

THE IMPACT OF BOLSA FAMÍLIA ON POVERTY: DOES BRAZIL'S CONDITIONAL CASH TRANSFER PROGRAM HAVE A RURAL BIAS?

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An important dimension in assessing any anti-poverty program is to know how it affects the living standards of different sub-groups of the poor. This paper examines the impact of Brazil's conditional cash transfer program on poverty in urban and rural areas, formally testing the hypothesis that the program has a rural bias because its eligibility cut-off and transfer size are not adjusted for spatial price differences. Grosh et al. (2008) argue that a program that does not adjust its eligibility cut-off for spatial price differences will be biased toward the rural poor because they face a lower cost of living. Fiszbein and Schady (2009) find that eligible families in urban areas are less likely to participate in Bolsa Família, which they attribute to self-exclusion due to the cost of living differential and the implicitly lower value of the transfer in cities. Although the authors suggest that Bolsa Família might have a rural bias, no study has rigorously compared its impact in urban and rural areas.*

Regional price differences are not negligible in Brazil: the Laspeyres price index based on the cost of food and housing, indexed to 1.000 for metropolitan São Paulo, is 0.447 in the rural Northeast region.¹ In other words, the cost of living in São Paulo is more than twice the cost of living in the rural Northeast. The real value of Bolsa Família's eligibility cut-off and the purchasing power of the transfer are therefore significantly higher in more rural states than in São Paulo.

This paper first presents a counterfactual static incidence analysis to determine the impact of Bolsa Família in 2009, using

* Helfand, Rocha, and Vinhais (2009) decompose rural income growth over the period 1998-2005 into four different sources of income, and find that growth in "other income", primarily due to an increase in conditional cash transfers, explains around 16 percent of the decline in rural poverty over the period. Their study focuses exclusively on rural areas.

micro-data from the 2009 Pesquisa Nacional por Amostra de Domicílios (PNAD),* an annual household survey. Incomes are adjusted by a spatial price index to reflect price differences across regions, and poverty is defined as the inability to buy a basket of basic needs in one's region. Through a series of formal hypothesis tests and regression analyses, this paper seeks to determine whether Bolsa Família has a "rural bias"—in other words, a tendency to have a higher impact in rural areas.† Finally, after identifying a statistically significant rural bias, the paper addresses policy implications.

The paper is divided into seven sections. Section 2 begins with a brief overview of poverty trends in Brazil and a description of the Bolsa Família program. It then describes how poverty should be defined in the context of this study and presents a methodology to adjust for spatial price differentials. Section 3 describes the data set and its issues and limitations. Section 4 analyzes the impact of Bolsa Família on poverty at the state level and examines whether its impact has been higher in relatively more rural states. Section 5 uses a probit model to assess the probability of escaping poverty due to Bolsa Família, and contrasts the likelihood of poor urban and poor rural households surpassing the poverty line. Section 6 discusses policy implications, and Section 7 presents the main conclusions.

DEFINING POVERTY AND ADJUSTING FOR SPATIAL PRICE DIFFERENTIALS

The number of Brazilians living below the poverty line reached its highest level in history in 2003.^{2‡} Although a growing poor population in absolute terms can be partially attributed to population growth, the percentage of Brazilians living in poverty had not declined in nearly a decade: the overall change in the pov-

* In English, this translates as National Household Sample Survey.

† This definition of "rural bias" is consistent with Todaro and Smith (2011).

‡ Here, the poverty line refers to the regional poverty lines calculated by the Brazilian government's Applied Economics Research Institute (IPEA) using the cost of basic needs method.

erty headcount index between 1995 and 2003 was close to zero.^{*} Measures that are sensitive to the depth and severity of poverty, such as the poverty gap and squared poverty gap,[†] show a similar trend: almost no change between 1995 and 2003.[‡] Since 2003, however, poverty in Brazil has declined significantly, whether one measures the absolute number of poor people (the poverty headcount), the percentage of the population living below the poverty line (the poverty headcount index), the depth of poverty (the poverty gap), or the severity of poverty (the squared poverty gap). For example, using IPEA's regional poverty lines,[§] the poverty headcount fell from over 61 million poor people in 2003 to under 40 million poor in 2009 and the headcount index from 35.8 percent to 21.4 percent during the same period.³ Figures 1 and 2 show the decline of various measures of poverty since 2003.

Although several factors contributed to the decline in pov-

* The overall change in the poverty headcount index between 1995 and 2003 varies depending on the data source, but all data sources agree that there was not a significant change. Using a \$4 PPP per day poverty line, the Socio-Economic Database for Latin America and the Caribbean (SEDLAC) reports a decrease in the poverty headcount index of -0.2 percentage points, while the World Bank's PovcalNet reports an increase of +0.5 percentage points. Using regional poverty lines, IPEA reports an increase in the headcount index of +0.7 percentage points for the same period.

† Throughout this paper, the poverty gap refers to the poverty gap index—also known as the poverty gap ratio—rather than the total poverty gap (and likewise for the squared poverty gap). The poverty gap index is equivalent to the total poverty gap (which can be thought of as the minimum amount of resources needed to eradicate poverty through perfectly-targeted transfers [Ravallion, 1992]) divided by the country's population and expressed as a percentage of the poverty line.

‡ Data sources agree that there was not a significant change in the poverty gap or squared poverty gap between 1995 and 2003. SEDLAC reports a change in the poverty gap index (squared poverty gap index) of 0.0 (+0.1) percentage points, while the World Bank's PovcalNet reports a change of +0.03 (-0.01) percentage points, both using a poverty line of \$4 PPP per day. IPEA does not report figures for the poverty gap and squared poverty gap.

§ See IPEA (2009) for the 25 regional poverty lines calculated by IPEA for the years 1976-2009. For purposes of international comparison, poverty lines in local currency can be converted into "international dollars" using purchasing power parity (PPP) conversion factors, which are intended to ensure a common purchasing power over commodities across countries (Ravallion, Chen, and Sangraula, 2009). Using a PPP conversion factor of \$1 PPP = 1.71 reais in 2009 prices (World Development Indicators, 2011), the non-weighted average of IPEA's regional poverty lines in the year 2009 is \$3.67 PPP per day. The weighted average (weighting each spatial region's poverty line by the region's population according to the 2009 PNAD) is \$3.75 PPP per day. These averages are close to the \$4 PPP per day poverty line, which is commonly used for middle-income countries and close to the median of the moderate poverty lines officially set by Latin American governments (Centro de Estudios Distributivos, Laborales y Sociales [CEDLAS] and World Bank, 2010).

erty, such as economic growth (Barros et al., 2010), expanded access to education during the 1990s (Gasparini and Lustig, 2011), increased demand for unskilled labor,⁴ and an increase in the minimum wage,⁵ cash transfer programs—and, in particular, Brazil's signature anti-poverty program Bolsa Família—have also played an important role.

