Should Conditional Cash Transfers Extend to Secondary Education?

Examining the Impact of Brazil's Bolsa Família on High School Transition Rates

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I. Executive Summary

This paper will take a closer look at Bolsa Família, an anti-poverty program, and its impact on youth education over its fifteen years of existence in Brazil. More specifically, it will explore the distinctive effects the program has had after the implementation of its 2008 Variable Youth Benefit extension, or Benefício Variável Jovem in Portuguese, that provided additional monetary assistance to teenagers aged 16 and 17.

Since its establishment in 2003, the overarching Bolsa Família program has provided allowances to households in poverty and extreme poverty, conditional on the children in those households having near-perfect school attendance. Fifteen years after its implementation, Bolsa Família has spread to all 5572 Brazilian municipalities and now reaches 13.7 million households, transferring over 600 million dollars a year and thus becoming the largest conditional cash transfer program in the world (Queijo). Recent changes in government leadership and waves of new political ideology, however, have brought into question the long-term efficiency of the program, as it takes up millions of dollars in public funds. Hence, It is important to understand how education has been impacted by Bolsa Família and how successful the program has been in breaking intergenerational poverty by allowing the poor to become more educated, achieving at least a high school education through the addition of the Youth Variable Benefit.

By analyzing data on program beneficiaries provided by the Brazilian government, this paper hopes to examine the impact on grade promotion rates that can be directly attributed to the 2008 Benefício Variável Jovem extension and what future trends those outcomes seem to indicate for the now well-established program. Understanding this will not only allow us to have more concrete evidence on the program's efficiency, but, more generally, it will also help in comprehending to what extent conditional-cash transfer programs are suitable for teenagers, who

inherently face a higher opportunity cost for their education, and whether an additional monetary incentive should indeed be considered for such recipients. In addition, changes in dropout rates and age-grade distortion rates will also be examined. With this, this study hopes to paint a broader picture of how BVJ implementation has impacted high school education in two profound ways: by ensuring continuity in adolescent schooling and, consequently, altering the composition of the student body itself.

II. Background Information

A. The Bolsa Família Program

In November 2003, incumbent Brazilian President Luiz Inácio "Lula" da Silva introduced one of the most ambitious anti-poverty programs to ever exist: Bolsa Família (BF hereafter). Roughly translated to "Family Allowance", BF aimed to combine several efforts from previous administrations into one giant-sized conditional cash transfer program that would offer monthly small amounts of cash to poor families as means to incentivize them to invest in the human capital of their children, breaking the intergenerational cycle of poverty (Wetzel). With this purpose in mind, the government provided households that were qualified as living below the poverty line with a monthly stipend. In exchange, children living in participating households were expected to fulfill two requirements: maintain a school attendance rate of at least 80% of all class days and conduct regular health checkups. In its incipient phase, the program already called for colossal levels of government spending, accounting for roughly 0.5% of the total Brazilian GDP at the time (Wetzel).

Naturally, the program caused uproar and confusion, especially amongst those who opposed President Lula and his left-leaning Workers' Party. Firstly, several social welfare

initiatives had already been implemented by Brazil in the recent past, and government spending already made up 22% percent of the country's GDP (Wetzel). In addition, many felt this was just a method of giving money away to the poor with no long-term benefit. It was difficult to foresee what subsidizing millions of households would do to the country's economy, much less how it would change the living habits of the poor.

Yet benefits to implementing Bolsa Família did emerge, mainly due to the two conditions it so strictly reinforced: education and healthcare. According to BCG's Centre for Public Impact, Bolsa Familia "was responsible for approximately 28 percent of the total poverty reduction in Brazil, and from 2002-12 the number of Brazilians living with less than BRL70 a week had fallen from 8.8 percent to 3.6 percent" ("Bolsa Familia in Brazil"). The program's significant effect on poverty is widely accepted in Brazil; however, a more complex issue is whether that decrease in poverty came solely due to the program's nature as cash transfer to the poor or if there indeed was a major, long-lasting impact on poverty: a distinct increase in non-transfer income for recipients over time. Cash transfers were seen by most of the population as temporary anti-poverty measures from the start, but whether it truly had any profound positive effect, allowing Brazilians to permanently escape the ever-elusive "poverty trap", is still up for debate.

The program, however, has not remained entirely static during its fifteen years of existence. Most notably, several "variable benefits" were added to the roster in order to extend the program's reach to new populations as the government saw fit. Today, the program is not only made up by the basic flat rate offered to families in extreme poverty, with income below 89BRL per person, but also of five *additional* variable benefits which families in poverty, with per capita income below 178BRL, can also receive. In fact, the original variable benefit was the one offered to households for every child aged 6 to 15 to attend school, implemented in tandem with the primary

BF package. Subsequently came four other additions to the package: a Variable Youth Benefit, Variable Pregnancy Benefit, Variable Nursing Benefit, and Variable Benefit for Overcoming Extreme Poverty. Each one came with strict requirement cutoffs, such as age or income, and predetermined implementation dates, usually the first business day of a given year. This paper will examine the effects of the Youth Variable Benefit and its aims in extending the success of BF to older teenagers, those aged 16 and 17.

B. Inflation Indexation

To understand shifts in program performance, it is imperative to look at the changes in the nominal value of cash awards throughout the years. Although BF is informally indexed to Brazilian inflation, meaning the population expects a yearly increase to at least offset rises in inflation rates despite there being no official commitment from the government to do so, changes in the transfer amount often surpass inflation. In fact, the latest data by the Brazilian Ministry of Social Development reveals that, between the years 2011 and 2016, the average package for those living below the poverty line saw a total 71.24% increase, when compared to a cumulative 41.24% surge in inflation in that same five-year period. The largest gain, however, came for those living below the *extreme* poverty line: the benefits for the extremely poor saw an increase of 112.78% in that same period, almost three times the inflation rate ("Benefício Médio Do Bolsa Família Subiu Mais Do Que a Inflação"). As mentioned previously, this gain reflects not necessarily an increase in BF packages, but an expansion in its breadth of coverage: new subsets of the larger package being created to benefit the extremely poor.

C. The Variable Youth Benefit Extension

The Benefício Variável Jovem (BVJ hereafter) was announced in 2008 as a complement to Bolsa Família that would cover young recipients receiving an education for an additional two years, at the ages of 16 and 17. It was capped at two teenagers per household and transferred participants a significantly higher amount than other BF benefits, 30 BRL monthly as opposed to the 18 BRL for younger children, an increase of over fifty percent in allowance for the high school students as soon as they turned 16. The larger amount was a conscious choice by government officials to reflect what they perceived as higher opportunity costs faced by teenagers to attend school: the targeted BVJ recipients, being older in age, were also more susceptible to join the workforce to help their families financially. Alternatively, they were also likely to fall prey to other obstacles that would prevent them from completing high school, such as criminal activity in urban settings or early pregnancies in the case of girls. Thus, it was generally accepted that those teenagers had to be compensated more highly in order to be properly incentivized. According to Rosani Cunha, National Secretary of Citizen Income at Brazil's Ministry of Social Development, the new benefit came as a way to reinvigorate the government's fight against inequality, reduce school evasion rates, and address one of the main causes of intergenerational poverty: low levels of schooling ("Bolsa Família Começa a Atender Jovens De 16 e 17 Anos"). Implemented five years after BF, BVJ can be seen then as an extension of all aims the original program proposed, now ensuring that low-income youth would be able to continue their studies well into their teenage years and ideally obtain a high school diploma that would allow them to pursue better job opportunities.

The Youth Variable Benefit was thus implemented in 2008, automatically enrolling all eligible teenagers already in the Bolsa Família database known as Cadastro Único. The new benefit

immediately impacted over 1.75 million teenagers, with the cash amount being transferred monthly to the mother of the household, like the original BF. Payments were to be made starting the month after a teenager's sixteenth birthday and went on for more than two years, until December after their eighteenth birthday. Conditionalities were slightly different than the ones for children: there were no requirements involving health checkups, and the school attendance threshold was a slightly reduced 75% from the children's 80% of all school days. These conditionalities were also tracked separately from all other benefits, meaning that not abiding by BVJ requirements would not preclude families from receiving the basic transfer and other variable benefits they might have qualified for.

D. Brazilian Poverty as a Geographical Phenomenon

In order to fully understand the many factors playing into Brazilian poverty historically, many of which could potentially influence BVJ's impact, one must first look at the country's geography and demographics. Brazil has 27 states, including a small Federal District that encompasses the capital Brasília, and those are divided into five regions, as illustrated below. Those five regions are known as North, Northeast, Center-West, Southeast, and South.

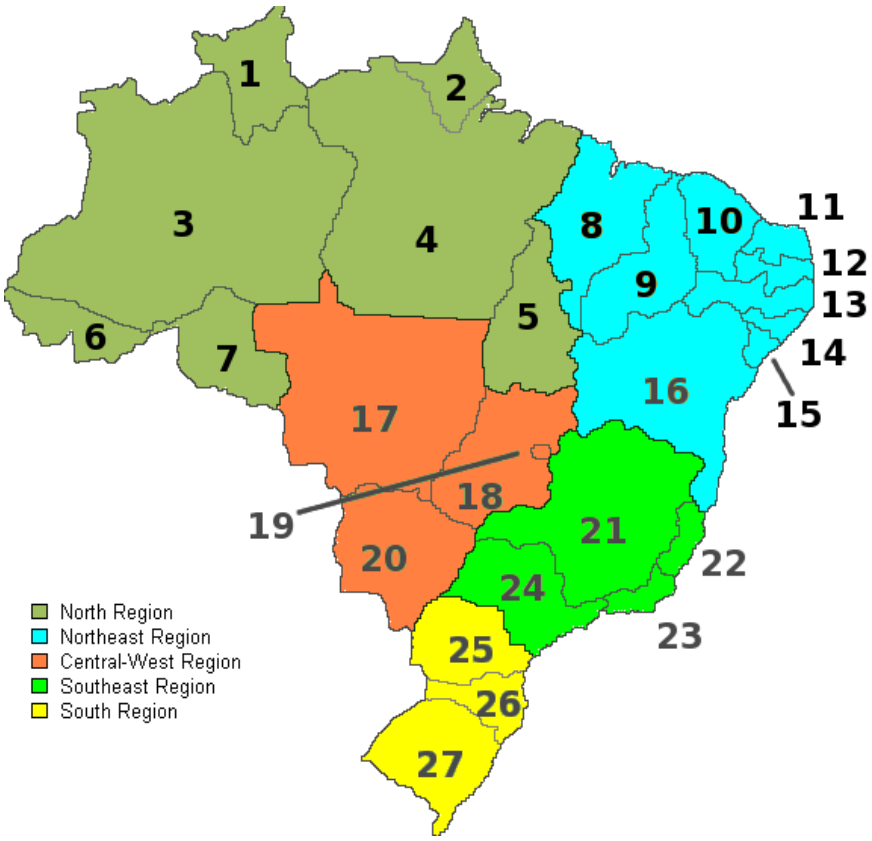

Figure 1 –Brazilian States and Regions (Source: Wikimedia Commons)

