Impacts of Bolsa Familia Program on multidimensional poverty

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Abstract

Poverty is a multidimensional concept, which is made up of contemporaneous capability deprivations that attack individuals and families, and also generates a stable situation of disadvantage. In fact, the interlinkages among deprivations can foster a robust poverty status that do not allow to escape from disadvantage easily. In this sense, policies based on human rights and freedoms, that are made up of interconnected and integrated interventions focused on different dimensions can have the power to tackle multidimensional poverty and to reduce its level over time, increasing the efficacy of the policy system in including families in the socio-economic system. Hence, my article is a case study which wants to inspect the role of the Bolsa Familia policy in reducing multidimensional poverty, and the intensity of disadvantage due to its ability to attack different deprivations, and to weaken their linkages. Specifically, I want to analyse the effect of Bolsa Familia on different families, from the least poor to the most vulnerable, in order to suggest the extent of the impact of this policy on multidimensional poverty. The results point out that Bolsa Familia has positive effect on multidimensional poverty status of the Brazilian recipient families, and on poverty intensity, as well as on vulnerable households.

Keywords: Bolsa Familia, Capability, Human Rights, Multidimensional Poverty, Poverty Intensity

1. Introduction

The capability approach (CA) points out that poverty is a multidimensional concept, specifically it is about the lack of fundamental capabilities which do not allow individuals to live a dignified life (Sen, 1981; Sen, 1999). Also, Sen, one founder of this approach, suggests that the main role of public policy, especially of social security, is about bringing entitlements to individuals and families (Drezè and Sen, 1995; Sen, 1988; Sen, 1987). In fact, individuals may face interlinked deprivations which create a joint burden of disadvantage (Sen, 1994) and the role of integrated, capability-oriented policy (Dreze' and Sen, 2013; Retherford and Ogawa, 2006; National Institute of Population and Social Security Research, 2003), such as Bolsa Familia, is about targeting interrelated deprivations contemporaneously in order to weaken their links and to decrease poverty in an effective way. In this respect, several studies have dealt with the impacts of Bolsa Familia on single dimensions (see section 3), such as health, schooling, and labour force participation, however, to the best of my knowledge, none has explored its impact on multiple simultaneous deprivations using causal analysis yet. I want to fill this gap in the literature by evaluating the impact of the CA-oriented program Bolsa Familia in the space of multidimensional poverty for both the vulnerable and the least poor, using an MPI based on the Alkire-Foster methodology (Alkire and Foster, 2007). Moreover, this article wants to fill the gap in the literature about the effect of Bolsa Familia on the intensity of multidimensional poverty, by inspecting the reduction in the mean number of deprivations over time, which is useful to suggest the ability of this policy to tackle the burden of multidimensional poverty. Specifically, Bolsa Familia is a complex social programme, which integrates conditional cash transfers with a set of coordinated and interconnected interventions targeted at the claimants of this policy. In this sense, it attacks multiple deprivations contemporaneously and contributes to tackling the intensity of multidimensional poverty too. Therefore, Bolsa Familia is very interesting and suitable programme to analyse the impact of CA-oriented interventions on multidimensional poverty. Specifically, I propose a Multidimensional Poverty Index (MPI), similar to the Global MPI published by OPHI, but also including dimensions relevant to the country-specific context, such as child labour, informal labour, and participation

in the community (Simoes and Sabates, 2014). In fact, these country-specific dimensions are explicit and implicit goals of Bolsa Familia, as it protects children's rights, and because the structure of this policy allows for an increase in formal jobs and in civil society participation, including the participation in the decision-making at local level.

The main findings of this article suggest that this policy contributes to reducing poverty in cooking fuel, social connectedness, child labour and it has a negative effect on undernutrition. Moreover, this program has some positive effect on the poverty status of claimant households, including the poverty situation of vulnerable families. Further, it has a role in tackling the intensity of disadvantage.

In the future, it might be interesting to inspect the drivers through which Bolsa Familia contributes to tackling multidimensional poverty. Also, further research should evaluate the role of Bolsa Familia in affecting the economic and labour inclusion of recipients, such as achieving good quality of jobs and influencing income as well as savings. Moreover, future analysis may investigate the potential of Bolsa Familia to allow for permanent escape from multidimensional and income poverty in terms of number of years in which families have been able to escape poverty and disadvantage. Finally, future research should focus on the effect of this policy to break intergenerational transmission of income poverty and disadvantage, that is about evaluating the inclusive role of Bolsa Familia for children. Extensions to the current paper would, however, require better data.

2. The Bolsa Família Program

Bolsa Familia is a social security programme implemented in 2004, which has been designed by merging four interventions, Bolsa Alimentação, Bolsa Escola, Auxilio Gas and Programa do Cartão Alimentação. This conditional cash transfer aims to transfer cash to recipients under certain conditions, such as parents sending children to school and to periodical health checks. Specifically, in 2004, to be eligible a family has to earn at most up to $50 of monthly per capita income (extreme poverty line) or from $ 50.1 to $ 100 income and has to have at least one child below 17 years old (Hellmann, 2015). The aim of the Brazilian authorities is stimulating improvements in children's education, health, social inclusion, and standards of living, which are important per se and have an instrumental role in the reduction of other deprivations. In brief, Bolsa Familia wants to increase the chance for poor families to escape intergenerational multidimensional poverty, and it aims to protect fundamental entitlements. In fact, the Brazilian Constitution states that Bolsa Familia has the goal to protect education, health and social security, which are considered important human rights in order for Brazilian households to be permanently included in the society (Midgley and Piachaud, 2013; Drèze and Sen, 2013). Particularly, Bolsa Familia is an integrated policy whose main feature is about targeting three main interrelated deprivations: low health, low education, low-income security contemporaneously, by delivering fundamental services to the recipients. This policy is managed both at Federal and at decentralized level. Municipalities are responsible for the registration of all potential beneficiaries in the Cadastro Unico, and this information is used by the Federal Government to send transfers directly to the female head of the recipient family, on monthly basis. Also, municipal authorities monitor the compliance of the conditionalities and report the results to the Federal Government, which can suspend and cancel the transfers to the families that do not abide with the rules. Both activities of the local governments are paid by the Federal Government through administrative transfers delivered to the municipalities. Moreover, local authorities may add other funds to increase the cash transfers to their recipient households (Parsons, 2015; Bastagli, 2006). In addition, the interlinked structure of the Bolsa Familia contributes to reducing the strength of the linkages among deprivations and to tackling multidimensional poverty with higher effectiveness compared to single-focussed policies. Particularly, the first difference with other conditional cash transfers is that it does not use the benefits mainly as an

incentive but, together with the conditionalities, the transfers are employed to reduce the barriers to education and health freedoms, such as by covering different aspects related to schooling, and health, as well as by tackling the issue of child labour. In fact, the transfers have the specific aim to cover some basic demands, and to fulfil the human right to income security, as the Brazilian Constitution envisages. Further, cash and in-kind transfers, such as the delivery of cooking gas, can be interpreted as a means of breaking barriers to the access to other fundamental basic capabilities such as being well-nourished, and to improve the quality of the accommodation (Mourao and al., 2012; Valença and Bonates, 2010; Chirivi, Quiroz and Rodríguez, 2011; Cecchini, Rossel, Figuera and Brain, 2015). Moreover, the conditionalities are a means to underline the barriers of families to access fundamental human rights, hence they also act as an obligation for Brazilian Government to intervene and tackle these barriers, as well as to make the delivery of capabilities effective. The second difference compared to other conditional cash transfer programs is that Bolsa Familia includes a network of complementary programs that focuses on different deprivations (Soares, 2012; Quinhoes and Fava, 2010; da Silva e Silva, 2008) and contributes to enhancing the power to reduce multidimensional poverty as well as to increasing the participatory structure of the Bolsa Familia (Trubek and al., 2013).

Specifically, among the complementary public actions, the Next Step, the Accreditation Program, the National Programme for Access to Technical Education and Employment, the National Programme for the Promotion of Access to the World of Work, More Employment Intervention, and the the Program of Local Development and of Solidary Economy deliver employment-related capabilities, such as trainings, job readiness, and hiring possibilities. Similarly, the National Program for Strengthening Family Agriculture, the National Program about Biodiesel access, together with other existing microcredit programs deliver jobs, assets, and income to families of farmers (Hellmann, 2015, Robles and Mirosevic, 2013; Gregol de Farias, 2014; Cecchini, and al., 2015; Ministerio de Desarrollo Social del Brasil, 2013; Ministerio del Trabajo y Empleo del Brasil, 2013; Da Silva e Silva, 2008). Also, the Caixa Facil instrument is bank account with no limitations which allows Bolsa Familia beneficiaries to receive financial products, to open a savings account and to have access to a microcredit product specifically set up for the Bolsa Familia beneficiaries (CGAP, 2011). Moreover, the program light for everyone and the program social electricity tariff aim to expand the access of electricity to rural areas, and to poor individuals (da Silva e Silva, 2008; Robles and Mirosevic, 2013). Finally, My house and My Life Program allows the Bosa Familia claimants to obtain the ownership of houses (Valença and Bonates, 2010; Chirivi, and al., 2011; Cecchini, and al., 2015; Tatagiba and al., 2014)[1]. Similarly, the Bolsa Familia can be integrated with existing state and municipal social programs, hence the transfers of the latter interventions can be topped up with Bolsa Familia transfers, or the services and in-kind benefits of these programs can be integrated with the services and the structure of the Bolsa Familia (da Silva e Silva, 2008; Hellmann, 2015). Hence, Bolsa Familia is interlinked with complementary programs, and forms a network of intersectoral services which is coordinated and flexible to the needs, values, and life characteristics of families. The most important goal of this net of services is about empowering households and allowing for a permanent escape from multidimensional poverty. Similarly, this set of interventions aims to widen and reinforce the impact of Bolsa Familia cash transfers, as well as to reduce inequalities (Quinhoes and Fava, 2010; Mourao and al., 2012).

