1- INTRODUCTION

Co-habitation is essential in the determination of the people's welfare, since it allows them to share goods, enjoy of the same source of income, give and receive caring and assistance and it reduces economical risks. Frequently, it implicates in intense monetary and non-monetary transfers among individuals of different generations, being relatives or not. The increase of the population's life expectancy, the fall in the fertility rate and the largest frequency in the dissolutions of the marriages and stable unions has been stimulating great interest regarding the new patterns of the elderly's household arrangements, since the largest fragmentation of these arrangements can mean a threat to the nets of private support to the disabled elderly.

In a more general way, the main determinant of the elderly's household arrangement are the demographic factors (size and composition of the relatives' net), the socioeconomic ones and health conditions (Camargos et al, 2007; Saad, 2000; Ghosh, 2007; Marteleto, 2007). Among the determinant factors, income is the most important, and two possibilities are pointed out in the literature: on the one hand, the reception of an income can stimulate the elderly to seek his/her privacy and independence, choosing to live alone (Costa, 1997; McGarry and Schoeni, 1998; Carvalho, 2000); on the other hand, the income received by the elderly, mainly in poverty situations, can attract relatives interested in enjoying those benefits (Edmonds et al, 2001; Saad, 2000; Camarano, 2003; Cioffi, 1998). Therefore, the reception of an income by the elderly would both enable him/her to live alone, and turn co-residence more attractive for the children and other relatives. The purpose of this paper is exactly to test which of those effects prevail when there is an income exogenous shock, such as the reception, by the elderly, of a social benefit previously inexistent.

This discussion is quite opportune in the current context of the several developing countries that have experienced an accelerated population aging, deep changes in the family structures and a wide increase of the social security covering of the elderly. In the Brazilian case these three tendencies are very clear. The Brazilian elderly who, up to 1970, represented less than 3% of the total of the population, in 2020 will respond for about 8.8%

and, in 2050, will reach 18% of the population (Carvalho & Wajnman, 2007). Regarding the changes in the household arrangements, until recently, the Brazilian family could be characterized by the family pattern of a couple with children, typically patriarchal. However, this form of family organization has been losing importance and alternative types of arrangements have become more and more frequent, such as women alone with children, parents alone with children, single women living alone, among others (Medeiros and Osório, 2002; Nascimento, 2006; Berquó, 1989; Goldani, 1994). These changes are reflexes of the changes in the values of the society regarding the family life and the lifestyle, which take the individuals to choose a smaller number of children, or even choose not to have them, as well as neither to get married nor to constitute a family, for instance. These changes are also a reflex of the largest feminine autonomy, caused by the women's largest insertion in the labor market, the legalization and social acceptance of separations and divorces.

In terms of social security, the Brazilian elderly have conquered rights more and more. The Brazilian Constitution of 1988, aimed at guaranteeing minimum rights to a population that has aged quickly and that, in great proportions, is in adverse situations of poverty, universalized the access to social benefits by the elderly, both regarding social security benefits and the e one of transfers of income without contributive link. In the rural area, the elderly who prove any type of agricultural crop for subsistence started to have access to the retirement benefit in the value of a minimum wage. In the urban area, it was instituted, starting from 1996, the Continuous Installment Benefit (BPC), which is a non-contributive transfer of income, in the value of 1 minimum wage, destined to elderly who do not receive retirements and who prove to possess *per capita* familiar income (pcfi) inferior to ¼ of the minimum age. Since its implementation in 1996, the number of granted benefits increased from approximately 50,000 for almost 1 million and a half in 2006 (Statistical Annual Report of the Ministry of Social Security of Brazil, 2006). Thus, in 2006, 10% of the Brazilian population above 60 years old received this benefit.

Therefore, this paper investigates the impact of the Continuous Installment Benefit (BPC) on the composition of the elderly' households in Brazil. The proposal is to verify whether

the reception of this income transfer would increase the elderly' propension to live alone or whether, due to the poverty situation in the which these individuals live, the new income would provoke the relatives' permanence (or even larger attraction) around the beneficiaries.

For the empiric verification, the statistical method of the Difference in Difference and the data of the National Research by Household Sampling (PNAD) for the years of 2002 and 2004 are used. The adopted strategy, to verify the impact of BPC on the elderly' household arrangement, was to use the change in the legislation in 2003, which altered the age limits for the reception of the benefit from 67 to 65 years old, as a proxy for an exogenous income shock. Therefore, a group of elderly who didn't receive the benefit started to have access to the benefit due to the change in the legislation and this group can be compared to another one unaffected by the change in the legislation.

The result obtained with the proposed exercise is that the reception of the benefit increased the elderly's probability of living alone, between 2002 and 2004. In addition, the temporal analysis of the composition of household arrangements for all the elderly above 60 years old in 1985, 1995 and 2005 revealed that the reception of a benefit, in the value of 1 minimum wage, disregard of stemming from retirement, pension or BPC, exerts decisive role in the constitution of the arrangement in which the elderly lives alone.

In the following section, the methodology of the analysis of the BPC impact over the household composition indicative variables is presented. In the fourth part, the evolution of the elderly' household arrangements is analyzed in Brazil in the last two decades, as well as its relationship with income. On the fifth part, the results of the methodological exercise of the impact of the income over the determination of the elderly's household arrangement are presented. Finally, in the last section, the final considerations of the paper are detailed.

