020	-0.578	-0.402
Secondary	(0.535)	(0.496)	(0.508)	(0.840)	(0.868)	(0.981)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Unweighted Observations	58	58	58	149	149	149

Source: Authors' calculations using the 2005-2006 panel sample.

Note: Columns (1) and (4) show the estimation of a Cox proportional hazard model for the 2005 to 2006 panel sample while columns (2), (3), (5) and (6) present the estimation of an IV Cox proportional hazard model. In columns (2), (3), (5) and (6) $I(BDH = 1)$ was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index and having children in schooling age (from 5 to 18 years old). Figures in parentheses are robust standard errors. Estimations use probability weights. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

None of the coefficients on the policy variable in both tables are statistically significant implying that at most these results are weak. Results for mothers receiving BDH benefits are mixed, when taking into account multinomial Logit specifications 2 and 3. Column (5) in Table 10 suggests that for mothers receiving the cash transfer compared with those mothers without benefits, the relative risk of going from unemployment to informality decrease by a factor of 0.59 while the coefficient in column (8) suggests that this relative risk would increase by a factor of 1.12. Both specifications suggest that the relative risk of leaving unemployment towards a formal job or out of the labor force is larger for mothers having BDH benefits than for the comparable group of mothers without those benefits. Multinomial Logit specifications 2 and 3 in Table 10 imply that for workers living in households receiving BDH benefits with respect to those workers living in households with no benefits the relative risk of transiting from unemployment towards an informal job would increase by a factor of about 1.10. The evidence in this table also suggests that workers living in households that have access to the BDH program are more likely to go from unemployment towards a formal employment or out of the labor force than the comparable group of workers that live in households with no BDH benefits.

Overall, this evidence confirms some of our earlier results. It seems that the BDH program does not have had the distortive effect of increasing the finding probability of an informal job while it could have had an income improving effect related to the fact that it could have financed the search process for for mothers and workers living in households with BDH benefits.

6.3 Effects on the Separation from Formal Employment

Table 12 shows the results for the effect of the program on the separation probability from a formal job. We estimate a Logit model using a pooled cross-section sample of workers that had a formal employment during the third and fourth quarters of 2005 and 2006. As before the dependent variable in the Logit estimation is a binary variable, *separation*, adopting the value one if the individual change its labor condition. That is, if the worker goes from formal employment to unemployment, informal employment or goes out of the labor force.

Columns (1) to (3) in the table show the estimation of a Logit model for beneficiaries mothers that had a formal employment, while columns (4) to (6) show the same estimations but for formal workers living in households having the BDH program. In columns (2), (3), (5) and (6) the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index and having children in schooling age (from 5 to 18 years old).

The estimated coefficient on the policy variable is positive in all specifications suggesting that having the benefits of the BDH program increase the probability of separation from a formal employment. The estimated coefficients on the policy variable in columns (3) and (6) imply that mothers having the BDH program and workers living in households receiving BDH benefits are

Table 10: Effect of the BDH over the Transition Probabilities out of Unemployment for Mothers

Dependent variable:	Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3		
Transition Probability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I(BDH = 1)$	-0.670	-0.548	-1.010	2.001	-0.524	1.580	1.876	0.116	1.524
	(1.020)	(1.064)	(0.834)	(1.249)	(1.072)	(1.224)	(1.206)	(0.967)	(1.241)
Age	-0.178	0.059	-0.183	-0.331	0.166	-0.330	-0.300	-0.074	-0.269
	(0.302)	(0.372)	(0.240)	(0.319)	(0.376)	(0.269)	(0.322)	(0.356)	(0.266)
Age^2	0.001	-0.001	0.002	0.003	-0.002	0.003	0.003	0.001	0.003
	(0.004)	(0.005)	(0.003)	(0.004)	(0.005)	(0.003)	(0.004)	(0.005)	(0.003)
Selben Index				0.080	-0.158	0.097	-0.632	-11.293	5.053
				(0.190)	(0.231)	(0.181)	(6.231)	(7.135)	(6.277)
Selben Index squared							0.005	0.084	-0.037
							(0.047)	(0.053)	(0.047)
Complete Primary (or less)	0.550	-1.452	0.292	0.767	-1.989	0.436	0.828	-1.532	0.420
	(1.119)	(1.461)	(1.066)	(1.146)	(1.207)	(1.048)	-1118	(1.193)	(1.046)
Intercept	5.864	-0.043	5.621	1.547	8.881	0.382	24.975	378.358	-165.457
	(5.407)	(6.414)	(4.618)	(14.153)	(17.252)	(13.418)	(209.683)	(241.854)	(209.839)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unweighted Observations	58	58	58	58	58	58	58	58	58

