Beneficiary dynamics in the Bolsa Familia Conditional Cash Transfer.

Capabilities, constraints and the local labor market.

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Social Protection and Jobs Global Practice

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Contents

Abstract

Bolsa Familia (BF) is one of the earliest established poverty-targeted conditional cash transfer (CCT) programs in the world, and, over time, it has experienced a large and heterogenous churn in beneficiaries. The program is among the few CCTs in developing countries that frequently reassess eligibility via household income test: this allows to study the factors associated with exit from social assistance at the individual, family, and community levels. We follow a cohort of 105,000 families—90 percent women-headed—who joined the program in 2012 and construct a panel of three administrative data sets (the social registry, benefit payroll, and the formal labor market registry) over eight years. The analysis shows that the duration of stay in the program ranges from less than three years for about one-quarter of families to more than seven years for nearly half of families. Factors associated with individual employability, such as the level of education and work experience in the formal sector, predict a more rapid exit from BF. Exit rates fall as the number of children increases and rise with the number of work-able adults in the family, which underscore the relationship between labor supply constraints and labor mobility. At the community level, exit and reentry rates are higher in urban areas and larger municipalities; they also increase in municipalities that have experienced a recent rise in formal employment. These findings suggest that the BF program, far from generating uniform long-term 'benefit dependency', balances different objectives fairly well for a heterogenous target population. It provides cash incentives to invest in human capital of poor children for prolonged periods, but also serves as a temporary last-resort social assistance for households that experience an income shortfall. The findings suggest that complementary policies that tackle individual supply-side constraints (childcare, skills, increasing education levels, and job matching) and demand-side constraints (local formal employment opportunities) are all relevant to support greater mobility of families out of means-tested social assistance.

Overview

This study analyzes mobility patterns and factors associated with the program exit of beneficiary families in Brazil's Bolsa Familia (BF) conditional cash transfer (CCT) program, by following the cohorts of newly entered beneficiaries in 2012 and up to the onset of the COVID-19 pandemic, when the program rules changed substantially. BF is one of the earliest established CCTs in the world, and throughout its tenor, the program saw an enormous and heterogenous rate of churn among its beneficiaries. This study follows about 105,000 households and combines data from *Cadastro Único* (Brazil's social registry of all applicants and beneficiaries of federal means-tested social programs), the BF payroll, and the formal labor relations registry (RAIS[1]). We employ descriptive statistics and heterogenous survival analysis,[2] which analyze the time it takes until a family drops out of the program. We emphasize the importance of conducting further rigorous research to identify factors, at the individual, family, and municipal levels, associated with the beneficiaries' duration of stay in BF.

The study has five sets of findings. First, the duration of stay in BF is very heterogenous, ranging from less than three years for 23 percent of families to more than seven years for 40 percent of families. Among those who exit the first time, only a small portion tends to enter again (though budget constraints may have also affected this result). Second, the duration of stay is highly influenced by the market labor profile of the adults in the safety net. Families with adult members that completed secondary and (even more) tertiary education, and with members that have experience in the formal labor market before program entry, have shorter duration of stay; having a member that held any type of job, on the other hand, is not significant (reflecting the challenge for the program to capture informal incomes and the fact that most BF beneficiaries have to work while receiving the relatively small benefit). This finding highlights that BF also plays an important role as the last-resort social assistance for the transient poor. Third, the number of children at entry, especially of young age, significantly reduces the likelihood to leave the program across seven years, while the presence of additional work-able adults besides the head has the opposite effect. Our interpretation is that children caretaking duties constrain the labor supply of women, especially to full-time formal jobs, and this is in part given by the low coverage of childcare services. On the contrary, families with children in middle or high school years at the time of entry tend to exit more quickly; this reflects a combination of lower labor supply constraints and the program's design effects (the income eligibility threshold to BF is much lower for families without minors). Fourth, the local labor market

[1] *Relação Anual de Informações Sociais (RAIS).*
[2] We use Kaplan-Meier (KM) estimators and Cox regressions.

context matters: beneficiaries in urban areas and in larger municipalities experience a more rapid exit than those in rural and smaller municipalities. Moreover, all else being equal, we find that short-term growth in local formal employment affects, with a lag, municipal-level exit rates from BF. The findings show the importance of labor market dynamics, particularly in the formal sector, for the duration of stay in the program of a significant share of the beneficiary population. Thus, the fifth finding is that, on average, income at exit is higher than at entry, consistent with program rules, and in about four out of five cases, exiting families accumulated higher labor income; in the remaining one-fifth, this is due to pensions.

The study contributes to the literature studying the causes of exit from cash transfers and has several implications for policy. First, the analysis confirms that BF, despite being often considered a policy tool to stimulate long-term human capital investments, includes both families that remain for a long period in the program and many that exit the program. The current design of BF promotes longer duration of stay for households with young children, which is a desirable outcome, and proves a certain ability of BF to balance stability with being responsive to transient poverty. Second, the responsiveness of BF work-able adults to labor market conditions is in line with earlier studies about the incentive compatibility of the program to join the formal labor market (as it was designed in the years considered in this paper). Even when positive design incentives are in place, program exit depends on many other factors, some of which could be shaped by policies that tackle demand-side and supply-side constraints. On the supply side, the evidence points at the importance of extending the provision of free or affordable childcare for beneficiaries of young age, as well as to extend school hours for older children. Second, it is clear that household members in safety nets who completed secondary school are including programs that subsidize beneficiaries for work experience and human capital, that relieve caretaking duties, and that stimulate local demand for (mostly low-wage) employment.

1. Introduction and Key Findings

This study analyzes mobility patterns and factors associated with program exit from the Bolsa Familia (BF) conditional cash transfer (CCT) program, by following the cohorts of families that first joined the program after 2011[3] and up to the onset of the COVID-19 pandemic. In 2023, Bolsa Familia celebrates 20 years in operation since its inception as Brazil's nationwide CCT.[4] Over this long period, the program went through different phases: rollout, expansion and retrenchment due to fiscal adjustment, and growth during and after the pandemic time. Besides these macro-dynamics, throughout its life, the program saw an enormous rate of churn among its beneficiaries. However, such dynamics have not been explored at the micro level until now. By following for seven years 105,792 households that entered BF in 2012, and whose members were not part of the program in previous years,[5] this study tackles two novel and relevant questions about the program. First, it identifies the prevailing patterns of duration in the program, including likelihood of reentry after the first and second exit. Second, by exploring individual and household-level variables about the family, recorded at the time of enrollment in the program, we can isolate the factors that are more strongly associated with longer duration in the safety net or with the chance of exit. Our data, combining Brazil's social registry, formal labor registry, and BF payroll, allow to explore the effects of age, education levels, demographic structure of the family, prior participation in formal employment, receipt of other social benefits, as well as several municipal-level characteristics.

The trajectory of beneficiaries in and out of CCTs over time and the determining factors remained largely unexplored by the vast literature around BF and other major cash transfers in developing countries. Owing to its data openness and policy rigor, over the last two decades, the BF program has been the subject of innumerable studies and evaluations, regarding a broad range of outcomes, including on the labor market effects. As the first generation of recipients' children reaches adulthood, a few studies have also begun to explore the long-term impacts of the program on early entrants (De Oliveira and Chagas 2020; IMDS 2023). Importantly, all such studies tend to presume a uniform and long-term application and 'treatment' (BF transfers) on children, from an early age until graduation. In practice, however, it is estimated that, on average, about 11.1 percent of households leave BF each year, and different types of

[3] The Ministry of Citizenship did not hold comparable time series preceding 2011, and this prevented considering families who joined BF in the first six years of the program. In this period, however, design features of the BF program differed, as the Brasil Sem Miseria reforms were not yet in effect, including Brasil Carinhoso and the extreme poverty benefit.
[4] BF ended in 2022 and was replaced through the new CCT program *Auxilio Brasil*.
[5] The study employs descriptive statistics, duration models, and regression analysis to analyze a panel of 105,792 households, as further detailed in appendix 1. The panel is built by matching the social registry, benefit payroll data, and administrative data on formal labor relations.

families received different levels of exposure to the program. Little has been studied on the reasons for this heterogeneity of stay and exit from the program, which could depend on program implementation, beneficiary behaviors, and local labor market dynamics**.** In fact, this question also remains little explored for other major social assistance programs in developing countries. Evidence concentrates on high-income countries, including United States, Spain and Sweden.[6]

Understanding the causes for beneficiaries' mobility out of social assistance matters for policy and program design. Understanding family characteristics that lead to faster exits from the program and those that constrain mobility are of interest for the design of policy interventions that could improve families' endowments or access to services as well as for targeting purposes. Our findings reject the view that the program creates a uniform long-term dependency and rather points to several levers for policy to affect the duration of stay in social assistance. Furthermore, our approach allows to understand how the BF program is balancing two potentially conflicting objectives: to serve as a shock-responsive safety net for the transient poor[7] and to serve as a CCT to stimulate human capital of children for extended periods.

The literature in middle- and low-income countries concentrated so far on identifying the relationship between cash transfers and labor supply decisions. While theory suggests that, under certain conditions, beneficiaries may reduce formal labor supply, the empirical evidence around the world (summarized in Gentilini et al. 2019) shows this is rarely the case, and program design matters for outcomes. Some studies find no overall impact of BF on labor supply of beneficiaries (De Brauw et al. 2015; De Oliveira 2009). De Brauw et al. (2015), however, find a decrease in hours worked for urban beneficiaries in the formal sector, which is almost entirely offset by an increase in hours worked in the informal sector. Other studies see an increase in labor supply caused by BF (Fruttero, Leichsenring, and Paiva 2020) or that an expansion of BF caused an increase in formal employment at the local level (Gerard, Naritomi, and Silva 2021). De Oliveira and Chagas (2020) look at the long-term impact of BF and found positive effects on labor market

[6] Ayala and Rodríguez (2007) studied the household characteristics associated with exiting social assistance in Spain, while Bäckman and Bergmark (2011) and Sandefur et al (1998) estimate the hazard rates of leaving social assistance in Sweden and the United States, respectively. The authors identify an association between being female, a single parent, or living in a single-adult household and lower exit rates from social assistance. On the other hand, higher education increases the chances of leaving the program. The main factors determining the program's duration are belonging to an ethnic minority and employability. The authors find that previous work experience substantially increases the chance of leaving the program.

[7] By design, BF attempted to cover both chronic and transient poor in a highly heterogenous country. Its unique targeting system uses as means test self-declarations of income, validated through administrative data cross-checks; it also applies two different income thresholds, the upper one reserved for families with children. These features allow to reach both adults in extreme poverty and families with children in moderate poverty.

participation, which are more pronounced for boys, smaller cities, and families with parents never formally employed, and this is associated with better schooling.

The study has five main findings.

