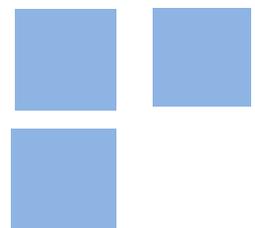


Housing program and social conditions impact: Evidences from *Minha Casa Minha Vida* program lotteries in Brazil

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Abstract: Housing policies to improve the quality of life of the poorest have been employed for a long time. In developing countries urbanization has increased the number of slums, supporting the creation of housing programs, like Minha Casa Minha Vida (MCMV) program, launched in 2009 in Brazil. The program intend to provide better housing conditions to poor family. To reduce the construction cost the houses are built in surround area of the cities, far from business center. In this paper, we took advantage of a randomly selection of families in Rio de Janeiro (one of the most important cities in Brazil) and São José do Rio Preto cities (a big city in the countryside of São Paulo state, Brazil) to evaluate the it impact on social conditions, mainly related to the employment and income. By combining two administrative databases we were able to measure the changes in the labor market for both groups, drawn and not drawn. The first conclusion is even with a random selection criteria, as the lottery, the program badly selected the beneficiary families, benefiting only one least linked to the labor market. Individuals with better job conditions choose remains the current house, independently of it structural condition or the neighborhood. To the beneficiary, the program negatively affects the labor supply, reducing the likelihood that the beneficiary will be formally employed. Also, the program increased the proportion of families receiving the cash income transfer. This work is one of the first articles to analyze microdata from MCMV, providing an important measure of the program's impact.

Keywords: housing policy, labor market, Minha Casa Minha Vida.

JEL Codes: R21, R31, I38

1. Introduction

Housing is the primary source of wealth for low-income families, particularly in developing countries. Because of this, housing has received the attention of the governments across the World in the adoption of housing policies to benefit vulnerable families. According to UN-Habitat, 3 billion people will need new housing or improvement in urban infrastructure by 2030, which represents about 40% of the world's population (Habitat, 2005). Housing programs intend to improve access to quality housing under different justifications and in different ways. In developing countries, including Brazil, the housing issue is even more severe. About one-third of the urban population of these countries lives in favelas or poor housing (Habitat, 2016).

A possible and conventional explanation for slums, tenement and other kind of bad residences is that low-income families are willing to live in substandard housing in polluted or flood-prone areas, on slopes or ridges, and in other inhospitable geographical environments if this allows them to be close to employment opportunities in the city center (Glaeser, 2011; Glaeser et al., 2008). Bad housing dwellers have a strong preference for being close to the labor market, compensating any real disamenity in the irregular areas. Then, the state-built formal houses will be beyond the willingness to pay of poor households, or located where they will not want to live. When the enforcement on the program does not prevent, the subsidy will only create an incentive to deviate, because beneficiaries will remain in the original residences and rent out the houses to other families. In which case the program's enforcement is binding, the families will not prefer to receive the subsidy and do not move to the new houses. In this instance, demand-side subsidies or cash-transfer programs are more appropriate interventions than government-built housing (Glaeser et al., 2008).

Another view consider that the dwellers continue to live in bad housing because they are "trapped in poverty" and cannot move on to the formal urban lifestyle in the competitive market forces offered by the city. Thus, precarious residences are the product of multiple market and policy failures (mainly governance and coordination problems) that obstruct bad housing dwellers' capital accumulation and human development opportunities Marx et al. (2013); Galiani et al. (2017).

The two views are not antagonistic each other and may represent the conditions of different families. Households relatively more closely linked to the labor market would prefer to remain in precarious housing, even when they were awarded a subsidy in the form of a new property since the costs of change would imply a loss of their current positions in the labor market. In the other hand, less connected families, with less formal jobs or with more mobility of employment and occupation, could consider the subsidy as an increase in their intertemporal income and, therefore, prefer to change. These beneficiary families may or may not revise their status as labor suppliers after the move.

A growing literature trying to analyze the impact of housing programs in the labor market, mainly considering the effects of labor supply. Economic theory yields ambiguous predictions about the effect's sign of the housing programs. As pointed by (Jacob and Ludwig, 2012), the standard static labor supply model predicts a reduction in labor supply through both income and substitution effects. Some works point housing programs may be work neutral, or even increase work, by reducing the price of complements to work (e.g., residential stability, housing or neighborhood quality, proximity to jobs) or because of the particular nonlinear budget frontiers created by the program (Shroder, 2002). (Jacob and Ludwig, 2012) estimate the effects of means-tested housing programs on labor supply using data from a randomized housing voucher wait-list lottery in Chicago. They find that among working-age, able-bodied adults, housing voucher use reduces labor force participation and the quarterly earnings, and increases Temporary Assistance for Needy Families program participation.

Despite the importance of the problem, there is a lack of good empirical evidence about the efficiency of these programs and its effect on families benefited for it, especially in developing countries. This paper intends to fill this gap in analyzing the performance of the individuals that were randomly selected by the program *Minha Casa Minha Vida* (My House My Live, henceforth MCMV) in the

cities of Rio de Janeiro (RJ), and São José do Rio Preto (SJRP), Brazil. The program, launched in 2009, has become the main Brazilian housing program, reaching an annual cost of over US\$ 3.6 billion and having contracted almost 5 million housing units. We provide one of the first estimates of the effect of the MCMV on labor supply and participation in social programs. Additionally, this is one of the first articles to explore the lotteries that took place in Rio de Janeiro and in São José do Rio Preto to select the beneficiaries of the program.

We took advantage of the beneficiary selection process, which is done through a lottery. Randomization of participants in MCMV provides a rare source of exogeneity. The economic theory dealing with housing programs is ambiguous about the household decision to accept or not the housing program benefit, as already pointed in (Glaeser, 2011) and (Marx et al., 2013) discussion. Among the recipients, there is also lack evidence related to the potential effects of a housing benefit on labor supply and other economic indicators, such as participation in social programs (Jacob and Ludwig, 2012; Shroder, 2002). However, more recent studies, which overcame problems of endogeneity, point out that housing assistance can reduce the labor supply for its beneficiaries (Jacob and Ludwig, 2012; Wood et al., 2008).

The results show that to individuals moving to MCMV projects has reduced the likelihood of being formally employed in both cities of Rio de Janeiro, and São José do Rio Preto. Estimates point to an adverse effect of the program of 3.3% in São José do Rio Preto and 5.9% in Rio de Janeiro on the formal employment rate. However, to individuals that remained employed, the wage does not appear to have been affected. Furthermore, the program has a positive impact on participation in Bolsa Família, Brazilian mainly income transfer program, indicating that the economic situation of beneficiary families has worsened. Estimates point to a positive effect of 4% in São José do Rio Preto and up to 7% in Rio de Janeiro on participation in the Bolsa Família program.

The work is divided into four sections, in addition to this introduction and the conclusion. The first section reviews the literature on housing programs and MCMV. The second section introduces the databases that were used and also describes the housing lotteries in Rio de Janeiro, and São José do Rio Preto. The third section presents the methodology used to analyze the data, and the fourth section presents the results for the cities of Rio de Janeiro, and São José do Rio Preto. It is shown that in both cities the treatment and control groups are comparable and that the MCMV program negatively impacts the formal employment rate and positively affects the participation in Bolsa Família.

2. Empirical evidence on housing assistance programs

2.1. Housing program and selection issues

Slums, tenement, and precarious residences are associated with the worst face of poverty. An old view about bad housing suggests that they are a transitory phenomenon mainly present in fast-growing economies. As developing economies approach the long run steady state, economic development progressively transforms informal settlements into formal neighborhoods (Galiani et al., 2017). To Glaeser (2011) the preference of people living in bad housing in large cities is due to accessibility opportunities. Low-income families move to there voluntarily, usually to avoid subsistence-level in a rural area or the commuting cost in low price houses in periphery of the cities. Slums, tenement and the other kind of bad residences close to the business center and the job opportunity places provide a way for low-income families improve their labor productivity by taking advantage of the benefits of networks offered by large cities. Poor neighborhood in the cities are not making people poor but instead are attracting poor people; the emergence of slums is attributed to the willingness of the poor to live in substandard housing and hostile geographical environments if doing so also enables them to be close to employment opportunities (Galiani et al., 2017). The benefits taking of the increase in labor productivity compensate the temporarily bad housing conditions. The opportunities of the job proximity allow them to gradually improve their living conditions and eventually to convert the

residence into a non-slum neighborhood or same to migrate out of the slums into formal housing within the city. Certainly, it is a mistake to idealize the bad housing, despite they represent opportunities to low income family. They also reveal public failure, requiring initiatives to upgrade them and better public goods for their residents, such as clean water and honest police, as well as better roads and means of transportation to connect bad housing with the more successful parts of their cities.

In one another approach, Marx et al. (2013) asserts that multiple market and policy failures (mainly governance and coordination problems) explain the presence of bad housing in the cities. Absent or deficient water and sewage systems translate into a broad range of health and sanitation issues, whether through direct exposure to bacterial agents, contaminated drinking water, or other channels. That issues prevent bad housing dwellers' capital accumulation and human development opportunities (mainly considering the health aspects of human capital). Additionally, irregular conditions of life could difficult access to the formal market, as the credit and financial market. It may be complicated for any bank to provide a loan of the necessary size to a person working in the informal sector and without access to existing collateral. Thus, life in the bad housing may constitute a form of poverty trap for a majority of the residents, most of whom find themselves stuck in precarious residences for generations (Marx et al., 2013).

From Glaeser (2011) point of view, people living in bad houses have a strong preference for being close to the labor market, which compensates eventual disamenity of the irregular areas. Then, a housing program subsidizing the purchase of new houses will be beyond the willingness to pay of poor households, or located where they will not want to live. When the enforcement on the program does not prevent, the subsidy will only create an incentive to deviate, because beneficiaries will remain in bad housing and rent out the houses to other families. In which case the program's enforcement is binding, the families will not prefer to receive the subsidy and do not move to the new houses. In this instance, demand-side subsidies or cash-transfer programs could be more appropriate interventions than government-built housing. On the other hand, (Marx et al., 2013) point of view justify the public intervention to correct market failures, eventually offering houses to poor people, or giving them vouchers to pay rent.

The two views are not antagonistic each other. They could represent the social conditions of different families. It is possible that households relatively more closely linked to the labor market would prefer to remain in slums, tenement or more precarious housing, near to the Central Business District, even when they were awarded a subsidy in the form of a new property. If the costs of change imply a loss of their current positions in the labor market and the accessibility to other market goods, they prefer eventually remain in bad houses. On the other hand, less connected families, with less formal jobs or with more mobility of employment and occupation, could consider the subsidy as an increase in their intertemporal income and, therefore, prefer to change. These beneficiary families may or may not revise their status as labor suppliers after the move. If this hypothesis is right, only the poorest households among the low income families will accept new houses far from the center of the city.

2.2. Housing program impact on compliers

However, to subsidy merely the acquisition of a new house, often far from the original home location and also far from job centers, may not entirely solve the problem of low-income families and, on the contrary, create others.

Several studies seek to analyze what happens to individuals who receive housing assistance, both in the form of vouchers¹, predominant in the USA, or in the direct provision of housing, which has dominated the housing policy in developing countries (Buckley et al., 2016). Despite the existence

¹In this case, the individual rents the dwelling in the private market and the government subsidizes part of the rent.

of a consolidated literature on housing programs, few studies have succeeded in isolating causal relationships of the programs. The vast majority suffer from problems of endogeneity, which arise from the fact that the recipient normally chooses or not to participate in the program (Collinson et al., 2015).

Studies that manage to overcome the problems of endogeneity show that housing assistance usually improves housing quality, both in the case of vouchers (Jacob and Ludwig, 2012; Wood et al., 2008), as in the case of public housing (Currie and Yelowitz, 2000). In addition, they also show that the share of income spent on rent decreases substantively (Jacob and Ludwig, 2012).² As important as the effects of housing programs on the quality of housing and accessibility are the indirect effects that this type of assistance can generate. The idea that housing assistance generates positive externalities is one of the main reasons for the existence of this type of benefit. If housing assistance does not bring in any gains other than the reduction in rent and housing quality, it is possible that a cash transfer would be more efficient.³

There is much empirical evidence from the housing program in the United States. The country has a long history with housing programs dating back to the early twentieth century. At first, the housing assistance was mainly through units built and managed by the government, commonly known as the projects, which were rented to families who needed it. This type of assistance was widely criticized in the country for two main reasons. First, these residential complexes were built in areas that were already occupied by the poor, which could lead to a greater concentration of poverty and intensify racial segregation in cities. Also, over time, these settlements were associated with places of high crime and poverty. (Currie and Yelowitz, 2000).⁴

One of the major externalities that economists expect is an effect on the individual's participation in the labor market. It was for this purpose, and after decades of criticism about the location of public housing, that the United States government created the Moving to Opportunity program. Designed as an experiment, the program selected families by lottery and provided a subsidy for them to move to areas of low poverty. One of the main effects awaited by the formulators of the program was the impact on the employment rate. Many studies have shown that housing programs affect the labor supply and physical and mental health of recipients (Chetty et al., 2016; Jacob and Ludwig, 2012; Ludwig et al., 2013; Susin, 2005; Wood et al., 2008). However, evaluations of the effect of *MTO* on the employment rate of those adults who participated did not find significant impacts (Kling et al., 2007; Chetty et al., 2016). Particularly important are the works of Jacob and Ludwig (2012); Chetty et al. (2016) and Jacob et al. (2015). The first paper showed that the voucher housing benefit of the Section 8 program⁵ reduced the probability of being employed at 4% and income at \$329 dollars. The effect on the employment rate is of long term, remaining negative up to eight years after the granting of the benefit. In addition, the housing benefit also significantly increases the proportion of people receiving other government assistance, such as the Temporary Assistance for Needy Families (TANF).⁶ The identification of the estimates is guaranteed by the selection of the beneficiaries in the

²Jacob and Ludwig (2012) uses the fact that the selection for program beneficiaries in the city of Chicago was via lottery. Currie and Yelowitz (2000) uses a gender-specific instrumental variable of the children of families who participated in the public housing program.

³For a discussion of in-kind and cash transfers, see Currie and Gahvari (2008).

⁴These criticisms led the United States to prioritize voucher-based housing programs, discouraging public housing model.

⁵Chicago's Housing Choice Voucher (HCV) Program, also called Section 8 voucher, allows low-income families to rent quality housing in the private market via federal funds provided by the U.S. Department of Housing and Urban Development (HUD). Through the HCV Program, Chicago Housing Authority (CHA) pays a portion of eligible families' rent each month directly to the landlord. Families can use their vouchers to rent a house or apartment in the private market throughout the city of Chicago. Because there are more families who need rental assistance than there are funds available, CHA uses a waiting list to administer the program to eligible families. Names are selected from the waiting list randomly using a lottery process. See <https://www.thecha.org/residents/housing-choice-voucher-hcv-program> for more information about HUD's Section 8 program.