Source: Authors' calculations using the 2005-2006 panel sample.

Note: Multinomial Logit specifications 2 and 3 instrument the $I(BDH = 1)$ variable using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index and having children in schooling age (from 5 to 18 years old). In all estimations remaining in unemployment is the base category. In the three specifications the first column shows the estimation for formal employment; the second column shows the estimation for informal employment; and the third column shows the estimation for out of the labor force. Figures in parentheses are robust standard errors. Estimations use probability weights. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 11: Effect of the BDH over the Transition Probabilities out of Unemployment for Individuals Living in Households having the BDH Program

Dependent variable:	Multinomial Logit 1			Multinomial Logit 2			Multinomial Logit 3		
Transition Probability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$I(BDH = 1)$	0.291	-0.563	-1.019	-0.597	0.092	-1.766	-0.596	0.098	-1.762
	(0.526)	(0.565)	(0.850)	(0.704)	(0.736)	(0.923)	(0.700)	(0.747)	(0.908)
Age	0.162	0.124	-0.262	0.167	0.118	-0.248	0.163	0.120	-0.259
	(0.126)	(0.104)	(0.131)	(0.120)	(0.104)	(0.136)	(0.117)	(0.100)	(0.135)
Age^2	-0.002	-0.001	0.004	-0.002	-0.001	0.003	-0.002	-0.001	0.003*
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
Gender ($male = 1$)	0.179	0.688	-1.272	0.856	1.015	-0.693	0.849	1.006	-0.893
	(0.705)	(0.749)	(0.936)	(0.697)	(0.725)	(0.883)	(0.693)	(0.723)	(0.941)
Selben Index				0.416***	0.259*	0.453**	1.522	-1.263	7.435
				(0.119)	(0.117)	(0.167)	(4.690)	(3.990)	(7.632)
Selben Index squared							-0.008	0.011	-0.052
							(0.036)	(0.031)	(0.057)
Complete Primary	0.100	-0.079	0.530	1.086	0.404	1.371	1.113	0.441	1.559
(or less)	(0.583)	(0.620)	(0.976)	(0.610)	(0.642)	(1.079)	(0.606)	(0.633)	(1.080)
Intercept	-2.351	-2.196	4.509	-30.151***	-19.836*	-25.123*	-67.052	30.500	-260.218
	(2.066)	(1.841)	(2.192)	(8.727)	(8.359)	(11.508)	(154.705)	(130.126)	(253.980)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unweighted Obs.	149	149	149	149	149	149	149	149	149

Source: Authors' calculations using the 2005-2006 panel sample.

Note: Multinomial Logit specifications 2 and 3 instrument the $I(BDH = 1)$ variable using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index and having children in schooling age (from 5 to 18 years old). In all estimations remaining in unemployment is the base category. In the three specifications the first column shows the estimation for formal employment; the second column shows the estimation for informal employment; and the third column shows the estimation for out of the labor force. Figures in parentheses are robust standard errors. Estimations use probability weights. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

more than 100% likely to leave formal employment than the comparable group of workers not receiving those benefits. These results are in line with the ones presented before for the same time period suggesting that the BDH program has increased the probability of separation from formal employment.

