Public transfer and interhousehold transfers to the elderly in Brazil

Extended Abstract
April 1, 2008

Preliminary version – Please do not cite

Vitor Miranda, *University of Pennsylvania (vitor@pop.upenn.edu)*
Eduardo Rios-Neto, *UFMG/Cedeplar (eduardo@cedeplar.ufmg.br)*
Cássio Turra, *UFMG/Cedeplar (turra@cedeplar.ufmg.br)*

Abstract:
This study examines the flow of inter-household transfers in Brazil. More precisely, we investigate if an exogenous increase in the income of the poor elderly, made by a public transfer program, led to a decrease in inter-household transfers received by this group. To test this hypothesis, we used data from periods before and after two major reductions in the age of eligibility to the program. The impact was then analyzed using a difference-in-difference approach. Using nationally representative data, we found a reduction both in the probability of receiving interhousehold transfers and in the magnitude of transfers received by the age groups that became eligible. This indicates that public income transfers may crowd out interhousehold transfers for Brazilian families.

Introduction

Interhousehold transfers play an important role in society. This is especially true in developing countries, where in many situations social networks help support individuals when there is an absence of adequate welfare state basic services. Many studies have tried to explain the motives why individuals engage in transfer behavior. This is especially important for income redistribution policies, since interhousehold transfers can displace public income transfers, thus reducing the original policy effect.

If transfers are motivated by altruism, donors transfer income because they want to guarantee the recipients a certain level of well-being (Becker 1974). In this case, increases in the recipients' income allow donors to reduce the amount of income transferred to the point that guarantees the recipients their original level of well-being. On the other hand, if transfers are mostly an exchange for services, increases in the recipients' income may increase the amount transferred, due to an increase in the implicit price of services.

Previous studies do not provide a conclusive word on the crowding-out of interhousehold transfers by public transfers. Using mostly data for developed countries, several studies concluded that recipient's income and amount of transfer received have a positive or small negative correlation. Cox (1987) finds that in 1979 in the US one percent increase in own income was associated with 0.53 percent increase in transfers received. Altonji et al (1997) observe that redistributing one dollar from the parent to his/her child is associated with less than 13-cent reduction in the parent's transfer to the child. A recent work by Kazianga (2006), for Burkina Faso – a low-income country in West Africa – does not find substantial crowding-out effects among low income families. In face of this empirical evidence, these studies propose exchange as the main motive for transfers and suggest that crowding-out effect is not an important issue for income redistribution policies.

On the other hand, other recent works have found empirical evidence of public transfers that displaced interhousehold transfers. Such works include the

studies of Albarran and Attanasio (2002), who measured the impact of the PROGRESA program in Mexico; Juarez (2006), who examined the impact of the *Pension Alimentaria para Adultos Mayores*, also in Mexico, and Jensen (2003), who investigated the impact of South African old age pensions in interhousehold transfers. All these studies find that public income transfers were associated with large declines in the amount of private transfers received.

The objective of this paper is to estimate the impact of income in the transfers received by the elderly in Brazil. Are interhousehold transfers to the elderly in Brazil primarily a product of an exchange for services? This motive implies that crowding-out effect may not be a concern for policy makers in Brazil. However, if it is mostly a product of other relatives guaranteeing the elderly well-being during less productive stages of his life course, increases in the elderly income must be associated with significant reductions in the amount of interhousehold transfers received.

As it is well pointed by Juarez (2006), one of the main difficulties of establishing causal effects of income on interhousehold transfer is the fact that income is potentially an endogenous variable. In order to account for this potential bias, this study uses two coverage expansions of the *Benefício de Prestação Continuada*[1] (BPC) – a national public transfer program for the elderly that took place Brazil during the 1990s and early 2000s – as a particular setting that crated exogenous source of variation in income of the elderly.

The rest of this study is organized as follows: we first describe the micro-economic model of interhousehold transfers proposed by Donald Cox (1987), which integrates altruistic and exchange motives in a single framework. Then we explain the empirical strategy employed, describe the dataset used and present the results along with some final remarks.