⁶TANF is a benefit for poor families in the United States. This program financially helps low-income families with

city of Chicago, which was made by a lottery.

The second paper examined the children of the families benefiting from the MTO program. The MTO program selected the candidates by lottery and required beneficiaries to move to areas of low poverty, providing a fairly unique source of exogeneity in the literature that analyzes the effect of neighborhoods. The results show that children who grew up in neighborhoods of lower poverty, benefited by the program, earn up to 30% more than those in the control group, who grew up in poor neighborhoods. In addition, these children were more likely to attend college than children in the control group.

Finally, Jacob et al. (2015) took advantage of a randomized housing voucher lottery in Chicago in 1997 to examine the long-term impact of housing assistance on a wide variety of child outcomes, including schooling, health, and criminal involvement. They focused on families living in unsubsidized private housing at baseline, for whom voucher receipt generates large changes in both housing and nonhousing consumption, and found that the receipt of housing assistance has little, if any, impact on neighborhood or school quality or on a wide range of important child outcomes.

Housing programs is increasingly important in developing countries. Buckley et al. (2016) identify 16 developing countries that have launched multibillion-dollar housing programs in recent years.⁷ However, there is very little empirical evidence from these countries in the economic literature. Barnhardt et al. (2017) studies a housing program in India that, like Brazil, has increased spending on housing programs in recent years. The program offered houses in better conditions on the outskirts of the city at a monthly cost well below the market for slum dwellers in the center of Ahmedabad, selecting the beneficiaries by lottery. Because of the distance of these new homes, a third of the winners chose not to move. Also, 32% of the winners moved and returned to the slums for ten years. The main reasons given for giving up the benefit were linked to the isolation of the dwellings. After 14 years, the winners of the lottery did not show any improvement regarding income or human capital, and the social ties of the winners were significantly impaired, suggesting that the program did not generate long-term economic benefits.

Alzua, Amendolagaine, Cruces, and Greppi (2016) analyze a housing lottery in Rosario, Argentina. They found a reduction in registered employment by more than 7 percentage points, especially for women and beneficiaries over 50 years of age. They also conducted a purposely-designed household survey among a sample of beneficiaries in order to understand the underlying mechanisms and welfare implications of these results. All in all, their results pointed out to the existence of an income effect and confirms the registered fall in formal employment and labor force participation. They did not find an increase in informal work contract, although beneficiaries' perceived access to local job opportunities is significantly reduced. Similarly, Franklin (2018) studies a large scale housing lottery in Ethiopia. Houses were built in the outskirts of the city and most of the beneficiaries came from slums near the city center. The study finds no significant effects on labor market outcomes such as income and hours worked. They also show that the lottery winners report lower levels of social interactions, similar to Barnhardt et al. (2017).

In Brazil, Bueno et al. (2018) have studied the effect of MCMV housing subsidies on the beneficiaries political preferences. The article studied the housing lotteries that occurred in Rio de Janeiro in 2011 and 2013. They have shown, contrary to expectations, that the program generated anti-incumbent (negative) political effects on those people who were selected to participate. They also show that lottery winners report lower life satisfaction than non-winners. These surprising results are consistent with program implementation difficulties and overall evaluation of MCMV program.

Given the poor location of the projects in developing countries, the worst results in the labor market could be due to the spatial mismatch hypothesis. Kain (1968) already called attention to the

children under age.

⁷Among them: Brazil, India, South Africa, Colombia.

adverse effects of spatial segregation on the labor supply of individuals. Urban populations living in areas far from (and poorly connected to) employment centers have great difficulties in finding and maintaining good jobs, which impairs their performance in the labor market. The worst outcomes in the labor market can be caused by some mechanisms: (i) Workers may reject jobs involving a long commuting time; (ii) The efficiency of the job search may decline given the enormous distance of jobs. (iii) Workers who live too far away from jobs can slow down their search efforts. (iv) The costs of looking for a job can be very high, causing workers to restrict their search to neighborhoods closer to where they live. (v) Employers may not hire or dismiss employees who live too far away because of commuting time, which can affect their productivity. (vi) These individuals may cost more for firms, which must compensate for the cost of transportation, among others. The effects on this population may include longer commuting time, lower wages and higher unemployment (Gobillon et al., 2007).

2.3. Minha Casa Minha Vida and the housing issues in Brazil

Brazil underwent an intense urbanization process from the second half of the twentieth century. In 60 years, the urban population has grown from 36% to 84% of the total population in the country. The agglomeration of people in slums, regions with high poverty and lack of adequate infrastructure, is one of the main consequence of fast urbanization. Currently, about 6% of the Brazilian population lives in favelas. In large cities the problem is even bigger: In Rio de Janeiro, 22% of the population lives in favelas; in Belém, this number reaches 54% of the population (Censo, 2010). The lack of adequate housing, same outside slums, is another problem associated with the intense urbanization that has taken place in the country. It is estimated that the housing deficit in 2010 in Brazil was of 6.9 million houses (Fundação João Pinheiro, 2016).⁸ About 84% of the housing deficit is in the urban area, and, among them, 63% is concentrated in households with income up to 3 minimum wages, which represent more than 3.5 million houses.

In order to face housing issues, some programs were created in Brazil throughout the last decades. The most important one, before MCMV, was the National Housing Bank (BNH, in Portuguese)⁹, created in 1964, which provided subsidies for low- and middle-income families to finance home ownership.¹⁰ In 22 years, until its extinction in 1986, this program financed the construction of 4.3 million new housing units, with 2.4 million of these units destined to the poorest households (Bonduki, 2008). After the end of the program, the country remained decades without a national strategy to fight the housing problem.

The MCMV Program was launched in 2009 with the goal of reducing the country's housing deficit and retake the federal housing program.¹¹ The program is aimed at families with income between 0 to 10 minimum wages (MW). In 7 years, the program has accumulated 4.9 million contracted Housing Units, being that 3.5 million houses have already been assigned to the recipients. The program is divided into three main segments, according to the income of the beneficiary families.

- Segment I builds homes for families with incomes of up to US\$ 400/mo (3 MW);
- Segment II for families with incomes between 3 to 6 MW; and
- Segment III, for families from 6 up to 10 MW.

⁸The houses that are in precarious conditions and that need to be restored are considered as part of the housing deficit and also the houses in which: a) two or more families live or b) the family income is up to 3 times the minimum wage and the cost of the rent exceeds 30% of it. For more details, see: (Fundação João Pinheiro, 2016).

⁹Despite the name, BNH was not a bank but a housing program

¹⁰Despite the name of Bank, the BNH was a public institution that operated the public housing program during its existence. It was the main federal institution of urban development, formulating, implementing and managing the housing public budget.

¹¹The program also had the indirect goal of stimulating the construction sector.

Also, as additional criteria for participating in the program, the family can not own any property financed by Caixa Econômica Federal, and do not have any active financing with any other financial agent.

Although most of the housing deficit is concentrated in families with up to 3 MW, only a third of the units delivered were directed to this income bracket. The evolution of total housing units by income bracket over time can be visualized in Figure 1.

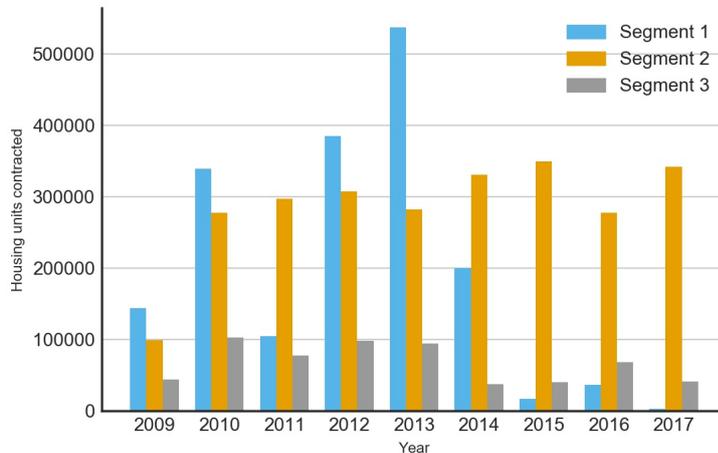


Figure 1: Housing units contracted in MCMV
Data from the Ministry of Cities. Own elaboration.

In addition to the family income criterion, the three program’s segments have different selection mode of beneficiaries. The subsidy for families in Segment I is very high, reaching 90% of the houses’ value and the monthly installments extend for up to 120 months. This is not the case for Segments II and III which have little or no subsidy. The selection of recipients in Segment I is made by the municipalities in which the projects are built. As the demand for housing usually exceeds supply, the program rules determine that families eligible for the program be registered and randomly selected by city halls to obtain housing. For the other two segments, the families themselves look for houses that participate in the program and check their eligibility (Marques and Rodrigues, 2013).

There are 11,375 housing projects for Segment I in Brazil, a total of 1.76 million housing units. Big cities, like São Paulo and Rio de Janeiro, have dozens of projects. São Paulo had contracted 40 projects to date, and Rio de Janeiro had 100 projects. In Segment I, the project and the execution of the enterprise are of responsibility of a private party. The prefectures of each municipality select the beneficiaries of the program and, finally, Caixa Econômica Federal finances these units for the selected individuals, subsidizing most of the value of the property.

The program has a considerable problem associated with the localization of the houses. To reducing the total costs, the houses are built in peripheral neighborhoods, away from public infrastructure, employment opportunities, commerce, public transport, health units, and schools (Marques and Rodrigues, 2013; Rolnik et al., 2015; Pequeno and Renato, 2013). This problem was also pointed out by the recipients in the Ministry of Development’s official survey in 2013 (Brasil, 2014) .¹²

3. Database

The analysis is based on different data sources. The list of recipients of the Minha Casa Minha Vida program was obtained from Caixa Econômica Federal (CEF), an official bank responsible for

¹²The problem of location repeats the experience of the BNH, which also prioritized the construction of large housing complexes on the outskirts of cities in places with poor urbanization (Bonduki, 2008).

controlling the credit housing contracts. The list contains the name, the social security number (CPF), the contract date, and data on the project. To the analysis, we concentrate on the data of program's Segment I. Information on the lottery in Rio de Janeiro and São José do Rio Preto was obtained on the city hall's website. The data include people enrolled in the lottery as well as those who won. In Rio de Janeiro, the lottery took place in 2011 and in São José do Rio Preto, 2013.¹³ To socioeconomic variables, we consider data from Annual Social Information Report (RAIS), an administrative database of Ministry of Labor and Employment, and the database of the Single Registry, an administrative database of the Ministry of Social Development, both of federal govern.

RAIS database has information about the individual's current job, such as salary, sector of activity, the date on which he started on employment and date on which he was dismissed. Also contains characteristics of individuals, such as gender, age, schooling, and skin color. Unfortunately, the information is restricted to formal contract.¹⁴ Single Registry contains information on Brazilian families living in poverty or extreme poverty. The information contained in this database is much more comprehensive than the information in RAIS, as it includes not only characteristics of individuals but also of the whole family. Also, it includes individuals working in the informal labor market, and information about the participants of the Bolsa Família program, the Brazilian main income transfer social program.¹⁵

For Rio de Janeiro, the analysis is restricted to the RAIS database, since that incorporating information from the Single Registry would bias the sample once the compliance is imperfect. The individuals who have become beneficiaries of the program are different from those who were not randomly selected. As only the recipients were registered in the Single Registry, using the information from that would make the treatment and control groups unbalanced. In the case of São José do Rio Preto, the socioeconomic characteristics of individuals are from the Single Registry. With this database, information on 99% of the sample is obtained.

3.1. The housing lotteries in Rio de Janeiro

Rio de Janeiro is the second biggest city in Brazil, with 6,7 million people. The city has the most beneficiaries of the MCMV program in Segment I. Currently, 27,843 families are benefited in the city. Between 2009 and 2012, 48 projects were inaugurated, 36 of which were used for resettlement of families living in high-risk areas and areas that would be reformed by the city.¹⁶ The remaining 12 projects were destined to families registered in a housing demand list of the city, composed of families who lacked housing (Cardoso and Lago, 2015). The total cost of these housing projects reached R\$ 225 million. The units were priced at about R\$ 51,644.00 and a square footage of about 45m².

The selection of the 3,934 beneficiaries among those of this second group was made by the city through a raffle. In Brazil, the lotteries are regulated by the government and the most traditional is the Federal Lottery, provided by Caixa Econômica Federal, the same official bank that provided credit to the housing contract. If the last two digits of the participant's registration number were the same as the last two digits of the Federal Lottery draw, then the family was selected, and public agents contacted them.

To avoid self-selection problem in the data, we restricted the analysis to the three raffle in which the

¹³Some houses were allocated by another criterion than lottery which avoids using our identification strategy to analyse their data. This individual were excluded from the analysis.

¹⁴Although informality is still relevant in the country, the formal employment rate for the population analyzed ranges from 50% to 58% between 2010 and 2014. Also, between 2006 and 2014, 75% of individuals analyzed appeared at RAIS at least once. That is, only one-quarter of all individuals did not hold a formal job in this period.

¹⁵All MCMV beneficiaries must be enrolled in the Single Registry. Therefore, this database contains complete information about the individuals and families of individuals benefiting from the program.

¹⁶Rio de Janeiro hosted the 2014 World Cup and the 2016 Olympics. There were several interventions in the city that motivated the resettlement of thousands of families, most of them by houses built by MCMV program (Cardoso and Lago, 2015).

participants came from the general register of the Secretary of Housing of Rio de Janeiro municipality (Lotteries 003, 006 and 009).¹⁷ Table 1 shows the number of people that participated in each lottery, as well as those who were randomly selected and the compliance rate, that is, the proportion of people selected that agreed in a change to the new house.

Table 1: MCMV lotteries in Rio de Janeiro city

	Lottery date	Participants	Winners	Beneficiaries	Compliance
Lottery 003/2011	11/06/2011	297,867	2,983	912	30.6%
Lottery 006/2011	13/08/2011	325,080	6,505	1,352	20.8%
Lottery 009/2011	02/11/2011	351,094	14,056	1,695	12.1%
<i>Total</i>		361,805	23,472	3,934	16.8%

Notes: Data from the city of Rio de Janeiro.

In the three lotteries considered, 23.5 thousands of people were selected to fill vacancies in the program, among more than 360 thousand. These individuals were contacted by phone or letter by public agents, who offered them a house of the program.¹⁸ About 16.8% of all individuals selected effectively became beneficiaries of the program. However, the compliance rate varied widely by lottery. This variation can be explained by the location of the houses offered in each lottery.¹⁹ The first lottery, which had the highest compliance rate, offered more vacancies in projects near public transportation and more consolidated neighborhoods than the second lottery. Also, most of the units in the last lottery were of vacancies that were not filled in the last two lotteries. Supplementary material shows the division of the beneficiaries of each project by lottery. Figure 2 shows the location of the projects in each lottery.

