The Impacts of Inclusive Education on Students with Disabilities and Their Peers

Job Market Paper

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Abstract

Does inclusive education affect the academic outcomes of students with special educational needs, and the academic outcomes of their peers? This paper addresses this question in the context of an inclusive education program in a developing country. Using school level panel data from 1999 to 2015, this study employs a fixed effects approach to estimate the impact of Brazil's Multifunctional Resources Classroom Inclusive Program on the academic outcomes of primary and secondary school students. The estimates indicate that the program raises the enrollment of disabled and non-disabled students in grades 1-5 and 6-9. Moreover, the results show that the program: reduces the dropout rates of disabled students in grades 6-9 and 10-12; reduces the repetition rates of disabled students in grades 6-9; and raises the promotion rates of disabled students in grades 6-9 and 10-12. Therefore, the results suggest that inclusive education may generate positive impacts for disabled students with no negative externalities for regular students.

Keywords: Inclusive education; Special needs; Academic outcomes; Peers; Brazil.

JEL classification: I21, I28, H52.

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1. Introduction

Inclusive education has been gaining ground in educational policy agendas around the world in recent decades (Soukakou, 2012; Kanter et al., 2014). The inclusion of children with disabilities into regular classrooms has been a means of reducing social and academic exclusion as well as stigma and discrimination. The impact on academic outcomes of disabled and non-disabled students, however, is controversial, with no clear evidence in favor of inclusive programs (Göransson and Nilholm, 2014; Dyson, 2014; Lindsay, 2007; Farrell et al., 2007).

Knowledge of the impact of inclusive programs on the academic outcomes of both students with disabilities and their non-disabled peers contributes to the overall debate regarding the adoption of inclusive policies in schools. This paper, therefore, aims to contribute to this discussion by evaluating the impacts of an inclusive education program in a developing country, Brazil.

As part of a national effort to include children with disabilities in regular education, the Brazilian government launched in 2007 the Multifunctional Resources Classroom Inclusive Program (*Programa Implantação de Salas de Recursos Multifuncionais*). It is a nationwide program in which participating schools are provided with specialized pedagogical materials, furniture, and computers, to equip an inclusive classroom, which is used by students with disabilities and special educational needs to improve these students' learning environment, socialization and the overall academic performance and personal development. Students from participating schools must be enrolled in regular classes for the regular school day and, in a different, after-school session, they can attend the "inclusive classroom."

Several studies have argued that both students with disabilities and special educational needs and regular students can benefit from inclusive education programs, but the development of an appropriate inclusive policy is still a challenge for education systems (Ainscow and César, 2006; Ainscow, 2005; Farrell, 2000). One of the main concerns regarding the inclusion of students with special educational needs in regular classrooms is that there may be negative effects on the academic achievement of other students. The argument is that students with disabilities may require more attention from teachers at the expense of their classmates which, ultimately, can reduce the effectiveness of the class learning process for the students without special educational needs.

The recent literature presents mixed evidence on the impacts of inclusive education on both students with and without special educational needs. Ruijs and Peetsma (2009) provide an extensive review of papers that evaluate the effects of inclusion on the cognitive and socio-emotional development of both students with special educational needs and other students. They find that, overall, the results of those papers suggest positive (or neutral) effects of inclusive education. Using a panel dataset of students in upper secondary education in Norway, Myklebust (2007) finds that students with special educational needs obtained better vocational competence under inclusive education. Hanushek et al. (2002) also find a positive impact of an inclusive education program in Texas on the academic achievement of special-education students, especially those classified as learning-disabled or emotionally disturbed, while not detracting from the performance of regular students. Friesen et al. (2010) use data from the Canadian province of British Columbia to investigate peer effects associated with disabled students in public schools. They find that attending school with a higher percentage of students with learning disabilities or behavioral disorders has a small and statistically insignificant impact on the reading and math test scores of non-disabled students. Using data from the Netherlands, Ruijs (2017), also finds no statistically significant effects of placing students with special educational needs in regular classrooms on the academic achievement of their peers.[2]

In contrast, other empirical research on inclusive education indicates that there may also be negative peer effects of classmates with disabilities or special educational needs onto the academic outcomes of students without disabilities. Gottfried (2014) uses a quasi-experimental method and longitudinal data for the United States and finds that students with a greater number of classmates with disabilities are negatively affected. This result is in line with the negative impacts observed by Fletcher et al. (2010) and Kristoffersen at al. (2015).

Despite the number of empirical studies on inclusive education, most of the literature has focused on developed countries. Moreover, in the scant literature on developing countries, no empirical study has evaluated the impact of Brazil's inclusive program. Therefore, using a school level panel data set, this study aims to evaluate the impact of the Brazilian Multifunctional Resources Classroom Inclusive Program on students' educational outcomes – specifically, on total

[2] For more discussion of the spillover effects of having classmates with disabilities or special educational needs on the achievement of regular students, see Kalambouka et al. (2007), Cole et al. (2004), Demeris et al. (2007), Dyson et al. (2004), and Huber et al. (2001).

enrollment, grade promotion, repetition, and dropping out rates – at the primary and secondary levels.

The impact of the program is assessed by using school census data and administrative data from 1999 to 2015. The data cover more than 250,000 schools in each year, with more than 50 million students and over 2 million teachers. In order to identify the impact of the program, this study relies on the assumption that, after controlling for school fixed effects, state-year fixed effects, initial enrollment level-year fixed effects, separate time trends for schools that eventually participate in the program and for schools that never participate, and observable school and student characteristics, the implementation of the program in a given school is unlikely to be correlated with unobserved variables that affect the academic outcomes evaluated.

The remainder of this paper is organized as follows. Section 2 presents a description of the Brazilian Multifunctional Resources Classroom Inclusive Program. Section 3 describes the data and provides descriptive statistics. The empirical framework, along with the estimation and identification strategies, is presented in Section 4. The results are presented and discussed in Section 5, and final conclusions are drawn, and suggestions for future research are made, in Section 6.

2. The Brazilian Multifunctional Resources Classroom Inclusive Program

Brazil's Multifunctional Resources Classroom Inclusive Program, named *Programa Implantação de Salas de Recursos Multifuncionais*, was launched in 2007. It is a federal (national) program in which participating schools receive pedagogical materials, furniture, computers and specialized resources, to equip the "inclusive classroom" for use by students with mental and physical disabilities or pervasive developmental disorders, as well as students deemed to be super-gifted. [3] The program targets regular public schools that have students with special educational needs or disabilities. These students must be enrolled in regular classes and, in a period outside of normal class time, they participate in programming in the inclusive classroom, which was constructed

[3] The presence of super-gifted students is relatively rare in primary and secondary education in Brazil. Although the number of students diagnosed with super-giftedness has been increasing over the past years, they still represent a very low proportion of students. In 2014, for instance, there were 13,308 super-gifted students in the Brazilian school census, which corresponded to 0.03% of all students.

exclusively for their use. Therefore, participating disabled students are provided with regular classroom instruction, placed together with non-disabled students (*mainstreaming*), along with specialized instruction, after school, in the inclusive classroom. The pedagogical instruction in the inclusive classroom is framed to meet disabled students' individual needs, through individual or group activities. Specialized instructors or teachers are responsible for determining what activities will be developed to better serve each student's needs. All regular schools with special educational needs students have them mainstreamed with other students, which means that the only difference between participating and non-participating schools is that the former implemented the inclusive classroom program.