Distinct levels of population density, poverty, and development across regions make it imperative to account for geographical differences within the country. For instance, the most populous regions are not the ones with the most people living in poverty, as one would expect. The Northeast region primarily presents a high concentration of poverty, followed closely by the North region. The Southeast, known for having the largest population with huge metropolitan cities like São Paulo and Rio de Janeiro, takes up a surprisingly small percentage of the national population in poverty. Regional differences become evident when looking at the map below:

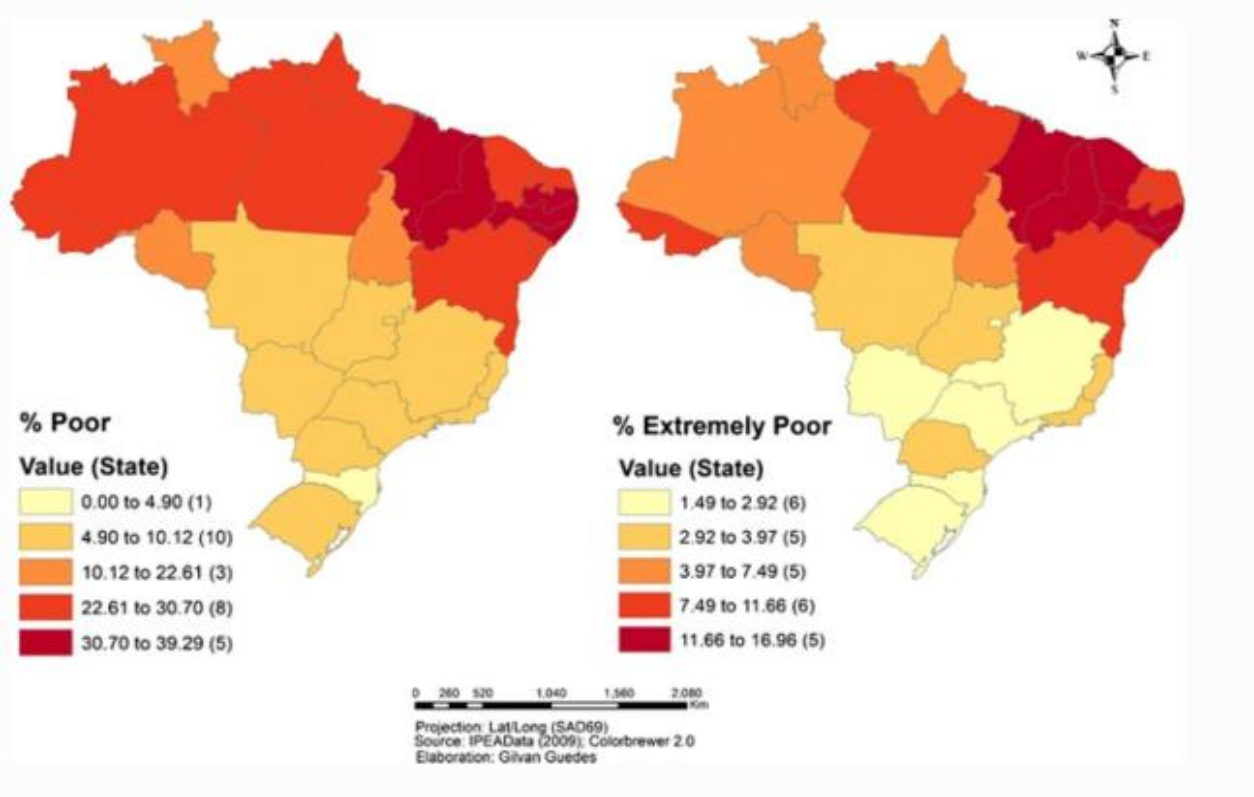

Figure 2 – Brazilian Poverty and Extreme Poverty by State, 2009 (Source: Guedes et al.)

According to the article "Economic Integration, Poverty and Regional Inequality in Brazil", published in the Brazilian Economy Magazine in 2006, the breakdown is as follows:

> "[...] the South-East region of the country, while counting for 43.84% of total population in 1995 had only 33% of the poor. These figures were 15.37% for the South region (8.15% of poor), and 6.81% for the Center-West region (5.23% of poor). For the poorer regions, on the contrary, the share of population in each region is lower than the share of poor: 4.56% (9.32% of poor) for the North region, and 29.42% (44.31% of poor) for the North-East region, the poorest region in the country [...]" (Filho, Ferreira, et al.)

The Northeast is home to virtually 45% of the poor in Brazil, despite only representing less than 30% of the general population. Similarly, albeit less severely, the North accounts for almost 10% of the poor despite being less than 5% of the overall population. Many theories have arisen as to why those two regions seem to showcase such a high level of poverty for their respective populations. Geographically, the two of them face distinct barriers to development unlike those present in any of the other regions. The Northeast faces a semi-arid climate that has historically hindered farming and economic activity in the area, plagued by droughts and numerous transportation problems due to fewer roads. Conversely, the North is where the lush Amazon rainforest is located, with its dense greenery covering most of the region that also happens to be the largest of the five in area. Despite exhibiting polar opposite climate to the Northeast's semi-arid climate, the Amazon rainforest also has proven itself to be a major cause for underdevelopment, as it is a major obstacle for communication and contains many untouched areas still populated by indigenous tribes.

The map below showcases Human Development Index by municipality in Brazil at three distinct periods: 1991, 2000, and 2010. There is a clear positive trend in HDI indices during the 1990s and early 2000s, with the number of cities having a low HDI indices being reduced significantly. However, it is important to note that those that remain are still mainly located in the North and Northeast of the country, and the cities with high HDI, shown in light green, primarily appear to be in the three other regions (Center-West, Southeast, and South) even as late as 2010. Thus, one must keep in mind that reception to both the Bolsa Família program and the BVJ extension benefit could differ vastly according to region, largely due to geographical, economic, and developmental differences.

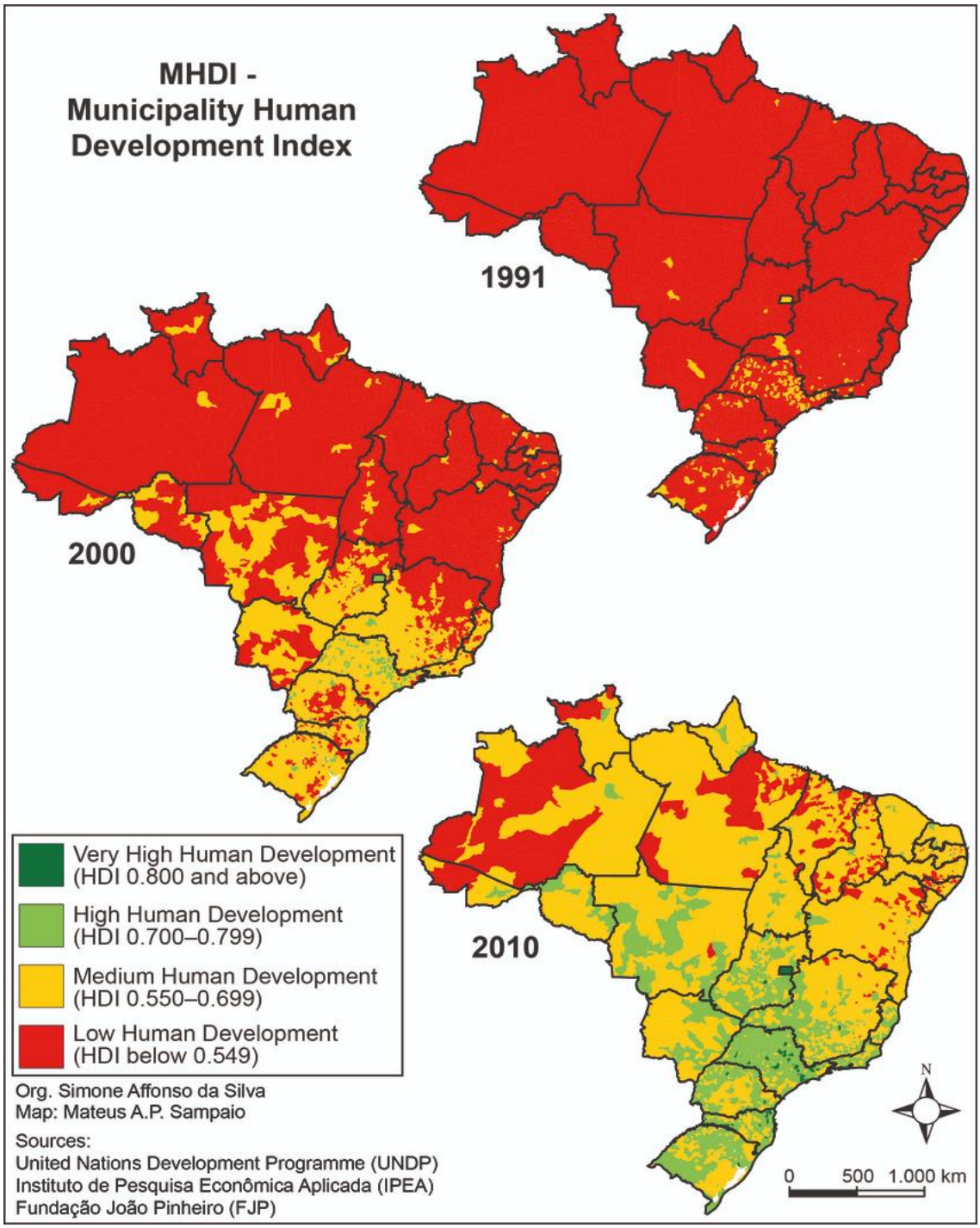

Figure 3 – Human Development Index of Brazilian municipalities in 1991, 2000, and 2010 (Source: ResearchGate)

E. Existing Literature

In order to understand the impact of the Youth Variable Benefit in 2008, it is first important to understand a CCT program's role as a means to invest in human capital and lift people out of generational poverty traps. By giving poor families the incentive to devote their children's time to education, Bolsa Família places school attainment as a key component in having a new generation break out of poverty, since it provides an educational foundation for its recipients to find more and better job opportunities. BVJ allowed for the extension of said pattern by introducing financial assistance to teenagers past the age of fifteen so that they could complete high school. Hence, to better analyze the program's efficiency, one must look at what behavioral changes in education have been put into motion since its implementation according to existing economics literature.