2- SOURCE OF DATA AND METHODOLOGY

The data bases of the National Research by Household Sampling (PNAD) of IBGE were used as data sources for the paper. It regards a household sampling research which collects data about households and family arrangements, in addition to a great variety of socioeconomic variables. For the temporal analysis of the composition of the elderly's arrangements the 1985, 1995 and 2005 PNADs were used, and for the causal analysis of the impact of BPC on the elderly's household arrangement, 2002 and 2004 PNADs 2002 were used.

In this paper, the analysis aims at focusing on the household arrangements and, not on the family arrangements. Household can be understood as the person or group of people who live in the same house, with the possibility of having more than a family in this arrangement. Family, which is a subgroup of the household – can be understood as the group of at least two people who have a relative relationship.

2.1 Methodologies of Analysis

The temporal analysis refers to the evolution of the composition of the household arrangements in the last two decades for all the people above 60 years old[1]. The general changes in the composition of the elderly's household arrangements (arrangements in which at least one elderly lives) are analyzed, and then, an analysis of the household composition by quartiles of *per capita* household income is made.

The methodological strategy for the causal analysis of the impact of the BPC reception takes advantage of the fact that, since it was implemented, the BPC suffered changes related to the eligibility criteria to receive the benefit. With respect to the criterion of age, the inferior limit for the eligibility, which corresponded to the age of 67 years old since 1998, fell to 65 years old, starting on January 1, 2004, determined by the elderly's statute.

[1] Elderly include those individuals aged more than 60 years old, according to the 2003 Elderly's Statute 2003 (Brazil, 2003).

Using the methodological strategy suggested by Carvalho (2000) and used by Carvalho (2000) and by Miranda (2007),[2] that legislation change, occurred in 2003, is a form of evaluating the impact of BPC over the elderly' household arrangement. The *63-64 year-old* elderly are taken as controlling group and those aged *65-65 years old* are considered treatment group. Before 2003, both the *63-64 year-old* elderly and the ones aged *65-65 years old* didn't receive BPC, once the minimum age of eligibility was 67 years old. After 2004, the *65-65 year-old* elderly became eligible for the reception of the benefit, while the *63-64 year-old* group remains without that right.

Therefore, the differences in the variables indicative of the household composition (which will be detailed below) between the *63-64 year-old* elderly and the *65-66 year-old* elderly in 2002 and in 2004 are compared. The difference existent between those differences will tell the impact of the change in legislation. Any difference existent between the *63-64 year-old* group and *65-66 year-old group*, in 2002, is explained by the age. In 2004, the difference between the groups due to the age remains, but the impact of the BPC reception is added. The difference, therefore, observed among these groups before and after 2004 can be attributed to the reception of BPC.

The method of the difference in difference allows investigating the impact of a policy on a certain interesting variable. The idea consists of comparing the situation of participants and non-participants of the program (group of treatment and control) in two moments in time: previously to the implementation of the program and one after the implementation of the program. The difference of those differences allows estimating the impact of the program over the analysis variable, or in other words, the average effect of the treatment over the treated.

[2] Carvalho (2000) used the change in the legislation concerning the age limits to the reception of the Rural Retirement to evaluate its impact on the household arrangements. Miranda (2006) used the change in the age limits for the reception of BPC to evaluate the impact of private transfers among households.

Using B and A to denote, "before" and "after" the intervention, the average change in the variable of interest Y in the group treatment is estimated as $E\ (Y_A - Y_B \mid T = 1)$ and in the controlling group, as $E\ (Y_A - Y_B \mid T = 0)$.

Where:

- *Y* is the response variable
- *T* is the treatment or controlling variable

The estimated resulted of the Difference in Difference (DD) it is given by:

$DD = E\ (Y_A - Y_B \mid T = 1) - E\ (Y_A - Y_B \mid T = 0$ **(Equation 1)**

The estimates of the average effect of the treatment, using the method of the difference in difference, can be both calculated through the use of simple averages - as shown in Equation 1 - as well as they can be obtained through regression - according to Equation 2, which follows.

The estimated model is a model logit, once the response variable is a dichotomic categorical variable:

$$\text{logit}\, Yi = \beta 0 + \beta 1 Pi + \beta 2 Ti + \beta 3 (Pix Ti) + \beta 4 Xi + \varepsilon i$$ **(Equation 2),**

where:

- *Yi:* Response variable - Indicative of Household Composition
- *Pi:* Period Variable (it assumes value 0 if the year equals 2002 and value 1 if the year equals 2004)
- *Ti:* Treatment variable (it assumes value 0 if the controlling group is 63-64 years old and it assumes value 1 if the treatment group is 65-66 years old)
- *Pi x Ti: Interaction* variable
- *X'is:* Controlling variables

The coefficient of the interaction variable (β_3) provides the result of the analysis of the impact of BPC benefit reception on analyzed response variables[3] – Indicative of Household Composition.

The result of the coefficient of the interaction is presented in terms of the ratio of the chance ratios[4] (*odd odd ratios*). This coefficient corresponds to the odd odd ratio, once it considers the double difference.

$$\beta_3 = \ln\left(\frac{\dfrac{\text{odds for } T=1, A=1}{\text{odds for } T=1, A=0}}{\dfrac{\text{odds for } T=0, A=1}{\text{odds for } T=0, A=0}}\right)$$

The interpretation of those odd odd ratios corresponds to the net differential, in other words, net of the period effect and of the structural differences among the groups.