All regular public schools with at least one student with a disability or special educational needs are eligible to participate in the program. The eligibility criteria do not mean, though, that all schools with disabled or special educational needs students participate in the program – there are also schools with special-education students that did not implement the program. Furthermore, in schools where the program was implemented, it is possible that not all disabled or special-education students are treated due to some space or resource restrictions; this means that there may be a waitlist to get into the inclusive classroom. Thus, treated schools may have some disabled or special educational needs students not being treated by the program, but all such students are mainstreamed into regular classrooms.

The decision on whether a specific school with special-education students will participate in the program is made by the state or local Department of Education. Then, based on the existence of at least one student with a disability or special educational needs enrolled in that school, which is recorded annually in the school census, the decision to adopt the program is made without any consultation with the school principal. Depending on the available funds, the national Ministry of Education, which is responsible for administering the program, can establish a quota for the number of inclusive classrooms for each municipality. Thus, the decision on whether a school will implement the program should be driven by the number of students with special educational needs in each school. Participating schools are provided with the materials and furniture only once, although in 2012, some schools received supplemental material.

Figure 1 presents the number of schools (and inclusive classrooms) in the Multifunctional Resources Classroom Inclusive Program since 2005. Note that, in response to the number of students with disabilities or special educational needs and the available infrastructure, a few

schools have more than one inclusive classroom. Although the program was officially launched in 2007, a few schools already had inclusive classrooms in 2005 and 2006, presumably under a different and smaller program.

It is important to highlight that since 2013 no new schools have been added to the program due to lack of funds; nevertheless, the program is still operating for schools that had implemented the inclusive classroom program in any previous year. According to the Ministry of Education, the number of schools that had implemented the program by 2013 corresponded to 48.5% of all regular public schools with disabled and special educational needs students in that year.

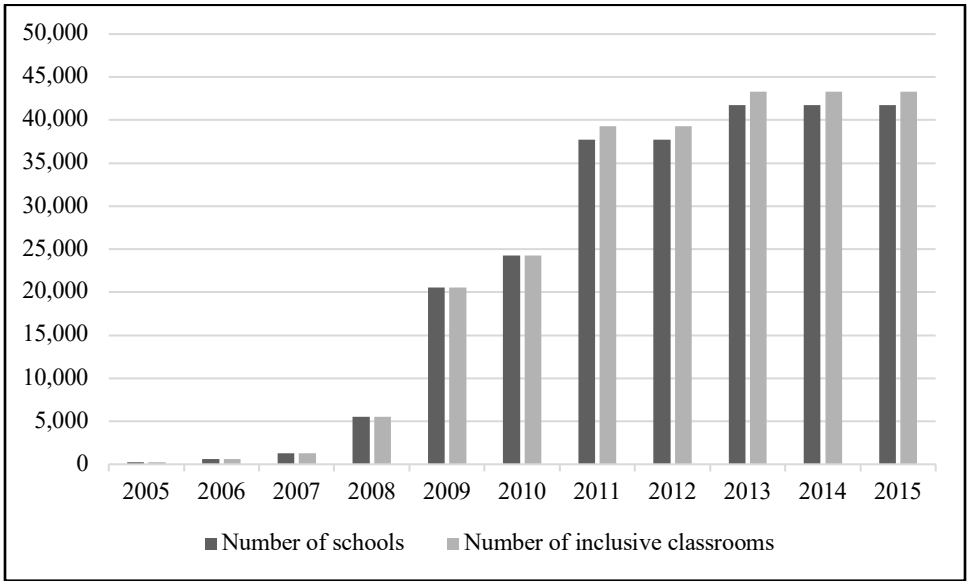

Figure 1 – Number of Schools (and Inclusive Classrooms) in the Multifunctional Resources Classroom Inclusive Program, 2005-2015

While the program officially started in 2007, the number of special-education students enrolled in regular public schools has been increasing since 2003. In 2014, the total enrollment of special-education students in regular public schools (with or without the inclusive program) was 655,375, which is 378% higher than in 2003, as seen in Figure 2 (MEC, 2015).

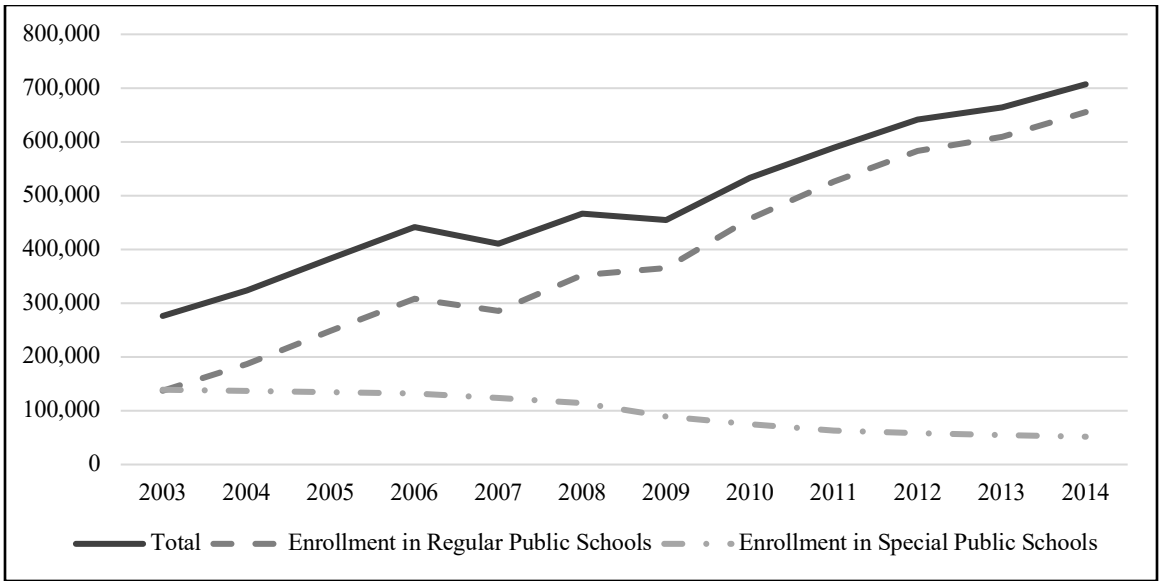

Figure 2 – Number of Students with Special Educational Needs Enrolled in Regular Public Schools and in Special Public Schools, 2003-2014

3. Data and Descriptive Statistics

This study uses Brazil's school census data and administrative data from the Brazilian Ministry of Education. Annually, the school census collects data on school, teacher and student characteristics, covering more than 250,000 public and private schools. All Brazilian schools are required to answer the census questions, which include information on academic outcomes such as total enrollment, and grade promotion, dropout and repetition rates.[4] The school census is conducted in two phases. The first occurs at the beginning of the academic year and data on total enrollment and school, teacher, and student characteristics are collected. In the second phase, at the end of the academic year, data on promotion, repetition, and dropout rates are assembled to reflect the status of the students enrolled at the beginning of the school year. The census also provides information on school infrastructure (including accessibility for disabled students), student race (since 2005), area of students' residence, and students' disability conditions (since 2007). Data on Brazil's

[4] The Brazilian school census does not provide information on students' academic performance. Thus, the data used in this study cannot identify the impact of the inclusive program on academic performance. To do so is beyond of the scope of this paper, as the data on academic performance come from a different source and they are available for all schools starting only in 2007. Data on math and reading test scores of students in elementary and middle high schools can be obtained from the System of Assessment of Basic Education (*Sistema de Avaliação da Educação Básica* – SAEB), at the Ministry of Education.