Using Brazilian panel data from household surveys in 2005 and 2009, an impact evaluation conducted by Washington DC's International Food Policy Institute in conjunction with Cornell University found that "among girls, the program significantly increases school participation by 8 percentage points and grade progression by 10 percentage points, with large, significant effects across both younger and older girls in rural areas but concentrated among girls aged 15–17 years in urban areas [...] few significant impacts are found among boys" (De Brauw et al.). Furthermore, scholars have observed changes in educational outcomes such as grade promotion and dropout rates, especially in program base participant pool of children aged 6 to 15. In a 2011 study by Paul Glewwe and Ana Lucia Kassouf, regression on school census data to estimate the BF average treatment effect showed that the program "increased enrollment by about 5.5% (6.5%) in grades 1–4 (grades 5–8); lowered dropout rates by 0.5 (0.4) percentage points in grades 1–4 (grades 5–8); and raised grade promotion rates by 0.9 (0.3) percentage points in grades 1–4 (grades 5–8)" (Glewwe & Kassouf).

In addition, studies have also identified spillover effects that extend beyond improvements in youth education. Generally, reductions in poverty and inequality associated with these types of programs have broader social consequences, mainly in closely associated aspects of economic development such as crime and unemployment, which should be taken into account in the policy-making process. In "Spillovers from Conditional Cash Transfer Programs: *Bolsa Família* and Crime in Urban Brazil", published in the Economics of Education Review in 2015, economists from the World Bank and the São Paulo School of Economics collected official geo-reference police data from the city of São Paulo to link crimes to a certain areas, which were artificial school districts they created by assuming a high correlation between a student's school location and place of residence. Looking at the years of 2006 and 2009, and accounting for the introduction of the BVJ expansion in 2008, the study found that a school district with higher rates of BF participation saw robust negative impacts on crime and violence reported to the police. Incapacitation from time in school did not seem to be an important driving force behind the results, and the reduction in crime was not concentrated solely on school days, meaning these effects were not simply due to increased time spent in the classroom and away from the streets, but rather to a genuine decrease in criminal activity by the youth (Chioda et al.).

Moreover, positive impacts on employment have been attributed to the program. By utilizing panel data model from 2004 and 2013 to find trends in formal employment at the city-level, researchers from the Pontifical Catholic University of São Paulo found that BF participation is "positively associated with the formal labor market in Brazilian municipalities, both in regard to the increase in employed workers and rising wages and other forms of income" (Correa Junior et al.).

Fifteen years after its implementation, Bolsa Familia is still the largest CCT program in the world, encompassing over 13 million Brazilian families, and it has in fact had an impact on the education of underprivileged Brazilian children and teenagers. However, there is little research analyzing the geographical breakdown of said impact. The Northeast region of Brazil historically has been the one with the highest rates of poverty in its cities. Due to the semi-arid climate of most of the region, resources like food and water are scarce (Ferreira and Lanjouw). Implementing the program in the region would naturally be harder than doing it in a big city, since schools are more spread out and the long journey can make parents have higher incentives to keep their children at home. Analyzing whether the Youth Variable Benefit managed to positively impact pockets of poverty such as those, where structural challenges can be decisive in a teenager's ability to attend school, is of great importance. With such an analysis, one can then understand the regional returns on investment and thus better distribute funds according to each location's needs.

III. Data

The study uses city-level data on high school grade promotion rates and dropout rates in the years of 2007 and 2010, before and after the program's implementation, provided by Brazil's National Institute for Educational Studies and Research (INEP). Promotion rates are defined as the percentage of students who successfully managed to complete a certain grade in a year when compared to the initial group of students enrolled in that grade at the beginning of the same year. Dropout rates are the percentage of students who left the school in that same year. Furthermore, age-grade distortion rates will also be examined to better understand changes in the composition of the Brazilian student body. Those are also provided by the Brazilian National Institute for

Educational Studies and Research and are defined as the proportion of students with a delay in their schooling of two or more years. In accordance with the country's public-school system, when students drop out or fail most of their classes, they must redo their most recent school year. This leads to exorbitant amounts of students facing serious setbacks to their education, thus leading to higher age-grade distortion rates. Complete data on all variables of interest across both years has been compiled on 5454 cities, out of the grand total of 5572 cities in the country. This data also includes the total number of public high school students in every city and, out of those, how many were BVJ recipients in 2010.

In order to assess and compare program participation in every city, a ratio of the BVJ program participants to total students was calculated. Therefore, the main input variable was not the total number of program beneficiaries in a city, but rather the ratio of beneficiaries to the total public-school population. It is important to emphasize that the analysis will be done at the city level, commonly referred to in Brazil as municipalities, as opposed to the household level that is most common in poverty-related research.

Furthermore, it should be noted that, due to systemic differences in education, this paper will assume a three-year high school structure. As depicted below, this is the traditional Brazilian schooling experience. Referred to in Portuguese as "ensino médio" or the more obsolete "segundo grau", quite literally "second degree", with elementary school being the first. Hence, only the grades equivalent to 10th, 11th, and 12th grades by US standards will be observed.

Age	Brazilian Ensino Médio	American High School System
14-15	9th grade (not Ensino Médio)	9th grade
15-16	1st year	10th grade
16-17	2nd year	11th grade
17-18	3rd year	12th grade

Figure 4 – High School Years, Brazil vs. USA

Another important distinction to emphasize is that the Brazilian school year is aligned with the calendar year, unlike in the American system. In other words, the school year begins in February and ends in December. Thus, attending high school in Brazil would take up three whole calendar years. As evidenced by the table above, the average BVJ program participant would start receiving the benefit at some point in 10th grade and would continue receiving it most likely until their completion of high school, December of the year in which they turned 18.

Based on the data collected, the dependent variable will be the difference in promotion rates for each grade between the two years (e.g 10th grade promotion rate in 2007 vs. 10th grade promotion rate in 2010).

$$y = \Delta p_g = p_g^{2010} - p_g^{2007}$$

Where p = promotion rate
g = grade (10th, 11th, or 12th)

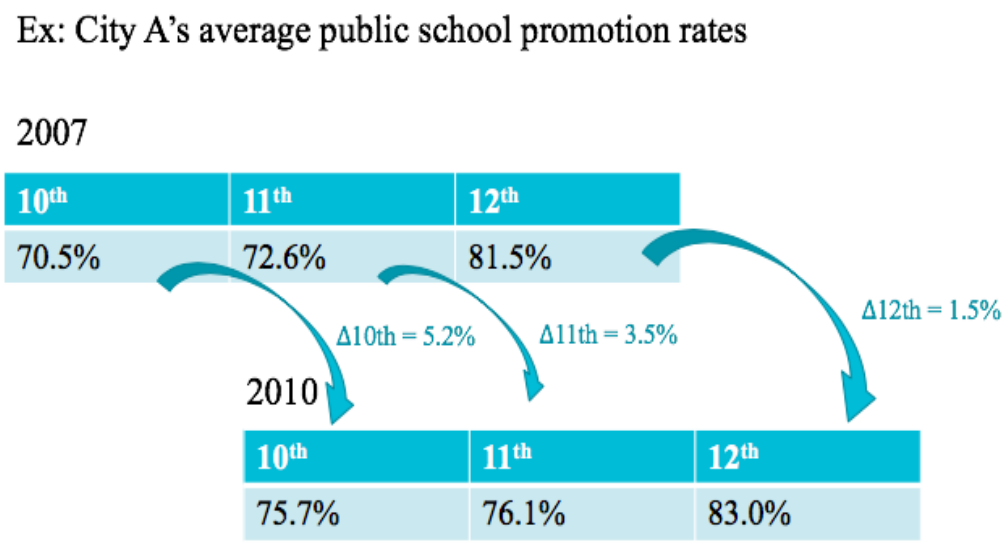

Figure 5 - Sample Grade Promotion Rates

This same mechanism will be replicated for the other two variables of interest: dropout rates and age-grade distortion rates. Hence, a total of nine output variables will be investigated: changes in the three rates between those years for all three years of high school.

In addition to the ratio of BVJ participants, data was also collected on poverty levels in each city in both years. Poverty ratios will be used to explore the relationship between a city's program participation and its poverty levels. It is expected that the more people there are living below the poverty line in a city (that is, the higher the poverty rate), the larger the ratio of BVJ recipients over the entire public high school population. Furthermore, this will allow us to account for any changes in poverty rates between the years of 2007 and 2010 that could potentially impact grade promotion rates. For instance, a city that faces a stark increase in poverty rates between those two years might also see a stark increase in the number of BVJ participants, which could in turn mitigate the impact on grade promotion rates.

Due to data on private schools being limited and incomplete for most cities, only public-school promotion rates will be analyzed. This could, of course, be a nonissue, considering BF recipients are inherently in poverty and generally could not have afforded attending a private school. However, this is a significant assumption made in regard to data collection that must be underscored. The BF program itself does not by any means require that its participants attend public schools, so it is theoretically possible that a BVJ recipient could have attended a private institution, perhaps with the help of scholarships, as long as they were abiding by the 75% attendance eligibility requirements for the cash transfer. Furthermore, looking at the change in private school promotion rates over time could have perhaps provided a valuable comparison to the public-school rates this paper explores, perhaps helping narrow down the true impact of BVJ.

