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Antipoverty Transfers and Labour Market Outcomes: Regression Discontinuity Design Findings

ARMANDO BARRIENTOS & JUAN MIGUEL VILLA
Brooks World Poverty Institute, University of Manchester, Manchester, UK

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ABSTRACT *The article estimates the impact of* Familias en Acción*, a human development conditional cash transfer programme, on adult labour market outcomes in urban areas in Colombia. Relying on a regression discontinuity design and a large panel dataset, the article finds significant, largely positive, but heterogeneous programme effects on labour market outcomes. The findings suggest that antipoverty transfers enable a re-allocation of household productive resources among participant households.*

1. Introduction

The emergence of large-scale antipoverty transfers in developing countries raises concerns over their potential effects on labour supply in participating households. The design and objectives of human development conditional cash transfer programmes suggest complex changes in the pattern of incentives facing households in poverty. Their focus on children's human capital lowers incentives for child labour. Entitlements under these programmes do not require an inactivity test on adults. On paper, they influence adult labour supply solely through their income effect. In practice, and depending on household demographics, adults might need to substitute their labour for the reduction in paid and unpaid work by children. Increases in children's school attendance might free more time for paid work, particularly for women. The fact that women are in most cases the direct recipient of the transfer can influence intra-household decision-making, included on labour supply. The growing literature on the labour supply effects of human development conditional cash transfers finds marginal changes in adult labour supply among recipients, positive and negative.[1]

This article examines net adult labour force participation effects among urban households registered in Colombia's human development conditional cash transfer programme, *Familias en Accion*. The analysis

Correspondence Address: Armando Barrientos, Professor and Research Director, Brooks World Poverty Institute, School of Environment, Education, and Development, Arthur Lewis Building, University of Manchester, Oxford Road, Manchester M13 9PL, UK. Phone: +44 161 306 6436. E-mail: a.barrientos@manchester.ac.uk

An Online Appendix is available for this article which can be accessed via the online version of this journal available at http://dx.doi.org/10.1080/00220388.2015.1010157

Data Availability

Researchers wishing to access *Sisben* data should contact Camilo Florez at the *Departamento para la Prosperidad Social* in Colombia (cflorez@dps.gov.co). The *Encuesta Nacional de Calidad de Vida* can be accessed at http://www.dane.gov.co. The Stata files used in this article will be provided upon request to the authors.

relies on a regression discontinuity design (RDD) applied to a large administrative panel dataset. Labour force outcome effects are identified at the threshold of programme eligibility scores in urban locations incorporated into *Familias en Accion* in 2007. The approach and data employed permit an accurate identification of intention to treat effects and local average treatment effects, avoiding many of the weaknesses associated with the estimates emerging from conventional approaches. The findings discussed in the article suggest human development conditional cash transfers encourage a re-allocation of household labour resources.

Economic theory predicts that income transfers will impact on the labour supply of recipients (Moffitt, 2002). In the textbook utility maximisation model, an income windfall will enable recipients to increase consumption across the board, including leisure, generating a rebalancing of labour and non-labour time. In the context of antipoverty income transfers in low- and middle-income countries, labour supply effects for participants are harder to predict, especially as groups in poverty show relatively inelastic labour supply and work in informal settings. As noted above, income transfers with school conditions have mixed labour supply effects. Sound empirical analysis is needed to identify net labour supply effects of human development conditional cash transfers, and antipoverty transfers more broadly (Moffitt & Rangarajan, 1989).

The relevant literature has yielded mixed results. The variety of data, methods and programme design accounts for, to some extent, the variation in their findings. This applies to studies on *Familias en Accion*. An evaluation report by the Centro Nacional de Consultoría (2008) employing a regression discontinuity design found no evidence of manipulation in the assignment score. It examined labour market outcomes for children and youths. Villa (2011) finds that households participating in *Familias en Accion* show lower rates of labour participation than non-participants. These results can be explained by the fact that beneficiary households are younger and have lower educational qualifications. An evaluation of *Familias en Accion* conducted by the Institute for Fiscal Studies and Econometria-SEI (2006) concluded that the programme marginally increased the participation rate of females in small towns and males living in rural areas, but found no significant impact on hours worked per week. Attanasio et al. (2010) examined the effect of programme registration on children's time use. They find a significant increase in school attendance, explained by a reduction of domestic work and, at the margins, in income-generating activities. Significant reductions in child labour are only observed for 14–17 year-olds in urban areas. The authors suggest this 'is perhaps not surprising if children are important labour inputs in agriculture and there is greater flexibility in hours worked for children in this sector' (Attanasio et al., 2010, 199).

This article contributes to the literature in several respects. First, it provides additional evidence on the adult labour supply effects of antipoverty transfers in metropolitan areas. In the literature, labour supply effects appear to be better defined econometrically in rural areas. As a consequence we know much less about how these effects apply in urban contexts. Second, the analysis in the article relies on RDD to identify and estimate potential effects. The available literature on the labour supply effects of human development conditional cash transfers identifies these largely through marginal effects estimated from regression analysis. The analysis in this article relies instead on discontinuities arising from programme eligibility thresholds.[2] This approach gives stronger internal validity to the results. Third, the large administrative dataset employed in the article, including data on close to 30 million individuals,[3] enables reliable identification of discontinuous effects. It also permits a more detailed analysis of the effects through sample restrictions without reducing the power and significance of the estimators. The RDD associates programme assignment in 2006, intention to treat (ITT) and local average treatment effects (LATE), with observed household labour market outcomes in 2010.

The rest of the article is divided into eight sections. Section 2 describes *Familias en Accion* transfers. Section 3 sets out a basic model showing how they can potentially impact on the labour market outcomes of participant households. Section 4 describes the RDD approach to the estimation of treatment effects. Section 5 describes the data. Section 6 tests the appropriateness of the RDD in the current setting. Section 7 presents the main results. A final section concludes.

2. *Familia en Acción* Design and Transfers

Familias en Accion was introduced in 2001 by the government of Colombia with the aim of strengthening human capital investment among children in poorest households in rural areas and

small towns. Coverage was subsequently expanded to large cities. The programme was a component of a social investment fund, and was intended to mitigate the adverse effects of the economic crisis in the late 1990s. In common with similar programmes in Latin America, *Familias en Accion* is premised on the view that addressing intergenerational poverty persistence is best done by combining direct transfers in cash to households with increased utilisation of health care and education services. By 2010, the programme provided a two-part transfer: (1) a fixed monthly nutrition transfer of US$30 for all participant households with children aged 0–6 (0–11 in large cities); and (2) a monthly transfer for each child of school age attending school. The school-related transfers for children in primary (secondary) schools in rural areas and small towns amounted to US$7.5 (US$15), with a larger transfer averaging US$25 per month to children attending secondary schools in large cities. Children attending primary school in large cities were not entitled to a school-related transfer. The transfers are paid bimonthly to the mother and are conditional on compliance with minimum school attendance, immunisation, health check-ups and on mothers attending nutrition and health sessions.