About the participatory structure of the Bolsa Familia, the bodies of the social control over the Bolsa Familia at local level are made up of municipal representatives, of the members of social welfare, of the health, education, and food security groups, as well as of the civil society representatives. These bodies help with the local management of this policy, especially in terms of the fulfilment of the necessities of beneficiaries. These councils have a pivotal role in the intersectoral and interdisciplinary implementation of the Bolsa Familia, by being a place where different actors can discuss on the coordination of complementary services and policies, and where information can be shared across sectors. The CRAS is an example of social control council, which deals with designing and delivering social protection for the beneficiaries, in order for them to be able to comply with the conditionalities (Trubek and al., 2013). Similarly, these local councils let the civil society participate in the policy-making process, and let it express their demands about the Bolsa Familia. Therefore, the participation of the civil society in these councils

1 Additional complementary programs are: the Bolsa Verde, the Free Pass for disabled individuals, the Access to Phones Program, and the Integral Program for Family Security (da Silva e Silva and de Almada Lima, 2014).

allow individuals to have a voice about the planning, the accountability, the budgeting, and the impact evaluation of this program.
Overall, the structure of Bolsa Familia can have direct impacts on many deprivations, moreover, as deprivations have mutual feedbacks, this policy can tackle a considerable range of dimensions contemporaneously. Moreover, the participatory and interlinked nature of Bolsa Familia increases its efficacy of reducing multidimensional poverty and enhances its power to weaken the linkages among deprivations.

3. Literature review

This section describes the main findings about the effect and association of Bolsa Familia with education, health, employment, child labour, living standards, and active and community life, also this literature review includes mainly experimental analysis.

As far as education is concerned, De Brauw and al., (2015) and Barrientos and al., (2016) analyse the impact of this policy on children and suggest that Bolsa Familia increases girls' participation in schooling. Also, the findings by Gaiger and al., (2013) point out that this programme enhances the probability of school attendance among urban boys and girls. Further, Otuonye, (2015) employs the systematic review approach and demonstrates that Bolsa Familia has an impressive impact on school enrolment, especially in poorer areas with better coverage. Similarly, Racchumi and Carvalho, (2013), da Fonseca and al., (2012), Jannuzzi, and Pinto, (2014), and Amaral and al., (2014) suggest that Bolsa Familia is associated with higher school attendance. Also, Soares, (2012), De Oliveira, (2005) and ILO, (2009) indicate that the programme enhances attendance and reduces the drop-out rate. In addition, an article by Cireno and al., (2014) indicates that the pupils in recipient families have lower drop-out and age-grade distortion rates in the 5th and 9th years. Similarly, Shaffland, (2014) suggests that children of recipient families are more likely to be enrolled in 2006 and miss school 0.30 days less than non-treated children. Further, Bastagli, (2006) estimates, among other outcomes, the impact of Bolsa Familia on school attendance and adults' decision to work and concludes that Bolsa Familia receivers are more likely to attend only school compared to non-treated group. Moreover, Bolsa Familia beneficiaries are 1.5% more likely to attend school, and among poor children the likelihood increases to 4%. Finally, Simoes and Sabates, (2014) implement a cross-section and panel data regression models and assess the effect of Bolsa Familia on test scores about Mathematics, which is not significant, and about Portuguese language, which is positive and significant. Also, they show that the proportion of 4th grade Bolsa Familia beneficiaries has a marginal positive effect on drop-out rate, and in the same year the drop-out rate decreases compared to the baseline period.

However, Neri, (2008) applying a difference-in-difference technique, shows that the program does not achieve its goals in terms of school participation, but only in the relative growth of school hours for children. Furthermore, Nilsson and Sjöberg, (2013) using a regression discontinuity technique evaluate the impact of Bolsa Familia on school enrolment and carry out semi-structured interviews with ten beneficiaries. The quantitative analysis demonstrates that Bolsa Familia has a significant but small negative impact on school enrolment. On the contrary, qualitative analysis signals that this policy seems to provide help for poor children to increase education attainment.

As far as health is concerned, Bohn and al., (2014) demonstrate that those who before their participation in Bolsa Familia are at the margins of the society, now can have access to healthcare services on more regular basis. Also, Shei and al., (2014) assess the effect of Bolsa Familia on health care utilization, and on health outcomes in a slum community, and show that the program enhances the likelihood of child visits to healthcare centres for preventive services. Specifically, about children less than 7 years old, this policy increases the probability of vaccinations, check-ups, and effects the number of growth monitoring visits. Moreover, De Braw and al., (2012) indicate that recipients who are pregnant in 2009 have more prenatal care visits than pregnant non-recipient women. However, the result is flawed by the small sample of pregnant women in 2009. Further, evidence is found that this program leads to a significant enhancement

in the share of children receiving on-time vaccinations. Further, da Fonseca and al., (2012), point out that a higher percentage of children up to the age of six months receive the seven prescribed vaccinations, compared to non-recipients with the same socioeconomic profile. This article also shows that Bolsa Familia increases the demand for health services. However, focus groups note that the quality of the services is poor and there are difficulties and high costs of access, especially for rural families. Finally, Jannuzzi and Pinto, (2014), and Mourao and al., (2012) show an enhancement in vaccination rates.

On the contrary, Andrade and al., (2012), and ILO, (2009) show no effect of this policy on the immunization status of beneficiary children between 0-6 years old compared to non-recipients.

As far as anthropometric measures are concerned, Paes-Sousa and Santos, (2009) assess the effects of Bolsa Familia on nutrition in various areas of Brazil and indicate that children from recipient families are more likely to have an appropriate height/age compared to those from non-recipient ones, the same difference is also found for weight/age and for birth weight. Moreover, Paes-Sousa and al., (2011) demonstrate that children in recipient families experience higher probability of having normal height compared to the non-recipients about the groups 12-35 and 36-59 months. Also, De Brauw and al., (2012) estimate that the impact of Bolsa Familia on weight-for-height is weakly significant and positive for beneficiaries compared to non-beneficiaries, and strongly significant for body-mass-index-for-age. In addition, an article by de Melo and al., (2012) suggests that Bolsa Familia contributes to reducing food insecurity.

Furthermore, Otuonye, (2015) analyses the impact of Bolsa Familia on child nourishment, the outcomes highlight positive effect in reducing malnutrition and low birth weight among the children from the recipient families. Similarly, da Fonseca and al., (2012) point out that recipient families have more food and a better varied diet. Further, Dest, (2009) points out that additional income transferred by Bolsa Familia is used to improve diet and food security. Also, qualitative interviews show that this policy contributes to adolescent development through financial security and higher food quality. Moreover, Kamakura and al., (2014) conclude that most part of additional income delivered by this programme is spent on necessary consumption, such as food, beverages, cleaning products and health. Similar findings are shown in an article by the ILO (2009) and by De Oliveira (2005). In addition, Cruz, and Ziegelhofer (2014) estimate that households increase their private expenditure about food and education disproportionally compared to the amount of the Bolsa Familia transfers, suggesting that the conditionalities could have changed the behaviour of the beneficiaries. Similarly, an article by Ferrario, (2014) indicates that beneficiary families increase their purchases on a great variety of food, alcoholic beverages, education, hygiene, health, and school material. The findings demonstrate that beneficiary families increase their purchases on these goods and on school items, which signals an investment in education too. Finally, Mourao and al., (2012) point out that Bolsa Familia contributes to increasing the number of daily meals and purchasing power of recipients compared to non-recipients.

On the other hand, de Souza and al., (2015) indicate that although this programme reduced the number of poor and undernourished persons in Brazil, it fails to solve the problem of food deprivation. Further, Andrade and al., (2012), suggest a positive effect of Bolsa Familia on children nourishment only for those children fulfilling educational requirements. Also, Bolsa Familia contributes to additional income and spurs changes in the pattern of food consumption, on the negative side families tend to buy food with less nutrients and more calories. Further, Piperata and al., (2016), analyse food security in rural Amazonian communities. The findings show that recipient households' food security is worse-off, and children's poor nutritional status is virtually unchanged after four years into the program. Similarly, an article by Soares, (2012) indicates mixed results on food security, and the author suggests that a complementary nutritional programme may be necessary for Bolsa Familia.