7 Conclusions

In this paper we analyzed the impact of the BDH program over the duration of unemployment, the probability of going from unemployment to informal employment and the probability of separation from a formal employment. Exploiting the program's targeting mechanism and a regression discontinuity design we isolate the causal effects of the program on these labor market outcomes for two groups of workers: mothers that receive the cash transfer and workers living in households that have the BDH program. The main findings of the paper are:

1. Mothers with BDH benefits and workers living in households having the BDH program experience a longer duration of unemployment than the comparable group of workers that do not receive those benefits.
2. The BDH program does not had distortive effects on the finding probability of an informal job for mothers and workers living in households with BDH benefits. Results also suggest that the BDH program appears to have financed the search process for workers living in households with benefits during the period 2005-2006.
3. The BDH program seems to increase the probability of separation from a formal employment for mothers receiving the cash transfer. This effect is less clear for workers living in beneficiary's households. The impact is small for both mothers with BDH benefits and workers living in households having the BDH program when using data for the period 2007-2009.

These findings are important because they suggest that the program has some non desirable effects over several labor market outcomes. It seems that the program increases the duration of unemployment and at the same time it induces an increment in the probability that a worker separates from a formal job. The evidence presented here implies that there is some room for the government to intervene in the labor market to try to eliminate or at least reduce these negative effects of the program.

Table 12: Impact of the BDH Program over the Separation Probability.

Dependent variable:	Mothers			Non Mothers		
Separation	(1)	(2)	(3)	(4)	(5)	(6)
$I(BDH = 1)$	0.384	0.506	0.696*	0.156	0.566**	0.811***
	(0.269)	(0.309)	(0.344)	(0.173)	(0.189)	(0.207)
Age	0.146**	0.138**	0.133**	-0.028	-0.033	-0.034
	(0.049)	(0.048)	(0.048)	(0.023)	(0.023)	(0.023)
Age^2	-0.002**	-0.002**	-0.001**	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Gender ($male = 1$)				0.139	0.131	0.103
				(0.262)	(0.264)	(0.264)
Selben Index		0.030	-1.134		0.073*	-1.614*
		(0.044)	(1.274)		(0.030)	(0.815)
Selben Index squared			0.009			0.013*
			(0.010)			(0.006)
Education						
Incomplete or Complete	0.241	0.198	0.165	-0.225	-0.232	-0.219
Secondary	(0.291)	(0.300)	(0.299)	(0.196)	(0.202)	(0.204)
More than Complete	-0.677	-0.711	-0.744	-0.634*	-0.680*	-0.688*
Secondary	(0.510)	(0.521)	(0.526)	(0.305)	(0.305)	(0.306)
Intercept	-4.153***	-6.300*	32.177	-0.911	-6.136**	49.788
	(1.187)	(3.153)	(42.317)	(0.533)	(2.181)	(27.234)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Unweighted Observations	493	493	493	1307	1307	1307

Source: Authors' calculations using the 2005-2006 pooled cross-section sample.

Note: Columns (1) to (3) show the estimation of a Logit model for mothers that had a formal employment during the third and fourth quarters of 2005 and 2006. Columns (4) to (6) show the same estimation but for workers that had a formal employment during the third and fourth quarters of 2005 and 2006. In columns (2), (3), (5) and (6) the $I(BDH = 1)$ variable was instrumented using an indicator variable adopting the value one for those households in the ENEMDU survey scoring less than or equal to 71.24 in the estimated Selben index and having children in schooling age (from 5 to 18 years old). Figures in parentheses are robust standard errors. Estimations use probability weights. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

References

Card, David, Raj Chetty, and Andrea Weber. 2007. "Cash-On-Hand and Competing Models of Intertemporal Behavior: New Evidence from the Labor Market." *The Quarterly Journal of Economics* 122 (4):1511–1560. URL http://ideas.repec.org/a/tpr/qjecon/v122y2007i4p1511-1560.html.

Hahn, Jinyong, Petra Todd, and Wilbert Van der Klaauw. 2001. "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design." *Econometrica* 69 (1):201–09. URL http://ideas.repec.org/a/ecm/emetrp/v69y2001i1p201-09.html.