In terms of the odd odd ratios, the coefficients found should be interpreted as the probability that the controlling group individuals have to try the event measured by the response variable larger / smaller than the individuals of the treatment group.

It should be clear that the result of the *interaction* term corresponds to the difference among the groups analyzed (*63-64 years old* and *65-66 years old*) in the analyzed periods (2002 and 2004), *i.e.*, the additional of the difference among the groups (*63-64 years old* and *65-66 years old*) is captured along the years (2002 and 2004). In other words, the net result, free from the impact, is searched by eliminating the existing differences among the groups and along the period.

[3] However, Ai and Norton (2003) and Miranda (2007) raise the subject of the difficulty of the direct interpretation of the marginal effect starting from the coefficient of the variable interaction. They argue that, as it is a logit model, the interpretation of the coefficients is not direct as it would be in a model of Ordinary Least Square (OLM). In spite of those statements, as they were dummy variables, the ratio of the ratio of chances would be enough to capture the impact (both signal and magnitude). If the variables were continuous, the analysis of the marginal effect would be necessary and, therefore, the statistical calculations should be used so that the results could be interpreted in an appropriate way.

[4] Once that is still a controversial point in the literature, the results of the models' coefficient are presented both in terms of the odds odds ratio, as well as in terms of the Ordinary Least Square (OLS) Mode and according to the method proposed by Ai and Norton (2003).

The selected response variables Indicative Household Composition were:

1- The elderly's probability to live with somebody - assumes value 0 if the elderly lives alone or 1 if he/she lives with someone;

2- Probability of the presence of children older than 21 years old - it assumes value 0 if there aren't any children and 1 if there are children in the household;

3- Probability of the presence of "other relatives'" in the household - it assumes value 0 if there aren't any other relatives in the household and 1 if there are some other relative in the household.

The DD method still allows the inclusion of controlling variables in the regression (*Xi*'s). These variables are important to guarantee that the comparison among the *63-64 year-old* elderly' groups with the *65-65 years old* groups, for instance, happens among individuals with similar characteristics, such as education level, gender, household location, etc. The controlling variables used were:

- Individual variables: Gender (it assumes value 0 if the individual is a woman and 1 if he is a man); Race (it assumes value 0 if the individual's race/color is white or yellow and 1 if it is black, brown or indigenous); Education (it indicates the amount of years of studies); Couple (it assumes value 0 if the individual is not married and 1 if he is married)

- Variables of Conditions in the household: Walls, Roof, Destiny of the Garbage and Illumination (it assumes value 0 if the condition is bad and 1 if the condition is good); Bathroom and Water (0 if there is bathroom or channeled water in the household and 1 if there aren't any of them);

- Variables of Location of the household: Urban (0 if the census points out that the household location is rural and 1 if it is urban); Metropolitan (0 if area is not metropolitan and 1 if area is metropolitan); Area (0 if household is located in the less developed areas of the country - North, Northeast and Middle-West and 1 if household is in the most developed areas - South and Southeast).

Regarding the identification of the elderly' groups, those should correspond to those elderly eligible to the reception of BPC, excluding, for methodological reasons, the age criterion. Once this group is determined, those elderly people aged *63-64 years old* will be part of the controlling group and those elderly people aged *65-65 years old* will be part of the treatment group.

Regarding the pcfi, only those elderly people whose pcfi is below ¼ of a minimum age are included in the analysis. Once, with the BPC income, the elderly people will probably have a pcfi larger than ¼ of a minimum age, it is necessary to deduce 1 minimum age from the elderly who receive BPC, in order to allow his/her identification. Therefore, the income from which the reception of BPC is deduced is considered.

Once identified the elderly with pcfi inferior to ¼ of the minimum age, those elderly who don't receive social security benefit, according to the eligibility criteria, are selected (those who declared to have neither retirement nor pension reception).

As there are many declaration mistakes regarding the reception of BPC, once many elderly, erroneously, declare BPC as retirement (Soares et al, 2006 and Sawyer & Carvalho, 2006), the decision was to still consider those elderly who declared to receive the exact value of 1 minimum of retirement as possible receivers of BPC, as suggested by Miranda (2007). By making this decision, the receivers' of BPC group is inflated with retirement receivers, which could alter the analysis. However, to cope with that problem, not only the *65-66 year-old* elderly receivers of 1 minimum age in the subsequent year to the change in the legislation were considered, but all the *63-64 year-old* and the *65-66 year- old* elderly, before and after the change, who received 1 minimum age of retirement. Therefore, the reception of 1 minimum age of retirement exerts influence in the household arrangement of all those groups. However, for the *65-66 year-old* group after the change, in other words, that group that really receives the BPC, the measured effect corresponds to the sum of both the reception of BPC and the retirement erroneously declared. Consequently, when comparing the groups, through the difference in difference, it is expected to capture the exclusive effect of the reception of BPC.

For the calculation of the pcfi eligibility for BPC, the income of the following family members was counted: the elderly's income, of his/her spouse and of the 21 year-old (and under) children, all residing in the household. The considered individual income is the

individual's total income, including all the social security and work incomes, and the transfers from the government and among households.

Once defined the controlling and treatment groups, the analysis of those individuals' household composition starts. The elderly considered in the analysis could assume the position of boss, spouse, son or other relative in the household. Among those, in order to facilitate the analysis, the elderly who assumed bosses or spouses' positions in the household were the only ones considered.[5] Therefore, the econometric analysis concentrates on verifying the impact of the reception of BPC on the elderly bosses or spouses in the household.