Eligibility for registration in *Familias en Accion* is determined through a proxy-means test. Households wishing to apply for a wide range of public programmes and assistance must register with the *Sistema de Identificación de Beneficiarios de Programas Sociales – Sisben* (Identification System for Social Programme Beneficiaries) and provide information on their socio-economic conditions. The information is then processed to yield a household welfare score, or *Sisben* score, ranging between 0 and 100. The score rises with the welfare status of the household. The statistical model generating the score from the household information is not in the public domain, to avoid potential manipulation. Until 2010, the National Planning Department (*Departamento de Planeacion*) would specify eligibility thresholds for registration in different public programmes, differentiated by urban and rural areas.[4] Eligibility to participate in *Familias en Accion* applies to households with scores of 0–11 and 0–17.5 in urban and rural areas respectively. As an illustration, a household living in an urban area without utilities, with poor dwelling materials, in overcrowded conditions and with low human capital is likely to obtain a *Sisben* score below 11. Registration for *Familias en Accion* is repeated every three or four years in each municipality.

The programme was implemented in stages, starting from municipalities with less than 100,000 inhabitants and with high levels of deprivation, and eventually covering the entire country. In 2007, all geographic restrictions were lifted and the programme began operating in large cities, the focus of our empirical study. By 2007, the programme reached 1.5 million households with 6.3 million individuals, around half of them children.

The impact evaluation of the first stage of the programme, covering small towns and rural areas, revealed positive effects on education and child labour.[5] These effects were identified through matching techniques at the municipality level (Attanasio & Mesnard, 2006). Evaluation studies commissioned by the programme agency found no significant effects on labour participation, employment or labour formality at the aggregate level (Institute for Fiscal Studies and Econometria–SEI, 2006). Differentiating by gender, the study showed the programme increased labour force participation by 2.7 percentage points for rural males and 4.1 percentage points for women living in small towns. No significant programme effects were found on labour income or the number of worked hours.

3. Labour Supply Effects of Antipoverty Transfers

The design of human development conditional cash transfers suggests programme registration will lead to changes in the pattern of labour supply incentives faced by beneficiary households. Rubio-Codina (2010) develops a model of household labour supply which throws light on labour supply effects from human development income transfer programmes, and will help us think through the empirical work which follows.[6] Starting with a household with members I, $1 \ldots I$, where adults are separated out as $a = 1, \ldots A$, children as $q = 1 \ldots Q$, and children receiving a transfer as $k = 1, \ldots K \leq Q$. The household maximises a utility function of the type:

$$U = U(C, L_i, \ldots, L_I; X, \varepsilon) \tag{1}$$

where C is household aggregate consumption and L_i is individual i's non-labour time. X represents observable household heterogeneity and ε denotes unobservable household heterogeneity. Each household member has total time available T divided in hours h which can be allocated to non-labour and labour activities j, say including paid and unpaid work. Activities have a marginal return w_j. Children can allocate s time to schooling with w_i^s representing the direct cost of schooling, such as fees, uniforms, transport. Y is non-labour income and P is the price of a composite commodity. The household budget constraint is:

$$\sum_i \sum_{j \neq s} w_i^j h_i^j + Y \geq pC + \sum_{i=q} w_i^s h_i^s \tag{2}$$

The transfer is in two parts, as in *Familias en Accion*, a household nutrition transfer $dY > 0$, and a transfer for each child of school age conditional on school attendance $dw_k^s t_s > 0$, where d denotes variation. This implies that the household nutrition part of the transfer works as pure income effect, whereas the schooling part of the transfer has in addition substitution effects (it reduces the costs of schooling w_i^s and therefore the relative price of education, while at the same time placing restrictions on the time allocation of children). The substitution effect can be divided into two: (a) the effect of a variation in a member's labour supply in response to a change in its shadow wage, the own substitution effect; and (b) a cross substitution reflecting the effect of a change in the shadow wage of one family member on all other family members' labour supply, the cross-substitution effect. Rubio-Codina writes the total effect of the antipoverty transfer on the hours of work for individual i in a participant household as:

$$dh_i^j = \frac{\partial \hat{h}_i^j}{\partial w_i^s} dw_i^s + \sum_{k \neq i} \frac{\partial \hat{h}_i^j}{\partial w_k^s} dw_k^s + \left[-\sum_k h_k^j dw_k^s + dY \right] \frac{\partial h_i^j}{\partial Y} \forall i,j \tag{3}$$

where $\widehat{h_i^j} = \widehat{h_i^j}(w, p.u; X, \varepsilon)$ is the Hicksian (utility compensated) labour supply. The first term describes own-substitution effects of the transfer; the second term describes the cross-substitution effects; and the third term describes the income effects. The first term reflects the increased school time among children of school age, given the conditional part of the transfer. The second term sums up the cross-substitution effects arising from other children living in the household and benefiting from the transfer. This effect nets out mixed incentives. A reduction in the direct cost of schooling can be expected to increase participation by adults in the labour market. To the extent that mothers provide most of the care for children, schooling reduces the shadow wage of unpaid work, although this effect will depend on the age of all children, particularly whether they are of school age. If all children are of school age, the reduction in the shadow wage of unpaid work raises. On the other hand, if children help with household chores, the reduction in the shadow wage of mothers might be attenuated. The crucial assumption here relates to whether children and adult paid and unpaid work are substitutes. The third term, the income effect, affects all members of the household and suggests a reduction in adult work. This basic model provides a framework with which to examine the process of labour re-allocation brought about by registration in the programme. The net re-allocation of labour is more significant for households who did not have their children in school before the programme.[7] The net effects of the transfer on labour supply will be greater for households facing constraints in their resource allocation prior to the programme, especially single mothers with children.

4. Estimating Programme Effects with a Regression Discontinuity Design

Assessment of the effects of *Familias en Accion* on labour outcomes involves establishing whether eligibility for the programme, denoted by an indicator variable $x_i \in [0, 1]$, with $x_i = 0$ for ineligibles and $x_i = 1$ for eligibles, is associated with an outcome y_i for an individual i (namely, labour force participation), where y_{1i} denotes the outcome for the eligible or treatment group and y_{0i} denotes the

outcome for the ineligible or comparison group. In a linear regression setting, the impact of *Familias en Accion* can be written as $y_i = \alpha_i + x_i \cdot \beta_i$, where the outcome level for ineligible or comparison individuals is represented by $\alpha_i \equiv y_{0i}$ and the effect of the conditional cash transfers on the outcome of interest is captured by $\beta_i \equiv y_{1i} - y_{0i}$.

In the context of an RDD, treatment x_i is known to depend on a variable z_i which in our context denotes the *Sisben* score. The eligibility indicator can then be written as a function of the *Sisben* score, $x_i = f(z_i)$. In a first approach, a sharp regression discontinuity indicates the effects of the eligibility status for *Familias en Accion* on labour outcomes irrespective of actual registration. It provides intention to treat estimates of the effects of the programme. In the sharp regression discontinuity design, z_i is discontinuous at point z_0 a *Sisben* score of 11 points, which is the eligibility threshold reflecting the assignment rule of the programme in urban areas. In a second approach, a fuzzy regression discontinuity design takes account of the probability that eligibles, and non-eligibles, are actually registered and participate in the programme. It estimates the effects of the programme on the treated. Thus, x_i is assumed to depend on the probability of registration in the programme around the threshold. The conditional expectation of the probability of registration in the programme can be specified as a random variable x_{i} with $f(z) \equiv E[x_i|z_i = z] = Pr[x_i = 1|z_i = z]$.