Theoretical Framework

The approach used in this work to investigate the relationship between public transfers and interhousehold transfers is based on the framework

---

[1] Continuous Cash Benefit Program.

developed by Donald Cox (1987). Cox's framework sets two motives that drive the giving of private transfers: altruism and exchange. In this model the donor's utility (U_d) is a function of his own consumption (c_d), the amount of services he receives (s) and the recipient's utility (U_r):

$$U_d = U_d(c_d, s, U_r(c_r, s))$$ **(Eq. 1)**

Donor's utility increases with his own consumption ($\partial U_d / \partial c_d > 0$), with the amount of services received ($\partial U_d / \partial s > 0$) and with the recipient's utility ($\partial U_d / \partial U_r > 0$). The recipient's utility increases with his own consumption ($\partial U_r / \partial c_r > 0$) and decreases with the amount of services he provides ($\partial U_r / \partial s < 0$). The constrains are:

$$C_d \leq I_d - T$$ **(Eq. 2a)**

$$C_r \leq I_r + T$$ **(Eq. 2b)**

$$U_r(c_r, s) \geq U_0(I_r, 0)$$ **(Eq. 2c)**

Equations (2a) and (2b) are the budget constrains: I_d and I_r are respectively the donor's and recipient's incomes before transfer (T). Equation (2c) is the participation constrain. It states that the recipient will only enter the relationship if the level of utility received is at least equal to the utility level he achieves by consuming only his income I_r and providing no service.

Cox (1987) demonstrates that altruism will prevail when Eq. (2c) is not binding ($U_r > U_0$). In this situation, the recipient is more than compensated by the service provided. On the other hand, exchange is the dominant motive when Eq. (2c) is binding. In this regime transfer are pictured as a function of the amount of services offered and its implicit price: $T = ps$. For example, an adult's main reason for transferring money to his elderly mother may be an exchange for taking care of her grandchildren. In this case, an increase in the mother's income leads to an increase in the value of the mother's time. The final result on the transfer flow will depend on the magnitude of the change in relative prices and how elastic the adult's demand for that service is. If the service the mother provides does not

have close substitutes in the market (the adult's demand for the service is inelastic) an increase in p leads to an increase in T.

Empirical Strategy

To test if there is crowding-out effects in Brazil, controlling for the endogeneity of income, we used data from periods before and after two major reductions in the age of eligibility to the *Benefício de Prestação Continuada* (BPC). BPC is a public transfer program created in 1996 that provides monthly minimum wage payments of to its beneficiaries.[2] Elderly people and people with disability with per capita family income below one quarter of the minimum wage are entitled to receive the benefit. In addition to the required income level, the elderly could not be employed or retired by the public pension system. Federal legislation establishes that eligibility must be checked every two years.

Introduced in 1996 as a benefit to poor elderly 70 years old or older, BPC had its eligibility age reduced to 67 in 1998 and to 65 in 2004. Administrative data presented in Figure 1 shows a large increase in the number of new BPCs after the first eligibility age reduction in January 1998, and an even larger increase after the second eligibility age reduction in January 2004.

---

[2] On September 2005, the Brazilian minimum wage was 300 reais, which was about 140 USD. In this study, all amounts are expressed in 2005 reais.
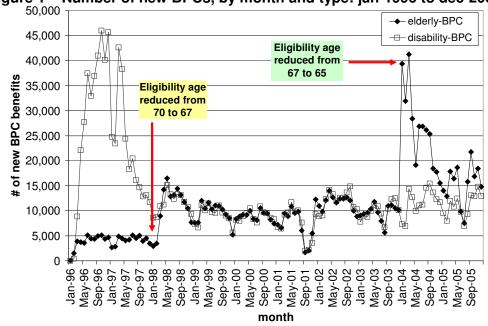
Figure 1 – Number of new BPCs, by month and type: jan-1996 to dec-2005.

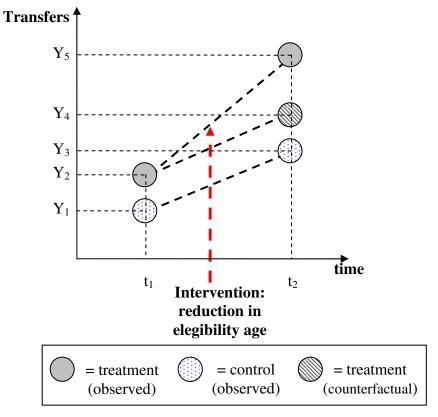Source: *Ministério da Previdência Social* (2006).

We used these two expansions in benefit coverage shown in Figure 1 as exogenous income increases directed to certain age groups (67-69 and 65-66) and the impact is analyzed using a difference-in-difference (DD) approach. The DD technique has been widely used in the social sciences literature. The intuition is illustrated in Figure 2. When measuring the impact of the reduction in eligibility age we are interested in the effect of the treatment on the treated (Y_5-Y_4). Since Y_4 is not observed, the distance Y_2-Y_1 is used to estimate Y_4-Y_3. Subtracting Y_2-Y_1 from Y_5-Y_3 gives an estimate of the effect of the treatment on the treated[3].

