Development Chutes and Ladders:
A Joint Impact Evaluation of Asset and Cash Transfers in Brazil

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Abstract

Land reforms provide large transfers of assets that enable households to increase investments in agriculture, but they can also lead to increases in human capital. Similarly, conditional cash transfers incentivize human capital investments, but they can also increase productive investments in agriculture. Thus, both programs have direct and indirect effects and may even complement each other, as land reforms provide productive assets that increase the returns to investments while cash transfers provide liquidity that make investments possible. In contrast, the goals of each program may conflict as they compete for scarce household resources. This paper jointly analyzes a recent land reform program and conditional cash transfer in Brazil in order to test for independent and joint treatment effects. Although neither program increases total monthly per capita income levels, the land reform increases agricultural asset holdings while the conditional cash transfer reduces some agricultural investments. Joint participation leads to a more balanced investment strategy, although it forces households to concentrate labor in own farm production rather than nonfarm employment. Collectively, this suggests that participation in both programs enables households to follow pluriactive pathways with broad investment strategies that may provide future financial gains and greater freedom.

Introduction

There are a variety of factors causing individuals to fall into and remain in poverty. While there is a tendency for researchers and policy makers to search for *the* cause and solution to poverty, no single program has yet to universally

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reduce poverty across households. Some individuals are liquidity constrained and require access to credit in order to undertake productive investments that increase long-term well-being. In contrast, those households lacking the productive assets that enable high return investments will benefit from asset transfers. In the context of multiple market failures, cash cannot necessarily be used to purchase land and land cannot always be leveraged into credit, resulting in a need for multiple policy interventions. As a result, programs need to be evaluated in terms of their explicit goals - whether increasing educational and health outcomes, investments, or securing property rights - as well as additional indirect outcomes and interactions with other programs. Programs can also have unintended consequences and, by conducting evaluations in isolation, we fail to recognize the important interactions between programs that can improve targeting and efficiency with vital results for the poor. This paper argues that individual programs may fail to overcome the various "chutes" into poverty - specifically a lack of productive assets and insufficient liquidity - and that their implementation should consider the various development "ladders" available to households - including both agricultural and nonfarm pathways.

Focusing on household investment decisions, economic activities, and income levels, this paper provides a joint analysis of Brazil's *Programa Nacional de Crédito Fundiário* (the National Program of Land Credit or the Land Credit), a market-assisted land reform program (MALR), and *Bolsa Família* (Bolsa), a conditional cash transfer (CCT) program targeting poor households. While land reforms are expected to increase many agricultural outcomes, they can also enable children to increase school attendance. Similarly, conditional cash transfers subsidize human capital investments, but may also be used to increase productive investments. This paper argues that asset and cash transfers can either reinforce each other - since asset transfers provide land that encourages investment while cash transfers provide liquidity that enables investment - or compete for scarce household resources - since households must balance both investments and labor across different activities. These programs can create synergies in either agricultural or human capital investments, depending on the potential returns in either sector, and it remains an empirical issue to evaluate how households respond. Furthermore, given that land reforms have been criticized for providing insufficient benefits and CCTs have been criticized for prioritizing educational investments without alleviating current poverty, the joint implementation of both programs may improve outcomes by reducing present and future poverty while building more viable rural communities.

This paper finds that the Land Credit increases many agricultural outcomes, Bolsa reduces participation in several agricultural activities, and households in both programs make balanced investments in agricultural and human capital. Unfortunately, however, neither program can be proven to increase income. Specifically, the Land Credit increases land ownership, animal ownership, agricultural assets, and participation in agricultural production. Bolsa households have a lower probability of entering land ownership and they have lower levels of forest production.

Although CCTs can be utilized to increase agricultural investments, this does not occur in Brazil. Households in both programs have a lower likelihood of earning income from either paid labor or nonfarm employment. This is likely to occur when access to land increases the returns to agricultural production while participation in Bolsa reduces the availability of child labor, which causes adults to work in household agricultural production rather than nonfarm employment in particular. Although increases in income would be expected after four years in the Land Credit program, if households are able to maintain income levels while investing in both agricultural and human capital, then this is a positive outcome that is likely to provide future benefits. Furthermore, land ownership increases the independence of beneficiaries and, with new opportunities in both agriculture and labor resulting from joint participation in both programs, households may obtain the freedom to choose their own pathways. According to Sen [2000], this freedom signifies true development.

Tests are also conducted for robustness and heterogeneous treatment effects. The primary results are robust across several different specifications that restrict the sample to lower income households, control for attrition, and redefine eligibility in order to alleviate concerns with the identification strategy. Possible heterogeneity is evaluated by interacting treatment effects with several baseline characteristics and there is some evidence of heterogeneity. For example, female Land Credit beneficiaries have significantly lower gains in agricultural production, Bolsa beneficiaries in urban zones are less likely to increase agricultural production, and Bolsa transfers enable households that already own some land at the baseline to increase their land holdings.

This paper utilizes a data set collected to evaluate the Land Credit program. A baseline survey was completed in 2006 that targeted recent beneficiaries and developed a control group of households that had applied to the program and been approved for participation, but had not yet received land. A follow-up survey was conducted in 2010. For the joint impact evaluation, thresholds in Bolsa regulations are used to define eligible and non-eligible households. When combined, the households are classified as either participating in both programs, only one program, or neither program.

Northeastern Brazil provides an excellent context in which to analyze these issues since rural poverty remains a major problem and there is a long history of state-led development projects that, if further improved, can provide significant gains for the region. In Brazil, the agricultural sector has experienced remarkable growth in recent decades, however this overall growth is driven by large farms and masks the struggles of small farmers, many of whom are in drought-troubled semi-arid zones in the North and Northeast (Helfand, 2004). In addition to over 700,000 families being forced to leave their land in the 1990s (World Bank, 2003), labor saving technologies have reduced agricultural employment opportunities (Baer, 2008). Despite these problems, rural poverty declined by 11 percent in the 1990s as a result of increasing incomes from diverse sources, including social security transfers and

migration, which had a small but significant impact (Helfand and Levine, 2006). However, despite this reduction, rural poverty persists as a major challenge for Northeastern Brazil and poverty levels remain at 70 percent as of the year 2000 (Jonasson and Helfand, 2010). Given this climate of landlessness and rural poverty, since 1995 approximately 1.5 million families participated in land reforms throughout Brazil (Navarro, 2009) and Bolsa has grown into an important national program. However, given the persistence of poverty, evaluations are required to help improve the effectiveness of these programs.

There is a long history of state-led development projects in Northeastern Brazil. Historically, the state has used a combination of public investment, subsidized credit, transfers, and government employment to support the Northeast, and this has helped maintain some regional equity throughout Brazil (Gomes and Vergolino, 1995). In semi-arid areas of the Northeast, small farmers primarily plant domestic staples, such as maize, beans, and manioc, while farmers with access to irrigation are sometimes able to plant cash crops including cashews, cotton, fruits, and vegetables (Sietz et al., 2006). Baer [2008] notes that the state maintains an important role in the Northeast but that state investments have not increased productivity and have, instead, created a dependence on transfers. Overall, this suggests that both land reforms and CCTs are, and will continue to be, important rural development policies in the Northeast. In order to break the Northeast's dependency on transfers, these programs should be evaluated with respect to their ability to break poverty traps by enabling productive investments with long-term benefits.

Crucially, there are indications that the Northeast, which has outgrown the rest of Brazil in the last decade, is becoming a more dynamic region that is scrambling to fill new jobs with trained workers (The Economist, 2011b). The Northeast has the lowest percentage of nonfarm employment in Brazil, given that only 25 percent of households list nonagricultural jobs as their principle occupations, but Jonasson and Helfand [2010] note that, in contrast to earlier research by Graziano da Silva and del Grossi [2001], this indicates that nonfarm income is becoming increasingly important.[1] Access to nonfarm employment and earnings are determined by both supply- and demand-side factors, and educational attainment increases both access to high return nonfarm opportunities as well as the earnings from these positions (Jonasson and Helfand, 2010). Verner [2005] shows that returns to education are highly heterogeneous throughout the Northeast, that nonfarm incomes are higher than agricultural returns, and that job creation has occurred, but that many of these jobs are informal. Given the potential returns to education, it is likely that Bolsa transfers will encourage many households to send their children to school (Cardoso and Souza, 2004; Melo and Duarte, 2010; de Janvry et al., 2012) and, depending on the availability of jobs, these investments in education may provide large future returns.

[1] This parallels trends in other developing nations, where nonfarm income can comprise approximately 40 percent of household income in many rural areas (Reardon et al., 2001; Barham et al., 2011).

Interactions Between Asset and Cash Transfers

In general, we expect the Land Credit to improve agricultural outcomes and Bolsa to increase human capital investments, but alternative possibilities exist. Given the increasing importance of nonfarm earnings in Northeastern Brazil, households may prioritize human capital investments. However, given that all households in the sample applied to the Land Credit, thus expressing an interest in agricultural production, they may be more inclined to invest in agriculture than the general population. In a pluriactive context, multiple programs remain necessary and many households will choose to invest in both agricultural and human capital.

These programs can either complement each other or force households to further balance the allocation of scare resources such as labor and income. First, these programs may be complementary with regards to agricultural investments because, while land reforms can increase household welfare, they may also require additional access to credit, insurance, technical assistance, and other provisions. Because the need for land reform in Brazil is driven, in part, by changes to the terms of trade that hurt small farmers and force many to leave their land (Baer, 2008), simply providing land will not end the rural exodus without remedying these problems. The addition of regular cash transfers to agricultural households can enable farmers to overcome both liquidity and insurance constraints by providing cash and a secure baseline income.[2] If the programs are complementary, joint access to land and cash transfers can enable households to increase agricultural investments and become more likely to escape poverty via an agricultural pathway. When combined, cash transfer programs can unlock the potential of land reform programs, and land reform programs can multiply the impact of cash transfer programs.

This complementary impact is more likely to occur in the context of multiple market failures, where access to liquidity may not allow households to purchase land and access to credit is limited, even when land ownership could serve as collateral. CCTs are expected to increase educational and health outcomes,[3] but recent research suggests that they can also provide the liquidity (and stable income) necessary for productive investments. This occurs in Mexico, where Gertler et al. [2012] find that *Oportunidades* increases agricultural investments, and in South Africa, where Lovo [2011] finds similar impacts for an unconditional cash transfer. In this context, joint participation in both programs should increase agricultural investments beyond the impact of the Land Credit alone, since these households obtain productive assets and the liquidity necessary to increase investments.

[2] Cash transfers can enable investments by either providing liquidity or, by receiving a secure monthly payment, overcoming insurance constraints (Gertler et al., 2012). Bianchi and Bobba [2011] argue that investments respond most to the alleviation of insurance rather than liquidity constraints. Dercon and Christiaensen [2011] develop an explicit model of credit and insurance constraints to analyze how households may respond to both of these factors while making agricultural investment decisions. Without accurate measures of risk in the data, this paper does not differentiate these impacts.

[3] The direct impact of conditional cash transfers on outcomes such as child health, nutrition, and educational attainment are well established. For example, see Hoddinott and Skoufias [2004], Behrman and Hoddinott [2005], Rawlings and Rubio [2005], and Parker et al. [2008].

Second, land reforms and CCTs may be complementary with respect to human capital investments. While CCTs subsidize school attendance, land ownership can provide a stable asset and income base that enables households to better cope with reduced child labor. Research suggests that some land reform beneficiaries choose to invest in human capital, even at the expense of agriculture (Deininger et al., 2008), and the ownership of small amounts of land can allow households to maintain school attendance during negative shocks (Conning et al., 2001). Winters and Chiodi [2011] find that households transition from agricultural to nonfarm employment as human capital increases, but that the magnitude of these transitions depends on household asset levels. This suggests that, even if land reforms fail to increase the standard agricultural indicators of success, they may provide households with important indirect benefits.

A third possibility also exists in which, rather than complementing each other, land reforms and CCTs cause households to further balance the allocation of scarce resources. For example, households must choose how to balance both adult and child labor across various activities. The Land Credit increases the returns to agricultural labor and may, as a result, pull adult labor away from nonfarm employment and child labor away from school. In contrast, Bolsa provides payments for school attendance and, as a result, may reduce child labor.[4] Davis et al. [2005] find evidence that *Oportunidades* provides a larger increase in health and nutritional outcomes for households that do not simultaneously receive PROCAMPO transfers, an agricultural cash transfer program, possibly because of the higher shadow price of time for agricultural households. In this context, by providing access to land, households may become less likely to meet Bolsa conditionalities. However, those households that do receive land and send their children to school are likely to pull adult labor away from nonfarm employment in order to work on the farm. This indicates that these households invest both in agriculture and education, but are forced to transfer adult labor into agricultural production and, as a result, the impact on current income is ambiguous.

In this context, it is expected that the Land Credit will increase agricultural outcomes, that Bolsa will increase educational outcomes, and that joint participation in both programs will allow households to invest in both agricultural and human capital - although both at lower levels than in the presence of complementarities - while shifting labor from nonfarm employment to agricultural production. Rather than joint participation increasing agricultural investments, total agricultural investments may even decline with joint participation white the impact on current nonfarm labor is likely to be negative.

[4] Although school and child labor must compete for some portion of a child's time, de Janvry et al. [2006] argue that they are not necessarily in conflict since children can both attend school and still work during the same day. Ravallion and Wodon [2001] analyze a school subsidy in rural Bangladesh and find that subsidies increase schooling by significantly more than they reduce child labor, thus indicating that school and child labor are not direct substitutes since leisure can also be changed. A similar finding is provided by Skoufias and Parker [2001], who show that *Oportunidades* increases school attendance by more than child labor declines, particularly among girls who tend to work in domestic jobs that can more easily be combined with schooling.

In addition, joint access to land reforms and CCTs provides an interesting context in which to evaluate how households respond to these programs based on the gender of the recipient. Many recent land reforms, including the Land Credit program and a similar program in South Africa, target female headed households but females remain far less likely to own land (Deere and León, 2003; FAO, 2011). CCTs frequently target transfers to mothers due to evidence that mothers spend more on children. In particular, Thomas [1990] uses data from Brazil to argue that unearned income controlled by women has a much larger impact on child health than similar income controlled by men. Similarly, Duflo [2003] finds that pension payments transferred to grandmothers have significant impacts on child health outcomes among girls but that no effect exists for transfers to grandfathers. However, recent studies suggest that credit access may benefit male more than female business owners (de Mel et al., 2008; Banerjee et al., 2010) and that credit access may only benefit females who are already earning relatively higher incomes (Fafchamps et al., 2012). By evaluating treatment effects interacted with the gender of the beneficiary, we are able to test whether or not gender determines the impact of either access to assets or cash. This paper finds that, overall, males and females respond similarly to the programs although females may still face discrimination in agricultural production. In addition, tests are conducted for differential impacts based on location, baseline assets, migration, and other factors.

Surprisingly, joint impact evaluations are not common in the literature, although several papers have compared conditional cash transfers tied to human capital investment (*Oportunidades*) and cash transfers targeting agricultural producers (PROCAMPO) in Mexico. Todd et al. [2010], in evaluating households with potential access to both of these cash transfers, find evidence that *Oportunidades* increases several agricultural outcomes including land use, livestock ownership, and crop spending (as in Gertler et al., 2012) and that *Oportunidades* and PROCAMPO are complementary in some cases but not others. Ruiz-Arranz et al. [2006] find that both programs increase food security at similar levels, although this occurs through either increased food purchases from *Oportunidades* or increased home production from PROCAMPO households. It is also possible that agricultural households face higher shadow prices of time and, as a result less likely to meet conditionalities Davis et al. [2005].

Winters and Davis [2009] argue that agricultural programs (including PROCAMPO) tend to benefit wealthier households while social programs target poorer households and focus on human capital investment with long-term gains, thus indicating the need for policies that target poorer agricultural households with immediate benefits. With these concerns, Handa and Davis [2006] argue that CCTs should be better designed to reduce current poverty in addition to targeting future poverty reductions. This paper provides an analysis of these issues in the context of Brazil by evaluating programs that transfer assets and cash, thus attempting to create many short- and long-term gains. Whereas other similar joint impact evaluations have only analyzed cash transfers (both educational and

agricultural) this paper evaluates an asset transfer alongside a CCT, which create new opportunities for investment in both agricultural and human capital.

This research provides several contributions to the literature. First, it provides a joint impact evaluation of two major policy interventions. There are surprisingly few joint impact evaluations and future research should emphasize the interactions between programs to test the need for multiple policy interventions. Second, the identification strategy combines a standard treatment and control analysis of the Land Credit while using discontinuities in Bolsa eligibility to conduct the joint analysis. This illustrates how joint impact evaluations can be conducted using existing data sets. Third, this paper extends the gender-based research to analyze how male and female beneficiaries respond to access to not only cash transfers but also productive assets. Finally, the existing literature on joint evaluations focuses heavily on Mexico, where evaluations of educational (*Oportunidades*) and agricultural (PROCAMPO) cash transfers have been conducted.[5] This paper extends this literature to Brazil, which is a world leader in both land reform and CCTs and enables verification of these key findings, and, rather than focusing on two types of cash transfers, evaluates how household behavior changes as they gain access to both productive assets and cash transfers.

