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A HETEROGENEITY ANALYSIS OF THE BOLSA FAMÍLIA PROGRAMME EFFECT ON MEN AND WOMEN'S WORK SUPPLY

Clarissa Gondim Teixeira *

ABSTRACT

This article analyses the impact of the *Programa Bolsa Família* (PBF), Brazil's Conditional Cash Transfer Programme), by way of an 'income shock' on the labour supply of beneficiaries as measured by probability of working and number of weekly hours worked by both men and women. *Bolsa Família* transfers are viewed as an income shock because they alter the income composition in terms of earned and unearned income. The analysis is undertaken using the values of the transfers as the treatment indicator to show how the Average Treatment Effect on the Treated (ATT) varies according to the amount received. ATT estimates obtained from the Propensity Score Weighting method lead to the conclusion that PBF marginally diminishes the supply of weekly work hours of working adults. The heterogeneous impacts of the cash transfers on men and women depending upon how they are placed in formal and informal sectors, agricultural and non-agricultural sectors and wage rate ranges are also assessed. The results indicate a nil average effect on probability of working and a marginal reduction in the supply of labour hours for men and women. The impact is greater for informal workers and unpaid workers and is more significant for higher values of the transfers.

Keywords: Bolsa Família Conditional Cash Transfer Programme; Dose-Effect; Heterogeneity; Propensity Score; Labour Supply.

1 INTRODUCTION

Since the 1990s, the Brazilian government, along with other Latin American governments, has implemented policies of social protection that aim at alleviating poverty in the short run and creating conditions for upward mobility in the long run. The *Programa Bolsa Família (PBF),* a Brazilian Conditional Cash Transfer Programme (CCT), which covered 11.1 millions Brazilian families in 2006, targets families below the poverty line.

Several studies point to *PBF's* positive effects on beneficiaries' human capital investment and poverty levels. For example, Chein, Andrade and Ribas (2006) find a reduction in inequality and poverty rates, and Cardoso and Souza (2004), and Pedrozo (2007), find that Bolsa Familia increases school attendance by 3 percentage points.

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The literature on labour supply effects of Conditional Cash Transfer Programs, while growing, is more limited. Parker and Skoufias (2000) have studied the impact of *Progresa* (now called *Oportunidades*), Mexico's CCT, on labour supply. They use an income and substitution effect approach. Here, the income-effect refers to a reduction in work as a direct consequence of an increase in non-work transfer income. i.e., a reduction of labour supply is an expected outcome of the income-effect. On the other hand, a substitution-effect occurs when there is an increase in adult labour supply in order to compensate for a reduction in child labour in response to the conditionality related to school attendance. They find that both income and substitution effects tend toward maintaining the original level of income, i.e. there is no reduction in labour market participation rates of the adults.

With regard to an analysis of the impact of Bolsa Familia, using household data, Soares, Ribas and Osório (2007) find an increase in participation rates for both men and women, which is more significant for the latter. Foguel and Barros (2008) use data at the municipality level to estimate the impact on both participation rates and labour hours. Their analysis showed that the transfers had no significant impact on either outcome.

Tavares (2008) also analyses the impact of *PBF* on labour hours and participation rates of mothers and finds that there is a increase in 5,6 per cent in the probability of working and of 1,6 per cent in weekly work hours. Ferro and Nicollela (2007) find a negative effect on labour supply for women in urban areas and for men in both urban and rural areas. The effect on women's labour supply in rural areas, however, was found to be positive. Considering that the same article points to a reduction in child labour as a result of *PBF*, it is possible to infer that the substitution-effect did not exceed the income-effect, at least for men and women living in urban areas.

The key contribution of this paper with respect to the existing literature is an impact analysis disaggregated by sex, type of occupation, wage rate and an analysis of the 'dose-effect', which allows for a more detailed investigation of the causal relation between cash transfer programs and labour supply.

According to Becker (1976), the decision of time spent on work is based on the total wage, the wage rate, exogenous income and the household production function. Thus, changes in a household's income sources can modify the amount of work hours supplied by household members. When there is an increase in household income, the household receives a positive 'income shock', and in the case of *Bolsa Família* Program, this income shock is unrelated to work income.

The choice to analyse individual labour supply functions within the household draws on Becker's 'Time and Household Production' theory. The theory suggests that time allocation decisions involve a trade-off between time devoted to domestic activities such as leisure or domestic production, and time devoted to paid labour, which yields income.

In the household production function, time devoted to housework activities appears as an important variable in the process of transforming acquired inputs into products that are ready to consume (e.g. cooking). Time allocated to housework activities contributes to generating utility (measure of well-being) and therefore has value. The wage serves as a benchmark for this value if the individual also performs paid work, or it is framed with regard to the individual's domestic production capacity. The value of time not used in paid work, also called 'shadow price of time' by Gronau (1986), varies according to the amount of time and income available.

When an income shock occurs, the value of time is modified and a new configuration of time allocation between paid work and housework activities is established. A sudden increase in household income unrelated to work enhances the value of time dedicated to housework activities, relative to the time dedicated to paid work. This theory would seem to indicate that social welfare programmes (based on cash transfers) can potentially create negative incentives for time allocated to paid work—i.e., the income effect discussed by Parker and Skoufias (2000)—at the same time that they incentivise housework activities which promote well-being.

Nevertheless, one would expect that the sensitivity to the income shock is not uniform among household members. A member's decision regarding time allocation is typically influenced by the other members' decisions. The concept of the 'additional worker' developed in Stephens (2001) suggests that intra-household work substitution follows a hierarchy defined by established family relations. i.e., tthe elasticity of substitution, or time allocation sensitivity between domestic production and paid work, varies among members, especially along gender lines.