- **The duration of stay in BF is very heterogenous.** It ranges from less than three years for 23 percent of families to more than seven years for 40 percent. The analysis also captures events of reentry after an exit: 12.2 percent of families who exited the program reentered it during the observation period.
- **Families with more constraints to labor supply remain the longest in the program.** Adults in family structures with higher care duties (proxied by the number of dependent children per adult) have lower chances of leaving the program early.
- **Families whose adult heads are better educated and hold formal work experience exhibit shorter stay in the program.** Households whose adult members have prior experience in the *formal* labor market are more likely to graduate from the program quickly, including through renewed labor market attachment at the time of exit. At the same time, being in any type of job while entering the program is common and not associated with quicker exits from the program. In addition, households whose head is better educated tend to exit more quickly from BF.
- **Duration of stay is, in part, correlated with children's presence and age.** Households reduce their propensity to stay once their dependents go beyond age 17 (when income eligibility conditions become stricter). The inverse relationship between program duration and children's age confirms that the program is overall successful in balancing two potentially opposing objectives: to serve as a short-term last-resort social assistance program and to act as a CCT program to stimulate investment in children's human capital, which has a longer time horizon.
- **As expected, on average, households at the time of exit exhibit higher income, especially from work.** In general, the increase in formal income above the threshold is the primary reason why families exit the BF program. Four-fifths of our sampled families with higher income at the time of exit derived it from employment, the remainder being pensions. Families with a higher per capita income at entry have a higher exit rate. This mechanical result shows that, overall, the program is capable of identifying higher incomes and translating that into operational decisions to discontinue benefit provision.

- **Last, the local labor market context and changes in local labor demand also affect duration spells in the program and exit probabilities.** Cohorts in urban areas and larger municipal centers are more dynamic. The same tendency can be observed for people living in larger municipalities, where less than one-third remain in the program for the full seven years. We also show results of forthcoming work by the authors that suggest that an increase in formal employment at the municipal level causes a significant (however very small) increase in the probability of exit from BF by work-able beneficiary adults, controlling for any other individual and family time-invariant characteristic. The likely channel is a rise in local labor demand, which benefits especially men, in terms of higher formal employment rates around the period of exit.

The study also presents several limitations as other factors likely to affect exits are not observable with the available data. We test empirically whether the information in *Cadastro Único* at the time of program entry is insufficient to predict the duration of stay in the program with reasonable margins of error. Based on international experience, information of households' likely duration of stay could provide potentially useful information to program managers in making decisions on family support type and intensity. Overall, we find that the available data allow to correctly predict only about half of the exit cases at different cutoff periods. We discuss future lines of research that could improve the understanding of duration dynamics, including by adding other administrative data in *Cadastro Único* on characteristics at entry.

The rest of the note is structured as follows: Section 2 gives an overview of the BF program, followed by section 3 that describes the data used. Section 4 describes the profile of different cohorts in BF. In section 5 exit and reentry dynamics are discussed, and section 6 presents factors associated with survival over time. Section 7 uses regression analysis to explore the effects of municipal-level labor market shocks on municipal exit rates. Section 8 looks at income dynamics and the duration of stay. Section 9 concludes.

2. Bolsa Familia in 2019, a Dynamic Program Interacting with the Labor Market

CCTs have the twofold objective of supporting basic consumption through the cash transfer while promoting an investment in human capital by making transfers conditional on utilization of services such as education and health. To date, tens of developing countries implemented such programs: while the objective of fighting poverty is a common characteristic of CCTs, each program must balance the delicate question of which, among the poor, to prioritize in support (Bastagli et al. 2019). Programs in most countries have, by design, focused on the chronic poor, with the intention of remaining for years with the same beneficiaries and accompanying children's development. More recently, however, attention has been placed in making social protection more adaptive and shock-responsive, to cover also those affected by temporary income shortfalls.

BF has been a precursor program in trying to balance the policy tradeoffs between addressing transient income shortfalls and providing incentives to build human capital of poor children. Applicant families registered at the local social assistance center and self-reported their income. Such declarations are then cross-checked across several public databases, and social workers may conduct household visits. Unlike many of its peers in Latin America, BF was thus designed to take in beneficiaries on a rolling basis and to be demand-driven (Fietz et al. 2021). To enter BF, income per capita of the family should fall below the moderate poverty administrative line (if children are present) or the extreme poverty line (if all family members are adults). The household composition and income also lead to a customized set of benefits.[8] Households need to recertify (reapply) every two years, and, in addition, formal incomes from various sources are also cross-checked on a periodic basis.

By design, BF neither prohibits nor discourages adults from working. As discussed in Fietz et al. (2021), de jure tax and benefit models show that the average BF benefit is sufficiently low compared to the minimum wage to ensure that in most cases families are better off when a member enters a formal job.[9] Moreover, BF includes a rather unique feature among CCTs —*Regra de Permanencia,* an income disregard

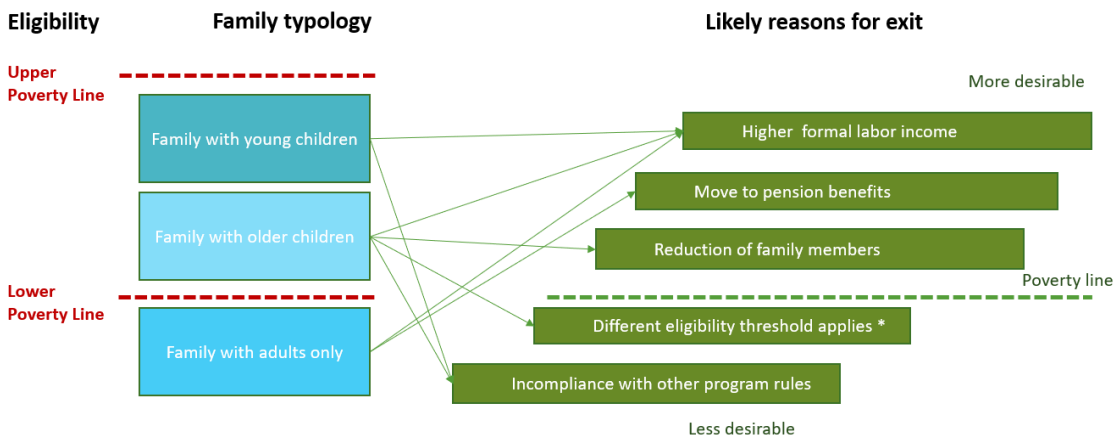
[8] In families below the *upper* poverty line, each child, youth, and pregnant or nursing woman receives a 'variable benefit'. These benefits have conditionalities that aim to support educational and health outcomes. In addition, families living below the *extreme* poverty line also receive a fixed amount and an additional amount to close the difference between post-transfer income and the administrative extreme poverty line. Between 2012 and 2019, the average BF cash benefit declined in real terms (Morgandi et al. 2019).

[9] Administrative data show that about one-quarter of households who receive BF have one member in a low-wage formal job (Morgandi et al. 2023). Similarly, in the national household survey in 2019, 57 percent of self-declared working-age BF beneficiaries were employed (27 percent formal and 73 percent informal).

that can safeguard households from being removed from BF for two additional years, if income goes above the eligibility entry threshold, *provided they voluntarily update their income information*. Families that are making use of the rule typically include those who saw an increase in labor income (Fietz et al. 2021). Despite all the positive incentives, overall, only a small share of families (7 percent in 2019) exits the BF program after using the *Regra de Permanencia*, for reasons that remain to be better studied.[10]

The program is also dynamic in exit: the reasons for exiting are diverse, and not all are equally desirable. In contrast to other CCTs, BF does not have a time limit to receive the benefit (see Fietz et al. 2021 for an overview of the exit criteria of other CCTs), and the eligibility lines at entry apply also at exit (with the exception of *Regra de Permanencia*, discussed below). Figure 1 shows the range of events that may lead a family to exit the program. At the aggregate program level, in 2019, three-quarters of program exits were due to the increase in household formal (detectable) income, sufficient to push income per capita above the eligibility threshold. In four out of five cases, higher income came from labor, and in the remainder, from other social benefits (Fietz et al. 2021). Both events fall in the range of the more desirable exits, since the family moved, at least temporarily, out of income poverty.

Figure 1: Mechanisms leading to exit from BF are varied and not equally desirable



Source: Authors' elaboration.

Note: As children turn 18, a different eligibility threshold for families with all adults applies.

Program rules and benefit design, however, also affect exit. A departure of a family member may cause an increase in income per capita, without a substantial change in household welfare. Second, moderately

[10] There are many potential reasons why most people fail to report their additional income, the most likely being lack of knowledge of *Regra de Permanencia*, lack of time, and lack of administrative capacities of social assistance offices (Centro de Referência da Assistência Social - CRAS) to handle such requests.

poor families whose children reach age 18 will lose 'variable benefits' for minors, and, unless they live in extreme poverty, they will be ejected by the program. Third, child-focused benefits can also be lost in case of unaddressed noncompliance with human capital conditions. Other reasons for exit include the failure by the family to address inconsistencies identified during cross-checks, or inability to reapply every two years to the program, or to withdraw funds for several months.[11] In all such cases, the system 'exits' the family but the household is not necessarily better off.

3. The Data

The study's key data source is the national single registry (*Cadastro Único*). The original data in 2012 included 25,068,130 families, living in 5,570 municipalities in the 27 states of the country. For improving data handling and preserving data safety, this study is based on an anonymized analytical sample of 15 percent of all households that newly entered BF in 2012.[12] The national social registry contains socioeconomic information of families whose declared income is below half the minimum wage per capita, including income sources, demographics (age, sex, and race), labor market, and education levels of individual members. The data extracted by the Ministry of Citizenship for this study refer to the middle of December each year. The panel is constructed by linking families and individual annual extractions through a hashed identification number.[13]

The movement in and out of the program can be observed based on the BF payments registry (*Folha de Pagamento*). The data set contains information on the monthly payments received by the main responsible person of the family (the household head). These data are matched to *Cadastro Único* data to identify the cohort of new beneficiaries in 2012 and the time when households leave the program.[14]

Formal employment can be observed by using the *Relação Anual de Informações Sociais* (RAIS). The administrative data contain information on formal dependent employment in Brazil. Formal firms in Brazil fill in the information on their employees including starting date, wage, occupation, and potential

[11] Additional reasons to leave the program were (a) excess time with blocked benefit, (b) exclusion from *Cadastro Único*, and (c) noncompliance with the rules for a valid record.

[12] We base our analysis on the years 2012–2019 due to various reasons. On the one hand, we started the analysis in 2012 because data availability was unreliable before those years. On the other hand, we stopped the analysis in 2019 given the COVID-19 pandemic. During the pandemic, registry recertifications were paused, and administrative rules of the program changed significantly. Therefore, exit dynamics also changed significantly during this period.

[13] A hashed identification number refers to an anonymized identifier, hence not the original identification number was used for merging purposes but an anonymized number instead.

[14] Around 6 percent of families that entered BF in 2012 left the program at some point and came back under a different family code. About 53 percent of the families that changed their family code during the observation period also moved between municipalities. To correct for this, households were recoded and linked with the original records.

dismissal date. By matching this additional data set to *Cadastro Úncio*, we can observe which of the BF beneficiaries are in formal employment.