The structure of the paper is as follows: the next section frames this research in the literature on poverty traps, land reforms, CCTs, and credit access; the programs and data are described; the joint impact evaluation is developed and implemented; and the final section concludes.

Literature Review

Poverty trap models define contexts in which certain households, based on their economic environment and initial circumstances, remain stuck in poverty while households with more favorable circumstances can transition to higher income levels. Poverty traps can inhibit agricultural investments (Dercon, 1998; Lybbert et al., 2004; Carter and Barrett, 2006), human capital investments (Basu and Van, 1998; Emerson and Souza, 2003; Das, 2007), entry into entrepreneurship (Buera, 2009), and the growth of existing firms (de Mel et al., 2008; Banerjee and Duflo, 2008). Overall, this literature suggests that households may be stuck in poverty due to either a lack of access to capital or a lack of productive assets.

Many poverty trap models are driven by incomplete credit markets since, without access to credit, households cannot undertake productive investments, even in cases where the expected returns are sufficiently large to repay

[5] Joint impact evaluations in Mexico, which are further evaluated in the next section, focus on either agricultural production (Todd et al., 2010) or food security and health outcomes (Davis et al., 2005; Ruiz-Arranz et al., 2006).

loans and enable households to enter new, higher return, economic activities. Barrett et al. [2008] argue that many agricultural households can escape poverty with the benefit of a capital transfer and that programs may be most efficient if they target households close to the threshold separating poor from nonpoor households. With respect to firms, de Mel et al. [2008] randomly provide credit to businesses in Sri Lanka to show that many small and medium sized firms are credit constrained while Banerjee and Duflo [2008] show that many firms are credit constrained in India. With access to credit, these firms make productive investments that pay off at high returns.

In the context of missing credit markets, cash transfer programs may ease liquidity constraints and enable households to undertake productive investments, thus providing an indirect program benefit. For example, *Oportunidades* increases agricultural investment and income since households invest about 26 percent of their transfers and consume the rest (Gertler et al., 2012).[6] In a separate evaluation of *Oportunidades*, Todd et al. [2010] find that transfers increase food production and agricultural investments, particularly among households that simultaneously receive additional PROCAMPO payments targeted for agricultural households. PROCAMPO transfers have been shown to have a large multiplier effect among households with sufficient assets, as medium and large farms use transfers to increase productive investments (Sadoulet et al., 2001). Given that CCTs are received only when children attend school, it is possible that a large portion of the transfers compensate for lost labor earnings and, in some cases, do not increase liquidity.

An unconditional cash transfer program in South Africa has been found to increase technical efficiency (Lovo, 2011), to increase nutritional status among girls (Duflo, 2003), to increase schooling while reducing child labor (Edmonds, 2006), and to increase adult labor by enabling costly migration (Ardington et al., 2009).[7] Several of these papers utilize an age discontinuity in transfer eligibility to conduct impact evaluations and this method is employed in the analysis of Bolsa transfers.

In addition to insufficient liquidity driving poverty, many households remain poor because they either lack productive assets or their assets have insufficient returns to spur investments in higher return activities. As illustrated in Fitz [2013b], access to cash enables households to increase investments and overcome poverty traps, but only among those households with sufficiently productive assets. This may be the reason that, although cash transfers

[6] Gertler et al. (2012) note that cash transfers can enable investments by either reducing credit constraints or by enabling risky investments since a baseline income level is ensured by the CCT program. Bianchi and Bobba [2011] argue that entrepreneurship is more responsive to future transfers than previous transfers and that this suggests that households are more constrained by the lack of insurance than the lack of credit. However, while it may be that guaranteed future income can enable investment (Bianchi and Bobba, 2011), doubt about future income can also increase savings and investment. Ravallion and Chen [2005] analyze China's Southwest Poverty Reduction Project, which provided large cash transfers, and find that households preferred to save rather than consume the gains due to perceived doubts about whether or not the program would persist. Thus, there is conflicting evidence about how the probability of future payments can impact current consumption, investment, and savings, but recent research suggests that cash transfers can increase investment, in part through the alleviation of liquidity constraints.

[7] Additional research suggests that the program targets poor households (Case and Deaton, 1998) and reduces adult labor supply (Bertrand et al., 2003).

increase agricultural investments in Mexico (Gertler et al., 2012), they do not do so in Nicaragua (Maluccio, 2010). Banerjee et al. [2010] show that microcredit increases investment among certain households with the ability to start microenterprises while other households do not utilize loans to begin businesses and instead increase consumption. In an analysis of a credit program in Thailand, Nelson [2011] finds similar evidence that access to credit enables households at specific wealth levels to become entrepreneurs. This suggests that liquidity constraints do not impede all poor households from escaping poverty and, instead, many remain poor because they lack productive assets and are not able to invest even with access to cash. Thus, further evidence is required to better identify the contexts in which access to cash will spur increased investments and long-term gains.

Combining these two causes of poverty, we can conclude that programs that provide the potential to earn income but fail to provide sufficient credit ultimately may prove to be unsuccessful. This applies to land reforms, which may provide access to land but, without sufficient credit support, may not enable many households to escape poverty. In Honduras and Nicaragua, Boucher et al. [2005] find evidence that market liberalization policies increased land titling, but that, even with secure titles, access to credit did not follow. Barham et al. [1996] show that many small producers in Guatemala are credit constrained and argue that government intervention may be required to overcome credit market failures. In these contexts, creating new small farms will not ensure their survival without additional help. In an evaluation of the Land Credit, the World Bank argues that recent land reform beneficiaries will be successful in areas with sufficient land quality, water access, and proximity to markets, so long as they are able to obtain technical assistance and credit (World Bank, 2009).

Overall, the core argument explored here is that poverty is often caused by either a lack of credit or productive assets. In contexts of multiple market failures, access to both assets and cash are necessary. Importantly, assets and cash are often non-fungible since land may not be leveraged into credit and land market failures often impede households from purchasing land even with credit.[8] As a result, households that benefit from land transfers and obtain secure and regular cash flows may achieve increased benefits compared to households with access to either land or cash but not both. Because of the presence of sustained, broad-scale programs offering both land and liquidity support, the Brazilian context provides an excellent opportunity to evaluate these issues.

The multiple asset poverty trap model developed in Fitz [2013b] suggests that households will invest more in human capital rather than agriculture if there are larger potential earnings in nonfarm labor than agricultural production. With limited capital access, households must optimally allocate income across consumption and investment in either agricultural or human capital and households are more likely to invest in human capital if sufficient employment opportunities exist. Given the increasing importance of nonfarm income in Northeastern Brazil and the continual

[8] Carter and Salgado [2001] provide evidence that land sales markets do not benefit the poor while rental markets are more likely to.

challenges facing family farms, especially in semi-arid regions, it is possible that households that obtain land and regular Bolsa transfers may, rather than using the additional cash to invest in agriculture, choose to invest further in human capital.

Overall, many households remain poor because they lack either productive assets, crash, or both. Since land reforms can provide immediate gains while CCTs encourage human capital investments that may not provide immediate financial returns, a combination of both programs can serve to create better educational attainment and greater agricultural investments that produce more vibrant rural communities with short- and long-term gains. By providing a context to evaluate households at the crux of these transitions - households with new opportunities to invest in agricultural assets, human capital, or even both simultaneously - the joint analysis provides an excellent opportunity to study these issues. In addition to these investment decisions, we will analyze whether or not income measures suggest that households have profited from these investments.

By analyzing transitions from 2006 to 2010, it should be possible to identify whether or not benefits have accrued. Keswell and Carter [2011] find significant gains three to four years following a land reform, Gertler et al. [2012] show that CCTs lead to increases in agricultural investments after only 18 months, and de Janvry et al. [2012] show that Bolsa reduces dropout rates in response to many short-term factors. This indicates that Bolsa transfers and the receipt of land are likely to produce many significant impacts within this time frame, although it is also likely that many impacts will continue to evolve through time.

Policy Interventions

The *Programa Nacional de Crédito Fundiário* (Land Credit) was implemented in 2002 as the largest and most recent iteration of MALR in Brazil and, by 2008, it had settled over 40,000 families (World Bank, 2009). In addition to a separate subdivision that assists existing family farms, the Land Credit and Rural Poverty Alleviation (CF-CPR) program provides loans for groups of landless farmers to purchase land from willing sellers. To be eligible for the Land Credit, households must be landless (or have insufficient land to subsist), possess experience as rural laborers (at least five out the previous fifteen years), and be poor (with family incomes below R$5,800 per year and asset holdings under R$10,000). Rather than applying individually, farmers organize into associations that identify land for purchase and create detailed farm development plans that are reviewed by community organizations before advancing to state level reviews. Once approved, associations receive up to R$15,000 per family to use for both

the purchase of land and investments in the new settlements.[9] Partially in an attempt to drive down the costs of land reform, the funding is designed to incentivize negotiations over land prices. The transfer of R$15,000 per family consists of both a loan for the land purchase (which can be up to half of the total transfer) and a grant for infrastructure investments, with repayments required on the land loan but not the investment grant. As a result, negotiating for lower land prices reduces the repayment burden while simultaneously increasing the size of the investment grant. Land loans are expected to be repaid within twenty years and a two-year initial grace period is provided. However, given this structure, farmers face a trade-off between purchasing better quality lands and having more grant money and this may reduce the probability of reaching high return agriculture by encouraging the purchase of low quality lands. Grants money is often used to build or improve housing, roads, and fences, for example. On new settlements, households combine individual production with cooperative production, which is often used for cash crops to help repay land loans.

Evaluations of the Land Credit program provide inconclusive findings.[10] While the program has clearly provided access to land, the World Bank (2009) concludes that success depends on access to additional credit, technical assistance, and water access, many of which are unavailable in remote regions where many beneficiaries received land. Another evaluation finds that some farmers can transition into lucrative cash crops (coffee, cacao, and rubber) but that many beneficiaries require additional credit and more initial funds to enable the purchase of better land (*Ministério do Desenvolvimento Agrário*, 2009). An evaluation of a previous MALR finds that incomes did not increase although beneficiaries did shift labor into agriculture (*Ministério do Desenvolvimento Agrário*, 2008). Land loan repayments were fairly small, averaging R$300-400 per year and repayment rates were high, at 97.6 percents (World Bank, 2009).

While the joint impact evaluation will test whether or not CCT payments can help households overcome liquidity constraints related to agricultural investments, Land Credit beneficiaries do have access to some credit sources. First, the grant component of the Land Credit is utilized for infrastructure improvements that may help increase productivity within the new settlements. Second, recent land reform beneficiaries receive preferential access to specific lines of credit through the *Programa Nacional de Fortalecimento da Agricultura Familiar* (PRONAF, or the National Program of Strengthening Family Agriculture). Despite these sources of grants and credit, the Land Credit was not designed to guarantee sufficient credit and it is expected that beneficiaries transition into private sources of credit (Deininger, 1999; World Bank, 2009). In this context, conditional cash transfers are one possible source of liquidity.[11]

[9] Additional transfers are provided in certain situations, including R$2,000 for households in semi-arid climates and R$1,000 for ecological investments.

[10] See Sparovek and Maule [2009] and Fitz [2013a] for a summary of these findings.

[11] Furthermore, as explained in the data section, the data utilized in this paper does not contain information on whether households

In 2003, President Lula formed *Bolsa Família* (Bolsa), as a combination of multiple programs.[12] Although less studied than *Oportunidades*, by 2007 Bolsa provided payments of of R$7.5 billion (approximately US$4 billion) to over 11 million families, which is more than double the number of *Oportunidades* beneficiaries (Glewwe and Kassouf, 2010). Bolsa transfers are conditional on school attendance (at least 85% for children ages six to fifteen) and regular health check-ups for children under seven years of age. As with most CCT programs, payments are targeted to female heads of households. This paper evaluates the impacts of Bolsa using eligibility at the time of the baseline survey, as is common in evaluations of *Oportunidades*, despite changes in the ages of eligible children imposed in 2008 (Parker et al., 2008).

Two types of benefits are available to households living in poverty (defined to be less than R$120 monthly per capita income). First, households receive R$15 each month for up to three children aged fifteen and younger with regular school attendance.[13] Second, those households living in extreme poverty (less than R$60 monthly per capita income) receive an additional monthly transfer of R$50, regardless of whether or not they have children. Thus, Bolsa provides a conditional cash transfer to poor households with children and an unconditional cash transfer to households living in extreme poverty. Table 1a summarizes the monthly Bolsa payments.

To become eligible for Bolsa, households self-report income while registering in the Single Registry (*Cadastro Único*) that oversees all government transfers. While self-reporting income presents some challenges for identification and may encourage some households to under-report income, Bolsa does verify income in multiple ways (Soares et al., 2010). First, the Single Registry collects information on incomes and consumption so that households that report consumption levels significantly larger than reported incomes can be re-evaluated. Second, federal databases enable verification of formal-sector earnings. Overall, these verifications help ensure that most Bolsa beneficiaries have incomes below the eligibility thresholds. In addition to the verification of household incomes, Soares et al. [2010] note that "as of late 2008, education conditionalities were monitored for 85 percent of beneficiaries, and health conditionalities were monitored for 59 percent of beneficiaries." Bolsa has a highly decentralized structure that should improve the targeting of poor households, but may simultaneously cause transfers to become susceptible to patronage (Handa and Davis, 2006). The implementation of Bolsa differs across municipalities and may even improve when mayors face reelection (de Janvry et al., 2012).

sought private credit or not, but only 3% of households have individual loans. Bolsa payments enable us to identify treatment effects based on eligibility and thus potentially isolate the impact of regular cash payments as a possible means to relax liquidity constraints.

[12] These programs include *Bolsa Escola* (an educational CCT that began in several cities in 1995), Gas Vouchers, the Program for the Eradication of Child Labor, and the Food Grant Program.

[13] As of 2008, Bolsa provides payments for children ages sixteen and seventeen and three transfer components exist. First, households classified as living in extreme poverty (monthly per capita income less than R$60) receive the Basic Benefit of R$62 per month, regardless of the number of children. Second, the Variable Benefit provides a payment of R$20 per child age fifteen and under, for up to three children. Third, the Variable Youth Benefit provides a payment of R$30 per child age sixteen and seventeen, for up to two children. These payments can be categorized in Table 1b.

In general, existing studies show that Bolsa provides many benefits. From 1995 to 2004, Brazil's Gini coefficient fell by 4.7 percent, with Bolsa driving 21 percent of this reduction (Soares et al., 2006). Bolsa increases adult labor participation by 2.6 percent (Oliveira et al., 2007) and increases school enrollment rates (Ferro and Kassouf, 2005; Glewwe and Kassouf, 2010; de Janvry et al., 2012), but it may simultaneously increase failure rates relative to non-beneficiaries (de Janvry et al., 2007; Oliveira et al., 2007). However, Bolsa may not increase consumption and does not significantly increase vaccination rates, although this may be driven by limitations in access to health services (Oliveira et al., 2007; Soares et al., 2010). Given these results, Bolsa should not be the only program implemented since households may benefit from additional programs that encourage the adoption of new technologies and provide more immediate returns to human capital.

Data Set and Key Variables

The empirical analysis utilizes a data set collected to evaluate the Land Credit program with a baseline survey completed in 2006 and a follow-up survey conducted in 2010. The selection of Land Credit beneficiaries involved the random selection of both settlements and a subset of households within each settlement. Control group associations were selected from a list of approved applicants, thus indicating that they applied for and were selected for participation, but these households did not receive land.[14] Control group associations were also selected from areas to to beneficiary settlements and a random subset of households was selected from each association. Keswell and Carter [2011] argue that the receipt of land through MALRs is often random as legal challenges and actions by the sellers determine whether or not qualifying households receive land. As explored in the next section, Bolsa identification relies on the use of household demographic and income data to define eligible and ineligible groups.

Information was collected on household demographics, income sources, and several other areas. As explained below, the analysis controls for many household demographic variables, characteristics of the officially enrolled beneficiary of the Land Credit, and baseline assets. To compare program impacts, results are analyzed across a range of outcome variables including agricultural and nonagricultural investments, economic activities, and income levels.

The analysis of agricultural investments focuses on land ownership, animal ownership (including cattle, mules, goats, pigs, poultry, fish, and others), and forest production (including extractive products, charcoal production, Brazil nuts, and other activities), all in terms of the likelihood of investments (using binary measures) and the level of investments. Furthermore, the likelihood of irrigation and the value of agricultural assets (including tools and

[14] Eventually, some control households did enter the program and those households are removed from the control group in this paper in order to focus on the impact of access to land and they are later added to the control group as a robustness check.

machinery) are evaluated. Additionally, the value of nonagricultural assets (including cars, houses, and household appliances) is evaluated, but the data does not currently enable an analysis of human capital or other nonagricultural investments.