Lastly, the years of 2007 and 2010 were deliberately chosen to try and narrow down the impact on promotion rates that can be specifically attributed to the new Youth Variable Benefit, created in 2008. The initial year, 2007, was exactly before BVJ was implemented and can thus serve as a good base year for comparison. The year 2010 was the third year after the program's implementation. Since the Brazilian definition of high school only entails three grades, this would mean that the 12th graders of that year would have been the first to have the BVJ allowance for all their high school years, thus being the first one to demonstrate the program's impact in its full capacity. In other words, 2010 is the first year in which all recipients will have received BVJ for the entirety of their high school years.

IV. Research Question

In the first three years of program implementation, did cities with larger Youth Variable Benefit participation rates experience: 1) higher promotion rates, 2) lower dropout rates, and 3)

lower age-grade distortion rates in the first three years? What geographical trends can be observed from changes in student performance in different regions?

V. Research Methods

A comparative research design based on difference-in-differences, albeit not exactly a DID model, will be used to determine the average treatment effect (ATE). The method will be used for all 5454 municipalities with data entries, looking for different ATEs in different regions in an attempt to determine how the program could have distinct impacts depending on geographical location.

As previously mentioned, the change in grade promotion rates, dropout rates, and age-grade distortion rates will serve as y-values in the research design. The x-values will be the participation rate of a city; in other words, the number of beneficiaries as a percentage of total public high school students in that city. Both x- and y-values will be accounted for in two different years, 2007 and 2010, and the change in value over that time period will be used to determine ATE. Naturally, pre-program participation rates in 2007 will be zero.

Thus, the model will be used to find the differences in transition rates for cities with distinct levels of program participation. The higher the percentage of recipients in a city, the higher the expected changes in grade promotion rates. Conversely, one would expect to see a negative correlation between program participation and dropout rates: as a higher percentage of people participate in the program, decreases in dropout rates should occur. The same can be said for age-grade distortion rates, although it requires more of a logical leap. Once again, with higher BVJ participation rates, one would expect age-grade distortion grades to *decrease*. Students are receiving higher incentives for a continuous education; hence, three years into program

implementation, it is predicted that the student body will become more homogenous age-wise. Fewer teenagers will face delays in their education, because they have higher incentives to perform well in that given age range.

Figure 8 illustrates the model to be estimated using promotion rates for 10th grade as the output variable of interest:

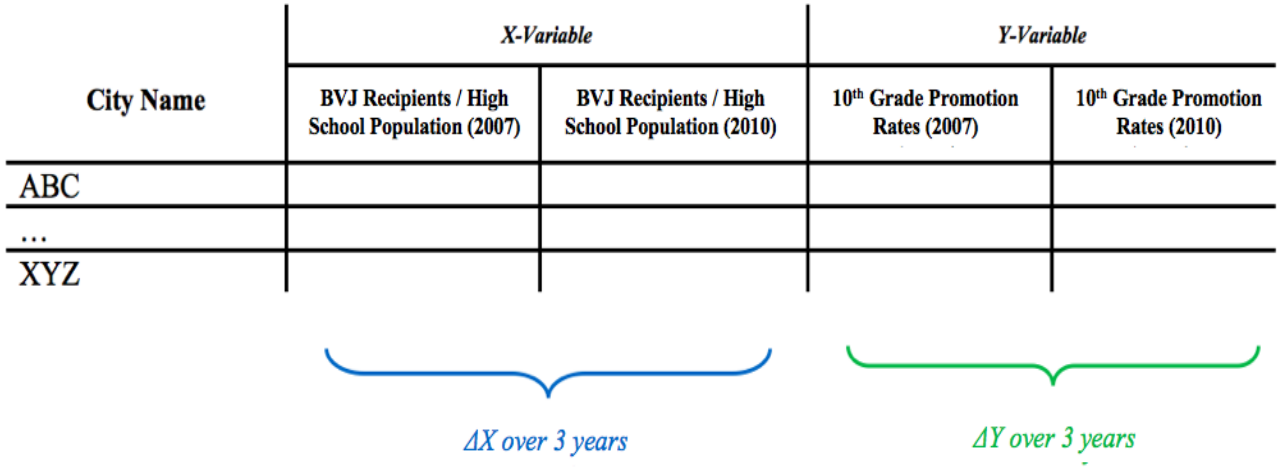

Figure 6 –Research Model

After modelling the data with the chosen design, it will be possible to find regional, geographical, or distributional similarities in changes to those rates, due to the data being broken down at the city-level.

For instance, cities with “poverty pockets” are those with higher poverty rates and where the poverty trap is common: parents do not invest in the human capital of their children because the opportunity cost of their time is too high -- they need their children to be working instead of attending school, yet this reinforces an intergenerational cycle where the child remains with the same financial struggle their parents had .

It can be assumed that those cities with higher poverty rates will have the largest Δx values as more people will be interested in the cash transfer program. Hence, it would be important to see if BVJ has any significantly higher impacts in school promotion rates in those cities, as it could be indicative of more families valuing education and having the ability to invest their children's time in it. On a more abstract level, it could even indicate a change in mentality: more people seeing high school as a tool to break out of their poverty trap.

The regression model used for the data is illustrated below:

$$Y_{cg} = \alpha + \beta * BVJ\ ratio + \varepsilon_i$$

where $Y_{cg} = \Delta r_{cg} = r_{cg}^{2010} - r_{cg}^{2007}$
c = city
g = grade
r = promotion rate

As detailed above, the output variable is the change is grade promotion rates *r* in a certain city *c* at grade *g*. BVJ ratio refers to the main input variable, the ratio of BVJ participants to the total eligible population of public high school students.

VI. Hypothesis

Based on the data presented, background information, and historical trends with regards to poverty, some expectations can be outlined as to what the data analysis might show us. First, one can predict that cities with higher rates of BVJ enrollees will see higher increases in grade promotion rates due to a larger percentage of the student population having incentives to attend and perform better in school. On the one hand, 10th grade might see a moderate growth in

promotion rates due to some students not being eligible for BVJ for being under 16 years of age, some of which might now start receiving the benefit well into the 11th grade. Similarly, 12th grade promotion rates might also see smaller changes because values are already initially higher. In fact, 12th grade promotion rates in pre-program implementation 2007 are consistently higher than the other two grades in the vast majority of cities. This could potentially be because students face a lower opportunity cost to complete the grade, since there is only one additional year in school before graduation and they have already invested so much of their time getting there. With this information in mind, it can be expected that 11th grade promotion rates will be impacted the most by the Youth Variable Benefit, meaning that there will be a significant increase between the years of 2007 and 2010 in most cities.

Secondly, when looking at regional trends in the data, cities in the north and northeast can be predicted to be impacted the most due to the higher poverty rates in 2007. The Brazilian Northeast, as detailed previously, is known to be the region with the higher poverty rates, facing issues of underdevelopment and harsh, semi-arid climate. Due to the semi-arid climate of most of the region, resources like food and water are scarce (Ferreira and Lanjouw). Moreover, the Northern region of the country is where the Amazon forest is mainly situated, the dense greenery providing similar geographical challenges to development. Thus, the additional monetary value of the BVJ is expected to play a larger role in incentivizing education, and consequently changes in grade promotion rates are expected to be higher.

VII. Data Analysis

A. BVJ Participation, Poverty, and Unemployment Rates

As previously indicated, this study focuses on the BVJ ratio as the main input variable for the research model. Figure 7 illustrates the distribution of BVJ participation ratios across the 5454 cities of interest in 2010. The median city lies at around the 0.30 mark, meaning the median percentage of public high school students receiving the BVJ benefit in a city is 30%. Quintiles are shown in red. Each quintile has about 1090 cities. The graph below shows that only the top quintile of cities had 50% or more of their students enrolled in BVJ. Taking advantage of the large city-level differential by quintile, this study uses the first quintile as a comparison group, where cities experienced zero to less than 17% BVJ participation rates. On the other hand, quintile 5 will be the treatment group, where cities experienced BVJ higher than 50% implementation rates.