Bolsa Família is a conditional cash transfer (CCT) program.* CCTs are direct monetary transfers that target poor households and require a specified level of investment in the human capital of the household's children. The requirements, which are known as conditions, usually entail a minimum level of use of health and education services. These conditions seek to reduce poverty in a sustainable way by giving poor children the human capital necessary to break the intergenerational poverty cycle. In the case of Brazil, the conditions specify attendance of prenatal and postnatal care sessions by pregnant women and breast-feeding mothers, adherence to a calendar of vaccinations for children up to age five, and a minimum level of school attendance for children ages six to seventeen⁶

To measure the impact of Bolsa Família on poverty, it is necessary to determine how poverty should be defined; in other words, what will be the cut-off criteria that separate the poor from the non-poor? Given the income-based nature of the PNAD household survey (see Section 3) and the monetary nature of CCTs, it makes sense to use income poverty lines. This necessarily ignores the multidimensionality of poverty;[†] while the information available in PNAD does permit a more multidimensional evaluation of poverty,[‡] the impact of Bolsa Família on multidimensional poverty cannot be accurately measured without panel data, as the program's impact on factors such as education and health in a particular beneficiary household are unknown.

* In English, Bolsa Família translates as Family Scholarship.

† See, for example, World Bank (2001).

‡ Using, for example, the class of multidimensional poverty measures developed by Alkire and Foster (2009). It should be noted that although multidimensional poverty measures have gained popularity in the literature, there are issues that have not been resolved and are still being debated. See, for example, Ravallion (2011).

This study will focus on the impact of Bolsa Família on absolute rather than relative poverty. Alternatively, one could choose a relative poverty line equal to the per capita income of the individual or household corresponding to the y th percentile of the cumulative income distribution,⁷ or measure the program's impact on the average income of the poorest y percent of the population.⁸ The first alternative is necessarily arbitrary and does not correlate poverty with a lack of command over basic consumption needs⁹ or a lack of certain capabilities.¹⁰ The second alternative is useful for comparing the average impact (on the relatively poor) of two different programs with equal funding,¹¹ but it limits the analysis to averages and rules out measuring the impact on more poverty averse indices. For these reasons, this paper does not determine poverty relative to the overall income distribution, and instead regards as "poor" individuals who do not have enough household income per capita to purchase a specified vector of basic needs.

The poverty line, in turn, will reflect the cost of that vector of basic needs. Calculating the cost of basic needs nationally would ignore regional differences in the costs of food and housing, which are especially important in countries that are larger and more diverse,¹² such as Brazil. Thus, the World Bank¹³ uses expenditure data from the Pesquisa de Orçamentos Familiares (POF) to calculate the cost of a bundle of basic food items sufficient to fulfill a minimum daily caloric intake in twenty-one different regions. Since similar price data is not available for expenditures on non-food basic needs, housing rental rates are used as a proxy for the price of non-food basic needs. Housing rental rates are estimated for each region using a regression model of (log) rent against dwelling characteristics (such as number of rooms, electricity, type of floor, etc.). Table 1 shows the values of the resulting Laspeyres spatial price index (which is a weighted average of the indices for food and housing) in twenty-one spatial regions, using metropolitan São Paulo as the reference region.

Deflating income by a Laspeyres price index is analogous to taking a welfare ratio approach to welfare measurement, which is preferable to the money-metric utility approach when assessing

policies in which distribution is an issue (in other words, when one wants to assume that transfers of money to the poor are more valuable than transfers to the non-poor, and that the poorer someone is, the more valuable the transfer).¹⁴ Once income has been deflated by a spatial price index, everyone's income can be compared to a single poverty line. First deflating incomes by a spatial price index that accounts for regional differences in the cost of living and then comparing each household's adjusted income to a fixed nominal poverty line is mathematically equivalent to comparing each household's nominal income to a regional poverty line adjusted by the spatial price index. Since metropolitan São Paulo was chosen as the reference region for the price index, an appropriate poverty line—given the definition of poverty used in this paper—would be the cost of a basic needs basket in metropolitan São Paulo. The World Bank (2007: Table 12) calculates this as 115 reais* in January 2003 prices. Adjusted for inflation of basic needs prices in São Paulo municipality,[†] this is equal to 162 reais in September 2009 prices.

THE DATA: ISSUES AND LIMITATIONS

The analyses in this paper use micro-data from the 2009 Pesquisa Nacional por Amostra de Domicílios (PNAD), an annual household sample survey conducted by the Brazilian government's Institute of Geography and Statistics (IBGE). PNAD's sample size in 2009 was 399,387 individuals—the survey was carried out in the last week of September and asked questions about the previous month. The survey questions are based on income rather than consumption, even though consumption is smoother over time, can be more accurately measured, and better reflects a household's abil-

* The Brazilian currency unit is called the real. The plural of real is reais. The nominal exchange rate as of April 30, 2011 was 1 US dollar = 1.57 reais. The purchasing power parity (PPP) adjusted exchange rate, based on the 2005 International Comparison Program (see World Bank, 2008), is \$1 PPP = 1.71 reais in 2009 prices (World Development Indicators, 2011).

† Conveniently, in addition to the temporal price index calculated for overall prices in the country, a temporal price index published by IPEA measures the monthly inflation in the cost of a basic needs basket in São Paulo municipality. This index is available online at <http://www.ipeadata.gov.br>

ity to meet basic needs.¹⁵ However, one of the justifications for measuring income is that it requires fewer questions; in fact, the costs of collecting consumption data are about five times higher than the costs of collecting income data.¹⁶ Thus, collecting income data allows for a larger sample size, which increases the confidence interval of calculations made using the micro-data and makes it more plausible to carry out a survey that is representative at the state level.

There are a number of methodological issues which arise when using household survey micro-data to estimate poverty. A few of the most pervasive are income underreporting, adult equivalence scales, economies of scale within households, item nonresponse, and defining income. Following the best practices for poverty measurement outlined by Székely et al. (2004), no adjustment is made for income underreporting, and adult equivalence scales and economies of scale within households are not considered (i.e., household per capita income is used).

With respect to item non-response, Székely et al. (2004) recommend dropping individual observations with missing or zero incomes, with the justification that they introduce noise into poverty measurement. However, they concede that dropping these observations has no theoretical base. Another methodology is to impute earnings to non-respondents using matching techniques.* Alternatively, income can be directly imputed from Mincer coefficients, which can be computed a number of ways. However, the matching and Mincer techniques are both inadequate, as the personal and household characteristics used as independent variables in the regressions do not closely predict income; the R-squared values of the regressions are usually low.¹⁷ For these reasons, this study regards missing and zero incomes as zero, unless the primary source of labor income for the household head is missing, in which case the

* For example, one of the options tested by Székely and Hilgert (2007) is to impute missing income for a given source by running a regression, with the income source as the dependent variable and personal and household characteristics as the independent variables. They then use the regression coefficients to predict the income from that source of each individual (respondents and non-respondents), and rank them according to predicted income. The non-respondent's missing income is imputed by the average of the individuals directly above and below him or her in the ranking.

household is excluded from the data. This methodology coincides with CEDLAS and World Bank (2010). It is worth noting that the different methodologies to adjust for missing and zero incomes do not have a large impact on poverty measures in the case of Brazil; Székely et al. (2004) apply a sensitivity analysis to PNAD data and find that the minimum and maximum values for the headcount index using different methodologies to adjust for non-response only vary by 2.6 percentage points.