Multifunctional Resources Classroom Inclusive Program, which are not available in the school census, were obtained directly from the program management at the Ministry of Education and comprise all schools that implemented the program in each year. Unfortunately, the data do not indicate how many disabled students participate in the inclusive classroom, so this paper estimates the impact of the existence of the program, rather than the impact of participation in the program.

In order to make the data comparable across schools and time, and to construct a panel of schools, school census data from 1999 to 2015 were used. The year 2006 was excluded from the panel since, due to methodological changes in the school census format, there is no information on most educational outcomes evaluated in this study for that year.[5] Columns 2 and 3 of Table 1 present the total number of schools and schools with at least one student enrolled in grades 1-5, 6-9, and/or 10-12 for each year. The total number of these schools declined from 1999 to 2007. As pointed out by Glewwe and Kassouf (2012), this reflects a policy of ending the activities of schools with unsatisfactory outcomes and merging small schools into larger ones. In contrast, from 2008 to 2015, the number of schools increased. One of the main reasons for that is the higher level of investments in education after the creation of the Fund for the Development of Basic Education (*Fundo de Manutenção e Desenvolvimento da Educação Básica* – FUNDEB) in 2007, which requires states and municipalities to invest 20% of their tax revenues into this fund.

To analyze the impact of Brazil's Multifunctional Resources Classroom Inclusive Program, treated schools are defined as those in which the program was implemented and all the remainder are defined as untreated schools. Columns 4, 5, and 6 in Table 1 show, respectively, the number of schools with grades 1-5, 6-9, and/or 10-12 with panel data from 1999 to 2015,[6] the number of treated schools in each year for the balanced panel of 98,307 schools, and the proportion of the latter in relation to the final number of schools in the panel. To build the panel data set, only schools with regular education for grades 1-5, 6-9, and 10-12 were considered, which reduced the

[5] In 2006, some methodological changes were introduced in the school census format preventing the collection of many education outcomes. Before 2007 schools were used as the basic unit of analysis in the school census. After that year students became the basic unit of analysis and the school census started to collect individual student information, along with teacher, cohort, and school characteristics. Estimates that include 2006 using imputation for the missing data are very similar to those presented in this paper and are available from the authors upon request.

[6] In Brazil, schools may offer classes for more than one grade level simultaneously. Considering the data used in this paper, there are 90,761 schools with students from grades 1-5. Among these schools, 52,632 offer both grades 1-5 and 6-9, and 15,844 of these also offer classes for students in grades 10-12. Additionally, from the total of 59,503 schools with grades 6-9, 21,954 also have students in grades 10-12. Finally, out of the 98,307 schools with panel data, 15,526 have grades 1-5, 6-9, and 10-12 simultaneously.

sample by 3-4%. The decision to keep only schools with regular education was driven by the fact that there are no detailed data on school, student and teacher characteristics for the other modalities of education, such as special education and youth and adult education, in the school census. In 2007, only 183 schools participated in the program, which represented less than one percent of schools with panel data. This proportion is substantially higher in 2015, with 31.4% of schools with panel data participating in the program.

Table 1 – Number of Schools in Brazil's School Census from 1999 to 2015

Years	Total number of schools	Schools with 1st to 5th and/or 6th to 9th and/or 10th to 12th grade classes	Schools with panel data (from 1999 to current year)	Total number of treated schools (after balancing the panel)	% of treated schools (after balancing the panel)
(1)	(2)	(3)	(4)	(5)	(6)
1999	266,645	209,280	209,280	0	-
2000	261,988	206,235	177,104	0	-
2001	264,735	201,479	166,886	0	-
2002	256,986	195,465	157,350	0	-
2003	253,405	191,379	150,350	0	-
2004	248,257	188,493	144,845	0	-
2005	248,103	184,513	138,494	183	0.19
2007	237,387	176,614	126,506	943	0.96
2008	250,350	175,985	122,964	4,259	4.33
2009	255,445	173,855	118,345	15,773	16.04
2010	259,831	170,801	114,041	18,210	18.52
2011	263,833	168,570	110,670	27,699	28.18
2012	268,244	167,358	107,941	27,699	28.18
2013	272,049	164,571	104,356	30,835	31.37
2014	276,331	161,906	101,063	30,835	31.37
2015	272,996	160,605	98,307	30,835	31.37

Note: Column 6 is obtained by dividing column 5 by the final number of schools with panel data (98,307).

Figures 3 to 7 present the educational outcomes evaluated in this study for eventually treated and never treated schools with grades 1-5, 6-9, and 10-12, from 1999 to 2015. Figure 3 shows the average enrollment of all students for both treated and untreated schools, over the period 1999-2015. Regardless the level of schooling, the average enrollment decreased over time. The decline was larger in schools with grades 6-9, with a reduction of 35.0% in treated schools and of 47.3% in untreated schools.