Imbens, Guido W. and Thomas Lemieux. 2008. "Regression discontinuity designs: A guide to practice." *Journal of Econometrics* 142 (2):615–635. URL http://ideas.repec.org/a/eee/econom/v142y2008i2p615-635.html.

Katz, Lawrence F. and Bruce D. Meyer. 1990. "The impact of the potential duration of unemployment benefits on the duration of unemployment." *Journal of Public Economics* 41 (1):45–72. URL http://ideas.repec.org/a/eee/pubeco/v41y1990i1p45-72.html.

Lalive, Rafael, Jan C. van Ours, and Josef Zweimueller. 2004. "How Changes in Financial Incentives Affect the Duration of Unemployment." IZA Discussion Papers 1363, Institute for the Study of Labor (IZA). URL http://ideas.repec.org/p/iza/izadps/dp1363.html.

Lee, David S. 2008. "Randomized experiments from non-random selection in U.S. House elections." *Journal of Econometrics* 142 (2):675–697. URL http://ideas.repec.org/a/eee/econom/v142y2008i2p675-697.html.

Lee, David S. and David Card. 2006. "Regression Discontinuity Inference with Specification Error." NBER Technical Working Papers 0322, National Bureau of Economic Research, Inc. URL http://ideas.repec.org/p/nbr/nberte/0322.html.

Llerena Pinto, Freddy. 2009. "Pobreza y educación en ecuador: evaluación de impacto de la transferencia monetaria condicionada." Mimeo.

McCrary, Justin. 2008. "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test." *Journal of Econometrics* 142 (2).

Meyer, Bruce. 1990. "Unemployment insurance and Unemployment Spells." *Econometrica* 58 (4).

Ponce, Juan and Arjun S. Bedi. 2010. "The impact of a cash transfer program on cognitive achievement: The Bono de Desarrollo Humano of Ecuador." *Economics of Education Review* 29 (1):116–125. URL http://ideas.repec.org/a/eee/ecoedu/v29y2010i1p116-125.html.

Schady, Norbert and Maria Caridad Araujo. 2006. "Cash transfers, conditions, school enrollment, and child work : evidence from a randomized experiment in Ecuador." Policy Research Working Paper Series 3930, The World Bank. URL http://ideas.repec.org/p/wbk/wbrwps/3930.html.

Thistlewaite, Donald L. and Donald T. Campbell. 1960. "Regression discontinuity analysis: An alternative to the ex-post facto experiment." *Journal of Educational Psychology* 51:309–317.

Turner, B. 2006. "Policy analysis of ecuador's bono de desarrollo humano program." Msfs-517, policies for poverty reduction.

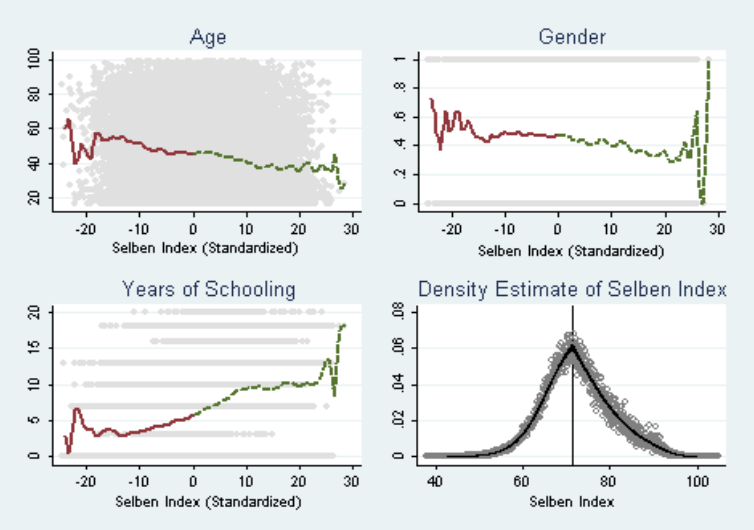
Urquiola, Miguel and Eric Verhoogen. 2009. "Class Size and Sorting in Market Equilibrium: Theory and Evidence." *American Economic Review* 99 (1):179–215.

van der Klaauw, Wilbert. 2002. "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression-Discontinuity Approach." *International Economic Review* 43 (4):1249–1287. URL http://ideas.repec.org/a/ier/iecrev/v43y2002i4p1249-1287.html.