Families in poverty and extreme poverty, who are eligible for *PBF*, appear to follow a survival strategy based on trying to achieve economies of scale. Sharing a household implies partaking in the use of resources such as durable and non-durable goods, as well as sharing in a division of labour to perform housework activities. Chiappori (1992) studied such intra-household resource allocation patterns and proposed a 'collective approach' for the analysis of the household. The approach suggests that the identity of the recipient (man, woman, or child, for example) will affect how resources are used and who benefits. *Bolsa Familia* prioritizes women as transfer recipients in the hope that it would benefit children the most.

In respect to the labour market, according to Cardoso (1999), the interaction between the domestic production function and labour supply is stronger where work relationships are less formalized. This happens mainly when there is a predominance of self-employment, in which household production mingles with domestic activity—be it for commercialization, or be it for self-consumption. For example, Martinez (2004) in analyzing BONSOL, the Bolivian's social security program, identified an impact on food consumption that was more than proportional to the income shock created by the transfers. The author indicated that, as the target population was comprised mostly of farmers, part of the transfer was likely devoted to investments in self-employment, thus generating multiplier effects on food production.

Besides using the transfer exclusively for consumption—which in itself shows its validity in improving beneficiary families' quality of life—the above studies suggest that there are other uses for the transfers, such as investing in self-employment related activities, which may in turn generate positive impacts on individual labour supply. This type of analytical framework also facilitates the identification of groups for which *PBF* has intensified beneficial effects as well as groups for whom there are effects which are not intended by the programme, and in so doing, it contributes to the design of programme improvement strategies.

2 METHODOLOGY

The methodology applied here is based on the model proposed by Becker (1976) according to which labour supply depends on work income, non-work income and household production. Given the lack of available data on household production, following recommendations contained in Gronau, (1986) we included in the model household characteristics seen as

essential for this production function, such as household income, infrastructure and location and certain demographic features that are determinant of household production. Individual characteristics were also included as controls.

The income shock caused by *PBF* transfers represents a non-work income variation and must be included in this equation. It is through the estimated coefficient of the variable that identifies treated households that the cash transfer programme effect on labour supply is assessed. This coefficient stands for the Average Treatment Effect on the Treated (ATT) according to Hirano and Imbens (2002). The ATT measure allows us to measure impact heterogeneity via interactions on several variables.

Bolsa Família targets two types of families. The first type is characterized by a monthly per capita income between US$23.00 (R$50.00)[1] and US$46.00 (R$100.00). This type receives variable transfers of US$7.00 (R$15.00) per child or pregnant women, up to the limit of three eligible people/children, which results in transfers of US$7.00 (R$15.00), US$14.00 (R$30.00) or US$21.00 (R$45.00). The second type is characterized by a monthly per capita income of less than US$23.00 (R$50.00). This second type receives an additional US$23.00 (R$50.00) on top of the variable transfer. This results in a total transfer amount of US$23.00 (R$50.00), US$30.00 (R$65.00), US$37.00 (R$80.00) or of US$44.00 (R$95.00).

The Brazilian National Household Survey 2006 (PNAD) provides the data used to perform the estimations. The sample is composed of households that contain at least one family with a per capita income between US$0.00 and US$92.00 (R$200.00). The widened spectrum of eligible families was chosen in view of the fact that programme targeting that is not means-tested as eligibility is self-declared. The average monthly per capita net income is US$45.86 for non-treated households, US$51.10 for treated households receiving less than US$21.00 and US$24.23 for treated households receiving more than US$23.00. Targeting statistics can be found in PBF Impact Evaluation (CEDEPLAR and SCIENCE, 2005).

A subsample of households containing at least one working individual between 16 and 64 years old was developed in order to estimate the effect on weekly work hours. The model takes the form below for weekly work hours:

$$L_i = \beta_0 + \beta_1 * V_i + \beta_2 * w_i + \beta_3 * M_{dj} + \beta_4 * Z_{dj} + \beta_5 * T_{dj} + u_i$$, where:

L_i: number of weekly work hours for working individuals between 16 and 64 years old;

V_i: household per capita income if the individual was not working (household total income minus wage divided by the number of people living in the household) —equivalent to non-work incomes;

w_i: wage rate;

M_{dj}: individual characteristics matrix that determine wages—years of study, race, age, age squared, sex, work position, if she/he performs agricultural activity, household position (head of family, spouse, children or another relative), number of months at the present work—equivalent to work income;

Z_{dj}: household characteristics matrix—numbers of hours dedicated to housework activities by members under 16 or over 64, number of non-eligible children, participation rate of members with ages ranging from 16 to 64 years, share of women among adults, household assets and infrastructure indexes,[2] location (metropolitan, urban or rural) and region—equivalent to household production;

T_{dj} : dummy for treatment and interactions of treatment and sex with informality, self-employment, agricultural activities, intervals of wage rate and transfer values;

u_i : idiosyncratic error.

The model takes the form below for probability of working:

$L_i = \beta_0 + \beta_1 * V_i + \beta_2 * M_{dj} + \beta_3 * Z_{dj} + \beta_4 * T_{dj} + u_i$, where:

L_i: work dummy for person between 16 and 64 years old;

V_i: household per capita income if the individual was not working (household total income minus wage divided by the number of people living in the household) —equivalent to non-work incomes;

M_{dj}: individual characteristics matrix that determine wages—years of study, race, age, age squared, sex, household position (head of family, spouse, children or another relative) — equivalent to expected work income;

Z_{dj}: household characteristics matrix—numbers of hours dedicated to housework activities by members under 16 or over 64, number of non-eligible children, share of women among adults, household assets and infrastructure indexes,[3] location (metropolitan, urban or rural) and region—equivalent to household production;

T_{dj} : dummy for treatment, transfer values and per capita transfer value and interactions of treatment and sex with received transfer values;

u_i : idiosyncratic error.