With respect to the definition of income, Haughton and Khandker (2009) argue that it is important to include components of income that are not typically captured directly by household surveys, such as in-kind income, food produced for own consumption, and implicit income from owner-occupied housing. In the case of Brazil, some in-kind income is captured by PNAD; for each labor income source, the respondent is asked how much they were remunerated both in money and in the value of products or commodities.¹⁸ Respondents are also instructed to include the value of food produced for own consumption, but only if the individual did not have a separate primary job with remuneration.¹⁹ Thus, food produced for own consumption is included but understated in PNAD. Implicit income for owner-occupied housing is imputed to households who own their homes to account for the benefit they receive from that housing (which they would otherwise be paying in rent), using the methodology proposed by Barros, Cury, and Ulyssea (2007). Other in-kind income, such as the value of access to public services, should ideally be included in household aggregate income²⁰ but the questions that would be necessary to impute it are not included in the survey.

The largest limitation of the data, at least for the purposes of this study, is that the survey does not include a question that specifically asks how much a household received in Bolsa Família transfers. Instead, non-labor income is divided into eight categories, one of which covers “other income”, which is supposed to include financial income (e.g., interest and dividends) and income from official social assistance programs, including Bolsa Família.²¹ Thus, of the methods to measure the direct impact of government transfers on

poverty and inequality (see Lustig, 2011), the inference method must be used. In other words, for households that reported an income value in the “other income” category, it is necessary to infer whether that amount corresponds to a Bolsa Família payment.

To infer whether a household received Bolsa Família, the income they reported under the “other income” category of non-labor income is compared to the possible transfer sizes of Bolsa Família, which are as follows (for September 2009). Any family with per capita income under 140 reais per month and at least one child under age eighteen is eligible for the program. The program rules establish that households below the cut-off receive twenty-two reais per month for each child in the family between the ages of zero and fifteen (for up to three children) and thirty-three reais per month for each adolescent aged sixteen or seventeen (for up to two adolescents), provided they comply with the program’s conditions. Households with per capita income under seventy reais per month are to receive an additional sixty-eight reais per month.²² In the latter case, a household does not need to have children to be eligible for the program; thus, the program has an unconditional cash transfer component for those identified as extremely poor. Table 2 summarizes the possible sizes of a Bolsa Família transfer.

Using these values, at least two methodologies have been used to infer whether a family received Bolsa Família. Let Ω represent the value reported for “other income.” Allowing for rounding or not remembering the exact value received when reporting, Souza (2010) assumes that any family in which a member reports Ω $(0, 200]$, with 200 being the maximum value of a Bolsa Família transfer, received that “other income” from Bolsa Família. Since Ω can also come from financial income, it makes the assumption that no households received monthly financial income under 200 reais, which does not seem reasonable. However, if one is concerned strictly with the impact on poverty, falsely identifying a non-poor household’s financial income as a Bolsa Família transfer is inconsequential;* that particular household will be above the poverty line in all cases, so it will not affect the poverty rate

* The same is not true if one is concerned with the impact on inequality.

when comparing income before program transfers to income after program transfers. Thus, in terms of a poverty impact analysis, the Souza (2010) methodology is equivalent to only assuming that poor families* do not receive financial income.

An alternative methodology is used by Barros, Carvalho, and Franco (2007). Because they analyze PNAD data from 2005 and earlier, they also account for the CCTs that preceded Bolsa Família, which were phased out only gradually after 2004. Qualifying households could receive benefits from multiple transfer programs, so the authors first compute all possible combinations of program transfer values, and count a family as receiving “Bolsa Família and its predecessors” if Ω is equal to an exact value of one of the possible combinations. By 2009 however, Bolsa Família had almost completely replaced its predecessors,[†] so it is not necessary to include all the possible combinations of CCT programs. An updated version of the methodology would be to count a household as a Bolsa Família recipient if Ω is equal to the exact value of a Bolsa Família transfer (see Table 1). This methodology risks excluding families that did not remember the exact value of their Bolsa Família transfer, did remember the exact value but rounded (to the nearest multiple of five or ten, for example), or received Bolsa Família in combination with a state- or municipal-level social assistance program. One example is Renda Cidadã in São Paulo state, a CCT of eighty reais per month to poor households,²³ which until March 2010 could be granted in addition to Bolsa Família.²⁴

Because the two methodologies have different limitations, the analyses in this study are carried out using both. When the results are presented from one methodology and not the other, I will specify which methodology is presented and whether the other methodology’s results differ. Both methodologies will provide downward-biased results regarding the magnitude of Bolsa Família’s impact on poverty because they do not capture all of the house-

* According to whatever poverty line is used in the analysis.

† In 2005, 8.7 million households were Bolsa Família beneficiaries (not counting beneficiaries whose benefits had been blocked or suspended) and 1.9 million were beneficiaries of other CCTs. By 2008, 10.6 million households were Bolsa Família beneficiaries and a negligible 15,000 households were beneficiaries of other CCTs (Soares and Sátyro, 2009: Table 6).

holds that received transfers from the program.* According to the Brazilian government's records, twelve million households received Bolsa Família transfers in September 2009. Using the appropriate sample weights, only 5.2 million households reported Ω equal to an exact value of a Bolsa Família transfer on the 2009 PNAD, while 9.8 million reported Ω greater than zero and less than or equal to 200. Even when questionnaire respondents are specifically asked if they received Bolsa Família, which happened in 2006 as part of a supplemental questionnaire to the PNAD, the number of recipients was underestimated: only 8.1 million households received Bolsa Família in September 2006 according to the PNAD supplement,²⁵ while the number was eleven million according to government records.²⁶ Table 3 summarizes the systematic underestimation of the number of Bolsa Família beneficiaries in PNAD.

There are a number of observations that can be made from Table 3. First, for 2006, the Souza method falsely identifies around 1.3 million households as Bolsa Família beneficiaries, compared to the number of families that reported receiving Bolsa Família or its predecessors on the special supplement. If some of those 1.3 million households were poor and were in fact reporting financial income, the Souza method might falsely attribute families escaping poverty due to financial income to families escaping poverty due to Bolsa Família. However, because it is unlikely that poor families receive financial income²⁷, the false inclusion of these households should not affect the analysis of Bolsa Família's impact on poverty. Furthermore, even if some poor households with financial income were falsely included, the Souza method would most likely still underestimate the impact of Bolsa Família on poverty in 2009 because at least 19 percent of Bolsa Família recipients are still not accounted for in the 2009 PNAD. The BCF method has the advantage of minimizing the amount of falsely included households,[†]

* Even though the Souza method will falsely identify financial income less than or equal to 200 reais as Bolsa Família, it should still underestimate Bolsa Família's impact on poverty, for the reasons outlined in the next paragraph.

† Foguel and Barros (2010) test the robustness of the BCF method using the 2004 PNAD, which, like the 2006 PNAD, included a supplemental question specifically asking if the respondent received transfers from Bolsa Família or another CCT. Less than 3 percent of those identified as beneficiaries by the BCF method were falsely identified (i.e., they indicated

but the disadvantage that it grossly underestimates the amount of households receiving Bolsa Família; only 44 percent of September Bolsa Família recipients are accounted for in the 2009 PNAD using the BCF method.

The inference error, or the difference between the number of beneficiaries according to government records and the number of beneficiaries according to PNAD, has a number of possible causes. First, administrative records may overstate the number of beneficiaries. This is unlikely, however, because the program's transparency efforts include a published list of all beneficiaries. Second, the nature of PNAD's sampling method and the mathematical model used to project absolute population numbers from the sample can lead to errors in its population projections.²⁸ The mathematical model is based on population results from the most recent census (including how the population is distributed among municipalities and tracts); this is particularly problematic for the 2009 PNAD, since the preceding census was carried out nine years prior, in 2000. If the spatial distribution of the population has changed significantly since the 2000 census, the weights assigned to each household will be biased, which could cause the extrapolated estimate of the number of Bolsa Família beneficiaries to be biased as well.