Income sources and changes in incomes are evaluated to determine the overall impacts of these programs on well-being. Both agricultural and nonfarm labor are important in Northeastern Brazil and this paper uses binary outcomes to measure whether or not households earn paid income, work as agricultural producers, or earn nonfarm labor income. To capture changes in income from 2006 to 2010, total income, the value of agricultural production, and the amount of labor income are analyzed, all measured in monthly per capita terms. These results will determine whether households are transitioning into agricultural production or nonfarm labor as a result of these programs and whether or not total income levels are increasing.

Overall, the sampled households are poor in both income and assets. At the time of the baseline survey, average monthly per capita income was approximately R$120, equal to the US$2 a day poverty line that defines Bolsa eligibility. Overall, 84 percent of households were agricultural producers and 40 percent of households worked in nonfarm labor, and 64 percent worked in agricultural labor. Thus, households participate in diverse economic activities yet agricultural production remains important. In addition, there appear to be few microenterprises as only 6 percent of households sold nonagricultural products produced at home. Only 6 percent of households owned land at the time of the baseline thus indicating the low level of productive assets possessed by households. Despite lacking land ownership, many households owned animals (82 percent) and engaged in forest production (53 percent).

Joint Evaluation Strategy

Identification of the Impact of the Land Credit

The Land Credit analysis relies on comparisons between the beneficiaries and the pipeline control group, which is shown to provide a good comparison both in terms of household demographic characteristics and baseline asset levels.[15] Despite these similarities, it remains important to control for possible observable and unobservable factors that can influence selection into the program and household responses to the program. The analysis controls for possible selection on observables by including a range of demographic and asset controls in the econometric analysis. Furthermore, a propensity score estimation, as done in Fitz [2013a], ensures that beneficiary and control households

[15] Fitz [2013a] conducts an evaluation of the Land Credit - using both a binary and duration of treatment analysis - and finds evidence that the Land Credit increases investments in agricultural assets and participation in certain agricultural activities, but that it does not significantly increase incomes among beneficiaries.

are adequately comparable while households that do not meet the common support assumption are removed from the joint analysis.

Furthermore, the inclusion of the application date provides a control for possible selection on unobservables under the assumption that the timing of application for the program influences both the receipt of land and the response to land. For example, if more entrepreneurial applicants both apply to the program earlier and also respond more positively to treatment, this can bias the results. Consequently, the year of application is controlled for (Keswell and Carter, 2011).

Identification of the Impact of Bolsa

Eligibility for Bolsa relies on thresholds in both the ages of children and household income and this enables the identification of treatment effects for Bolsa transfers. Generally, this approach compares eligible households to those that are either just ineligible or further from being eligible, and the identification relies on households being similar across these thresholds other than for Bolsa.[16] The analysis parallels similar evaluations of an unconditional cash transfer in South Africa that classify discrete groups based on whether a household is eligible and how close to eligible it is.[17]

In a comparison of identification strategies that use either age discontinuities or the randomized design of *Oportunidades*, Buddelmeyer and Skoufias [2004] find that discontinuity approaches effectively estimate treatment effects for many outcome variables and that inconsistencies across the two approaches may be explained by anticipation effects and specific problems related to the randomized control group (and thus provide a possible benefit to discontinuity approaches even over randomization). Bolsa can be analyzed using either discontinuities in eligibility or propensity score methods, however the former method is preferred in order to deal with the endogenous decision to participate in the program.[18] This endogeneity can be overcome by analyzing program eligibility rather than the actual receipt of transfers as a means of calculating intent to treat estimators. Whereas propensity score evaluations that utilize the actual receipt of transfers may suffer from endogeneity, a discontinuity approach, based on eligibility, can overcome this limitation.

[16] While current data limitations make standard regression discontinuity analysis impossible, this will be introduced when feasible (Hahn et al., 2008; Lemieux and Lee, 2010).

[17] See, for example, Case and Deaton [1998], Duflo [2003], Bertrand et al. [2003], and Edmonds [2006]. Rather than relying on exact ages, Duflo [2003], for example, calculates whether or not each household has a member that is within five years of becoming or being eligible, among other controls.

[18] For Bolsa, propensity score estimations are used to evaluate the impact of Bolsa on child labor and school attendance (Cardoso and Souza, 2004) and health outcomes (de Brauw et al., 2010).

Calculating Bolsa Eligibility

To satisfy the age requirements for Bolsa, households must have children ages fifteen or under. Without exact data on the ages of children, this identification strategy will compare households that are eligible (with children under fourteen years of age) to those that are just ineligible (with children between fourteen and eighteen) and those that are further from eligibility (with older children).[19] As a result, the results are likely to underestimate the treatment effects since some households in the control group (those with children ages fourteen and fifteen) are, in fact, eligible for Bolsa payments.

In addition to satisfying age requirements, households are eligible for Bolsa transfers if they are classified as living in poverty (less than R$120 monthly per capita income). An additional transfer is available to households living in extreme poverty (less than R$60 monthly per capita income) regardless of whether or not there are children. Given variation in income levels across time, it is likely that the baseline income data does not parallel income levels as reported in the Single Registry used to determine Bolsa payments. However, using income measures from a data set unrelated to Bolsa eligibility should provide a good independent measure of income.[20][21]

Together, these age and income eligibility estimations accurately predict the receipt of government benefits.[22] Table 2 shows that predicted Bolsa eligibility is a highly significant predictor of whether or not transfers are received and the predicted amount of Bolsa transfers accurately predicts the total amount received through government transfers. With the construction of an accurate measure of Bolsa eligibility to interact with the Land Credit analysis, a regression approach is introduced that relies on this information to calculate individual and joint treatment effects for the Land Credit and Bolsa programs.

Joint Treatment Groups

This framework provides four groups for analysis: Land Credit beneficiaries that are Bolsa eligible (215 households); Land Credit beneficiaries that are not Bolsa eligible (121 households); Bolsa eligible households without the Land

[19] With current data limitations, the change in eligibility cannot be utilized for identification and Bolsa age-eligible households are defined to be those with children under the age of fourteen during the baseline. This provides the closest possible measure of whether or not there are children fifteen or under. With the 2008 extension of transfers to sixteen and seventeen year-olds, these same households are defined to be eligible in the 2010 survey, since thirteen year-olds are by then seventeen and still eligible.

[20] As noted, earlier, the self-reporting of income poses some challenges for a discontinuity design (Lemieux and Lee, 2010), but Bolsa does verify income in several ways and the present independent measure of income provides a good proxy for Bolsa eligibility.

[21] In general, most CCTs do not regularly drop households that increase income above the threshold or add households that drop below the threshold (Handa and Davis, 2006).

[22] Government benefits are evaluated rather than just Bolsa transfers due to limitations with the available data. Government benefits include Bolsa transfers as well as transfers from the Program for the Eradication of Child Labor (PETI), which provides payments to families with working children (especially in high risk jobs) who enroll their children in school, but does not have the same income restrictions, and several other programs.

Credit (81 households); and households without the Land Credit that are not Bolsa eligible (44 households). Summary statistics are provided for these four groups in Tables 3a-d, in which significance tests compare each group to the remaining three. Land Credit beneficiaries generally applied earlier for the program and are more likely to have male beneficiaries. Bolsa eligible households have significantly different demographic variables, including larger families, more children, and lower income levels, as predicted from the eligibility requirements. In contrast, households that are ineligible for Bolsa appear to earn higher incomes through nonfarm labor earnings. There are similar levels of baseline assets across the four groups, but the number of significant differences across groups in 2010 indicates that programs are influencing household investment and participation in various economic activities.

Joint Regression Approach

With these four groups, the following econometric specification utilizes the age and income thresholds for Bolsa transfers as well as other variables intended to control for possible selection into the Land Credit. The following specification controls for households that are just ineligible for Bolsa, using both age and income measures, in order to test whether there is a differential treatment effect on Bolsa eligible households while interacting this treatment with the Land Credit.[23] For each household i in settlement j, define binary treatment indicators for the Land Credit ($L_{ij} = 1$) and Bolsa ($E_{ij} = 1$), where Bolsa eligible households are defined to be those that earn less than R$120 and have an eligible child, or earn under R$60 (even without kids). With these treatment indicators and their interaction, consider the OLS regression:

$$A_{ij} = \beta_L L_{ij} + \beta_T E_{ij} + \beta_J L_{ij} E_{ij} + \lambda W_{ij,06} + \lambda V_{ij,06} + \delta X_{ij,06} + \gamma A_{ij,06} + \epsilon_{ij}$$

where A_{ij} is investment (income, assets, or other outcomes) measured in 2010, $W_{ij,06}$ is a vector of control dummy variables measuring if there is a child under the age of 14, a child 18 or under, or if the household head has any children, and $V_{ij,06}$ is a vector of control dummy variables measuring if the household has income below R$120, R$180 and R$240.[24] Collectively, these variables enable the identification of Bolsa intent to treatment estimators, since they control for households that have children just old enough to be ineligible and households that have just enough income to be ineligible, as well as households that are eligible with respect to either age or income but not

[23] While a difference-in-difference approach could be utilized, this regression approach controls for baseline assets and identifies incremental changes in outcome variables in a similar manner. Since impacts are evaluated across four groups while controlling for several more groups of households that are "just-ineligible" for Bolsa transfers, a difference-in-difference approach becomes much more complicated, thus this regression approach is preferred.

[24] Results are mostly robust to the use of continuous income rather than these income groups. With more detailed age information among households, continuous age and income variables will eventually be utilized to estimate distance from eligibility but currently discrete measures of both are employed to maintain symmetry.

both.

Possible selection on observables is controlled for through $X_{ij,06}$, a vector of household characteristics including the age, education, race, gender, and farming experience of the household head and the household size.[25] The vector $X_{ij,06}$ also controls for the year of application in order to account for possible selection on unobservables such as entrepreneurial ability. Furthermore, controls are included for the initial levels of l assets ($A_{ijl,06}$) in order to evaluate changes in assets over time. Baseline assets include dummies for land ownership, dirt floors, and electricity, as well as measures of the value of forest production, animals, agricultural assets, and nonagricultural assets.

Identification in this regression relies on controlling for households that are similar to treated households except for Bolsa eligibility. Focusing on age criteria for Bolsa, the estimation controls for households that have children under the age of fourteen but are excluded from participation as a result of their larger income levels. Similarly, it controls for households that have children between the ages of fourteen and eighteen. In order to accurately identify treatment effects, this approach must control for differences between these households. Focusing on households below the income threshold, if there are fundamental differences between households with children that are eligible and just ineligible then these differences will be confounded with the treatment effect. It is possible that some differences exist, such as households with older children having older parents, but controls are included for additional household demographic variables which alleviates these concerns.

One possible weakness to the Bolsa identification strategy is that being just ineligible may be positively correlated with previous Bolsa participation, since these households may be ineligible because either their children are now too old or because their incomes increased above the threshold.[26] If they previously participated in Bolsa then they may have higher levels of assets and other variables than current Bolsa recipients, however comparisons of the summary statistics indicate that, although there are differences in ages and income, as expected from eligibility rules, households across all groups are remarkably similar in terms of baseline assets. This suggests that the four groups provide useful comparisons with which to evaluate joint treatment effects.

Although many Bolsa eligible households received transfers before 2006, this estimation will evaluate the impact of Bolsa on household investments and income from 2006 to 2010. In Mexico, Gertler et al. [2012] find that transfers increase participation in agricultural activities as well as the intensity of investment, indicating that transfers can continue to impact investment through time. As a result, it is expected that Bolsa will enable households to increase

[25] Results are robust to replacing these $X_{ij,06}$ variables with a propensity score estimation for the Land Credit treatment. Imbens and Wooldridge [2008] note that regressions can be conducted on treatment indicators and either the estimated propensity score or the full set of covariates utilized to estimate the propensity score. Results are robust to using the propensity score and, as in Paper 1, the analysis restricts the sample to the households that satisfy the common support assumption.

[26] It is unlikely that households become ineligible if their income increases, since Handa and Davis [2006] note that most conditional cash transfers do not frequently add or drop households due to this reason.

agricultural outcomes if they choose to invest during this time period.

Joint Impact Evaluation Results

Overall, there is strong evidence that the Land Credit increases holdings of many agricultural assets but relatively little evidence of interactions between the two programs. The Land Credit treatment effect measures the impact of households enrolled only in the land reform, the Bolsa treatment effect measures the impact on households only eligible for cash transfers, and the joint treatment effect captures the additional interaction effect of the programs. This implies that the total treatment effect for households that participate in both programs is equal to the sum of all three coefficients. The tables report significance tests evaluating the null hypothesis that either the impact of only the Land Credit or only Bolsa are equal to the total impact of participating in both programs. Outcomes are evaluated for all households as well as for only the subset of households with zero baseline assets (in the case of binary outcomes) or positive baseline assets (in the case of continuous outcomes) to evaluate investments at the extensive and intensive margins.

Table 4 evaluates the likelihood of investments in agricultural assets (using binary outcomes) and provides evidence that the Land Credit increases the probability of owning animals as well as land. The likelihood of animal ownership increases for all households by 27 percent (but not among households with zero animals at the baseline) while the likelihood of land ownership increases for all households (most of whom had zero initial land ownership) by over 250 percent. Participation in Bolsa lowers the likelihood of entering land ownership, with a decline of 100 percent, and it reduces the probability of having forest production by 85 percent. Although no joint treatment effects are significant, the significance tests in Table 4 provide useful comparisons of the programs. These indicate that Land Credit households have significantly higher likelihoods of forest production (only among all households) and land ownership than households in both programs. Households enrolled only in Bolsa have lower likelihoods of having any asset, except for forest production and irrigation. Focusing on the extensive margin, Bolsa households are less likely to enter forest production or purchase animal, land, or irrigation compared to households in both programs.

Focusing on the magnitude of investments, Table 5 provides evidence that the Land Credit increases the overall level of many agricultural assets. Specifically, the Land Credit causes an increase in the value of animals (among all households but not households with positive baseline animal ownership) by 57 percent, or R$1782. Furthermore, land ownership increases by 8 hectares and the value of agricultural assets increases by approximately R$450, a doubling of assets (among all households as well as households with positive baseline assets). Although Bolsa does not change the value of agricultural assets, households enrolled only in Bolsa do have fewer assets than

households in both programs. Bolsa causes a significant reduction of R$220 in the value of forest production among all households and a reduction of R$296 among households originally engaged in forest production. Table 5 also illustrates that neither program has a significant impact on nonagricultural assets. Joint treatment effects provide evidence against complementarities, since there are not significant interactions between the programs. Focusing again on the significance tests, Land Credit households have smaller reductions in forest production than joint beneficiaries as well as a larger increase in the value of animals among those with positive baseline levels. Bolsa only households have smaller investments in land and agricultural assets than joint beneficiaries.

Sources of income and overall income levels are evaluated in Table 6, which provides evidence, as expected, that the Land Credit increases the likelihood of being an agricultural producer to almost 100 percent. Joint program participation reduces the likelihood of earning income for paid work (by 16 percent) and earning nonfarm labor income in particular (by 35 percent) relative to the single treatment effects, but not at the extensive margin.

Despite these impacts, Table 6 provides evidence that neither program increases the change in monthly per capita income. The limited impact on income provides a challenge for these programs moving forward. Although this result is unexpected, significant increases may occur in the future as human capital investments open new labor opportunities and investments in land quality or permanent crops create higher returns. Furthermore, if child labor is important for household agricultural production, then being able to maintain pre-program income levels while investing in both agricultural and human capital - thus losing family labor in the short-run - can be seen as a positive impact that will provide many long-run economic benefits for households in both programs.[27]

Discussion

Overall, these findings suggest that Bolsa transfers may encourage households to reduce certain agricultural investments, as they are less likely to enter land ownership and reduce the value of forest production. In contrast, the Land Credit is, as expected from a large asset transfer, causing a major increase in agricultural investments including land, animal ownership, and agricultural assets. Meanwhile, joint participation reduces the likelihood of earning income from paid labor or nonfarm labor in particular when compared to the individual treatment effects. One reason for this is that access to land increases the returns to family agricultural labor and, if children attend school and are less available to work, then households members must reduce their nonfarm work and increase household agricultural production in response. This indicates that participation in the Land Credit transitions households into a portfolio of agricultural production (including forest, animal, and crop production), eligibility for

[27] It is possible that, if income is constant and investments increase, consumption decreases as a result, but this cannot be tested with the data.

Bolsa encourages households to invest in human capital,[28] and combined participation in both programs enables households to develop broad investment portfolios. While current labor becomes more specialized in agricultural production, these broad investments are likely to provide pluriactive opportunities in the future that combine both agriculture and nonfarm labor. In a semi-arid region, this may provide many benefits that, even if they do not yet pay off financially, will help to reduce risk among joint beneficiaries and may provide large future economic gains.