4. The Profile of the Studied Cohort of Beneficiary Families

Of the families that newly entered BF in 2012, four-fifths lived in urban areas, comprising both small and large municipalities. About 78 percent of the analyzed cohort lived in urban areas, mainly in the Southwest (37 percent) and Northeast (33 percent) (Figure 2). About 40 percent live in municipalities with less than 50,000 inhabitants, followed by 31 percent of families that live in municipalities with 50,000 to 500,000 inhabitants. In the North, Northeast, and South, small municipalities are the most frequent, whereas in the Midwest and Southwest, most families live in municipalities with more than 500,000 inhabitants (Figure 3). Families in rural areas live to a large extent in small municipalities (below 50,000 inhabitants). In addition, more than 50 percent of families living in rural areas are in the Northeast, and as many as 15 percent of all rural families that entered BF in 2012 live in Bahia.

Of the families in the examined cohort, 82 percent have children, mostly young: 80 percent of the families have at least one child between 0 and 7 years old, and 27 percent of families have at least one child between 8 and 17 years old (Figure 4:). Of the overall population in 2012, 53 percent had at least one child—showing that BF is targeting especially families with children. More than half (55 percent) of all families have *only* children between 0 and 7 years old, while the share of families having *only* children in an older age group is significantly lower (Figure 5:).

Figure 2: Newly entered families by region

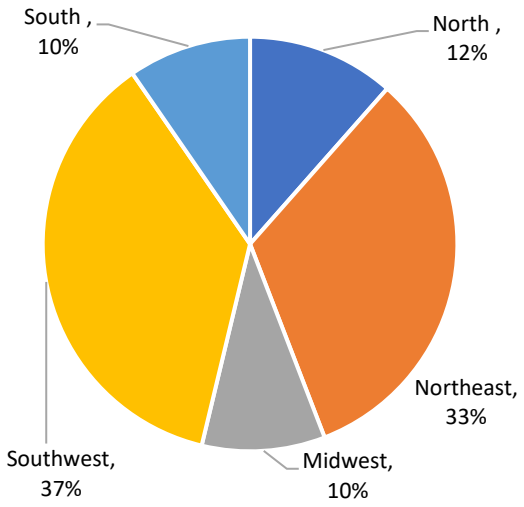
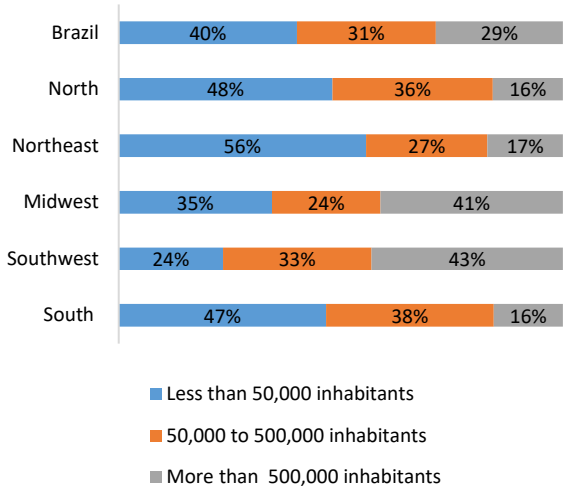


Figure 3: Newly entered families by region and municipality size



Source: Authors' elaboration based on *Cadastro Único* analytical sample (2012).

Figure 4: Share of families with children, by child age group in the analytical sample (newly entered families in 2012)

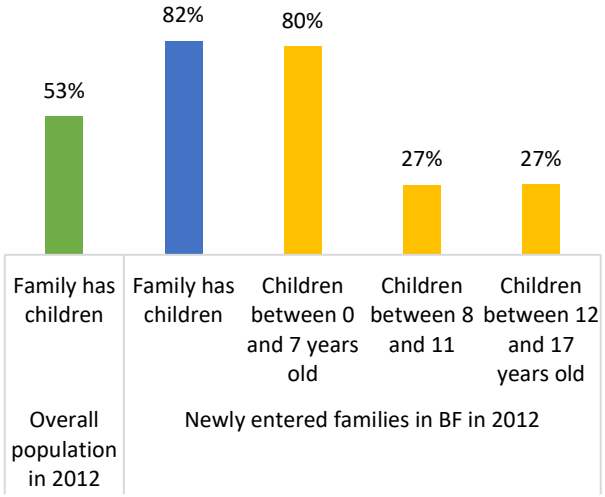
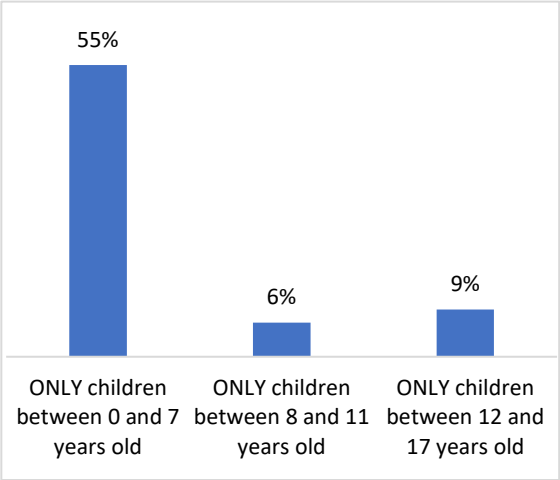


Figure 5: Typologies of families by exclusive age group of children



Source: Authors' elaboration based on *Cadastro Único* 2012–2020 and the household survey Pesquisa Nacional por Amostra de Domicílios (PNAD)2012.

A large share of household heads is low-educated and female. Over two-thirds of all household heads have less than secondary education, and 86 percent are women. About 14 percent are illiterate, and 26 percent have primary education or less. Only 35 percent have middle school education, and less than 1

percent hold tertiary education (Figure 6). Interestingly, the education levels of male household heads are even lower than those of women, with 18 percent with completed secondary education (Figure 7).

Figure 6: Education level of all household heads

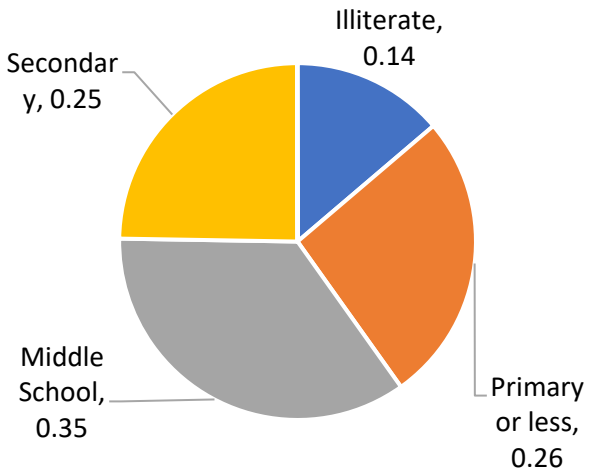
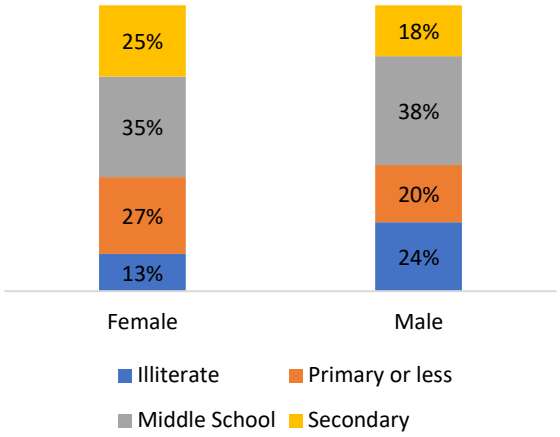


Figure 7: Education level of household heads by sex



Source: Authors' elaboration based on *Cadastro Único* 2012–2020.

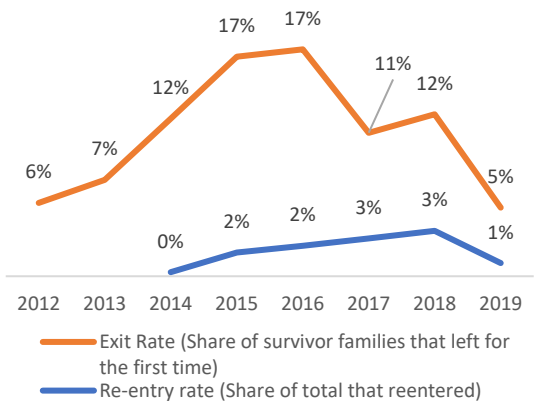
Predictably, education levels and formal labor market participation are lower among rural families. While among all families, 14 percent of family heads are illiterate, among rural families, this share increases to 19 percent. In addition, only 19 percent of family heads have completed secondary school, compared to one-quarter of all household heads. While the share of rural household heads having a job is not substantially lower compared to all families (32 percent and 35 percent, respectively), the percentage of household heads having a formal job is 7 percent and thus significantly lower than among all families, where 18 percent of household heads had a formal job.

About 28 percent of families report some income at the time of program entry, mostly non-labor income. Recorded non-labor income such as pension represents, on average, 83 percent of the total labor income of families, while labor income only represents 17 percent of the total income at entry. This, however, changes significantly at the exit, as discussed in section 5.

5. Exit and Reentry Dynamics

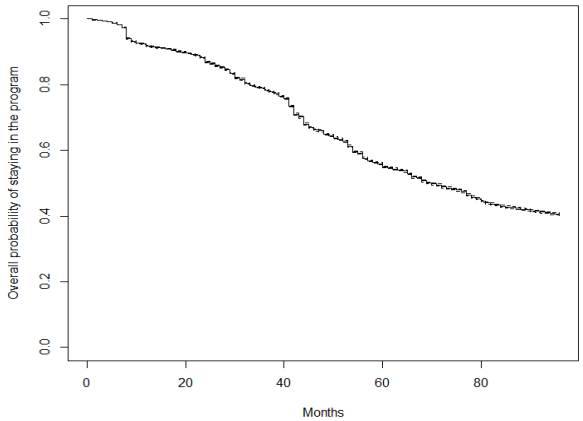
On average, sampled families remain five years (61 months) in the program, and 46 percent of families were still in the program by the end of 2019.[15] Figure 8 shows the program's annual exit rates: these represent the share of families that left the registry of beneficiaries, compared to the previous year.[16] Exit rates increased continuously from 2012 to 2016 and fell thereafter. Figure 9 provides a different perspective for the same data. It shows the *survival probability* of families;[17] the curve represents the probability to still be in BF after each additional month since program entry. The probability of remaining in BF in our study sample is over 50 percent after five years and falls to 40 percent within the eighth year (the last year observable in the data).

Figure 8: Exit rate and reentry rate by year in percent



Source: Authors' elaboration based on *Cadastro Único* 2012–2020.
Note: Sample is restricted to first-time exits of those that entered in 2012.