As it is not possible to assess the effect for the same individual receiving and not receiving the transfers at the same time, a comparison between beneficiary (treated) and non-beneficiary (control) households is proposed. The descriptive analysis in table 1 shows that 11,771 (10,637 with at least one working men or women) treated and 18,641 (16,200 with at least one working men or women) non-treated households samples differ significantly.

According to Rosembaum and Rubin (1983), it is necessary to have a valid comparison group, equal in every characteristic to the treated group except for treatment, to identify the causal effect of the *PBF* cash transfer on labour supply. Propensity Score methods present an alternative to deal with differences between treatment and control group arising from, for example, non-experimental design, or non-randomized treatment assignment, to either of the two groups, as is the case of *PBF*.

Hirano and Imbens (2002) propose multiplying control sample weights by a propensity score ratio. This adjustment in weighting makes non-beneficiary household´s probability participation distribution similar to beneficiary´s. As this probability, called propensity score, was obtained from a Probit[4] regression of participation over a set of household characteristics, it works as a condensed index of household characteristics. The full sample of households and the reduced sample of households with working men or women were re-weighted using the probability of the household participating in *PBF* and the probability of the household participating in *PBF* if there is a working men or women respectively. The two participation probabilities, or Propensity Scores, were estimated using the regression below on both the full and reduced samples:

$treat_d = \alpha_0 + \alpha_1 * Z_{dj} + u_d$, where:

$treat_d$: dummy for participation on *PBF*;

Z_{dj} : matrix of household characteristics—number of children bellow 15 years old and number of adults between 16 and 64 years old, their square and third power and their

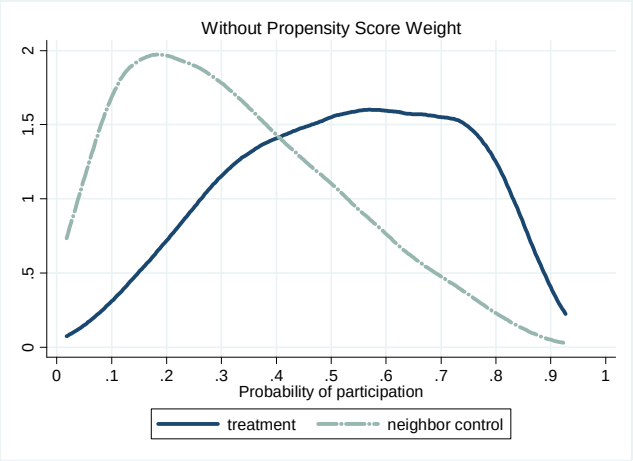
interaction with the race of the head of the household; dummies for range of household per capita net income (total income minus *PBF* transfers) —below R$50, between R$50 and R$100, between R$100 and R$150, and above R$150; share of adults per educational level groups; share of adults per occupational position groups; share of adults currently working; share of women between 16 and 64 years old; dummies for household property, possession of mobile phone, black head of household, married head of household, metropolitan area, rural area, Brazilian State.

u_d : idiosyncratic error.

Observe the Propensity Score distribution graphs 1 and 2 for treated and control groups for the full sample. Graph 1 considers only sample weights as graph 2 depicts the distribution using the weights proposed by Hirano and Imbens (2002) – HI_weights.[5] The graphs for the subsample of households with working adults were omitted for they are very similar to the ones below.

GRAPH 1

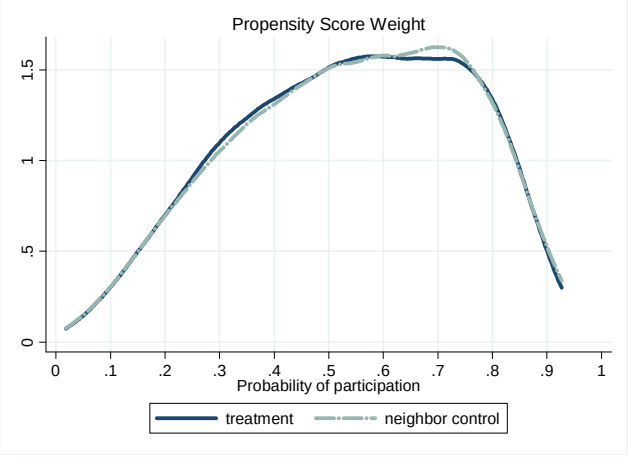
Participation Probability Distribution (Kernel Density) – Standard Propensity Score – Sample Weights



Source: PNAD 2006. Author's calculation.

GRAPH 2

Participation Probability Distribution (Kernel Density) – Standard Propensity Score – HI_Weights



Source: PNAD 2006. Author's calculation.

Tables 1 and 2 in the appendix offer a full sample description disaggregated by sex for the main variables. Note that in the last column of table 1, treated and control mean difference are less significant. From this point forth estimations will use HI_weights that make treated and control groups comparable in a common 'support' region. It is important to highlight that this is a non-experimental design that only controls for observable characteristics. Thus, the estimated impact can only be interpreted as an approximation of its true value and the results must be interpreted with caution.