As far as employment, child labour and informal jobs are concerned, an article by the ILO, (2009) demonstrates that Bolsa Familia contributes to increasing labour market participation among beneficiaries. Specifically, poorest beneficiaries improve their participation rate by 8%. However, Bolsa Familia does not decrease child labour significantly. Further, an article by Ribas and Soares, (2011) shows that the program enhances the participation of additional workers in rural areas, however, it reduces the labour supply of households' main source of labour income in the formal sector in metropolitan areas. Similarly, Machado

and al., (2011) indicate an increase in the occupation rate of the active population, a reduction in the percentage of inactive individuals and in informality, and a growth of mean hourly wage. However, the program seems to have a limited impact in terms of reducing child labour. Moreover, Soares, (2012) signals that Bolsa Familia does not have an overall negative impact on labour market participation and reduces child labour. Further, Nazareno, (2016) indicates that Bolsa Familia transfers are negatively related to the choice of informal jobs. Similarly, Machado and al., (2011), point out that the rate of informality among beneficiaries and eligible families decreases over time. Finally, de Oliveira and al., (2013) point out small, positive impacts on the labour market.

On the other hand, do Monte and Filho, (2013) demonstrate that Bolsa Familia is associated with lower probability of participating in the labour market. Further, Teixeira, (2010) indicates that this policy decreases the labour supply in terms of weekly worked hours of adults marginally. The effect is bigger for informal and unpaid workers and is more significant for higher values of the transfers. Moreover, an article by Barrientos and al., (2016) suggests no significant effect on adult labour force participation. Also, da Fonseca and al., (2012), highlight that most recipients prefer to keep working after being enrolled in the Bolsa Familia, and that their average monthly payment is not enough to provide for basic needs. Also, most vulnerable beneficiaries give up working because of lack of available jobs. In addition, poor women say that the need to take care of their home, of their children and older members of the family become barriers to the labour market. Further, articles by De Brauw and al., (2013), Bosh and Manacorda, (2012), and by Barbosa and Corseuil, (2014) show no effect of Bolsa Familia on occupational choice and on the number of worked hours for families in both informal and formal sectors. However, according to the first article this policy is associated with a shift from worked hours in formal jobs to informal employment. Similar outcome on worked hours in informal and formal sectors are highlighted by Marinho and Mendes, (2012), and by Da Silva, and al., (2016). Finally, Jannuzzi and Pinto, (2014) show mixed results on adult labour market participation.

As far as child labour is concerned, Gaiger and al., (2013) evaluate the role of Bolsa Familia jointly on children's decision of studying and working. The results signal that the transfers increase both school attendance and child labour. Specifically, higher likelihood of studying and working in conjunction, as well as the decrease in the probability of not studying and not working are shown. Similarly, Santos, (2012) estimates the contribution of Bolsa Familia on school and work activities. The outcomes suggest that this policy lowers the probability of 'not studying or working' and of 'only working' for children between 10 to 25 years old, but it enhances the probability that a child will study and work than only study. Moreover, Gottschalk and al., (2012) examine the effect of Bolsa Familia on labour decisions for children using simulation analysis. The findings demonstrate a significant reduction of child labour. Finally, Chitolina and al., (2014) examine the impact of the 2007 expansion of the Bolsa Familia program for families with youths aged 16 to 17 years on time allocation of youths, and on the labour supply of their parents, before and after the Bolsa Familia expansion. The findings suggest that the transfers have positive and significant impact on the decision of young people to study and work at the same time.

On the other hand, Otuonye, (2015) indicates that Bolsa Familia has little impact on child labour in Brazil, whereas it has more positive impact on adult and women who participate in the labour force. Moreover, an article by Ferro and Nicollela, (2007) shows that Bolsa Familia reduces the probability of child labour but does not reduce the time spent in the labour market.

Finally, as far as community, voice and social capital are concerned, an article by Soares, (2012), assesses the literature and suggests that Bolsa Familia has a positive impact on isolation and small social networks, which reduce welfare of the poor and keep them in poverty, in fact people who live in isolated areas have little contact with neighbours or relatives.

The review of the literature shows a gap about the estimation of the impact of Bolsa Familia on multidimensional poverty. My article wants to fill this gap by inspecting the effect of this policy on an MPI made up of different dimensions related to the specific goals and to the structure of Bolsa Familia. The aim of this article is interesting, as Bolsa Familia is a cash transfer coupled with a network of complementary interventions that can tackle a wide range of deprivations contemporaneously, and this analysis wants to estimate whether it can reduce the burden of poverty in an effective way.

4. Research Questions

This article analyses the role of the Bolsa Familia Program in reducing multidimensional poverty, and it aims to inspect three issues:

1) How does Bolsa Familia affect single dimensions of poverty?

2) How is the impact of Bolsa Familia on multidimensional poverty?

3) How does Bolsa Familia affect intensity of multidimensional poverty?

In this sense this article wants to inspect whether Bolsa Familia has positive effects on the less poor, and vulnerable families, as well as on the average number of deprivations. Specifically, the theoretical assumption is that this policy is made up of a set of transfers and of a network of flexible and coordinated interventions that can weaken the burden of poverty of families, especially about severely poor households.

5. Dataset

5.1. Sample

The dataset used in this analysis is the A.I.B.F. (Avaliacao de Impacto do Bolsa Familia), which includes 15,426 households in the year 2005, and is collected under the supervision of the Centro de Desenvolvimento e Planejamento Regional (Ministério do Desenvolvimento Social e Combate à Fome, 2012). In 2009, a follow-up of the A.I.B.F was carried out, specifically, 11,433 households included in the first wave of the A.I.B.F. were re-interviewed. This dataset contains information on demographics, income, consumption, health, education, and participation in social policies. Moreover, the households included in the A.I.B.F. were selected in non-random way, thus, simply comparing the outcome among participants and non-participants is likely to produce biased results. Also, the main issue about this dataset deals with the attrition rate in 2009, whose main source deals with the fact that the field team was not able to find physically recorded addresses of the interviewed families, and the fact that some families left their recorded addresses. Moreover, another issue is about the different labelling of the same variables between years, which made difficult properly merge both datasets and undertake the preliminary analysis. Therefore, the author conducted a thorough revision of the dataset to inspect and solve eventual data problems. Similarly, the two waves of the A.I.B.F. do not allow to match the members of the families in the two years, hence the author needs to undertake an empirical analysis at household level (De Brauw and al., 2015). Specifically, the A.I.B.F. dataset is divided in three groups: the recipient families included in the Cadastro Unico; the households registered in the Cadastro Unico, but not yet receiving Bolsa Familia benefits; and the households not in the Cadastro Unico, which are not eligible for the Bolsa Familia. Moreover, the sample is representative of the three biggest areas of Brazil, North-East, South-East, and South and North, and Centre and West.

Further, the households have been included in the dataset through a stratified sampling procedure (Ministério do Desenvolvimento Social e Combate à Fome 2012). Hence, the sample is divided into three strata, the first one was set up for the recipient families, that is the treatment group, the second one was

set up for the eligible households included in the Cadastro Unico, but not yet beneficiaries, called control group 1. The third one is made up of non-recipient households, which are not inside the Cadastro Unico, called control group 2. The families in control group 1 are eligible but not enrolled in the Bolsa Familia because there are quotas at national, state, and local level, which limits the number of families that can obtain the cash transfer (Parsons, 2015). In fact, after the Ministry of Social Development defines the number of households which will be enrolled in the Bolsa Familia on monthly basis, three levels of prioritisation during the selection process are applied. The highest priority is given to families in the social vulnerability categories listed in article 7 of Portaria GM/MDS 341, 7/10/2008. The next highest priority is given to municipalities with coverage lower than the calculated local quota (art. 8, §1). The final level of priority is on the household level (art. 9). The benefit is given first to (i) families with the lowest household income, then to (ii) families with the largest number of children from 0-17 years old (Parsons, 2015).

To estimate the effect of Bolsa Familia on multidimensional poverty, the year 2005 is considered as the baseline, whereas the 2009 is the follow-up period. Moreover, the treatment group is made up of families that do not receive Bolsa Familia transfers in 2005 and obtain the benefits in 2009, and the control group is made up of families which do not obtain transfers in both years. In particular, the treatment group is made up of 4398 units whereas the control group amounts to 3945 units, also the treatment group belongs mainly to the first control group (eligible families but not enrolled in the Bolsa Familia in 2005 which started to receive the transfers in the 2009), whereas the control group belongs equally to the two control groups.

One important aspect of the dataset is that, as it only covers poor households (control and treatment groups), one cannot, in principle, extrapolate the findings of what are national MPI rates without making additional assumptions. Therefore, this study will only look at impact of the program among beneficiaries, rather than suggesting conclusive national-level implications. In other words, this study could conclude that “Bolsa Familia reduced multidimensional poverty among its beneficiaries by x%”, but not “Bolsa Familia reduced multidimensional poor in Brazil by x million people”.