Another potential problem with the extrapolation model is that the point estimate may be subject to a high variation depending on which households are selected. Bootstrapping the population projections can reveal whether they are subject to such a bias. Table 4, which shows the result of bootstraps with 1000 replications, reveals that the potential for variation in the point estimates of beneficiary households is small. The biases, expressed as a proportion of the point estimates, are nearly zero, and the standard errors are less than 1 percent of the point estimates. Thus, variability of the population estimates does not appear to be a significant factor explaining the underestimation of Bolsa Família beneficiaries.

While the official definition of "other income" includes income from social assistance programs,²⁹ interviewers do not tell survey respondents the definition unless asked. Thus, respondents may

on the supplemental questionnaire that they did not receive a CCT transfer).

not think to include their income from social assistance programs under “other income.” This problem became obvious in 2004: as in 2006, the 2004 PNAD included a supplement that asked specific questions about social assistance programs. A number of households reported “other income” of zero, only to later report receiving Bolsa Família or one of its predecessor CCTs on the supplemental questionnaire. The problem was so prevalent that IBGE sent interviewers back to those households to correct the values reported for “other income.”^{30*}

Despite the above limitations, the data can still be very useful for assessing Bolsa Família’s impact on poverty (keeping in mind that the estimates will be downward biased) and comparing its impact on the urban and rural poor. If program beneficiaries who are not captured by PNAD are distributed equivalently to those who are captured by PNAD in terms of income and geographical location, there will be no effect on the conclusions of whether Bolsa Família has a rural bias. However, because Bolsa Família recipients might be more highly concentrated in municipalities that have a low chance of being selected by PNAD’s sampling method, such an assumption probably does not hold. Nevertheless, municipalities with a low chance of being sampled are far more highly concentrated in more rural areas, so Bolsa Família’s impact in rural areas will most likely have a stronger downward bias than Bolsa Família’s impact in urban areas. Thus, the statistically significant rural bias found in this study probably underestimates Bolsa Família’s actual rural bias.

BOLSA FAMÍLIA’S IMPACT ON POVERTY: HIGHER IN RELATIVELY RURAL STATES?

The common methodology to evaluate the direct impact of a transfer program on income is an ex post counterfactual incidence analysis. Once program beneficiaries have been identified, two scenarios are examined: the actual scenario, under which each indi-

* The supplemental questionnaire did not ask how much a family received from the CCT programs, only whether it had received benefits (Soares et al., 2007).

vidual's income is calculated using the methodology described in Section 3, and a counterfactual scenario. In the latter scenario, it is assumed the program did not exist, so the value of each Bolsa Família transfer is subtracted from its beneficiary's aggregate household income. Various measures of poverty (e.g., the headcount, poverty gap, and squared poverty gap indices) can then be compared under the two scenarios. The percent reduction of a given poverty measure between the counterfactual and actual scenarios is interpreted as the impact of Bolsa Família on poverty.

The counterfactual methodology is limited to measuring the impact of Bolsa Família on poverty through one channel—its direct effect on household income—and assumes away behavioral responses and general equilibrium effects,³¹ which have the potential to reduce or amplify Bolsa Família's impact on poverty. For example, it assumes that households do not adjust their labor supply in response to the transfer. Adults may increase their labor supply because they use the transfer income to overcome constraints arising from non-divisible costs and capital market imperfections, or decrease it if the transfer has negative incentive effects on labor. Children may decrease their labor supply to attend school, which might in turn cause adults to increase their labor supply, or decrease it if they need to take time away from work to transport their children to and from school. In addition to time that parents may have to take off of work, families might face other participation costs to receive the transfer or comply with conditions, which would reduce the real value of the transfer. On the other hand, a counterfactual analysis also ignores the positive longer-term impact of increased human capital on income. It also assumes the program has no spillover effects, which can decrease poverty among non-beneficiaries. Each of these possible behavioral responses and general equilibrium effects is addressed in turn.

One of the criticisms of conditional cash transfers is that they could provide adults in beneficiary families with an incentive to work less.³² This could result from an income effect, where beneficiaries who were only transiently poor decrease their labor supply to remain eligible for the program, and/or a substitution ef-

fect, where beneficiaries substitute time between work and leisure. However, CCT beneficiaries are generally very poor and more than likely have a low income elasticity of leisure.³³ On the other hand, cash transfers also have the potential to *increase* adult labor supply. Searching for a job and investing in one's own business have non-divisible costs, and the additional income from Bolsa Família would allow some beneficiaries to overcome these constraints and thereby increase their labor supply.³⁴

From an empirical standpoint, CCTs have not had a significant impact on adult labor supply.* Foguel and Barros (2010) find that Bolsa Família had no effect on female labor participation rates, a statistically significant but very small negative impact on female hours worked, a statistically significant but very small positive impact on male participation rates, and no effect on male hours worked. Similarly, Teixeira (2008: Table 2) finds no effect on male labor supply and a small negative effect on female labor supply averaging 2.6 hours per week. Tavares (2010) finds that mother beneficiaries tend to reduce the length of their work week by between 0.8 and 1.7 hours. Soares and Sátyro (2009) note that the observed effect of Bolsa Família on female labor supply is insubstantial, and is actually a desirable impact of the program, since some of the reduced work hours are probably spent caring for young children, and a vast literature has documented the important benefits of early childhood development.

When families face costs to receive their transfer or comply with conditions, the real value of the transfer decreases. For this reason, Lustig (2011) stresses the importance of subtracting user fees and participation costs from income before arriving at “final income”, but that is outside the scope of this paper. Nevertheless, it is worth noting that Brazil strives to minimize these costs for beneficiaries. The decentralized nature of the program's administration minimizes the cost of a poor family registering itself for benefits.³⁵ To receive the transfer each period, beneficia-

* This effect is not only found in Brazil, but also in most other countries with CCT programs (Grosh et al., 2008); examples include Mexico, Ecuador, and Cambodia (Fiszbein and Schady, 2009).

ries use an electronic card at ATM machines. There are minimal or no direct costs to complying with the health and education conditions, as public education and health facilities are free to all Brazilians. Hopefully, these factors have minimized the program's direct and participation costs, although those costs might remain higher for rural households who live further from schools and health centers.

While decreased mother and child labor supply and participation costs could lower the amount by which Bolsa Família increases family income, other factors may increase Bolsa Família's impact on poverty in ways that are not captured by a counterfactual simulation. The first is through the program conditions, which should (ideally) increase human capital accumulation among poor children and decrease poverty in the long term. The second is through indirect and spillover effects. For example, the magnetic benefit card given to Bolsa Família beneficiaries (who are preferentially women) can also be used for other basic banking functions—including access to credit and insurance services—which is an important step toward the financial inclusion of poor women.³⁶ In addition, CCTs have been shown to decrease poverty among poor non-beneficiaries living in the same community as beneficiaries.^{37 38}

Assuming away these and any additional behavioral responses and general equilibrium effects, Bolsa Família caused between a 12 and 18 percent decrease in the poverty headcount index, between a 19 and 26 percent decrease in the poverty gap, and between a 24 and 31 percent decrease in the squared poverty gap at the national level in 2009.* The decrease was substantially lower in Brazil's most urban states (measured by proportion of the population living in metropolitan areas)[†] and substantially higher in Brazil's most rural

* The ranges presented here do not account for standard error (see Table 5), but for the two methodologies used to determine whether a family received Bolsa Família (see Section 3).