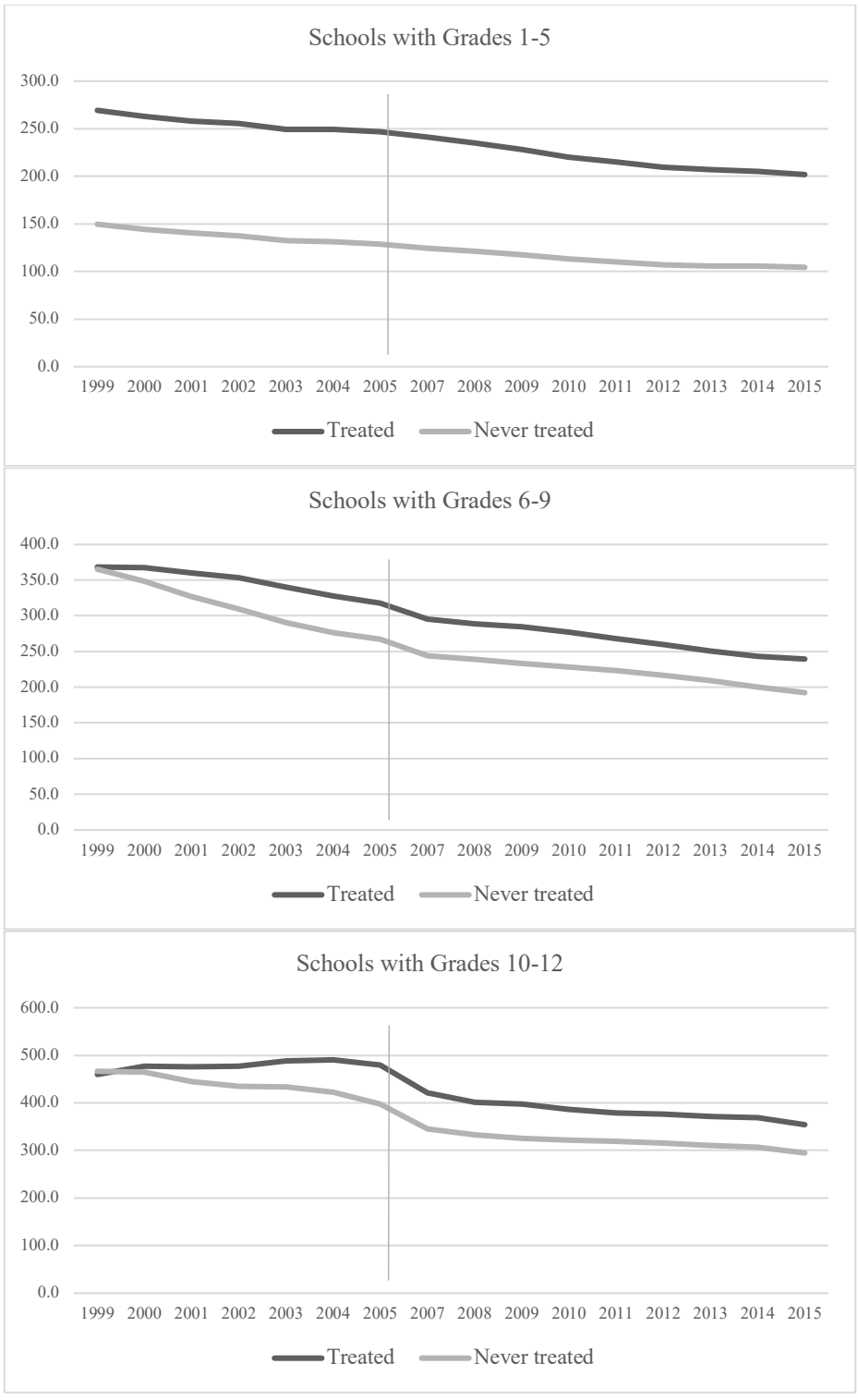

Figure 3 – Average Enrollment of All Students in Treated and Never Treated Schools with Grades 1-5, 6-9, and 10-12, 1999-2015

The average enrollment of disabled students in eventually treated and untreated schools from 2007 to 2015 is presented in Figure 4. The first year in this figure is 2007 because data on students with disabilities were not collected in the school census until that year. Over the period 2007-2015, the average enrollment of disabled students increased in all groups of grades and in both treated and untreated schools. Schools with grades 10-12 had the largest percentage increase in enrollment of disabled students (453% and 380% in treated and never treated schools, respectively). For schools with grades 1-5 and 6-9 that implemented the program, the increase was from 3.1 to 7.3 (132%) in the former and from 1.3 to 6.0 (359%) in the latter. The increase for never treated schools with grades 1-5 and 6-9, in turn, was 129% (from 0.8 to 1.9) and 260% (from 0.7 to 2.6), respectively. Figure 4 also shows that treated schools with grades 1-5 had the highest average enrollment of this kind of student in all years of the study when compared to schools with higher grade levels. Table A of the appendix presents the average total enrollment of disabled and non-disabled students considering all schools and also separately for eventually treated and never treated schools with grades 1-5, 6-9, and 10-12 from 1999 to 2015.

The dropout rates for treated and never treated schools are presented in Figure 5. Treated schools with grades 1-5 had lower dropout rates than never treated schools before the program's implementation. However, the difference between the rates of both types of schools has reduced over the years, particularly after 2007, suggesting that the program also increased dropout rates for schools with grades 1-5. Treated schools with grades 6-9 and 10-12, in contrast, had higher dropout rates than never treated schools before 2007. The difference, nevertheless, also decreased after that, suggesting a beneficial effect of the inclusive program.