Due to the differences in compliance rates and different composition of the list of participants in each lottery, the analysis was done separately for each lottery.²⁰ When accepting the housing unit, the family goes through verification of income and compliance with the criteria of the program. This verification is made independently of city hall by Caixa Econômica Federal. After approval, the family waits for the completion of the house.

The houses were delivered throughout 2012 at different addresses in the West Zone of Rio de Janeiro city (Figure 2). The distance from these complexes to the city center, which concentrates jobs in the municipality, varies between 20km and 30km in a straight line, making travel to this region quite costly (Cardoso and Lago, 2015). The project areas have a smaller number of jobs and concentrate the low-income population of the city (Figures 2). Several studies criticize the location of these residential complexes, highlighting the concentration of low-income families in areas with little infrastructure and urban services (Cardoso and Lago, 2015).

¹⁷The remaining lotteries occurred in 2011 were special for seniors and people with disabilities, and the number of selected individuals were too small (417).

¹⁸It is critical to note that although each housing lottery has more people enrolled than the previous one, not all who participated in the previous lottery is in the subsequent one. For instance, 25,316 people who participated in Lottery 003 not participate in Lottery 006. Of them, 24,321 come back to list in Lottery 009. The documentation on each lottery does not make clear why this happened. Instead, they declare that all participants in the lottery come from the general register of the Municipal Secretary of Housing.

¹⁹There may also be other factors that explain low compliance, such as not meeting the program's income criterion.

²⁰The Individuals randomly selected in the other lotteries will be kept in the sample, i.e., in the sample of Lottery 003, we keep all individuals randomly selected in lotteries 006 and 009. In the supplementary material, we show that excluding these individuals in each sample does not alter the results.

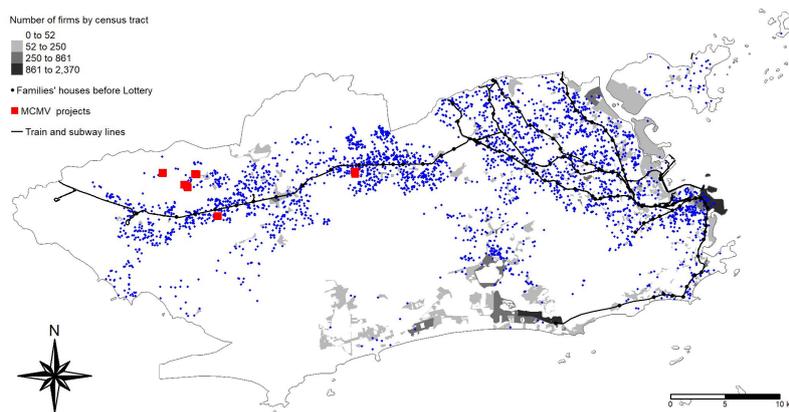


Figure 2: Distribution of formal jobs Rio de Janeiro and MCMV housing projects location. Data from RAIS and the 2010 Census. Own elaboration.

3.2. The housing lottery in São José do Rio Preto

São José do Rio Preto is one of the most populous cities in the state of Sao Paulo, with more than 450 thousand people. Currently, the city has about 6,556 housing units on MCMV Segment I, making it the seventeenth city with the most beneficiaries of the program. In 2013, the municipality of São José do Rio Preto selected 2,508 families to participate in MCMV Segment I. They selected 2,356 families randomly, by a raffle open to the public and widely publicized.²¹

The information on participants in São José do Rio Preto was obtained from the City Hall. The lists contain the name and CPF of all individuals that participated in the lottery and all of those that won the lottery. Using the CPF, we merge the participants information to the two confidential datasets of Single Registry and RAIS.

In São José do Rio Preto, 99% of the individuals who participated in the lottery were registered to the Single Registry before the lottery. Therefore, it is possible to obtain better information on almost all the families of treatment and control groups, differently from Rio de Janeiro. This allows a much better characterization of the families and gives more precision to the results.²² The total cost of the two projects in SJRP was almost R\$ 170 million²³.

Despite having different names, the two housing complexes are contiguous and have the same characteristics. Like Rio de Janeiro, the housing complexes are located outside the city center, the region that concentrates formal jobs, as shown in Figures 3. Each houses has 41m² and was evaluated at about R\$ 68,000. All homes have access to basic sanitation, drinking water and electricity. The recipients started moving to the complexes in April/2014. In 2015, a health unit and a school were inaugurated in the neighborhood (da Cunha, 2014).

4. Methodology

Selection bias is the main issue in estimating causal treatment relationships. If there is no source of exogeneity, any study comparing recipients of some program with non-beneficiaries will be subject to selection bias. In the case of welfare programs for low-income individuals, this bias is almost

²¹The other families were chosen because of their socioeconomic characteristics.

²²We also construct a sample made only with variables from RAIS, similar to Rio de Janeiro analysis, to mimic what was done to Rio de Janeiro city.

²³Of this total, the federal government paid R\$ 120 million and the municipal government the remaining (da Cunha, 2014).

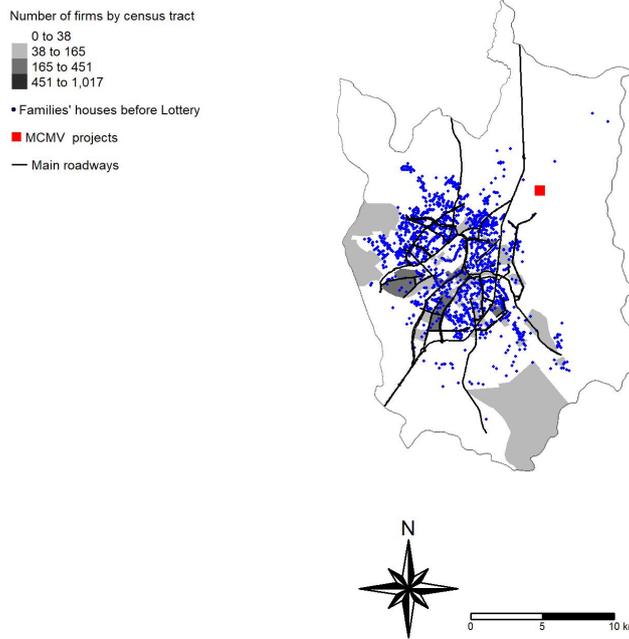


Figure 3: Location of the recipients in São José do Rio Preto
Data from Cadastro Único. Own elaboration.²⁴

always negative. Individuals who participate in social programs tend to have a greater vulnerability regarding the labor market, income, and others. Therefore, a simple comparison between the variables of individuals who participate and who do not participate in a government program is biased (Angrist and Pischke, 2009). Randomizing the selection to the program solves the selection problem. In this case, treatment (randomly selected) and control (not selected) groups are comparable and any variation, after treatment, in the variables of interest can be attributed to the program in question. In this work, we took advantage of the fact that the selection for Minha Casa Minha Vida Segment I is random, both in Rio de Janeiro and in São José do Rio Preto. As the selection for the program was random, the simple comparison between the treatment and control groups guarantees a non-biased estimate of the effect of having been *offered* to participate in the MCMV, which is known in the literature as an intent-to-treat effect.

The estimate of this effect consists primarily in calculating the differences between the means of the treatment and control groups. In this way, a equation of the following type could be estimated:

$$y_{it} = \alpha_t + \beta^{ITT} d_{it} + \mathbf{x}'_{it} \delta + \varepsilon_{it} \quad (1)$$

where y_{it} indicates the dependent variables (labor income, labor market participation, or participation in the Bolsa Família program), α_t are time fixed effects, d_{it} is a dummy variable, indicating whether the individual was randomly selected to participate in MCMV and \mathbf{x}_{it} is a k dimensional vector of control variables, including a constant term.

If randomization was successful, then $E(d_{it}\varepsilon_{it}) = 0$ and the parameter β^{ITT} identifies the effect of being randomly selected to participate in MCMV (*receiving an offer*) and the interest variables. However, not all of the individuals selected accepted the offer for participating in MCMV. As pointed out before, people would prefer staying close to the business center instead move to a new house far away. The family social condition would impact the decision to accept or not the MCMV offer. If the costs of change imply a loss in their labor market positions and the accessibility to other market goods, these families eventually prefer to remain in bad houses. In this turn, less connected families could consider the subsidy an opportunity (an increase in their long-run income) opting to change. Therefore, the estimation of the ITT effect in equation 1 underestimates the actual effect of participating in MCMV.

Because of this compliance issue, a two-stage methodology is used, where the results of the lottery

are used as an instrumental variable for participation in the program. If the lottery was truly random and if the offer has any impact on those who have decided not to participate in the program, we can identify the effect of the program on its beneficiaries (Angrist and Pischke, 2009).

Consider c_{it} a variable indicating if the i -th individual accepted the house offer in the t -th period (complier). We could estimate the effect of the treatment on the treated (the effect of accepting the house) using an equation relating the variable of interest the c_{it} indicator. However, this variable is clearly endogenous. If the lottery was successful, a system of equation approach could be estimated as

$$\begin{aligned} c_{it} &= \lambda_t + \mu d_{it} + \mathbf{z}'_{it}\pi + \nu_{it} \\ y_{it} &= \theta_t + \beta^{TOT} c_{it} + \mathbf{x}'_{it}\gamma + \epsilon_{it} \end{aligned} \quad (2)$$

Where y_{it} and \mathbf{x}_{it} are defined as in (1), \mathbf{z}_{it} is a l dimensional vector of control variables to the selection equation, may including some or all variables in \mathbf{x}_{it} . We assume that

- i $E(\nu_{it}|d_{it}, \mathbf{z}_{it}) = 0$;
- ii $E(\epsilon_{it}|d_{it}) = 0$,
- iii $E(\nu_{it}\epsilon_{it}|d_{it}) = 0$; and
- iv $l \geq k$.

The assumptions are intuitive. *i*) is the identification assumption to the selection equation as a function of control variables and the lottery. *ii*) and *iii*) are the traditional instrumental variables assumptions and *iv*) is the rank condition assumption to the identification.

The first equation in the system permits to verify the relevant conditions to the drawn individuals to accept or not the program's house. Possibly predetermined conditions influence this option. Our central hypothesis is that only most impoverished family among the drawing are willing to move to the new houses. To verify the impact of the MCMV program on the treated individuals, we took advantage of the exogeneity in the lottery in the first equation to instrumentalize the second equation. Given assumption *iii*) above, the system equation can be estimated using the two-stage approach.

Under the assumption *ii*) above, β^{TOT} captures the local average treatment effect (LATE) of the program. That is, the average effect of participating in MCMV on those individuals who actually move after winning the lottery and on those who do not move because they were not drawn (i.e. respect the outcome of the lottery). However, in both cities analyzed, individuals in the control group who were not randomly selected do not have access to the program.²⁵ This means that β^{TOT} represents the average effect of the MCMV program on the treated, known in the literature as the treatment-on-the-treated effect (Angrist and Pischke, 2009).

As the dependent variable in the second equation, we analyze three different dimensions. For the first dimension, employment, we use a dummy variable to indicate whether the individual was formally employed in a given year, which corresponds to whether the individual appeared in RAIS database in that year. Furthermore, as a robustness test, we also estimate the impact on two other variables of labor market participation. In the first, the employment information in RAIS database was transformed into a quarterly panel, so the dependent variable indicates whether the individual was employed in a given quarter. In the second, we use a dummy variable that is already present in the RAIS database, and that indicates whether the individual was formally employed on the last day each year (12/31).

²⁵MCMV participants in the housing projects analyzed non selected by the lottery are excluded from the sample in both the cities.

For the second dimension, income, we use the average wages of the individual in that year in RAIS database, and for participation in Bolsa Família, data indicating if the individual received the benefit comes from the Single Registry.

Time (year or quarter) fixed effects are also included to control macroeconomic effects, as business cycle co-movement. The control variables \mathbf{x}_{it} are used for greater precision of the estimates and include variables found in RAIS and in the Single Registry such as gender, schooling and age. The set of control variables is different for the two cities analyzed below. In Rio de Janeiro, RAIS control variables are used. In Rio Preto, control variables come from the Single Registry.

5. Results

5.1. Characteristics of treatment and control groups

We merged individuals data on the lotteries database with data from RAIS and Single Registry for the years 2006 to 2014. We can successfully link 75% of the total sample to people from Rio de Janeiro city, and more than 98% of the total sample to São José do Rio Preto city. Table 2 shows the balance between treatment and control groups for all lotteries in RJ, and São José do Rio Preto. The balance analyzes permit to conclude the lotteries were random. The treatment and control groups are quite similar in almost all the characteristics that we get from RAIS (RJ) or RAIS and Single Registry (SJRP). Some few variables present significant differences at 5% or 10%, but the F statistic of a regression where the dependent variable indicates whether the individual had won is quite low for the three lotteries, indicating that there are no significant differences between the two groups.

Most of the individuals participating in the program are female, middle aged (35 to 37 years old), white or brown people, with high school completed, and average wage a little more than the minimum wage. More than half (57%) of individuals in Rio de Janeiro had some regular work before the Lottery, and in São José do Rio Preto only 38% of individuals had regular work. These workers were predominately in the service sector of the economy.

The houses characteristic seems to be similar between control and treatment groups (Table 3, columns (4)-(6)) in terms of number of people or families living in the household, number of rooms and infrastructure conditions, like piped water, access to sewage system, access to garbage collection, masonry walls, electricity, sidewalks around the house and cement or ceramic floor. Also, when considering budget allocation, the groups are similar regarding the spent on energy, water, and sanitation, rent or transportation. Only in respect to spending on food, the groups seem different, but the difference (BRL 6.4) is less than US\$2. The comparison between treated and control groups in Rio de Janeiro city is impaired due to the selection problem in the data (columns (1)-(3)). The observation to houses and budget characteristics is available only in the Single Registry database, a restricted sample in the Rio de Janeiro case. Is evidence on Table 3 this selection problem, once that the control group seems to be always in the worst condition than the treatment. Of course, only the more impoverished families in the control group was enrolled in the Single Registry, while all family in the treatment group was.

Tables 2 and 3 show that treatment and control groups are balanced, which is a consequence of randomization. Therefore, the estimates that will be presented below should not have major problems with endogeneity.