5.2. Outcome variables

The novel goal of this article is to analyse the effect of Bolsa Familia on the multidimensional poverty status of Brazilian families, which is estimated through the computation of an MPI specifically designed to measure the impact of Bolsa Familia. This measure follows the Alkire-Foster methodology, and the choice of this measure of poverty is suggested by its capacity to identify the families which are multidimensional poor through the set-up of a poverty cut-off (Alkire and Foster, 2007). Hence, this index can estimate the level of overall poverty, and adds more information about the situation of family deprivations. Moreover, this MPI is appropriate because of other desirable properties, such as subgroup decomposability, and the possibility of the analysis of censored headcount ratios for different dimensions. Also, its choice is indicated by the fact that this index considers the joint burden of the dimensions affecting households' life, similarly, the Alkire-Foster MPI can estimate the effect of the Bolsa Familia on the intensity of disadvantage.

In particular, the Alkire-Foster methodology uses two distinct cut-offs: the deprivation cut-offs and the poverty cut-off. The deprivation thresholds define the minimum level of achievement, below which a person is deprived in each dimension. The poverty line indicates the minimum share of deprivations required to be identified as poor. Also, weights for each dimension are assigned.

Specifically, the first step of the Alkire-Foster methodology identifies the number of deprivations of every individual/household. Then, the weights are applied and for each individual/household the weighted deprivations are computed, generating the deprivation score. Afterwards, the poor individuals/households are identified by comparing the deprivation score with the poverty cut-off. Also, the multidimensional headcount ratio (H) is obtained by dividing the total number of poor individuals/households by the total

number of individuals/households. One novelty of this methodology is the intensity of poverty (A). This corresponds to the average deprivation score among the poor. Finally, the product of H and A generates the M_0, this is the adjusted headcount ratio, which inspects the incidence as well as the intensity of poverty (Alkire and Foster, 2015). In particular, the headcount ratio, which estimates the incidence of poor individuals on all the population, is defined as:

$$H= q/n \quad (1)$$

q represents the number of poor individuals/households according to the poverty cut-off, and n is the total size of the population. The intensity of multidimensional poverty is the average deprivation score across poor individuals/households:

$$A=\Sigma_q\, c_i(k)/q \quad (2)$$

k is the poverty cut-off, $c_i(k)$ is the censored deprivation score of the household/individual i, estimated according to a given poverty cut-off k. Specifically, this index indicates the mean deprivation intensity in a given society. Moreover, the adjusted headcount ratio is the mean of the censored deprivation score vector and it is defined as:

$$M_0=HxA= 1/n\ \Sigma_i\, c_i(k) \quad (3)$$

Specifically, I estimate the impact of Bolsa Familia on the multidimensional poverty status of Brazilian families, using the Alkire-Foster MPI, which takes the value 0 if a family is not poor and takes the value one if a family is poor (Alkire and al., 2015, chapter 5). Moreover, I estimate the impact of Bolsa Familia on multidimensional poverty intensity. Finally, I analyse the effect of this policy on the single dimensions that make up the MPI: nutrition, vaccination, access to healthcare, ability to read and write, school attendance, cooking fuel, improved sanitation, access to drinking water, electricity, flooring, assets, unemployment, child labour, informality, social connectedness (see table 1).

6. The Multidimensional Poverty Index and the Alkire-Foster Methodology

As far as the structure of the Alkire-Foster MPI is concerned, the selection of dimensions is based on the Global MPI, (Alkire and al., 2020) and on an article by Burchardt and Vizard (2011), who analyse the main international treaties on human rights as the basis to choose the domains and the dimensions which are valuable for individuals.

Specifically, the MPI includes four main domains, health, education, standards of living and active and community life (see table 1). The first domain, health, is made up of three dimensions: no vaccination card, lack of access to health care and undernutrition, which is estimated using the z-scores of weights for age. Further, the second domain, education includes no school attendance and low ability to read and write for children inside families. Both domains have been chosen as they are explicit human rights targeted by the Bolsa Familia, including undernutrition, which is tackled by two programs that form the Bolsa Familia (see the second section). Also, education achievement of Bolsa Familia is under-researched, hence, the analysis on the ability to read and write is interesting and can contribute to the literature about the impact of the Bolsa Familia. The third domain, standards of living, is made up of six dimensions, low sanitation, inadequate cooking fuel, inadequate water source access, inadequate access to electricity, inadequate

flooring, and no assets. This composite domain has been chosen as Bolsa Familia explicitly focuses on material deprivation, in fact one goal of this policy is delivering income security and basic needs through Bolsa Familia transfers, also one intervention that forms this policy, Auxilio Gas, targets cooking fuel issues. Similarly, complementary Bolsa Familia programs tackle low access to electricity and to drinkable water source too (Da Silva e Silva, 2008; Da Silva e Silva, and de Almada Lima, 2014). Finally, the domain, active and community life, includes unemployment, child labour, informal jobs, and social connectedness (see table 1). The deprivations inside this domain have been included in the article, as Bolsa Familia and the related complementary programs aim at tackling employment issues, informal jobs, and child labour. About social connectedness dimension, it is defined as the inclusion of Bolsa Familia claimants in the civil society organizations with different goals, such as organizations which focus on decision-making, labour protection and political aims. The effect of Bolsa Familia on this dimension is based on its participatory structure, and on education inclusion delivered by this policy, as well as on the transfers that can tackle income barriers to the participation in civil society organizations. The four domains are weighted equally, and the dimensions within each domain are also weighted equally (see table 1). Moreover, the level of identification is the household, in fact, although the dataset allows to identify individual deprivations, Bolsa Familia targets families, further, the dataset does not allow to match the members of each household over time. About the identification of poor families, I use two poverty cut-offs, k=25%, which considers as MPI poor the households which are poor in 1 domain, and k=40%, which considers as MPI poor the families poor in the equivalent to one domain plus 60% of a second domain, such as one domain plus one dimension of health and one dimension of community life (see table 1). I selected a second threshold because I want to analyse the impact of Bolsa Familia on two sets of poor families, the households which have a moderate level of multidimensional poverty and the families which are poorer, that is vulnerable.

7. Possible direct and indirect effects of Bolsa Familia

As far as the mechanisms through which Bolsa Familia may have an impact on the single dimensions are concerned, this policy directly affects the availability of vaccination card and the access to healthcare through the health conditions and through the cash transfer as well. Also, the improvement in nutrition is a direct consequence of the availability of in-kind and cash transfers as well as of the availability of free cooking gas (Lignani and al., 2010; de Souza and al., 2015; da Fonseca and al., 2012; Kamakura and al., 2014). Furthermore, school attendance conditionalities can increase the level of education of children and indirectly enhance the level of health (Sen, 2015). Specifically, the conditions and the transfers together may increase school attendance and education attainment. In fact, in order not to lose the transfers the parents are incentivized to let their children go to school (Gaiger and al., 2013; Otuonye, 2015; Barrientos and al., 2016; Soares, 2012). Also, the benefits can cover a big part of costs related to education (books, uniforms, transportation), which can be important for education attainment. Moreover, health conditionalities can contribute to easing access to education. Similarly, the transfers can let parents reallocate worked hours, which can improve parenting and child education monitoring, this outcome can improve child education attainments. Further, the education conditionality aims to tackle child labour, which increases time to study and to learn, as well as more frequent school attendance, all these factors can spur higher education attainment (Soares, 2012; Helmer Santos, 2012; Ferro and Nicollela, 2007). A first possible mechanism deals with the fact that a Bolsa Familia family becomes richer, due to the transfers, and does not need the child to work anymore or it does not need the child to work as long as before. This reason may be reinforced by the conditionality on school attendance. Moreover, cash transfers may spur a reallocation of worked hours between the parents, in this case one of the parents can decrease

the amount of worked hours to take care of the house and of the children. In turn, this fact causes a decrease in domestic unpaid work of children. In addition, the education conditionality may reduce domestic work.

As far as unemployment is concerned, Bolsa Familia might have negative and positive effects, as well as direct and indirect influence on this domain (ILO, 2009; Ribas and Soares, 2011; Machado and al., 2011; Soares, 2012). First, the transfers may increase total income, which incentivizes parents to reduce worked hours to stay home and take care of children, and to increase their leisure time, or to reduce work effort. Furthermore, the amounts of transfers may spur individuals to increase worked hours to reach desired levels of monthly income, consumption, and of savings. Moreover, the transfers deliver resources to search for jobs and to look for more valued jobs. Finally, the job-related complementary programs included in the Bolsa Familia can increase the opportunities to apply and to find good jobs (da Silva e Silva., 2008; da Silva e Silva and de Almada Lima, 2014). The indirect effect may deal with the fact that the cash transfers generate consumption (through the possibility to credit access too), which in turn enhances labour demand, this fact increases both employment possibilities and worked hours as well. This mechanism may be reinforced by the possibility of having access to microcredit too. In fact, the availability of funds to set up a business may increase labour demand and employment, through self-employment and through the employment of workers.