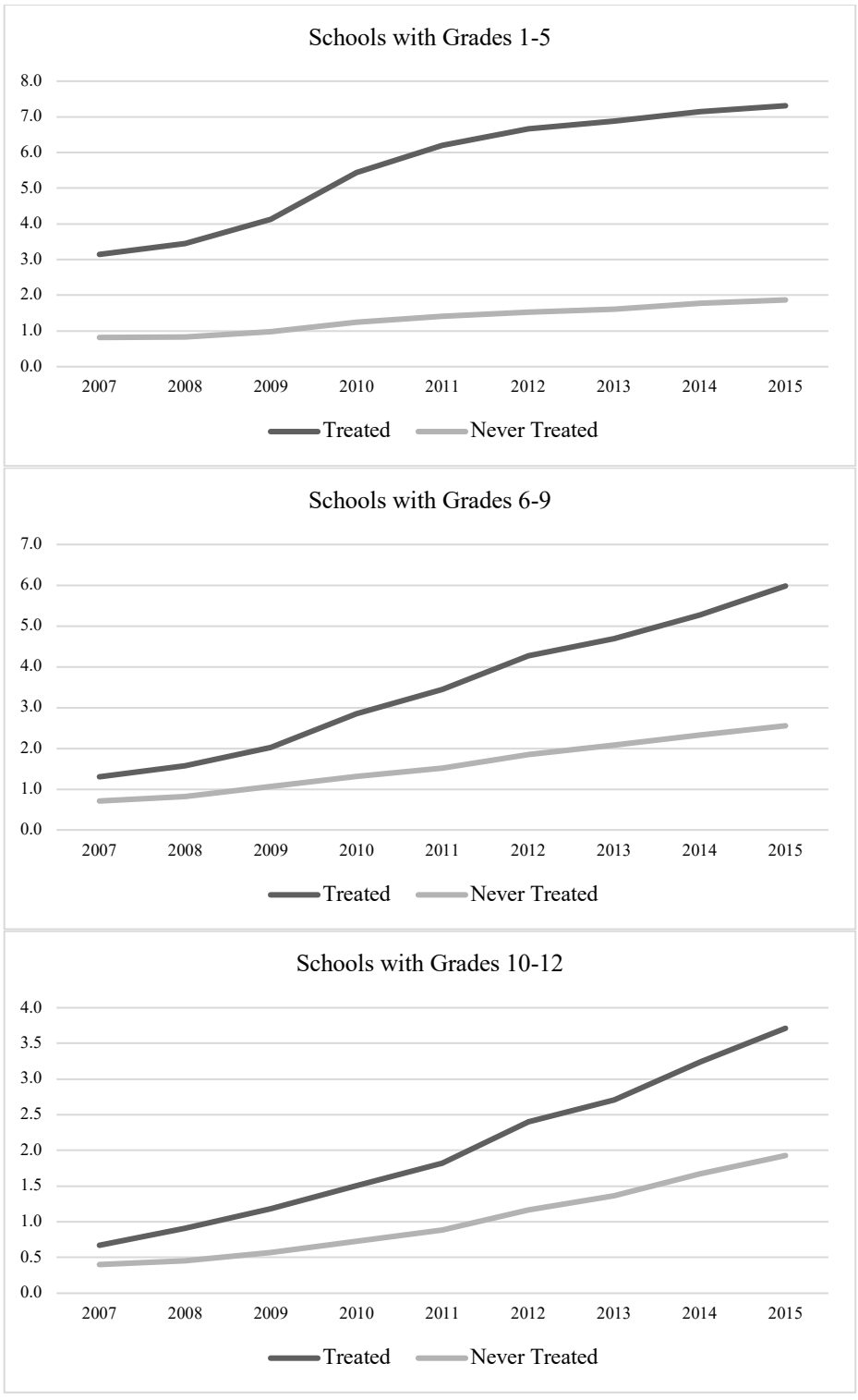

Figure 4 – Average Enrollment of Disabled Students in Treated and Never Treated Schools with Grades 1-5, 6-9, and 10-12, 2007-2015

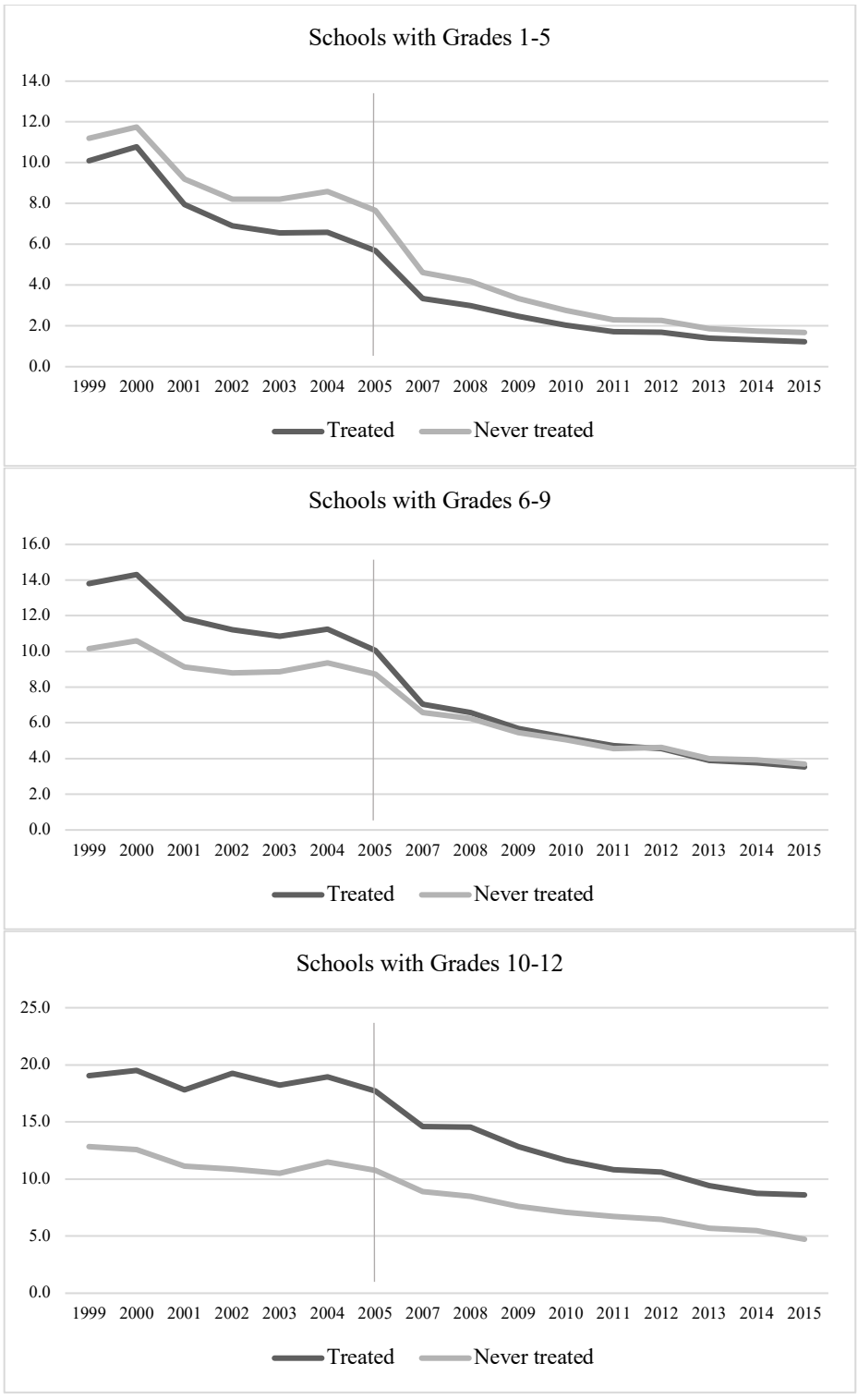

Figure 5 – Dropout Rates for Treated and Never Treated Schools with Grades 1-5, 6-9, and 10-12, 1999-2015

The repetition rates for treated and untreated schools are shown in Figure 6. As can be seen in the figure, the repetition rate for treated schools with grades 1-5 was lower than that for untreated schools before the program's implementation. After 2007, however, the outcomes for both types of schools got closer, suggesting that the program increased the repetition rate for grades 1-5. Similarly, the program seems to have increased the repetition rate of treated schools with grades 10-12, but not for schools with grades 6-9.

Figure 7 presents the grade promotion rates for eventually treated and never treated schools from 1999 to 2015. For both types of schools and for all groups of grades, the grade promotion rates are higher in 2015 than in 1999. For schools with grades 1-5, however, the program, which started in 2007, seems to have reduced this outcome. Yet this does not appear to be the case for schools with grades 6-9 and 10-12.

Descriptive statistics averaged over the years 1999 to 2015 for all outcomes and explanatory variables are shown separately for treated (schools that eventually implemented the program) and never treated schools with grades 1-5, 6-9, and 10-12 in Table 2. For all grade levels, dropout, repetition, and grade promotion rates add up to 100% as enrolled students have only three possible outcomes at the end of the academic year: withdraw from school, fail to progress to the following grade, or advance to the next grade.[7]

It is important to note that simple comparisons between treated and untreated schools may lead to misleading interpretations. For instance, in schools with grades 10-12, treated schools have lower grade promotion and higher repetition rates than never treated schools, which suggests that the inclusive program reduced promotion and increased repetition, which may not be true since time trends before the program implementation should be taken into account. In addition, for most variables, treated and untreated schools are statistically significantly different, which is controlled for during the estimation process.

[7] As a consequence, the estimated coefficients on the impact of program adoption on dropout, repetition, and grade promotion should add up to zero.