Figure 9: Survival probability of sampled families



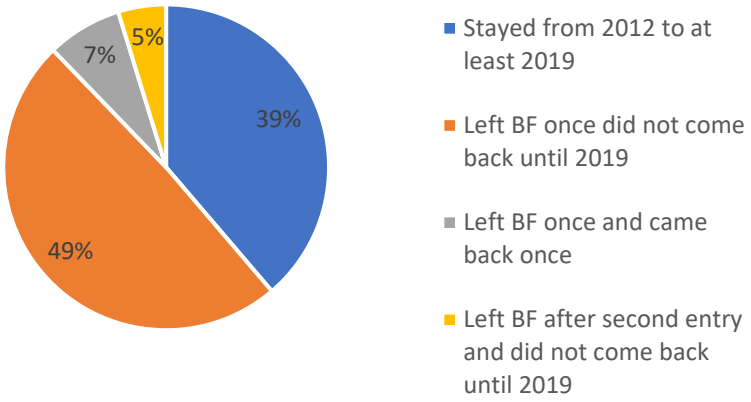
Source: Authors' elaboration based on *Cadastro Único* 2012–2020.
Note: Based on KM estimator of survival.

Only 12 percent of families in the cohort left the program and returned during the observed period. The families that joined the program in 2012 can be divided into four groups: (a) those that never left the program (39 percent of families), (b) those that left BF once and did not come back until 2019 (49 percent of families), (c) those that left BF once and came back to the program once (7 percent of families), and (d)

[15] They either never left the program (39 percent) or left once and came back (7 percent).
[16] This rate does not include those families who left and entered again in the program (discussed later).
[17] Survival probability is derived using the KM estimator. The estimate is often used in a medical context to evaluate the time of survival of patients after a certain treatment occurred (Goel, Khanna, and Kishore 2010). However, the same is frequently applied in labor economics literature, for instance, to describe the duration in programs such as unemployment insurance (appendix 1 explains the method in greater detail).

those that left BF after a second entry and did not come back until 2019 (5 percent of families) (Figure 10).

Figure 10: Cohorts of families



Source: Authors' elaboration based on *Cadastro Único* 2012–2020.

Changes in annual exit rates depended also on program management practices. In 2015, Brazil's economy suffered a steep economic crisis, and 2016 was the height of fiscal adjustment. The government sought efficiency savings across social protection programs and changed the procedures and frequency of cross-checks to verify the consistency of income declarations in *Cadastro Único* with other sources. Those cross-checks led to an increasing number of administrative benefit cancellations, as shown in peaking exit rates in 2016. This is also confirmed in government records on reasons for benefit cancellation for that year.[18]

6. Individual and Community Factors Associated with Survival in the Program

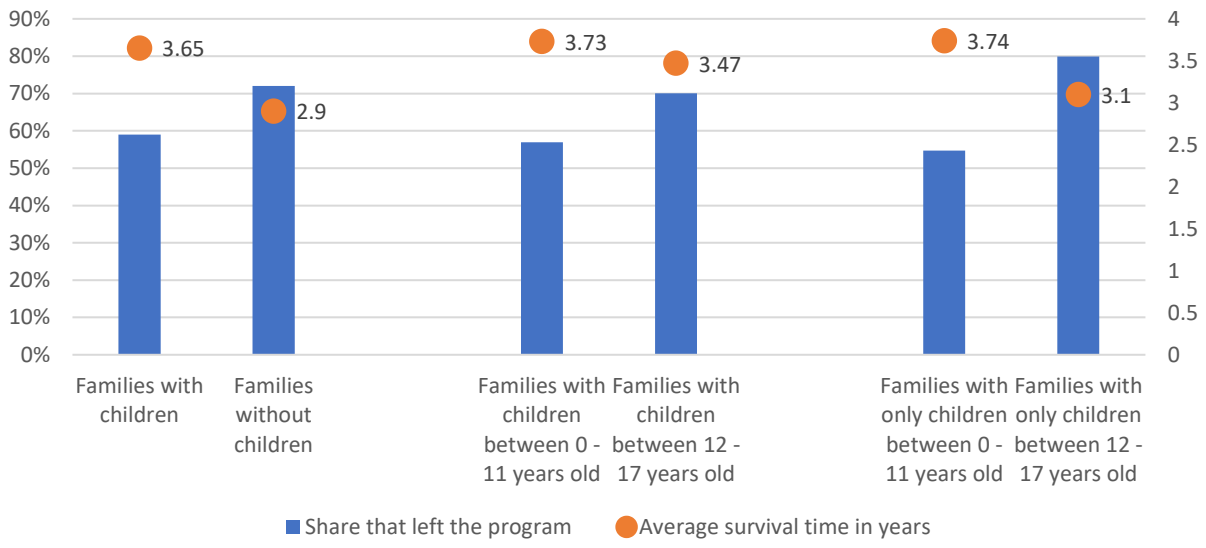
Demographic structure

Exit probabilities vary according to demographic structure, with households having only older children or no children at entry being more likely to exit BF by 2019 than those with very young children. Figure 11 and Figure 12 (b, c) compare the probability of exiting the program for households with different demographic structures. About 59 percent of families with children, especially if all children are under 12 years, left BF during the eight years of observation; the probability is significantly higher (72 percent) for those without children. At the other end of the spectrum, exit rates peak to 80 percent among households

[18] Annual statistics computed by the Ministry of Citizenship since 2016, reported in appendix 2 Figure 18, show that cancellations prevalently occurred that year due to registry inaccuracies (36 percent) and because the 'income per capita exceeds the BF threshold'.

who have only older children who are 12 years or above. Figure 12(c) provides a different perspective; it shows the duration probability of families of different types in the program at every month since entry. The figure allows to see the time when dropouts accelerate. Families that had only older children, 15–18 years, at entry exhibit the lowest duration of stay, followed by those with 8–15 year-olds, while those with 0–7-year-old children stay the longest. This finding is in line with the program design and objective: less stringent income eligibility conditions apply to households with minors, allowing families to invest in young children's health and education for longer periods.

Figure 11: Share of families that left the program and average survival time by number of children

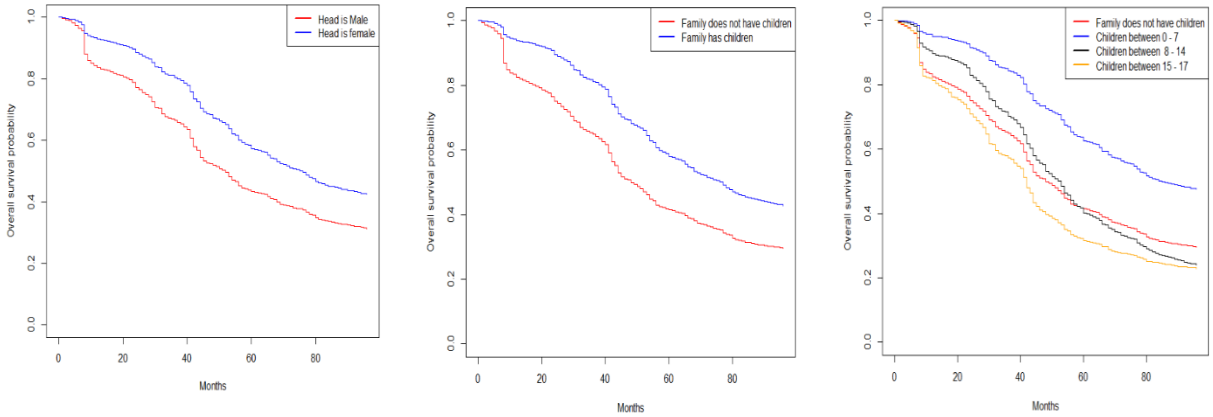


Source: Authors' elaboration based on *Cadastro Único* 2012–2020.
Note: Sample is restricted to first time exits.

Families headed by women (the large majority) tended to remain longer in the program than those headed by men. Figure 12 also shows that a family in a male-headed household (that is, where the man is the direct program recipient) has a lower chance to be in BF after 40 months than a family in a female-headed household. Note that nine out of ten households at entry are women-led, since the program tends to select the adult woman in the family as the direct recipient, if available. The reason for lower persistence in the program by male-headed households is likely due to lower probability of young children also being present in those.

Figure 12: Survival probability and family types

(a) Sex of household head *(b) Family has children (0–17 years old)* *(c) Number of children (0–17 years old)*



Source: Authors.
Note: KM estimator applied to studied cohort of families, based on *Cadastro Único* and BF *Folha de Pagamento* data, 2012–2019. The figures show the probability of remaining in the program (survival probability) at each month, since entry (month 0). Groups are defined by their characteristic at the time of entry, as declared in *Cadastro Único*.

Exit probability is much higher among the families led by better-educated adults. The probability of leaving the program increases with the level of education, but not monotonically (Figure 20 in appendix 2). Adults with upper secondary education, on average, remain in the program 55 months, about 6–7 months less than those with lower levels of education. Remarkably, there is hardly any difference in duration of stay among families whose heads have less than upper secondary education. Beneficiaries who completed primary school stay 62 months on average, nearly the same duration of those who completed middle school (61 months). On the other hand, the difference between upper secondary and tertiary education is stark, with tertiary educated staying 16 months less in the program on average.[19] It is important to recall that education may be a proxy for a much broader set of household and geographic circumstances that altogether affect the spell of time in the program. Regression analysis in later sections tries to isolate the effect of education from other observable characteristics. **Exit probability also increases with the age of the household head.** This is consistent with the higher likelihood of elderly members reaching pensionable age.

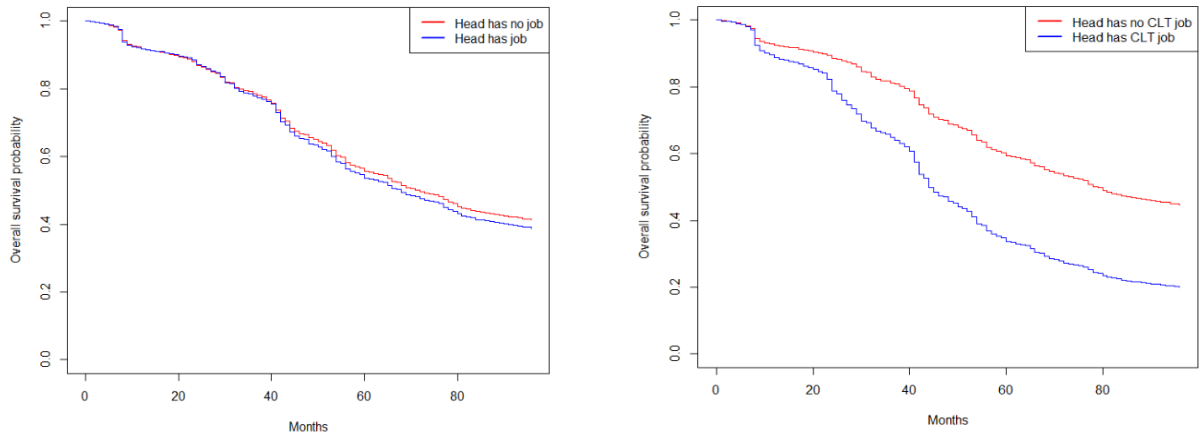
[19] However, it should be noted that the sample of families having a household head with tertiary education is very small.