3 RESULTS ANALYSIS

The result analysis encompasses Average Treated Effects on the Treated (ATT) of *Bolsa Família* Programme on probability of working by sex and weekly work hours by sex, informality, self-employment, agricultural activities and intervals of wage rate. It also allows for streaming by the treatment intensity through transfer values. Thus it offers an overview of how programmeparticipation affects labour supply.

a) Probability of working

Three estimations were made: the first one only using a dummy for programme participation; the second one using the latter dummy and an integer variable for transfer value; and the third one using the same participation dummy and a continuous variable for per capita transfer value. The coefficients and averages are in table 2 and 3 below:

TABLE 2

Average Treatment Effect on the Treated by Sex

Impact on probability of working	**Women**		**Men**	
	Average	Estimated effect	Average	Estimated effect
	0.888	0.000	0.948	-0.005
Programme participation	(0.002)	(0.005)	(0.001)	(0.003)
	0.888	0.022**	0.948	0.016**
Programme participation	(0.002)	(0.011)	(0.001)	(0.008)
		-0.002**		-0.002***
Marginal transfer per capita value		(0.001)		(0.000)

*** Significant at 0.01 level.

** Significant at 0.05 level.

* Significant at 0.1 level.

Source: PNAD 2006. Author's calculation. Standard error reported in parenthesis.

The average effect on the probability of working is not significant for men or women. However, there is an increase in working probability of 2.5 per cent for women and 1.7 per cent for men due to programme participation. The substitution effect, as argued before, and the fact that women may work more outside the household as they need less time to take care of children once the latter attend school more regularly are reasonable explanations. However, the income effect as the transfer per capita values increases nullifies the latter.

Table 3 shows the transfer value dummies coefficients:

TABLE 3

Average Treatment Effect on the Treated by Transfer Value and Sex

	Women		Men	
	Average	Estimated effect	Average	Estimated effect
US$7.00	0.856	-0.008	0.917	-0.009
	(0.002)	(0.012)	(0.009)	(0.013)
US$14.00	0.883	0.022 *	0.947	0.011
	(0.011)	(0.012)	(0.007)	(0.019)
US$21.00	0.899	0.034 **	0.950	0.021
	(0.012)	(0.015)	(0.008)	(0.019)
US$23.00	0.906	0.015	0.937	-0.006
	(0.010)	(0.012)	(0.007)	(0.019)
US$30.00	0.880	-0.010	0.949	-0.004
	(0.009)	(0.010)	(0.005)	(0.018)
US$37.00	0.901	0.000	0.956	-0.008
	(0.007)	(0.009)	(0.004)	(0.018)
US$44.00	0.904	-0.013	0.964	-0.010
	(0.006)	(0.008)	(0.003)	(0.018)

*** Significant at 0.01 level.

** Significant at 0.05 level.

* Significant at 0.1 level.

Source: PNAD 2006. Author's calculation. Standard error reported in parenthesis.

The transfer value dummy coefficients were significant and positive for women members of households recipient of US$14.00 and US$21.00 transfers, meaning that those women have higher probability of 2.5 per cent and 3.8 per cent of working. Those transfer values are possibly not sufficiently high to generate an income effect big enough to nullify the substitution effect of conditionality. Men's probability of working does not seem to be responsive to the programme independent of the transfer value.

b) Weekly work hours

Table 4 describes the average effects on weekly work hours and housework hours for men and women:

TABLE 4

Average Treatment Effect on the Treated by Work and Housework Weekly Hours and Sex

Impact on	Women		Men	
	Average	Estimated effect	Average	Estimated effect
Weekly work hours	29.006	-1.184 ***	43.203	-0.558 **
	(0.129)	(0.349)	(0.080)	(0.235)
Weekly housework hours	30.106	0.537 *	9.726	-0.034
	(0.090)	(0.302)	(0.057)	(0.172)

*** Significant at 0.01 level.

** Significant at 0.05 level.

* Significant at 0.1 level.

Source: PNAD 2006. Author's calculation. Standard error reported in parenthesis.

The participation coefficient indicates a reduction of 0.56 work hour/week (1.3 per cent) for male beneficiaries and 1.18 work hour/week (4.1 per cent) for female beneficiaries. Note that the *PBF* does not cause a large work 'discouragement', although the calculated average effects were statistically significant.

Given the modest impacts on labour supply found in this study, and taking into account that the average effect on probability of working was not significant, one can hardly accuse *Bolsa Família* of causing large reductions in labour supply, or of creating a strong dependence on non-work incomes.

Women's value of time's shadow price—hours dedicated to housework activities' value—exceeds men's possible due to cultural assigned norms linked to the domestic division of labour. Women contribute more to domestic production, be it with regard to childcare, children's education, household work, food acquisition and preparation etc. For this reason, women are more sensitive to an income shock, and show a greater variation in respect to labour supply.

In line with this argument *PBF* effects on women's housework activities are positive, indicating an increase of 0.54 hours/week (1.8 per cent). This suggests that the programme stimulates allocation of time in activities that increase household well-being although it reduces paid work hours for women. Even if there is not a perfect substitution between hours of paid work and housework activities, we cannot confirm that women's work hours are fully replaced by leisure hours.

The observed effect may in part be explained by the fact that women are the ones that collect the transfer in the majority of households. If distribution of financial resources among household members is not uniform, and women keep the transfer, it is likely that the women may feel the income shock the most.

Men's behaviour contrasts with women's since men's paid working hours are converted to leisure hours—domestically unproductive time. Men's housework hours do not increase. It is important to emphasize that men, at the income levels considered, contribute very little to domestic production compared to women. Women dedicate 24 hours/week to housework activities on average, while men dedicate only 9 hours/week.