Table 2: Characteristics of treatment and control groups - Rio de Janeiro (all lotteries) and São José do Rio Preto

	Rio de Janeiro			São José do Rio Preto		
	(1) Control group	(2) Treatment group	(3) Difference (1) - (2)	(4) Control group	(5) Treatment group	(6) Difference (4)-(5)
% with information linked in RAIS	0.746	0.746	0.000 (0.003)			
% linked in Single Registry				0.983	0.991	-0.008*** (0.003)
Female	0.532	0.531	0.000 (0.004)	0.729	0.707	0.022** (0.010)
Age	36.921	36.965	-0.044 (0.083)	35.647	36.212	-0.565** (0.287)
White	0.380	0.384	-0.004 (0.004)	0.642	0.653	-0.010 (0.011)
Yellow	0.006	0.005	0.001* (0.001)	0.002	0.001	0.001 (0.001)
Black	0.115	0.113	0.002 (0.002)	0.088	0.083	0.005 (0.006)
Brown	0.342	0.340	0.002 (0.004)	0.264	0.258	0.006 (0.010)
Indigenous	0.003	0.002	0.000 (0.000)	0.001	0.001	-0.001 (0.001)
Color not identified	0.055	0.059	-0.004** (0.002)			
Attends school				0.028	0.028	0.000 (0.004)
Illiterate	0.001	0.001	-0.000 (0.000)	0.027	0.025	0.001 (0.004)
Completed elementary school	0.874	0.871	0.003 (0.003)	0.844	0.841	0.004 (0.008)
Completed High School	0.655	0.649	0.006 (0.004)	0.588	0.585	0.003 (0.011)
Completed College	0.108	0.103	0.005** (0.002)	0.055	0.060	-0.006 (0.005)
Disabled				0.023	0.022	0.001 (0.003)
Head of the family				0.947	0.947	0.000 (0.005)
Formally employed (before Lottery)	0.575	0.572	0.003 (0.003)	0.382	0.385	-0.003 (0.011)
Formal wage (before Lottery)	614.826	610.660	4.167 (5.891)	436.408	445.811	-9.403 (14.992)
Worked in the services sector	0.206	0.205	0.001 (0.003)	0.252	0.246	0.006 (0.010)
Worked in the administrative sector	0.182	0.181	0.001 (0.003)	0.137	0.137	-0.000 (0.008)
Worked in the manufacturing sector	0.076	0.076	-0.000 (0.002)	0.134	0.139	-0.005 (0.008)
Receives Bolsa Familia				0.169	0.156	0.013 (0.009)
F-statistic			0.97			0.82
P-value			0.489			0.7123
Observations	338,333	23,472	361,805	9,728	2,356	12,084

Notes: This table shows the balance between the treatment and control groups of total Lotteries in Rio de Janeiro and in São José do Rio Preto. The unit of analysis is the individual. All information presented to Rio de Janeiro is from RAIS, and, to São José do Rio Preto, RAIS and Single Registry. Information on gender, skin color, schooling, age and disability are from restricted sample (74% of the total sample to Rio de Janeiro, and 99% of total sample, to São José do Rio Preto). Information on formal salary, formal employment and the employment sector is from the whole sample. The columns (1) and (4) present the data on the individuals who did not win the MCMV lottery. The columns (2) and (5) present the data on the individuals who won. The columns (3) and (6) indicate the difference between the groups and the results of t-tests for the difference between the two groups. The F-test and p-value statistics are from a regression where the dependent variable is equal to one if the individual won a Lottery and 0 otherwise. The standard error for this regression is clustered at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Characteristics of the houses and budget of treatment and control groups - Rio de Janeiro city (all lotteries) and São José do Rio Preto

	Rio de Janeiro			São José do Rio Preto		
	(1) Control group	(2) Treatment group	(3) Difference (1) - (2)	(4) Control group	(5) Treatment group	(6) Difference (4) - (5)
Receives Bolsa Familia	0.505	0.343	0.162*** (0.006)	0.169	0.155	0.013 (0.09)
Number of people in household	3.231	2.673	0.557*** (0.021)	2.801	2.819	-0.018 (0.036)
Number of families in household	1.029	1.038	-0.009 (0.008)	1.214	1.236	-0.022 (0.014)
Number of room in the house	3.940	4.068	-0.129*** (0.016)	4.488	4.494	-0.006 (0.029)
Has piped water	0.952	0.965	-0.013*** (0.002)	0.989	0.989	-0.000 (0.002)
Has access to sewerage system	0.904	0.937	-0.033*** (0.003)	0.949	0.948	0.002 (0.005)
Has access to garbage collection	0.681	0.801	-0.119*** (0.005)	0.997	0.998	-0.001 (0.001)
Masonry walls	0.708	0.822	-0.114*** (0.005)	0.998	0.997	0.001 (0.001)
Has electricity	0.688	0.789	-0.101*** (0.005)	0.998	0.997	0.001 (0.001)
Has sidewalks around the house	0.809	0.865	-0.056*** (0.005)	0.950	0.945	0.004 (0.005)
Cement floor	0.174	0.128	0.046*** (0.004)	0.158	0.162	-0.005 (0.008)
Ceramics floor	0.418	0.589	-0.171*** (0.005)	0.816	0.811	0.005 (0.009)
Value spent on energy (R\$)	35.958	36.227	-0.270 (6.654)	65.615	64.653	0.963 (3.921)
Value spent on water and sanitation (R\$)	10.835	10.296	0.539 (3.107)	30.788	31.231	-0.443 (0.591)
Value spent on natural gas (R\$)	35.997	32.703	3.294*** (0.508)	21.280	20.996	0.284 (0.853)
Value spent on rent (R\$)	88.266	90.328	-2.062 (1.686)	198.953	198.686	0.267 (4.502)
Value spent on transportation (R\$)	7.781	11.537	-3.756*** (0.427)	22.075	21.678	0.397 (1.147)
Household income (R\$)	428.408	330.727	97.681 (505.385)	512.183	526.205	-14.022 (8.546)
Value spent on food (R\$)	200.478	215.817	-15.340*** (3.266)	238.094	244.483	-6.389** (2.949)
Distance between house at baseline MCMC projects				9566.464	9232.765	333.699 (741.001)
Distance between house at baseline and city center (in meters)				5304.467	5044.604	259.863 (746.805)
Observations	87,355	8,987	96,342	9,566	2,335	11,901

Notes: The unit of analysis is the domicile of the individual who participated in the MCMV lottery. The data are from the Single Registry and represent about 74% of the sample, to Rio Janeiro city, and 99% of the sample to São José do Rio Preto. The columns (1) and (4) present information on the individuals who did not win in the MCMV lottery. The columns (2) and (5) present the information of the individuals who won. The columns (3) and (6) indicate the difference between the groups and the result of a t-test of differences between the two groups. All monetary values are in 2012 Brazilian Reais.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Despite the randomization in the lottery, the decision to move to the new house is not random and is strongly linked with the income condition of the individual, which, in turn, is due to the labor market condition. The table 4 makes it clear that the population that accepted the housing benefit (compliers) is different from the population that was assigned to treatment. Individuals who became beneficiaries of the program were female and had lower income, and employment rate than the non-compliers both in Rio de Janeiro and in São José do Rio Preto. In Rio de Janeiro, the compliers were younger and proportionally more black or brown people. In São José do Rio Preto, white people predominate, due to the past colonization of this area, strongly influenced by European migrants. This conclusion is reinforced when it is considered the houses and budget characteristics of treatment and control groups (Table 5). Looking to the São José do Rio Preto data (columns (4)-(6)), the decision to move to the program's new house is not influenced by the current condition of the house, like the number of rooms, or the infrastructure characteristics, like piped water, access to sewage system, access to garbage collection, masonry walls or electricity. The number of people or families living together is more important (in the opposite direction, if more people live in the same house lower the likelihood to move, while if more families live together, higher the likelihood), or income variables, like spending on energy, water and sanitation, rent, transportation or total income

in the household. Richer family tends to disregard the program's house in favors of the current one. The São José do Rio Preto data also permit us to consider the distance of house before the lottery to the MCMV house or the city's Central Business District. Both in one case and another, as bigger the distance lowe the likelihood to move. Once again, the Rio de Janeiro data (restricted in case of table 5) confirm the data selection problem, with non-compliers seem in the worst condition than complier. This is because compliers were enrolled in the Single Registry, but only the less improved non-compliers family was. These data suggest that the complier population (i.e., those who were assigned to treatment and comply with it) is more vulnerable than noncompliers (which are assigned to treatment but choose not to participate) and than individuals in the control group.

Table 4: Characteristics of compliers and non-compliers groups - Rio de Janeiro (all lotteries) and São José do Rio Preto

	Rio de Janeiro			São José do Rio Preto		
	(1) Compliers	(2) Noncompliers	(3) Difference (2)-(1)	(4) Compliers	(5) Noncompliers	(6) Difference (5)-(4)
with information linked in RAIS	0.728	0.750	0.023*** (0.008)			
Receives Bolsa Familia				0.166	0.129	-0.037** (0.016)
Female	0.628	0.512	-0.116*** (0.010)	0.738	0.633	-0.105*** (0.021)
Age	36.012	37.151	1.139*** (0.219)	36.047	36.603	0.556 (0.591)
Color White	0.375	0.386	0.010 (0.010)	0.645	0.671	0.025 (0.022)
Color Yellow	0.006	0.005	-0.001 (0.001)	0.001	0.001	0.000 (0.002)
Color Black	0.139	0.108	-0.031*** (0.006)	0.087	0.075	-0.012 (0.012)
Color mixed	0.382	0.332	-0.049*** (0.010)	0.264	0.243	-0.021 (0.020)
Indigenous	0.001	0.002	0.001 (0.001)	0.001	0.003	0.002 (0.002)
Color not identified	0.051	0.061	0.010** (0.005)			
Attends school				0.029	0.026	-0.003 (0.007)
Illiterate	0.002	0.001	-0.001 (0.001)	0.024	0.029	0.005 (0.007)
Completed elementary school	0.860	0.873	0.014** (0.007)	0.830	0.866	0.036** (0.017)
Completed High School	0.602	0.658	0.056*** (0.010)	0.578	0.601	0.023 (0.022)
Completed College	0.063	0.110	0.047*** (0.006)	0.057	0.068	0.010 (0.011)
Disabled				0.024	0.017	-0.007 (0.007)
Head of the family				0.966	0.902	-0.064*** (0.010)
Formally employed (before Lottery)	0.527	0.581	0.054*** (0.009)	0.367	0.425	0.058*** (0.0011)
Formal wage (before Lottery)	399.812	653.114	253.302*** (15.255)	391.167	574.820	183.653*** (14.992)
Worked in the services sector	0.241	0.198	-0.044*** (0.007)	0.242	0.255	0.014 (0.019)
Worked in the administrative sector	0.160	0.185	0.025*** (0.007)	0.146	0.114	-0.032** (0.008)
Worked in the manufacturing sector	0.060	0.079	0.019*** (0.005)	0.127	0.168	0.041*** (0.016)
Observations	3,934	19,538	23,472	1,655	701	2,356

Notes: This table shows the balance between the compliers and non-compliers to Rio de Janeiro (all Lotteries) and São José do Rio Preto. The unit of analysis is the individual. All information presented to Rio de Janeiro is from RAIS, and, to São José do Rio Preto, RAIS and Single Registry. Information on gender, race, schooling, age and disability are from restricted sample (74% of the total sample to Rio de Janeiro, and 99% of total sample, to São José do Rio Preto). Information on formal salary, formal employment and the employment sector is from the whole sample. The columns (1) and (4) present data on the individuals who won the lottery and who became beneficiaries of MCMV (compliers). The columns (2) and (5) present data on those who won but did not become beneficiaries (non-compliers). The columns (3) and (6) indicate the difference between the non-compliers and compliers and the result of a t-test for the difference between the two groups.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Characteristics of the houses and budget of treatment and control groups - Rio de Janeiro (all lotteries) and São José do Rio Preto

	Rio de Janeiro			São José do Rio Preto		
	(1) Compliers	(2) Noncompliers	(3) Difference (5)-(4)	(4) Compliers	(5) Noncompliers	(6) Difference (5)-(4)
Receives Bolsa Familia	0.236	0.427	0.191*** (0.010)	0.166	0.129	-0.037** (0.016)
Number of people in household	2.350	3.018	0.667*** (0.038)	2.767	2.941	0.173** (0.073)
Number of families in household	1.029	1.048	0.019 (0.016)	1.256	1.188	-0.068** (0.028)
Number of room in the house	4.117	4.030	-0.087*** (0.034)	4.468	4.554	0.086 (0.065)
Has piped water	0.980	0.953	-0.026*** (0.004)	0.987	0.993	0.006 (0.005)
Has access to sewerage system	0.972	0.910	-0.062*** (0.005)	0.948	0.946	-0.001 (0.010)
Has access to garbage collection	0.907	0.716	-0.191*** (0.008)	0.999	0.997	-0.002 (0.002)
Masonry walls	0.920	0.744	-0.177*** (0.008)	0.998	0.996	-0.002 (0.002)
Has electricity	0.852	0.739	-0.113*** (0.009)	0.996	0.999	0.003 (0.003)
Has sidewalks around the house	0.897	0.830	-0.066*** (0.008)	0.948	0.939	-0.009 (0.010)
Cement floor	0.099	0.151	0.053*** (0.007)	0.171	0.142	-0.028* (0.017)
Ceramics floor	0.737	0.473	-0.264*** (0.010)	0.806	0.822	0.015 (0.018)
Value spent on energy (R\$)	36.510	35.973	-0.537 (1.500)	62.849	68.908	6.059* (3.390)
Value spent on water and sanitation (R\$)	9.775	10.810	1.035** (0.481)	30.820	32.202	1.382 (1.117)
Value spent on natural gas (R\$)	31.258	33.912	2.654 (1.677)	20.257	22.739	2.483*** (0.681)
Value spent on rent (R\$)	89.887	90.767	0.879 (3.249)	188.628	222.478	33.850*** (8.983)
Value spent on transportation (R\$)	13.178	9.823	-3.355*** (0.877)	20.102	25.410	5.307** (2.177)
Household income (R\$)	451.405	236.943	-214.462*** (6.992)	520.427	539.839	19.412 (16.703)
Value spent on food (R\$)	226.024	207.457	-18.567*** (2.623)	234.585	267.844	33.260*** (5.805)
Distance between house at baseline MCMC projects				8685.975	10,520.95	1,834.977** (730.082)
Distance between house at baseline and city center (in meters)				4,513.620	6,295.553	1,781.933** (735.140)
Observations	3,930	5,057	8,987	1,640	695	2,335

Notes: The unit of analysis is the domicile of the individual who participated in the MCMV lottery. The data are from the Single Registry and represent about 74% of the sample, to Rio Janeiro city, and 99% of the sample to São José do Rio Preto. The columns (1) and (4) present the information of the individuals who won the lottery and who became beneficiaries of MCMV. The columns (2) and (5) present the information of those who won the lottery but did not become beneficiaries. The columns (3) and (6) indicate the difference between the non-compliers and compliers and the result of a t-test for the difference between the two groups. All monetary values are in 2012 Brazilian Reais.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The MCMV house seems to represent an improvement in the before houses' conditions when considering only the beneficiaries (compliers),. Table 6 indicates this possible improvement in the housing conditions of those individuals participating in the program. Both in Rio de Janeiro and São José do Rio Preto cases, the number of rooms increasing after the program, the number of families decreases, the floor covering improves as well as the walls, the access to the sewage system, garbage collection, and electricity. In Rio de Janeiro, only 13% of compliers lived in slums before moved to MCMV houses. São José do Rio Preto did not have information about slums before the lottery. The value spent by the families with rent decreased after they moved, but the value spent on transportation, increase.