Having defined all those steps, the results of the BPC impact over the household arrangement are presented in section 5. Prior to that, however, in the following section the temporary analysis of the elderly's household arrangements is presented.

3- COMPOSITION OF ELDERLY'S HOUSEHOLD ARRANGEMENTS, HIS/HER RELATIONSHIP WITH THE INCOME, IN 1985, 1995 and 2005

In this section, the results of the temporary analysis of the household composition of the elderly' arrangements are presented along the last two decades, emphasizing the relationship of the arrangements with the income. The 1985, 1995 and 2005 PNADs were used and all the elderly that assume bosses, spouses or other relatives' positions in the household were selected. In the temporal analysis, the elderly who assumed "other relatives'" position in the household were maintained.

In TABLE 1, the evolution of the elderly' household arrangements is presented in the last two decades. The categories 1 to 12 correspond to those in which the elderly assume the positions of "bosses" or "spouses." On the other hand, categories 13, 14 and 15 are those in which the elderly assume "other relatives'"" position. The elderly' great majority assumes

[5]The elderly who assumed son's position in the household were not considered in the sample, due to the few observed cases. Regarding the elderly who assumed another relative's position in the household, in spite of the fact that the number of cases was significant, they were removed from the sample due to the difficulty in identifying the exact family relationship between them and the other family members.

the position of bosses or spouses (categories 1 to 12) and this proportion has increased along the analyzed years.

TABLE 1
Evolution of the proportion of households according to elderly's household arrangements in the periods of 1985, 1995 and 2005, Brazil

Types of elderly's household arrangements - Categories	1985	1995	2005
1 "elderly couple living alone"	13.7	14.9	16.6
2 "elderly couple + other relatives"	3.3	3.4	3.4
3 "elderly (man) living alone"	4.1	4.6	5.6
4 "elderly (man) + other relatives"	0.7	0.7	0.7
5 "elderly (woman) living alone "	8.7	10.6	11.6
6 "elderly (woman) + other relatives "	4.0	4.3	4.6
7 "elderly couple with children"	22.3	19.5	16.7
8 "elderly couple with children + other relatives"	10.3	10.6	9.7
9 "elderly (man) with children"	2.0	2.0	2.0
10 "elderly (man) with children + other relatives"	1.3	1.3	1.3
11 "elderly (woman) with children"	7.3	7.9	8.7
12 "elderly (woman) with children + other relatives "	5.5	6.8	8.0
13 "single man with elderly relative"	2.1	1.7	1.5
14 "single woman with elderly relative"	3.3	3.2	3.5
15 "young couple with elderly relative"	11.4	8.5	6.2
Total	100.0	100.0	100.0

Source: 1985, 1995 and 2005 PNADs
Note: 1) the term elderly couple corresponds to the union among two people, in which at least one of them is above 60 years old. The term young couple corresponds to that union, in which none of the individuals is elderly.

Naturally, the population aging and the increase of the longevity modify the household arrangements. Due to the dynamics of the matrimonial family system, the children leave the houses to constitute new families and, consequently, the trend is that the individuals, when they get old, stay alone in their households.

The reduction of the proportion of arrangements of the "elderly couple with children type " (category 7) the increase of the categories proportion "elderly couple living alone", (category 1) "elderly (man) living alone" (category 3) and "elderly (woman) living alone" (category 5) can, however, be not only reflecting the population aging, but, also, the importance that the elderly's income has in enabling him/her the choice of an arrangement in which the privacy can be respected (TABLE 1). The enlargement of the social security covering in the last years should certainly influence the elderly's possibility of living alone.

In addition to these categories, those in which the elderly assume "other relatives'" position in the household – “single man with elderly relative", (category 13), “single woman with elderly relative" (category 14) and “young couple with elderly relative" (category 15) - also present results that can take to a similar analysis. It bears emphasizing, mainly, the significant reduction in the proportion of the arrangements of "Young couple with elderly relative" type (category 15), which practically was reduced in half. This significant reduction seems to indicate larger autonomy of the elderly, who can change from "other relatives'" position to household "bosses" if his/her income allows it (TABLE 1).

Other results of TABLE 1, can, however, indicate the importance of the elderly's income for the children and grandchildren’s sustenance, as well as does the literature suggest (Camarano, 2003). It bears noticing both the increase in the proportion of the arrangement “elderly (woman) with children", (category 11), as well as “elderly (woman) with children + other relatives” (category 12). Due to the relatives' economical difficulties, a lot of times, the co-residence need would state youth’s idea, who would benefit from the elderly's income. However, with respect to the categories "elderly (man) with children" and (category 9) "elderly (man) with children and other relatives", (category 10) it bears emphasizing the fact that the proportion of these households remained constant at only 2% and 1.3%, respectively, in the three analyzed periods. Therefore, this result relative to the importance of the elderly's income in the children and grandchildren’s care is especially with regard to the elderly. It is believed that this result is reflex of the women's trend to constitute more households under their leadership, added to the longer life expectancy. In that sense, the gender subject should be better explored for the understanding of the phenomenon.

In TABLE 2, the categories are cut according to pchi quartiles. The results elucidate better the subject of the elderly' household arrangements, their evolution and their relationship with income. In first place, it bears noticing the hike, in the proportion of households of “elderly (man) living alone" (category 3) and "elderly (woman) living alone" (category 5) types, when moving from the 1st to the 2nd quartile of income, in any one of the 3 years

analyzed. Taking the year of 2005, as example, it is noteworthy that the proportion of "elderly (man) living alone" (category 3) hikes from tiny 1.3% to 9.2%. Regarding the arrangement "elderly (woman) living alone", the variation is even more significant, passing from 1.1% to 18.1%.