† Despite having the highest metropolitan proportion according to the 2009 PNAD and the second-highest urban proportion according to the preliminary results of the 2010 census (IBGE, 2011), Distrito Federal was excluded from selection as the most urban state because of the following irregularity: according to the BCF method, only 6,955 households received Bolsa Família transfers in September, 2009, while 71,574 households did according to the Souza method. In reality, 79,055 households in Distrito Federal received Bolsa Família that month (SAGI/MDS, 2011).

states (measured by proportion of the population living in rural areas).^x For example, the impact on the headcount index in Rio de Janeiro state (the most urban), was only between 4 and 7 percent, while in Piauí (the most rural), it was between 31 and 37 percent. Table 5 presents these results.

After adjusting income for spatial price differentials to generate poverty measures that obey the consistency principle and reflect the real living standards of the poor in different regions, Bolsa Família has had a much higher impact on poverty in Brazil's most rural state, Piauí, than its most urban state, Rio de Janeiro. For all measures of poverty in Table 5, the true reduction in poverty in Piauí was higher than in Rio de Janeiro at the 1 percent significance level. The robustness of this result was also tested using sensitivity analyses, and is robust to the choice of different states,[†] alternative spatial price indices,[‡] and different poverty lines. The null hypothesis could always be rejected at the 10 percent significance level, meaning that the general conclusion that one can be at least 90 percent confident that Bolsa Família has had a higher impact on poverty in Brazil's most rural states than its most urban states is very robust.

Having confirmed that Bolsa Família is significantly biased toward Brazil's most rural states compared to its most urban states, in terms of its real impact on living standards, it is useful to test for a rural bias across all states. A rural bias can be confirmed if, when taking all of Brazil's states into account, there is a strong

* The proportions of the population living in metropolitan and rural areas in each state were extrapolated from the 2009 PNAD, using appropriate sampling weights. According to the preliminary results of the 2010 census, published by IGBE (2011), Rio de Janeiro is indeed the most urban state, while Piauí is the second-most rural state behind Maranhão (which is, in turn, the third-most rural according to the PNAD). As part of the robustness test discussed later in this section, hypothesis tests were performed using Piauí, Maranhão, and Alagoas as the most rural states and Rio de Janeiro and São Paulo as the most urban states.

† The states tested as most rural were Piauí, Alagoas, and Maranhão. The states tested as most urban were Rio de Janeiro and São Paulo. Distrito Federal was not considered due to a data irregularity discussed in an earlier footnote, and the fourth-most urban state was not tested in its place due to large discrepancies between which state is most urban according to the two possible measures: highest proportion living in metropolitan areas and highest proportion living in urban [i.e., non-rural] areas.

‡ Specifically, a price index using the cost of a basic needs basket calculated by IPEA for 25 different spatial regions based on expenditure data from the 1987/1988 POF survey (see IPEA, 2009).

positive correlation between a state's percentage population living in rural areas and the impact of Bolsa Família on poverty in that state. Indeed, such a correlation exists, as shown in Figure 3, which compares Bolsa Família's state-level impact on the squared poverty gap with the estimated percentage of a state's population that lives in rural areas.* Each state is one observation, or one point on the scatterplot. The positive correlation is statistically significant (the *t*-statistic equals 6.76) and the data conforms fairly well to the correlation (*R*-squared = 0.65). The more rural a state is, the more successful Brazil's signature anti-poverty program tends to be.

PROBABILITY OF ESCAPING POVERTY DUE TO BOLSA FAMÍLIA

Another way to test and quantify Bolsa Família's rural bias is to compare the probability of being urban and poor to being rural and poor in the actual and counterfactual scenarios, using a probit model. Probit regression analyses are frequently used in poverty assessments to determine the correlates of poverty.³⁹ Comparing the results of probit models in actual and counterfactual scenarios can be used to see how transfer programs change the composition of who is poor, and which sub-groups of the poor are more likely to remain poor despite the program.⁴⁰

The socioeconomic variables selected for the probit model are similar to those used by Pessino (2011) to compare the probabilities of being poor before government transfers and remaining poor after government transfers in Argentina. Her independent variables include the number of children in the family, dummy variables for geographic region and whether the house is in a shantytown or other precarious location, and dummy variables for the gender, age,

* The squared poverty gap is chosen because it satisfies a number of desirable poverty axioms that are not satisfied by the headcount index or poverty gap, such as the monotonicity axiom (satisfied by the poverty gap but not the headcount index) and the transfer axiom (not satisfied by the headcount index or poverty gap) (Foster, Greer, and Thorbecke, 1984). It is less useful to focus on Bolsa Família's impact on the incidence of poverty, as the most cost-effective way to lower the headcount index is to target those whose incomes per capita place them right below the poverty line, whereas those who are furthest from the poverty line are arguably much more needy.

education level, and migration, employment, and marital status of the household head. This study added a dummy variable to distinguish between urban and rural households.* The shantytown variable was removed due to data limitations, and migration status was removed due to the existence of small cells when performing crosstab tests. To maintain the categorical nature of the predictor variables, the number of children variable was changed to a dummy variable equal to one if there are children in the household, and zero if there are not.† As in Pessino (2011), one probit model is run to estimate the probability of being poor before monetary transfers (in this case, Bolsa Família), and another to estimate the probability of being poor after transfers, conditional on being poor before transfers. The latter is equivalent to the probability of remaining poor after Bolsa Família, and can also be used to calculate the probability of escaping poverty due to Bolsa Família. Table 6 presents the results of the two probit regressions.

In the first probit, a negative coefficient indicates a lower probability than the omitted group of being poor before Bolsa Família, and a positive coefficient indicates a higher probability than the omitted group. The results are as expected: households with children have a higher chance of living in poverty than households without, households in the Northeast and North regions are more likely to be poor than households in other regions, and households with an educated household head employed in the formal sector are least likely to be poor. Living in a rural setting makes a household substantially more likely to be poor than living in an urban area. As an illustration, consider a family with children in the North region, headed by a single female between the ages of twenty-five and forty who completed primary school but not secondary school and is employed in the informal sector. In an urban area, such a household would have a 14 percent likelihood of being poor, while a household with the same characteristics would have a 21 percent

* Such a variable could not be included in Pessino's analysis for Argentina, since Argentina's household survey only covers urban areas.

† The model was estimated with and without this change, with an insubstantial change in the coefficients and no change in the conclusions.

likelihood of being poor in an urban area.*

In the second probit, a negative coefficient indicates a higher probability than the omitted group of escaping poverty due to Bolsa Família, while a positive coefficient indicates a higher probability of remaining poor despite the existence of the anti-poverty program. A family could remain poor despite the program because it does not receive a transfer from Bolsa Família, or because the transfer is insufficient. In the former case, the poor family might be excluded from the program by design (because there are no children in the household, for example), by choice (self-exclusion), or by error (perhaps the family has not been identified as poor by the municipal workers responsible for registering poor families for the program). In the latter case, the family's monthly income remains too low to purchase a basic needs basket in the area, despite receiving a Bolsa Família transfer.