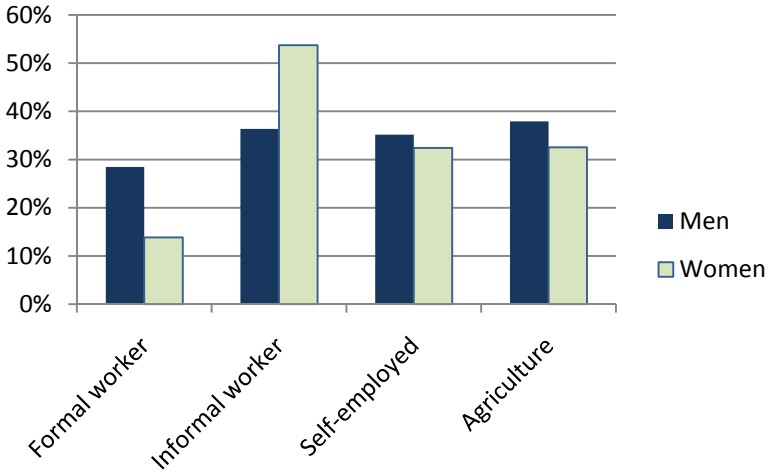
Furthermore, poor and extremely poor adults are engaged in various types of labour market activities. These activities differ for men and women, respectively. Each activity offers a range of different wage rates, flexible or fixed hours, stability and other characteristics that may influence the elasticity of the response with regard to an income shock. The graph below illustrates the composition of the labour force for poor adult Brazilians.

Formal workers are defined as those with working papers, those who are in the army, or work for the public administration. Informal workers are those without working papers, unpaid workers, and domestic workers. Employers, those who own a business and those who work for their own consumption fall into the self-employed category.

Informality prevails in the sample. It is important to keep in mind how uncertain the labour market is for women. 11 per cent of women do not work which is twice the proportion of non-working men. Only 14 per cent of working women are formally employed. 2 per cent of women engaged in agricultural activities are formal employees and 53 per cent are self-employed. Some 81 per cent of women agricultural workers are unpaid workers.

GRAPH 3

Labour Force Composition



Source: PNAD 2006. Author's calculation.

Table 5 shows the heterogeneity in the effects of cash transfers on work hours of agricultural and non-agricultural workers, formal and informal workers,[6] self-employed and employees.[7]

TABLE 5

Average Treatment Effect on the Treated by Work Position and Sex

Impact on weekly work hours of	**Women**		**Men**	
	Average	Estimated effect	Average	Estimated effect
Agricultural[1] worker	22.123	-1.079 *	41.917	-0.776 **
	(0.200)	(0.555)	(0.137)	(0.362)
Non agricultural[1] worker	33.842	-1.214 ***	44.429	-0.437
	(0.155)	(0.430)	(0.098)	(0.296)
Formal worker	39.736	-0.443	46.819	0.355
	(0.217)	(0.632)	(0.105)	(0.303)
Agricultural	42.725	-1.651	48.912	-0.029
	(0.923)	(2.513)	(0.301)	(0.704)
Non agricultural	39.518	-0.265	46.246	0.249
	(0.223)	(0.626)	(0.111)	(0.307)
Informal worker	27.842	-1.223 ***	42.272	-0.759 ***
	(0.141)	(0.387)	(0.100)	(0.289)
Agricultural	21.786	-1.015 *	41.225	-0.840 **
	(0.200)	(0.575)	(0.146)	(0.395)
Non agricultural	32.798	-1.336 ***	43.597	-0.750 *
	(0.180)	(0.498)	(0.138)	(0.411)
Self-employed	21.388	-1.659 ***	42.974	-0.265
	(0.218)	(0.581)	(0.145)	(0.411)
Agricultural	16.703	-1.203 *	42.363	-0.166
	(0.246)	(0.726)	(0.208)	(0.531)
Non agricultural	28.724	-2.104 **	43.792	-0.375
	(0.344)	(0.915)	(0.206)	(0.627

⇨

Employee	33.226	-0.968 **	43.348	-0.683 **
	(0.147)	(0.420)	(0.095)	(0.279)
Agricultural	28.165	-0.845	41.545	-1.113 **
	(0.276)	(0.808)	(0.181)	(0.492)
Non agricultural	35.427	-0.994 **	44.734	-0.439
	(0.169)	(0.482)	(0.107)	(0.315)

1. May be formal, informal or self-employment.

*** Significant at 0.01 level.

** Significant at 0.05 level.

* Significant at 0.1 level.

Source: PNAD 2006. Author's calculation. Standard error reported in parenthesis.

The negative effects observed for the majority of occupation types vary in magnitude and statistical significance. The estimated coefficient for programme participation is not statistically significant for formal work for both men and women.

Formal work is likely to be the least elastic due to workers' rights, income stability, benefits, unemployment transfers, etc., which make such work more valuable compared to other types. As, in most cases, it involves a fixed number of working hours, the work discouragement effect caused by the shock does not alter the quantity of hours men and women dedicate to this type of work, or at least it does appear to result in a change in the number of hours that they declare in the PNAD 2006 survey.

Non-agricultural self-employed women are the most sensitive to the PBF transfer, which reduces their average labour supply by 2.1 (7.3 per cent) weekly work hours. Interestingly, the effect on self-employment is not significant for men. Their most 'sensitive' type of work is agricultural employment, where the PBF transfer is responsible for a 1.1 (2.7 per cent) reduction in weekly work hours in that group.

It is important to highlight the lack of significance for effects on self-employed male workers. The diverse behaviour in comparison to informal employees could indicate that part of the transfer is invested in own employment/entrepreneurship to strengthen production. An increase in production might increase the demand for work according to the production function, thus constraining the negative impact on labour supply. This is in line with Martinez (2004), especially as concerns agricultural activities. The same is not true for women. Further investigation is necessary in order to back up the above line of speculation.