There are several possible explanations for the overall lack of significance for joint program participation. As argued previously, if these programs were complementary with respect to agriculture, then we would expect there to be positive joint impacts on agricultural outcomes. Despite access to both land and cash transfers, however, households may still face difficult choices when balancing investment and labor decisions. The lack of joint significance for agricultural outcomes may imply that Land Credit beneficiaries are not credit constrained and do not want to further increase investments, that they prefer to invest in education and human capital, that Bolsa does not increase liquidity, or that these programs are not complementary. As found in several evaluations of previous land reforms in Brazil, beneficiaries frequently cite the need for increased credit and this is likely to remain true in the Land Credit, since this program is similar to other recent MALRs. Furthermore, it is possible that Bolsa, which provides transfers but may reduce child labor, does not increase liquidity. The impact of Bolsa on the change in total income is economically but not statistically significant. This suggests that many households are likely to benefit and, with a more precise identification of Bolsa eligibility (with complete household demographic information), this result is likely to strengthen. Given the increasing importance of nonfarm employment in Northeastern Brazil, many households are beginning to alter their expectation about regional nonfarm employment and, as a result, may prefer to utilize Bolsa transfers to invest in the education and health of their children. The most likely scenario, given that households jointly participating in the Land Credit and Bolsa reduce participation in paid labor and nonfarm labor activities, is that households are becoming agricultural producers that send children to school while reducing nonfarm labor in order to focus on current agricultural production. This indicates that joint beneficiaries undertake diverse investments that, despite presently shifting labor into agriculture, will open pluriactive pathways to households in the future. To achieve these broad investments without a decline in consumption can be seen as a positive result.

[28] This hypothesis will be tested more directly when better data becomes available, but it is well established by other evaluations in the Northeast (Cardoso and Souza, 2004; Melo and Duarte, 2010; de Janvry et al., 2012).

Robustness Checks

In Table 7 the joint impacts are recalculated for key outcomes by restricting and expanding the sample groups in various ways. First, only households with baseline monthly per capita incomes under R$300 are included, which cuts out the upper seven percent of households. Since both programs target poor households, this restriction helps to focus the analysis on households that we might reasonably expect to be directly impacted by the programs. Second, households are similarly restricted to only those with baseline monthly per capita incomes under R$120. Despite removing forty percent of the sample, this allows the calculation of Bolsa eligibility to rely on age but not income thresholds,[29] which may improve the analysis given risk of variation in reported incomes, and again focuses more precisely on treatment effects among the poorest households. Third, Bolsa eligibility is modified to include households with incomes up to R$180, recognizing that many households with incomes above the threshold receive Bolsa transfers.[30] Fourth, households that received land in between the two surveys (the "new beneficiaries") are included in the control group. Although these "new beneficiaries" did eventually become land owners, including them in the control provides a robustness check to address the concern that households in the control group that never received land are somehow different than those "new-beneficiaries" that did. Next, rather than relying on discrete income controls, continuous income is included as a regressor. Finally, natural logs of continuous outcome variables are analyzed.

Overall, the results are quite robust with respect to the major variables of interest. The Land Credit increases the likelihood of owning animals among all households by similar magnitudes in all but two estimations. The likelihood of owning land is extremely robust across all estimations for both all households and households with zero initial land ownership. The magnitude is lowest when "new beneficiaries" are included and highest when focusing on the poorest households. The positive impact of the Land Credit on the value of animal ownership is reasonably robust, with lower and insignificant impacts in two estimations. The lack of significance when the sample is restricted to households with less than R$120 suggests that poorer households may invest in less valuable animals. Under the Land Credit, land ownership is increased by approximately eight hectares in all but the "new beneficiary" analysis and the natural log analysis. Furthermore Bolsa does not impact the number of hectares except when continuous income is included, in which case Bolsa appears to increase the amount of land owned by three hectares. However, when this same analysis is restricted to only households below R$300 baseline income levels, this result is no longer significant (not shown). The additional joint program impact on land ownership is significantly negative (by 3 to 4 hectares) in these estimations, suggesting some balancing of agricultural and human capital investments by

[29] Households with incomes below R$60 but without any children remain eligible in this specification.

[30] In fact, a major Bolsa evaluation uses a cutoff of R$200 as an additional robustness check in addition to the strict eligibility criteria (Oliveira et al., 2007).

households in both programs. The value of agricultural assets are increased by R$400-500 as a result of the Land Credit in all estimations except when the sample is restricted to the poorest households. As with land ownership, only when continuous incomes are included does Bolsa appear to increase agricultural assets, and again this result disappears when continuous income is utilized and the sample is restricted to households below R$300.

Interestingly, the Land Credit appears to be least effective among the poorest households. When the analysis is restricted to households with monthly per capita income levels below R$120, several of the significant increases in agricultural assets as a result of the Land Credit disappear.

There is very little evidence that income measures are impacted by these programs. There is some evidence that, when Bolsa eligibility is extended to R$180, either program may increase the change in total income, while additional joint participation reduces the change. Also, when the log of changes in income is evaluated, there is evidence that the Land Credit increases both the change in total income and agricultural production while additional joint participation attenuates this impact for total income among households with positive baseline incomes.

Attrition Analysis

Attrition is relatively high in the Land Credit data and the analysis thus far has relied on those households that appear in both surveys, which includes 56 percent of households from the baseline survey.[31] In a land reform, in particular, attrition may bias results if poor households tend to attrite while only the most talented farmers remain in the sample, thus overstating the impact of the program. Conversely, the best farmers may attain such high incomes that they choose to migrate to urban centers in search of work, thus biasing the results downward. Among beneficiaries, 38 percent of households attrited. For the control sample, the primary analysis considers households that left the sample or became beneficiaries themselves to be attritors, which would indicate an attrition level of 73 percent among the original control group. However, when the new beneficiaries are included in the control group and allowed to attrite or not attrite themselves, then the control group attrition rate reduces to 59 percent.

Using the framework developed by Fitzgerald et al. [1998], we can weight the sample by using the probability of attrition calculated using the entire original sample.[32] The main challenge resulting from attrition is to estimate the population density:

$$f(y|x)$$

[31] This is a high attrition rate, but it is similar to the 50 percent attrition in the Michigan Panel Study on Income Dynamics for which appropriate methods of controlling for attrition were developed. Despite these high attrition rates in the PSID, neither Fitzgerald et al. [1998] nor Becketti et al. [1988] find that attrition biased the final estimates and they argue that attrition remains important to analyze since it may bias results if it occurs in a way that is correlated with outcomes.

[32] Fitzgerald et al. [1998] distinguish between attrition on observables and unobservables, but develop methods that are able to control for attrition on observables.

using the observable density:

$$g\left(y|x, A=0\right)$$

where $A=1$ indicates attrition. Fitzgerald et al. [1998] utilize a probit to evaluate the probability of attrition using a matrix of variables (x) that influence the outcomes being analyzed (y) and a vector of variables that influence the probability of attrition but not the outcomes (z). Variables included in z, which serve as instruments, can include lagged dependent variables, fixed characteristics, or interviewer characteristics (Fitzgerald et al., 1998; Alderman et al., 2001). By calculating the probability of attrition using either just the x variables or both the x and z variables, weights can be calculated as:

$$w\left(z,x\right)=\frac{Pr\left(A=0|x\right)}{Pr\left(A=0|z,x\right)}$$

These weights can then be utilized to estimate the full population density function:

$$f\left(y|x\right)=\int\left\{g\left(y,z|x,A=0\right)w\left(z,x\right)dz\right\}$$

Fitzgerald et al. [1998] note that attrition will not bias results if the z variables do not influence attrition - in which case the weights will simply be equal to one - and if the z variables are independent of the outcomes when controlling for x variables among the non-attriting households.

Controlling for Attrition on Observables

Consider two specifications of attrition: first, attritors are defined to include all households not in the 2010 survey, including all new beneficiaries and second, these new beneficiaries are included in the control group and allowed to have either attrited or not, as with all other households, based on whether or not they appear in the 2010 survey.

In order to predict the probability of attrition, define x variables to include the number of household members, the application year, and the age, gender, education, education squared, race, and farming experience of the beneficiary. The attrition instruments include a measure of lagged total monthly per capita income, a dummy variable measuring whether or not a household moved in the last 10 years, and enumerator fixed effects.

The first step is to analyze the probability of attrition using the x variables and then the x and z variables using a probit estimation. These results are presented in Table 8 and indicate whether or not attrition is based on observables and whether or not the attrition instruments influence attrition, which would suggest that weighting may influence the estimated treatment effects. Focusing on the x variables, the results indicate that the larger households are more likely to attrite, that beneficiaries with more farming experience are more likely to attrite, and

that households that applied later are more likely to attrite. Focusing on the z variables, there is evidence that attrition is higher or lower for certain enumerators and that households that had moved within ten years of the baseline survey were more likely to attrite.

These weights can then be utilized to estimate treatment effects using a weighted version of the OLS employed previously in the paper. These results are presented in Table 9 and illustrate that, overall, controlling for attrition does not significantly impact the estimated treatment effects. There are only a few differences when attrition weights are included, with the weighted estimates indicating that additional joint participation reduces the number of hectares of land owned (a reduction of 3.4 hectares) and also reduces the probability of participating in not only paid and nonfarm labor, but also agricultural labor. This even strengthens the argument that joint participation allows households to produce on their own land while sending children to school, but that this causes a reduction in paid labor and may even lead households to farm less land due to the lost labor.

Heterogeneous Treatment Effects

In this section, treatment effects are interacted with factors that may impact the ability of beneficiaries to respond to these programs. First, gender provides an interesting comparison given that males generally control productive assets while many cash transfers target women with the goal of ensuring that more money reaches children. Throughout this analysis, the gender of the Land Credit beneficiary is captured with a dummy variable equal to one for females.

Second, treatment effects are interacted with a binary measure of whether households live in an urban or rural zone in order to test whether or not location influences how households respond to these programs. It may be the case that Land Credit beneficiaries in urban zones are better able to access markets and, as a result, are more able to produce cash crops, such as fruit, that are more difficult to transport but may provide higher returns (Samuelson, 1983). Similarly, these households may have better access to labor markets and, as a result, choose to work for nonfarm income that could increase total income (Fafchamps and Shilpi, 2003; Jonasson and Helfand, 2010). In turn, these opportunities may facilitate further investments in either agriculture or human capital.

Third, treatment effects are interacted with the amount of land owned at the time of the baseline survey. This allows for tests concerning whether or not households that previously owned land are more successful at transitioning into agricultural production.

Fourth, a measure of migration is interacted with treatment effects. This variable is equal to one if a household has lived in a different location within the last ten years. Although some households likely moved close to ten years ago,

some of these households moved in order to purchase land through the Land Credit.[33] Moves can make it more difficult to understand local soil conditions and make it difficult to retain larger possessions (such as houses and agricultural equipment) and this may impact how successfully households respond to the Land Credit program or how they choose to utilize Bolsa transfers.

Fifth, interactions are included with the date of application to the Land Credit since, as argued above, this date may serve as a proxy for either more entrepreneurial households that take advantage of government programs or households that are more eager to enter agricultural production. For this analysis, the application date is a dummy variable equal to one if the household applied later than 2006, and zero otherwise.[34]

Sixth, baseline agricultural assets are interacted with treatments since households with more assets may be able to leverage these assets into additional credit or use productive assets to increase production relative to other households. Although agricultural assets may impact how well households respond to these programs, the average level of agricultural assets (R$248 and R$287 for treatment and control households) is low compared to an asset transfer of R$15,000 or monthly cash transfers of approximately R$100.

Gender Effects

The majority of households (79 percent) have male Land Credit applicants and these households are more likely to receive land. Focusing on participation in agricultural activities, Table 10 shows that the Land Credit does not significantly increase the probability of owning animals, except among female beneficiaries. However, when considering all female Land Credit beneficiaries, this impact is diminished by the negative marginal impact of their joint participation by in both programs. Thus, females only enrolled in the Land Credit invest in animals while those jointly eligible for Bolsa do not, perhaps instead investing in their children. This may indicate a balanced investment portfolio that combines land and some agricultural investment alongside human capital investment. Since Table 10 also suggests that the total value of animals is not significantly changed, females may be more likely to enter animal ownership, but only with investments in small animals.

Furthermore, the Land Credit significantly increases the likelihood of owning land, total land holdings (by 8 hectares), and the value of agricultural assets (by over R$400), regardless of gender. Changes in total incomes and agricultural production largely parallel earlier results, in that the treatment effects are insignificant, but there is evidence that female beneficiaries respond significantly worse than males to the Land Credit. This may occur if

[33] The World Bank (2009) recognizes that this happened less than expected which indicates that many households remained in semi-arid regions.

[34] Since 50% of households applied in 2006, 42% applied in 2005, and 8% applied in 2004, the application year is easily defined as a binary variable.

discrimination against females farmers (in credit or land markets, technical assistance, or even the functioning of settlements) persist following the reform. Given the market emphasis in the Land Credit, it is possible that the reliance on markets that contain gender biases makes it more difficult for female beneficiaries to succeed. However, given evidence from the cash transfer literature that females are more likely to spend income on children.

Location

Overall, the results are similar regardless of location. Although urban households are less likely to own animals, the Land Credit has a strong positive increase on the probability (but not he value of) animal ownership in urban zones. This can occur if it is difficult for landless households to invest in animals and if proximity to markets facilitates the selling of animal goods. Alternatively, it may be driven by the fact that most rural households already own some animals regardless of treatment status, while land ownership enables beneficiaries in urban zones to purchase animals. While Bolsa does not significantly increase the change in the value of agricultural production for rural households, urban Bolsa households have a significantly smaller change in agricultural production (by R$38-69). While proximity to cities can provide opportunities for higher return agriculture or labor, this may indicate that urban Bolsa households use this program to focus on human capital investments over agricultural investments.

Land Effects

Interactions with households that owned land at the time of the baseline suggest that land ownership may negatively impact both the probability of animal ownership and land ownership, as shown in Table 11. Specifically, among Land Credit participants, households that owned land are less likely to own animals (compared to all other Land Credit households) but are more likely to enter animal ownership and to experience increases in agricultural production as a result of the Land Credit. Among Bolsa households, baseline land ownership is related to an increase in the likelihood of land ownership and the amount of land owned (2 hectares), indicating that households with land are able to expand land ownership as a result of Bolsa transfers.

Migration

Households that have lived in a different city in the last ten years own fewer agricultural assets overall in the followup survey, but respond more positively to the Land Credit (Table 11). Overall, migrating households own R$350 less in agricultural assets, but the Land Credit causes them to increase holdings by R$691 more than non-migrating households, who experience an increase of R$334. These results may be expected if migrating households had to sell

many of their assets in order to move and purchase new assets following the receipt of land. In addition, migrating households that are eligible for Bolsa have lower land holdings (4 hectares less) than non-migrating households while the Land Credit increases holdings by 8 hectares regardless of migration. Migrating households have negative changes in total incomes (by R$116) but respond more positively to the Land Credit (R$86) and Bolsa (R$84) than non-migrating households. If migration is costly and has the potential to dissolve social networks and employment opportunities, then migration can reduce incomes unless migrants are able to access land or cash transfers.

Application Date

The earlier a household applied to the Land Credit, the more entrepreneurial or the more eager to invest in agriculture they may be, and these results are analyzed in Table 12.[35] With regards to the likelihood of land ownership, when application date is included, the results indicate that the Land Credit increases land ownership regardless of application date, but that the marginal joint impact is negative (regardless of application date). In addition, the likelihood of investing in land is significantly lower for late applicants (to the Land Credit) as a result of Bolsa transfers than for earlier applicants. It appears that later applicants own fewer animals overall, that Bolsa reduces the value of animals for early applicants (unless they are joint beneficiaries), that late applicants in either program have almost zero change in animals (although this is significantly more than early beneficiaries), and that joint participation has a negative impact on animal ownership among later applicants.

When analyzing changes in income, it appears that the Land Credit increases total income and the value of agricultural production significantly more (by R$136 and R$74, respectively) for later applicants than earlier ones. Furthermore, Bolsa eligible households that applied later also experience significantly larger increases in agricultural production (R$62) than earlier applicants, but these results are attenuated by joint participation which reduces agricultural production (R$92). Collectively, these results indicate that households that applied later perform better as a response to these programs.

Assets

Overall, treatment effects do not vary significantly with respect to baseline agricultural assets (Table 12). The results from the initial analysis hold, with the Land Credit increasing many agricultural outcomes. Surprisingly, the Land Credit may reduce earned income for households that own more agricultural assets. Although it might be expected that households with more agricultural assets can better respond to land ownership, the evidence

[35] Due to strong correlations between application date and certain states, state fixed effects are added to these regressions.

suggests that the Land Credit might increase the change in the value of agricultural production, but that this is not increasing in baseline agricultural assets.