In sum, the DD technique uses the temporal trend in the control group to estimate the counterfactual. The main assumption necessary for the DD is that the trend in the dependent variable would be parallel in the absence of the intervention. Although this parallelism cannot be verified empirically, we used data for a prior period (e.g., period t_0 in Figure 2) and estimated this placebo DD comparing period t_0 and t_1.

---

[3] For a formal presentation of the technique see Meyer (1995) and Cameron and Trivedi (2005). Bertrand et al (2004) address some of the possible weak points of this technique.

Figure 2 – Schematic illustration of the impact of the reduction in eligibility age in transfer received by treatment and control groups

Using age groups to indicate treatment and control groups, we estimated the following DD model for each reduction in the age of eligibility:

$$Y = \beta_0 + \beta_1 T + \beta_2 A + \beta_3 TA + \delta X + \varepsilon \qquad \textbf{(Eq. 1)}$$

Where the dummy variables *T* and *A* are as follows:

Table 1 - Dummy variables values for Equation 1

Model:	T		A	
	Control (0)	Treatment (1)	Before (0)	After (1)
1998 age reduction	64-66	67-69	1995, 96, 97	1998, 1999, 2001
2004 age reduction	63-64	65-66	2002, 2003	2004, 2005

X is a vector of socio-economic variables that includes information on sex, education, race, household size and urban/rural status. We estimated Equation 1

using two dependent variables: the probability of receiving transfer and the amount of transfer received.

Data

The data used is from the 1996-2005 PNADs (*Pesquisa Nacional por Amostra de Domicílios*) surveys. These are nationally representative household surveys fielded on an annual basis by the Brazilian Institute of Geography and Statistics (IBGE)[4]. During the 1990s and 2000s, its sample size was around 350,000 individuals.

As the BPC is available only to unemployed elderly with per capita family income below one quarter of the minimum wage, we restricted our sample to capture this population. Since our approach estimates the average impact on the treated, having a treatment group that includes individuals not affected by the BPC expansion (*e.g.,* high income elderly) may underestimate the average impact. Therefore our sample is restricted to elderly that live in families with per capita income below half of the minimum wage and that are not employed[5].

A third restriction was necessary to define the sample, given that BPC is available only to those not retired by the public pension system. All individuals retired by the public pension system were excluded from the sample, with the exception of those who reported to receive exactly the minimum wage value. As pointed by Saywer and Carvalho (2006), since the minimum wage is a very common value of retirement payments in the Brazilian public pension system many BPC beneficiaries may have misreported BPC as retirement income. Instead of dropping from the sample all individuals that reported to receive retirement income equal to the minimum wage, we chose to keep those individuals in the sample and discount this value from the family income when

---

[4] There is no PNAD during a year of Census. Therefore, 2000 is the only year not included in the 1996-2004 interval.
[5] We decided to use one half of minimum wage instead of one quarter to allow for the fact that some families may intentionally underreport their income when applying for BPC. For example, individuals that work in the informal economy are sampled in the PNADs, but may not report their income for BPC.

calculating the eligibility income. One consequence of this strategy is that our results may underestimate the impact of the BPC on the transfers received.

Results

Table 2 summarizes the main results of the impact of the BPC on the interhousehold transfers received by the elderly, based on Equation 1. The values of most interest are the coefficients of the interaction term (*treat x after*). Our model predicts that the percentage of the 67-69 age group receiving interhousehold transfers after the 1998 age reduction was 3 percentage points lower than it would be in the absence of BPC for that age group (Panel A). Instead of the observed 0.6% of the 67-69 age group receiving interhousehold transfers, the models predicts that the value would be 3.6%.

In a similar way, the model predicts that the value of the interhousehold transfer received by those 67-69 after 1998 would be, on average, 2.78 reais higher than it in fact was. This would increase the average value of transfers received from the observed 0.74 reais to 3.52 reais.

In Panel B we present estimates for the 2004 age reduction. The proportion of 65-66 years old receiving transfers would be 2.9 percentage points higher, increasing from the observed 1.7% to 4.6%. A crowding-out effect is also observed in the value of transfers received. According to our model, the average amount of transfers received by those 65-66 in 2004 and 2005 would have been 3.99 reais higher. Instead of the observed average value of 1.91 reais, the average transfer would be 5.90 reais.