Another question addressed is the relevance of transfer values to the impact. The income shock varies in dosage according to household net income and transfer value. In pursuit of understanding and proving the existence of a dose-effect, dummies were added to the model identifying households that received transfers of the following values: US$7.00, US$14.00, US$21.00, US$23.00, US$30.00, US$37.00 and US$44.00. The results are presented in table 6.

Significant effects are observed for female beneficiaries who receive transfer of US$23.00, US$37.00 and US$44.00. These women receive transfers applicable to families with a per capita income below US$23.00. Because their transfer/income ratio is relatively higher, these households experience a more intense income shock. The transfer/income ratio is relevant as it represents how much the household budget changed due to the programme. Note that the

effect is not linear with regards to increasing transfer values, probably because the transfer varies with the number of children living in the household as described before.

TABLE 6

Average Treatment Effect on the Treated by Transfer Value and Sex

Impact on weekly work hours of	Women		Men	
	Average	Estimated effect	Average	Estimated effect
US$7.00	30.597	0.690	44.119	-0.544
	(0.733)	(0.593)	(0.458)	(0.626)
US$14.00	31.016	0.150	44.465	0.418
	(0.647)	(0.703)	(0.396)	(0.903)
US$21.00	30.321	-0.911	44.975	0.479
	(0.714)	(0.749)	(0.460)	(0.943)
US$23.00	26.405	-1.757 **	39.919	0.223
	(0.617)	(0.687)	(0.439)	(0.973)
US$30.00	27.018	-0.872	42.265	1.319
	(0.468)	(0.532)	(0.295)	(0.865)
US$37.00	27.130	-2.327 ***	43.148	0.724
	(0.431)	(0.525)	(0.283)	(0.859)
US$44.00	28.217	-1.771 ***	43.005	0.285
	(0.373)	(0.493)	(0.246)	(0.858)

*** Significant at 0.01 level.

** Significant at 0.05 level.

* Significant at 0.1 level.

Source: PNAD 2006. Author's calculation. Standard error reported in parenthesis.

The last disaggregation concerns the wage rate. Once again dummies identifying unpaid workers, and workers for ranges of wage rate were added to the model. The estimated results are in table 7.

TABLE 7

Average Treatment Effect on the Treated by Wage Rate and Sex

Wage Rate (US$/Hour)	Women		Men	
	Average	Estimated effect	Average	Estimated effect
US$0	20.477	-1.223 **	32.542	-3.858 ***
	(0.196)	(0.499)	(0.284)	(0.876)
US$0-0.93	39.208	-1.264	44.799	-0.642
	(0.555)	(1.423)	(0.426)	(1.109)
US$0.93-2.33	37.359	0.082	46.391	0.459
	(0.338)	(0.859)	(0.218)	(0.592)
US$2.33-4.67	36.467	-1.232 **	45.723	-0.353
	(0.205)	(0.569)	(0.103)	(0.276)
US$4.67- 7	26.778	-2.312 ***	42.825	-0.348
	(0.297)	(0.718)	(0.143)	(0.383)
More than US$7	17.601	-1.732 **	36.616	-3.139 ***
	(0.328)	(0.706)	(0.291)	(0.938)

*** Significant at 0.01 level.

** Significant at 0.05 level.

* Significant at 0.1 level.

Source: PNAD 2006. Author's calculation. Standard error reported in parenthesis.

Unpaid workers are mostly informal and self-employed workers, that is, people that probably work in family enterprises. They show a significant reduction of 3.9 (11.9 per cent) in weekly work hours for men and 1.2 (6.0 per cent) for women.

As women contribute less than men to total household income, they have less responsibility for being 'a provider'. This may make a women's labour supply more elastic to positive income shocks when her wage rate is above US$2.33, unlike men, whose labour supply only becomes elastic for wage rates above US$7.00. The latter may be explained by the fact that men whose wage rate is more than US$7.00 are mostly part time or daily paid workers and have more time flexibility.

Observe that low paid workers, below US$ 7 per hour, work more hours than better paid workers. This is clearly a result of the cut made to build the sample with households below US$92.00 net income per capita.

Further study is needed to back up these arguments, but, at a first glance, it can be concluded that the intra-household division of labour and the sources of household income are two factors that can help to explain the dynamics of the labour supply in face of an income shock.

4 CONCLUSION

In light of the above, the first conclusion is that there is no effect on the probability of working of men and women and the impact of *PBF* on their weekly work hours, although statistically significant, was not large in magnitude. Thus, one cannot affirm that *PBF* is responsible for generating dependence on account of income transfers.

The results also confirm that the elasticity of labour supply varies according to sex and type of work. Unpaid work and informality intensify the effect on the supply of labour hours. Women are more sensitive to a positive income shock than men. Based on these findings, it seems that cash transfer programmes reinforce the domestic role played by women.

From the point of view of dose-effect, higher effects were found for greater income shock intensities. This behaviour is understandable because it was expected that a more intense cause would generate more incisive effects.

A detailed study looking into whether transfers are invested in home-production might point to whether there are multiplier effects of *PBF* transfers strengthening the CCT's potential to mitigate poverty. The need for a more in-depth study is evident from our results for the impacts of PBF on labour supply by wage rate.

The main contribution of this paper is to present a more detailed analysis of the causal relation between cash transfer programs and work supply. This research proposition identifies beneficiary heterogenic behaviour. These effects are to be expected, and it does appear to be the case that the transfers induce a dependency upon non-work source of income.