Conclusion

This paper evaluates two recent programs in Brazil: the Land Credit, a market-assisted land reform, and Bolsa, a major conditional cash transfer. Although each program remains important in its own right, there exist the potential for important interactions between the two. Asset transfers allow households to increase production and provide new opportunities for investment while conditional cash transfers subsidize educational investments while providing cash that can be used for investments. As a result, these programs can complement each other as households obtain productive assets and the liquidity necessary to increase investments in either agricultural or human capital. In contrast, however, these programs may also conflict since they compete over limited household time and income endowments. For example, given fixed household labor availability, land ownership increases the returns to farm labor while CCTs pull labor away from the farm. Due to the potential for positive or negative interactions between the programs, joint evaluations are important to understand how households respond to the receipt of asset and cash transfers.

This paper analyzes these issues using a data set collected to evaluate the Land Credit while integrating an analysis of Bolsa. Overall, neither program is found to significantly increase income among beneficiaries. Although the Land Credit increases many agricultural investments, households appear to achieve few returns or are perhaps compensating elsewhere since total income fails to significantly increase. This is consistent with some previous evaluations of MALRs in Northeastern Brazil that find increases in agricultural investments but not income. However, if households undertake investments that may provide large future gains, such as improvements in land quality or investments in children's education, then the programs may yet increase beneficiary incomes. Importantly, if the programs enable these broad investments without forcing households to reduce current income levels, this may be viewed as an accomplishment.

In terms of specific investments, there is strong evidence that the Land Credit increases many agricultural outcomes. As a result of the Land Credit, the likelihood of owning animals and value of animals owned increases (by 27 and 57 percent, respectively), the likelihood of owning land and the amount of land owned increases (by 260 percent and 8 hectares, respectively), the value of agricultural assets doubles (by almost R$500), and the likelihood of being an agricultural producer increases to 91 to 100 percent.

Households eligible for Bolsa that have not participated in the Land Credit show a lower tendency to invest in agriculture. Specifically, they are 85 percent less likely to engage in forest production, they have much less valuable forest production (R$220), and they are very unlikely to enter land ownership (by 96 percent). However, Bolsa also does not significantly impact income levels. While there is not yet sufficient data to evaluate educational outcomes, if Bolsa does successfully increase school attendance, then it is likely to increase the future incomes of beneficiaries.

Joint participation in both programs leads households to follow diverse investment strategies that combine agricultural and human capital investments. With access to land and Bolsa transfers, households appear to balance both time and investments. For example, joint participation causes a reduction in both the likelihood of earning income from paid labor (by 16 percent compared to the group not enrolled in either program) and the likelihood of earning nonfarm income in particular (by 35 percent). This indicates that these households choose to pull adult labor away from nonfarm employment opportunities in order to work on the family farm while children attend school. As a result of participation in both programs, households obtain ownership of productive assets, become more independent producers, increase agricultural investments, and simultaneously are more likely to increase school attendance. These results are robust to several specifications and definitions of Bolsa eligibility. This indicates that, rather than being complementary with respect to agricultural investments, these programs encourage broad investments as households balance their allocation of resources across multiple activities.

In addition, the analysis is extended to consider the gender of the Land Credit beneficiary. Evidence suggests that males and females, overall, respond in similar ways to these programs. This indicates that land reforms provide an important opportunity for females to enter land ownership, forest production, and animal ownership.

Overall, these results indicate that recent land reforms and conditional cash transfers in Brazil impact household investments in significant ways, but that improvements must be made to ensure that household welfare improves. While these investments may generate larger future incomes, the lack of significant changes following four years of the Land Credit indicates that households may be more independent and able to jointly invest in agriculture and human capital, but that additional assistance remains necessary.

Table 1a - Bolsa Transfer Levels (Reais) - Pre-2008

	Number of Children (Under 15)			
	0	1	2	3
Income				
Extreme Poverty	50	65	80	95
Poverty	0	15	30	45

Table 1b - Bolsa Transfer Levels (Reais) - Post-2008

	Number of Children (16-17)	Number of Children (Under 15)			
		0	1	2	3
Income					
Extreme Poverty	0	62	82	102	122
	1	92	112	132	152
	2+	122	142	162	182
Poverty	0	0	20	40	60
	1	30	50	70	90
	2+	60	80	100	120

Table 2 - Predicting the Receipt of Government Benefits

	Government Benefits (R$)	**Government Benefits (0/1)**
	OLS	Logit
	(1)	(2)
Predicted Bolsa Transfer (R$)	0.497	
	[11.21]***	
Predicted Bolsa Recipient (1/0)		3.927
		[9.20]***
Constant	462.346	
	[17.26]***	
Observations	950	950
Pseudo R2	0.12	

* significant at 10%; ** significant at 5%; *** significant at 1%

Odds ratio reported

Absolute value of z statistics (OLS) or t statistics (logit) in brackets

Note: These measures are imprecise since the analysis focuses on Bolsa eligibility but the variable measuring government benefits includes Bolsa as well as additional programs.

Table 3a - Control and New Beneficiary Summary Statistics

	No Treatment Group					Bolsa but not Land Credit					Land Credit but not Bolsa					Land Credit and Bolsa				
	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value
Household Demographics																				
Beneficiary Age	39.5	15.4	44	1.08	0.28	37.7	11.0	81	0.03	0.98	37.1	13.1	121	-0.59	0.55	37.6	10.7	215	-0.02	0.98
Beneficiary Male = 1	0.86	0.35	44	0.52	0.60	**0.74**	**0.44**	**81**	**-2.52**	**0.01**	0.83	0.38	121	-0.32	0.75	0.87	0.34	215	1.50	0.13
Beneficiary Education	4.7	3.5	44	1.52	0.13	3.6	3.1	81	-0.87	0.39	**4.9**	**4.1**	**121**	**3.69**	**0.00**	**3.3**	**3.2**	**215**	**-3.15**	**0.00**
Beneficiary White = 1	0.23	0.42	44	0.41	0.68	0.17	0.38	81	-0.74	0.46	0.20	0.40	121	-0.16	0.88	0.18	0.38	215	-1.25	0.21
Beneficiary Black = 1	0.09	0.29	44	0.17	0.86	0.11	0.32	81	0.96	0.34	0.08	0.28	121	-0.06	0.95	0.08	0.28	215	-0.02	0.99
Years of Farming Experience	23.9	15.0	44	0.03	0.98	24.7	12.0	81	0.59	0.56	22.5	14.2	121	-1.28	0.20	25.0	11.8	215	1.66	0.10
Year Applied	**2005.9**	**0.3**	**44**	**6.28**	**0.00**	**2005.7**	**0.5**	**81**	**5.81**	**0.00**	**2005.1**	**0.5**	**121**	**-5.63**	**0.00**	**2005.1**	**0.6**	**215**	**-9.32**	**0.00**
Household Members	**3.8**	**1.9**	**44**	**-4.36**	**0.00**	5.5	2.1	81	0.93	0.35	**4.3**	**1.9**	**121**	**-5.37**	**0.00**	**6.1**	**2.4**	**215**	**7.17**	**0.00**
Members Under 14 = 1	**0.30**	**0.46**	**44**	**-6.23**	**0.00**	**0.90**	**0.30**	**81**	**4.43**	**0.00**	**0.40**	**0.49**	**121**	**-8.40**	**0.00**	**0.85**	**0.36**	**215**	**6.43**	**0.00**
Members Under 18 = 1	**0.48**	**0.51**	**44**	**-5.99**	**0.00**	**0.94**	**0.24**	**81**	**3.26**	**0.00**	**0.57**	**0.50**	**121**	**-7.96**	**0.00**	**0.93**	**0.25**	**215**	**6.32**	**0.00**
Children Over 18 = 1	**0.50**	**0.51**	**44**	**-4.67**	**0.00**	**0.89**	**0.32**	**81**	**2.66**	**0.01**	**0.59**	**0.49**	**121**	**-5.85**	**0.00**	**0.90**	**0.30**	**215**	**5.68**	**0.00**

*Note: The significance tests compare each group to the remaining three groups.

Table 3b - Control and New Beneficiary Summary Statistics - Baseline Assets and Income

	No Treatment Group					Bolsa but not Land Credit					Land Credit but not Bolsa					Land Credit and Bolsa				
	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value
Baseline Assets and Incomes																				
Forest Production = 1	0.43	0.50	44	-1.52	0.13	0.53	0.50	81	-0.20	0.84	0.50	0.50	121	-1.13	0.26	0.56	0.50	215	0.83	0.41
Animal Ownership = 1	0.84	0.37	44	0.42	0.67	**0.74**	**0.44**	**81**	**-1.93**	**0.05**	0.78	0.42	121	-1.30	0.19	**0.86**	**0.35**	**215**	**2.13**	**0.03**
Own Land = 1	0.09	0.29	44	0.72	0.47	0.04	0.19	81	-1.12	0.26	0.06	0.23	121	-0.38	0.71	0.06	0.23	215	-0.73	0.47
Irrigation = 1	0.02	0.15	44	-0.22	0.83	0.01	0.11	81	-0.93	0.36	0.02	0.13	121	-0.87	0.39	0.02	0.14	215	-1.08	0.28
Value of Forest Production	197	413	43	-0.08	0.94	178	287	81	-0.65	0.51	199	359	117	-0.07	0.94	199	346	214	-0.12	0.91
Value of Animals	2574	5256	44	1.31	0.19	1344	2548	81	-1.50	0.13	2186	4135	120	1.01	0.31	1633	3020	214	-1.38	0.17
Land Owned (ha)	0.44	2.49	44	0.14	0.89	0.31	1.89	81	-0.44	0.66	0.41	2.01	121	0.07	0.95	0.32	1.61	215	-0.77	0.44
Value of Agricultural Assets	405	842	44	1.32	0.19	213	511	81	-1.03	0.30	301	527	121	0.38	0.71	245	645	215	-1.07	0.29
Value of Nonagricultural Assets	**6983**	**5954**	**44**	**1.68**	**0.09**	5490	5343	81	-0.11	0.91	**6370**	**5959**	**120**	**1.72**	**0.09**	5140	6014	211	-1.33	0.18
Dirt Floors = 1	0.23	0.42	44	0.06	0.96	**0.30**	**0.46**	**81**	**1.70**	**0.09**	**0.14**	**0.35**	**121**	**-2.51**	**0.01**	0.22	0.41	215	-0.24	0.81
Electricity = 1	0.89	0.32	44	1.27	0.21	0.84	0.37	81	0.61	0.54	**0.88**	**0.33**	**121**	**1.96**	**0.05**	**0.78**	**0.42**	**215**	**-1.89**	**0.06**
Food Secure = 1	**0.86**	**0.35**	**42**	**2.38**	**0.02**	0.65	0.48	78	-0.87	0.38	**0.79**	**0.41**	**114**	**2.47**	**0.01**	**0.59**	**0.49**	**210**	**-4.38**	**0.00**
Income from Paid Work = 1	0.84	0.37	44	-0.54	0.59	0.88	0.33	81	0.26	0.80	**0.92**	**0.28**	**121**	**1.84**	**0.07**	0.87	0.34	215	-0.14	0.89
Agricultural Producer = 1	0.91	0.29	44	1.28	0.20	0.89	0.32	81	1.27	0.20	**0.79**	**0.41**	**121**	**-1.93**	**0.05**	0.84	0.37	215	0.02	0.98
Nonfarm Labor Income = 1	**0.55**	**0.50**	**44**	**2.13**	**0.03**	0.42	0.50	81	0.48	0.63	**0.49**	**0.50**	**121**	**2.36**	**0.02**	**0.30**	**0.46**	**215**	**-3.65**	**0.00**
Agricultural Labor Income = 1	**0.48**	**0.51**	**44**	**-2.35**	**0.02**	0.68	0.47	81	0.79	0.43	0.62	0.49	121	-0.52	0.60	**0.70**	**0.46**	**215**	**2.29**	**0.02**
Sell Nonagricultural Goods = 1	0.05	0.21	44	-0.81	0.42	**0.02**	**0.16**	**81**	**-1.91**	**0.06**	0.07	0.26	121	-0.10	0.92	0.07	0.26	215	-0.15	0.88
Total Income	**234**	**133**	**43**	**7.54**	**0.00**	**75**	**37**	**80**	**-4.94**	**0.00**	**224**	**106**	**121**	**13.82**	**0.00**	**66**	**35**	**215**	**-12.55**	**0.00**
Total Earned Income	**144**	**94**	**42**	**4.79**	**0.00**	**54**	**36**	**81**	**-3.82**	**0.00**	**156**	**109**	**121**	**11.87**	**0.00**	**47**	**31**	**215**	**-9.77**	**0.00**
Total Labor Income	**95**	**79**	**44**	**4.49**	**0.00**	**40**	**35**	**81**	**-2.54**	**0.01**	**99**	**85**	**119**	**9.22**	**0.00**	**30**	**28**	**215**	**-8.43**	**0.00**
Value of Agricultural Production	35	45	42	1.44	0.15	**15**	**21**	**80**	**-2.39**	**0.02**	**46**	**62**	**120**	**6.02**	**0.00**	**15**	**20**	**215**	**-4.78**	**0.00**
Total Income from Government Ben	**5**	**8**	**44**	**-3.33**	**0.00**	**12**	**8**	**80**	**2.97**	**0.00**	**7**	**9**	**119**	**-2.99**	**0.00**	10	8	214	1.44	0.15
Savings = 1	0.36	0.49	44	0.95	0.34	0.25	0.43	81	-1.14	0.26	0.36	0.48	121	1.50	0.13	0.27	0.44	215	-1.46	0.15
Debt = 1	0.50	0.51	44	-1.42	0.15	0.59	0.49	81	-0.16	0.87	0.61	0.49	121	0.28	0.78	0.61	0.49	215	0.33	0.74
Individual Loans = 1	0.02	0.15	44	-0.53	0.59	0.05	0.22	81	0.62	0.53	0.03	0.18	121	-0.28	0.78	0.03	0.18	215	-0.47	0.64

*Note: The significance tests compare each group to the remaining three groups. Incomes measured in monthly per capita values.

Table 3c - Control and New Beneficiary Summary Statistics - 2010 Assets and Income