Labor market participation

Households whose members have prior experience in the formal labor market are more likely to exit BF early and through greater formal employment. As shown in Figure 13(a), the duration in the program for families whose heads declared at entry to have any type of labor income is nearly identical to those who did not report any labor income. However, the presence of a household member who held a formal wage job at entry is associated with significantly less time in BF (30.3 percent after five years, compared to 55.6 percent), as seen in Figure 13(b). This finding suggests that households with prior attachment to the labor market are also those more likely to return to a formal job, which, in turn, leads to higher probability of exit from the program. Consistent with this hypothesis, according to the RAIS database, about 18 percent of BF household heads in the analyzed cohort held a formal job at some point in 2012. In the year of exit, the share of heads in the formal labor market rises to about 30 percent (Table 2).[20]

Figure 13: Duration of stay in the program for household heads with prior labor market experience

(a) Head has job at the time of program entry *(b) Head has formal job in RAIS at entry*



Source: Authors' elaboration.
Note: KM estimator applied to studied cohort of families, based on *Cadastro Único* and BF *Folha de Pagamento* data, 2012–2019.

[20] To conduct this estimate, we rely on cross-checks between *Cadastro Único* and RAIS, rather than on the variable for self-declared labor market status also available in *Cadastro Único*. This allows to reduce error and omissions. As shown in Table 1, between 1 and 5 percent of household heads reported to be in the formal labor market at the time of registration in the program at some point in 2012 (depending on the family typology), while in the same year we identify via cross-checks between 9 and 29 percent of household heads with a formal employment relation. The discrepancy could have multiple reasons: an actual gap between the end of employment end and the start of the benefit, an error, a classification of the formal job in other ways, or deliberate under-reporting. In addition, in large households, per capita income of the family could still be below the allowed threshold even if a member holds a low-wage formal job.

Families that leave and then return to BF are also more likely to have previous attachment to the formal labor market, compared to those who do not leave or those who leave but do not return. Table 1 plots the characteristics of households that returned to BF after exiting, once or twice, and compares them to those that never left over the eight years. Overall, there are few discrepancies in observable individual characteristics across the four groups. However, a clearer distinction emerges when merging with administrative data on labor relations to identify labor market attachment. Households who moved in and out of the program (groups 3 and 4 in Table 1) were those with highest formal labor market attachment at entry. Nearly half of the households (44 percent) had at least one member in RAIS in 2012, compared to only 9 percent of those who never left. It is also important to note that the share of households in groups 3 and 4 could have been higher without the restrictions to reenter BF imposed after 2016.[21]

Table 1: Characteristics of families in BF according to their degree of mobility

	1 **Stayed from 2012 to at least 2019**	**2** **Left BF once and did not come back until 2019**	**3** **Left BF once and came back once**	**4** **Left BF after second entry and did not come back until 2019**
Number of families	272,973	345,353	51,853	33,033
Share of families (%)	39	49	7	5
Family composition (%)				
Has children	87	78	88	86
Has small children	60	38	58	51
Area household (%)				
Rural	31	15	19	18
Urban	69	85	81	82
Size of municipality (%)				
Small	50	33	42	45
Middle	29	33	31	30
Large	21	34	27	25
Sex of household head (%)				
Male	8	13	6	8
Female	92	87	94	92
Education of household head (%)				
Illiterate	14	14	13	13
Primary or less	39	32	41	35
Middle school	27	26	28	26
Secondary	20	29	18	26
Tertiary	0	0	0	0
Labor market status of household head at entry (%)				
Has job	33	36	31	32
Has formal job (self-declared)	1	5	3	5

[21] Specific municipality quotas determine the allocation of families in the BF program. If families want to rejoin the program, they either need to join the waiting list or use the guaranteed return rule. If families leave the program voluntarily, they have a guaranteed return to the program for up to two years.

	1 Stayed from 2012 to at least 2019	2 Left BF once and did not come back until 2019	3 Left BF once and came back once	4 Left BF after second entry and did not come back until 2019

Source: Authors' elaboration based on Cadastro Único 2012–2020.

Table 2: Share of families with at least one member in RAIS

	All families	1 Stayed from 2012 to at least 2019	2 Left BF once and did not come back until 2019	3 Left BF once and came back once	4 Left BF after second entry and did not come back until 2019
Information at point of entry in 2012 (%)					
Head in RAIS	18	9	23	21	29
Other family member in RAIS	28	17	35	36	44
Information at point of first exit (%)					
Head in RAIS	30	—	31	25	35
Other family member in RAIS	41	—	41	38	48

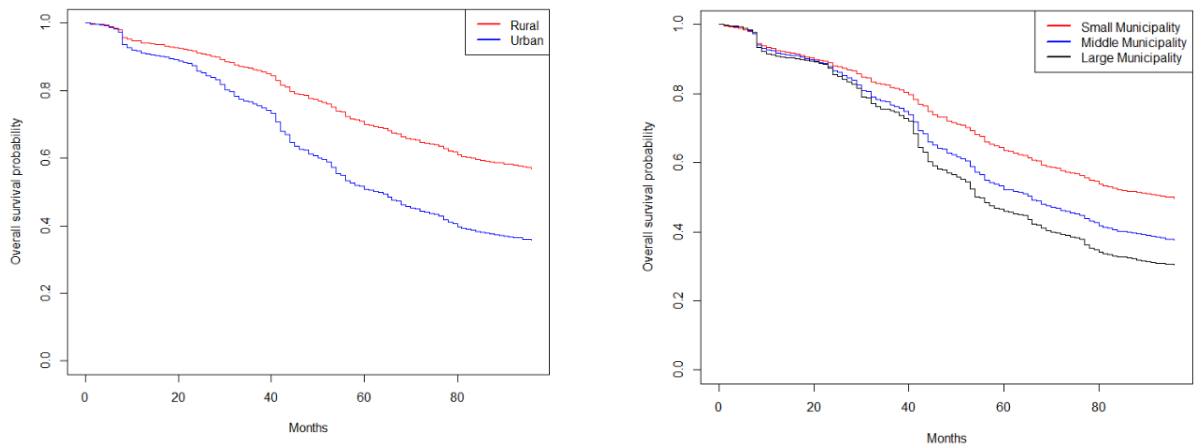
Source: Authors' elaboration based on *Cadastro Único* 2012–2020 and RAIS 2012–2019.

Geographic factors

BF beneficiaries in urban and in larger municipalities exhibit higher chances of exiting from the program during the observed period. Figure 14 charts (a) and (b) show, respectively, the probability of being in BF depending on rural or urban location and municipality size. The charts indicate that families living in rural areas and small municipalities stay longer in BF, which is likely associated with a different degree of labor market dynamism and opportunity.

Figure 14: Duration of stay in the program among households in different geographic locations

(a) Urban/rural *(b) Size of municipality*



Source: Authors.
Note: KM estimator applied to studied cohort of families, based on *Cadastro Único* and *Folha de Pagamento* BF data, 2012–2019.

7. Regression Analysis

Regression analysis confirms that all the abovementioned individual factors, independently of each other, affect the duration of stay in the program. Cox regression analysis[22] allows to isolate the impact of each household and individual-level factor (at the time of entry) on the duration of stay in the program of a family. Such analysis allows to confirm the results from the descriptive analysis in the previous section in a more rigorous way.[23]

All education levels of the household head, compared to being illiterate, increase the likelihood of leaving the BF program. In particular, secondary education completion increases likelihood by 35 percent and tertiary education (a very rare event) by 54 percent, controlling for other characteristics of the family and for geographic location.[24]

[22] Cox regression analysis determines the influence of several variables on survival time—in our case, the time a family stays in BF. For a more technical explanation, see appendix 1.
[23] The detailed regression outputs can be found in appendix 3. A positive coefficient, with statistical significance indicated by p value close to zero, is associated with an increased likelihood of leaving the program. A negative coefficient is interpreted as a lower chance of leaving the program over time.
[24] All education levels higher than 'illiterate' increase the likelihood of leaving the BF program. However, the share of household heads having tertiary education is very low: 0.1 percent of the whole sample. In comparison, a family with a household head that has completed secondary school has a 41 percent higher chance of leaving the program. Middle school education increases the probability of leaving by 21 percent, and primary education is still by 7 percent (Table 4).

Exit probability also increases with the age of the household head, especially above age 64. The likely reason is that households with elderly can transition to more generous social pensions or spousal pension and lose eligibility to BF.

As the number of children rises, the chance of leaving BF earlier falls. Compared to families with no children, those with one or two children have lower probability (40 percent) of leaving the program; this falls to minus 67 percent for families with three or four children, and minus 114 percent for five or more children. Note that this outcome is expected and desirable, as the program is meant to protect families with higher risk of poverty for longer. Families that have only older children between 12 and 17 years old at entry have a 45 percent higher chance of leaving the program compared to a family with no children.

Former employment status is a significant determinant of shorter duration in BF, but only if in a formal job. The regression results show that a household head in informal or formal self-employed work in the year of program entry (2012) has a no effect on the probability of leaving the program; however, if the person had a formal wage job in the same year of entry[25] (and this is likely before the month of entry), the probability of leaving the program, holding all other characteristics constant, increases by 59 percent.

Urban families, compared to rural, have a 38 percent higher chance of exiting the program, and so do families in middle and large municipalities, with 17 and 20 percent higher chances of leaving compared to those in small municipalities, respectively.[26]

[25] To capture prior formal labor market attachment, we cross *Cadastro Único* and RAIS data, so the formal job dummy also those who underdeclared their formal income (Table 3). However, they are at the same time most likely underreporting employment.

[26] When using both variables as an interaction term, the interaction between living in urban households and middle-size municipalities is as expected, increasing the probability of leaving by 14 percent. However, living in urban and large municipalities decreases the likelihood of leaving the program by 13 percent (Table 4).

Table 3: Cox regression results

Variable		N	Hazard ratio	p
Urban	Rural	21118	Reference	
	Urban	77531	1.46 (1.42, 1.49)	<0.001
Municipality Size	Small	39290	Reference	
	Middle	31096	1.19 (1.16, 1.21)	<0.001
	Large	28263	1.23 (1.20, 1.25)	<0.001
Number of children	No children	16040	Reference	
	1-2 children	67254	0.67 (0.65, 0.69)	<0.001
	3-4 children	13953	0.51 (0.49, 0.53)	<0.001
	4+ children	1402	0.32 (0.29, 0.35)	<0.001
Only children 12 - 17		98649	1.56 (1.52, 1.61)	<0.001
Family size		98649	1.12 (1.11, 1.13)	<0.001
HH head is female		98649	0.89 (0.86, 0.91)	<0.001
HH education	Illiterate	13763	Reference	
	Middle School	25806	1.21 (1.18, 1.25)	<0.001
	Primary or less	34764	1.08 (1.05, 1.10)	<0.001
	Secondary	24264	1.41 (1.37, 1.45)	<0.001
	Tertiary	52	1.71 (1.23, 2.38)	0.002
HH age	<18	3105	Reference	
	18 - 24	30533	0.95 (0.90, 1.00)	0.060
	25 - 34	34756	1.21 (1.15, 1.28)	<0.001
	35 - 44	16492	1.59 (1.50, 1.68)	<0.001
	45 - 54	8605	1.88 (1.77, 2.00)	<0.001
	55 - 65	4358	2.64 (2.47, 2.82)	<0.001
	65+	800	5.85 (5.34, 6.41)	<0.001
RAIS job		98649	1.80 (1.77, 1.84)	<0.001
Other job		98649	0.94 (0.92, 0.96)	<0.001

Source: Authors' elaboration based on *Cadastro Único* 2012–2019 and RAIS 2012–2019.
Note: All variables refer to household status at the time of entry. A coefficient (hazard ratio) greater than 1 and a p-value close to 0 corresponds to a shorter time in the BF program, whereas a hazard ratio smaller than 1 and a p-value close to 0 indicates being in the BF program for a longer time.