Table 6: Characteristics of beneficiaries' houses (Rio de Janeiro city)

	Rio de Janeiro		São José do Rio Preto	
	Before	After	Before	After
Permanent private residence	0.97 (0.156)	0.99 (0.081)	0.995 (.070)	.998 (.040)
Lives in slums	0.13 (0.342)	0.00 (0.000)		
Number of rooms	4.06 (1.368)	4.73 (1.208)	4.468 (1.528)	4.814 (0.758)
Has piped water	0.98 (0.144)	0.98 (0.134)	0.987 (0.113)	0.993 (0.081)
Number of families in the house	1.03 (0.335)	1.01 (0.089)	1.256 (0.688)	1.120 (0.651)
House has dirt floor	0.13 (0.339)	0.01 (0.0893)		
Ceramics floor			0.806 (0.395)	0.931 (0.254)
House has masonry walls	0.92 (0.278)	0.99 (0.104)	0.998 (0.049)	0.999 (0.029)
House has access to sewerage system	0.97 (0.169)	0.98 (0.149)	0.948 (0.222)	0.982 (0.133)
Has access to garbage collection	0.90 (0.298)	0.98 (0.146)	0.999 (0.035)	1.000 (0.000)
Has electricity	0.86 (0.343)	0.90 (0.305)	0.996 (0.065)	0.998 (0.040)
Has sidewalks around the house	0.89 (0.313)	0.95 (0.223)	0.948 (0.222)	0.985 (0.120)
Value spent on rent (R\$)			188.628 (188.499)	101.111 (144.527)
Value spent on transportation (R\$)			20.102 (45.647)	28.762 (61.632)
Linked in Single Registry			1.000 (0.000)	0.748 (0.435)
<i>N</i>	3,666	1,378	1,640	1,226

Notes: The unit of analysis is the domicile. Standard deviation between parentheses. The information in column (1) is from the houses of the beneficiaries before moving to the MCMV. In column (2), the information is after the move and includes only those households that updated the Cadastro Único after the move. The information was collected from the Cadastro Único. More information can be found in the text.

5.2. The effect of housing offer and other baseline characteristics on complier to MCMV decision

The participation in the MCMV program is determined by the lottery result and other individual characteristics. Table 7 shows the relationship between the lottery and the likelihood to participate in the program. In Rio de Janeiro case we divide the analyze by lottery. In each column, the dependent variable is a binary variable that indicates whether the individual participates in the MCMV. The result is just the compliance rate of each lottery. The first and second lotteries included MCMV houses closer to the business center district than the third one, which would explain the higher compliance rate comparable to the last lottery analyzed. The table also shows how individual characteristics affect the probability of accepting the vacancy in the program. As discussed before, many reasons may explain why the people who won each lottery do not participate in the program. Our central hypothesis is that individual strongest connected with the labor market will avoid moving

to a new house, more distant from the business center district. In the second panel of Table 7, the dependent variable is an indicator of whether the individual has accepted the vacancy in MCMV after being randomly selected. Estimates differ a bit little among the three lotteries, but the qualitative results are the same. Women, lower-income individuals, and those in the service sector are more likely to accept participation in the program once they have been selected.

Also, the Table 7 shows that 70% of the individuals assigned to treatment in São José do Rio Preto city effectively became beneficiaries of the program. This is a huge compliance rate comparable to the Rio de Janeiro and give us more confidence in use SJRP lottery as a instrumental variable. The compliance rate difference between RJ and SJRP is likely by the way in which the lotteries were conducted in each cities. In SJRP, the enrollment had several stages. In the first stage the families who were interested in the houses signed up to participate in the program in 2012. Then, the city verified the framing of these families in the rules of participation in the program. Only those who fit the rules could participate in the lottery, conducted in 2013. Therefore, the selection process was quite different from Rio de Janeiro, where the list of participants came from an old housing demand register. The heterogeneity for participation in the program among the individuals of the treatment group is explored. The dependent variable is a dummy that indicates whether the individual has moved into one of MCMV projects. Estimates show that women and heads of households had a greater chance of participating in the program. In addition, individuals who lived closer to the residential complex site also had a greater chance of moving to the houses of the program.

The SJRP database also permits us to include additional variables to explore the relationship of them and the compliance to MCMV program. Receive income transfer (Bolsa Família) before the lottery does not have an impact on the decision to comply with MCMV as well as to be a disabled person, a person physically handicapped, for instance. On the other hand, how distant the current housing is from the MCMV houses, less likely that the individual complies with the program supporting the idea that MCMV impact the accessibility of people to a job or other usual services. Also, how bigger is the current rent paid in the house, less likely the compliance with MCMV program. This result reinforces previous assertion, suggesting that the MCMV houses are inferior goods, and the program select only the most improved family.

Table 7: The effect of housing offer and other baseline characteristics on participating in MCMV

	Rio de Janeiro City			São José do Rio Preto city
	Lottery 003	Lottery 006	Lottery 009	
Dependent variable: compliance to MCMV program				
Won the lottery	0.306*** (0.000848)	0.208*** (0.000719)	0.121*** (0.000561)	0.703*** (0.00270)
<i>N</i>	297,867	325,080	351,094	11,901
<i>R</i> ²	0.304	0.205	0.116	0.655
<i>F</i>	129,856.3	83,584.5	46,216.0	22,620.4
Dependent variable: compliance to MCMV program				
Female	0.103*** (0.0201)	0.0817*** (0.0119)	0.0313*** (0.00656)	0.0628*** (0.0242)
Age	-0.00167* (0.000930)	-0.00239*** (0.000560)	-0.00110*** (0.000312)	-0.00176* (0.000978)
Color black	0.0683*** (0.0309)	0.0578*** (0.0186)	0.0293*** (0.0103)	0.0199 (0.0330)
Color brown	0.0596*** (0.0208)	0.0134 (0.0124)	0.0198*** (0.00693)	0.0218 (0.0219)
Elementary school	0.0197 (0.0322)	0.0345* (0.0203)	0.0106 (0.0111)	-0.0956*** (0.0329)
High school	-0.0417* (0.0251)	-0.0479*** (0.0149)	-0.0134* (0.00812)	-0.00334 (0.0240)
College	-0.0541 (0.0350)	-0.0296 (0.0198)	-0.0209* (0.0112)	-0.0171 (0.0414)
Formal wage	-0.0000837*** (0.0000143)	-0.0000424*** (0.00000657)	-0.0000294*** (0.00000422)	-0.000126*** (0.0000216)
Formally employed	0.0117 (0.0391)	-0.0268 (0.0444)	-0.0176 (0.0121)	-0.0381 (0.0443)
Services sector	0.0908*** (0.0343)	0.0752*** (0.0193)	0.0472*** (0.0107)	0.0444 (0.0407)
Administrative sector	0.0407 (0.0337)	0.00677 (0.0188)	0.0167 (0.0105)	0.121*** (0.0427)
Manufactury	0.0231 (0.0422)	0.0763*** (0.0242)	0.0000535 (0.0133)	0.0415 (0.0443)
Head of the family				0.172*** (0.0490)
Bolsa Família				0.0190 (0.0301)
Disabled				0.0796 (0.0629)
Attends school				-0.0221 (0.0588)
Household income (R\$)				-0.0000544 (0.0000362)
Distance to MCMV (km)				-0.00000133** (0.000000649)
Rent (\$)				-0.000189*** (0.0000475)
Value spent on transportation (\$)				-0.000327 (0.000213)
Value spent on energy (R\$)				-0.0000654 (0.000131)
Value spent on water and sanitation (R\$)				0.000399 (0.000414)
Value spent on food (R\$)				-0.000229*** (0.0000808)
Number of people in household				-0.0225** (0.00894)
Number of families in household				0.0405** (0.0198)
Number of room in the house				-0.00337 (0.00582)
Has piped water				-0.0618 (0.0721)
Has access to sewerage system				-0.0684 (0.0692)
Has access to garbage collection				0.0630 (0.284)
Has electricity				-0.0986 (0.113)
Masonry walls				0.217 (0.220)
Has sidewalks around the house				0.0627 (0.0648)
Cement floor				0.0782 (0.0724)
Ceramics floor				0.0747 (0.0692)
<i>N</i>	2,192	4,882	10,501	2,310
<i>R</i> ²	0.061	0.042	0.020	0.085
<i>F</i>	11.89	17.79	18.00	5.560

Notes: Each of the columns indicates a different lottery. The first three columns refer to Rio de Janeiro lotteries, and the last one to São José do Rio Preto. The first panel includes all participants in each lottery and the dependent variable indicates compliance to MCMV program. Each row displays the results of a regression where the independent variable indicates whether the individual won the lottery in each of the lotteries. The second panel includes only those individuals who won the lottery. The dependent variable also indicates compliance to MCMV program. The information is from RAIS from 2006 to 2014 (RJ) and Single Registry (SJRJ). See details about database in section 21. All standard errors are clustered at the individual level.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$

5.3. *Effects of the program on employment, wages and participation in social programs*

Table 8 shows the program's impact on variables of interest from the post-lottery period (2012 to 2016, Rio de Janeiro case, and 2014 to 2016, for São José do Rio Preto case). The table shows the ITT and TOT (instrumental variable) results, where the lottery is the instrument variable to the participation in the program. The unit of observation is the individual each year. Each of panels A to D presents the estimates for the group of individuals who participated in Lotteries 003, 006 and 009, in Rio de Janeiro city, and São José do Rio Preto, respectively. Results are presented with and without control variables.²⁶ Fixed time effects are included, and all results have standard errors clustered at the individual level.

The participation in MCMV reduces the probability of being formally employed in the years following the lotteries. However, only in Lottery 006, the impact is significant at the level of 5%. People who were assigned to treatment and moved to MCMV houses in this lottery were 4.9% less likely to be employed in subsequent years.²⁷ One of the possible explanations for the significant result only in Lottery 006 is that the vacancies were for projects located further away from public transport and less consolidated urbanization areas than the projects in Lottery 003. Another explanation is the fact that the number of treatment and control units in Lottery 006 is twice as large as the amount in Lottery 003. Lottery 009, on the other hand, had a compliance rate of only 12%, needing a substantial impact on the employment rate to affect the employment rate of the entire treatment group. For the São José do Rio Preto sample (Panel D) there is a doubtless negative impact on the formal employment rate. The individuals on the treatment group had their formal employment rate reduced by about 2.3%. Considering the compliance rate of 70%, this means that those who accepted the vacancy in the program and moved to the Minha Casa Minha Vida residential projects had their formal employment rate reduced by up to 3.3% in three years after moving.

²⁶The results with control variables include data for about 74% of the sample, in Rio de Janeiro case, and 99% of the sample, in São José do Rio Preto case, which corresponds to those individuals who had some formal job between the years 2006 and 2014. For these restricted samples it was possible to create control variables as presented in table 2, and consider information about gender, schooling, age, race, and information about the formal job in the year prior to the lotteries, such as formal employment rate, formal wage and activity sector

²⁷The magnitude of the impact is similar among the lotteries, but the significance is different. In Lottery 003 the significance is only at 10%, and in the Lottery 009 there is not significance.

Table 8: Effects of MCMV on employment, wage and cash transfer program

	Control group - mean	ITT		biased LATE		Late IV	
		(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Lottery 003							
Formally employed (yearly)	0.539	-0.013 (0.008)	-0.012* (0.007)	-0.052*** (0.014)	-0.022* (0.013)	-0.042 (0.027)	-0.040* (0.023)
Formal wage (yearly)	923.3	-33.620 (21.873)	-33.260* (19.027)	-333.311** (21.713)	-149.955** (22.614)	-109.965 (71.103)	-112.340* (64.060)
Receives Bolsa Família	0.114	0.020*** (0.005)	0.021*** (0.005)	0.110*** (0.011)	0.086*** (0.012)	0.065*** (0.017)	0.070*** (0.018)
Number of individuals	297,867	297,867	220,411	297,867	220,411	297,867	220,411
Panel B: Lottery 006							
Formally employed (yearly)	0.549	-0.008 (0.006)	-0.010** (0.005)	-0.044*** (0.012)	-0.015 (0.010)	-0.037 (0.026)	-0.049** (0.023)
Formal wage (yearly)	987.2	-8.758 (16.715)	-9.697 (14.992)	-359.071** (18.173)	-140.999** (19.005)	-42.140 (80.293)	-47.771 (73.785)
Receives Bolsa Família	0.0996	0.007** (0.003)	0.007** (0.003)	0.089*** (0.009)	0.063*** (0.009)	0.033** (0.015)	0.037** (0.016)
Number of individuals	325,080	325,080	242,791	325,080	242,791	325,080	242,791
Panel C: Lottery 009							
Formally employed (yearly)	0.548	-0.005 (0.004)	-0.005 (0.003)	-0.036*** (0.011)	-0.008 (0.009)	-0.040 (0.032)	-0.040 (0.027)
Formal wage (yearly)	977.5	-8.663 (10.721)	-6.148 (9.771)	-324.754** (17.783)	-131.380** (20.154)	-71.838 (88.767)	-51.980 (82.553)
Receives Bolsa Família	0.109	-0.003 (0.002)	-0.002 (0.002)	0.084*** (0.008)	0.060*** (0.008)	-0.022 (0.019)	-0.015 (0.019)
Number of individuals	351,094	351,094	262,218	351,094	262,218	351,094	262,218
Panel D: São José do Rio Preto							
Formally employed (yearly)	0.556	-0.025** (0.010)	-0.023*** (0.008)	-0.051*** (0.012)	-0.034*** (0.009)	-0.036** (0.015)	-0.033*** (0.011)
Formal wage (yearly)	783.9	-19.069 (18.216)	-21.199 (14.046)	-109.018*** (19.401)	-75.582*** (14.992)	-27.146 (25.882)	-30.105 (19.901)
Receives Bolsa Família	0.131	0.020*** (0.007)	0.028*** (0.005)	0.043*** (0.008)	0.040*** (0.006)	0.029*** (0.010)	0.040*** (0.007)
Number of individuals	12,084	12,084	11,843	12,084	11,843	12,084	11,843
Time fixed effects		Yes	Yes	Yes	Yes	Yes	Yes
Control variables		No	Yes	No	Yes	No	Yes

Notes: Each panels represents a separate sample composed only of those individuals who participated in the corresponding lottery. The first column presents the mean of each dependent variable for the control group. Columns (1) and (2) indicate the intent-to-treat effects. The results come from OLS regressions where each dependent variable is regressed against a binary variable that indicates whether the individual won in that lottery. Columns (3) and (4) are the results for the LATE estimation biased (without correct to selection problem in the complier decision). Columns (5) and (6) are the results of a two-stage regression, where participation in the program is instrumented by a variable indicating the random assignment to treatment. Estimates represent the treatment-on-the-treated effects, as described in the text. Columns (1), (3), and (5) present the results for the whole sample without any control variables. Columns (2), (4), and (6) present the results with control variables for about 74% of the sample, in RJ cases (Panel A-C) or 99% fo the sample, in SJRP case (Panel D). The reduction in sample corresponds to those individuals who had some formal job between the years 2006 and 2014. For these individuals it was possible to create control variables which are presented in table 2. The formally employed variable (yearly) is a dummy that indicates whether the individual had any formal employment in a given year. The variable formal wage indicates the average salary of the individual in each year. The Bolsa Família participation variable is a dummy that indicates whether the individual receives Bolsa Família after the lottery.