Appendix A

In this appendix we present further evidence suggesting the validity of the RD approach. As mentioned in section 4.1 one of the assumptions that is needed for the RD strategy to identify casual effects of the BDH program is that observable and unobservable characteristics are smooth functions of the Selben index around the cutoff point. While we cannot be certain about the unobservable characteristics satisfying this condition we can provide evidence for the observable characteristics. In this sense, the first three panels in Figure 7 shows the estimation of a local polynomial regression around the cutoff point for three observable characteristics, age, years of schooling and gender. As it can be seen from the figure neither age nor gender or years of schooling show a discontinuity around the cutoff point of the Selben index.

Figure 7: Local Polynomial Regressions around the Cutoff Point of the Selben Index.



Source: Authors' calculations using the panel ENEMDU sample from 2005 to 2010.

Note: The figure was obtained from locally linear polynomial regressions around the cutoff point using Austin Nichols *rd* Stata module for regression discontinuity estimation. The predicted values of each variable from these two regressions are plotted against the Selben index standardized so that the cutoff point is at the zero value.

We complement the visual evidence computing a Wald test statistic for the hypothesis that the difference in estimates at the cutoff point is zero against the alternative that the difference is not zero. Rejecting the null hypothesis is evidence in favor of a discontinuity at the cutoff point. Results are presented in Table 13. Since estimations are sensitive to the choice of bandwidth, the table presents the results for three different bandwidth selections. The evidence provided in the ta-

Table 13: Wald Tests for Discontinuity at the Cutoff Point.

	Wald Test Statitic		
Variables	(1)	(2)	(3)
Gender	-0.005	0.026	0.001
	(0.026)	(0.035)	(0.021)
Age	0.854	2.941	1.065
	(1.252)	(1.627)	(0.968)
Years of schooling	-0.121	-0.024	-0.167
	(0.267)	(0.353)	(0.208)
Bandwidth	1.150	0.575	2.301

Source: Authors' calculations using data from the panel ENEMDU sample from 2005 to 2010.

Note: Wald tests were implemented using Austin Nichols *rd* Stata module for regression discontinuity estimation. The columns in the table show the Wald test statistics for the hypothesis that the difference in estimates at the cutoff point is zero and in parentheses its bootstrapping p-values. We use 500 replications. Statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

ble suggests that the three observable characteristics analyzed, age, gender and years of schooling, do not show a statistical significative discontinuity around the cutoff point.

The other assumption made in section 4.1 is that there were no reasons for the individuals to lie about their socioeconomic characteristics in the ENEMDU surveys to manipulate the Selben index. If such manipulation exists then it should be manifested in a discontinuity of the Selben index around the cutoff point. Here we implement the Wald test developed by McCrary (2008) to test this discontinuity in the density function of the Selben index. The null hypothesis is that the discontinuity around the cutoff is zero. The fourth panel in Figure 7 shows the estimated density of the Selben index below and above the cutoff point of 71.24 (bold solid line) along with 95% confidence bands (solid lines). As it can be seen, the figure do not show any discontinuity around 71.24. To confirm this evidence we compute the Wald test. The estimated log difference in height at the cutoff point is $.0047$ with an standard error of $.0168$ implying that the null hypothesis cannot be rejected at any standard statistical significance levels.

Overall, the evidence presented in this appendix suggests that there are no jumps in the exogenous controls and that there is no discontinuity in the Selben index around the cutoff point implying that the RD strategy could be used to identify the causal effects of the BDH program.