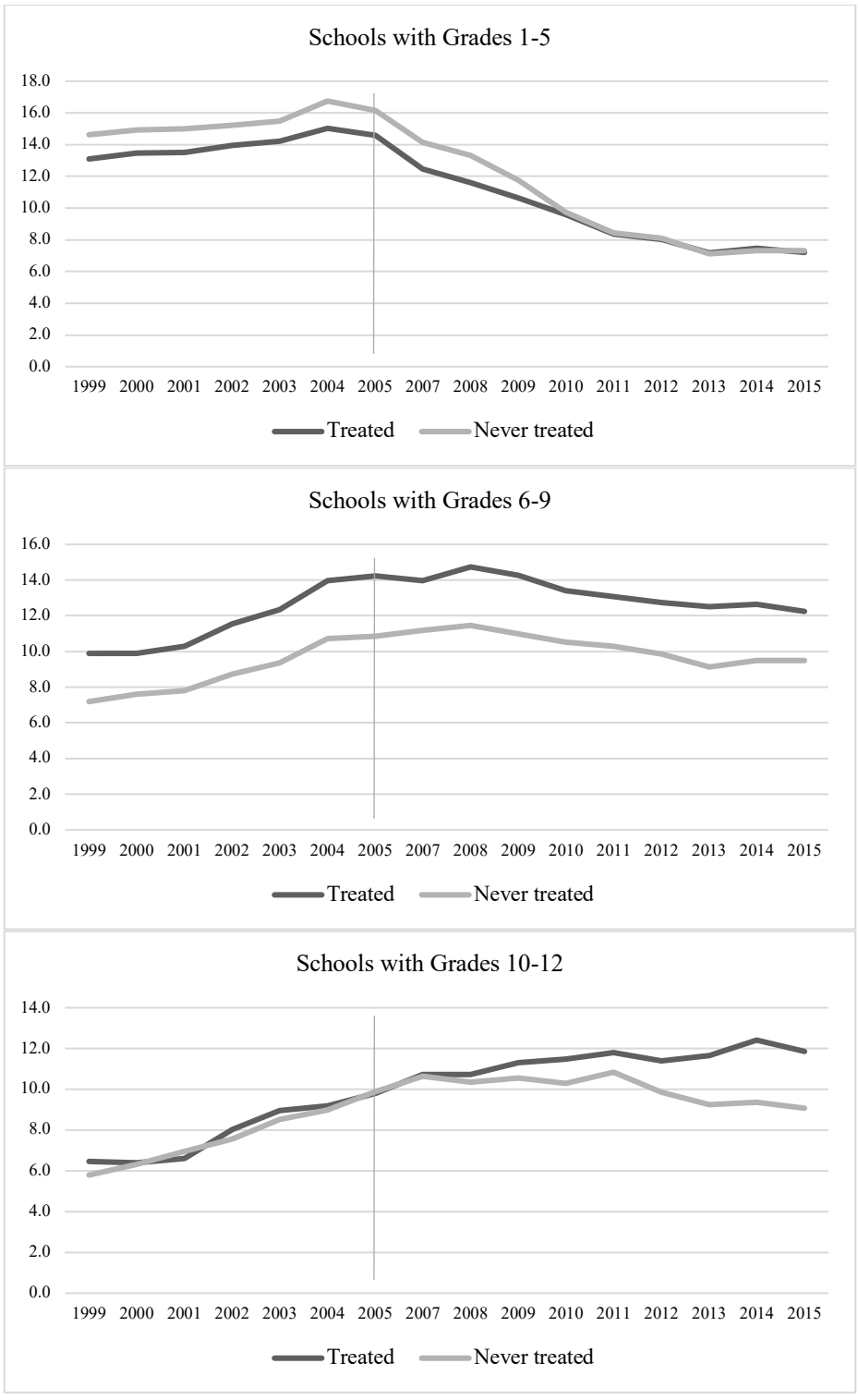

Figure 6 – Repetition Rates for Treated and Never Treated Schools with Grades 1-5, 6-9, and10-12, 1999-2015

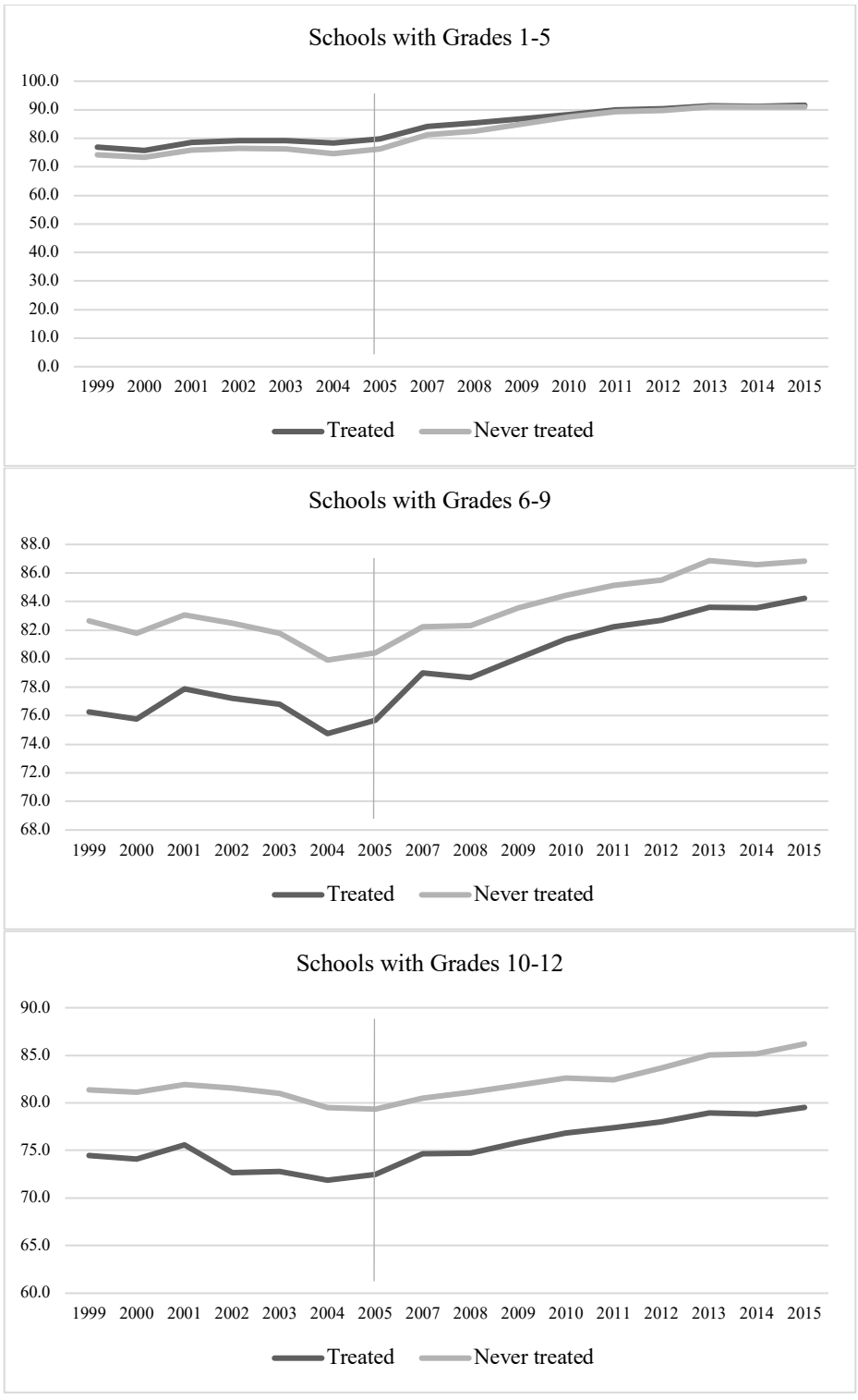

Figure 7 – Grade Promotion Rates for Treated and Never Treated Schools with Grades 1-5, 6-9, and 10-12, 1999-2015