TABLE 2

Proportion of the households with elderly by type of household arrangement for quartiles o fper capita household income in 1985, 1995 and 2005, Brazil

	Types of elderly's household arrangements - Categories	1985				1995				2005			
		Income Quartile				Income Quartile				Income Quartile			
		1º	2º	3º	4º	1º	2º	3º	4º	1º	2º	3º	4º
1	"young couple living alone"	10,4	14,1	13,0	17,4	9,5	15,4	15,6	19,2	8,5	17,6	19,3	21,1
2	"young couple with another relative"	5,1	3,0	2,8	2,3	4,7	3,6	2,6	2,6	5,1	3,3	2,8	2,3
3	"Elderly man living alone"	0,7	5,8	5,6	4,5	1,4	5,6	6,4	5,0	1,3	9,2	5,2	6,7
4	"Elderly man with another relative"	0,8	0,7	0,7	0,7	0,8	0,8	0,6	0,6	0,7	0,7	0,7	0,6
5	"Elderly woman living alone"	2,7	15,4	8,2	8,6	1,8	15,3	13,5	12,2	1,1	18,1	11,9	15,2
6	"Elderly woman with another relative"	6,3	3,4	3,5	2,7	6,2	4,3	3,4	3,2	6,9	4,1	4,0	3,5
7	"young couple with children	25,8	19,2	21,3	23,1	21,6	16,9	18,8	20,7	19,0	12,4	17,7	17,7
8	"young couple with another relative"	13,9	10,0	9,9	7,2	17,1	9,6	8,6	6,7	18,3	7,9	7,1	5,6
9	"Elderly man with children"	1,6	1,8	2,3	2,2	2,1	1,7	2,0	2,1	2,1	1,6	2,0	2,2
10	"Elderly man with children and another relative"	2,0	1,1	1,2	1,0	2,2	1,1	1,0	1,0	2,6	1,0	1,0	0,7
11	"Elderly woman with children"	6,2	7,0	8,5	7,4	6,8	7,5	8,4	9,2	7,0	7,7	10,8	9,1
12	"Elderly woman with children and another relative"	8,3	5,2	4,8	3,5	10,7	6,9	5,4	4,0	13,9	7,8	6,2	4,0
13	"Single man with elderly relative"	1,2	1,9	2,7	2,6	1,3	1,4	2,1	2,2	1,2	1,2	1,7	1,9
14	"Single woman with elderly relative"	3,0	2,7	3,4	4,0	3,6	2,6	3,0	3,6	3,8	2,7	3,8	3,7
15	"young couple with elderly relative "	11,9	8,8	12,0	12,9	10,3	7,3	8,5	7,9	8,6	4,6	5,9	5,7
	Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Source: 1985, 1995 and 2005 PNADs.

This enormous variation, from the 1st to the 2nd quartile, it is explained by the reception of 1 minimum age of retirement, pension or even BPC, because it is exactly in the 2nd quartile that the value of 1 minimum age[6] stays. It bears mentioning that the elderly' proportion in the 2nd quartile presented very high values. Among all the incomes located in the 2nd quartile, the reception of a retirement, a pension or an income of the BPC type produces an extraordinary effect in the composition of the elderly' arrangements, enabling great proportion of them to live alone. These incomes, supposedly, should provide larger

[6] In 2005, the value of the MW (R$ 300.00) is in the 2nd quartile (households with pchi among R$ 200 and R$ 305). Similarly, in 1995, the value of the MW (R$ 100) is in the 2nd quartile (households with pchi among R$ 75 and R$ 125). Regarding 1985, the great wage variation in the period hindered the precise collection of that information

autonomy to the elderly for him/her to decide on his/her household arrangement, being evident the importance of the income that values 1 minimum age in the determination of the household arrangement of the types "elderly (man) living alone (category 3), "elderly (woman) living alone" (category 5) and "elderly couple living alone" (category 1).

Another interesting result is that, in all the categories where there is "other relatives" living in the household, the highest the income, lower are the proportions of households in those categories. That is because people tend to join together in order to combat the effects of the poverty and the presence of other relatives is an indicator of that situation.

In the following section the impact of BPC in the determination of the household arrangement will be evaluated. Both the elderly's possibility to live alone and the possibility of relatives' aggregation around the new received income can, theoretically, be affected by the reception of BPC.

4- RESULTS OF THE IMPACT OF BPC OVER THE ELDERLY'S HOUSEHOLD ARRANGEMENT

4.1 Descriptive Analysis of the BPC beneficiaries vis-à-vis the non-beneficiaries

In this first part, the household arrangements of the elderly who form the controlling and treatment groups are analyzed, as specified in the methodology. It bears reminding that the elderly considered in this chapter are those *63-64 year-old* and *65-66 year-old* bosses and spouses.

TABLE 3 presents some results of the descriptive analysis of the variables related to individual characteristics, as gender and race, and of variables related to the geographical location of the residents selected for the analysis. It bears noticing that, as expected, the individuals of the controlling and treatment groups are very similar, since all of them are elderly and, mainly, possess pcfi lower than ¼ of a minimum age.