Changes in local employment also have a small positive effect on the average probability of exiting from BF. In addition to duration analysis, we use panel regression analysis to explore the causal impact of change in the level of local formal employment on the likelihood for a family to exit BF.[27] The regression shows that if formal employment grows by 10 percent in a municipality, the exit rate (share of families

[27] These findings are further illustrated in appendix 4 and based on fixed-effects regressions. They employ municipality as the unit of analysis. Fixed effects allow to isolate the effect of changes in the local labor market on changes in employment rates.

that leave the program) at the municipality level increases by 0.2 percentage points. This increase is statistically significant, but rather small, given that the mean exit rate is about 10.2 percent each semester.

Despite these results, the observable characteristics of the beneficiaries explain only a small portion of the variation on beneficiary household duration in the program. Appendix 1 shows the results of several simulations and overall indicates that just about half of the exit episodes could be predicted with the available data. This implies, for instance, that it is not possible to make robust predictions about the duration of stay of newly entered families with the current data. Moreover, the amount of variation in exit rates (random effects) that cannot be explained with the existing data about family characteristics at entry varies significantly by municipality. Municipalities with greater economic dynamism and higher overall formal labor markets tend to be those where greater variation occurs.

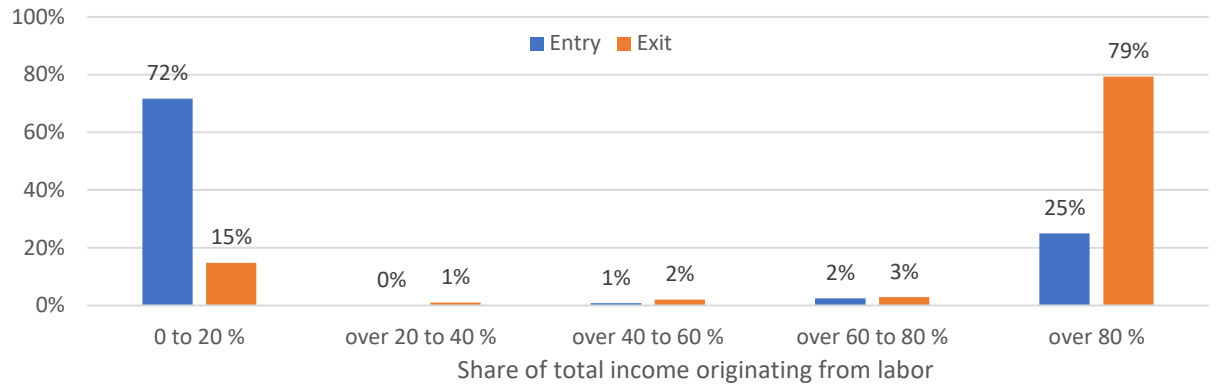
8. Income Dynamics and Duration of Stay

Overall, families experience an income increase at the time of exit, in most cases due to higher labor earnings and in a few cases from pensions. Average total income recorded in *Cadastro Único* at the time of exit is more than double the average total income at the time of entry (nominally and in real terms, Table 4 in appendix 1). In four out of five cases, such rise in incomes was due to a rise in labor income, both in absolute terms and as a share of total household income. Most families had little to no labor income at the time of entry in 2012, but for 79 percent of households who left the program in any year, labor income represented between 80 and 100 percent of family income. A minority of exits is associated with a steep rise in pensions (Figure 16). Other income sources recorded in *Cadastro Único* (donations, alimony, and unemployment insurance) do not play a significant role in total household income at exit.

About four out of five households that leave BF in the observed period experienced a rise in labor income. Three-quarters of the observed cohort of families had little to no labor income at the time of entry in 2012. This is in contrast with the situation at exit: among 79 percent of households who left the program in any year, labor income represented between 80 and 100 percent of family income (Figure 15). A minority of exits is associated with a steep rise in pensions.[28] Among the minority of households who exit the program with little labor income, the share of pensions increases significantly between entry and exit, from 10 percent at the point of entry to 58 percent at the exit point (Figure 16).

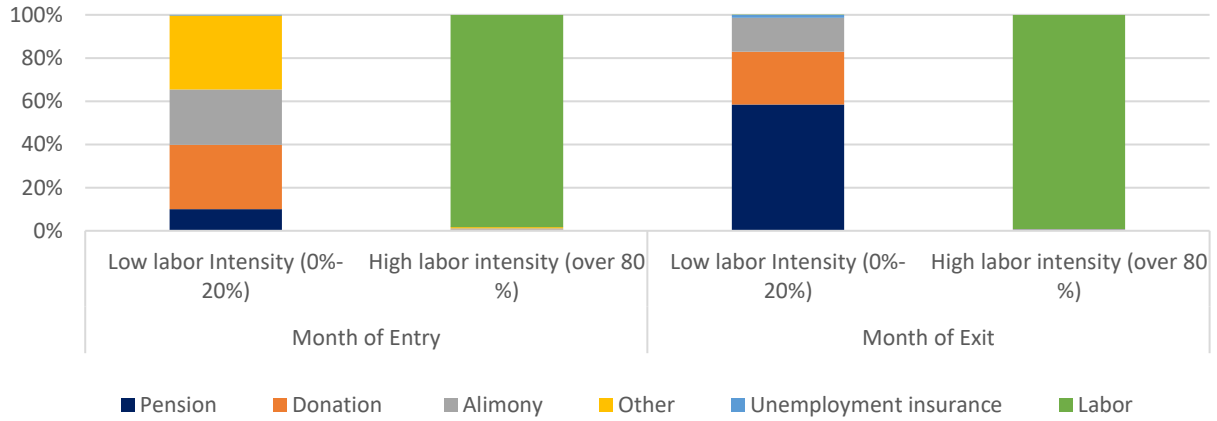
[28] Income sources other than labor in *Cadastro Único* include donations, alimony, unemployment insurance, and pensions.

Figure 15: Distribution of households in BF according to the share of their income from labor, at entry and at exit



Source: Authors' elaboration based on information on total family income in *Cadastro Único* and RAIS 2012–2020. *Note:* Labor income is computed as the sum of informal labor income from *Cadastro Único* and formal labor income (wages) from the RAIS data set for the same month and family members. Non-labor income derives from *Cadastro Único*. Total income is the sum of informal income, non-labor income, and formal income. Income at entry includes every household in our analytical sample, and at exit, only of families that left the program (first exit). Nominal values. All estimates exclude income from the BF transfer. Values computed for families reporting above zero income.

Figure 16 Share of income sources among families with low labor income and high labor income, at entry and at exit

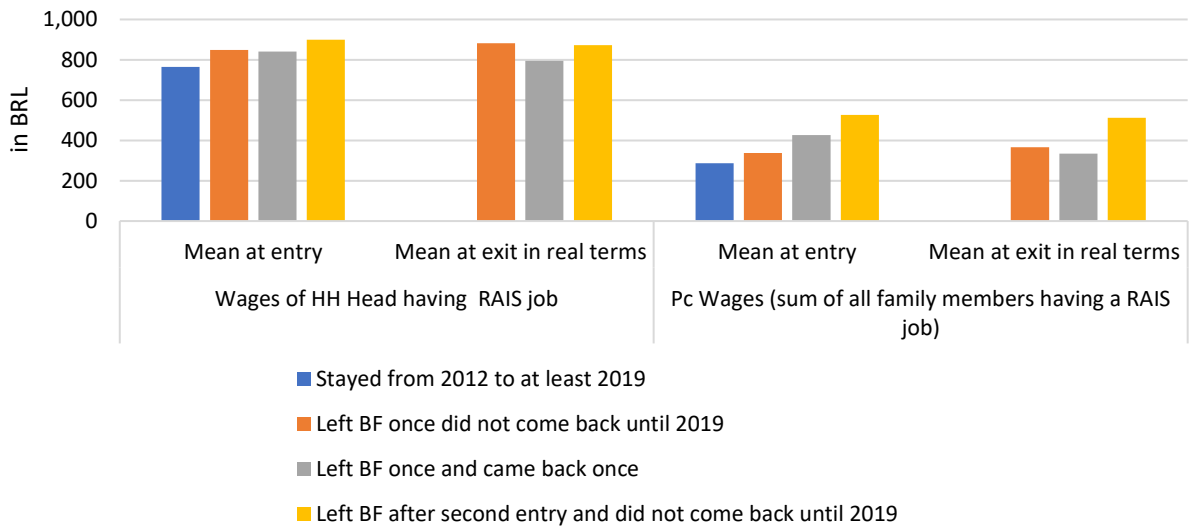


Source: Authors' elaboration based on information on total family income in *Cadastro Único* and RAIS 2012–2020. *Note:* Labor income is computed as the sum of informal labor income from *Cadastro Único* and formal labor income (wages) from the RAIS data set for the same month and family members. Non-labor income derives from *Cadastro Único*. Total income is the sum of informal income, non-labor income, and formal income. Income at entry includes every household in our analytical sample, and at exit, only of families that left the program (first exit). Nominal values. All estimates exclude income from the BF transfer. Values computed for families reporting above zero income.

Households with the highest wages at the time of entry are also more likely to exit permanently from the program. When looking at the change of average wages at the point of entry in BF and the point of

exit in BF, it stands out that wages decrease in real terms for cohorts (3) and (4). Those families that leave the program at some point and come back to the program later see a decrease in the family's per capita income through a formal dependent job (Consolidação das Leis de Trabalho - CLT job) by 22 and 3 percent, respectively. The cohort of individuals that leave the program forever, in turn, see an increase in wages. Here, the average per capita income of all family members having a RAIS job increases by 9 percent.

Figure 17 Mean Wages based on RAIS



Source: Authors' elaboration based on *Cadastro Único* 2012–2020 and RAIS 2012–2019.

9. Conclusions and Policy Implications

This study is based on a long-term analysis of the cohort of households that joined the BF program in 2011 and contributes to the literature that explores the causes of exit from cash transfers, which till date is almost entirely based on programs in high-income countries. The BF CCT exhibits a significant and heterogenous rate of churn and exit over time, with different types of families responding to program rules in different ways according to their characteristics at entry. **Exit from BF occurs mainly due to increases in detectable income per capita, which in most cases is represented by higher labor earnings: this underscores the centrality of the labor market as the main channel that lifts families out of social assistance in Brazil.** In addition, exit also occurs, less frequently, due to noncompliance with program conditionalities or because of natural increase in the age of family members, causing a loss in eligibility to child benefits or acquisition of pensions.