Hahn, Todd, and Klaauw (2001) demonstrate that if the treatment effect β is expected to be constant across individuals, and $E[\alpha_i|z_i = z]$ is continuous in z at z_0, the treatment effect can be identified non-parametrically as follows:

$$\beta = \frac{y^+ - y^-}{x^+ - x^-} \tag{4}$$

where $y^+ \equiv lim_{z \to z_0^+} E[y_i|z_i = z]$ and $y^- \equiv lim_{z \to z_0^-} E[y_i|z_i = z]$. In other words, the estimand is defined by the difference of the outcome close to the threshold of the *Sisben* score at z_0, divided by the difference in the probability of registration. For the sharp regression discontinuity design (also denoted as the ITT) the probability of registration equals 1, while in the case of the fuzzy regression discontinuity design (also denoted as the LATE) the probability of registration varies according to the observed rate of registration in the programme.[8] The difference in the outcomes can also be written as $E[y_i|z_i = z_0 + e] - E[y_i|z_i = z_0 - e]$ where e is an arbitrary number known as the bandwidth which denotes the distance from the threshold within which the differences in the expectation of the outcome are taken. The effect of the programme is then the difference of the outcome around the threshold with observations within a distance denoted by e.

We estimate Equation (4) using a non-parametric local linear regression proposed by Fan (1992) and specified by Hahn et al. (2001). Given the asymptotic properties of the local linear regression, we follow Imbens and Kalyanaraman (2012) and define an optimum bandwidth, e^*, within which the local linear regression is specified for each outcome variable.

Lee and Lemieux argue that regression discontinuity design 'is not "just another" evaluation strategy, and that causal inferences from RDD are potentially more credible than those from typical "natural experiment" strategies' (Lee & Lemieux, 2009, p. 1). They show that regression discontinuity is a close cousin of randomised experiments in settings where agents are unable to precisely control the assignment variable around the eligibility threshold, with the implication that randomisation is a consequence of agents' imperfect control. In appropriate settings, RDD can provide unbiased impact estimates with reliable internal validity.

The literature suggests that the main weakness of the RDD lies in the external validity of the results, as further conditions are needed to extend the treatment effects estimands to those households located away from the assignment threshold. Here we assume that the discontinuities around the threshold are statistically constant at any specific point of the *Sisben* score as proposed by Hahn et al. (2001). Given the design of the programme, we cannot fully test this assumption at different points of the *Sisben* score.

5. Data and Outcome Variables

To estimate the effects of registration in *Familias en Accion* on adult labour outcomes we make use of two waves of *Sisben* household level data. Wave Two collected data in 2003–2006 and Wave Three in 2010. We use 2006 data from Wave Two to obtain pre-programme characteristics and Wave Three to obtain post-programme outcomes. As noted earlier, *Sisben* collects information on households applying for public programmes, and the information is used to compute a household welfare score which determines eligibility. The *Sisben* survey is implemented by enumerators making pre-announced visits to neighbourhoods or on demand at municipal offices. *Sisben* data have a census quality for low-income groups, in that it covers the vast majority of the population in the bottom two quintiles. *Familias en Accion* was initially implemented in rural areas and small towns only. In the article we exploit the expansion of the programme to large cities in 2007 to identify programme effects there. In 2006, *Sisben* data were collected for households likely to be eligible for the programme in large cities, mainly metropolitan areas, to help determine eligibility for the planned expansion of the programme in 2007. In 2010, *Sisben* collected a new wave of household data to update the welfare scores and reassess eligibility. We thus use the 2006 data as the baseline and examine labour market outcomes with the 2010 data.

In constructing the working dataset, we included only households in urban areas which joined the programme in 2007. We can rule out any contamination from households with experience of participating in the programme prior to 2007. Our baseline household data were obtained by cross-referencing 2006 *Sisben* survey data with administrative records for *Familias en Accion*. These records were made available from a validation exercise carried out by the National Planning Department. An analysis of the baseline household dataset led us to rule out any contamination from households with registration in the programme prior to 2007 (for example, households moving from rural areas to large cities).

The 2006 *Sisben* working dataset includes information on 2,304,419 households, 957,925 of which are eligible and 1,346,494 are non-eligible, according to their welfare scores. This represents 10,406,494 people, divided into 5,034,068 eligible and 5,372,426 non-eligible individuals. From the total number of eligible households, only 63 per cent of them were registered in the programme in the selected cities.[9] Among non-eligible households, 3 per cent managed to register in the programme. Matching the 2006 and 2010 *Sisben* data shows some attrition, with 20.2 per cent of original households missing in the 2010 data. The rate of attrition among eligible households was 21.7 per cent, while attrition among ineligible households was 19.1 per cent.

The labour outcomes variables are constructed from the information provided by respondents in responses to three main questions in the *Sisben* survey: (1) a standard question on household members' economic activity in the previous month; (2) a question on how long unemployed respondents have been looking for a job; and (3) a question on health insurance coverage. The activity question is standard. It requires survey respondents to provide information on the economic activity of all household members in the last month. Active household members can be employed as salaried workers, self-employed, employers or familiar unpaid workers. Alternatively, they can report being unemployed. They are also asked whether they have been engaged in job search. A follow-up question requires information on the number of weeks those unemployed have been searching for a job. In addition to being employed or unemployed, respondents can report their activity status as: students; housework; rentier; retired; pensioner; and disabled. The *Sisben* survey did not collect information on hours worked or occupation. The fact that the *Sisben survey* is used to establish entitlement to public programmes might induce bias in reported labour market outcomes.

The survey also includes a question on the health coverage of each household member. The respondents are provided with several options: (1) whether they are covered as members of the armed forces; (2) whether they contribute to Social Insurance; (3) whether they contribute to other health insurance institutions; (4) whether they contribute to an employer health insurance scheme or receive health insurance as a retiree from an employer scheme; (5) whether they are included in the subsidised health insurance component; (6) whether they have health protection as an indigenous person; or (7) whether they have no health insurance. This information was used to construct a binary variable to

capture formal employment, with a value of 1 indicating individuals living in a household where someone contributes to any employer health insurance scheme (options 1 to 4 above), and 0 otherwise.

The final working dataset includes 3,038,946 adults aged 21 or over in the 2010 survey, 45.1 per cent of whom are eligible. Descriptive statistics for the sample and subsamples in are presented in Table 1.