TABLE 3

Percentages, Averages and Standard Deviations of the descriptive variables selected for the elderly of the treatment and controlling groups in 2002 and 2004

Selected variables	"63-64 years old"		"65-66 years old"	
	2002 (prior to the change)	2004 (after the change)	2002 (prior to the change)	2004 (after the change)
Gender (men percentage)	47.37	42.86	52.02	47.15
	(0.5)	(0.5)	(0.5)	(0.5)
Race (whites percentage)	38.85	37.23	40.71	40.09
	(0.49)	(0.48)	(0.49)	(0.49)
Education (Average of Years of Study)	1.82	1.88	1.76	1.87
	(2.61)	(2.9)	(2.53)	(2.64)
Census situation (percentage of residents in the urban area)	75.39	76.29	77.71	76.73
	(0.43)	(0.43)	(0.42)	(0.42)
Region (percentage of residents in the South and Southeast regions)	32.66	32.67	35.38	36.04
	(0.47)	(0.47)	(0.48)	(0.48)
Metropolitan (percentage of residents in the metropolitan area	28.95	28.57	25.53	29.73
	(0.45)	(0.45)	(0.44)	(0.46)

Source: Own elaboration starting from 2002 and 2004 IBGE/PNADs
Note: Standard deviations in parentheses

After that, considering the data from TABLE 4, the result of the descriptive analysis of the composition of the BPC beneficiaries and non-beneficiaries' household arrangement is analyzed. The terms "age effect" is used to designate the difference among the *63-64 years-old* and *65-66 years-old* groups, when it is supposed that the difference found among these two groups is just due to the age and the term "BPC effect" is used to designate the difference among those same two groups occurred due to the BPC income shock.

TABLE 6

Absolute and Relative Values of the elderly by type of household arrangement and Percentage Variation between the treatment and controlling groups in 2002 and 2004

Household arrangements categories		2002					2004				
		"63-64 years old"		"65-66 years old"		Proportional change	"63-64 years old"		"65-66 years old"		Proportional change
		Abs	%	Abs	%		Abs	%	Abs	%	
1	"Elderly living alone (man or woman)"	38838	13.8	41093	14.9	0.08	36380	12.1	57382	19.4	0.61
2	"Elderly married without children and other relatives"	40089	14.2	44076	16.0	0.12	48222	16.0	44764	15.1	-0.05
3	"Unmarried elderly with children and other relatives"	74990	26.6	75676	27.4	0.03	91382	30.3	89030	30.1	-0.01
4	"Elderly married with children and other relatives"	127740	45.4	114936	41.7	-0.08	125135	41.6	104387	35.3	-0.15
Total		281657	100.0	275781	100.0	-	301119	100.0	295563	100.0	-

Source: 2002 and 2004 PNADs

Note: The category no-married "unmarried elderly with children and other relatives" corresponds to the sum of the categories “unmarried elderly with children" and "unmarried elderly with children and other relatives." The same is valid for the category “elderly married with children and other relatives"

The objective of this analysis is to verify whether the marginal reception of BPC had some effect in the *65-66 year-old* elderly's group after the change in the legislation. As it is verified, this first analysis reveals solid and interesting results.

In first place, it is possible to observe, in TABLE 6, that in 2002, the percentage variation among the *63-64 year-old elderly* and the *65-66 year-old elderly* who live alone (category 1) reached 8%. The supposition is that this result was only due to the age effect. A larger proportion of elderly living alone in the *65-66 year-old age,* rather than the *63-64 year-old elderly* reveals, supposedly, a larger probability for the children to have already left the parents' house and for the spouse to have already died. On the other hand, the difference among those groups in 2004 was significantly larger, at 61%. The supposition is that this fact is due to the BPC effect added to the age effect, assuming that other shocks of any nature have not happened in the period.

Passing directly for the other extreme, the category “married elderly with children and other relatives" (category 4) - with respect to the "age effect", among the *63-64 year-old* elderly and

65-66 year-old ones, in 2002, the result is a negative variation of 8%. This result is coherent with the above-mentioned hypothesis that as the elderly's age increases, the chance that the elderly's children have already left their parents' house and that there are no longer spouses sharing the household increase. If these elderly are analyzed in 2004, the percentage variation increases to 15%, what corroborates the previous result indicating that the reception of BPC competes for the reduction of the elderly' proportion who live in more numerous households (in this case, with spouses, besides children and other relatives).

The analysis of the other types of arrangement of the table, "married elderly, without children and other relatives" (category 2) and "unmarried elderly, with children and other relatives" (category 3) present results of more difficult interpretation, since the changes occurred can be due to effects of contrary signs. If the age reduces the probability of both an elderly to have a spouse and of having children and other relatives at the household, therefore, age effect can present any sign in each one of those categories.[7]

As a conclusion, this initial analysis called the attention, mainly, to the impact of BPC on the households of elderly who live alone. This is coherent with the result of section 3, which evidenced the importance of an income of 1 minimum age on the independent household arrangement. The conclusion is that the elderly who are BPC beneficiaries are added to the elderly that, due to the reception of a minimum income, could choose an arrangement that respected their privacy.

In the next pages that descriptive analysis will be deepened with the statistical tests of significance. The impact of BPC on the following response variables will be verified - Indicative of Household Composition -: the elderly's probability to live with somebody (to live alone), probability of the presence of children (older than 21 years old), probability of the existence of "other relatives" presence.

4.2 The result of the analysis of the method Difference in the Difference

[7] The analysis of more disaggregated categories of household arrangements would elucidate those tendencies better. However, very specific categories of household arrangement implicate a very limited number of observed cases, hindering the statistical analyses.