Table 1 – Model Estimates

A) 1998 age reduction (from 70 to 67)

	Prob. of receiving interhousehold transfer		Value of interhousehold transfer received	
	Coef.	P>t	Coef.	P>t
treatment	0.009	0.04	0.74	0.17
after	0.015	0.00	1.35	0.01
treat x after	-0.030	0.00	-2.78	0.00
female	0.001	0.66	-0.32	0.33
years of schooling	-0.001	0.01	-0.08	0.21
race_white	-0.005	0.08	-0.75	0.02
other_65up	-0.016	0.00	-1.36	0.00
# members of household	-0.004	0.00	-0.33	0.00
urban	0.005	0.17	0.40	0.36
constant	0.032	0.00	3.53	0.00
[N]	8,462		8,462	
Prob > F	0.000		0.000	
R-squared	0.015		0.008	

B) 2004 age reduction (from 67 to 65)

	Prob. of receiving interhousehold transfer		Value of interhousehold transfer received	
	Coef.	P>t	Coef.	P>t
treatment	0.009	0.27	1.06	0.33
after	0.004	0.53	1.62	0.10
treat x after	-0.029	0.00	-3.99	0.00
female	-0.007	0.14	-2.01	0.00
years of schooling	-0.001	0.07	-0.03	0.77
race_white	-0.009	0.05	-0.49	0.45
other_65up	-0.025	0.00	-2.40	0.00
# members of household	-0.007	0.00	-0.72	0.00
urban	0.015	0.04	0.06	0.95
constant	0.066	0.00	8.14	0.00
[N]	5,435		5,435	
Prob > F	0.000		0.000	
R-squared	0.018		0.011	

Source: PNADs 1995-2005. Notes: OLS estimates. In panel A, treatment group is age group 67-69, control group is 64-66, after the age reduction is 1998, 1999 and 2001, and before the age reduction is 1995, 96 and 97. In panel B, treatment group is age group 65-66, control group is 63-64, after the age reduction is 2004 and 2005, and before the age reduction is 2002 and 2003.

As mentioned in an earlier section, the validity of the DD strategy is closed linked to the parallelism in the temporal trend of the dependent variable in the counterfactual scenario of no intervention. In this sense, Table 2 presents a placebo estimate as a test for the validity of the DD approach. The placebo

estimate re-estimates the model for in which there was no change in BPC, using the same age groups for treatment and control group. The variable *treat x after* is not statistically different from zero for both the probability of receiving transfer and or the value of transfer received. This evidence provides support in favor of the use of the DD technique in the particular case of BPC expansion.

Table 2 – Placebo Model Estimates

A) Placebo estimation (age reduction from 70 to 67)

	Prob. of receiving interhousehold transfer		Value of interhousehold transfer received	
	Coef.	P>t	Coef.	P>t
treatment	0.007	0.26	0.44	0.54
after	-0.001	0.90	-0.48	0.54
treat x after	0.007	0.46	0.98	0.38
female	0.008	0.09	0.38	0.52
years of schooling	-0.002	0.04	-0.17	0.12
race_white	-0.003	0.52	-0.42	0.46
other_65up	-0.019	0.00	-1.94	0.00
# members of household	-0.004	0.00	-0.37	0.00
urban	0.004	0.52	0.68	0.39
constant	0.031	0.00	3.35	0.00
[N]	2,896		2,896	
Prob > F	0.000		0.005	
R-squared	0.013		0.008	

B) Placebo estimation (age reduction from 67 to 65)

	Prob. of receiving interhousehold transfer		Value of interhousehold transfer received	
	Coef.	P>t	Coef.	P>t
treatment	0.025	0.01	2.40	0.03
after	-0.001	0.91	-0.16	0.87
treat x after	0.002	0.87	0.42	0.76
female	-0.006	0.33	-1.82	0.02
years of schooling	-0.004	0.00	-0.27	0.03
race_white	-0.017	0.00	-2.25	0.00
other_65up	-0.061	0.00	-5.79	0.00
# members of household	-0.011	0.00	-1.11	0.00
urban	0.014	0.12	-0.14	0.90
constant	0.092	0.00	11.21	0.00
[N]	3,965		3,965	
Prob > F	0.000		0.000	
R-squared	0.035		0.025	

Source: PNADs 1995-2003. Note: In panel A, treatment group is age group 67-69, control group is 64-66, after the intervention is 1997, and before the intervention is 1995 and 1996. In panel B, treatment group is age group 65-66, control group is 63-64, after the intervention is 2002 and 2003, and before the intervention is 1999 and 2001.

Final Remarks

In summary, the empirical results show that the two reductions in the eligibility age were associated with reductions both in the probability of receiving interhousehold transfers and in the magnitude of transfers received by those in the age groups that became eligible. This indicates that public income transfers may crowd out interhousehold transfers for Brazilian families.