	No Treatment Group					Bolsa but not Land Credit					Land Credit but not Bolsa					Land Credit and Bolsa				
	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value
2010 Assets and Incomes																				
Forest Production = 1	0.25	0.44	44	-0.29	0.77	**0.16**	**0.37**	**81**	**-2.39**	**0.02**	0.31	0.46	121	1.05	0.30	0.27	0.44	215	0.05	0.96
Animal Ownership = 1	**0.68**	**0.47**	**44**	**-3.20**	**0.00**	**0.69**	**0.46**	**81**	**-4.29**	**0.00**	0.88	0.33	121	1.01	0.31	**0.89**	**0.31**	**215**	**2.43**	**0.02**
Own Land = 1	**0.23**	**0.42**	**44**	**-6.26**	**0.00**	**0.16**	**0.37**	**81**	**-10.94**	**0.00**	**0.83**	**0.38**	**121**	**4.82**	**0.00**	**0.75**	**0.43**	**215**	**4.15**	**0.00**
Irrigation = 1	0.05	0.21	44	0.30	0.77	**0.00**	**0.00**	**81**	**-1.93**	**0.05**	**0.07**	**0.25**	**121**	**1.90**	**0.06**	**0.01**	**0.12**	**215**	**-2.34**	**0.02**
Value of Forest Production	166	421	43	1.33	0.18	70	224	80	-1.44	0.15	111	232	120	-0.02	0.98	101	250	214	-0.71	0.48
Value of Animals	3130	6390	44	-0.73	0.47	**1751**	**4158**	**80**	**-3.24**	**0.00**	**4809**	**6316**	**121**	**2.12**	**0.03**	3586	5590	214	-0.58	0.56
Land Owned (ha)	**1.34**	**3.42**	**44**	**-3.17**	**0.00**	**2.75**	**10.29**	**81**	**-3.31**	**0.00**	7.80	10.22	121	1.12	0.26	7.46	10.31	215	1.16	0.25
Value of Agricultural Assets	465	855	44	-0.91	0.37	**278**	**506**	**80**	**-2.95**	**0.00**	**809**	**1187**	**120**	**2.29**	**0.02**	605	1086	213	-0.06	0.95
Value of Nonagricultural Assets	8766	10317	44	1.50	0.13	8092	7744	80	1.27	0.20	7211	7453	119	0.23	0.82	6571	8024	208	-1.18	0.24
Dirt Floors = 1	**0.30**	**0.46**	**44**	**3.29**	**0.00**	**0.23**	**0.43**	**81**	**2.88**	**0.00**	**0.07**	**0.25**	**121**	**-2.52**	**0.01**	**0.10**	**0.30**	**215**	**-2.05**	**0.04**
Electricity = 1	0.91	0.29	44	0.10	0.92	0.94	0.24	81	1.11	0.27	0.94	0.23	121	1.59	0.11	0.90	0.30	215	-0.16	0.87
Food Secure = 1	**0.66**	**0.48**	**44**	**1.91**	**0.06**	0.44	0.50	81	-1.51	0.13	**0.59**	**0.49**	**118**	**1.77**	**0.08**	**0.48**	**0.50**	**214**	**-1.71**	**0.09**
Income from Paid Work = 1	0.59	0.50	44	-1.07	0.28	**0.79**	**0.41**	**81**	**2.62**	**0.01**	0.71	0.46	121	1.23	0.22	0.63	0.48	215	-1.46	0.15
Agricultural Producer = 1	**0.91**	**0.29**	**44**	**-2.81**	**0.01**	**0.90**	**0.30**	**79**	**-4.59**	**0.00**	**1.00**	**0.00**	**121**	**2.06**	**0.04**	**0.99**	**0.10**	**213**	**2.00**	**0.05**
Nonfarm Labor Income = 1	0.34	0.48	44	0.27	0.79	**0.44**	**0.50**	**81**	**2.55**	**0.01**	0.36	0.48	121	1.09	0.28	**0.24**	**0.43**	**215**	**-3.50**	**0.00**
Agricultural Labor Income = 1	0.34	0.48	44	-1.39	0.17	0.49	0.50	81	1.05	0.29	0.46	0.50	121	0.57	0.57	0.48	0.50	215	1.48	0.14
Sell Nonagricultural Goods = 1	0.00	0.00	44	-1.17	0.24	0.04	0.19	81	0.54	0.59	0.02	0.13	121	-0.87	0.39	0.03	0.18	215	0.52	0.60
Total Income	**206**	**142**	**44**	**2.68**	**0.01**	**128**	**103**	**81**	**-1.79**	**0.07**	**214**	**173**	**115**	**5.53**	**0.00**	**115**	**102**	**211**	**-5.34**	**0.00**
Total Earned Income	**135**	**141**	**43**	**2.07**	**0.04**	99	98	81	-0.16	0.88	**145**	**153**	**114**	**4.82**	**0.00**	**73**	**81**	**214**	**-4.70**	**0.00**
Total Labor Income	74	103	42	1.36	0.17	62	66	80	0.51	0.61	**86**	**110**	**120**	**4.34**	**0.00**	**39**	**62**	**214**	**-4.29**	**0.00**
Value of Agricultural Production	35	51	44	-0.42	0.68	31	57	81	-1.19	0.24	**55**	**83**	**114**	**3.33**	**0.00**	**31**	**46**	**214**	**-2.20**	**0.03**
Total Income from Government Ben	**4**	**9**	**43**	**-5.31**	**0.00**	14	11	81	0.88	0.38	**10**	**12**	**120**	**-3.65**	**0.00**	**17**	**11**	**212**	**5.95**	**0.00**
Savings = 1	0.25	0.44	44	-0.40	0.69	0.26	0.44	81	-0.37	0.71	0.29	0.46	121	0.37	0.71	0.27	0.44	215	-0.47	0.64
Debt = 1	0.77	0.42	44	0.33	0.74	0.79	0.41	81	0.86	0.39	0.72	0.45	121	-0.95	0.34	0.76	0.43	215	0.27	0.78
Individual Loans = 1	0.02	0.15	44	-0.96	0.34	0.07	0.26	81	0.86	0.39	0.06	0.23	121	0.21	0.84	0.05	0.21	215	-0.63	0.53

*Note: The significance tests compare each group to the remaining three groups. Incomes measured in monthly per capita values.

Table 3d - Control and New Beneficiary Summary Statistics - Income Changes

	No Treatment Group					Bolsa but not Land Credit					Land Credit but not Bolsa					Land Credit and Bolsa				
	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value	Mean	St. Dev.	N	t-test	p-value
Baseline Incomes																				
Total Income	**234**	**133**	**43**	**7.54**	**0.00**	**75**	**37**	**80**	**-4.94**	**0.00**	**224**	**106**	**121**	**13.82**	**0.00**	**66**	**35**	**215**	**-12.55**	**0.00**
Total Earned Income	**144**	**94**	**42**	**4.79**	**0.00**	**54**	**36**	**81**	**-3.82**	**0.00**	**156**	**109**	**121**	**11.87**	**0.00**	**47**	**31**	**215**	**-9.77**	**0.00**
Total Labor Income	**95**	**79**	**44**	**4.49**	**0.00**	**40**	**35**	**81**	**-2.54**	**0.01**	**99**	**85**	**119**	**9.22**	**0.00**	**30**	**28**	**215**	**-8.43**	**0.00**
Value of Agricultural Production	35	45	42	1.44	0.15	**15**	**21**	**80**	**-2.39**	**0.02**	**46**	**62**	**120**	**6.02**	**0.00**	**15**	**20**	**215**	**-4.78**	**0.00**
Total Income from Government Benefits	4.81	7.62	44	-3.33	0.00	11.63	8.23	80	2.97	0.00	6.88	9.24	119	-2.99	0.00	9.64	7.95	214	1.44	0.15
2010 Incomes																				
Total Income	**206**	**142**	**44**	**2.68**	**0.01**	**128**	**103**	**81**	**-1.79**	**0.07**	**214**	**173**	**115**	**5.53**	**0.00**	**115**	**102**	**211**	**-5.34**	**0.00**
Total Earned Income	**135**	**141**	**43**	**2.07**	**0.04**	99	98	81	-0.16	0.88	**145**	**153**	**114**	**4.82**	**0.00**	**73**	**81**	**214**	**-4.70**	**0.00**
Total Labor Income	74	103	42	1.36	0.17	62	66	80	0.51	0.61	**86**	**110**	**120**	**4.34**	**0.00**	**39**	**62**	**214**	**-4.29**	**0.00**
Value of Agricultural Production	35	51	44	-0.42	0.68	31	57	81	-1.19	0.24	**55**	**83**	**114**	**3.33**	**0.00**	**31**	**46**	**214**	**-2.20**	**0.03**
Total Income from Government Benefits	**4.37**	**8.59**	**43**	**-5.31**	**0.00**	14.38	10.81	81	0.88	0.38	**9.89**	**12.07**	**120**	**-3.65**	**0.00**	**16.94**	**11.05**	**212**	**5.95**	**0.00**
Net Change (2010-Baseline)																				
Total Income	-28.29					52.67					-9.70					48.06				
Total Earned Income	-8.39					44.90					-10.48					26.42				
Total Labor Income	-21.11					22.37					-12.88					9.55				
Value of Agricultural Production	-0.25					15.89					9.13					16.31				
Total Income from Government Benefits	-0.44					2.74					3.01					7.30				

*Note: The significance tests compare each group to the remaining three groups. Incomes measured in monthly per capita values.

Table 4 - Joint Treatment Effects on Binary Agricultural Assets

	Forest Production (1/0)		Animal Ownership (1/0)		Land Ownership (1/0)		Irrigation Ownership (1/0)	
	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	0 Baseline
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment Effects								
Land Credit (β_L)	0.054	0.114	0.184	0.264	0.588	0.586	0.052	0.046
	[0.084]	[0.085]	[0.080]**	[0.256]	[0.096]***	[0.100]***	[0.046]	[0.046]
Bolsa (β_C)	-0.212	-0.156	-0.065	-0.44	-0.137	-0.191	0.009	-0.003
	[0.107]**	[0.122]	[0.110]	[0.510]	[0.100]	[0.108]*	[0.061]	[0.061]
Both (β_J)	0.052	0.055	-0.021	0.044	-0.029	0.006	-0.022	-0.012
	[0.087]	[0.102]	[0.093]	[0.276]	[0.089]	[0.093]	[0.040]	[0.042]
Observations	468	221	468	85	468	439	468	459
R-squared	0.14	0.16	0.15	0.38	0.34	0.37	0.13	0.12
Significance Test p-values								
Land Credit = Both	**0.060**	0.280	0.170	0.310	**0.020**	**0.020**	0.710	0.670
Bolsa = Both	0.120	**0.000**	**0.050**	**0.070**	**0.000**	**0.000**	0.110	**0.080**
Mean Dependent Variable (Neither Treatment)								
Mean	0.25	0.12	0.68	0.43	0.23	0.20	0.05	0.05
SD	0.44	0.33	0.47	0.53	0.42	0.41	0.21	0.21
Percent Change								
Land Credit Only (β_L)	22%	95%	27%	62%	259%	293%	114%	99%
Bolsa Only (β_C)	-85%	-130%	-10%	-103%	-60%	-96%	20%	-6%
Both (β_J)	21%	46%	-3%	10%	-13%	3%	-48%	-26%
Both ($\beta_L+\beta_C+\beta_J$)	-42%	11%	14%	-31%	186%	201%	86%	67%

Notes: Robust standard errors are clustered at the settlement level and reported in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level. For continuous outcomes, outliers are trimmed at the top and bottom 1 percent of observations. The following controls are included: dummy variables measuring whether or not each household has children under 14, under 18, or any children at all, dummy variables measuring whether or not monthly per capita household income is less than R$120, R$180, and R$240, the number of household members, the beneficiary's age, gender, education, education squared, race (dummies measuring if white and if black), and years of farming experience, the application year, dummy if pension payments are received, and baseline assets (value of forest production, value of animals, land ownership dummy, dirt floors dummy, electricity dummy, the value of agricultural assets, and the value of nonagricultural assets).

For each variable, the first column reports results for all households and the second column reports results for only households with 0 baseline levels (for binary outcomes) or positive levels (for continuous outcomes).

Table 5 - Joint Treatment Effects on Assets and Agricultural Outcomes

	Value of Forest Production		Value of Animals		Land Owned (ha)	Value of Agricultural Assets		Value of Nonagricultural Assets
	All HHs	Pos. Baseline	All HHs	Pos. Baseline	All HHs	All HHs	Pos. Baseline	All HHs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment Effects								
Land Credit	-61.276	-113.841	1781.611	1741.497	8.16	464.31	444.634	172.877
	[56.267]	[101.979]	[919.199]*	[1,266.570]	[1.634]***	[193.533]**	[204.357]**	[1,629.294]
Bolsa	-220.341	-295.546	-771.452	-1566.798	1.415	58.839	71.847	-1451.872
	[94.819]**	[171.440]*	[1,150.836]	[1,662.711]	[1.986]	[215.833]	[266.089]	[2,232.601]
Both	85.762	177.562	-542.235	-578.155	-2.934	-163.992	-223.477	281.208
	[65.103]	[118.205]	[992.704]	[1,483.194]	[1.867]	[176.221]	[208.103]	[1,978.583]
Observations	458	239	464	289	468	464	320	453
R-squared	0.21	0.29	0.29	0.31	0.19	0.18	0.23	0.23
Significance Test p-values								
Land Credit = Both	**0.03**	0.20	0.16	**0.09**	0.30	0.58	0.48	0.370
Bolsa = Both	0.49	0.33	0.13	0.30	**0.00**	**0.07**	0.25	0.690
Mean Dependent Variable (Neither Treatment)								
Mean	169.70	373.75	3130.31	5305.88	1.34	465.26	517.32	15251.67
SD	425.38	594.78	6389.83	7930.82	3.42	854.67	888.89	19508.73
Percent Change								
Land Credit Only	-36%	-30%	57%	33%	610%	100%	86%	1%
Bolsa Only	-130%	-79%	-25%	-30%	106%	13%	14%	-10%
Both (β_J)	51%	48%	-17%	-11%	-219%	-35%	-43%	2%
Both ($\beta_L+\beta_C+\beta_J$)	-115%	-62%	15%	-8%	496%	77%	57%	-7%

Notes: Robust standard errors are clustered at the settlement level and reported in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level. For continuous outcomes, outliers are trimmed at the top and bottom 1 percent of observations. The following controls are included: dummy variables measuring whether or not each household has children under 14, under 18, or any children at all, dummy variables measuring whether or not monthly per capita household income is less than R$120, R$180, and R$240, the number of household members, the beneficiary's age, gender, education, education squared, race (dummies measuring if white and if black), and years of farming experience, the application year, dummy if pension payments are received, and baseline assets (value of forest production, value of animals, land ownership dummy, dirt floors dummy, electricity dummy, the value of agricultural assets, and the value of nonagricultural assets).

For each variable, the first column reports results for all households and the second column reports results for only households with 0 baseline levels (for binary outcomes) or positive levels (for continuous outcomes).

Table 6 - Joint Treatment Effects on Income Sources and Levels

	Income from Paid Work (1/0)		Agricultural Producer (1/0)		Nonfarm Labor Earnings (1/0)		Change in Total Income		Change in the Value of Ag. Production		Change in Labor Income	
	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	Pos. Baseline	All HHs	Pos. Baseline	All HHs	Pos. Baseline
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment Effects												
Land Credit	0.109	0.275	0.081	0.837	0.029	0.123	26.021	38.926	16.631	20.26	-7.921	-48.452
	[0.084]	[0.188]	[0.038]**	[0.229]***	[0.081]	[0.109]	[28.041]	[35.312]	[13.284]	[16.215]	[16.294]	[36.554]
Bolsa	0.046	-0.15	-0.008	0.302	0.037	0.086	30.264	13.713	12.756	14.244	25.163	-7.807
	[0.137]	[0.361]	[0.036]	[0.287]	[0.123]	[0.141]	[37.532]	[44.792]	[18.321]	[23.490]	[25.881]	[39.387]
Both	-0.251	-0.261	0.008	-0.248	-0.185	-0.183	-25.065	-53.63	-14.036	-27.817	-9.553	39.977
	[0.104]**	[0.312]	[0.039]	[0.203]	[0.106]*	[0.137]	[29.864]	[36.285]	[13.919]	[18.703]	[19.439]	[33.325]
Observations	468	58	464	71	468	284	459	270	460	253	458	188
R-squared	0.14	0.46	0.11	0.69	0.18	0.11	0.16	0.17	0.12	0.16	0.13	0.3
Significance Test p-values												
Land Credit = Both	**0.050**	0.290	0.990	0.690	0.100	0.350	0.860	0.260	0.930	0.410	0.370	0.150
Bolsa = Both	**0.020**	0.950	**0.040**	**0.000**	**0.050**	0.570	0.950	0.440	0.730	0.490	0.130	0.550
Mean Dependent Variable (Neither Treatment)												
Mean	0.59	0.29	0.91	0.25	0.34	0.15	-14.89	115.17	-5.47	37.81	-14.11	120.87
SD	0.50	0.49	0.29	0.50	0.48	0.37	159.44	124.67	52.88	42.62	111.72	95.94
Percent Change												
Land Credit Only	18%	96%	9%	335%	9%	82%	-175%	34%	-304%	54%	56%	-40%
Bolsa Only	8%	-52%	-1%	121%	11%	57%	-203%	12%	-233%	38%	-178%	-6%
Both (β_J)	-42%	-91%	1%	-99%	-54%	-122%	168%	-47%	257%	-74%	68%	33%
Both ($\beta_L+\beta_C+\beta_J$)	-16%	-48%	9%	356%	-35%	17%	-210%	-1%	-281%	18%	-54%	-13%

Notes: Robust standard errors are clustered at the settlement level and reported in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level. For continuous outcomes, outliers are trimmed at the top and bottom 1 percent of observations. The following controls are included: dummy variables measuring whether or not each household has children under 14, under 18, or any children at all, dummy variables measuring whether or not monthly per capita household income is less than R$120, R$180, and R$240, the number of household members, the beneficiary's age, gender, education, education squared, race (dummies measuring if white and if black), and years of farming experience, the application year, dummy if pension payments are received, and baseline assets (value of forest production, value of animals, land ownership dummy, dirt floors dummy, electricity dummy, the value of agricultural assets, and the value of nonagricultural assets).
For each variable, the first column reports results for all households and the second column reports results for only households with 0 baseline levels (for binary outcomes) or positive levels (for continuous outcomes). All changes in incomes are measured in monthly per capita terms.