Table 1. Descriptive statistics

	Aged 21 and over		Aged 21–35 years		Adult + children 0–6		Two or more adults + children 0–6	
Variable (%)	Eligible	Non-eligible	Eligible	Non-eligible	Eligible	Non-eligible	Eligible	Non-eligible
Male	43.2	44.0	42.7	44.9	26.6	25.4	45.1	45.9
	[49.8]	[49.6]	[49.8]	[49.5]	[46.0]	[44.3]	[50.0]	[49.9]
Age*	41.8	42.3	28.8	28.5	41.0	42.4	41.9	42.3
	[13.8]	[13.8]	[4.1]	[4.1]	[13.1]	[13.5]	[17.7]	[17.9]
Education level								
None	7.9	5.0	2.8	2.2	7.9	6.3	7.9	4.8
	[30.5]	[2.0]	[20.8]	[11.0]	[49.5]	[48.8]	[47.0]	[45.1]
Primary	47.6	37.5	30.4	19.3	47.4	38.9	47.7	37.4
	[49.8]	[4.9]	[5.0]	[44.2]	[48.8]	[44.7]	[49.3]	[46.9]
Secondary	42.2	51.8	62.6	67.9	42.6	50.4	42.2	51.9
	[47.4]	[5.0]	[5.0]	[47.3]	[41.8]	[46.6]	[43.2]	[48.3]
Technician	1.1	2.5	2.2	4.5	1.1	2.3	1.1	2.5
	[6.3]	[11.6]	[0.8]	[14.8]	[4.0]	[7.7]	[4.9]	[9.1]
Undergraduate	1.1	3.1	1.9	5.9	1.0	2.0	1.1	3.3
	[7.3]	[14.9]	[0.9]	[18.6]	[3.9]	[8.5]	[5.2]	[10.9]
Graduate	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	[1.5]	[2.9]	[1.7]	[2.9]	[0.7]	[1.7]	[1.1]	[2.0]
Assignment score*	5.9	13.1	5.8	12.4	6.1	13.9	5.8	13.0
(0–100 scale)	[2.4]	[3.0]	[2.3]	[2.9]	[2.0]	[2.7]	[2.4]	[2.9]
Activity last month								
No activity	10.3	9.5	8.6	8.3	5.9	6.2	10.9	9.9
	[32.1]	[28.3]	[31.0]	[26.3]	[47.6]	[45.8]	[45.3]	[42.2]
Working	53.9	54.6	55.1	58.1	71.9	69.7	51.9	53.1
	[50.0]	[49.9]	[50.0]	[49.9]	[41.7]	[42.8]	[42.2]	[44.4]
Seeking a job (unemployed)	4.2	4.8	6.2	7.4	3.7	4.2	4.3	4.9
	[24.3]	[23.6]	[28.2]	[28.0]	[15.8]	[16.5]	[18.6]	[18.8]
Studying	1.4	2.0	3.0	4.9	0.8	0.8	1.4	2.2
	[12.1]	[13.6]	[16.7]	[16.7]	[45.4]	[46.7]	[44.6]	[45.1]
House-keeping	29.0	25.6	27.0	21.0	16.1	15.0	30.5	26.7
	[45.7]	[44.9]	[45.5]	[44.3]	[31.0]	[30.3]	[37.2]	[37.2]
Rentier	0.3	0.6	0.1	0.1	0.8	1.3	0.3	0.5
	[7.6]	[8.7]	[0.5]	[0.0]	[6.2]	[6.4]	[4.3]	[4.9]
Retired	0.7	2.6	0.0	0.1	0.7	2.8	0.7	2.6
	[6.1]	[14.2]	[1.5]	[3.3]	[2.2]	[5.1]	[3.4]	[3.4]
Disabled	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2
	[4.8]	[4.8]	[3.3]	[3.1]	[2.2]	[2.0]	[3.8]	[8.6]
Labour force participation	58.1	59.5	61.3	65.6	75.6	73.9	56.1	58.0
	[49.6]	[49.3]	[49.6]	[48.7]	[43.3]	[44.4]	[44.3]	[46.1]
Labour force participation – male	84.0	81.2	86.7	84.1	88.4	84.6	83.7	81.0
	[38.6]	[38.1]	[37.8]	[35.1]	[42.5]	[42.2]	[49.0]	[49.5]
Labour force participation – female	38.5	42.3	42.4	50.5	70.9	70.2	33.5	38.5
	[47.4]	[48.9]	[47.7]	[49.5]	[39.4]	[36.0]	[35.1]	[39.7]
Proportion of adults in household with labour force participation	61.5	61.5	66.7	69.1	–	–	0.6	0.6
	[28.5]	[28.9]	[26.8]	[26.8]	–	–	[2.3]	[2.4]

(*continued*)

Table 1. (*Continued*)

	Aged 21 and over		Aged 21–35 years		Adult + children 0–6		Two or more adults + children 0–6	
Variable (%)	Eligible	Non-eligible	Eligible	Non-eligible	Eligible	Non-eligible	Eligible	Non-eligible
Employed with health insurance	15.6 [24.1]	36.2 [47.3]	19.0 [22.2]	40.3 [46.4]	10.9 [20.3]	22.9 [40.2]	16.3 [22.1]	38.0 [46.5]
Employed with health insurance – male	15.2 [24.6]	35.1 [47.5]	18.4 [23.3]	37.9 [46.3]	11.5 [20.9]	20.4 [41.2]	15.4 [22.4]	36.0 [46.7]
Employed with health insurance – female	16.3 [23.7]	37.8 [47.1]	20.1 [21.3]	43.5 [46.4]	10.7 [19.9]	23.9 [39.4]	18.2 [21.8]	41.4 [46.3]
Weeks of job search*	16.1 [5.7]	17.5 [6.1]	16.0 [6.6]	17.3 [7.1]	15.3 [2.8]	16.3 [3.1]	16.2 [4.3]	17.6 [4.7]
Weeks of job search – male	15.9 [6.9]	17.2 [7.2]	15.5 [7.7]	16.8 [8.0]	14.4 [2.5]	15.6 [2.7]	15.9 [5.0]	17.3 [5.3]
Weeks of job search – female	16.6 [4.4]	17.9 [5.0]	16.5 [5.5]	17.8 [6.3]	15.6 [3.0]	16.6 [3.4]	16.8 [3.4]	18.1 [4.1]
Observations	1,373,385	1,665,561	533,618	615,328	142,247	151,202	1,233,671	1,516,547

Notes: Standard deviations in brackets. *Numbers in these variables do not denote percentages. **This variable is calculated at the household level. All columns contain information for individuals above 21 years of age.

6. Testing for the Appropriateness of the Regression Discontinuity Approach

In this section we test for the appropriateness of a regression discontinuity design to evaluate labour force outcomes among *Familias en Accion* participants. We examine four issues. First, regression discontinuity design relies on the assignment rule generating a discontinuity on a function $f(x_i)$ which otherwise can be expected to be smooth (Hahn et al., 2001; Lee & Lemieux, 2009). Manipulation of the eligibility score by potential participants or programmes agencies could generate a bunching of participants just below the threshold and contaminate the results generated by RDD. We examine densities just below and just above the threshold to reject possible participant manipulation in welfare scores. Second, we examine rates of registration in *Familias en Accion* by welfare scores to determine whether the eligibility threshold is implemented appropriately by the programme agency. We can establish there is a jump in registrations for the programme at the eligibility threshold. Third, the RDD assumes that outcome functions are smooth and continuous before the programme is introduced but discontinuous for the treatment group after it. We examine the distribution of programme outcomes before the introduction of the programme and are able to establish the absence of discontinuities. Fourth, we test for potential confounders. The Colombian government uses *Sisben* welfare scores for a variety of public programmes with the implication that discontinuities at the *Familias en Accion* eligibility threshold may in fact be confounded by other public programmes using the same threshold scores. We are able to establish that, by design, there are no overlaps in public programme eligibility thresholds. The tests provide strong support for the use of RDD in this context.

Is there any potential manipulation of the welfare scores by programme participants? We performed a test of discontinuity in the distribution of welfare scores around the eligibility threshold. The test was developed by McCrary (2008) to detect any potential manipulation of the assignment score by checking densities on the left and right sides of the cut-off point.[10] Figure 1 provides a histogram of the population in the working dataset by *Sisben* welfare scores. The distribution is bimodal, with a small increase in the density at the *Familias en Accion* eligibility score marked with the vertical continuous line. The McCrary test yielded an estimated coefficient of 0.074 with standard error at 0.051 confirming the absence of statistically significant differences in the densities just below and just above the eligibility score.