All standard errors presented have clusters at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

It is interesting to note that both samples from Rio de Janeiro and São José do Rio Preto had a negative and similar impact on employment of the program. However, the effect is more significant in the case of the city of São José do Rio Preto. This is possibly a reflection of the compliance rate, which is significantly higher in the case of Rio Preto.

Figure 4 details the impact of MCMV over time by lottery. For Lottery 006 (B), the chart shows the effect becomes more negative over time, turning statistically significant at 5% after the third year following the lottery. Four years after the lottery, the estimated effect is of a 10% reduction in employment rates. For Lottery 003 (A), the estimated effect is significant at 5% in the last year of the sample, five years after the lottery. This trend seems to indicate a medium-term impact, not just a short-term one. A short-term effect could mean a transitional phase for the new dwelling. Once they adapted to the new environment, the effect would tend to dissipate, as has occurred in some studies in the US (Wood et al., 2008). However, this dissipation effect seems do not occur in Rio de Janeiro case, where the negative effect, for all lotteries, increases over time. Same in the Lottery 009 (C), the effect is negative, despite to be non-significant at 5%. In São José do Rio Preto (D), the impact is negative and significant as early as the first year after the lottery, which is when the individuals effectively moved to the residential complexes. Three years after the lottery, the impact is no longer significant at 5%. As the RAIS datasets for 2017 and 2018 are not yet available, it is difficult to say whether the negative effect is medium-long term, as appears to be the case in Rio de Janeiro. Or if the effect is short-term, having an impact on the employment rate only in the first two years after the move.

The lower employment rate among beneficiaries may be the result of two different processes. On the one hand, the beneficiaries may have found it more difficult to find a job or remain in the labor market after they changed to the new house, more distant from center business district. On the other hand, there may have been a shift from the formal to the informal labor market, situation in that we can not see them in RAIS database. However, both processes represent a deterioration of working conditions.

Estimating the effect of the program on income faces greater difficulties, given the nature of the datasets used. From RAIS, only the wage of the individuals working in the regular labor market can be obtained, thus excluding the income information of those who work in the informal labor market and who are a significant part of the sample.²⁸ Therefore, we only calculate the impact of the program on the wage in the formal market, as shown in the second row of each panel of Table 8. That is, for those individuals who did not have a formal employee in a given year, we input a zero value for the salary.²⁹ Although imperfect, the estimate seems to indicate that there was no effect on the income for those benefited by the program. In the estimate for Lottery 003, when control variables are considered, the effect seems to be negative, at 10% of significance. Despite the lower censure in the data base of São José do Rio Preto, the results over the formal wage is the same as in Rio de Janeiro and we can not affirm that MCMV program impacted the wage of treated individuals.

Bolsa Família is the main conditional cash transfer program in Brazil. Currently, the program has almost 14 million family beneficiaries, who are in poverty and extreme poverty condition.³⁰ Participation in Bolsa Família is an important indicator about the economic situation of families. The third row of each panel in Table 8 presents the impact of the MCMV on the participation in Bolsa Família. The results indicate that participation in Bolsa Família increased significantly in both

²⁸As mentioned above, for the Rio de Janeiro city 75% of the individuals in the sample had a formal job between 2006 and 2014, which means that at least a quarter of individuals have other sources of income outside the formal market. This number should be even higher if we consider that some individuals can switch between formal and informal labor markets during the period analyzed.

²⁹In the robustness check section (section 5.4) we restricted the sample only to the observable data, and the results remain.

³⁰Families with a monthly income of up to US\$ 20 per person or families that have incomes between US\$ 20 and US\$ 45 per person and who have young children in their composition are eligible.

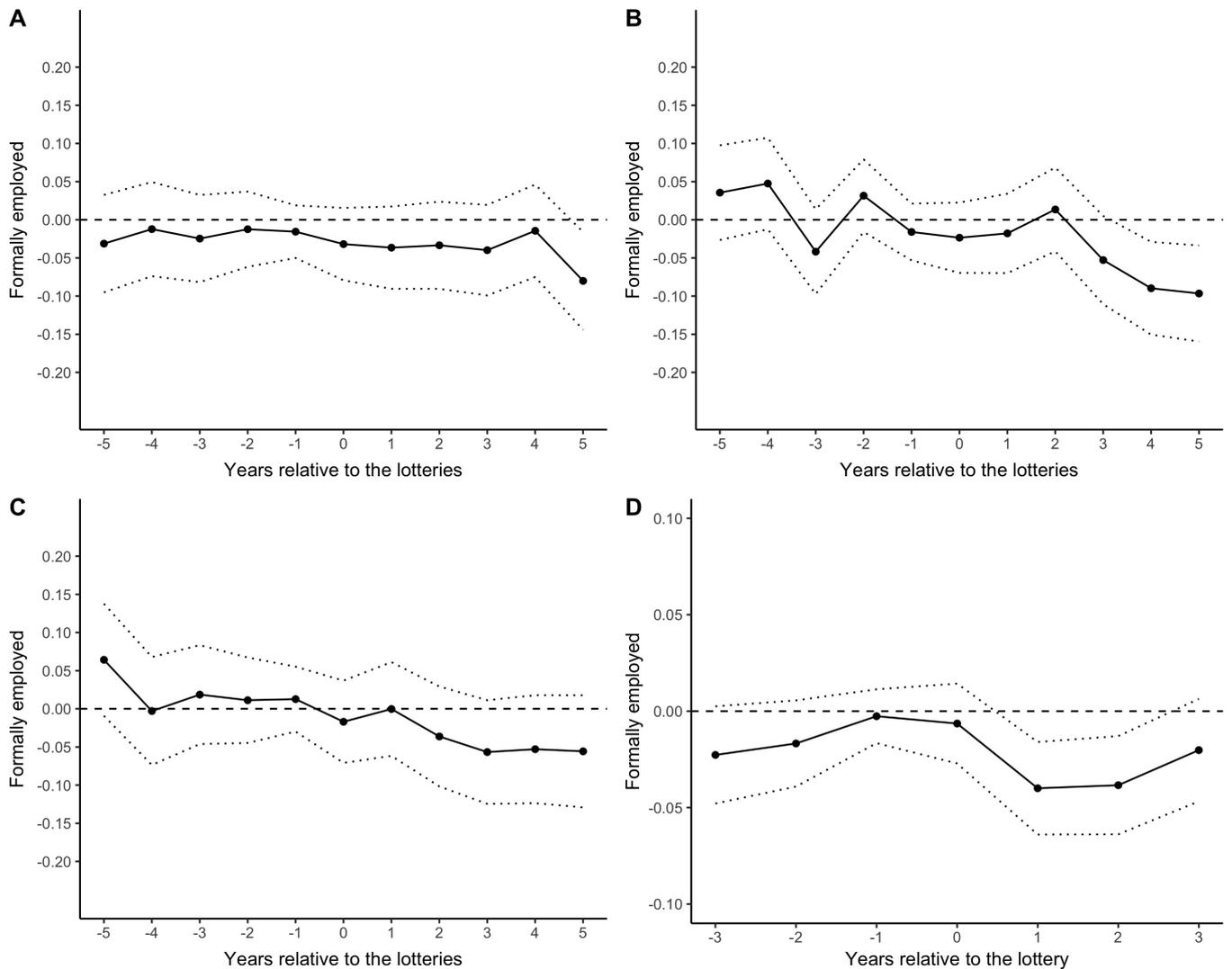


Figure 4: Effects of the program on employment rates over time by lottery

Notes: Figures A, B, C and D correspond to Lotteries 003, 006 and 009 in Rio de Janeiro and the lottery in São José do Rio Preto, respectively. Each solid line represents instrumental variable estimates for the sample with control variables in each year. Dotted lines represent the 95% confidence interval around the estimates. Year zero is the year the lotteries were held (2011). Data comes from RAIS of 2006 to 2016.

Lotteries 003 (A) and 006 (B). In the first, this increase was of 6.5 to 7%, and 3.3 to 3.7% in the second (table 8, panels A and B). A negative result does not necessarily mean that the economic situation of the households got worse. To participate in MCMV is mandatory to register in the Single Registry database, which could facilitate the Bolsa Família program find a family that already should be attended to the program. The available data to Rio de Janeiro covers only the periods between 2012 and 2017, making it impossible to verify whether the treatment and control groups had similar participation rates in the Bolsa Família before the lottery year. However, the SJRP database permits us to investigate this impact properly. Unlike the Rio de Janeiro lotteries, the São José do Rio Preto data comes from Single Registry prior to the date of the lottery, and about 99% of the sample from Rio Preto was in the Single Registry in 2013. In SJRP case, the estimated effect is also positive, indicating that participating in MCMV program also increases the Bolsa Família participation by up to 4%. Then, it is possible to conclude that the increase in Bolsa Família beneficiaries is, in fact, a negative impact of MCMV, which reinforces similar conclusion to RJ case. For participation in Bolsa Família, (Figure 5) makes clear to SJRP (D) the positive impact appears from the second year after the lottery and remains until the last year in which the data was available, which coincides with the date of bianual mandatory update in the Single Registry.

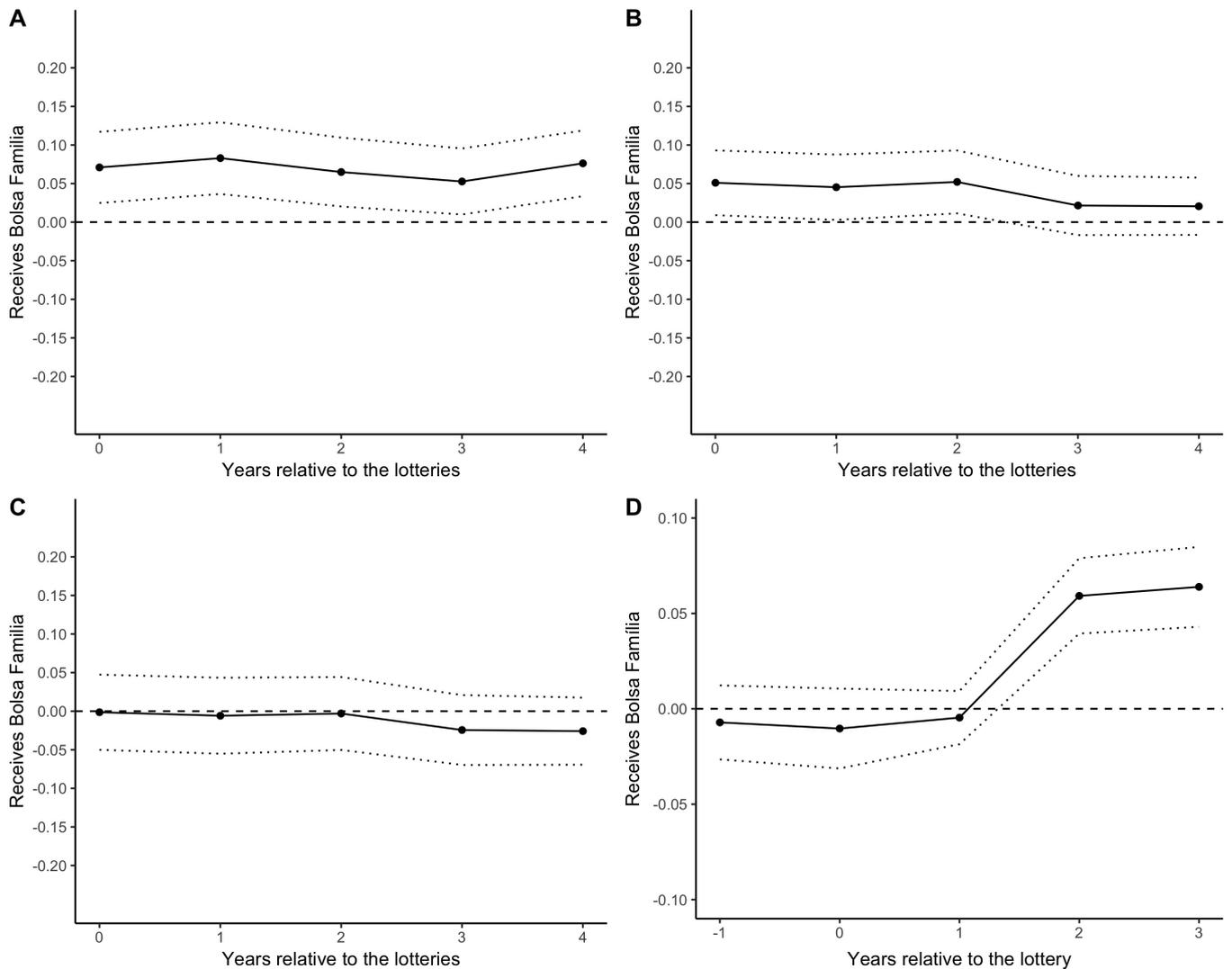


Figure 5: Effects of the program on bolsa familia participation rates over time by lottery

Notes: Figures A, B, C and D correspond to Lotteries 003, 006 and 009 in Rio de Janeiro and the lottery in São José do Rio Preto, respectively. Each solid line represents instrumental variable estimates for the sample with control variables in each year. Dotted lines represent the 95% confidence interval around the estimates. Year zero is the year the lotteries were held (2011). Data comes from Cadastro Unico from 2012 to 2016.

5.4. Robustness Check

We estimate the impact on employment considering two alternative dependent variables. The first one we transformed RAIS in a quarterly panel, indicating whether the individual was formally employed in a given quarter between 2012 and 2016. For the second alternative measure, we use an indicator whether the individual was formally employed on the last day of each year (31/12), available in RAIS database. Table 9 shows the impact on formal employment by using these two alternative dependent variables. To quarterly employment indicator, estimates remain similar. Among Rio de Janeiro lotteries, only Lottery 006 presents a significant and negative effect at 5%. For all lotteries the effect certainly is not positive. To SJRP sample, the effect remains negative and significant. To employment in the last day of the year, also the negative effect remains, but now, they turned significant also to Lottery 003, at 5%, and at 1% to the Lottery 006.