In the first place, the impact of BPC is analyzed about the probability of the elderly to live with somebody. In order to make clear, to "living with somebody" refers to any situation in which he/she doesn't live alone. It is possible to live with spouse, children or "other relatives", whichever the combination may be. The verification of the impact is given, in TABLE 7, by the coefficient of the variable *interaction*. Four models were estimated. In the first one, only the variables *interaction, year* and *treatment* were included. It bears observing that the interaction coefficient (which supplies the impact result) is statistically significant. The variables *year* and *treatment* in the model serve to purge the existent differences among the two analyzed periods (variable *year*) and between the treatment and controlling groups (variable *treatment*). Therefore, the result says that, removing those differences, the net impact of BPC on the probability of the elderly to live with somebody was negative and statistically significant. Therefore, the reception of the benefit, given by the change in the legislation, provoked a reduction in the elderly' probability to live with somebody.

The magnitude of that reduction cannot be obtained directly by the value of the interaction coefficient, once the model is of the logit type. In order to obtain that magnitude, the chance ratio is used. Under the interpretation of the chance ratio, it can be said that the controlling group has a probability 57% larger of living with somebody than the treatment group, considering the difference among the periods and among the groups (the chance of living with somebody is 57% larger for the elderly who, supposedly, don't receive the BPC). It is worth to recall that this is a difference among the groups and among the periods, in other words, the additional of the difference among the groups along the years is captured.

Still in TABLE 7, in model 2, in addition to the variables *interaction, year and treatment*, the controlling variables of *gender, race and education* are also included. It bears observing that, even when inserting those variables, the coefficient of the variable *interaction* stays negative and statistically significant. The same can be said about the inclusion of the other variables*, roof, walls, bathroom,* aguacana*, garbage, illumination, sitcen, metropolitan* and *area*, in the model 3.

In addition to the result of the BPC impact, the analysis of the model's independent variables allows to make inferences on the household arrangements. The models indicate that being white or yellow, belonging to the urban area, being located in the South or Southeast area and having good conditions of garbage drainage reduces the elderly's chance of the elderly to live with somebody. On the other hand, larger education increases his chance to live with somebody.

TABLE 7

Estimates of the Models of Logistics Regression – Dependent Variable: Elderly's Probability to live with somebody in the household (in opposition to living alone)

Living with somebody	Model 1			Model 2			Model 3		
interaction	-0.45	(0.22)	**	-0.46	(0.22)	**	-0.49	(0.23)	**
year	0.13	(0.17)		0.13	(0.17)		0.13	(0.17)	
treatment	-0.08	(0.16)		-0.07	(0.16)		-0.04	(0.16)	
gender				0.06	(0.11)		0.07	(0.11)	
race				-0.25	(0.11)	**	-0.2	(0.12)	
education				0.06	(0.02)	**	0.06	(0.02)	**
roof							-0.08	(0.34)	
walls							0.47	(0.23)	**
bathroom							0.23	(0.21)	
water							0.48	(0.17)	*
garbage							-0.43	(0.25)	***
illumination							0.36	(0.27)	
urban							-0.72	(0.19)	*
metropolitan							0.02	(0.13)	
area							-0.45	(0.13)	*

Source: Own elaboration starting from IBGE/PNADs 2002 and 2004, using regression of Equation 2.

Note: 1) * * * it indicates significant at 10%, * * significant at 5% and * significant at 1%

2) The standard deviations are in parentheses

3) Result of the interaction in terms of chance ratio (1/exp (β) = 1.57

4) Result of the OLS interaction coefficient (-0.0589) and in line with the method suggested by Ai and Norton (-0.0617). It bears noticing that the sign of the interaction doesn't change as using OLS as using the method suggested by Ai and Norton.

Regarding the other response variables analyzed "presence of children older than 21 years old in the household" and "other relatives' presence in the household", the results of the interaction were also negative and statistically significant, indicating that the reception of the BPC increased the chance for the BPC receiver elderly to live without children and

other relatives in comparison with the elderly who doesn't receive BPC benefits (please, see annex 1 – TABLE 8 and TABLE 9).

5- FINAL CONSIDERATIONS

This paper analyzes the relationship between income and the composition of the elderly's household arrangements in Brazil. The investigation considers two premises of literature on the theme: the reception of an income would both allow the elderly to choose privacy in his/her arrangement, and turn co-residence attractive for the relatives.

In the temporal analysis of the composition of the elderly's household arrangements, using 1985, 1995 and 2005 PNAD data, the importance of the income in the arrangements where the elderly people live alone is clear. The larger the income, the larger the elderly's possibility to live alone. It bears noticing that the value of 1 minimum age, which is the poor elderly's typical income in Brazil, attended by some type of social transfer, is decisive for the independent household arrangements.

The result of the econometric analysis of the BPC impact, using the statistical method of the "difference in difference" and the 2002 and 2004 PNAD data also showed that the BPC increases the elderly's probability to live alone. The results of this analysis are quite plausible once the elderly analyzed were those "young" elderly, in other words, people whose health condition, in a general way, allow the option for privacy and independence in the household arrangement. In addition, the BPC is a non-contributive income that works like an exogenous shock of income, destined to the elderly who probably imagined himself/herself depending financially on some relative for all his/her old age. Consequently, it is supposed that the power of the elderly's decision modifies completely with the reception of income, making possible his/her independence.