Table 2 – Descriptive Statistics for Eventually Treated and Never Treated Schools

Variables	Schools with grades 1-5		Schools with grades 6-9		Schools with grades 10-12	
	Eventually Treated	Never treated	Eventually Treated	Never treated	Eventually Treated	Never treated
School variables						
Total enrollment (units)	235.4	123.7	300.5	256.1	421.8	364.3
	(201.5)	(157.5)	(263.9)	(259.5)	(411.6)	(369.6)
Dropout rate (%)	4.7	5.7	7.8	6.7	14.2	8.6
	(8.0)	(9.7)	(9.3)	(10.0)	(10.7)	(10.3)
Repetition rate (%)	11.4	12.3	12.7	9.8	10.1	9.2
	(9.5)	(12.9)	(9.5)	(9.9)	(8.3)	(8.5)
Grade promotion rate (%)	84.0	82.0	79.5	83.6	75.7	82.3
	(13.8)	(17.9)	(13.3)	(14.6)	(12.7)	(13.7)
Geographic region (%)						
North	11.2	15.2	10.4	10.6	11.3	4.9
	(31.5)	(35.9)	(30.6)	(30.8)	(31.7)	(21.7)
Northeast	36.6	48.3	32.8	33.5	24.3	21.7
	(48.2)	(50.0)	(46.9)	(47.2)	(42.9)	(41.2)
South	21.1	10.0	27.2	12.3	32.9	10.6
	(40.8)	(30.0)	(44.5)	(32.8)	(47.0)	(30.8)
Central-West	8.9	3.5	11.3	5.2	14.2	4.9
	(28.5)	(18.4)	(31.7)	(22.2)	(34.9)	(21.5)
Southeast	22.2	23.0	18.3	38.4	17.3	57.9
	(41.6)	(42.1)	(38.7)	(48.6)	(37.8)	(49.4)
Rural (%)	33.2	61.1	25.9	29.6	7.9	4.8
	(47.1)	(48.7)	(43.8)	(45.7)	(26.9)	(21.4)
Electricity (%)	97.4	85.4	99.2	97.0	99.7	99.5
	(16.0)	(35.3)	(8.9)	(17.0)	(5.4)	(6.8)
Water (%)	98.3	95.8	98.9	98.3	99.5	99.5
	(12.8)	(20.0)	(10.3)	(12.8)	(7.4)	(7.2)
Sewage (%)	97.7	89.4	98.7	96.6	99.2	99.3
	(15.1)	(30.7)	(11.2)	(18.2)	(9.1)	(8.5)
Offers meal (%)	98.7	88.2	98.7	79.6	95.4	66.6
	(11.4)	(32.3)	(11.4)	(40.3)	(21.0)	(47.2)
Library (%)	48.2	27.6	66.1	56.8	83.3	73.6
	(50.0)	(44.7)	(47.3)	(49.5)	(37.3)	(44.1)
Accessible restroom (%)	21.0	8.5	26.4	17.5	32.6	25.7
	(40.7)	(27.8)	(44.1)	(38.0)	(46.9)	(43.7)
Accessibility (%)	17.3	7.1	22.5	14.9	28.0	21.8
	(37.8)	(25.8)	(41.8)	(35.6)	(44.9)	(41.3)
Computer lab (%)	39.9	24.2	53.6	53.3	70.5	78.4
	(49.0)	(42.8)	(49.9)	(49.9)	(45.6)	(41.1)
Science lab (%)	9.1	8.9	20.5	26.8	44.8	50.5
	(28.8)	(28.5)	(40.4)	(44.3)	(49.7)	(50.0)
Computer (units)	7.8	5.6	11.1	13.0	16.4	23.3
	(17.8)	(19.1)	(20.7)	(26.6)	(21.6)	(38.5)
Internet (%)	41.9	29.9	51.3	56.2	65.7	80.4
	(49.3)	(45.8)	(50.0)	(49.6)	(47.5)	(39.7)
Teacher with college (%)	50.8	38.6	77.9	76.9	89.5	92.8
	(38.5)	(40.3)	(31.4)	(33.6)	(19.8)	(16.4)
Student variables						
Female (%)	46.9	46.6	49.5	49.2	54.2	53.0
	(5.9)	(8.8)	(6.1)	(8.2)	(6.6)	(7.5)
Evening class (%)	1.5	1.7	10.1	8.9	46.4	35.4
	(6.9)	(7.9)	(21.4)	(22.4)	(31.0)	(34.7)
Skin color (%)						
White	25.3	21.3	21.5	23.2	25.9	29.6
	(25.0)	(25.1)	(24.2)	(25.3)	(26.7)	(26.3)
Black	3.5	3.4	2.9	2.9	2.7	2.7

	(6.0)	(7.3)	(5.5)	(5.8)	(4.9)	(4.6)
Pardo	32.2	35.7	26.4	26.7	24.8	21.3
	(25.7)	(28.6)	(24.2)	(24.8)	(22.8)	(21.3)
Yellow	0.5	0.5	0.5	0.5	0.8	0.5
	(2.3)	(2.7)	(2.8)	(2.5)	(3.4)	(2.1)
Indigenous	0.6	1.5	0.5	1.1	0.6	0.6
	(5.5)	(10.4)	(5.1)	(8.7)	(5.6)	(5.8)
Non-declared skin color	38.1	37.6	48.2	45.6	45.2	45.2
	(32.3)	(32.6)	(35.2)	(34.0)	(35.5)	(33.7)
Lives in rural area (%)	4.4	7.1	4.0	3.9	2.7	1.3
	(19.4)	(25.2)	(17.9)	(18.5)	(12.8)	(8.8)
Disability[1] (%)	3.2	1.2	1.6	0.7	0.7	0.4
	(7.5)	(5.1)	(3.8)	(2.6)	(2.2)	(1.1)
Vision problems or blind (%)	0.3	0.1	0.3	0.1	0.1	0.1
	(1.4)	(1.0)	(1.5)	(1.0)	(1.0)	(0.5)
Hearing problems or deaf (%)	0.2	0.1	0.1	0.0	0.1	0.0
	(1.5)	(1.0)	(1.1)	(0.6)	(0.7)	(0.4)
Deaf and blind (%)	0.0	0.0	0.0	0.0	0.0	0.0
	(0.1)	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)
Physical disability (%)	0.3	0.2	0.2	0.1	0.1	0.1
	(1.2)	(0.9)	(0.8)	(0.6)	(0.5)	(0.3)
Mental disability (%)	2.2	0.8	1.0	0.4	0.3	0.2
	(5.8)	(4.0)	(2.6)	(1.8)	(1.4)	(0.8)
Multi disability (%)	0.2	0.1	0.1	0.0	0.0	0.0
	(1.4)	(0.9)	(0.6)	(0.5)	(0.3)	(0.1)
Gifted (%)	0.0	0.0	0.0	0.0	0.0	0.0
	(0.3)	(0.2)	(0.6)	(0.2)	(0.3)	(0.2)
Observations	419,117	949,803	290,226	443,577	94,708	198,773
Number of schools	26,195	59,363	18,139	27,724	5,919	12,423