Is programme registration discontinuous at the eligibility threshold? Figure 2 shows the frequencies of registration in *Familias en Accion* by welfare scores. On the left and right hand sides of the dashed line the

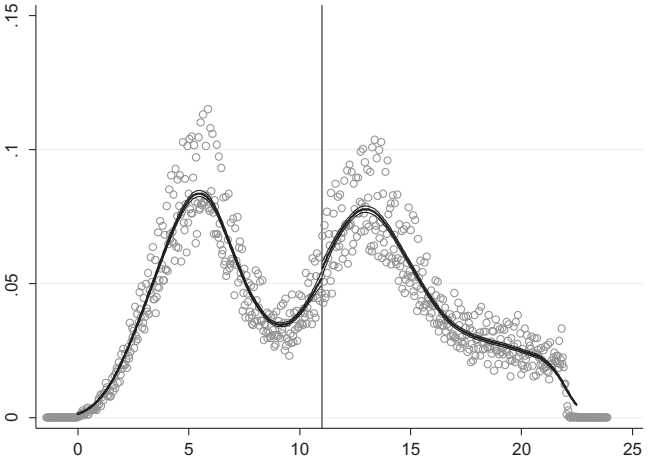

Figure 1. Distribution of welfare scores.
Note: Graph generated by the Stata programme implementing the McCrary test. *Source: Sisben* 2006 data.

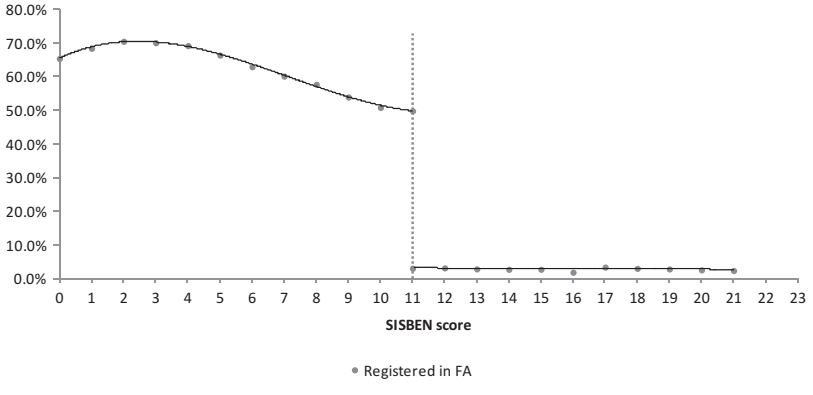

Figure 2. Rates of registration in *Familias en Accion* by Sisben welfare scores.
Source: Authors' calculations using *Sisben* 2006 data.

households are considered eligible and ineligible respectively, while the solid line indicates the take-up or registration rate. As can be seen, there is a large discontinuity in the registration rate at the threshold of eligibility. The information in the figure is also helpful in confirming the appropriateness of the sharp version of the RDD in the analysis reported in this article. The sharp RDD yields intention to treat (ITT) estimates whereas the fuzzy RDD yields local average treatment effects (LATE). Recalling Equation (4), the ITT assumes that registration and eligibility overlap precisely, that is, that the probability of registration in *Familias en Accion* for households with welfare score below 11 is equal to 1. In practice, there are households who are eligible but are not participating and households who are not eligible but somehow manage to participate in *Familias en Accion*, but their numbers are marginal. The LATE estimand explicitly models errors in assignment, but in our context the sharp RDD is appropriate.

Are there significant discontinuities in reported outcome variables at baseline? Table 2 presents the estimates from a 'placebo' effect test, an estimation of ITT on the baseline data collected before implementation of the programme. This was done by estimating ITT effects for all the outcome and control variables at the baseline and using the treatment eligibility threshold. There figures in the Table demonstrate there are no significant discontinuities in the outcome and control variables for the sample population before the implementation of the programme at the eligibility threshold. This exercise provides an opportunity to test for the potential effect of attrition. The last row shows ITT

Table 2. ITT estimates using 2006 *Sisben* (baseline) data

Baseline variables	Wald estimate	OBW
% male	0.001	0.74
	(0.002)	
Average age	0.146	0.89
	(1.099)	
% with primary education	0.009	0.78
	(0.008)	
% with secondary education	−0.008	0.93
	(0.008)	
% household with children aged 0–6	0.000	0.30
	(0.000)	
Household size	0.089	0.81
	(0.070)	
Age of household head	0.251**	0.76
	(0.126)	
Labour force participation	0.005	0.13
	(0.009)	
Labour force participation – male	0.003	0.92
	(0.004)	
Labour force participation – female	0.005	0.18
	(0.010)	
% employed	−0.001	0.94
	(0.002)	
% employed – male	−0.001	0.61
	(0.001)	
% employed – female	−0.001	0.69
	(0.001)	
% employed with health insurance	0.016	0.16
	(0.062)	
% employed with health insurance – male	0.019	0.99
	(0.036)	
% employed with health insurance – female	0.007	0.19
	(0.008)	
% unemployed	0.004	0.19
	(0.004)	
% unemployed – male	0.002	0.93
	(0.003)	
% unemployed – female	0.000	0.24
	(0.003)	
Weeks of job search	−0.154	1.18
	(0.357)	
Weeks of job search – male	0.001	2.06
	(0.050)	
Weeks of job search – female	−0.342	1.30
	(0.340)	
Attrited	−0.004	0.86
	(0.005)	

Notes: The estimations are obtained with *Sisben* 2006 data prior to programme implementation. **significant at 5%. Standard errors in parenthesis. OBW stands for Optimal Bandwidth as defined in Imbens and Kalyanaraman (2012).

estimates on a binary attrition indicator with a value of 1 applied to households which attrited between the baseline and the follow-up, 0 otherwise. A significant coefficient for the attrition indicator would indicate that attrition is systematic, and would suggest potential attrition bias in the estimates for the full model. As can be observed, the relevant coefficient is close to 0 and it is not significant, with the implication that attrition is not contaminating our results.

Could registration in other public programmes using *Sisben* welfare scores confound the effects of *Familias en Accion*? *Familias en Accion* is not the only public programme relying on *Sisben* welfare scores to determine eligibility. If there are other programmes employing *Familias en Accion* threshold eligibility scores, any observed discontinuities in outcome variables could not be reliably attributed to the latter programme. We investigated this issue using data from the 2008 *Encuesta Nacional de Calidad de Vida* (Colombian Living Standards Survey),[11] which contains information on registration in several social transfer programmes. By checking rates of registration in public programmes for households just above and just below the eligibility threshold for *Familias en Accion*, we established there is no overlap. The only exception appeared to be the school feeding programme at the national level, where households with welfare scores just above the threshold showed significantly higher rates of registration than households just below the threshold (7.2 percentage points). This difference vanishes when we restrict the sample to urban areas. By design, this school feeding programme does not employ *Sisben* welfare scores in urban areas for the assignment of beneficiaries as it is provided to all children attending schools in poor areas. There is no overlap between the school feeding programme's and *Familias en Accion*'s assignment. We are confident that registration in other social assistance programmes is unlikely to confound the regression discontinuity results presented in the next section.

7. Results and Discussion

The focus of the analysis is on labour market outcome variables, including labour force participation, employment, health insurance status, and job search. The estimates of labour market outcomes are presented for all adults aged 21 or above and for adults aged 21 to 35 in 2010. The large number of observations in the working dataset allows a disaggregation of the full sample by household composition. This makes it possible to explore potential restrictions on labour force participation faced by households with young children. We estimate labour outcomes for single adults with children aged 0–6, and households with two or more adults and children 0–6. We are able to identify labour supply effects for males and females separately.