Table 7 - Robustness Checks of Joint Impact Evaluation for Main Outcomes

	Animal Ownership (1/0)		Land Ownership (1/0)		Value of Animals		Land Owned (ha)	Value of Agricultural Assets		Change in Total Income		Change in the Value of Ag. Production	
	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	Pos. Baseline	All HHs	All HHs	Pos. Baseline	All HHs	Pos. Baseline	All HHs	Pos. Baseline
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Treatment Effects - Original Estimation													
Land Credit (β_L)	0.184	0.264	0.588	0.586	1781.611	1741.497	8.16	464.31	444.634	26.021	38.926	16.631	20.26
	[0.080]**	[0.256]	[0.096]***	[0.100]***	[919.199]*	[1,266.570]	[1.634]***	[193.533]**	[204.357]**	[28.041]	[35.312]	[13.284]	[16.215]
Bolsa (β_C)	-0.065	-0.44	-0.137	-0.191	-771.452	-1566.798	1.415	58.839	71.847	30.264	13.713	12.756	14.244
	[0.110]	[0.510]	[0.100]	[0.108]*	[1,150.836]	[1,662.711]	[1.986]	[215.833]	[266.089]	[37.532]	[44.792]	[18.321]	[23.490]
Both (β_J)	-0.021	0.044	-0.029	0.006	-542.235	-578.155	-2.934	-163.992	-223.477	-25.065	-53.63	-14.036	-27.817
	[0.093]	[0.276]	[0.089]	[0.093]	[992.704]	[1,483.194]	[1.867]	[176.221]	[208.103]	[29.864]	[36.285]	[13.919]	[18.703]
Treatment Effects - Restrict Analysis to Households With Baseline Income Less Than R$300													
Land Credit (β_L)	0.177	0.466	0.601	0.601	1877.363	1826.701	8.225	478.479	413.488	3.387	31.22	17.773	9.996
	[0.079]**	[0.215]**	[0.101]***	[0.108]***	[853.185]**	[1,248.052]	[1.536]***	[200.712]**	[207.159]**	[27.139]	[34.398]	[13.560]	[16.038]
Bolsa (β_C)	-0.083	-0.257	-0.134	-0.185	-614.809	-1533.239	0.933	68.63	56.928	12.417	5.893	8.11	5.186
	[0.115]	[0.561]	[0.106]	[0.116]	[1,161.187]	[1,699.880]	[1.982]	[219.840]	[274.309]	[37.035]	[45.233]	[17.513]	[24.384]
Both (β_J)	-0.006	-0.106	-0.036	-0.005	-659.157	-580.678	-2.665	-173.126	-211.041	-2.04	-49.077	-15.803	-17.342
	[0.098]	[0.277]	[0.096]	[0.103]	[945.951]	[1,483.083]	[1.869]	[179.998]	[213.799]	[28.872]	[37.118]	[14.104]	[19.098]
Treatment Effects - Restrict Analysis to Households With Baseline Income Less Than R$120													
Land Credit (β_L)	0.055	0.915	0.701	0.774	853.985	997.601	9.771	120.848	247.801	-34.302	-1.722	-0.552	-4.003
	[0.146]	[0.309]***	[0.157]***	[0.171]***	[1,398.339]	[2,135.090]	[1.951]***	[361.243]	[358.899]	[43.830]	[52.427]	[25.625]	[33.790]
Bolsa (β_C)	-0.163		-0.103	-0.099	-1343.89	-2077.076	0.099	-236.231	-217.051	-6.318	-0.608	-0.395	11.554
	[0.151]		[0.155]	[0.183]	[1,626.415]	[2,215.600]	[1.999]	[365.717]	[408.145]	[47.314]	[60.889]	[28.398]	[38.939]
Both (β_J)	0.107	-0.616	-0.136	-0.172	404.897	-98.562	-3.246	121.354	-27.911	28.45	-7.968	1.859	-7.976
	[0.149]	[0.337]*	[0.141]	[0.173]	[1,525.549]	[2,253.799]	[1.868]*	[340.643]	[356.357]	[44.630]	[54.269]	[26.360]	[35.992]
Treatment Effects - Bolsa Eligibility Extended to Households With R$180 or Less (Rather than R$120)													
Land Credit (β_L)	0.166	0.206	0.623	0.629	2174.848	2791.08	8.75	464.629	493.048	56.368	90.224	21.152	17.62
	[0.090]*	[0.292]	[0.099]***	[0.101]***	[1,040.240]**	[1,517.446]*	[1.670]***	[206.970]**	[226.339]**	[34.549]	[36.793]**	[15.187]	[20.010]
Bolsa (β_C)	-0.033	-0.506	0	-0.044	-628.574	-863.662	-0.559	-18.947	-4.449	67.076	61.307	20.301	25.098
	[0.109]	[0.475]	[0.104]	[0.110]	[1,172.400]	[1,628.153]	[1.588]	[195.375]	[237.791]	[35.530]*	[45.159]	[17.200]	[24.088]
Both (β_J)	0.009	0.135	-0.068	-0.044	-926.888	-1705.061	-3.23	-138.923	-246.385	-63.097	-109.605	-18.611	-20.498
	[0.099]	[0.297]	[0.089]	[0.094]	[1,103.824]	[1,659.142]	[1.644]*	[202.291]	[237.046]	[35.902]*	[39.235]***	[14.868]	[21.666]
Treatment Effects - Include New Beneficiaries (That Received Land Between 2006 and 2010) in the Control													
Land Credit (β_L)	0.076	0.211	0.402	0.409	468.94	-415.595	3.424	371.89	494.32	26.021	38.926	16.631	20.26
	[0.065]	[0.193]	[0.098]***	[0.103]***	[1,157.367]	[1,736.616]	[2.469]	[222.194]*	[211.644]**	[28.041]	[35.312]	[13.284]	[16.215]
Bolsa (β_C)	-0.089	-0.146	-0.112	-0.151	-1528.004	-2643.764	-0.91	17.072	198.034	30.264	13.713	12.756	14.244
	[0.086]	[0.440]	[0.101]	[0.104]	[1,328.209]	[1,848.571]	[2.362]	[258.579]	[286.630]	[37.532]	[44.792]	[18.321]	[23.490]
Both (β_J)	0.002	-0.027	-0.056	-0.038	16.993	789.886	-0.167	-187.182	-414.784	-25.065	-53.63	-14.036	-27.817
	[0.074]	[0.214]	[0.089]	[0.096]	[1,146.702]	[1,805.171]	[2.173]	[236.861]	[271.683]	[29.864]	[36.285]	[13.919]	[18.703]
Treatment Effects - Controling for Continuous Income Rather than Discrete Income Groups													
Land Credit (β_L)	0.186	0.384	0.589	0.589	1959.763	1694.271	8.55	495.045	475.283	19.421	39.473	15.003	21.026
	[0.085]**	[0.234]	[0.096]***	[0.101]***	[953.721]**	[1,358.483]	[1.644]***	[185.948]***	[198.120]**	[27.819]	[35.521]	[12.929]	[15.414]
Bolsa (β_C)	-0.03	-0.089	-0.107	-0.157	385.442	-793.213	3.418	371.485	364.181	20.486	42.904	17.487	29.857
	[0.098]	[0.319]	[0.091]	[0.096]	[1,144.596]	[1,669.929]	[1.719]**	[181.603]**	[210.310]*	[36.410]	[44.830]	[14.203]	[19.777]
Both (β_J)	-0.026	-0.081	-0.031	0.002	-663.333	-565.468	-3.195	-185.448	-245.66	-23.451	-50.983	-13.249	-27.758
	[0.094]	[0.242]	[0.088]	[0.094]	[989.236]	[1,520.907]	[1.822]*	[169.374]	[200.684]	[28.308]	[36.122]	[13.198]	[17.956]
Treatment Effects - Continuous Outcomes Measured in Logs													
Land Credit (β_L)	0.184	0.264	0.588	0.586	0.371	0.371	0.702	0.937		0.689	0.706	0.497	0.756
	[0.080]**	[0.256]	[0.096]***	[0.100]***	[0.399]	[0.399]	[0.427]	[0.292]***		[0.389]*	[0.385]*	[0.427]	[0.398]*
Bolsa (β_C)	-0.065	-0.44	-0.137	-0.191	-0.266	-0.266	0.85	0.373		-0.014	0.335	0.201	0.452
	[0.110]	[0.510]	[0.100]	[0.108]*	[0.640]	[0.640]	[0.525]	[0.433]		[0.540]	[0.484]	[0.611]	[0.600]
Both (β_J)	-0.021	0.044	-0.029	0.006	-0.4	-0.4	-1.023	-0.621		-0.586	-0.725	-0.55	-0.774
	[0.093]	[0.276]	[0.089]	[0.093]	[0.470]	[0.470]	[0.522]*	[0.328]*		[0.425]	[0.393]*	[0.525]	[0.486]

*Regressions run as before except for the change described for each robustness check. All changes in incomes are measured in monthly per capita terms.

Table 8 - Estimation of Attrition Weights

	First Attrition Specification		Second Attrition Specification	
		With Instruments		With Instruments
Household Members	-0.016**	-0.018**	-0.019***	-0.021***
	[0.007]	[0.008]	[0.007]	[0.007]
Benficiary Age	0.000	-0.001	-0.001	-0.002
	[0.002]	[0.002]	[0.002]	[0.002]
Benficiary Gender	0.044	0.048	0.041	0.042
	[0.037]	[0.038]	[0.037]	[0.038]
Benficiary Education	0.001	0.002	0.004	0.004
	[0.005]	[0.005]	[0.005]	[0.005]
Benficiary Education Squared	-0.000	-0.000	-0.000	-0.000
	[0.000]	[0.000]	[0.000]	[0.000]
Benficiary White (=1)	0.034	0.041	0.002	0.006
	[0.036]	[0.037]	[0.036]	[0.037]
Benficiary Black (=1)	0.018	0.052	0.044	0.076
	[0.050]	[0.052]	[0.051]	[0.053]
Years of Farming Experience	-0.006***	-0.004*	-0.005**	-0.003
	[0.002]	[0.002]	[0.002]	[0.002]
Application Year	0.142***	0.141***	0.056***	0.057**
	[0.025]	[0.025]	[0.022]	[0.022]
Lagged Total Income		-0.000		-0.000
		[0.000]		[0.000]
Lived in a Different City Within Last 10 Year		0.062*		0.089**
		[0.037]		[0.037]
Enumerator Fixed Effects	No	Yes	No	Yes
Observations	1,214	1,214	1,214	1,214

Probit estimation. Marginal effects reported.

Notes: Robust standard errors are clustered at the settlement level and reported in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level. Specification one defines attritors to be all households that fail to appear in the 2010 survey, including all new beneficiaries. Specification two includes new beneficiaries in the control group and defines attritors to be those households that fail to appear in the 2010 survey.

Table 9 - Robustness Checks of Joint Impact Evaluation for Main Outcomes

	Animal Ownership (1/0)		Land Ownership (1/0)		Value of Animals		Land Owned (ha)	Value of Agricultural Assets		Change in Total Income		Change in the Value of Ag. Production	
	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	Pos. Baseline	All HHs	All HHs	Pos. Baseline	All HHs	Pos. Baseline	All HHs	Pos. Baseline
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Treatment Effects - Original Estimation													
Land Credit (β_L)	0.184	0.264	0.588	0.586	1781.611	1741.497	8.16	464.31	444.634	26.021	38.926	16.631	20.26
	[0.080]**	[0.256]	[0.096]***	[0.100]***	[919.199]*	[1,266.570]	[1.634]***	[193.533]**	[204.357]**	[28.041]	[35.312]	[13.284]	[16.215]
Bolsa (β_C)	-0.065	-0.44	-0.137	-0.191	-771.452	-1566.798	1.415	58.839	71.847	30.264	13.713	12.756	14.244
	[0.110]	[0.510]	[0.100]	[0.108]*	[1,150.836]	[1,662.711]	[1.986]	[215.833]	[266.089]	[37.532]	[44.792]	[18.321]	[23.490]
Both (β_J)	-0.021	0.044	-0.029	0.006	-542.235	-578.155	-2.934	-163.992	-223.477	-25.065	-53.63	-14.036	-27.817
	[0.093]	[0.276]	[0.089]	[0.093]	[992.704]	[1,483.194]	[1.867]	[176.221]	[208.103]	[29.864]	[36.285]	[13.919]	[18.703]
Treatment Effects - Attrition Weights Treating New Beneficiaries as Attritors													
Land Credit (β_L)	0.182	0.307	0.628	0.623	1832.757	1593.211	8.614	455.871	445.163	24.613	41.546	17.471	20.639
	[0.077]**	[0.242]	[0.091]***	[0.096]***	[935.203]*	[1,342.861]	[1.660]***	[193.176]**	[207.800]**	[27.018]	[34.553]	[11.753]	[14.677]
Bolsa (β_C)	-0.031	-0.356	-0.134	-0.186	-1142.527	-2293.717	1.351	42.503	91.298	24.362	10.493	9.064	12.081
	[0.110]	[0.503]	[0.091]	[0.099]*	[1,240.292]	[1,855.074]	[2.015]	[219.456]	[275.045]	[37.121]	[45.921]	[16.503]	[20.821]
Both (β_J)	-0.041	-0.026	-0.048	-0.008	-613.059	-436.531	-3.413	-168.352	-250.896	-21.919	-55.147	-13.949	-26.833
	[0.090]	[0.272]	[0.081]	[0.086]	[1,052.827]	[1,631.622]	[1.955]*	[178.308]	[211.816]	[29.025]	[35.804]	[12.791]	[17.768]
Treatment Effects - Includes New Beneficiaries in Control and Allows New Beneficiaries to be Attritors or Nonattritors													
Land Credit (β_L)	0.067	0.199	0.413	0.415	564.994	-201.415	3.23	390.111	501.787	2.533	1.433	6.061	4.059
	[0.062]	[0.186]	[0.101]***	[0.106]***	[1,157.859]	[1,714.995]	[2.605]	[219.863]*	[209.490]**	[28.752]	[39.009]	[15.415]	[17.952]
Bolsa (β_C)	-0.081	-0.121	-0.116	-0.155	-1668.837	-2855.602	-1.267	14.185	205.013	7.236	-23.385	1.406	-10.34
	[0.082]	[0.431]	[0.102]	[0.110]	[1,417.023]	[2,015.476]	[2.505]	[255.304]	[281.512]	[33.364]	[38.735]	[18.312]	[20.655]
Both (β_J)	0.006	-0.043	-0.053	-0.031	-73.426	606.102	-0.14	-202.563	-431.033	0.837	-19.879	-3.606	-8.079
	[0.069]	[0.214]	[0.087]	[0.094]	[1,196.089]	[1,824.880]	[2.311]	[219.991]	[246.421]*	[29.900]	[39.696]	[14.958]	[17.631]

*Regressions run as before except for the change described for each robustness check. All changes in incomes are measured in monthly per capita terms.

Table 10 - Joint Treatment Effects and Gender/Location Interactions

	Animal Ownership (1/0)		Land Ownership (1/0)		Value of Animals		Land Owned (ha)	Value of Agricultural Assets		Change in Total Income		Change in the Value of Ag. Production	
	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	Pos. Baseline	All HHs	All HHs	Pos. Baseline	All HHs	Pos. Baseline	All HHs	Pos. Baseline
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Treatment Effects - Interactions with Gender													
Land Credit (β_L)	0.111	0.057	0.577	0.577	1429.658	1505.743	8.331	421.989	469.251	36.121	43.995	24.511	26.871
	[0.093]	[0.287]	[0.107]***	[0.112]***	[1,019.978]	[1,523.576]	[1.766]***	[216.955]*	[252.472]*	[33.614]	[45.481]	[15.476]	[20.000]
Bolsa (β_C)	-0.097	-0.672	-0.102	-0.168	-746.741	-1522.451	1.856	-14.938	19.013	27.382	0.528	17.177	19.525
	[0.115]	[0.546]	[0.111]	[0.115]	[1,224.072]	[1,871.095]	[2.281]	[228.501]	[273.273]	[39.975]	[50.277]	[19.835]	[26.507]
Both (β_J)	0.044	0.344	-0.016	0.026	-80.2	-83.085	-3.509	-52.309	-213.144	-29.243	-52.864	-18.862	-30.495
	[0.097]	[0.322]	[0.101]	[0.102]	[1,153.820]	[1,807.141]	[2.148]	[216.668]	[257.960]	[33.249]	[45.046]	[16.205]	[22.031]
Land Credit * Female	0.374	0.73	0.062	0.04	1800.055	1862.38	-0.917	219.302	-90.203	-49.915	-32.698	-38.13	-24.481
	[0.148]**	[0.414]*	[0.190]	[0.214]	[2,079.976]	[3,037.800]	[2.387]	[352.697]	[294.792]	[51.965]	[71.014]	[22.708]*	[37.306]
Bolsa * Female	0.177	0.715	-0.148	-0.109	-16.27	-695.42	-2.022	340.27	311.746	9.063	72.4	-22.117	-14.702
	[0.159]	[0.528]	[0.206]	[0.225]	[1,627.211]	[2,527.446]	[2.312]	[255.981]	[324.369]	[42.467]	[62.586]	[14.998]	[28.263]
Both * Female	-0.365	-1.092	-0.119	-0.137	-2816.847	-3375.635	2.808	-571.22	-38.87	30.507	25.781	24.9	7.508
	[0.177]**	[0.693]	[0.238]	[0.258]	[2,153.066]	[3,424.452]	[3.297]	[440.594]	[466.590]	[57.906]	[85.990]	[23.303]	[37.015]
Female	-0.254	-0.675	0.041	0.03	105.294	1381.926	0.354	-273.616	-289.728	-5.279	54.947	-22.652	-0.415
	[0.138]*	[0.366]*	[0.176]	[0.201]	[1,746.489]	[2,561.151]	[1.770]	[210.740]	[231.230]	[42.395]	[57.184]	[15.111]	[28.868]
Treatment Effects - Interactions with Location													
Land Credit (β_L)	0.077	0.228	0.593	0.57	1891.417	2202.55	7.634	510.722	519.675	30.503	54.002	20.283	22.842
	[0.088]	[0.338]	[0.110]***	[0.120]***	[1,047.739]*	[1,490.595]	[1.821]***	[201.243]**	[217.831]**	[33.841]	[43.899]	[15.047]	[17.738]
Bolsa (β_C)	-0.077	-0.446	-0.106	-0.167	-458.697	-980.901	1.729	138.839	166.007	35.151	20.769	22.837	28.997
	[0.114]	[0.517]	[0.110]	[0.122]	[1,207.428]	[1,747.614]	[2.148]	[211.959]	[252.500]	[39.541]	[49.731]	[18.989]	[25.448]
Both (β_J)	0.002	-0.101	-0.089	-0.032	-814.907	-1101.044	-3.314	-168.203	-227.596	-25.841	-56.1	-23.203	-41.751
	[0.098]	[0.365]	[0.103]	[0.114]	[1,214.439]	[1,746.081]	[2.263]	[217.439]	[249.422]	[33.433]	[43.443]	[15.242]	[21.541]*
Land Credit * Urban	0.416	0.403	-0.031	0.064	-449.672	-1662.832	1.682	-170.939	-279.418	-17.251	-81.688	-17.809	-30.433
	[0.142]***	[0.471]	[0.189]	[0.186]	[1,659.242]	[2,644.039]	[2.736]	[445.876]	[619.265]	[59.910]	[76.460]	[22.598]	[39.896]
Bolsa * Urban	0.101	0.429	-0.086	-0.015	-978.35	-2039.949	-1.257	-285.404	-361.624	-18.117	-48.879	-38.817	-69.825
	[0.182]	[0.414]	[0.160]	[0.150]	[1,279.249]	[2,113.483]	[2.159]	[355.091]	[515.510]	[57.215]	[66.438]	[14.561]***	[33.571]**
Both * Urban	-0.171	0.053	0.209	0.105	591.292	1442.71	1.441	-130.047	-136.909	-5.301	31.912	29.593	60.168
	[0.204]	[0.510]	[0.208]	[0.199]	[1,989.438]	[3,321.346]	[3.880]	[549.176]	[802.975]	[68.335]	[84.908]	[24.465]	[44.373]
Urban	-0.299	-0.51	-0.076	-0.142	-69.993	1055.779	-0.301	162.379	363.784	12.009	78.088	16.874	26.591
	[0.123]**	[0.408]	[0.142]	[0.140]	[1,201.755]	[1,833.874]	[1.407]	[332.115]	[477.699]	[47.239]	[59.503]	[13.332]	[30.550]