Regarding informality, Bolsa Familia might have direct and indirect effects, for example through the microcredit policy Bolsa Familia can create new business which entails an incentive to create formal jobs**,** both for entrepreneurs (family business), and for employees. In addition, the complementary programs of the Bolsa Familia may spur adult literacy or training, which contributes to being able to enter the formal job market (Nazareno, 2016; Machado and al., 2011; da Silva e Silva, 2008; da Silva e Silva and de Almada Lima, 2014). Also, this policy may have direct effects on the young generation by contributing to building up necessary skills which enable them to participate in the formal labour market. Moreover, the cash transfers may help access to the credit market to set up family business, which may increase the number of formal jobs. For example, in the rural areas small farmers and sharecroppers are likely to become dependent on the private moneylenders and on the landlords, which implies informal and not dignified jobs. In this situation, Bolsa Familia together with microcredit or, in some case the program itself, may avoid this trap and contribute to making informal workers shift to the formal sector, through the cash transfers and through an eventual formal credit market access. In addition, the likely impact of Bolsa Familia on social connectedness may work through the feeling of being involved in the society and being responsible for it, which incentivizes the participation in the civil society, in NGOs or simply it spurs an increase of networking with other individuals. Specifically, this effect may be enhanced by the feeling to be empowered and to have the possibility to change the society. This mechanism can be reinforced by a direct impact too, the availability of transfers may create the entitlement to join NGOs and other associations. Moreover, education conditionalities may increase the possibility to have voice through joining NGOs or civil society (Sen, 2015). Finally, the participatory structure of the Bolsa Familia can itself generate and increase participation in social activities, such as local decision-making, in the related civil society movements. Finally, the effect of the structure and the goals of the Bolsa Familia program can affect the standards of living, such as the availability of cooking fuel. Also, the transfers may ameliorate the life quality, such as about sanitation and housing flooring, similarly, complementary programs of Bolsa Familia can ameliorate the access to important entitlements, such as clean water, electricity, and assets (da Silva e Silva, 2008; da Silva e Silva and de Almada Lima, 2014).

The main hypothesis is that that Bolsa Familia contributes to delivering and protecting fundamental human rights and capabilities for the vulnerable segment of Brazilian society. Also, its integrated design enhances the effectiveness of Bolsa Familia in tackling multidimensional poverty. In fact, targeting more interlinked deprivations contemporaneously can increase the efficacy of the programme to empower individuals and families and to reduce poverty permanently (Drezè and Sen, 1989; Sen, 1987; Sen, 1988; Kanbur and Squire, 1999).

Table 1 - Definition of domains and of dimensions

Domains	Dimensions	Definition	Weights
Health	Undernutrition	Household has a child 0-4 years old undernourished in terms of weight	8%
	Vaccination	Household has a child 0-6 years old without vaccination card	8%
	Access to healthcare	Household is health poor if it has no access to public health agents and to private health insurance	8%
Education	Ability to read and write	Household has a child less than 17 years old who cannot properly read and write	12.5%
	School attendance	Household has any child 6-17 years old out of school	12.5%
Standards of living	Cooking fuel	Household uses wood or charcoal	4%
	Improved sanitation	Household has no bathroom or toilet; it has poor bathroom or toilet	4%
	Safe drinking water	Water source is not in general network or in property	4%
	Electricity	No access to electric network	4%
	Flooring	No wood or cement	4%
	Assets	Household has no car, motorbike, truck, or bicycle	4%
Active and community life	Unemployment	At least one household member is not working	6.25%
	Child labour	Any child less than 18 years old is working	6.25%
	Informality	At least one household member is working and not paying any contribution	6.25%
	Social connectedness	At least one household member does not participate in any civil society organization	6.25%

8. Empirical Strategy

As far as the empirical analysis is concerned, I combine propensity score matching (PSM) with difference-in-difference (DID) technique to estimate the impact of Bolsa Familia on the previous outcomes (Mu and Van de Walle, 2011). Specifically, the PSM technique constructs a control group which is similar to the treatment group in some relevant observable features, and the DID allows to estimate a causal relationship between Bolsa Familia and poverty reduction, based on the balanced treatment and control group obtained by applying the PSM. DID also takes into account some time-invariant unobservable characteristic which might bias the suggested causal link. Specifically, the DID applies a double difference: first between the two groups in each year and afterwards it makes difference of the previous two differences. In this sense, the effect of different social or labour policies in tackling multidimensional poverty, the uncertainty of the rule about how the priority is assigned to families in the enrolment in the Bolsa Familia (Parsons, 2015) are factors which may bias the PSM outcomes and are accounted for by the DID. On the other hand, the advantage of the PSM is about allowing to construct a control group which is balanced according to time variant characteristics due to initial observable features, which avoids distortions in the DID analysis (Khandker and al., 2009; Gertler and al., 2016). The procedure I am applying in this article has already been used by Mu and Van de Walle, in the context of economic policy evaluation (Mu and Van de Walle, 2011).

8.1. Propensity score matching technique

First, this procedure estimates the propensity score about the likelihood of being Bolsa Familia recipient for treatment and control groups in 2005, using a logit model including the following baseline characteristics: living in a favela, number of families sharing the same house, the presence of any pregnant woman in the family, number of pregnant women in the family, number of children between the age of 6 to17, number of children under 6, number of family members over 64, state in which the family lives, region in which the family lives, the presence of an unemployed household member, the ethnicity of household head, and whether the household head is married. Afterwards, these matching variables are used by the Kernel-matching estimator to form a control group which matches the main features of the treatment group, in order to generate a control group which is similar to treatment group in relevant observed characteristics. This matching estimator constructs a counterfactual for each treatment unit considering each control unit, and it weights each of the latter units proportionally to its distance from the treatment unit, the closer the control unit the higher its weight. Specifically, I am applying the Epanechnikov algorithm metric, which gives a higher weight to control units with similar propensity scores. The Kernel weighting equation is:

$$W_{i,j} = G(p_j - p_i/a_n) / \Sigma_j G(p_j - p_i/a_n) \quad (4)$$

in which G(.) is the Kernel function, "a_n is a bandwidth parameter which scales the difference in the estimated propensity scores and p is the estimated propensity score" (Morgan and Winship, 2015, page 162), i and j refer to the unit i and unit j for which the distance is computed (Morgan and Winship, 2015). The main advantage of the of this non-parametric technique is that it uses more information compared to other matching estimators. The main disadvantage is that it does not discard poor matches (Caliendo and Kopeinig, 2005). In order to avoid biased results, the estimates of the causal effects have to be performed only in the common support area, which is the range in which control and treatment units overlap. (Caliendo and Kopeinig, 2005). Specifically, I inspect that treatment and control units have a common support area in terms of propensity score values in order to be sure that the there is a "sufficient overlap in

the distribution of the observed covariates" (Guo and Fraser, 2015, page 257). Moreover, I check that the matching procedure generates a balanced treatment and control group, by testing the equality of the mean value of the relevant variables for both groups after the matching procedure. I also employ other indicators to control for the quality of the matching procedure (Rosenbaum and Rubin, 1985; Rubin, 2001). Finally, the use of the propensity score techniques avoids that the parallel trend assumption be binding, in fact the rationale and the structure of this technique make this assumption fulfil or minimize the bias due to an eventual violation of the parallel trend assumption (Ryan et al., 2019; Becker and Hvide, 2013; Ichino et al., 2007; Rosenbaum and Rubin, 1983). Also, the control group units are also from Bolsa Familia recipients that, for different reasons, have not received the transfers yet, hence, the main features of treatment and control groups are very similar, so it can be assumed that the parallel trend assumption is fulfilled.