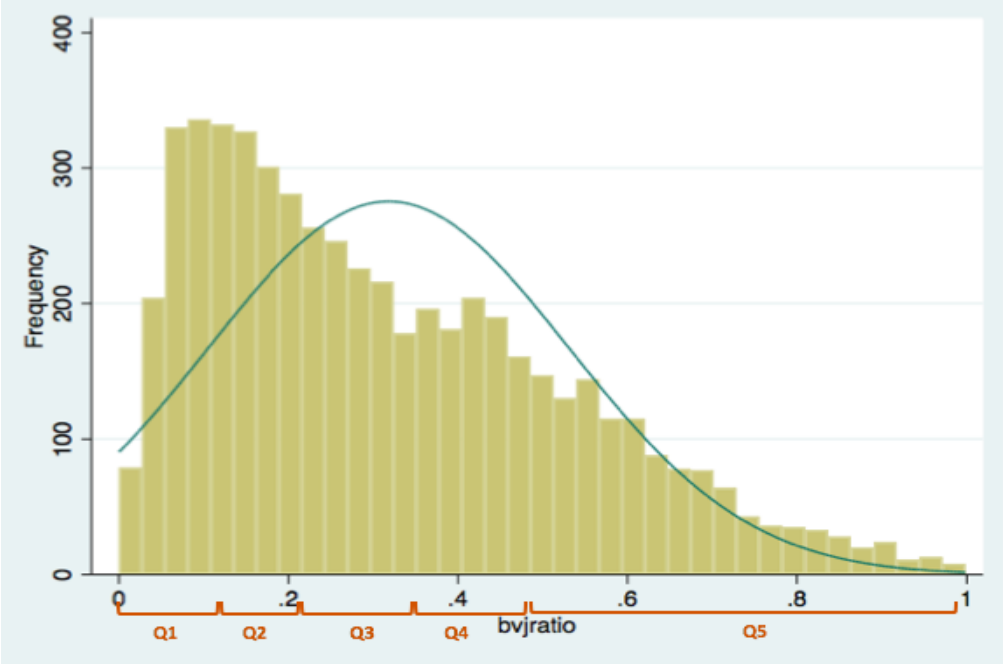

Figure 7 – Distribution of BVJ participation rates in 2010

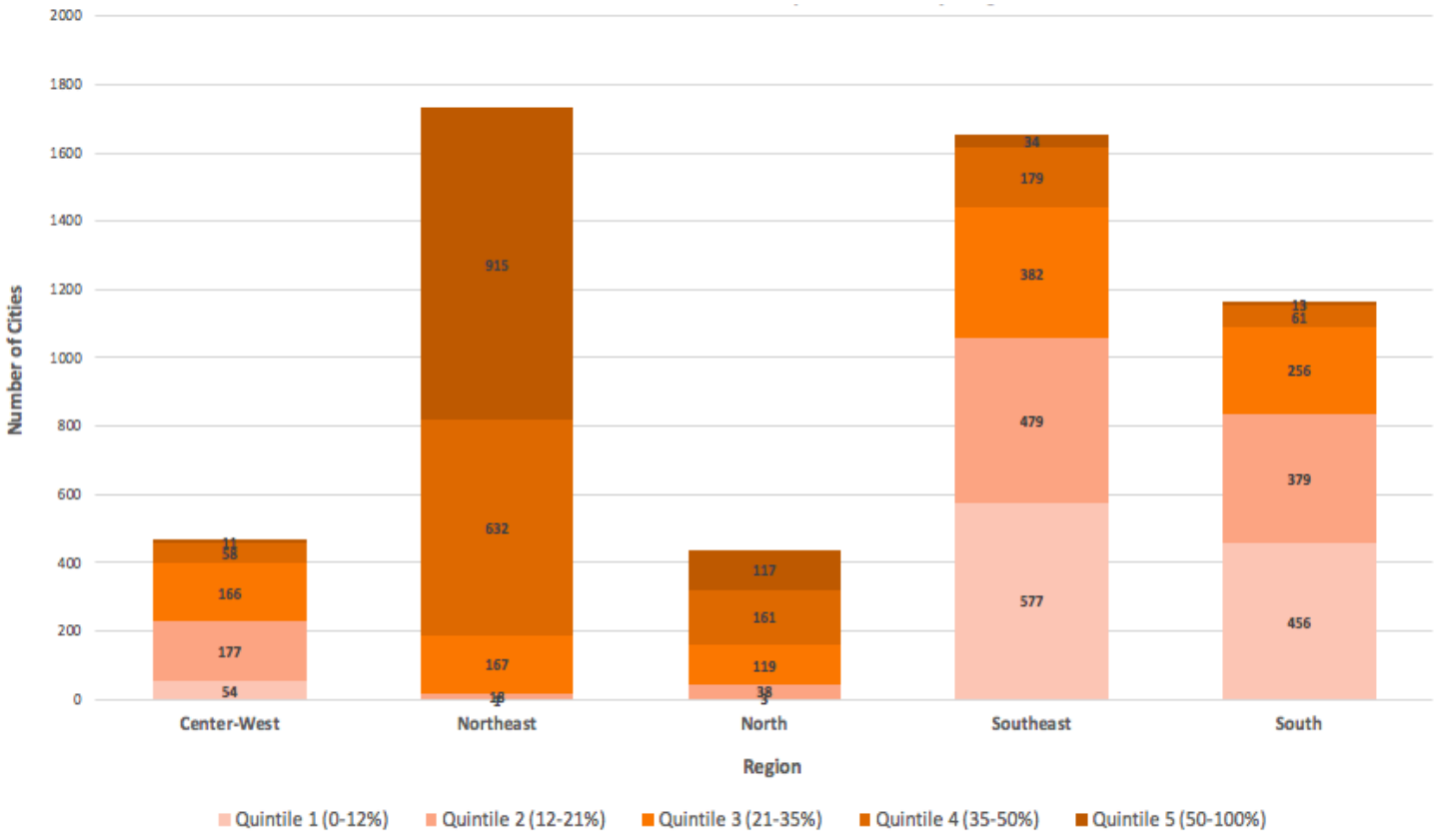

Figure 8 – Quintile Breakdown of BVJ Participation Rates by Region (2010)

Figure 8 breaks down the quintiles at the regional level. Dissecting program participation geographically, as shown above, allows for better insight into the regional nature of Brazil's poverty problem, and thus how regionally skewed any policy that aims to address it has to be. Almost all of the high participation cities, those in quintile 5 with BVJ implementation rates of 50% or above, are located in the Northeast, with most of the remaining few being in the North. Conversely, quintile 1, indicative of lower participation, is mainly split up between the Southeast and South regions. The Northeast and Southeast, the two regions with the highest number of cities, show distinct program participation patterns when compared side by side. These regional

differences are important to keep mind when later looking at the different changes in educational outcomes in those regions.

In order to determine whether the ratio of BVJ participants to overall public high school students is indeed a good proxy for a city's poverty rate, it is important to examine the correlation between the two variables. Using the data compiled on cities in 2010, it was found that nationally there was a 74.9% correlation between BVJ ratio and poverty rates. In other words, there is a positive trend indicating that the poorest cities tend to have a higher rate of their public students receiving the BVJ monetary aid. When plotting this data, this trend can be visually discerned.

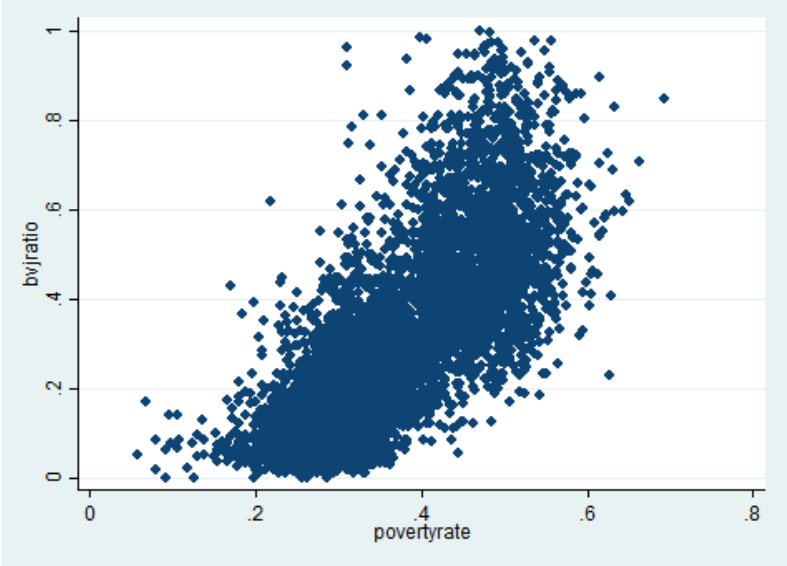

Figure 9 –- Poverty Rates and BVJ Ratio, Nationwide, 2010

However, that correlation is not as homogenous when looking at the regional breakdowns of the same variables. As expected, the Northeast and North regions have higher poverty rates, with their scatterplots being significantly displaced further to the right than other regions'. They also seem to have higher BVJ ratios as evidenced by plot points being located farther up than other regions.

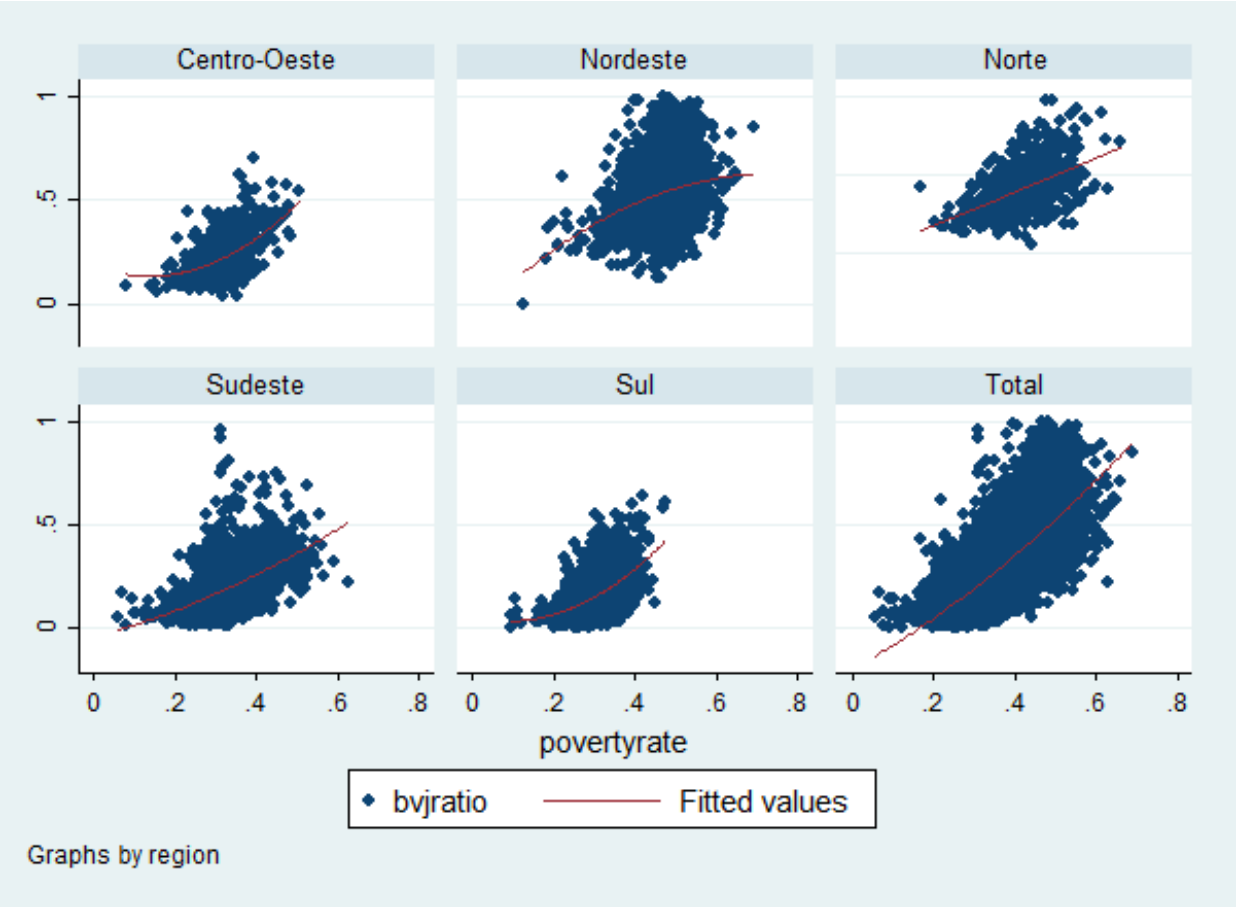

Figure 10 – Poverty Rates and BVJ Ratio, Regional Breakdown and Nationwide, 2010

Yet although all four other regions appear to have comparable correlation rates of around 50%, the Northeast regional correlation drops to only around 27%. This is supported by the fitted value lines in the graph above, of which only the Northeast's flattens out towards the right, as if reaching some horizontal asymptote. Hence, in the Northeast, it can be said that after a certain point, namely past a 0.6 poverty rate threshold, an increase in that rate is not corresponded by an increase in the BVJ ration in as fast a pace. Although the reasons behind this are unclear, one could theorize that this lag in program participation could be due to the underdevelopment of

said cities with dire rates of poverty: in cities where there is a larger percentage of poor people, not as many students feel encouraged to enroll in BVJ. This is a major regional difference that seems to only apply to the Northeast.