Notes: Robust standard errors are clustered at the settlement level and reported in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level. For continuous outcomes, outliers are trimmed at the top and bottom 1 percent of observations. The following controls are included: dummy variables measuring whether or not each household has children under 14, under 18, or any children at all, dummy variables measuring whether or not monthly per capita household income is less than R$120, R$180, and R$240, the number of household members, the beneficiary's age, gender, education, education squared, race (dummies measuring if white and if black), and years of farming experience, the application year, dummy if pension payments are received, and baseline assets (value of forest production, value of animals, land ownership dummy, dirt floors dummy, electricity dummy, the value of agricultural assets, and the value of nonagricultural assets). All changes in incomes are measured in monthly per capita terms.

For each variable, the first column reports results for all households and the second column reports results for only households with 0 baseline levels (for binary outcomes) or positive levels (for continuous outcomes).

Table 11 - Joint Treatment Effects and Land/Migration Interactions

	Animal Ownership (1/0)		Land Ownership (1/0)		Value of Animals		Land Owned (ha)	Value of Agricultural Assets		Change in Total Income		Change in the Value of Ag. Production	
	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	Pos. Baseline	All HHs	All HHs	Pos. Baseline	All HHs	Pos. Baseline	All HHs	Pos. Baseline
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Treatment Effects - Interactions with Baseline Land Ownership (has)													
Land Credit (β_L)	0.21	0.264	0.62	0.586	1967.934	1908.989	8.071	422.141	388.428	25.462	24.781	16.243	13.174
	[0.082]**	[0.256]	[0.098]***	[0.100]***	[953.020]**	[1,368.144]	[1.688]***	[188.999]**	[201.858]*	[29.220]	[39.461]	[13.680]	[17.413]
Bolsa (β_C)	-0.066	-0.44	-0.161	-0.191	-773.693	-1695.817	0.269	43.622	58.62	30.29	9.33	14.08	13.337
	[0.112]	[0.510]	[0.101]	[0.108]*	[1,163.033]	[1,731.343]	[1.941]	[214.759]	[266.043]	[37.010]	[48.220]	[18.170]	[24.518]
Both (β_J)	-0.035	0.044	-0.031	0.006	-714.662	-697.632	-2.218	-138.653	-199.251	-25.724	-32.73	-14.445	-18.718
	[0.094]	[0.276]	[0.090]	[0.093]	[1,042.518]	[1,627.102]	[1.852]	[184.572]	[219.705]	[30.464]	[40.722]	[14.085]	[19.721]
Land Credit * Land Ownership	-0.051	0.363	-0.072		-351.078	-205.236	0.103	76.077	70.601	3.311	33.956	1.138	12.031
	[0.024]**	[0.177]**	[0.019]***		[406.507]	[377.252]	[0.401]	[93.741]	[94.210]	[8.884]	[25.651]	[3.487]	[6.440]*
Bolsa * Land Ownership	0.005		0.04		46.726	176.637	2.204	16.426	14.443	2.941	73.782	-2.085	22.156
	[0.018]		[0.017]**		[206.142]	[233.863]	[0.504]***	[29.716]	[31.848]	[4.310]	[62.921]	[1.916]	[13.747]
Both * Land Ownership	0.008		-0.004		121.185	-22.629	-1.567	0.992	9.557	-4.603	-93.994	0.564	-31.866
	[0.030]		[0.024]		[520.561]	[517.119]	[0.724]**	[91.650]	[92.695]	[9.292]	[65.624]	[3.776]	[15.372]**
Land Ownership	0.009		0.035		-82.213	-166.34	-0.535	-14.808	-14.39	-11.688	-18.774	-0.509	-3.47
	[0.014]		[0.013]***		[177.853]	[209.624]	[0.361]	[23.282]	[26.945]	[3.442]***	[24.826]	[1.730]	[1.513]**
Treatment Effects - Interactions with Migration (=1 if a household lived in a different place within 10 years of the baseline)													
Land Credit (β_L)	0.202	0.366	0.613	0.605	1517.776	1675.514	7.744	334.056	287.493	11.371	23.62	12.924	7.618
	[0.087]**	[0.278]	[0.101]***	[0.106]***	[976.205]	[1,343.398]	[1.696]***	[197.888]*	[209.848]	[28.205]	[36.870]	[15.383]	[17.001]
Bolsa (β_C)	-0.048	-0.347	-0.086	-0.155	-538.034	-1243.641	1.933	-11.518	-26.597	11.8	7.839	9.859	1.18
	[0.108]	[0.545]	[0.104]	[0.109]	[1,221.135]	[1,822.792]	[2.068]	[229.218]	[283.265]	[37.537]	[42.822]	[18.711]	[22.643]
Both (β_J)	-0.017	-0.118	-0.053	-0.01	-355.545	-654.126	-2.745	-51.932	-18.801	-16.78	-47.94	-12.236	-16.614
	[0.095]	[0.305]	[0.096]	[0.098]	[1,136.564]	[1,675.684]	[2.007]	[189.919]	[239.203]	[30.089]	[36.656]	[15.958]	[19.529]
Land Credit * Migration	-0.092	-1.095	-0.154	-0.119	1203.518	1070.854	1.767	690.921	883.093	85.807	135.27	18.286	52.099
	[0.161]	[0.395]***	[0.163]	[0.179]	[1,907.713]	[3,412.316]	[2.854]	[294.331]**	[335.635]***	[48.169]*	[64.229]**	[20.912]	[28.664]*
Bolsa * Migration	-0.052	-1.038	-0.304	-0.217	-1481.086	-1831.63	-4.175	321.254	529.611	84.099	79.119	8.688	33.416
	[0.209]	[0.422]**	[0.188]	[0.193]	[1,665.925]	[2,720.411]	[2.357]*	[252.908]	[384.005]	[47.553]*	[56.852]	[19.379]	[29.075]
Both * Migration	-0.057	1.265	0.181	0.116	-483.642	53.016	0.707	-553.377	-1225.625	-42.302	-71.679	-3.956	-14.814
	[0.223]	[0.475]**	[0.229]	[0.243]	[2,727.339]	[4,351.496]	[4.422]	[391.578]	[551.745]**	[56.311]	[72.313]	[23.384]	[34.405]
Migration	0.145	1.026	0.215	0.163	1097.086	889.631	1.086	-350.159	-434.076	-116.714	-124.09	-20.778	-75.365
	[0.148]	[0.337]***	[0.142]	[0.158]	[1,393.652]	[2,362.584]	[1.849]	[193.700]*	[254.274]*	[40.023]***	[53.640]**	[17.223]	[23.385]***

Notes: Robust standard errors are clustered at the settlement level and reported in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level. For continuous outcomes, outliers are trimmed at the top and bottom 1 percent of observations. The following controls are included: dummy variables measuring whether or not each household has children under 14, under 18, or any children at all, dummy variables measuring whether or not monthly per capita household income is less than R$120, R$180, and R$240, the number of household members, the beneficiary's age, gender, education, education squared, race (dummies measuring if white and if black), and years of farming experience, the application year, dummy if pension payments are received, and baseline assets (value of forest production, value of animals, land ownership dummy, dirt floors dummy, electricity dummy, the value of agricultural assets, and the value of nonagricultural assets). All changes in incomes are measured in monthly per capita terms.

For each variable, the first column reports results for all households and the second column reports results for only households with 0 baseline levels (for binary outcomes) or positive levels (for continuous outcomes).

Table 12 - Joint Treatment Effects and Application Date/Agricultural Asset Interactions

	Animal Ownership (1/0)		Land Ownership (1/0)		Value of Animals		Land Owned (ha)	Value of Agricultural Assets		Change in Total Income		Change in the Value of Ag. Production	
	All HHs	0 Baseline	All HHs	0 Baseline	All HHs	Pos. Baseline	All HHs	All HHs	Pos. Baseline	All HHs	Pos. Baseline	All HHs	Pos. Baseline
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Treatment Effects - Interactions with Binary Application Date (=1 if 2006 or later)													
Land Credit (β_L)	0.074	0.316	0.591	0.558	-3164.95	-2925.249	3.683	220.055	240.475	-91.899	29.37	-37.956	-8.505
	[0.087]	[0.242]	[0.122]***	[0.148]***	[2,477.831]	[2,297.706]	[3.672]	[305.132]	[301.442]	[58.497]	[60.206]	[23.592]	[17.952]
Bolsa (β_C)	-0.166	-0.388	0.015	-0.112	-6757.88	-7297.686	0.862	-50.237	-192.709	-72.867	13.734	-40.985	-20.705
	[0.200]	[0.439]	[0.102]	[0.156]	[2,369.176]***	[2,276.402]***	[3.737]	[419.099]	[448.515]	[90.996]	[78.901]	[29.844]	[23.782]
Both (β_J)	0.015		-0.202	-0.092	4898.809	4414.707	-3.597	-107.63	-206.388	83.633	-66.388	50.248	17.927
	[0.184]		[0.103]*	[0.147]	[2,466.756]**	[2,342.676]*	[3.763]	[386.262]	[387.069]	[85.646]	[71.805]	[26.578]*	[18.185]
Land Credit * App. Date	-0.03	-0.253	-0.085	-0.024	4736.998	6220.038	2.202	342.612	-72.538	136.296	-19.014	74.487	47.499
	[0.131]	[0.403]	[0.169]	[0.179]	[2,841.055]*	[3,428.816]*	[4.142]	[464.774]	[444.067]	[72.606]*	[77.002]	[38.697]*	[27.924]*
Bolsa * App. Date	0.016	-0.111	-0.195	-0.084	5583.606	5487.827	-1.362	66.127	131.835	108.815	-8.935	62.051	36.676
	[0.197]	[0.316]	[0.117]*	[0.154]	[2,413.661]**	[2,443.793]**	[3.514]	[374.942]	[380.414]	[88.376]	[75.989]	[27.254]**	[21.448]*
Both * App. Date	0.02	-0.141	0.232	0.102	-5029.754	-6380.736	3.567	-265.073	118.423	-111.772	58.732	-92.171	-67.615
	[0.215]	[0.411]	[0.158]	[0.200]	[3,017.406]*	[3,713.361]*	[4.555]	[528.069]	[502.479]	[94.487]	[87.258]	[40.118]**	[32.591]**
App. Date	-0.065	0.203	0.05	-0.001	-5698.302	-5565.288	-0.847	-162.973	-227.961	-115.901	-25.133	-57.418	-30.343
	[0.105]	[0.364]	[0.134]	[0.157]	[2,502.537]**	[2,535.721]**	[3.481]	[337.666]	[332.556]	[62.154]*	[62.269]	[24.268]**	[19.488]
Treatment Effects - Interactions with Baseline Agricultural Assets													
Land Credit (β_L)	0.196	0.223	0.634	0.616	2634.404	3312.703	8.482	0.348	0.253	45.762	50.044	28.055	19.886
	[0.097]**	[0.278]	[0.106]***	[0.111]***	[941.888]***	[1,326.907]**	[1.710]***	[0.201]*	[0.210]	[31.356]	[41.699]	[14.629]*	[18.617]
Bolsa (β_C)	-0.06	-0.446	-0.156	-0.164	494.286	746.753	-0.488	0.129	0.161	44.286	26.125	21.463	13.634
	[0.122]	[0.601]	[0.120]	[0.119]	[1,097.748]	[1,548.191]	[1.936]	[0.202]	[0.246]	[38.531]	[48.978]	[18.021]	[25.413]
Both (β_J)	-0.001	0.055	-0.047	-0.035	-1491.225	-2331.864	-1.739	-0.109	-0.129	-37.392	-52.895	-23.261	-23.142
	[0.108]	[0.309]	[0.108]	[0.110]	[989.450]	[1,479.057]	[1.909]	[0.184]	[0.223]	[31.780]	[40.633]	[15.505]	[20.508]
Land Credit * Ag. Assets	-0.024	0.599	-0.162	-0.097	-2003.111	-2002.677	-2.059	0.424	0.439	-53.477	-16.112	-29.294	4.484
	[0.064]	[2.181]	[0.147]	[0.166]	[1,222.723]	[1,308.713]	[2.644]	[0.365]	[0.378]	[23.854]**	[35.965]	[22.165]	[18.209]
Bolsa * Ag. Assets	0.046	0.125	0.098	-0.08	-3018.193	-3439.73	6.592	-0.273	-0.282	-12.659	3.962	-11.407	9.77
	[0.057]	[1.402]	[0.084]	[0.109]	[1,819.680]*	[1,793.038]*	[6.282]	[0.196]	[0.177]	[25.178]	[25.672]	[12.895]	[9.787]
Both * Ag. Assets	-0.107	0.174	0.036	0.161	2402.863	2393.427	-4.453	-0.145	-0.146	21.341	-26.643	19.52	-21.775
	[0.083]	[2.596]	[0.152]	[0.175]	[2,377.374]	[2,398.297]	[6.841]	[0.407]	[0.405]	[32.769]	[41.180]	[25.252]	[19.503]
Ag. Assets	0.099	-1.466	0.024	0	3282.27	3193.596	0.609	0.373	0.368	33.543	18.751	20.197	3.906
	[0.047]**	[0.597]**	[0.077]	[0.108]	[1,002.365]***	[1,033.574]***	[0.814]	[0.226]	[0.216]*	[16.975]*	[15.512]	[6.440]***	[6.730]

Notes: Robust standard errors are clustered at the settlement level and reported in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level. For continuous outcomes, outliers are trimmed at the top and bottom 1 percent of observations. The following controls are included: dummy variables measuring whether or not each household has children under 14, under 18, or any children at all, dummy variables measuring whether or not monthly per capita household income is less than R$120, R$180, and R$240, the number of household members, the beneficiary's age, gender, education, education squared, race (dummies measuring if white and if black), and years of farming experience, the application year, dummy if pension payments are received, and baseline assets (value of forest production, value of animals, land ownership dummy, dirt floors dummy, electricity dummy, the value of agricultural assets, and the value of nonagricultural assets). The Application Date results include state fixed effects. All changes in incomes are measured in monthly per capita terms.

For each variable, the first column reports results for all households and the second column reports results for only households with 0 baseline levels (for binary outcomes) or positive levels (for continuous outcomes).

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