Future improvements in the PBF must take account the household dynamics, especially as regards the gender division of labour. In addition, complementary initiatives focused on training and empowering informal and self-employed workers are desirable in order to strengthen the programme's role in reducing vulnerability.

APPENDIX

TABLE 1

Descriptive Analysis for 16 and 64 Years Old Men – Means and Means' Difference Significance

Male	Treated	Control		Weighted Control	
Work	0.949	0.916	***	0.948	
	0.002	0.002		0.002	
Work hours	42.997	44.518	***	43.409	**
	0.124	0.103		0.106	
Housework hours	9.666	9.973	**	9.786	
	0.091	0.081		0.074	
Formal work	0.210	0.341	***	0.199	**
	0.004	0.004		0.003	
Informal work	0.393	0.311	***	0.401	
	0.005	0.004		0.004	
Self-employment	0.388	0.335	***	0.388	
	0.005	0.004		0.004	
Domestic worker	0.009	0.013	***	0.011	
	0.001	0.001		0.001	
Agricultural activities	0.493	0.293	***	0.483	*
	0.005	0.004		0.004	
Non eligible children	0.510	0.320	***	0.647	***
	0.009	0.006		0.008	
Household per capita income if not employed	46.605	59.490	***	50.772	***
	0.423	0.424		0.364	
Wage rate (R$/hour)	6.851	8.625	***	6.751	
	0.083	0.074		0.099	
Household per capita income	96.381	125.989	***	99.126	***
	0.440	0.365		0.364	
Sum of housework hours by children and elderly	8.682	5.560	***	8.000	***
	0.120	0.082		0.096	
Years of study	5.301	6.758	***	5.294	
	0.029	0.026		0.024	
Age	33.366	33.345		32.979	***
	0.105	0.085		0.086	
Race	0.720	0.628	***	0.728	
	0.004	0.003		0.003	
Number of adults	3.157	2.994	***	3.167	
	0.012	0.009		0.010	
Number of children	2.272	1.624	***	2.345	***
	0.013	0.009		0.011	
Presence of spouse	0.910	0.888	***	0.900	***
	0.002	0.002		0.002	
House ownership	1.378	1.428	***	1.373	
	0.006	0.005		0.005	

Assets possession	0.371	0.235 ***	0.400 ***
	0.004	0.003	0.003
Housing infrastructure	0.302	0.476 ***	0.305
	0.004	0.004	0.003
Metropolitan area	2.637	2.223 ***	2.637
	0.006	0.006	0.005
Rural area	0.415	0.256 ***	0.415
		0.004	0.003

*** Significant at 0.01 level.

** Significant at 0.05 level.

* Significant at 0.1 level.

Source: PNAD 2006. Author's calculation. Standard errors in parenthesis.

TABLE 2

Descriptive Analysis for 16 and 64 Years Old Women – Means and Means' Difference Significance

Female	**Treated**	**Control**	**Weighted Control**
Work	0.890	0.816 ***	0.885
	0.003	0.004	0.003
Work hours	28.413	32.187 ***	29.621 ***
	0.191	0.176	0.177
Housework hours	30.158	30.216	30.055
	0.140	0.121	0.117
Formal work	0.091	0.184 ***	0.105 ***
	0.003	0.004	0.003
Informal work	0.323	0.255 ***	0.316
	0.005	0.004	0.005
Self-employment	0.361	0.303 ***	0.352
	0.006	0.005	0.005
Domestic worker	0.225	0.258 ***	0.228
	0.005	0.004	0.004
Agricultural activities	0.420	0.250 ***	0.405 **
	0.006	0.004	0.005
Non eligible children	0.535	0.340 ***	0.639 ***
	0.009	0.006	0.007
Household per capita income if not employed	80.941	105.928 ***	85.230 ***
	0.421	0.390	0.349
Wage rate (R$/hour)	4.554	6.623 ***	4.694
	0.077	0.090	0.088
Household per capita income	95.913	126.015 ***	99.896 ***
	0.436	0.355	0.353
Sum of housework hours by children and elderly	8.168	5.158 ***	7.215 ***
	0.111	0.075	0.089
Years of study	5.968	7.242 ***	5.944
	0.030	0.026	0.025

⇨

Age	32.849		32.669		32.290 ***
	0.093		0.081		0.080
Race	0.712		0.613	***	0.711
	0.004		0.003		0.003
Number of adults	2.949		2.847	***	2.969
	0.011		0.008		0.009
Number of children	2.327		1.686	***	2.368 **
	0.013		0.009		0.010
Presence of spouse	0.834		0.813	***	0.817 ***
	0.003		0.003		0.003
House ownership	1.388		1.436	***	1.385
	0.006		0.005		0.005
Assets possession	0.352		0.211	***	0.368 ***
	0.004		0.003		0.003
Housing infrastructure	0.329		0.504	***	0.336
	0.004		0.003		0.003
Metropolitan area	2.594		2.171	***	2.591
	0.006		0.006		0.005
Rural area	0.378		0.224	***	0.366 **
	0.004		0.003		0.003

*** Significant at 0.01 level.

** Significant at 0.05 level.

* Significant at 0.1 level.

Source: PNAD 2006. Author's calculation. Standard errors in parenthesis.

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REFERENCES

Becker, Gary S. (1976), The Economic Approach to Human Behavior, Chicago: The University of Chicago Press, pp. 92.

Bourguignon, François and Pierre-Andre Chiapori, 1994. 'The Collective Approach to Household Behavior.' In The Measurement of Household Welfare. Blundell and others, editors. Cambridge, UK: Cambridge University Press.