In our benchmark model, we consider the wage of regular worker found in RAIS database and imputed zero wage to the other individuals. However, these people could be working in informal market. To robustness check we consider a restricted sample including only workers founded in RAIS data base. Table 10 presents the result considering this restricted sample. The conclusion is similar as when the total sample is considered, that is, the program seems does not have effect on the wage of the treated individuals that remain working, only impacting the likelihood of the employment.

Table 9: Effects of MCMV on alternative employment variables

	Control group mean	ITT		LATE IV	
		(1)	(2)	(3)	(4)
Panel A: Lottery 003					
Formally employed (quarterly)	0.479	-0.013 (0.008)	-0.012* (0.007)	-0.041 (0.025)	-0.040* (0.023)
Formally employed on 31/12	0.441	-0.014* (0.008)	-0.014* (0.007)	-0.046* (0.025)	-0.048* (0.025)
Number of individuals	297,867	297,867	220,411	297,867	220,411
Panel B: Lottery 006					
Formally employed (quarterly)	0.490	-0.010* (0.005)	-0.012** (0.005)	-0.048* (0.025)	-0.059** (0.023)
Formally employed on 31/12	0.452	-0.011** (0.005)	-0.014** (0.005)	-0.054** (0.025)	-0.067** (0.024)
Number of individuals	325,080	325,080	242,791	325,080	242,791
Panel C: Lottery 009					
Formally employed (quarterly)	0.489	-0.004 (0.004)	-0.004 (0.003)	-0.034 (0.030)	-0.033 (0.027)
Formally employed on 31/12	0.451	-0.002 (0.004)	-0.002 (0.003)	-0.020 (0.030)	-0.014 (0.029)
Number of individuals	351,094	351,094	262,218	351,094	262,218
Panel D: São José do Rio Preto					
Formally employed (quarterly)	0.473	-0.025** (0.010)	-0.024*** (0.007)	-0.035*** (0.014)	-0.034*** (0.010)
Formally employed on 31/12	0.419	-0.021** (0.010)	-0.021*** (0.008)	-0.030** (0.014)	-0.030*** (0.011)
Number of individuals	1,2084	12,084	11,843	12,084	11,843
Time fixed effects		Yes	Yes	Yes	Yes
Control variables		No	Yes	No	Yes

Notes: Each panels represents a separate sample composed only of those individuals who participated in the corresponding lottery. The first column presents the mean of each dependent variable for the control group. Columns (1) and (2) indicate the intent-to-treat effects. The results come from OLS regressions where each dependent variable is regressed against a binary variable that indicates whether the individual won in that lottery. Columns (3) and (4) are the results of a two-stage regression, where participation in the program is instrumented by a variable indicating the random assignment to treatment. Estimates represent the treatment-on-the-treated effects, as described in the text. Columns (1) and (3) present the results for the whole sample without any control variables. Columns (2) and (4) present the results with control variables for about 74% of the sample, in RJ cases (Panel A-C) or 99% fo the sample, in SJRP case (Panel D). The reduction in sample corresponds to those individuals who had some formal job between the years 2006 and 2014. For these individuals it was possible to create control variables which are presented in table 2. The formally employed variable (quarterly) is also a dummy that indicates whether the individual was employed in each quarter. The variable formally employed on 31/12 is a RAIS variable that indicates whether the individual was employed on 31/12 of each year.

All standard errors presented have clusters at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Effects of MCMV on wage - restricted sample

	Control group - mean	ITT		LATE IV	
		(1)	(2)	(3)	(4)
Panel A: Lottery 003					
Formal wage conditional on working	1711.737	-20.674 (30.904)	-19.106 (19.374)	-73.024 (108.541)	-67.623 (68.334)
Number of individuals		195,622			
Panel B: Lottery 006					
Formal wage conditional on working	1799.671	12.205 (23.830)	2.873 (17.374)	62.943 (123.297)	14.815 (89.607)
Number of individuals		215,749			
Panel C: Lottery 009					
Formal wage conditional on working	1783.558	0.714 (14.522)	7.033 (9.675)	6.280 (127.760)	61.966 (85.375)
Number of individuals		233,330			
Panel D: São José do Rio Preto					
Formal wage conditional on working	1411.22	-19.069 (18.216)	-21.199 (14.046)	-27.146 (25.882)	-30.105 (19.901)
Number of individuals		7,881			
Time fixed effects		Yes	Yes	Yes	Yes
Control variables		No	Yes	No	Yes

Notes: Each panels represents a separate sample composed only of those individuals who participated in the corresponding lottery. The first column presents the mean of each dependent variable for the control group. Columns (1) and (2) indicate the intent-to-treat effects. The results come from OLS regressions where each dependent variable is regressed against a binary variable that indicates whether the individual won in that lottery. Columns (3) and (4) are the results of a two-stage regression, where participation in the program is instrumented by a variable indicating the random assignment to treatment. Estimates represent the treatment-on-the-treated effects, as described in the text. Columns (1) and (3) present the results for the whole sample without any control variables. Columns (2) and (4) present the results with control variables for about 74% of the sample, in RJ cases (Panel A-C) or 99% fo the sample, in SJRP case (Panel D). The reduction in sample corresponds to those individuals who had some formal job between the years 2006 and 2014. For these individuals it was possible to create control variables which are presented in table 2. The formally employed variable (yearly) is a dummy that indicates whether the individual had any formal employment in a given year. The variable formal wage indicates the average salary of the individual in each year. The Bolsa Família participation variable is a dummy that indicates whether the individual receives Bolsa Família after the lottery. All standard errors presented have clusters at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To Rio de Janeiro regressions, we also did a exercise excluding from control groups the individuals who won in the other lotteries from each of the samples of Lotteries 003, 006 and 009. That is, in the sample of Lottery 003, individuals who won in Lotteries 006 and 009 are excluded from control grupo, and so on for the other two lotteries. The results are presented in Table 11. There is no change in the results. The impact of formal employment remain negative about 4.0 to 5% and significant at 5% both Lotteries 003 and 006. Also, the increase in the access to Bolsa Família program is the same like before, varying between 3.7 to 7%.

In Table 12 we explore the subsample robustness, looking to the the impact of the program on

Table 11: Effects of the program on individuals in Rio de Janeiro - Excluding other lottery winners

	ITT		LATE IV	
	(1)	(2)	(3)	(4)
Panel A: Lottery 003				
Formally employed (yearly)	-0.015* (0.008)	-0.013* (0.007)	-0.050* (0.027)	-0.046* (0.024)
Receives Bolsa Família	0.019*** (0.005)	0.021*** (0.005)	0.064*** (0.017)	0.070*** (0.018)
Number of individuals	280,913	207,822	280,913	207,822
Panel B: Lottery 006				
Formally employed (yearly)	-0.008 (0.006)	-0.010** (0.005)	-0.038 (0.027)	-0.050** (0.023)
Receives Bolsa Família	0.007** (0.003)	0.007** (0.003)	0.032** (0.016)	0.037** (0.017)
Number of individuals	309,809	231,347	309,809	231,347
Panel C: Lottery 009				
Formally employed (yearly)	-0.005 (0.004)	-0.005 (0.003)	-0.041 (0.032)	-0.040 (0.027)
Receives Bolsa Família	-0.003 (0.002)	-0.002 (0.002)	-0.023 (0.019)	-0.015 (0.019)
Number of individuals	350,452	261,740	350,452	261,740
Year fixed effects	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes

Notes: Each panels represents a separate sample composed only of those individuals who participated in the corresponding lottery. The first column presents the mean of each dependent variable for the control group. Columns (1) and (2) indicate the intent-to-treat effects. The results come from OLS regressions where each dependent variable is regressed against a binary variable that indicates whether the individual won in that lottery. Columns (3) and (4) are the results of a two-stage regression, where participation in the program is instrumented by a variable indicating the random assignment to treatment. Estimates represent the treatment-on-the-treated effects, as described in the text. Columns (1) and (3) present the results for the whole sample without any control variables. Columns (2) and (4) present the results with control variables for about 74% of the sample. The reduction in sample corresponds to those individuals who had some formal job between the years 2006 and 2014. For these individuals it was possible to create control variables which are presented in table 2. The formally employed variable (yearly) is a dummy that indicates whether the individual had any formal employment in a given year. The formally employed variable (quarterly) is also a dummy that indicates whether the individual was employed in each quarter. The variable formally employed on 31/12 is a RAIS variable that indicates whether the individual was employed on 31/12 of each year. The variable formal wage indicates the average salary of the individual in each year. All these regressions are for the years 2012 to 2016, subsequent to the lotteries. The Bolsa Família participation variable is a dummy that indicates whether the individual receives Bolsa Família in each of the years between 2012 and 2017.

All standard errors have clusters at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

formal employment and participation in the Bolsa Família for a number of subgroups. To simplify the presentation, we only show the treat-on-treated and compare the estimated coefficient with the main sample result, using a simple mean test. The p-value of this test is reported in parenthesis. In general, despite some difference in specific coefficients, only in a few cases they were statistically significant, which occurs only in São José do Rio Preto to people living far from the new houses (in case of the likelihood of remaining employed) or, in the case of joining to the cash transfer program, to people in working age, completed high school formally employed before the lottery and living far from new houses before moving.

Table 12: Effects of the program by subgroup - Rio de Janeiro (all Lotteris) and São José do Rio Preto

	TOT							
	Formally employed				Receives Bolsa Família			
	Lottery 003	Lottery 006	Lottery 009	SJRP	Lottery 003	Lottery 006	Lottery 009	SJRP
Main sample (Table 8)	-0.040	-0.049	-0.040	-0.033	0.070	0.037	-0.015	0.040
Female	-0.026	-0.049	-0.057	-0.038	0.061	0.014	-0.039	0.027
	(0.687)	(0.999)	(0.695)	(0.769)	(0.770)	(0.412)	(0.478)	(0.159)
Working age	-0.036	-0.050	-0.046	-0.035	0.069	0.040	-0.012	0.023**
	(0.904)	(0.975)	(0.877)	(0.898)	(0.970)	(0.898)	(0.913)	(0.048)
Color black or brown	-0.066	-0.047	-0.005	-0.041	0.088	0.049	-0.043	0.033
	(0.501)	(0.959)	(0.437)	(0.705)	(0.569)	(0.686)	(0.408)	(0.539)
Completed elementary school	-0.021	-0.055	-0.056		0.075	0.045	-0.003	
	(0.584)	(0.860)	(0.686)		(0.853)	(0.740)	(0.672)	
Completed high school	-0.022	-0.063	-0.086	-0.046	0.058	0.061	0.013	0.019**
	(0.641)	(0.711)	(0.289)	(0.485)	(0.673)	(0.363)	(0.360)	(0.034)
Formally employed before Lottery	-0.044	-0.062	-0.059	-0.028	0.070	0.042	-0.011	0.019**
	(0.908)	(0.714)	(0.650)	(0.779)	(0.999)	(0.836)	(0.888)	(0.023)
Worked in the administrative sector	-0.093	-0.121	-0.069	-0.036	0.074	0.092	-0.053	0.021
	(0.311)	(0.220)	(0.641)	(0.913)	(0.913)	(0.153)	(0.340)	(0.145)
Worked in the services sector	-0.010	-0.025	-0.093	-0.059	0.074	0.026	0.014	0.022
	(0.483)	(0.574)	(0.297)	(0.325)	(0.911)	(0.733)	(0.436)	(0.167)
Earns less than a Minimum Wage				-0.052				0.033
				(0.368)				(0.539)
Lived more than 5km from MCMV project				-0.081**				0.022**
				(0.035)				(0.036)

Notes: The columns present treatment on the treated results of the effect of the MCMV program on the variables of formal (yearly) employment and participation in Bolsa Família in each lottery. Each of the lines is from a different regression, where the sample is restricted to that subgroup. The result of each row is the coefficient of a dummy variable indicating whether the individual won in that lottery. All results are for samples with control variables, which corresponds to about 75% of the total sample in each lottery, to the Rio de Janeiro city, and 99% to São Jose do Rio Preto city.

In parenthesis, the p-value of a test comparing the estimated coefficient with the main sample result.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The database of São José do Rio Preto city permits us to check the biases in Rio de Janeiro samples. Rio de Janeiro data is based only on RAIS information, which contains all the formal workers in the country in a given year. The results of that section are for about 75% of the sample, which correspond to those individuals who had a formal job between 2006 and 2014. We build to SJRP data a sample of individuals with only information of RAIS between the years 2009 and 2014. The balance between the treatment and control groups with RAIS information is about 76% of whole dataset.³¹ The Table 13 presents the results for this exercise. Note that although we are excluding 25% of SJRP sample to make it similar to RJ restriction, the results are quite similar to the case where all individuals are included (Table 8). The impact's magnitude is similar to that estimated to Rio de Janeiro Lotteries 003 and 006, that is, the employment rate after the lottery decrease between 3.8 and 4.3%, the wage is not impacted, and the participation on Bolsa Família program increase from 3.5 to 7%.

6. Discussion and conclusion

Housing programs affect the beneficiaries in different ways. Low-income families could be willing to live in substandard housing if this allows them to be close to employment opportunities in the

³¹The balance between treatment and control groups is maintained. There are no significant differences between the two groups in those variables that we were able to construct from RAIS.

Table 13: Effects of the program on individuals - RAIS sample

	ITT		LATE IV	
	(1)	(2)	(3)	(4)
Formally employed (yearly)	-0.025** (0.010)	-0.029*** (0.009)	-0.036** (0.015)	-0.042*** (0.014)
Formally employed (quarterly)	-0.025** (0.010)	-0.029*** (0.009)	-0.035*** (0.014)	-0.043*** (0.013)
Formally employed on 31/12	-0.021** (0.010)	-0.026** (0.010)	-0.030** (0.014)	-0.038*** (0.015)
Formal wage (yearly)	-19.069 (18.216)	-17.729 (20.681)	-27.146 (25.882)	-25.920 (30.170)
Receives Bolsa Família	0.020*** (0.007)	0.024*** (0.007)	0.029*** (0.010)	0.035*** (0.011)
Time fixed effects	Yes	Yes	Yes	Yes
Control variables	No	Yes	No	Yes
Number of individuals	12084	9228	12084	9228

Notes: Columns (1) and (2) indicate the intent-to-treat effects of MCMV on the dependent variables on each of the lines. The results are from OLS regressions where each dependent variable is regressed against a binary variable that indicates whether the individual won the housing lottery. Columns (3) and (4) are the results of a two-stage regression, where participation in the program is instrumented by lottery winning. Estimates represent the treatment-on-the-treated effects, as described in the text. Columns (1) and (3) present the results for the whole sample without any control variables. Columns (2) and (4) present the results with control variables to about 76% of all individuals, corresponding to those with RAIS information between the years 2009 and 2014, similar to what was done for the case of Rio de Janeiro. The control variables are those presented in Table 2. The formally employed (yearly) variable is a dummy that indicates whether the individual has had any formal employment in a given year. The formally employed (quarterly) variable is also dummy that indicates whether the individual was employed in each quarter. The variable formally employed on 31/12 is a RAIS variable that indicates whether the individual was employed on 31/12 of each year. The variable formal wage indicates the average salary of the individual in each year. All these regressions are for the years 2014 to 2016, after the lottery. The Bolsa Família participation variable is dummy that indicates whether the individual receives Bolsa Família in each of the years between 2014 and 2016.