Another important variable to account for is unemployment. As previously mentioned, studies have found that BF, first established in 2003, caused spillover effects on formal labor markets and increases in employment rates and wages. This phenomenon must be accounted for, as it might influence students' educational outcomes. Theoretically, if a city has booming employment, students might feel like dropping out of school is a worthwhile decision, since they can easily find a job and help sustain their families. In poorest cities, this plays a large role: teenagers sometimes need to bring in additional income for their family. In order to understand the relationship between poverty and unemployment, and possibly account for those incentives in student's lives, changes in unemployment at between the years of 2007 and 2010 were examined for the 27 Brazilian states. The relationship between poverty rates and changes in unemployment within that time frame is plotted below:

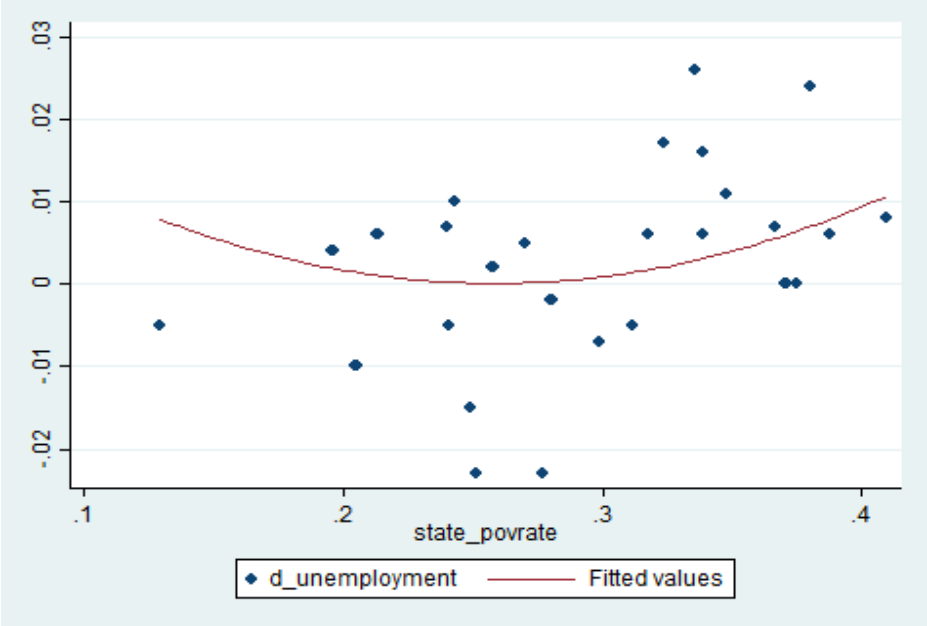

Figure 11 –Poverty rates and changes in unemployment between 2007 and 2010 at the state-level

Although the quadratic fit line does not exhibit a clear relationship between poverty and changes in unemployment rates, by looking at the upper-right section of the scatterplot one can distinguish a distinct pattern: the states with the highest average poverty rates, namely those of 0.3 or above, saw *increases* in unemployment rates in those three years. Below is a demonstration of how the poorest cities saw the highest uptakes in program participation. If one is to take high poverty as indicative of high increases in unemployment, as shown above, then by extension it can be said that high-poverty, high program participation cities were the ones who saw rises in unemployment. This could impact the overall conjecture of BVJ impact on schooling because an increase in a city's unemployment rate could be a further incentive for students to stay in school. Hence, it might add on to the positive effects of program implementation. Evidently, this is only considering formal labor. Informal labor, on the other hand, is also very much common in Brazil, but difficult to measure. It might be that the informal labor market showcased a completely different trend, but since the statistical means to analyze it are limited, the focus of this paper will be solely the formal labor market.

B. Regression on Grade Promotion Rates

With the complex relationship between the BVJ participation ratio and poverty rates having been established, it is now time to turn to the regression model and find out if there were indeed any significant changes in high school grade promotion rates as a result of BVJ implementation. Before accounting for the BVJ ratio variable and seeing if schools with larger participation rates did indeed see higher changes, it is valuable to look at whether there were *any* changes to public school promotion rates over those years. Although that change might not be solely due to the new BVJ, it is nevertheless relevant to look at the change in promotion rates

immediately following its implementation, as a significant jump in numbers in such a short amount of time could indeed be proof of its efficacy.

For this consideration, a regression model excluding the BVJ ratio variable is utilized, looking only at the constant as it changes over time, clustering for state differences. Below is the output for this regression:

	Mean differential	Standard Error	T Value	P Value
10th grade	0.0264393	0.0067192	3.93	0.001
11th grade	0.0312701	0.0058199	5.37	0.000
12th grade	0.0291461	0.0063572	4.58	0.000

Figure 12 – Pre-post regression on changes in grade promotion rates, Nationwide, 2007-10 (sample size: 5454 cities)

At the national level, there was a positive, statistically significant change that happened in promotion rates for all three grades. Note that coefficients represent the average national rate at which grade promotion rates have increased for that grade. For instance, in 11th grade there was a 3.127% average increase in public school rate promotion rates between 2007 and 2010. This means that, in only three years, at the average public school in Brazil three percent more of all students are completing 11th grade successfully. This demonstrates that there was, indeed, a major increase in promotion rates in those years. At around 2.5-3% for all grades, this increase becomes fairly important when one considers the broad scope of a whole nation.

Unfortunately, this broad national scope might be misleading when one considers the regional differences present in Brazil when it comes to poverty. It might not be appropriate to look at the data at a country-level when promotion rates were heterogeneous in the first place:

education in the Northeast was not at the same standard as it was in the South, for example. In addition, the poorest region also had the largest percentage of its public-school population enrolled in BVJ, and hence looking at the change in promotion rates at the regional level might also be beneficial.

To account for this, a preliminary pre-post regression analysis model is deployed, looking at the constant as it changes over time at the regional level, again clustering for state differences. Below is the output for this regression, with the starred regions representing statistically significant changes:

		Mean differential	Standard Error	T Value	P Value
10th grade	Center- West	-0.0045193	0.0035764	-1.26	0.296
	Northeast*	0.0409803	0.0098969	4.14	0.003
	North*	0.0475822	0.0049973	9.52	0.000
	Southeast	0.0271073	0.0177949	1.52	0.225
	South	0.0082972	0.004658	1.78	0.217
11th grade	Center- West*	0.0078584	0.0009173	8.57	0.003
	Northeast*	0.0399402	0.0127996	3.12	0.014
	North*	0.0368169	0.0095289	3.86	0.008
	Southeast*	0.0416024	0.0048161	8.64	0.003
	South	0.0110103	0.0046717	2.36	0.143
12th grade	Center- West*	0.0113069	0.0022277	5.08	0.015
	Northeast*	0.0172034	0.0070926	2.43	0.041
	North*	0.0545982	0.0193372	2.82	0.030
	Southeast*	0.0508624	0.0088594	5.74	0.010
	South	0.0135043	0.0040341	3.35	0.079

Figure 12 – Pre-post regression on changes in grade promotion rates, Regional breakdown, 2007-10 (sample size: 5454 cities)

In this case, there are still many statistically significant jumps in grade promotion rates, but they are disparate and vary according to region. In the 10th grade, only the North and Northeast seem to have seen a significant change, each at around a 4% increase. For 11th and 12th grade, major changes appear to have occurred in four out of five regions, all of them except the South, ranging from a modest 0.7% increase in 11th grade promotion rates in the Center-West to a much higher 5.45% increase in 12th grade promotion rates in the North. To put it into perspective, only three years after the initial 2007 observation, an additional five percent of *all* 12th graders in the North are finishing the grade within a year.

The increase in promotion rates across the board for the Northern and Northeastern regions are aligned with the initial perception that they would be the most impacted due to their high rates of poverty. The changes in Center-West and Southeast for both 11th and 12th grade, however, seem to indicate that the impact was much more far-reaching than one would initially expect. Especially in the Southeast, the region with the highest number of people containing huge cities like Sao Paulo and Rio, an increase of 4-5% in promotion rates in such a short time frame is no small feat.

Yet this still does not answer the main question: does higher rates of BVJ participation influence these grade promotion rates? In other words, if a city has higher levels of engagement in the program will it see higher impacts in education? This is where the research design involving a regression on BVJ participation ratios comes into play. Once again, the national results will first be examined to see if any changes are evident at a broader level.

Below is the output for this regression, including the BVJ ratio variable and once again clustering for state differences, with the starred variables representing statistical significance:

		Coefficient	Standard Error	T Value	P Value
10th grade	BVJ Ratio	0.0371977	0.0281506	1.32	0.198
	Constant	0.0146324	0.0129788	1.13	0.270
11th grade	BVJ Ratio	0.0275602	0.0255789	1.08	0.291
	Constant*	0.0225113	0.00097488	2.31	0.029
12th grade	BVJ Ratio	-0.0263054	0.0250928	-1.05	0.304
	Constant*	0.0375012	0.0117559	3.19	0.004

Figure 13– Regressing changes in grade promotion rates on BVJ participation, Nationwide (sample size: 5454 cities)

Regression results in this scenario are much more of a mixed bag. While the constants for both 11th and 12th grade regressions are still statistically significant, meaning there was a change in promotion rates in those grades between the two years, none of the coefficients on the BVJ ratio variable appear to be significant at a national level. This implies that there is no inherent relationship between BVJ program enrollment and changes in promotion rates nationally.