Table 1 provided descriptive statistics on the different samples. This information is important to help contextualise and interpret the regression discontinuity effects. They show that households with one adult and children aged 0–6 have salient differences in characteristics compared to the full sample of adults. In particular, this group is predominantly female, has lower education levels but also higher rates of employment and lower rates of inactivity. Significantly, the mean welfare scores for this group are not very different from those of the rest of the sample. The other important point to note is that mean labour market outcomes for the full sample do not differ much across eligible and non-eligible groups, except perhaps in the fact that non-eligibles have on average higher rates of formal employment.

We focus on two related sets of estimates. First, recall that applying a sharp RDD with welfare scores as the forcing variable provides estimates of ITT effects. This evaluates labour outcomes at the deterministic threshold provided by the assignment rule of the programme regardless of whether individuals are actually registered in the programme. Second, fuzzy RDD estimates can be interpreted as estimates of the LATE, and take account of the realised registration of eligible households in the programme. As the ITT estimands are based on the assignment and not on the uptake, it will yield a lower effect than the LATE (Angrist & Pischke, 2008). The RDD estimates are presented in summary form in Table 3. The table includes only statistically significant RDD estimates (Figures A1 to A4 in the Online Appendix show graphically the estimated effects).[12]

7.1. Labour Force Participation

Starting with the ITT results for labour force participation, the estimates for the whole sample do not suggest significant effects on labour force participation. These effects are significant only when sample restrictions are applied. For the sample containing adults aged 21 and over and for the sample 21–35 years of age, the ITT effects on labour force participation among males are positive and

Table 3. Regression discontinuity estimates

	Aged 21 and over			Aged 21–35 years			Adult + children 0–6			Two or more adults + children 0–6		
Outcome variable	ITT	LATE	OBW	ITT	LATE	OBW	ITT	LATE	OBW	ITT	LATE	OBW
Labour force participation							0.087***	0.241***	0.92			
							(0.018)	(0.050)				
Labour force participation – male	0.023***	0.047***	0.24	0.029***	0.079**	0.28				0.017*	0.040*	0.36
	(0.008)	(0.017)		(0.010)	(0.029)					(0.010)	(0.023)	
Labour force participation – female							0.061***	0.105***	0.70			
							(0.013)	(0.022)				
Employed – male	0.028***	0.071***	0.28	0.025**	0.059**	0.35						
	(0.008)	(0.020)		(0.012)	(0.027)							
Employed with health insurance – Female	0.032***	0.064***	0.06							−0.029**	−0.039**	0.55
	(0.003)	(0.007)								(0.015)	(0.020)	
Weeks of job search	0.329**	1.735**	2.80				−2.750**	−3.705**	3.66			
	(0.163)	(0.859)					(1.092)	(1.471)				
Weeks of job search – male	0.657***	2.913***	3.00	0.584**	2.289**	2.88						
	(0.190)	(0.845)		(0.246)	(0.968)							
Weeks of job search – female							−3.188**	−4.386**	3.79			
							(1.266)	(1.741)				

Notes: Observations are restricted to individuals aged 21 and above. Empty cells are for non-significant effects. * significant at 1%; ** significant at 5%; *** significant at 10%. Standard errors in parenthesis. OBW stands for optimal bandwidth (Imbens & Kalyanaraman, 2012).
Source: Authors' estimation based on *Sisben* 2010 data with eligibility/participation defined by *Sisben* 2006 data.

significant. Eligibility increases participation among adults aged 21 and over by 2.3 percentage points. For males aged 21–35, programme eligibility increases the probability of participating in the labour market by 2.9 percentage points.[13] The estimates for the LATE are around twice as large as the ITT estimates. This is because they focus on registration as opposed to eligibility.

When the sample is restricted to adults in single adult households with children 0–6, the estimated RDD coefficient associated with labour force participation is again positive and significant, but much larger than in the adult sample at just below 9 percentage points. In this group, women outnumber males three to one among adults and it is not surprising that labour force participation increases by 6 percentage points among eligible women living alone with young children. RDD estimates for adult women in the other samples are not statistically significant. As expected the estimates for the LATE are much larger than the estimates using the ITT. The LATE estimates for the sample of individuals in single-adult households with young children indicates that programme registration is associated with a rise in labour force participation of 24.7 percentage points, a very large effect compared to the ITT estimate; and for women alone the LATE estimate increases by 10.5 percentage points. These are significant increases in labour force participation associated with programme registration.

When the sample is restricted to households with young children and two or more adults, programme eligibility is associated with an increase in labour force participation only for males. Labour force participation at the threshold of eligibility is 1.7 percentage points higher for eligibles in the ITT, and double that in the LATE.

These findings confirm that eligibility for (and receipt of) *Familias en Accion* does not lead to adverse effects on adult labour force participation rejecting the presence of moral hazard associated with antipoverty transfers. In fact, for the full sample of adults, no significant effects can be observed. Programme effects on labour force participation are concentrated among households with one adult and one or more young children. Disaggregation by household composition and sex is essential to capturing these effects. More positively, the results suggest that among households facing constraints on their capacity to allocate their labour resources, antipoverty transfers can have strong positive effects in raising participation rates. Interestingly, standard microeconomic models of labour force participation would predict that adverse labour supply effects are likely to be a function of the level of the transfer. In this case households receiving the consumption supplement show the strongest positive effects on labour force participation.

7.2. Employment

Turning to employment, only the estimates for adult males generated statistically significant effects. The difference in employment status at the eligibility threshold is 2.3 percentage points for all male adults and 2.9 percentage points for male adults aged 21–35. The RDD estimates for the whole sample and for females were not statistically significant. The effects are larger for the LATE.[14] The estimated effects are in line with the labour force participation effects.

7.3. Informality

The survey data contain information on whether employment includes health insurance coverage. The inclusion of health insurance coverage as part of the employment package is a very good predictor of formality in Colombia, and informality is often defined and measured as the absence of employee benefits mandated by law in the employment package. The RDD estimates of the difference at the threshold of eligibility indicate a positive and significant effect for women, 3.2 percentage points for the ITT and double that for the LATE. These estimates suggest that *Familias en Acción* programme in Colombia facilitates formal employment among women beneficiaries when compared to non-eligible women, at the margins of eligibility. None of the estimated ITT effects for males turned out to be significant. When considering households with two adults and young children, the sign of the estimated effects changes to negative. For adult women in this type of households, programme eligibility and registration reduces the likelihood of formality. These are interesting

results. There is scarce literature for Colombia on the specific channels through which these effects might operate.

7.4. Job Search

Finally, we turn to the results on job search. The *Sisben* questionnaire collects information on job search from individuals reporting being active in the labour market and looking for employment. This is measured in weeks of job search. For the sample taken as a whole, and for adult males, the estimated effects reported are positive, suggesting a more extended job search for eligible individuals at the threshold of eligibility compared to non-eligible individuals. They are significant and positive for males in the full sample, and males aged 21–35. The estimated effects from the LATE estimation are much larger, over three times larger than the ITT estimates. For the adult sample as a whole and for males, the programme lengthens job search by 2.9 weeks in the LATE and 0.3 weeks in the ITT.

The estimates for adults living with young children are consistently negative for the sample as a whole and for adult women, and not-significant for males. For women in households with children aged 0–6, the treatment effects on job search are negative. Here the measured discontinuity effects for the ITT and the LATE are very similar. At the threshold of eligibility unemployed women living alone with young children report 3.1 fewer weeks of job search than eligible women in the ITT, and 4.3 fewer weeks of job search in the LATE. It is interesting that the job search estimates are of a different sign for males and females, and negative for single women with young children.