All standard errors presented have clusters at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

central business district, as suggested by Glaeser et al. (2008) and Glaeser (2011). Then, the housing program will fail in the objective of change the life's condition of the low-income family if the houses are built far from the center of the city. However, bad housing could represent a "trapped in poverty," making it difficult for a poor family to move to another place due to market failure. Therefore, the government intervention could help this family to improve their life's condition, same it the house are built in the surrounding area.

To Subsidize the acquisition of a new house, often far from the original home location, and also far from job centers, may create other problems for the beneficiary families. Several studies seek to analyze the impact of housing programs to individuals who receive housing assistance, both in the form of vouchers or in the direct provision of housing. The performance in the labor market is one of the most interesting impacts considered, which is done not only to explore the indirect effects of housing programs but also to bring more information to the debate about how the government should help the most vulnerable families. Also, the idea that housing assistance brings positive externalities to the beneficiary families is one of the main reasons for the high investment in this type of program, which is very popular all over the world.

In Brazil, Minha Casa Minha Vida program has reached a very significant size in just eight years of existence, delivering more than 1.2 million houses only in Segment I of the program, which is aimed at the most impoverished families. The program is one of the most costly for the government and has been criticized because the houses built by the program are usually located in peripheral regions, with little infrastructure, which imposes an additional cost to the beneficiaries: the cost of distance. The present work is one of the first to analyze microdata of Minha Casa Minha Vida. Also, it explores a rare source of exogeneity in the literature: randomization of the selection of program beneficiaries.

Our result suggests that the housing program in Brazil badly select the family, benefiting only one least linked to the labor market. Same as the family are selected by a random process, as a lottery, the decision to move to MCMV houses is less influenced by the current houses condition, as infrastructure, characteristic of the property or its neighborhood, but depends strongly on the distance of the new houses to the center of business and employment, and of the current condition of the individual in the labor market, as the wage. Individuals living currently distant from the new houses or with the strongest link in the labor market are less likely to move to new homes in the program.

To families that moved, the results show that MCMV has no positive effect on the formal employment rate. Not only that, the estimates allow us to affirm that MCMV had a negative effect on the formal employment rate on both cities analysed, Rio de Janeiro and São José do Rio Preto. The effect is around 3.3% in the city of São José do Rio Preto, and varies from 4% to 6% in the city of Rio de Janeiro, according to the lottery. New studies, which provide data for the informal labor market, will be very important in determining whether there has been a migration from the formal to the informal labor market or whether there has indeed been a reduction in the employment rate among the beneficiaries of the program. Given the nature of the available data, the exact transmission mechanism of this negative effect can not be isolated yet. However, the negative effect was greater to the houses located far from the city center. Also, in São José do Rio Preto, the effect was more negative for those who, at the baseline, lived more than 5 km (3 miles) from the housing complexes, suggesting that distance (accessibility) matters. Finally, in Rio de Janeiro, the negative effect on employment increases along of time. In the first and second lotteries analyzed, the negative impact reaches almost 10% five years after the lotteries, indicating a negative medium to long term effect. In São José do Rio Preto, the impact was more immediate and remained negative (less significantly) with time.

Despite the negative impact on employment, the formal income of the individuals seems not to have been affected, that is, the wage of the individual that remains employed is not impacted by the program. However, it is also shown that the program has a positive effect on the participation

in Bolsa Família program, a program that is aimed at economically vulnerable families. This may indicate a worsening of the economic situation among beneficiaries.

The results are very relevant for housing policies in Brazil. In addition, many developing countries have started housing programs with similar characteristics to MCMV in recent years. However, there are still few studies on these programs. This work will also contribute to this literature.

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Table 14: Housing projects of MCMV by lottery - Rio de Janeiro

Housing project	Lottery 003	Lottery 006	Lottery 009	Total
Cascais	4	354	56	413
Destri	411	11	2	411
Estoril	73	100	230	400
Évora	17	18	411	446
Park Imperial	46	72	161	278
Park Royal	59	85	134	277
Res. Rio Bonito	148	8	3	157
Sevilha	4	236	15	254
Taroni	10	198	2	209
Toledo	72	228	135	434
Vidal	59	20	142	220
Zaragosa	9	22	404	435
Total	912	1,352	1,695	3,934

Notes: The table presents the 12 housing projects for which the selection of beneficiaries happened in the three lotteries held in 2011. Columns indicate in which of the lotteries the beneficiaries were selected.

7. Attachments

Table 15: Characteristics of treatment and control groups - Lottery 003

	(1)	(2)	(3)	(4)	(5)	(6)
	Control group	Treatment group	Difference (1) - (2)	Compliers	Noncompliers	Difference (5)-(4)
% with information linked in RAIS	0.747	0.747	-0.000 (0.004)	0.733	0.749	0.016 (0.011)
Female	0.532	0.532	-0.000 (0.005)	0.616	0.521	-0.095*** (0.015)
Indigenous	0.003	0.003	-0.000 (0.001)	0.001	0.003	0.002 (0.002)
Color White	0.380	0.387	-0.006 (0.005)	0.382	0.387	0.006 (0.015)
Color Black	0.115	0.113	0.002 (0.003)	0.136	0.110	-0.026*** (0.010)
Color Yellow	0.006	0.004	0.002** (0.001)	0.005	0.004	-0.000 (0.002)
Color mixed	0.342	0.334	0.008* (0.005)	0.378	0.329	-0.050*** (0.014)
Color not identified	0.055	0.060	-0.005** (0.002)	0.047	0.062	0.015** (0.007)
Illiterate	0.001	0.001	0.000 (0.000)	0.001	0.001	-0.000 (0.001)
Completed elementary school	0.874	0.873	0.001 (0.003)	0.868	0.874	0.006 (0.010)
Completed High School	0.655	0.646	0.008* (0.005)	0.610	0.651	0.041*** (0.014)
Completed College	0.107	0.103	0.004 (0.003)	0.064	0.108	0.045*** (0.009)
Age	36.913	36.950	-0.036 (0.106)	35.865	37.095	1.231*** (0.322)
Formal wage in 2010	614.399	612.536	1.862 (7.492)	406.398	640.803	234.405*** (22.112)
Formally employed in 2010	0.575	0.574	0.001 (0.004)	0.526	0.580	0.054*** (0.013)
Worked in the services sector	0.206	0.205	0.001 (0.003)	0.244	0.200	-0.044*** (0.010)
Worked in the administrative sector	0.182	0.179	0.003 (0.003)	0.164	0.181	0.017* (0.010)
Worked in the Industrial sector	0.076	0.077	-0.001 (0.002)	0.051	0.081	0.030*** (0.007)
F-statistic			0.91			
P-value			0.575			
<i>N</i>	294884	2983	297867	912	2071	

Notes: This table shows the balance between the treatment and control groups of Lottery 003, the first lottery held in 2011 to select the beneficiaries of the MCMV in Rio de Janeiro. The unit of analysis is the individual. The sample includes all individuals enrolled in Lottery 003. All information presented is from RAIS from 2006 to 2014. Information of gender, skin color, schooling, age and disability are from 74% of the total sample, whose information was present at the RAIS. Information on formal salary, formal employment and the employment sector is from the whole sample. The first column presents the information of the individuals who did not win the MCMV lottery. The second column presents the information of the individuals who won. The third column indicates the difference between the groups and the result of a t-test of difference between the two groups. The fourth column presents the information of the individuals who won the lottery and who became beneficiaries of MCMV. The fifth column presents the information of those who won but did not become beneficiaries. The sixth columns indicates the difference between the groups and the result of a t-test of difference between the compliers and non compliers. The F and p-value statistics are from a regression where the dependent variable is equal to one if the individual won the Lottery 003 and 0 otherwise. The standard error is clustered at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 16: Characteristics of treatment and control groups - Lottery 006

	(1)	(2)	(3)	(4)	(5)	(6)
	Control group	Treatment group	Difference (1) - (2)	Compliers	Noncompliers	Difference (5)-(4)
% with information linked in RAIS	0.747	0.750	-0.004 (0.005)	0.733	0.755	0.022* (0.013)
Female	0.525	0.528	-0.003 (0.007)	0.633	0.501	-0.132*** (0.018)
Indigenous	0.003	0.002	0.001 (0.001)	0.001	0.002	0.001 (0.001)
Color White	0.383	0.382	0.000 (0.007)	0.385	0.382	-0.004 (0.017)
Color Black	0.114	0.112	0.002 (0.005)	0.141	0.105	-0.037*** (0.011)
Color Yellow	0.006	0.006	0.000 (0.001)	0.006	0.006	-0.000 (0.003)
Color mixed	0.342	0.345	-0.003 (0.007)	0.366	0.340	-0.027 (0.017)
Color not identified	0.055	0.061	-0.006* (0.003)	0.059	0.062	0.003 (0.009)
Illiterate	0.001	0.002	-0.001** (0.000)	0.004	0.001	-0.003* (0.002)
Completed elementary school	0.877	0.876	0.001 (0.005)	0.866	0.878	0.012 (0.012)
Completed High School	0.660	0.662	-0.002 (0.007)	0.605	0.676	0.070*** (0.017)
Completed College	0.110	0.105	0.005 (0.005)	0.069	0.114	0.045*** (0.011)
Age	36.994	37.009	-0.015 (0.153)	35.976	37.272	1.296*** (0.380)
Formal wage in 2010	623.110	624.114	-1.004 (11.016)	400.710	682.729	282.020*** (28.869)
Formally employed in 2010	0.579	0.575	0.004 (0.006)	0.533	0.586	0.052*** (0.015)
Worked in the services sector	0.205	0.201	0.003 (0.005)	0.237	0.192	-0.045*** (0.012)
Worked in the administrative sector	0.185	0.186	-0.001 (0.005)	0.153	0.195	0.042*** (0.012)
Worked in the Industrial sector	0.077	0.074	0.002 (0.003)	0.073	0.074	0.001 (0.008)
F-statistic			0.87			
P-value			0.616			
<i>N</i>	318575	6505	325080	1352	5153	6505

Notes: This table shows the balance between the treatment and control groups of Lottery 006, the second lottery held in 2011 to select the beneficiaries of the MCMV in Rio de Janeiro. The unit of analysis is the individual. The sample includes all individuals enrolled in Lottery 006. All information presented is from RAIS from 2006 to 2014. Information of gender, skin color, schooling, age and disability are from 76% of the total sample, whose information was present at the RAIS. Information on formal salary, formal employment and the employment sector is from the whole sample. The first column presents the information of the individuals who did not win the MCMV lottery. The second column presents the information of the individuals who won. The third column indicates the difference between the groups and the result of a t-test of difference between the two groups. The fourth column presents the information of the individuals who won the lottery and who became beneficiaries of MCMV. The fifth column presents the information of those who won but did not become beneficiaries. The sixth column indicates the difference between the groups and the result of a t-test of difference between the compliers and non compliers. The F and p-value statistics are from a regression where the dependent variable is equal to one if the individual won the Lottery 006 and 0 otherwise. The standard error is clustered at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 17: Characteristics of treatment and control groups - Lottery 009

	(1)	(2)	(3)	(4)	(5)	(6)
	Control group	Treatment group	Difference (1) - (2)	Compliers	Noncompliers	Difference (5)-(4)
% with information linked in RAIS	0.747	0.747	-0.000 (0.004)	0.733	0.749	0.016 (0.011)
Female	0.532	0.532	-0.000 (0.005)	0.616	0.521	-0.095*** (0.015)
Indigenous	0.003	0.003	-0.000 (0.001)	0.001	0.003	0.002 (0.002)
Color White	0.380	0.387	-0.006 (0.005)	0.382	0.387	0.006 (0.015)
Color Black	0.115	0.113	0.002 (0.003)	0.136	0.110	-0.026*** (0.010)
Color Yellow	0.006	0.004	0.002** (0.001)	0.005	0.004	-0.000 (0.002)
Color mixed	0.342	0.334	0.008* (0.005)	0.378	0.329	-0.050*** (0.014)
Color not identified	0.055	0.060	-0.005** (0.002)	0.047	0.062	0.015** (0.007)
Illiterate	0.001	0.001	0.000 (0.000)	0.001	0.001	-0.000 (0.001)
Completed elementary school	0.874	0.873	0.001 (0.003)	0.868	0.874	0.006 (0.010)
Completed High School	0.655	0.646	0.008* (0.005)	0.610	0.651	0.041*** (0.014)
Completed College	0.107	0.103	0.004 (0.003)	0.064	0.108	0.045*** (0.009)
Age	36.913	36.950	-0.036 (0.106)	35.865	37.095	1.231*** (0.322)
Formal wage in 2010	614.399	612.536	1.862 (7.492)	406.398	640.803	234.405*** (22.112)
Formally employed in 2010	0.575	0.574	0.001 (0.004)	0.526	0.580	0.054*** (0.013)
Worked in the services sector	0.206	0.205	0.001 (0.003)	0.244	0.200	-0.044*** (0.010)
Worked in the administrative sector	0.182	0.179	0.003 (0.003)	0.164	0.181	0.017* (0.010)
Worked in the Industrial sector	0.076	0.077	-0.001 (0.002)	0.051	0.081	0.030*** (0.007)
F-statistic			1.27			
P-value			0.192			
<i>N</i>	337038	14056	351094	1695	12361	14056

Notes: This table shows the balance between the treatment and control groups of Lottery 009, the third lottery held in 2011 to select the beneficiaries of the MCMV in Rio de Janeiro. The unit of analysis is the individual. The sample includes all individuals enrolled in Lottery 009. All information presented is from RAIS from 2006 to 2014. Information of gender, skin color, schooling, age and disability are from 76% of the total sample, whose information was present at the RAIS. Information on formal salary, formal employment and the employment sector is from the whole sample. The first column presents the information of the individuals who did not win the MCMV lottery. The second column presents the information of the individuals who won. The third column indicates the difference between the groups and the result of a t-test of difference between the two groups. The fourth column presents the information of the individuals who won the lottery and who became beneficiaries of MCMV. The fifth column presents the information of those who won but did not become beneficiaries. The sixth column indicates the difference between the groups and the result of a t-test of difference between the compliers and non compliers. The F and p-value statistics are from a regression where the dependent variable is equal to one if the individual won the Lottery 009 and 0 otherwise. The standard error is clustered at the individual level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$