Evidently, this could still be aligned with the theory that regional differences will influence program impacts. Program engagement does not display any trends at the national level, but BVJ could still be playing an important role in the poorest regions of the country, providing the additional incentive those teenagers need to achieve an education. Thus, the same regression is deployed again, accounting for the BVJ ratio but executing them individually by region this time, still clustering for state differences. Below is the output of this regression, with starred variables being statistically significant:

	Region	Variable	Coefficient	Standard Error	T Value	P Value
10th grade	Center- West	BVJ Ratio	0.04007763	0.0512437	0.80	0.484
		Constant	-0.0140832	0.0154849	-0.91	0.430
	Northeast	BVJ Ratio	-0.0025742	0.0176388	-0.15	0.888
		Constant*	0.0423587	0.013344	2.93	0.019
	North	BVJ Ratio	0.0539988	0.0278956	1.94	0.101
		Constant	0.0250372	0.0116822	2.14	0.076
	Southeast	BVJ Ratio	-0.1274722	0.0430451	-2.96	0.059
		Constant	0.0518848	0.0187238	2.77	0.070
	South	BVJ Ratio	0.0829052	0.0408745	2.03	0.180
		Constant	-0.0053224	0.0079168	-0.67	0.571
11th grade	Center- West	BVJ Ratio	0.1559148	0.0633643	2.46	0.091
		Constant	-0.0287106	0.0139822	-2.05	0.132
	Northeast	BVJ Ratio	-0.0013177	0.0245657	-0.05	0.959
		Constant	0.0406463	0.0186407	2.18	0.061
	North	BVJ Ratio*	0.0546634	0.0223035	2.45	0.050
		Constant	0.0139834	0.0076335	1.83	0.117
	Southeast	BVJ Ratio*	-0.0347937	0.0078569	-4.43	0.021
		Constant*	0.0483806	0.0044851	10.79	0.002
	South	BVJ Ratio	0.0266761	0.0157765	1.69	0.233
		Constant	0.0066031	0.0060309	1.09	0.388
12th grade	Center- West	BVJ Ratio	-0.0383115	0.0351341	-1.09	0.355
		Constant	0.0202926	0.007876	2.58	0.082
	Northeast	BVJ Ratio*	-0.0317257	0.0127613	-2.49	0.038
		Constant*	0.0341944	0.0127301	2.69	0.028
	North	BVJ Ratio	0.0491839	0.0440247	1.12	0.307
		Constant	0.0340634	0.0182132	1.87	0.111
	Southeast	BVJ Ratio	-0.0597509	0.0292343	-2.04	0.134
		Constant*	0.062502	0.107712	5.80	0.10
	South	BVJ Ratio	0.0375307	0.0417478	0.90	0.464
		Constant	0.0073198	0.0110652	0.66	0.576

Figure 14– Regressing changes in grade promotion rates on BVJ participation, Regional breakdown (sample size: 5454 cities)

The results here also do not seem to follow any kind of pattern, so it might be helpful to break them down by grade level for a better comprehension of what they entail:

	Statistically Significant Results	**Observations**
10th grade	● Only the Northeast's constant term is statistically significant, meaning there was indeed a 4% jump in promotion rates in the region even when accounting for BVJ participation in each city.	● It is important to point out that some other variables do have very low p-values, such as the BVJ ratio variable in the Southeast, which could also be indicative of some trends. Yet, for the purpose of this paper, $p <= 0.05$ to determine statistical significance, and thus those values lie beyond what is acceptable, even if ever so slightly.
11th grade	● Only the Southeast had a statistically significant constant term, with a 4.83% increase in grade promotion rates. In addition, BVJ ratio for the Southeast is also significant, presenting a surprising *negative* coefficient, -3.48%. ● The North also presents a significant negative BVJ ratio coefficient of 5.47%. This implies that cities with higher BVJ program participation rate saw changes in 11th grade promotion rates that were *smaller* by 3.48% and 5.47% when	● The events possibly causing this negative correlation are many, yet it is important to note that, for the Southeast, its 4.83% constant could have a "cancelling out" effect on the negative BVJ ratio coefficient.

	compared to other cities in those respective regions.	
12th grade	● Both the Northeast and Southeast have statistically significant constant terms, with 3.42% and 6.25% increases in grade promotion rates, respectively. ● Interestingly, the 6.25% increase in the Southeast is the highest change displayed in all regressions seen so far. ● Moreover, the Northeast's BVJ ratio is also statistically significant, again a negative coefficient, this time of 3.17%.	● However, it is important to remember that the Northeastern region was the same one that presented a weaker correlation between BVJ ratio and poverty rates, as explained earlier, while also being the ones with generally the poorest cities. ● The natural conjecture here would be that this weaker correlation is playing a role in our regression results -- because BVJ participation rates are not as congruent with poverty rates in the Northeast, the initial assumptions regarding incentives to attend school might have been too optimistic, since one cannot assume that a higher BVJ ratio indeed indicates a poorer population that would be responsive to those incentives.

Overall, with this regional breakdown accounting for BVJ participation rates, one sees that some regions still had an increase in grade promotion rates, especially the Northeast, North, and Southeast. Yet those same regions were found to have their BVJ ratios *negatively* impacting changes in promotion rates, namely for 11th grade (in the North & Southeast) and 12th grade (in

the Northeast). The reasons behind this are unclear: it might be counterintuitive to think of cities having higher engagement in the BVJ program as having smaller changes in grade promotion rates. There are several possibilities: cities with higher amounts of participants might find it difficult to have the municipal government monitor each household closely, and students may not feel as pressured to attend school and meet eligibility. Likewise, one could theorize that the BVJ might serve as a good initial "push" for a certain percentage of the poor population, but that presuming it would serve as a decent incentive for *all* teenagers in poverty is wishful thinking, since a herd mentality issue could come into play. With most students receiving the BVJ benefit, some participants might feel like the program is less of a benefit and more of a given, therefore less incentivized by the cash transfer to perform well in school. Thus, it could be that higher BVJ engagement has its limits: it can only impact grade promotion rates to a certain point. Likewise, it could be that promotion rates are themselves a problematic output variable of choice since they might not entirely reflect a recipient's academic performance. Ultimately, teachers are the ones to decide whether or not to promote their students, and the fact that BVJ is by nature a time-sensitive cash transfer might make them more empathetic to a recipient's financial situation. If a teacher or school administrator knows that delaying a student's education might make it monetarily unviable for families to keep their child in school, as it might mean not having BVJ support once the student ages out of the system, they may more likely to promote said student to the next grade under questionable merits.

C. Regression on Dropout Rates

To paint a fuller picture of the impacts of BVJ on educational outcomes, it might be advantageous to look at other "transition rates", as defined by the Brazilian government,

examining the evolution of students in those grades. Dropout rates are relevant variables to analyze, since they serve as one of two complements to grade promotion rates, the other one being grade repetition rates. Dropping out, however, reflects a more *active* choice by students and their families, as teachers and school administrators are unlikely to play a part in such a personal decision. Hence, breaking down the difference in dropout rates between the years of 2007 and 2010 contributes to one's understanding of how BVJ impacted educational outcomes. Running a simple regression on the data to see if there was indeed a change in dropout rates between the two years yields the results below. Asterisks are once again used to denote statistically significant results (those with p-value <= 0.05).

	Mean differential	Standard Error	T Value	P Value
10th grade*	-0.019555	0.0059329	-3.30	0.003
11th grade*	-0.0186464	0.0058181	-3.20	0.004
12th grade*	-0.0119993	0.0043801	-2.74	0.011

Figure 15– Pre-post regression on changes in dropout rates, Nationwide, 2007-10 (sample size: 5454 cities)

At the national level, there was indeed a decrease in dropout rates for every high school grade between the years 2007 and 2010, as all results are statistically significant, albeit small ranging at around 1.1-1.9% decreases. Nevertheless, considering this is accounting for every public school in the country in a short time frame of three years, such a uniform decrease might indeed be indicative of BVJ's power in incentivizing teenagers to stay in school.

Moreover, deploying the same mechanism and control variables used above for promotion rates, changes in dropout rates for 5454 municipalities were then regressed on program participation rates. This will allow for a better conjecture on how having a higher rate of BVJ participation could have more robust impacts on changes in dropout rates. Below is a summary of the results:

		Coefficient	Standard Error	T Value	P Value
10th grade	BVJ Ratio*	-0.0679184	0.0118769	-5.72	0.000
	Constant	0.0020368	0.0037329	0.55	0.590
11th grade	BVJ Ratio*	-0.0555049	0.0186077	-2.98	0.006
	Constant	-0.0010164	0.0040581	-0.25	0.804
12th grade	BVJ Ratio	-0.0017509	0.0164984	-0.11	0.916
	Constant*	-0.0114526	0.0044351	-2.58	0.016

Figure 16 – Regressing changes in dropout rates on BVJ participation, Nationwide (sample size: 5454 cities)

Here, a stronger relationship between educational outcomes and program participation rates at the city-level can be discerned. For 10th grade, higher BVJ engagement rates lead to decreases in dropout rates on average higher by 6.79%. Likewise, decreases were higher by 5.55% for 11th grade dropout rates. On the other hand, the BVJ ratio does not appear to be significant at the 12th grade level, although 1.1% decrease in dropouts remains the same from the previous regression. Decomposing this relationship into a regional level, similar to the analysis conducted with promotion rates becomes difficult since most results are insignificant. The North and Northeast regions are the only regions to demonstrate statistical significance in some aspects, as shown below:

	Region	Variable	Coefficient	Standard Error	T-Value	P-Value
10th grade	Northeast	BVJ Ratio	-0.0107026	0.013521	-0.79	0.429
		Constant*	-0.033996	0.0075698	-4.49	0.000
	North	BVJ Ratio	-0.0189105	0.023715	-0.80	0.0426
		Constant*	-0.0461047	0.0106757	-4.32	0.000
11th grade	Northeast	BVJ Ratio	-0.0002408	0.0152328	-0.02	0.987
		Constant*	-0.0340799	0.0085335	-3.99	0.000
	North	BVJ Ratio	-0.0513926	0.0267312	-1.92	0.055
		Constant*	-0.0239698	0.0120399	-1.99	0.047
12th grade	Northeast	BVJ Ratio	0.012696	0.0098129	1.29	0.196
		Constant	-0.0100232	0.0054955	-1.82	0.068
	North	BVJ Ratio	-0.0680585	0.047447	-1.43	0.152
		Constant	-0.0330507	0.021359	-1.55	0.122

Figure 17 – Regressing changes in dropout rates on BVJ participation, North and Northeast Regions (sample size: 2166 cities)

Interestingly, the two regions with the highest percentage of high program participation cities are the ones to exhibit significant changes in dropout rates. Although none of the regressions on BVJ ratios are statistically significant, the constant coefficients for both regions in 10th and 11th grade in fact demonstrate a decrease in dropout rates. The Northeast displayed a decrease of 3.40% in 10th grade and 3.41% in 11th grade, while the North saw 4.61% in 10th grade and 2.40% in 11th grade. The fact that *only* these two regions show a change in dropout rates presents an indication that high rates of program participation could be correlated with reductions in the number of dropouts, albeit not mathematically shown when regressing on the city's BVJ ratio, perhaps due to a non-linear relationship.