8.2. The difference-in-difference estimation strategy

After estimating the propensity score for treatment and control units and the weights of the control units, I begin the estimation of the DID on the outcome variables. The most important outcome variable is the multidimensional poverty status of Brazilian households, which is computed using the Alkire and Foster methodology (Alkire and Foster, 2007) between 2005 and 2009. As mentioned earlier, the poverty status is a dichotomic variable which ranges from 0, when a household is not poor, to 1, when a household is poor in a specified number of dimensions. Specifically, as the equations 5 and 7 show, I compute a DID that is called ATT (Average Treatment on the Treated effect) in two steps, first I estimate the average level of the difference of the multidimensional poverty status of each household in the treatment group over time, using the 25% poverty line in 2005 (Morgan and Winship, 2015). Therefore, I make the difference for each Brazilian household belonging to the treatment group over time: for example, if one treated family is poor in 2005 and not poor in 2009 the difference is -1, on the other hand the value of the difference is 1 if the treated family is not poor in 2005 and is poor in 2009. On the contrary, if in 2005 that family is not por and remains out of poverty in 2009 the difference is zero. After computed all these differences I estimate the average value of these differences. Similarly, I calculate the average value of the difference in the level of poverty status for each household in the matched control group over time, using the 25% poverty line. As mentioned in the in section seven, the matching procedure gives higher weight to control groups which are more similar to the treatments. Afterwards, I compute the difference between the two previous differences, and if the sign of the difference in the differences is negative the results show a reduction in the level of poverty within the chosen poverty threshold. Similar analysis is undertaken for the 40% poverty threshold, as I want to inspect the effect on vulnerable families too. Moreover, I analyse the impact of the Bolsa Familia on several other poverty cut-offs in order to estimate the role of Bolsa Familia in reducing poverty for more vulnerable families. I also estimate the effect of Bolsa Familia on the intensity of multidimensional poverty using the vector score, and finally, I apply the ATT to estimate the effect of the Bolsa Familia on the single dimensions that make up the AF MPI. The formula of the ATT is:

$$\delta_0 = E[Y_{t1} - Y_{t0}] \qquad \delta_0 \epsilon[-1 ; +1], \qquad t \epsilon[0,1] \qquad (5)$$

$$E[Y_{t1} - Y_{t0}] = 1/M[\sum_j^M (Y_{tj1} - Y_{tj0})] \qquad j=1\ldots\ldots\ldots\ldots M \qquad t \epsilon[0,1] \qquad (6)$$

$$\delta_1 = E[Y_{c1} - Y_{c0}] \qquad \delta_1 \epsilon [-1 ; +1], \qquad t \epsilon[0,1] \qquad (7)$$

$$E[Y_{c1} - Y_{c0}] = 1/N[\sum_i^N (Y_{ci1} - Y_{ci0})] \qquad i=1\ldots\ldots\ldots\ldots N \qquad t \epsilon[0,1] \qquad (8)$$

$$ATT = \delta_1 - \delta_0 \qquad (9)$$

In which δ_0 is the mean value of the difference of the level of the poverty status for each treated household over time, similarly δ_1 the mean value of the difference of the level of the poverty status for each matched control group household over time. Finally, the ATT is the difference of the two previous differences. Specifically, Y_{tj1} and Y_{tj0} are the values of poverty status for each treated household over time, Y_{ci1} and Y_{ci0} are the values of poverty status for each household in the control group over time, t is the time-period: 0, period before the policy introduction, and 1 period of policy implementation. Moreover, j and i are the set of households inside the matched treated and control groups.

Overall, as far as the whole methodology process is concerned, I use a single estimation framework based on information from both treatment and control groups contemporaneously. Specifically, I employ the STATA software command psmatch2 which estimates the propensity score for each treatment and control group by applying a logit regression analysis which accounts for the confounders. Afterwards, I compute the matching between treatment and control units through the kernel matching estimator, which attaches higher weights to control units that have bigger propensity score. This procedure allows to identify the control units which are more similar to treatment units. Also, this command checks for the common support area, which indicates that treated and control groups have overlapping common support area in terms of propensity scores, in order to avoid bias in the final outcome (Guo and Fraser, 2015). Finally, the command psmatch2 estimates the difference-in-difference between treatment and control groups using an ATT specification. Further, I employ the command STATA software pstest which inspects the balance of the single confounder variables, using simple t-test statistic to control for the equality of mean values of the regressors between the treatment and control groups after performing the matching procedure. Similarly, this command checks the level of bias after the matching procedure and apply some indicators to control for the balance of the whole set of matching variables (Rosenbaum and Rubin, 1985; Rubin, 2001). Considering the process of propensity score matching and the ATT procedure as a joint estimation approach, the formula is:

$$DID = 1/M[\sum_j^M (Y_{tj1} - Y_{tj0}) - \sum_i^N W(j,i)(Y_{ci1} - Y_{ci0})] \quad (10$$

in which W(j,i) are the kernel-based weights for each control group unit. This formula implies that every treated unit is compared to all control units inside the common support area. In this sense, the fact that the treatment and control units are similar in important observable characteristics means that the difference in the outcome dimensions between these two groups are reasonably caused by the fact that the treatment group is affected by the Bolsa Familia, because the control group does not receive the services and cash transfers of this social policy.

9. Results

9.1. Descriptive Analysis

Table 2 points out the differences in some demographic characteristics of the unmatched treatment and control groups in the baseline period, 2005, which have not been balanced by using the PSM technique. The results suggest that the group of Bolsa Familia recipients has higher family size, lower income, a bigger

percentage of pregnant women, a higher proportion of children for each considered age, a greater percentage of families living in rural areas and in favelas, compared to the group of households in the control group.

Table 3 shows the aggregated poverty measures, MPI, H and A, for the unmatched control and treated group at the baseline and the end-line, without using the PSM to balance them. At the baseline, multidimensional poverty is higher for the unmatched treatment group than for the control group. This is a result of the Bolsa Familia selection mechanism, which targets income and multidimensionally poor families. Similar results are shown about H and A. As mentioned earlier, the treatment group belongs mainly to the first control group (eligible families but not enrolled in the Bolsa Familia in 2005 which started to receive the transfers in the 2009), whereas the control group belongs equally to the two control groups.

Table 2 – Demographic characteristics using unmatched treatment and control group

Dimensions	**Unmatched treatment**	**Unmatched control**
Mean family size	4.74	3.97
Mean family income	449.76	679.48
Mean female age	42.7	45.13
Mean male age	39.8	46.39
Percentage of females	35.65%	37.41%
Percentage of males	64.35%	62.59%
Number of pregnant women	3.84%	3.08%
Precentage of females, age 0-15	70.83%	64.06%
Percentaage of children, age 6-17	82.29%	63.17%
Percentage of children, age 6	46.88%	31.36%
Percentage of children, age 4	34.42%	23.52%
Percentage of children, under 6	40.88%	27.63%
Percentage of adults over 64	10.05%	19.87%
Percentage of families in rural areas	23.05%	15.82%
Percentage of families in urban areas	76.96%	84.18%
Percentage of families living in favelas	6.53%	4.99%

Table 3 – Level of disadvantage by poverty threshold in the year 2005

Thresholds	**25%**	**40%**
M_0 2005 unmatched control group	0.09	0.02
M_0 2005 unmatched treatment group	0.19	0.05
H 2005 unmatched control group	27.9%	5%
H 2005 unmatched treatment group	54.1%	12%
A 2005 unmatched control group	33%	46.4%
A 2005 unmatched treatment group	35.1%	48%

Table 4 - ATT by dimension for unbalanced and balanced treatment and control groups

Dimensions	Unmatched ATT	Matched ATT
Undernutrition	-0.004	0.009**
Vaccination	-0.016***	-0.007
Access to healthcare	-0.003	-0.0003
School attendance	0.015	0.004
Ability to read and write	-0.016*	-0.012
Improved sanitation	-0.02**	-0.009
Cooking fuel	-0.037***	-0.04***
Safe drinking water	-0.01	-0.009
Electricity	-0.0003	-0.003
Flooring	-0.009	-0.01
Assets	-0.025***	-0.025***
Unemployment	0.027**	0.017
Informality	0.006	-0.001
Child labour	-0.01**	-0.012*
Social connectedness	-0.085***	-0.086***

*** significant at 1%

** significant at 5%

* significant at 10%

As far as the effect of Bolsa Familia on single dimensions is concerned (see table 4 second column), this policy contributes to decreasing the level of poverty in inadequate cooking fuel, no assets, child labour and low social connection, whereas it seems to worsen undernutrition. Specifically, Bolsa Familia seems to deliver important capabilities: the ability to move and to have a proper fuel to cook food, also it contributes to diminishing child labour, which is a fundamental human right for the dignity of children's life. Finally, it plays a role about enhancing families' voice, that is to increase their democratic power to influence policymakers' decisions as well as to spur social change and increase the quality of democracy (Drèze and Sen, 1996; Sen, 2015). As for the remaining variables, Bolsa Familia has positive outcome on vaccination, access to healthcare, ability to read and write, improved sanitation, safe drinking water, electricity, flooring, informality but they are not statistically significant. Similarly, it has negative effect on school attendance and unemployment, but the outcomes are not significant.

10. Impact of Bolsa Familia

This section analyses whether Bolsa Familia reduces multidimensional poverty for less poor families. Moreover, it investigates the role of the Bolsa Familia in the reduction of poverty for vulnerable households (families which are below the 40% cut-off). In fact, empirical results point out that Bolsa Familia has succeeded in tackling extreme income poverty (Drèze and Sen, 2013), and it is interesting to inspect whether similar findings are shown at multidimensional level too. Finally, this article wants to analyse if this policy has some impact on poverty intensity. Hence, the main rationale of this analysis is testing the protection effect of Bolsa Familia over time, that is whether this policy can protect fundamental human entitlements, which may lead to a permanent promotion from the 25% poverty line over time (Ahmad and al., 1991). Similarly, the latter analysis aims to inspect whether Bolsa Familia can generate a positive change for vulnerable families too (Ahmad and al., 1991).