As Table 6 shows, rural households are more likely to escape from poverty due to Bolsa Família, and urban households are more likely to remain poor in spite of the anti-poverty program.† The hypothetical household presented above would have a 31 percent chance of escaping poverty in rural Brazil, and a 26 percent chance in urban Brazil.‡ This makes sense: the cost of living tends to be significantly higher in urban areas (see Table 1), and Bolsa Família's eligibility cut-off for household income per capita is not adjusted for regional differences in the cost of living, so urban (and, in particular, metropolitan) families living in poverty should be more likely to be excluded from the anti-poverty program by design.§ As

* This follows from $P(Z < -2.049 + 0.293 + 0.248 - 0.073 - 0.324 + 0.595 + 0.217) = .14$, and $P(Z < -2.049 + 0.293 + 0.248 - 0.073 - 0.324 + 0.595 + 0.217 + 0.297) = .21$.

† This does not mean that rural families are less likely than urban families to be poor after Bolsa Família. On the contrary, the results of a probit regression to measure the probability of being poor after Bolsa Família (not conditional on being poor beforehand) reveal that the rural predictor variable has a coefficient of 0.240. Even though rural families have a higher likelihood of escaping poverty due to Bolsa Família, they are still substantially more likely to be poor than urban families.

‡ This follows from $1 - P(Z < 1.922 - 0.413 - 0.400 - 0.335 - 0.119 - 0.018 + 0.006 - 0.146) = .31$, and $1 - P(Z < 1.922 - 0.413 - 0.400 - 0.335 - 0.119 - 0.018 + 0.006) = .26$.

§ For a description of the difference between exclusion by design and true errors of exclusion, see Lustig (2011); for a practical application of the concepts to case studies of Argentina, Brazil, Mexico, and Peru, see Lustig et al. (2011).

an example, a family living in Brasília with household per capita income of 150 reais per month would be ineligible for Bolsa Família (the cut-off is 140 reais⁴¹), despite not being able to afford a minimum standard of living (the basic needs basket costs about 167 reais in Brasília).^{*} On the other hand, a family with household per capita income of 110 reais per month living anywhere in rural Brazil would be eligible for Bolsa Família, despite already being capable of purchasing the basic needs basket.[†]

To move beyond hypothetical examples, the survey data matches up quite well with the assertion that poor metropolitan families would be more likely to be excluded from the anti-poverty program by design. Over one hundred thousand poor households with children had nominal income above the Bolsa Família eligibility cut-off in 2009 and did not receive Bolsa Família; they were excluded by design. The sample mean of the values of the Laspeyres spatial price index corresponding to each of those excluded households equals 0.988 (nearly the index's maximum), and running a tabulation of the spatial regions to which each of the observations belongs reveals that all of the poor in the sample who were excluded by the program design feature of not adjusting program eligibility for the different costs faced by the poor across regions lived in four metropolises: Belém, Rio de Janeiro, São Paulo, and Brasília.[‡]

While some poor metropolitan households with children are declared ineligible and excluded, over a third of beneficiary families that are eligible based on nominal income are non-poor, meaning they could already afford the basic needs basket. These non-poor yet eligible households are most highly concentrated in the rural Northeast region, which has the lowest cost of fulfilling basic needs.

Even after accounting for the likelihood of being excluded by design, poor urban households are still more likely than rural

* The cost of the basic needs basket in Brasília is calculated as the cost of the same basket in metropolitan São Paulo in September, 2009 (162 reais) times 1.028, the value for Brasília of the Laspeyres spatial price index for food and housing, which is indexed to São Paulo (see Section 2).

† In Brazil's most expensive rural area, the basic needs basket would cost 106 reais. This follows from multiplying the cost of the basic needs basket in metropolitan São Paulo in September, 2009 (162 reais) by the highest value of the Laspeyres's price index in rural areas (0.654).

‡ 186 sampled households, representing 103,394 actual households, fit these criteria.

households to see their transfers fall short of what is needed to escape poverty, since the transfer has a lower purchasing power in areas with a higher cost of living. The average cost of living in Brazil's ten metropolises is about 40 percent higher than the average cost of living in Brazil's rural areas, which can have an important impact on the real purchasing power of the transfer in terms of the food and non-food basic needs it can buy. In many cases, the difference is even higher: the cost of a basket of basic needs in metropolitan Brasília, São Paulo, Rio de Janeiro, or Belém is over twice as expensive in nominal terms as the same basket in the rural Northeast (see Table 1). Thus, not only would a poor family in Belém with a given per capita monthly income already be much worse off than a family with the same nominal income living in the rural Northeast (*ceteris paribus*), but the transfer would also make a much smaller impact on the metropolitan family's standard of living, since it can only be used to purchase around half of the basic needs that could be purchased with the same nominal transfer in the rural Northeast. It is not surprising, then, that poor families in the Northeast (which is also Brazil's most rural region) are more likely to escape poverty due to Bolsa Família than poor families in any other region (see Table 6).

In sum, Bolsa Família's rural bias becomes even more obvious when analyzing the probability of being poor in the absence of Bolsa Família income, the sub-groups with the highest likelihood of escaping poverty after Bolsa Família, and the effects that spatial price differences can have on program eligibility and the real value of monetary transfers. While rural households are more likely to be poor in the absence of Bolsa Família, they are also more likely to surpass the poverty line due to the CCT. Metropolitan households are more likely to be excluded from the program because eligibility is based on nominal income. Furthermore, an urban beneficiary's transfer will have a lower purchasing power and a lower positive impact on standard of living than a nominally equal transfer to a rural beneficiary. Probit regressions, hypothetical examples, and an analysis of the composition of the non-eligible poor and the eligible non-poor confirmed the rural bias found in Section 4, and rein-

forced the speculation that regional differences in the cost of living are the primary cause of Bolsa Família's rural bias.

POLICY IMPLICATIONS

Having identified Bolsa Família's larger impact in rural areas and the fact that some of Brazil's poor children living in metropolitan areas are excluded from the program by design, while some non-poor households in rural areas remain eligible and, in fact, do receive Bolsa Família transfers, a logical follow-up would be to determine what implications this has for policy. From the government's and policymakers' perspective, there are two possibilities: first, that Bolsa Família was intended to have a rural bias—in which case no policy action would be required—and second, that the rural bias is an unintended consequence of not adjusting the CCT program's eligibility cut-off and transfer size for spatial price differentials.

There are a number of reasons the Brazilian government might have intended for Bolsa Família to have a rural bias. Historically, poverty has been much higher in rural Brazil than in urban Brazil.⁴² Baseline school enrollment rates also tend to be lower in rural areas,⁴³ indicating that rural families are investing less in the human capital of their children. In addition, since rural families tend to live further from schools, health facilities, and transfer payment locations, the direct and opportunity costs of complying with the program conditions tends to be higher in rural areas, which could justify a higher real transfer for rural households.* For these reasons, a number of CCT programs are explicitly restricted to the rural poor: examples include El Salvador's Red Solidaria, Paraguay's Tekaporã, and, up until 2003, Mexico's signature anti-poverty program Oportunidades.⁴⁴ Other CCTs have used geographic targeting mechanisms that advertently or inadvertently focus on the rural poor, such as Nicaragua's Red de Protección Social⁴⁵ and

* To deal with this issue, one of the bills on the table in the Brazilian legislature seeks to increase the transfer amount received by rural families who face high transportation costs to withdraw their transfers (Britto and Soares, 2011). This type of proposal does not take into account that rural beneficiaries already receive higher transfers in real terms than their urban counterparts.