The characteristics of BF beneficiaries that are typically associated with the ability to seize labor market opportunities are all significant predictors of faster transition out of the BF program, even controlling for other demographic factors. These determinants include the education level of the household head, having a member with previous work experience in formal wage employment, and not being a caretaker of young children (with the duration of stay increasing with each additional child). The central role of individuals' labor market characteristics in explaining exit patterns of BF families has been observed also in social assistance programs in high-income countries (revised by Immervoll et al, 2015), whose duration tends to be lower than Brazil's. It is, however, notable that the Brazilian CCT displays similar patterns to programs in Europe, since BF was designed with a more explicit human capital development objective.

These findings underscore the importance of complementary supply-side interventions that build up employability and release labor force participation constraints of adult family members, largely women. For the majority of BF beneficiary households that have young children, access to childcare that relieves labor force participation constraints is a precondition for attending other labor market interventions and eventually for joining a formal wage job. To build up foundational human capital, targeted interventions that incentivize and support students toward the completion of formal secondary education (including the BF program itself) are of primary importance. For unemployed beneficiaries, programs that allow building a first experience of formal employment can reduce the risk of long-term stay on social assistance: these include targeted wage subsidies for employers and on-the-job training. A vast literature discusses the effectiveness of each of these programs and policies for Brazil's working poor.

Policies that stimulate labor demand for entry-level employment and that favor geographic mobility are also relevant in areas with limited economic dynamism. Beneficiary households living in urban and larger communities—characterized by greater chances of formal employment—exhibit greater dynamism, both in terms of likelihood to exit from safety nets and in terms of probability of entering and exiting more than once. As rural areas and small towns offer fewer formal work opportunities, mobility is generally lower. In such locations, BF is more likely to serve as a permanent income support system in addition to the low and informal income originating from rural activities. Changing this equilibrium would require local investments that can significantly improve formal labor demand or establishing support systems to facilitate relocation to areas with better wage work opportunities (transportation and relocation support). It is possible that programs that stimulate income in informal jobs or self-employment can also improve household welfare, but such effects cannot be detected with our data, and they would

have less impact on stay in BF due to the challenges the program continues to have in identifying self-employment income.

Finally, the analysis shows that, under the current design, the program tends to allow longer duration of stay for households with young children. This is a desirable outcome, and shows a certain ability of BF to balance stability objectives with the need to respond to transient poverty.

The dynamics displayed in this analysis are also in line with prior assessments that BF's de jure design led to low disincentives to take up formal work. Fietz et al. (2021) found that BF benefit formula generates very low marginal tax rates on earned labor income, which means that for most types of households, taking up a formal wage job pays significantly more than remaining in BF: our data corroborate this prediction and show that households with the capabilities to join the formal labor market do so and exit the program. Addressing beneficiaries' capabilities remains central to policies that aim to reduce reliance on safety nets. Importantly, this analysis was conducted over a period when the BF benefit level was relatively low compared to the minimum wage.[29]

The study also leaves many questions unanswered and for future research. First, the observable factors associated with exit are insufficient to predict exit time or likelihood, using a variety of predictive models. This shows how much remains unexplained about such processes. Greater investments in program-level monitoring and improving the quality of data about households at the time of registration could help improve the understanding of entry and exit dynamics. Third, our research does not control for program management practices, but these clearly also have an impact on exits, as shown by the peak in exits around 2016. More data on local-level implementation capacity and efforts, including on the communication and application of income disregards (*Regra de Permanencia*) would also provide a clearer picture. Finally, future studies could assess whether changes in program parameters would achieve even better the objective of granting long-term duration in the CCT for families with children, while encouraging faster exit for those without dependents.

[29] Note that this observation is valid for the period considered in this study; results could differ in 2023, since the program has much higher benefit levels relative to the minimum wage.

Appendix 1: Methodology and Technical Results

Sample selection and data

The study will make use of two administrative data sets: the social registry *Cadastro Único* and *RAIS*.

The analysis is built on a survival table, which records families' entry and exit characteristics. Due to data limitations, it cannot be ensured that selected families have not been in the program at a previous time and only reentered the program in 2012; however, cross-checks with the *Cadsatro Único* registration date have been performed. For the analysis, a sample of 15 percent of the families has been created.

Families are followed based on their family code (*Codigo Familiar*). In addition to the family code, the social identification number (Número de Identificação Social – NIS) of the individual has been followed. The procedure allows us to identify families that change their family codes or individuals leaving the program in a given family but coming back to BF in a different family.[30] Due to many possible ways of having an interrupted benefit payment (one month interruption, two-month suspension, legal appeals, and so on), we consider that a family left the program in a given year if it was not the recipient of any monthly payment in the next year. The month in which the family received its last payment is considered the exit date.

KM estimator

After presenting some general descriptive statistics, we use the KM method to calculate the probability of staying in the BF program. The KM estimator is a non-parametric estimator used for the survival function. The estimate is mostly used in the medical context, to evaluate the time of survival of patients after a certain treatment occurred (Goel, Khanna, and Kishore 2010). However, it can also be used in other setups. In the present case, the survival curve indicates the probability of being in the BF program after a certain time has passed. In addition, the survival probability for different subgroups—such as female- or male-headed households—will be estimated. For the above figures (Figure 12 and Figure 13), we consider the survival time for the first exit.

[30] About 24.4 percent of families in the sample have at least one family member that leaves the family and the BF program and comes back to the program. About one-quarter (6 percent of the overall sample) of those families leave as a complete family and come back as a family under a different family code.

Cox regression model

In a second step, we use Cox regression to estimate the effect of independent variables on the probability of staying in the BF program. Cox regression is a method of investigating the effect of one or more variables upon an event likely to happen. In our case, the event is 'stopped receiving BF benefits due to cancellation', and the variables of interest are families' characteristics that are provided at first registration in *Cadastro Único*.

The conventional Cox regression model is as follows:

$$\lambda(t) = \lambda_0(t)e^{X\beta}$$
$$b \sim G(0, \Sigma(\vartheta)), \tag{1}$$

where $\lambda_0(t)$ is an unspecified baseline hazard function and X are matrices for the independent variables in our case: whether a family lives in an urban area and the size of the municipality, the family size and composition, education levels and age of the household head, and indications whether the household had/has a (formal) job. β is the vector of coefficients.

After using conventional Cox regression (Model 1), the model is enhanced through mixed-effects Cox regression (Model 2). Mixed-effects Cox regression is based on the idea that observations are nested within some hierarchy. In the BF program, municipalities are responsible for many aspects of its administration, such as keeping the data up to date and making sure beneficiaries are compliant to conditionalities. In that sense, families are nested within municipalities. A conventional regression model (in this case the Cox proportional hazards model) is improved through the incorporation of random effect terms to account for within-cluster homogeneity in outcomes. Families in the same municipality therefore share a similar risk of leaving the program, conditional on the observable covariates. Therefore, with a mixed-effects model, we can also show, geographically, which municipalities have abnormal frailty levels, that is, municipalities that, conditional on the observable variables, may have unobservable characteristics that may drive families to depend more on the benefit—or less—when compared to the average. The mixed-effects Cox regression model is as follows:

$$\lambda(t) = \lambda_0(t)e^{X\beta+Zb}$$
$$b \sim G(0, \Sigma(\theta)), \tag{2}$$

where $\lambda_0(t)$ is an unspecified baseline hazard function. In addition to X, matrices for the independent variables, Z is added to the model, matrices for the random effects variables. While β is again the vector of coefficients, b is the vector of random effects coefficients. The random effects distribution G is modeled as Gaussian with mean zero and a variance matrix Σ, which in turn depends on a vector of parameters θ.

Exit prediction test

Statistical methods in some cases can use at-entry data to predict the probability of a family being in the program for particular periods (cutoffs). We tested several approaches and concluded that the available data are insufficient to produce well-performing predictive models. We test whether the socioeconomic information contained in *Cadastro Único* can forecast whether a family will be in the program after 12, 18, or 36 months and check the quality of predictions with observed exit rates**.** To predict the probability of being in the BF program after a certain time, a Probit regression model is used.

Probit model:

$$Pr(Y_i | x_i, w_i) = \Phi(x^0_i \beta + w_i^0 \delta), \quad (3)$$

where Y_i is a dummy variable with the value of 1 if the family is currently receiving BF and with the value of 0 if the family received BF in the past and left after 12, 18, or 36 months; x'_i is a vector of socioeconomic characteristics of the family and individual family members; and w'_i is a vector of employment characteristics of family members, for example, if employed in the formal labor market.

After predicting the probability of being in the program after a certain amount of time, the results are compared to the actual status of the families. The results indicate how well socioeconomic characteristics of families predict the time in the program. The prediction results based on *Cadastro Único* variables underline the need to improve the data quality of the social registry and possibly to include more information regarding the labor market context and the quality of program execution.

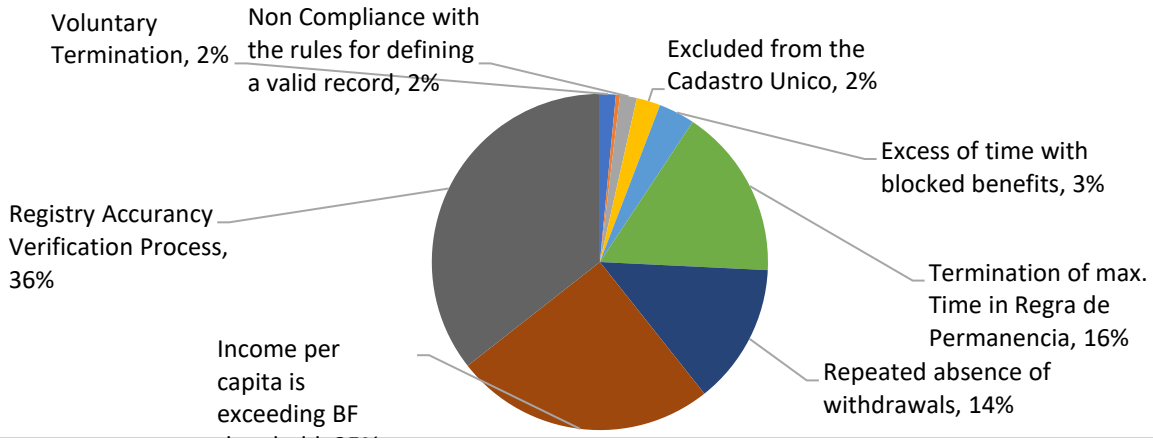
Table 4: Prediction results

Prediction of still being in the program	Correctly specified (%)
After 12 months	62
After 18 months	62
After 36 months	53

Source: Authors' elaboration based on *Cadastro Único* 2012–2019.