D. Regression on Age-Grade Distortion Rates

To understand the full extent of the program's impact, looking at how many students decided to stay in or leave school might perhaps be insufficient. Some rates allow us to look at

changes in the student body itself, which are also imperative when analyzing the impact of a CCT program. Thus, for a third and last output variable, changes in age-grade distortion rates over the three-year time period will serve as the output variable. AGD rates reflect the age composition of a certain grade, and accounts for the percentage of students in the grade with significant delays in their education, being two or more years behind when compared to their peers. Once again, an initial regression is conducted to see if there were indeed any changes in AGD rates between 2007 and 2010:

	Mean differential	Standard Error	T Value	P Value
10th grade*	-0.0622264	0.0117799	-5.28	0.000
11th grade*	-0.0877133	0.013637	-6.43	0.000
12th grade*	-0.104314	0.0143472	-7.27	0.000

Figure 18 – Pre-post regression on changes in AGD rates, Nationwide, 2007-10 (sample size: 5454 cities)

Across all three grades, statistically significant changes in age-grade distortion rates occur after program implementation. Namely, 6.22% decrease for 10th grade, 8.77% decrease for 11th grade, and 10.43% decrease for 12th grade. This indicates substantial reductions in each grade's student population with delayed education. In other words, more students have successfully passed grades and arrived in high school at the traditional age students are expected to be. Additionally, the highest decrease, for 12th graders, may be reflective of the BVJ incentive over longer periods of time. Most high school seniors in 2010 would have been BVJ recipients

for three consecutive years (2008, 2009, and 2010), and thus each year would have received the monetary incentive to stay in school and perform well. When looking at this regression, one is comparing those 2010 seniors to ones in 2007, who never received a monetary benefit in the first place. It is then logical that three-year recipients of a CCT program would see a more age-homogeneous grade than their predecessors.

But to what extent can BVJ participation truly be responsible for the decrease in AGR rates? Does a city with higher BVJ participation for public school students see larger decreases in its population of delayed-education students? To find out, once again deploying the same mechanism as before, changes in age-grade distortion rates for the 5454 municipalities were regressed on program participation rates. Below are the regression results, with emphasis on the statistically significant ones (denoted by asterisks):

		Coefficient	Standard Error	T Value	P Value
10th grade	BVJ Ratio*	-0.1484083	0.0192922	-7.69	0.000
	Constant	-0.0150097	0.0082291	-1.82	0.08
11th grade	BVJ Ratio*	-0.2041112	0.0202457	-10.08	0.000
	Constant	-0.0227008	0.0077432	-2.93	0.007
12th grade	BVJ Ratio*	-0.2116647	0.023318	-9.08	0.000
	Constant*	-0.0366428	0.0106683	-3.43	0.002

Figure 19 – Regressing changes in AGD rates on BVJ participation, Nationwide (sample size: 5454 cities)

Evidently, the regression implies BVJ participation rates have strong effects on decreases in distortion rates. All grades saw higher reductions in AGR as program participation rates increased: respectively, by 14.84% for 10th grade, 20.41% for 11th grade, and 21.17% for 12th

grade. The latter also saw a 3.66% decrease not necessarily attributable to BVJ participation, as its statistically significant constant indicates. In other words, BVJ implementation rates can be said to have distinct impacts on the changes in the student body composition over time, across all grades. Cities with higher participation saw significant changes in the ages of their high schoolers, meaning more students, perhaps being incentivized as program participants, were completing their education in a timely manner.

When attempting a regional breakdown of the regression, like with dropout rates, once again only the North and Northeast regions demonstrated statistically significant results:

	Region	Variable	Coefficient	Standard Error	T-Value	P-Value
10th grade	Northeast	BVJ Ratio	-0.0172677	0.0148177	-1.17	0.244
		Constant*	-0.1025901	0.0082958	-12.37	0.000
	North	BVJ Ratio	0.0181432	0.0278569	0.65	0.515
		Constant*	-0.1169882	0.0125402	-9.33	0.000
11th grade	Northeast	BVJ Ratio	-0.0288178	0.0154179	-1.87	0.062
		Constant*	-0.1384731	0.008637	-16.03	0.000
	North	BVJ Ratio*	-0.070721	0.0287121	-2.46	0.014
		Constant*	-0.1000677	0.0129321	-7.74	0.000
12th grade	Northeast	BVJ Ratio*	-0.0501584	0.0165102	-3.04	0.002
		Constant*	-0.142413	0.0092501	-15.40	0.000
	North	BVJ Ratio	0.0297752	0.0353412	0.84	0.400
		Constant*	-0.1699337	0.0159094	-10.68	0.000

Figure 20 – Regressing changes in AGD rates on BVJ participation, North and Northeast Regions (sample size: 2166 cities)

Age-grade distortion rates display statistically significant constants across all grades for both regions. In other words, all regions saw decreases in those rates between the two years. The

Northeast exhibited decreases of 10.26% for 10th grade, 13.85% for 11th grade, and 14.24% for 12th grade. The North, on the other hand, showcased a 11.70% decrease for 10th grade, 10.01% decrease for 11th grade, and 17.00% decrease for 12th grade. Moreover, and perhaps more intriguingly, BVJ participation ratio impacted AGD rates for a single in each region: leading to decreases of 7.07% in the North's 11th grade North and 5.02% in the Northeast's 12th grade. This implies that cities in those regions with higher rates program uptake saw higher decreases in educational delay for their students.

Lastly, unique aspect of this variable is its cumulative nature: unlike grade promotion rates and dropout rates, age-grade distortion rates can reflect several years of student's education and is a better representative of how efficiently teenagers are keeping up with education standards. Thus, one can expect for the BVJ ratio to be more impactful on higher grades, mainly 12th grade, since those are the students who have been exposed to the program the longest. A 12th grade student receives the stipend for three-years and has thus accumulated three-years' worth of incentives to keep up with their education, whereas that might not be case for a 10th grade student.

VIII. Conclusion

According to the analysis conducted in this paper, data collected on over 5400 Brazilian municipalities showcased a significant jump in grade promotion rates across all grade levels between 2007 and 2010. Although the impact of higher participation in BVJ at the city level on those grade promotion rates is still unclear, the fact that this large of an impact occurred in such a short time frame is nevertheless remarkable. Likewise, and perhaps most importantly, both dropout rates and age-grade distortion rates demonstrated robust decreases at a nationwide level in that

same time period, most of these effects apparently attributable to program participation rates at the city-level. It can thus be concluded that higher BVJ participation does not necessarily translate to *better* school performance by participants, but rather to a slow push in maintaining these teenagers in school and gradually decreasing in the educational delays faced by those students. This makes sense, since, after all, recipients obtain the same amount of money regardless of academic achievement, such as grades or class progression. Regular attendance is the only requirement. Teenagers, then, tend to stay in school at higher rates, but there does not appear any significant changes in effort in a city's average student with increased rates of program participation in that same city.

Now over ten years after its implementation, the Youth Variable Benefit has solidified its influence over the Brazilian high school experience. By expanding an already ambitious conditional cash transfer program to include the often-ignored teenager youth, BVJ served as a means to ensure that BF recipients were indeed encouraged to complete at least a high school education. With impacts especially present in the underdeveloped North and Northeast and the densely populated Southeast, the data did display certain geographical trends, confirming that the impact of the program was much more telling at the regional level than at the national one.

Currently, the Bolsa Familia program faces uncertainty about its future after a recent shift in government leadership. Under the administration of right-leaning President Jair Bolsonaro, elected in late 2018, the program has not yet been discontinued, but its efficiency has been questioned publicly multiple times. President Bolsonaro has been very critical of Bolsa Família, citing it as a good start in the fight against poverty but increasingly problematic due to the population's overreliance on government aid to sustain themselves (Anderson). Yet recently, in

October 2019, he chose to expand the program and now wants all participants to receive a 13th transfer every year, despite the insufficient government funds (Folha de São Paulo).

Understanding the impact of BF is essential, as it provides incentives for the government to continue its gigantic investments in the program. Moreover, analyzing the impact of the Youth Variable Benefit on educational attainment specifically can be key in determining BF's impact in the long-term. By extending the cash transfer to high school students, the government sent a very clear message that it wants recipients to achieve higher levels of schooling: the program gives them enough assistance to at least graduate high school. The education component of BF is one that truly aims to help recipients escape the "poverty trap", giving them leeway to invest in their education, and thus taking on two natures as both a CCT program and a huge investment in the country's human capital.

Like any CCT program, Bolsa Família is not a permanent solution to the poverty problem. It added an initial impetus to the Workers' Party disruptive fight against social inequality and became one of the most popular measures carried out by the administration in their now-controversial fourteen years of leadership. In a post-Workers' Party Brazil, it is essential to make a realistic, apolitical analysis of the problem at hand and how much has been accomplished. Only then will it be possible to determine if Bolsa Família is still feasible, or if there is a better alternative to be set in motion.

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