It can be said, in a general way, that the contribution of this paper is to consider a hypothesis concerning the behavior of the poor elderly in light of an exogenous reception of income. The understanding of that phenomenon helps the understanding of the household

arrangements' trends in the future, and the elaboration and execution of social policies. If an income like the BPC increases the elderly's chance to live alone, as the result signals, forms of attendance to the elderly should be thought of, such as complementary policies, once the elderly population will age and probably accumulate disabilities. Another subject highlighted is that, for the "youngest" elderly, this non-contributive income, in principle, can stimulate them to look for an arrangement where they obtain privacy and independence. However, as they become older, the relatives' cares should become necessary, and the co-residence can happen again.

Finally, for the best understanding of the results found, other aspects related to the elderly should be included in subsequent studies. The senior's health and his/her age have a great importance in the determination of the elderly's household composition. Healthy elderly can exercise their preferences, while weakened elderly will certainly need cares. The same is valid for the age. Young elderly will probably present better health conditions, while the oldest elderly, will certainly present more disabilities. Another important factor to be considered is the gender subject. A differentiated analysis for the men and women's household arrangements should be done. In addition to the autonomy that they have been conquering, women have larger life expectancy, compared to men, and jointly, these two factors impact the composition of the elderly' households, differentiating them from the others.

6- ANNEX

TABLE 8
Estimates of the Models of Logistics Regression – Dependent Variable: Elderly's Probability of the presence of children older than 21 years old in the household

Presence of children older than 21 years	Modelo 1			Modelo 2			Modelo 3			Modelo 4		
interation	-0.26	(0.16)	***	-0.27	(0.16)	***	-0.30	(0.16)	***	-0.28	(0.16)	***
year	0.12	(0.11)		0.11	(0.11)		0.10	(0.11)		0.11	(0.11)	
treatment	0.00	(0.11)		0.02	(0.11)		0.03	(0.12)		0.04	(0.12)	
gender				-0.37	(0.08)	*	-0.32	(0,08)	*	-0.46	(0.08)	*
race				-0.29	(0.08)	*	-0.32	(0.09)	*	-0.32	(0.09)	*
education				0.06	(0.02)	*	0.04	(0.02)	**	0.04	(0.02)	**
roof							0.18	(0.25)		0.19	(0.25)	

walls							0.15	(0.19)		0.11	(0.19)		
bathroon							0.07	(0.15)		0.04	(0.15)		
water							0.30	(0.13)	*	0.30	(0.13)	*	
garbage							-0.02	(0.16)		-0.01	(0.16)		
ilumination							0.07	(0.19)		0.08	(0.19)		
urban							-0.10	(0.12)		-0.05	(0.12)		
metropolitan							0.37	(0.10)	*	0.40	(0.10)	*	
area							-0.07	(0.09)		-0.07	(0.09)		
couple										0.35	(0.09)	*	

Source: Own elaboration starting from IBGE/PNADs 2002 and 2004, using regression of Equation 2.
Note: 1) * * * it indicates significant at 10%, * * significant at 5% and * significant at 1%
2) The standard deviations are in parentheses
3) Result of the interaction in terms of chance ratio (1/exp (β) = 1.30
4) Result of the OLS interaction coefficient (-0.061) and in line with the method suggested by Ai and Norton (-0.058). It bears noticing that the sign of the interaction doesn't change as using OLS as using the method suggested by Ai and Norton.

TABLE 9

Estimates of the Models of Logistics Regression – Dependent Variable: Elderly's Probability of the presence of "other relatives'" in the household

Other relatives' presence in the household	Modelo 1			Modelo 2			Modelo 3			Modelo 4		
interation	-0,30	(0,16)	***	-0,31	(0,17)	***	-0,30	(0,17)	***	-0,31	(0,17)	***
year	0,05	(0,11)		0,03	(0,12)		0,01	(0,12)		0,01	(0,12)	
treatment	-0,01	(0,12)		0,02	(0,12)		0,01	(0,12)		0,01	(0,12)	
gender				-0,48	(0,08)	*	-0,43	(0,09)	*	-0,41	(0,09)	*
race				-0,39	(0,09)	*	-0,32	(0,09)	*	-0,32	(0,09)	*
education				0,02	(0,02)		0,01	(0,02)		0,01	(0,02)	
roof							0,03	(0,27)		0,02	(0,27)	
walls							-0,07	(0,2)		-0,06	(0,2)	
bathroon							-0,06	(0,16)		-0,05	(0,16)	
water							0,15	(0,13)		0,15	(0,13)	
garbage							0,18	(0,17)		0,17	(0,17)	
ilumination							0,51	(0,22)	**	0,51	(0,22)	**
urban							0,24	(0,13)	***	0,23	(0,13)	***
metropolitan							-0,05	(0,1)		-0,05	(0,1)	
area							-0,42	(0,1)	*	-0,42	(0,1)	*
couple										-0,07	(0,09)	

Source: Own elaboration starting from IBGE/PNADs 2002 and 2004, using regression of Equation 2.
Note: 1) * * * it indicates significant at 10%, * * significant at 5% and * significant at 1%
2) The standard deviations are in parentheses
3) Result of the interaction in terms of chance ratio (1/exp (β) = 1,35
4) Result of the OLS interaction coefficient (-0.0655) and in line with the method suggested by Ai and Norton (-0.0684). It bears noticing that the sign of the interaction doesn't change as using OLS as using the method suggested by Ai and Norton.

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