The first analysis is about estimating the average effect of Bolsa Familia on the magnitude of poverty for the selected thresholds, 25% and 40%. The estimates on the outcome of interests are presented in table 7. The findings point out that Bolsa Familia contributed to reducing the level of multidimensional poverty for both 25% poverty line, almost 3% decrease, and for vulnerable households, specifically the impact on this subset of families is higher than 2%. In order to gain more detailed information on the impact of this policy on multidimensional poverty, I inspect its impact across different poverty thresholds. Table 6 presents the estimate of the impact of Bolsa Familia on the level of multidimensional poverty considering a range of different cut-offs. The results suggest that Bolsa Familia reduces the level of poverty increasingly across the first three thresholds and across higher thresholds (from the 33.3% to the 37.5% cut-offs), and afterwards its poverty-reducing power decreases across higher level of multidimensional poverty thresholds (see table 6). Therefore, the effect of Bolsa Familia reaches the vulnerable households, that is families which are almost deprived in two domains, although its contribution becomes negligible as well as non-significant from the 50% poverty line (see Picture 1)**.** About the trend of the levels of the effect of this policy, probably, the structure of the Bolsa Familia allows to reduce the magnitude of disadvantage at the 27.1% and 29.2% poverty lines increasingly, that is for the families deprived in 1 domain and from 8.4% to 17% of a second domain. In fact, the domains suffered from the households below the 25% poverty line, as well as the related dimensions, may be attacked and tackled with efficacy by this policy, and the interlinkage strength among them may be weakened too. Similar mechanism seems to occur for the families which are poor from one domain and 41.6% of a second domain to 1.5 domains, that is families which are poor at the 35.4% and 37.5% (see table 6). On the other hand, the effectiveness of this policy steadily decreases for vulnerable households, maybe because the burden of poverty diminishes the self-selection in the service system, because of lower flexibility in the access to public support. Similarly, Bolsa Familia's efficacy becomes limited because of missing collateral services, and because of the availability of some fundamental services only, moreover, lack of human and financial resources and low social control in social councils are experienced by beneficiaries (da Silva e Silva, 2008; da Silva e Silva and de Almada Lima, 2014). Finally, Bolsa Familia affects the mean intensity of multidimensional poverty too, in fact it contributes to decreasing the mean share of deprivations by 0.005, although this result is not significant (see table 5).

These findings indicate that Bolsa Familia contributes to multidimensional poverty reduction for poor and vulnerable families, however it seems not to reach more vulnerable families sufficiently (families which are included in the 50% poverty cut-off or in higher cut-offs), that is the families which are poor in two or more than two dimensions. Overall, the outcomes point out that this policy delivers human rights and substantial capabilities across the distribution of poor families. Specifically, it contributes to breaking the linkages among the deprivations for poor households, and especially for vulnerable families, however it does not play a role for more vulnerable families. One likely reason about the level of the effect across thresholds, and about the lack of impact for more vulnerable households probably are due to not enough resource redistribution from the Federal Government in poorer areas. Moreover, the low quality of services in areas

with bigger level of multidimensional poverty can be another explanation of difference in the impact on poverty. Similarly, lack of organization to increase self-selection in existing services, and the lack of fundamental services, also the lower possibility of participation at local level in poorer areas can be important drivers of the limited efficacy of Bolsa Familia. Finally, the result about single dimensions may suggests that poverty reduction occurs mainly via the channels of standards of living and active and community life dimensions.

As I mentioned earlier, these results are important for policy purposes as they suggest the ability of this programme to tackle multidimensional poverty, especially for vulnerable households. Also, it protects fundamental entitlements over time, in fact this policy seems to allow poor and vulnerable families to diminish the intensity of poverty, although the outcome is not statistically significant, which is useful to increase the chance of promotion from multidimensional poverty permanently for these households in the future (Ahmad and al., 1991). However, it seems not to have enough effect to produce a substantial reduction in the level of multidimensional poverty for more vulnerable households.

Hence, the integrated structure of Bolsa Familia, also its wide network of service provision, and its inclusive design, such as the participation of civil society in the management of this policy at local level, have contributed to spurring social change for poor families, and especially for vulnerable households, by giving fundamental entitlements and agency. However, lack of infrastructures, such as school and health facilities, insufficient service and policy coordination, such as low coordination with transportation policy, low quality of services, the paucity of cash transfers for families with high level of multidimensional poverty, and not enough resource distribution especially in poorer areas as well as the lack of business-related services probably has made Bolsa Familia ineffective towards more vulnerable households, for example in the remote areas of Brazil (Parsons, 2015; da Silva e Silva and al., 2008; da Silva e Silva and al., 2014).

Table 5 – ATT on poverty level and intensity of poverty for unbalanced and balanced treatment and control groups

Dimensions	ATT unmatched	Standard error	ATT matched	Standard error
Poverty status; threshold 25%	-0.0275**	0.01	-0.0279*	0.02
Poverty status; threshold 40%	-0.03***	0.01	-0.0218**	0.01
Average poverty intensity	-0.012***	0.0032	-0.005	0.0036

*** significant at 1%

** significant at 5%

*significant at 10%

Table 6 – ATT for balanced treatment and control groups across multidimensional poverty thresholds

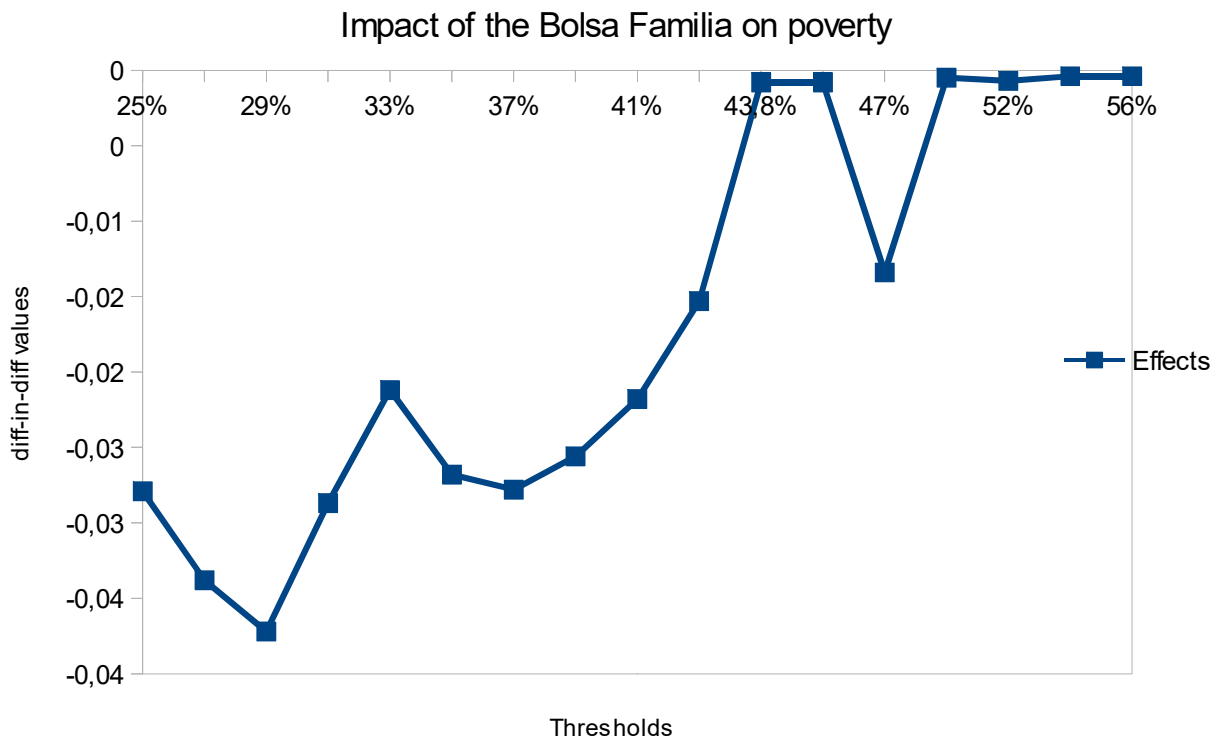
Poverty thresholds	ATT by threshold of poverty, matched groups	Confidence Interval
25%	-0.0279*	-2.82 ; -2.76
27.1%	-0.0338**	-3.41 ; -3.35
29.2%	-0.0372***	-3.75 ; -3.69
31.3%	-0.0287**	-2.9 ; -2.84
33.3%	-0.0212	-2.15 ; -2.09
35.4%	-0.0268**	-2.7 ; -2.65
37.5%	-0.0278**	-2.8 ; -2.76
39.6%	-0.0256***	-2.58 ; -2.54
41.7%	-0.0218**	-2.2 ; -2.16
43.7%	-0.0153*	-1.54 ; -1.51
43.8%	-0.0147*	-1.48 ; -1.45
45.8%	-0.008	-0.81 ; -0.76
47.9%	-0.0134**	-1.35 ; -1.32
50%	-0.005	-0.51 ; -0.49
52.1%	-0.007	-0.71 ; -0.69
54.2%	-0.0039	-0.009 ; 0.001
56.3%	-0.004	-0.41 ; -0.39