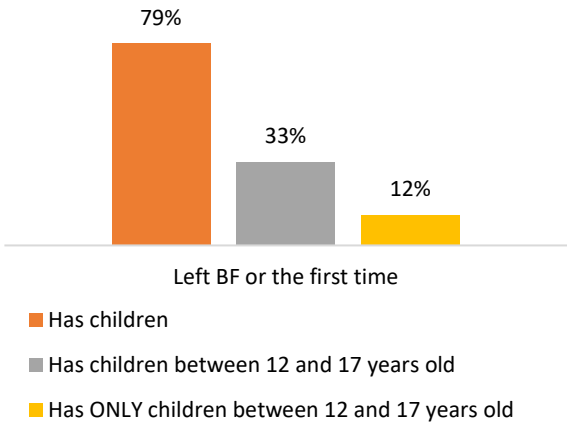
Appendix 2: Additional Tables and Charts

Figure 18: March 2016 to February 2017; top 99% of reasons



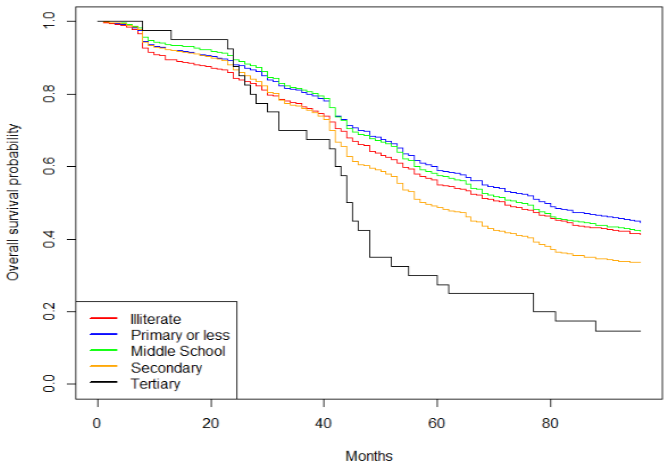
Source: Authors' elaboration based on administrative data on 'reasons for cancellations' of BF, Ministry of Citizenship extracted in 2020.
Note: The figure shows the aggregated exit reasons of *all* individuals leaving between March 2016 and February 2017 including those that were in BF before 2012 and entered after 2012. Therefore, the sample differs from the sample of this study.

Figure 19: Share of children at entry of exit families



Source: Authors' elaboration based on *Cadastro Único* 2012–2020.
Note: Sample is restricted to first-time exits.

Figure 20: Education level of household head and duration of stay in the program



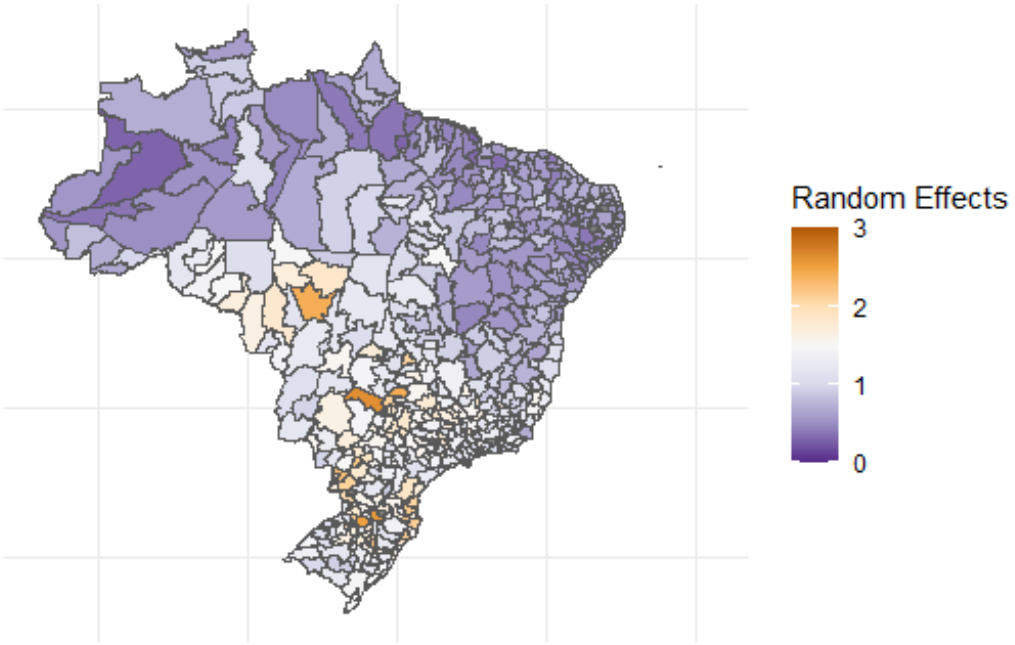
Source: Authors' elaboration based on *Cadastro Único* individual data 2012–2020.

Table 5: Mean time in the program by education level in months

Illiterate	59
Primary or less	62
Middle school	61
Upper secondary	55
Tertiary	39

Source: Authors' elaboration based on *Cadastro Único* 2012–2020.

Figure 21: Random effects distribution



Source: Authors' elaboration based on *Cadastro Único* 2012–2020.

Table 6: Total income and sources for sampled families at entry and at exit

	Non-labor income	Labor income	Total income
At entry - all families (p.c. mean BRL)	27	112	139
At (first) exit - (p.c. mean BRL)	54	263	318
At entry (%)	19	81	100
At exit (%)	17	83	100

Source: Authors' elaboration based on information on total family income in *Cadastro Único* and RAIS 2012–2020.

Note: Labor income is computed as the sum of informal labor income from *Cadastro Único* and formal labor income (wages) from the RAIS data set for the same month and family member. Non-labor income derives from *Cadastro Único*. Income at entry includes every household in our analytical sample, and at exit only of families that left the program (first exit). Nominal values. All estimates exclude income from the BF transfer. Incomes are often not updated when families leave the program, and labor income is corrected by including information from RAIS if applicable.

Table 7: Exit rates by per capita income

Income per capita	Share of families that left BF (%)
Below average	74
Above average	84

Source: Authors' elaboration based on *Cadastro Único* 2012–2020 and RAIS 2012.

Appendix 3: Cox Regression Results

Table 8: Cox Regression on the determinants of the duration of stay

	(1)	(2)	(3)	(4)	(5)
	coef	**Hazard ratio**	**se(coef)**	**z**	**p**
Urban	0.38	1.46	0.01	30.61	0.00
Middle-size municipality	0.17	1.19	0.01	16.30	0.00
Large-size municipality	0.20	1.23	0.01	18.43	0.00
Family has 1–2 children	−0.40	0.67	0.01	−28.06	0.00
Family has 3–4 children	−0.67	0.51	0.02	−32.62	0.00
Family has 5+ children	−1.14	0.32	0.04	−25.50	0.00
Family has only children between 12–17 years old	0.45	1.56	0.02	28.43	0.00
Family size	0.12	1.12	0.00	31.41	0.00
Family head is female	−0.12	0.89	0.01	−8.58	0.00
Head - primary education or less	0.19	1.21	0.01	13.14	0.00
Head - middle school education	0.07	1.08	0.01	5.32	0.00
Head - upper secondary education	0.35	1.41	0.01	23.58	0.00
Head - tertiary education	0.54	1.71	0.17	3.16	0.00
Head 18–24 years old	−0.05	0.95	0.03	−1.88	0.06
Head 24–34 years old	0.19	1.21	0.03	6.82	0.00
Head 35–44 years old	0.46	1.59	0.03	15.72	0.00
Head 45–54 years old	0.63	1.88	0.03	20.33	0.00
Head 55–64 years old	0.97	2.64	0.03	28.84	0.00
Head 65+ years old	1.77	5.85	0.05	37.88	0.00
Head has a job different from formal dependent (based on CadUnico registry)	−0.06	0.94	0.01	−6.93	0.00
Head has a formal dependent job (based on RAIS registry)	0.59	1.80	0.01	55.07	0.00
N: 98,649					

Source: Authors' elaboration based on *Cadastro Único* 2012–2019 and RAIS 2012–2019.

Note: All variables refer to household status at the time of entry. A positive coefficient, with statistical significance indicated by p value close to zero, is associated with an increased likelihood of leaving the program. A negative coefficient is interpreted as a lower chance of leaving the program over time. Column (2) shows the hazard ratio of the corresponding variable. A hazard ratio greater than 1 corresponds to a shorter time in the BF program, whereas a hazard ratio lower than 1 indicates being for a longer time in the BF program. In classical survival analysis, a hazard ratio greater than 1 is called a bad prognostic factor since survival time is shorter. Accordingly, a hazard ratio lower than 1 is called a good prognostic factor since survival time is longer. In the present case however, the interpretation

is reverse since a good prognostic factor is associated with leaving the program earlier; hence, having hazard ratio lower than 1 is good.

Appendix 4: Panel Data Analysis

In a separate follow-up study, the authors apply panel data analysis to isolate the effect of employment growth on exit rates and probabilities at the municipal level.

$$Y_{\tau t} = \beta_1 EmploymentGrowth_{\tau\, t-1} + \alpha_i + p_t + u_{\tau t}, (1)$$

where Y_t is the dependent variable, the exit rate of BF in municipality τ at time t. Our variable of interest is $EmploymentGrowth_{\tau t-1}$ and is defined as the change in the total number of jobs links in municipality τ and semester $t - 1$. This information is obtained using RAIS data. The model controls for time and municipality fixed effects, and standard errors are clustered at the municipality level.

A methodological challenge relates to potential reverse causality, namely that the changes in coverage of BF cash transfers might affect levels of formal local employment through local multipliers effect (Gerard, Naritomi, and Silva 2021). While at the national level, the number of beneficiary families remained more or less stable in our observation period (in December 2012, 13.9 million families were registered in BF compared to 13.2 million families in December 2019), we do observe variation at the local level, which might cause biases in our results (Ministerio da Cidadania 2022). It can be assumed that the potential reverse causality lowers our baseline ordinary least squares (OLS) effects.

To deal with this challenge, we propose a shift-share instrument as used in Bartik (1991). The idea behind the instrument is to interact the local industry employment shares with the national industry employment growth rates. The instrument can be expressed as follows:

$$EmploymentGrowth_{\tau t} = \beta_0 + \beta_1 \sum_i z_{i\tau t-1}\, g_{it}, (2)$$

where $z_{i\tau t-1}$ is the share of employment in industry i in municipality τ in the previous period and g_i is the national growth rate of employment in industry i. We follow Borusyak, Hull, and Jaravel (2022) and assume the shifters to be exogenous. Further tests for this shift exogeneity will be presented in the forthcoming work.

Table 9 shows the first results of the analysis. As expected, the baseline results of the OLS are positive but insignificant. Turning to the instrumental variable, the instrument is significant and has a sufficiently high F-statistic (79.4). The results of the second stage indicate that we have a small but positive and significant increase in exit rates when employment grows. If employment grows by 10 percent, the exit rate at the

municipality increases by 0.2 percentage points. Given a mean exit rate of 10.2 percent, this increase is rather small.

Table 9: Panel data analysis at the municipality level

	Basic model	**First stage instrumental variable approach**	**Second stage instrumental variable approach**
Dependent variable	**Exit rates**	**Employment growth**	**Exit rates**
Employment growth_t-1	0.0000444		0.0201*
	0.0011		0.0086
Shift-share instrument		0.928***	
		0.1042	
N	71,697	71,697	71,697
F-statistic		79.4	

Note: Robust Standard errors in parenthesis
* p<0.05, ** p<0.01, *** p<0.001"

The forthcoming work by the authors will look at the individual probability of exit as well as how far employment increase influences the changes to find formal dependent employment in Brazil.

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