Taken together, the findings suggest that concerns over potential adverse effects of antipoverty transfer programmes on labour market incentives and outcomes are misplaced in the context of *Familias en Accion*. The literature on the labour supply effects of human development conditional cash transfer programmes suggests this may apply across similar programmes in other countries.

How can we explain the limited labour market incentive effects of *Familias en Accion*, especially when compared with the vast literature on these effects in high-income countries? In low- and middle-income countries, antipoverty transfers provide a fixed supplement to the income and consumption of households in poverty, as opposed to income maintenance benefits common in high-income countries, which fill in the poverty gap for households. Moreover, in low- and middle-income countries, antipoverty transfers are widely shared within extended households. In low- and middle-income countries, personal income taxes are restricted to a small segment of high earners and seldom reach low-income groups, whereas in high-income countries it is the combination of income taxes and benefits which reinforces adverse labour force participation incentives. Entitlements to antipoverty transfers in low- and middle-income countries are focused on socio-economic status and seldom include have inactivity or asset tests. In this sense, human development conditional cash transfer programmes are more 'productivist' than similar programmes in high-income countries.

More positively, the findings add to the growing body of evidence suggesting that antipoverty transfer programmes can be a powerful instrument helping households to overcome constraints in the allocation of their productive resources (Ardington, Case, & Hosegood, 2009; Barrientos, 2012). An important finding from this analysis is that the impact of *Familias en Accion* on labour market outcomes is heterogeneous across categories of household composition. Human development conditional cash transfers programmes have important labour supply effects for some groups of participants, but less so for other groups. Our findings underline the need to pay attention to labour supply effects of antipoverty transfers at a disaggregated level.

8. Conclusions

The article examined the effects of eligibility for, and registration in, *Familias en Accion* on labour outcomes. Our strategy to identify these effects relied on an RDD exploiting the discontinuity

associated with the eligibility welfare score threshold. A large panel dataset constructed from *Sisben* data provided a quasi-experimental setting for the analysis. We were able to associate welfare scores defined in 2006, prior to the implementation of the programme in urban areas in Colombia in 2007, with labour market outcomes in 2010.

We find that for the full sample of adults in urban areas, the differences in labour force participation at the margins of eligibility are positive but not statistically significant. This confirms the main findings in the literature that antipoverty transfer programmes do not have adverse effects on adult labour supply. Disaggregating the sample by categories of household composition finds large and positive effects on labour force participation rates among households with one adult and children aged 0–6. Women adults outnumber adult males three to one in this category of households. In addition, we find statistically significant programme effects on the probability of formal employment among women, positive for adult women taken as a whole and negative for women in two-adult families with young children. We can also identify positive programme effects on the length of job search among men, although this effect turns negative for households with one adult and young children.

Our approach to estimating these effects and the large panel dataset employed gives substantive internal validity to the findings. Lee and Lemieux (2009) make a strong case for approaching RDD as a form of randomised experiment. Providing the setting has conditions appropriate to an RDD and large datasets help minimise potential biases in the estimates, regression discontinuity estimates might be preferable to those generated by competing methods. The view that RDD estimates have applicability only in the neighbourhood of the discontinuity threshold is unduly pessimistic given the randomisation inherent in RDD (Lee & Lemieux, 2009). The findings suggest that adult labour market outcomes associated with antipoverty transfer programmes are heterogeneous in household composition and gender. These results can be interpreted as confirming that households respond to antipoverty transfers, such as *Familias en Accion*, by re-allocating their productive resources, labour being the most significant resource for low- and middle-income households. The gains from improvements in the allocation of productive resources are likely to be larger the stronger are the constraints prior to the implementation of the transfer programme.

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Disclosure statement

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Notes

1. Several studies examine labour supply effects associated with participation in conditional cash transfer programmes (Skoufias & Parker, 2001; Freije, Bando, & Arce, 2006; Cortez Reis & Camargo, 2007; Ferro & Nicollela, 2007; Carvalho, 2008; a; Foguel & Paes De Barros, 2008; Rodriguez Oreggia & Freije Rodriguez, 2008; Schady & Araujo, 2008; Skoufias & Di Maro, 2008; Skoufias, Unar, & González-Cossío, 2008; Alzúa, Cruces, & Ripani, 2010; Attanasio et al., 2010; Ferro, Kassouf, & Levison, 2010; Rubio-Codina, 2010; Teixeira, 2010; CEPAL, 2011; Bazzi, Sumarto, & Suryahadi, 2012; Fernandez & Saldarriaga, 2013).
2. Some studies have applied regression discontinuity to study the labour supply effects of social pensions, where an age-based eligibility enforces a discontinuity in outcomes (Borrella & Sartarelli, 2013; Eyal & Woolard, 2011; Sinaert, 2008). Lee and Lemieux (2009) draw a distinction between applied work relying on age discontinuities and other sources of discontinuity.

Regression discontinuity design can only parallel randomised experiment in a context where there is some uncertainty over whether individuals ultimately receive the treatment. This might not apply in some old-age-related transfers.

3. In Colombia, all households applying for any form of public assistance are required to provide information on their socio-economic conditions. The resulting datasets has a census-like quality for households in the bottom two quintiles.
4. Since 2010, the individual programme agencies are able to set their own eligibility thresholds.
5. The impact evaluation report of the programme in the period 2001–2004 by Institute for Fiscal Studies and Econometría-SEI (2006) shows that school attendance increased by 5.1 and 7.2 percentage points in urban and rural areas respectively for children between 12–17 years of age. The programme reduced the number of grade repeats by 0.12 for children between 14–17 years of age. The incidence of child labour declined by 5.5 percentage points in rural areas.
6. Readers interested in the details of the model should consult Rubio-Codina (2010).
7. The percentage point increase in school attendance rates after the introduction of PROGRESA in Mexico was below 1 per cent for primary school children and between 4 and 6 percentage points for secondary school children.
8. Imbens and Lemieux (2008)
   argue that the estimation of the fuzzy regression discontinuity design emulates an instrumental variable estimation, and the estimand for the former is the same as the Wald's estimator in the instrumental variable analysis.
9. A study by Marcelo (2009) found that eligible but not registered households fell into two groups. One group consisted of households who were unaware of the programme, while a second group knew about the programme, but declined to participate. These groups were about equal in size.
10. We used a Stata programme developed by Brian Kovak available at http://emlab.berkeley.edu/~jmccrary/DCdensity/.
11. Available from http://www.dane.gov.co
12. As a robustness check, we re-run the ITT and LATE with an arbitrary bandwidth of 3 *Sisben* points. Our results confirm that the estimations are robust to a change in the bandwidth. See Table A1 in the Online Appendix.
13. The estimation controls for the trend in the outcome variable around the threshold. We used the Stata programme rdob.ado available from http://scholar.harvard.edu/imbens/scholar_software/regression-discontinuity (accessed 4 June 2013).
14. Disaggregating the sample further produced significant and positive employment rate differences at the threshold of eligibility for the sample of adults in Bogotá, the capital city. The estimated difference is around 2 percentage points. RDD estimated coefficients are significant and negative for female adults in Bogotá, a −4 percentage point difference for this group; but the estimated coefficient switches to positive and significant for single women with young children in the sample.

References

Alzúa, M. L., Cruces, G., & Ripani, L. (2010). *Welfare programs and labour supply in developing countries. Experimental evidence for Latin America (Documento de Trabajo 95)*. La Plata: CEDLAS-UNLP.

Angrist, J. D., & Pischke, J.-S. (2008). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton, NJ: Princeton University Press.