*** significant at 1%

** significant at 5%

* significant at 10%

Picture 1 – Effect of Bolsa Familia on the level of poverty across the thresholds



11. Robustness checks

As the estimates of the impact of Bolsa Familia might be sensitive to the choice of the parameters of the measure (e.g. weights), I undertake a robustness check about the previous results using regression analysis with controls for baseline features of families, which are not considered in the previous ATT analyses (see Tables 6-8) and compare the findings with the previous outcomes. Specifically, I regress the outcome variable on the propensity score and on the dummy variable which is about being inside the treatment and control groups. I can safely use this regression analysis as in the considered period there are no external events or conditions, and additional confounders that can blur the causal outcome. The result suggests similar outcomes compared to the previous analysis (see tables 5 and 7), specifically Bolsa Familia has higher effect on the families in the 25% cut-off compared to the households in the 40% line. Also, the magnitude is similar but the difference in the values between the two poverty thresholds is bigger in the robustness analysis, because the effect of Bolsa Familia on families in the 40% line is lower in the robustness analysis. Further, the ATT outcome about the poverty intensity is higher and significant in the robustness analysis. This finding suggests that Bolsa Familia has a significant impact on decreasing the deprivation level of Brazilian households. Moreover, the findings about the impact of Bolsa Familia on single dimensions show similar outcomes except for undernutrition and child labour which become non-significant, and on unemployment, which becomes significant, as well as about electricity whose sign is positive (see Tables 4 and 8). Hence, the results confirm that standards of living and active and community life may drive the impact of Bolsa Familia on multidimensional poverty. Finally, as far as the ATT analysis across multiple cut-offs is concerned (see tables 6 and 9), the trend by poverty line is the same except for the decreasing effect outcomes across the 35.4% and 37.5% thresholds, also, the effect of Bolsa Familia,

after controlling for baseline features of families, becomes non-significant at the 43.7% poverty threshold. The result of the robustness analysis indicates that this policy influences the poverty status of vulnerable households, but it has a limited positive impact on this set of families compared to the previous analysis. Specifically, in the previous analysis Bolsa reaches the families with 1.9 deprivations, whereas the robustness analysis shows that it supports families with 1.7 deprivations.

Table 7 – ATT analysis effect about poverty level and the intensity of poverty for balanced treatment and control groups

Dimensions	**ATT effect on poverty level, matched groups**	**Standard error**
Poverty status; threshold 25%	-0.0266*	0.01
Poverty status; threshold 40%	-0.0176**	0.008
Average poverty intensity	-0.0063*	0.003

*** significant at 1%

** significant at 5%

* significant at 10%

Table 8 - ATT effect for balanced treatment and control groups by dimension using regression analysis

Dimensions	Matched ATT
Undernutrition	0.005
Vaccination	-0.004
Access to healthcare	-0.002
School attendance	0.01
Ability to read and write	-0.016
Improved sanitation	-0.008
Cooking fuel	-0.035***
Safe drinking water	-0.007
Electricity	0.001
Flooring	-0.005
Assets	-0.026***
Unemployment	0.025**
Informal labour	-0.001
Child labour	-0.007
Social connectedness	-0.082***

*** significant at 1%

** significant at 5%

* significant at 10%

Table 9 – ATT effect for balanced treatment and control groups across multidimensional poverty thresholds

Poverty thresholds	ATT effect on poverty level across thresholds, matched groups	Confidence Intervals
25%	-0.0266*	-2.68 ; -2.63
27.1%	-0.0287**	-2.89 ; -2.84
29.2%	-0.0311***	-3.13 ; -3.08
31.3%	-0.0265**	-2.67 ; -2.62
33.3%	-0.0196	-1.98 ; -1.93
35.4%	-0.0265**	-2.66 ; -2.63
37.5%	-0.0245**	-2.46 ; -2.43
39.6%	-0.0167*	-1.68 ; -1.65
41.7%	-0.0176**	-1.77 ; -1.74
43.7%	-0.0101	-1.023 ; -0.996
43.8%	-0.0097	-0.023 ; 0.004
45.8%	-0.0039	-0.403 ; -0.376
47.9%	-0.0073	-0.741 ; -0.718
50%	-0.0005	-0.059 ; -0.04
52.1%	-0.0018	-0.187 ; -0.172
54.2%	0.0025	-0.008 ; 0.003
56.3%	-0.0015	-0.155 ; -0.144

*** significant at 1%

** significant at 5%

* significant at 10%

12. Conclusion

Bolsa Familia is an integrated, human-rights based social policy which aims to protect social security, health, education, and standards of living of families and children as fundamental entitlements (Midgley and Piachaud, 2013**;** Drèze and Sen, 2013). Specifically, its design incorporates and coordinates different policies and services: cash transfers, education and health programmes, and gas delivery, as well as complementary programs: hence, this programme tackles different interlinked dep**r**ivations simultaneously to ease the escape of Brazilian families from poverty over time, and to fight intergenerational transmission of poverty as well. In the literature related to the effect of Bolsa Familia there is a gap on the estimation of this policy on multidimensional poverty. My article fills this gap by inspecting the effectiveness of Bolsa Familia's design in reducing multidimensional poverty as its constitutional goals demand. This empirical analysis is interesting, in fact Bolsa Familia has been constructed as a network of coordinated interventions mingled with conditional cash transfers, and it is able to attack a range of different deprivations simultaneously. Hence, it is important, in terms of policy recommendations, the estimation of the effectiveness of Bolsa Familia on the burden of disadvantage, in order to suggest new social policy structures that are able to increase the efficacy in fighting multidimensional poverty. I analyse this issue by using propensity score and difference-in-difference model in a longitudinal data setting. The findings suggest that this policy fulfils its tasks, also, it contributes to defending very important dimensions of life, such as having a voice in the decision-making, which is a crucial form of democracy and inclusion in any society and which may spur social and economic change too (Drèze and Sen, 1996, Sen, 2015; Drèze and Sen, 2013). Moreover, it improves standard of living, which entails acquiring important capabilities, such as the ability to move (assets) and to eat warm food, it also protects children from labour, which is a fundamental human right in terms of children's current and future life. All these dimensions are crucial to live a dignified life and to curtail intergenerational transmission of disadvantage. However, Bolsa Familia seems to contribute to increasing unemployment and undernutrition, which may undermine the reduction of disadvantage for the current generation of Brazilian households. However, the outcome about unemployment can be affected by the reduction of child labour and by the possibility to quit from exploiting jobs, as well as by the possibility to be with children. Therefore, this result may not be negative and further analysis is needed to specify the effect of Bolsa Familia on this dimension. Further, this analysis shows that Bolsa Familia plays a role in the reduction of multidimensional poverty, both for poor and vulnerable households, as its impact spreads across a big range of distribution of the poverty cut-offs. Moreover, Bolsa Familia contributes to reducing the average intensity of poverty for Brazilian households, however, it does not seem to be able to ameliorate the situation of more vulnerable families.

In this respect, the findings suggest that Bolsa Familia has a protection role for Brazilian families (Ahmad and al., 1991). Hence, this program can give fundamental entitlements not only to households with lower level of poverty, but also to family in more entrenched poverty situation, contributing to decreasing disadvantage. In particular, the integrated structure of Bolsa Familia, the agency in combining the related services, and the participatory framework of this policy can have the capacity to protect crucial human rights. Also, this policy enables to break interlinkages among deprivations and to contribute to promoting the escape from multidimensional poverty over time (Ahmad and al., 1991). Specifically, the results indicate that Bolsa Familia has some influence on multiple deprivations, and it affects more dimensions compared to its designed impact on health, education, and income poverty, by exploiting the wide network of coordinated programs and services that may generate a sort of compounding impact on multidimensional poverty too. Particularly, the analysis about the effect on single dimensions may indicate that reduction in multidimensional poverty occurs via active and community life and standards of living. Finally, the effect on the intensity of multidimensional poverty reinforces the outcome about the power of Bolsa Familia to increase the chance of poor families to escape poverty in the future.

However, Bolsa Familia seems not to influence more vulnerable households (households which are included inside the 50% poverty cut-off). Probably, this program is not integrated enough in terms of policy and service coordination, furthermore the amount of cash transfers is not enough for more vulnerable families, also lack of infrastructures, facilities such as, roads, schools, and health centres in remote areas, and the lack of fundamental services, as well as the low quality of these services may impede Bolsa Familia to reach the poorest of the poor effectively, in order to lift them out of deep disadvantage (Parsons, 2015; da Silva e Silva, 2008; da Silva e Silva and de Almada Lima, 2014).

As far as the robustness check is concerned, the findings point out similar outcomes in each analysis I undertook, confirming the effect of Bolsa Familia on single dimensions and on multidimensional poverty as well. The main difference is about the fact that the impact of Bolsa Familia on the average intensity of poverty is statistically significant and higher compared to the first ATT analysis. Similarly, the effect on vulnerable families seems to be more limited compared to the findings of the first analysis. Finally, the impact on undernutrition, and child labour becomes statistically non-significant whereas the effect on unemployment becomes significant.

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