Guatemala's *Mi Familia Progres*a.⁴⁶

In the case of Brazil, however, it does not seem that the program's rural bias is the result of an intentional objective to focus specifically on the higher persistence of poverty, low school enrollment, child labor, or program transaction costs in rural areas. The law instituting *Bolsa Família* (Lei No 10.836/04) makes no mention of rural or urban areas, nor do the program's objectives, described by Brazil's Ministry of Social Development.⁴⁷ The fact that some metropolitan families who cannot afford a basic needs basket for each family member are deemed ineligible and excluded from the program, while some non-poor rural families are deemed eligible and included in the program (see Section 5), is in direct conflict with *Bolsa Família*'s role as a component of Brazil's Zero Hunger safety net system, whose objective is to assure the human rights of adequate nourishment and food security.⁴⁸ With this objective in mind, there is no justification for excluding families who cannot afford a basic needs basket.

One of the three "principal axes" of *Bolsa Família* is the cash transfer, which is intended to promote the immediate alleviation of poverty.⁴⁹ That being the case, a portion of the metropolitan poor should not be excluded by design. Not adjusting the transfer size for spatial price differences is also unjustified, as the transfer does much less to alleviate poverty for poor urban households than for poor rural ones.

With these considerations in mind, the Brazilian legislature should move to adjust the program's eligibility cut-off and transfer size to account for regional cost of living differences. An ideal adjustment would divide the country into multiple spatial regions, such as the twenty-one used in this paper (see Table 1) or the twenty-five used by IPEA (see IPEA, 2009), to more truly reflect differences in the cost of living and make the real values of the eligibility cut-off and transfer size as consistent as possible across the country. Because program eligibility is determined via partially verified means testing of self-reported income and registered in an electronic database called *Cadastro Único*,⁵⁰ it would be straightforward to adjust the means test and registry to incorporate spatial

price differences. Furthermore, benefits are withdrawn using magnetic cards at ATM machines,⁵¹ so adjusting benefits based on cost of living should also be simple. The only added administrative cost of adjusting for spatial price differences would theoretically be the small up-front cost of programming a code that automatically adjusts the eligibility cut-off and benefits.*

Adjusting eligibility cut-offs for price differences in two or three spatial regions is not unheard of for cash transfer programs: South Africa accounts for urban/rural location in the simple means test used to determine eligibility for an unconditional cash transfer program,⁵² and Panama has different cut-offs for rural indigenous areas, rural non-indigenous areas, and urban areas.⁵³ Nor is it unheard of to adjust the transfer size, even in Brazil itself: the country's first federal CCT, Programa de Erradicação do Trabalho Infantil,[†] gave twenty-five reais per child per month to rural families with children employed in dangerous forms of child labor, and forty reais per child to urban ones.⁵⁴ In other countries, Colombia's Familias en Acción pays higher transfers to the urban poor.⁵⁵

In sum, adjusting the eligibility cut-off and transfer size of Bolsa Família for spatial price differences would make the program more in line with its overarching objectives, and add neither a great deal of complexity nor substantial administrative costs to the program. Such a change is bound to be controversial, however. Rural beneficiaries or municipalities might not trust the spatial price index, and feel that they are getting cheated by the adjustment. Political economy dynamics might complicate an effort to reduce the program's rural bias. When former president Luiz Inácio Lula da Silva was reelected in October 2006, he won every state in the Northeast region (Brazil's most rural region) by a considerable margin, whereas his main support in four previous presidential elections (of which he won one and lost three) had been in the more urbanized South and Southeast regions.⁵⁶ Voting patterns in

* It helps that the same entity, Caixa Econômica Federal, is in charge of the Cadastro Único database, responsible for paying the benefits, and even owns the ATMs that beneficiaries use to receive their benefits (Soares and Sátyro, 2009).

† In English, this translates as Child Labor Eradication Program.

the 2010 election mirrored those of 2006: Lula's appointed successor and former chief of staff Dilma Rousseff also won every state in the Northeast.⁵⁷ In both cases, this regional shift of electoral support can be largely attributed to Bolsa Família.^{58,59}

If the spatial price adjustment proposed in this paper had to be made without increasing the program's budget, current beneficiaries who are not poor would have to be removed from the program in order to include the currently excluded poor metropolitan households, and the transfers allocated to rural households would have to be decreased in order to increase the transfers allocated to urban households. Removing households that are not poor is consistent with the program's objectives; indeed, if a beneficiary family escapes poverty during their first two years in the program, they exit the program at the end of that period. Nevertheless, it might not be ideal to remove families that are non-poor but near-poor. Income volatility is particularly high in Brazil,⁶⁰ especially among Brazil's poor.⁶¹ As a result, people at risk of becoming poor frequently cross the poverty line in both directions.⁶² Systemic shocks can push many near-poor households below the poverty line; economic recessions in Latin America have been associated with increases in poverty, particularly among children.⁶³ Shocks can also have negative effects on poor children's human capital accumulation. Brazil's macroeconomic crisis of 1987–1991, for example, was associated with lower school enrollment and higher infant mortality.⁶⁴ Because Bolsa Família seeks to alleviate poverty not only in the present but also in the future, and because it is an important part of Brazil's broader system of safety nets, families that are non-poor but highly vulnerable to falling into poverty should not necessarily be excluded. Thus, even on theoretical grounds, it is controversial to remove the near-poor beneficiaries, such as the rural households who are eligible for the program due to their low nominal income, but can buy a basket of basic needs in their region and are therefore not poor.* It is even more controversial to reduce the benefits of

* The non-poor who are also not vulnerable to poverty, however, should be removed. There should be absolutely no beneficiaries in the top 40 percent of the distribution function of household income per capita, for example; in 2006, about 5 percent of Bolsa Família transfers went to this portion of the population (Soares and Sátyro, 2009). This is known as an error of

poor rural households, who may still be in poverty despite receiving Bolsa Família, in order to free up budgetary resources to increase the transfers of poor urban households and “even out” the real benefits received by each.

Nevertheless, there is no reason to believe that Bolsa Família’s budget is limited to what it currently spends. On the contrary, the total program budget and the total value of transfers paid have increased every year since the program began. In addition, the program has been expanding to include more households since the 11 million household limit was removed in January 2009. Figure 4 shows the increase in the number of beneficiary households and total transfers paid since the program was implemented in January 2004. In fact, when the limit was removed at the beginning of 2009, the government set a new goal (but not a limit) for the number of beneficiaries: 13.7 million households by the end of that year.⁶⁵ As of March 2011, Brazil was still over 750,000 households short of that goal,⁶⁶ indicating that there is ample room to add the excluded metropolitan poor into the program.