Some next steps in the development of this paper include the examination of alternative econometric models. The OLS estimation technique employed may not be the most suitable technique for the two types of response variables: the probability of receiving transfer (a binary response variable) and the value of transfer received (although a continuous variable, most observations receive zero transfer). Regarding the probability of receiving transfer, estimation techniques in consideration are the use of weighted least squares and the use of nonlinear models, such as the logit. Regarding the value of transfer received, a tobit model is considered for further developments. The use of nonlinear models, however, must be tested with care, since the interpretation of the interaction term is not straightforward as it is in the OLS model. In this sense, the use of logit and tobit estimations should take into account the remarks by Ai and Norton (2003).

Another important improvement considered is to estimate the impact of the BPC not only on the elderly, but also on their household. It is probable that a increase in the elderly income may affect the interhousehold transfers directed to other members of his household. If this is the case, the impact can be much higher. For instance, in 2004 about 1.9% of the elderly 64-69 in our sample received interhousehold transfers, but 4.0% of them lived in households that received transfers that year. Analyzing the impact of the BPC expansions on the households may show larger consequences of the program on interhousehold transfers than the ones estimated in this study.

References

Ai, Chunrong and Norton, Edward C., "Interaction terms in logit and probit models", *Economics Letters*, Elsevier, vol. 80(1), pages 123-129, July. 2003.

Altonji, J., Fumio, H.; Kotlikoff, L. "Parental Altruism and Inter Vivos Transfers: Theory and Evidence". *The Journal of Political Economy*, vol. 105, n. 6, dec. 1997, pp. 1121-1166.

Albarran, P. and Attanasio, O. "Do public transfers crowd out private transfers?" Evidence from a randomized experiment in Mexico. *WIDER Discussion Papers*, n. 2002/06. 2002.

Barro, Robert. "Are Government Bonds Net Wealth?" *Journal of Political Economy*. University of Chicago Press, v. 82, n. 6, p. 1095-1117, nov./dez. 1974.

Becker, Gary. "A theory of social interactions". *Journal of Political Economy*. University of Chicago Press, v. 82, n. 6, p. 1063-1094, nov./dez. 1974.

Bernheim, B., Shleifer, A. and Summers, L. "The Strategic Bequest Motive". *Journal of Political Economy*, vol. 93, n. 6, p. 1045-76. 1985.

Bertrand, M., Duflo, E., and Mullainathan, S. "How Much Should We Trust Differences-in-Differences Estimates?," *The Quarterly Journal of Economics*, MIT Press, vol. 119(1), pages 249-275, February, 2004.

Cameron, A. and Trivedi, P. *Microeconometrics: Methods and Applications*. Cambridge University Press, New York, 2005.

Carvalho, Irineu. *Old-Age Benefits and Retirement Decisions of Rural Elderly in Brazil*. Paper presented at the Latin American and Caribbean Economic Association (LACEA) Annual Meeting. Paris, 2005. Available at: <http://wwwtest.aup.edu/lacea2005/system/step2_php/papers/decarvalhofilho_idec.pdf>

Cox, Donald. Motives for Private Income Transfers. *Journal of Political Economy*, University of Chicago Press, v. 95, n. 3, p. 508-546, jun. 1987.

Jensen, Robert T. "Do private transfers 'displace' the benefits of public transfers? Evidence from South Africa," *Journal of Public Economics*, Elsevier, vol. 88(1-2), pages 89-112, January, 2004.

Juarez, Laura. *Three Essays on Social Policy and the Labor Market: Learning from Mexico*. PhD Dissertation. Department of Economics, University of Texas at Austin. May, 2006.

Kazianga, H. Motives for household private transfers in Burkina Faso, *Journal of Development Economics*, Volume 79, Issue 1, February 2006, Pages 73-117.

Meyer, B. "Natural and quasi-experiments in economics." *Journal of Business and Economic Statistics*, 13(2), 151-161, 1995.

Ministério da Previdência Social. *Base de Dados Históricos do Anuário Estatístico da Previdência Social*. Brasília, 2007. Available at: <http://creme.dataprev.gov.br/infologo2005/inicio.htm>.

Saywer, D. and Carvalho, J. *Estudo e projeção dos índices de cobertura do BPC - Produto 2. Projeto de Avaliação do Benefício de Prestação Continuada*,

Cedeplar – UFMG. Relatório de Pesquisa (mimeo). Belo Horizonte, September 2006.

Sigelman, L. and Zeng, L. Analyzing censored and sample-selected data with Tobit and Heckit models. *Political Analysis*, vol. 8, n. 2, p. 167-182, 1999.

Teruel, G., and B. Davis. Final Report: An Evaluation of the Impact of PROGRESA Cash Payments on Private Inter-Household Transfers. August. International Food Policy Research Institute, Washington, D.C. 2000.