Bryson, A., Dorset, R., Purdon, S. (2002) 'The Use of Propensity Score Matching in the Evaluations of Active Labor Market Policies.' <http://eprints.lse.ac.uk/4993/1/The_use_of_propensity_score_matching_in_the_evaluation_of_active_labour_market_policies.pdf> [Accessed in: 05.15.09]

Cameron, Trivedi. (2005). Microeconometrics Methods and Applications. Cambridge University Press.

Cardoso, E. Souza, A. (2004). 'The impact of cash transfers on child labor and school attendance in Brazil.' *Working Paper nº 04-W07*. Vanderbilt.

Cardoso (1999), 'Estrutura Setorial-Ocupacional do Emprego no Brasil e Evolução do Perfil Distributivo nos Anos 90'. *IPEA Working Paper No. 655,* Rio de Janeiro: IPEA, pp. 13.

CEDEPLAR and SCIENCE. 2005. *AIBF – Avaliação de Impacto do Bolsa Família.*

Chein, F.; Andrade, M. V.; Ribas, R. P. (2006). *Políticas de Transferência de Renda e Condição Nutricional de Crianças: Uma avaliação do Bolsa Família.* Belo Horizonte: Cedeplar, 2007 (Texto para Discussão, n. 312).

Chiappori P. (1992), Collective Labor Supply and Welfare, *The Journal of Political Economy*, Vol. 100, No. 3 (Jun., 1992), pp. 437-467

Duryea, S., Lam, D., Levison, D., (2003). 'Effects of Economic shocks on children´s employment and schooling in Brazil.' PSC Research Report number 03-541. Michigan.

Ferro, A. R., Nicollela, A.C. (2007). *The Impact of Conditional Cash Transfers Programs on Household Working Decision in Brazil*. <http://www.iza.org/conference_files/worldb2007/ferro_a3468.pdf >. [Accessed: 10. 09. 2008].

Foguel, M. N., Barros, R. P. 2008. The Effects of Conditional Cash Transfer Programmes on Adult Labour Supply: An Empirical Analysis Using a Time-Series-Cross-Section Sample of Brazilian Municipalities. Anais ANPEC 2008, Disponível em: http://www.anpec.org.br/encontro2008/artigos/200807211655420-.pdf , acesso em: 27 de julho de 2009.

Gronau, R. (1986). 'Home Production – A Survey'.(in Ashenfelter and Layard-Ed: *Handbook of Labor Economics*), North Holand, pp.273-303.

Hirano, Keisuke; Imbens, Guido W. (2004). *The Propensity Score with Continuous Treatments*. <http://www.irp.wisc.edu/initiatives/trainedu/igrfp/readings07/Hirano_Imbens_GPS_2004.pdf> [Accessed: 04. 24. 2008].

Hirano, K., and G. Imbens (2002), 'Estimation of Causal Effects Using Propensity Score Weighting: An Application of Data on Right Hear Catherization,' *Health Services and Outcomes Research Methodology*,2 (3-4):1387-3741.

Imai, Kosuke; Dyk, David A. (2003). 'Causal Inference with General Treatment Regimes: Generalizing the Propensity Score'. *J Am Stat Assoc* 2004; 99:854–66.

Imbens, G., Wooldridge, J. M. (2008). 'Recent Developments in Econometrics for Program Evaluation'. *NBER*, *Working Paper, n.14251*. Cambridge: National Bureau of Economic Research.

Martinez, Sebastian. (2004). *Pensions, Poverty and Household Investments in Bolívia*. <http://emlab.berkeley.edu/users/webfac/bardhan/e271_f04/martinez.pdf> [Accessed: 04. 24. 2008].

Parker, S. Skoufias, E. 2000. 'The Impact of Progresa on Work, Leisure and Time Allocation'. Final Report. International Food Policy Research Institute. . <http://www.ifpri.org/sites/default/files/publications/parkerskoufias_timeuse.pdf > [Acessed in: 28 de july 2009].

Pedrozo, E. (2007). 'Uma Avaliação ex-ante dos Impactos do Bolsa Família na Redução do Trabalho Infantil'. *Anais do XXXV Encontro Nacional de Economia*. Recife: ANPEC.

Soares, F.; Ribas, R.; Osório, R.; (2007). *Avaliando o Impacto do Programa Bolsa Família: uma Comparação com Programas de Transferência Condicionada de Renda de outros Países*. <http://www.undp-povertycentre.org/pub/port/IPCEvaluationNote1.pdf> [Accessed: 04. 24. 2008].

Stephens, J. R. M. (2001). 'Worker displacement and the added worker'. *NBER*, *Working Paper, n.8260*. Cambridge: National Bureau of Economic Research.

Tavares, P. A. (2008). 'Efeito do Programa Bolsa Família sobre o Trabalho das Mães'. Anais do XVI Encontro Nacional de Estudos Populacionais, ABEP, Caxambú- MG.

Rosenbaum, P. and Rubin, D. B. (1983), 'The Central Role of the Propensity Score in Observational Studies for Causal Effects', *Biometrika*, 70, 41-55.

NOTES

1. Exchange rate from 09/30/2006 when US$1.00 was worth R$2.17.

2. *Dummy* variables were built according to households clusters based on responses about household and members characteristics.

3. *Dummy* variables were built according to households clusters based on responses about household and members characteristics.

4. Cameron and Trivedi (2003).

5. The propensity score accomplished balancing for 98 per cent mean tests for 54 relevant variables on 15 (19 for subsample) blocks.

6. For the estimation informal workers refer to everyone who is not formally employed, thus include self-employed workers.

7. For the estimation employees refer to everyone who is not self-employed, thus include formal workers.

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