Ardington, C., Case, A., & Hosegood, V. (2009). Labour supply responses to large social transfers: Longitudinal evidence from South Africa. *American Economic Journal: Applied Economics*, *1*, 22–48.

Attanasio, O., Fitzsimons, E., Gomez, A., Gutiérrez, M. I., Meghir, C., & Mesnard, A. (2010). Children's Schooling and Work in the Presence of a Conditional Cash Transfer Program in Rural Colombia. *Economic Development and Cultural Change*, *58*, 181–210. doi:10.1086/648188

Attanasio, O., & Mesnard, A. (2006). The Impact of a Conditional Cash Transfer Programme on Consumption in Colombia. *Fiscal Studies*, *27*, 421–442. doi:10.1111/j.1475-5890.2006.00041.x

Barrientos, A. (2012). Social transfers and growth. What do we know? What do we need to find out? *World Development*, *40*, 11–20. doi:10.1016/j.worlddev.2011.05.012

Bazzi, S., Sumarto, S., & Suryahadi, A. (2012). *It's all in the timing: Household Expenditure and Labour Supply Responses to Unconditional Cash Transfers (Working Paper)*. Jakarta: SMERU Research Institute.

Borrella, M. A., & Sartarelli, M. (2013). *Does a cash transfer affect elderly labor supply? Evidence from age discontinuities in Bolivia* (Mimeo). Alicante: Universidad de Alicante.

Carvalho, I. E. D. (2008). Old-age benefits and retirement decisions of rural elderly in Brazil. *Journal of Development Economics*, *86*, 129–146. doi:10.1016/j.jdeveco.2007.10.007

Centro Nacional de Consultoría. (2008). *Evaluación del Programa Familias En Acción para Población Desplazada (Serie de Evaluaciones Externas)*. Bogotá: Centro Nacional de Consultoría.

CEPAL. (2011). *Protección social y generación de empleo, (Report)*. Santiago: Comisión Economica para América Latina y el Caribe.

Cortez Reis, M., & Camargo, J. M. (2007). Rendimientos domiciliáres com aposentadorias e pensões e as decisões dos jovens quanto à educacão e a participação na forca de trabalho. *Pesquisa e planejamento economico*, *37*, 221–246.

Eyal, K., & Woolard, I. (2011). *Female labour force participation and South Africa's child support grant (Mimeo)*. Cape Town: SALDRU, University of Cape Town.

Fan, J. (1992). Design adaptive nonparametric regression. *Journal of the American Statistical Association*, *87*, 998–1004. doi:10.1080/01621459.1992.10476255

Fernandez, F., & Saldarriaga, V. (2013). *Conditional cash transfers, payment dates and labour supply: Evidence from Peru (Documento de Trabajo 140)*. Buenos Aires: CEDLAS, Universdad de la Plata.

Ferro, A., Kassouf, A. L., & Levison, D. (2010). The impact of conditional cash trasfer programs on household work decisions in Brazil. *Research in Labor Economics*, *31*, 193–218. doi:10.1108/S0147-9121(2010)0000031010

Ferro, A., & Nicollela, A. (2007). *The impact of conditional cash transfer programmes on household work decisions in Brazil (Mimeo)*. Sao Paulo: University of Sao Paulo.

Foguel, M. N., & Paes De Barros, R. (2008). *The effects of conditional cash transfer programmes on adult labour supply: An empirical analysis using a times series cross section sample of Brazilian municipalities* (Mimeo). Rio de Janeiro: IPEA.

Freije, S., Bando, R., & Arce, F. (2006). Conditional transfers, labour supply, and poverty: Microsimulating oportunidades. *Economía*, *7*(1) 73–124.

Hahn, J., Todd, P., & Klaauw, W. V. D. (2001). Identification and estimation of treatment effects with a regression-discontinuity design. *Econometrica*, *69*, 201–209. doi:10.1111/1468-0262.00183

Imbens, G., & Kalyanaraman, K. (2012). Optimal bandwidth choice for the regression discontinuity estimator. *The Review of Economic Studies*, *79*, 933–959. doi:10.1093/restud/rdr043

Imbens, G., & Lemieux, T. (2008). Regression discontinuity designs: A guide to practice. *Journal of Econometrics*, *142*, 615–635. doi:10.1016/j.jeconom.2007.05.001

Institute for Fiscal Studies and Econometría SEI (2006). Evaluación de Impacto Del Programa Familias En Acción - Subsidios Condicionados de La Red de Apoyo Social (Informe Final). London: IFS.

Lee, D. S., & Lemieux, T. (2009). *Regression discontinuity designs in economics* (NBER Working Paper 14723). Cambridge, MA: National Bureau of Economic Research.

Marcelo, D. (2009). Razones de No Inscripción de Familias Nivel Uno al Programa Familias en Acción (Report), Bogotá: Acción Social.

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics*, *142*, 698–714. doi:10.1016/j.jeconom.2007.05.005

Moffitt, R. A. (2002). Welfare programs and labour supply. In A. J. Auerbach & M. Feldstein (Eds.), *Handbook of public economics* (pp. 2394–2430). London: Elsevier Science B.V. doi:10.1016/S1573-4420(02)80013-1

Moffitt, R. A., & Rangarajan, A. (1989). The effect of transfer programmes on work effort and human capital formation: Evidence from the US. In A. Dilnot & A. Walker (Eds.), *The economics of social security* (pp. 116–136). London: Oxford University Press.

Rodriguez Oreggia, E., & Freije Rodriguez, S. (2008). Una evaluación de impacto sobre el empleo, los salarios y la movilidad ocupacional intergeneracional del Programa Oportunidades. In S. D. D. Social (Ed.), *Evaluación externa del Programa Oportunidades 2008. A diez años de intervención en zonas rurales (1997-2007)* (pp. 63–123). Mexico City: Coordinación Nacional del Programa de Desarrollo Humano Oportunidades.

Rubio-Codina, M. (2010). Intra-household time allocation in rural Mexico: Evidence from a ramdomized experiment. *Research in Labor Economics*, *31*, 219–257. doi:10.1108/S0147-9121(2010)0000031011

Schady, N., & Araujo, M. C. (2008). Cash transfers, conditions, and school enrollment in ecuador. *Economía*, *8*, 43–70. doi:10.1353/eco.0.0004

Sinaert, A. (2008). *The labour supply effects of the south african state old age pension: Theory, evidence and implications* (Working Paper 20). Cape Town: SALDRU, University of Cape Town.

Skoufias, E., & Di Maro, V. (2008). Conditional cash transfers, adult work incentives, and poverty. *Journal of Development Studies*, *44*, 935–960. doi:10.1080/00220380802150730

Skoufias, E., & Parker, S. W. (2001). Conditional cash transfers and their impact on child work and schooling: Evidence from the PROGRESA program in Mexico. *Economía*, *2*, 45–86. doi:10.1353/eco.2001.0016

Skoufias, E., Unar, M., & González-Cossío, T. (2008). *The impacts of cash and in-kind transfers on consumption and labour supply: Experimental evidence from rural Mexico* (Policy Research Working Paper WPS 4778). Washington, DC: The World Bank.

Teixeira, C. G. (2010). *A heterogeneity analysis of the Bolsa Familia Programme effect on men and women's work supply* (Working Paper 61). Brasilia: International Policy Centre for Inclusive Growth.

Villa, J. M. (2011). *Análisis del Comportamiento Laboral de las Familias Beneficiarias del Programa Familias en Acción en el Nivel Uno de Sisben (Report)*. Bogotá: Acción Social.