How should this be accomplished? First, all metropolitan households with nominal per capita income above the current eligibility cut-off but below the cost of a basic needs basket who are already registered in the Cadastro Único should immediately be included in the program. Municipal workers, who are in charge of locating the poor in their respective municipalities, should be informed of the change, so they know the revised target population. Municipal quotas, which are based on poverty mapping elaborated by IBGE and identify a target number of beneficiaries in each municipality, are used to identify municipalities that are underperforming in locating beneficiary households;⁶⁷ these quotas should be revised according to the spatial price adjustment.

With regard to increasing the transfer size, scaling up benefits by the Laspeyres spatial price index presented in Section 2—assuming the government does not wish to lower the amount paid to rural households—would increase the cost of transfers by ap-

inclusion or unintended leakage.

proximately 42 percent.* This is a very affordable increase, especially considering that Bolsa Família is a relatively lightweight budget item, at just 0.39 percent of Brazil's GDP in 2009.† After the increase, the program would cost about 0.55 percent of GDP, which can be compared to other more regressive government transfers such as federal employee pensions, which cost 2.3 percent of GDP, and social security, which costs 7.0 percent of GDP.⁶⁸

Furthermore, Brazil's executive branch already increases the nominal transfer size periodically. Since the program was implemented, the transfer was increased by presidential decree in July 2007, June 2008, July 2009, and March 2011.^{69 70} The most recent increase raised the minimum transfer from twenty-two to thirty-two reais—an unprecedented 45 percent increase. Bills on the table in Brazil's Senate and Chamber of Deputies propose further increases to transfer size, such as indexing the benefit to national inflation and adding performance-based benefits. Another bill currently under consideration in the Senate proposes to raise the minimum Bolsa Família benefit to half of the monthly minimum wage.⁷¹ At present, the minimum wage is 510 reais, and increasing each household's monthly transfer to 255 reais would increase the cost of transfers by a factor of ten. Clearly, Brazil's policymakers are not opposed to raising the cost of Bolsa Família transfers, especially when the well-being of poor households and their children is at stake.

In short, the Brazilian legislature should adjust Bolsa Família's eligibility cut-off and transfer size to account for spatial price differences. Including poor metropolitan households that are cur-

* The total monthly cost of Bolsa Família transfers after the proposed adjustment is calculated as the sum of the cost of transfers after the adjustment in each state. The cost of transfers in state s , in turn, is calculated as the value of transfers paid in state s in March, 2011 times an index measuring the average cost of living in state s . The index is calculated as the sample mean of the Laspeyres spatial price values corresponding to the surveyed individuals from that state, divided by 0.449, the lowest value of the original Laspeyres spatial price index (see Table 1), to ensure that all families receive no less than they were previously receiving in nominal terms. The proportional increase in total monthly cost is simply the national monthly cost after the proposed adjustment (which comes to \$1.7 billion reais) divided by the national monthly cost in March, 2011 (\$1.2 billion reais).

† Author's calculation based on a program budget of 12.4 billion reais in 2009 (SAGI/MDS, 2011) and GDP of 3.2 trillion reais in 2009 (World Development Indicators, 2011).

rently excluded by the nominal eligibility cut-off should be the first priority. Ideally, they should not replace non-poor beneficiaries that are vulnerable to poverty, since income is volatile and systemic and idiosyncratic shocks can send near-poor families into poverty. The number of beneficiary households has been increasing since the limit was removed at the beginning of 2009, and the current number of beneficiaries is still over 750,000 households less than the goal that was set for the end of 2009. Excluded poor metropolitan households that are already registered in Cadastro Único should be included immediately, and urban municipalities should expand their search for poor households that were previously thought to be ineligible. Transfer sizes should also be increased, which can be done without reducing any household's transfer for 42 percent of the current cost of transfers. This is very affordable, especially considering the precedent for raising Bolsa Família's transfer size.

CONCLUSIONS

Poverty has been falling in Brazil since 2003 according to all commonly-used poverty measures, and monetary transfers have played an important role in this process. In particular, the conditional cash transfer program Bolsa Família caused between a 12 and 18 percent decrease in the poverty headcount index, and between a 24 and 31 percent decrease in the squared poverty gap index in 2009. Because the eligibility cut-off and transfer size of the program are not adjusted for regional differences in the cost of living, it has had a much higher impact in rural areas than in urban ones.

This paper adjusted income by a Laspeyres spatial price index to reflect the different costs of a basic needs basket in different areas. This adjustment also generates poverty lines that obey the consistency property, or in other words, that are fixed in terms of the real standard of living they imply. Using consistent poverty lines, Bolsa Família reduced the squared poverty gap by around 50 percent in Brazil's most rural state, Piauí, and around 8 percent in its most urban state, Rio de Janeiro. Since poverty figures are calculated us-

ing a sample survey that is subject to measurement error, however, it is possible for an observed difference in poverty reduction in two states to be statistically insignificant; a hypothesis test confirmed that Bolsa Família's impact was higher in Brazil's most rural states than in its most urban ones. The robustness of this result was also tested, and is robust to the choice of different states, alternative spatial price indices, and different poverty lines. Furthermore, there is strong positive correlation between a state's percentage population living in rural areas and the impact that Bolsa Família had on the squared poverty gap in that state.

A probit model comparison was used to see how Bolsa Família changed the composition of who is poor, and which sub-groups of the poor were more likely to remain poor despite the program. While rural families are more likely to be poor before Bolsa Família, they are also more likely to escape poverty due to the program. Urban families are more likely to remain in poverty, either because they are excluded or because the transfers they receive fall short. A group of metropolitan poor that was excluded because its nominal incomes exceeded the eligibility cut-off was identified, as well as a group of non-poor rural beneficiaries whose nominal incomes made it eligible for the program.

For Bolsa Família to achieve its objectives, spatial price differentials must be taken into account when setting the eligibility cut-off and transfer size. It is not unprecedented to adjust a CCT for regional differences in the cost of living; a few cash transfer programs in other countries adjust the eligibility cut-off or transfer size for price differences across two or three spatial regions. An ideal adjustment would make a narrower distinction, such as the adjustment proposed here, which divides Brazil into twenty-one spatial regions.

Given that the number of Bolsa Família beneficiaries has been expanding since the eleven million household limit was removed in early 2009, and that the current number of beneficiary households is still about 750,000 households below the goal set by the government for the end of 2009, poor metropolitan households that were excluded by the nominal eligibility cut-off could very fea-

sibly be immediately included in the program. Excluded poor metropolitan households (those with nominal per capita income above the current eligibility cut-off but below the cost of a basic needs basket) that are already registered in the Cadastro Único should immediately be included in the program, and municipal quotas should be adjusted. The size of transfers should also be adjusted for regional differences in the cost of living. Assuming policymakers do not want to decrease the size of anyone's transfer, the value of transfers to be paid would increase by 42 percent, which is very affordable, especially since Bolsa Família is a relatively lightweight budget item, comprising just 0.39 percent of GDP in 2009.

Policymakers have already shown interest in expanding both the coverage and benefits of Bolsa Família in order to continue alleviating poverty and increasing the human capital of Brazil's poor. The next step is to adjust Bolsa Família's eligibility cut-off and transfers for the different prices faced by the urban and rural poor, and to expand the program accordingly.

*To view all charts and tables, visit:
<http://www.belvidius.org/2012/higgins>*

Notes

- 1 World Bank, "Brazil: Measuring Poverty Using Household Consumption," Table 15.
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- 4 James A Robindon, "The Political Economy of Redistributive Policies."
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