Notes: Standard deviations in parentheses. These are averages for 1999 to 2015. Some student variables are averages over fewer years. Skin color variables are available only for 2005-2015, and proportion of students living in rural area and proportion of students with disabilities are available only for 2007-2015. [1]The disability variable comprises the following categories: vision problems or blind, hearing problems or deaf, deaf and blind, physical disability, mental disability, and multi disability.

Table 2 also shows descriptive statistics for student characteristics that are available for all years, as well as those that are available only from 2005 to 2015 and only from 2007 to 2015, such as student race, disability conditions, and area of residence. For these variables, which are missing data for some years of the period of analysis (1999-2015), many approaches were attempted to impute values for the missing data. Although not ideal, the imputation for missing data was necessary to allow the use of relevant student characteristics. Thus, the mean values for the period 2005-2015 (2007-2015) were calculated and assigned to observations from 1999 to 2004 (from 1999 to 2005). Schools that had no information on those variables for the entire period 2005-2015 (2007-2015) were excluded from the regression estimation since it was not possible to calculate the mean values for them. For disability conditions, only categories that were available for all years in the school census were considered.

4. Empirical Framework

This section presents the empirical strategy used to estimate the impact of the Brazilian Multifunctional Resources Classroom Inclusive Program on educational outcomes – specifically, on total enrollment, grade promotion, repetition, and dropout rates. In order to identify the effects of the program, this paper relies on the assumption that, after controlling for school fixed effects, state-year fixed effects, initial enrollment level-year fixed effects,[8] separate time trends for schools that eventually participate in the program and for schools that never participate, and finally observable school and student characteristics, the adoption of the program in a given school is unlikely to be correlated with unobserved variables that determine the educational outcomes evaluated. This assumption could be violated, though, if the decision on implementing the inclusive program in a specific school is driven by unobserved factors. For instance, if the program is implemented in that school not only due to the enrollment of students with special educational needs or disabilities, but also due to political interests affecting local governments' decisions, and these same political interests also directly affect the educational outcome of interest, than the estimated impact of the program will be biased.

4.1 Equations for Estimation

The estimation strategy presented in this section relies on a panel data approach with fixed effects to evaluate the impact of the Multifunctional Resources Classroom Inclusive Program on educational outcomes. The main program impacts one would like to estimate are: (i) the average treatment effect (ATE) – the impact of the inclusive program on all students, participants and non-participants, including those with no special educational needs; and (ii) the average treatment effect on the treated (ATT) – the treatment effect on students who participate in the inclusive program. However, the existing administrative data on the inclusive program do not include

[8] In Brazil, there are 27 states, which implies that the interaction between states and 16 years generates 432 different fixed effects. Because schools had different sizes in 1999, all estimated regressions are also controlled for initial enrollment level-year fixed effects, allowing general trends in the educational outcomes to differ over time for different initial school sizes. All schools are arranged in ten different categories based on their initial enrollment levels, and then these categories are interacted with years, which creates a fixed effect for each interaction between categories and years.

information on the proportion of students with special educational needs who actually participate in the program, which implies that the ATT cannot be estimated. Although the proportion of treated students is not available in the school census data, since 2007 the proportion of students with disabilities or special educational needs in each school is provided, which can be used to estimate the effect of program eligibility on academic outcomes. The availability of data on the proportion of eligible students allows the estimation of two kinds of treatment effects: an average spillover effect onto ineligible (and onto eligible)[9] students, which I will abbreviate as ASE, and an intent to treat effect for eligible students, which I will abbreviate as ITT. This ITT is slightly different from the standard ITT since, in the case of the Multifunctional Resources Classroom Inclusive Program, schools may be involved in the decision about which eligible students get treated, not just the students and their parents.

Let Y_{ist} be an academic outcome (enrollment, grade promotion, repetition, or dropout) for a student (child) i in school s at time t. Suppose that Y_{ist} is a function of: student and household variables ($\boldsymbol{C}_{ist}$) other than variables indicating special needs; school and teacher characteristics ($\boldsymbol{S}_{st}$); whether a school has the program at time t (P_{st}); and whether a student is eligible to participate in the program (E_{ist}). The linear model is given by:

$$\begin{aligned} Y_{ist} = {} & \boldsymbol{\alpha}'\boldsymbol{C}_{ist} + \beta E_{ist} + \boldsymbol{\rho}'\boldsymbol{S}_{st} + \gamma P_{st} + \boldsymbol{\delta}'(\boldsymbol{C}_{ist} \times P_{st}) + \boldsymbol{\lambda}'(\boldsymbol{S}_{st} \times P_{st}) + \tau E_{ist} P_{st} \\ & + \boldsymbol{\eta}'(\boldsymbol{C}_{ist} \times E_{ist}) + \boldsymbol{\kappa}'(\boldsymbol{S}_{st} \times E_{ist}) + \boldsymbol{\theta}'(\boldsymbol{C}_{ist} \times P_{st} \times E_{ist}) \\ & + \boldsymbol{\phi}'(\boldsymbol{S}_{st} \times P_{st} \times E_{ist}) + \varepsilon_{ist} \end{aligned} \quad (1)$$

where ε_{ist} is an error term with mean zero.

Equation (1) allows the impact of the program to vary by student and school characteristics. Ideally, one would take the mean of Equation (1) at the school level. The problem, however, is that it is not possible to take the mean of $\boldsymbol{C}_{ist} \times P_{st} \times E_{ist}$ and $\boldsymbol{S}_{st} \times P_{st} \times E_{ist}$, since there is no school level information on $\boldsymbol{C}_{ist}$ and $\boldsymbol{S}_{st}$ separately for special educational needs students. That

[9] In the context of inclusive programs, eligible students may also be affected by the presence of other disabled classmates. The externalities on both types of students may take the form of resource spillovers, changes in the curriculum or pedagogy to accommodate a more diverse classroom, increase in the frequency of disruptions, or reduction of teacher's attention due to disabled students who require extra help.

is, for any given school it is not possible to observe $\boldsymbol{C}_{ist} \times E_{ist}$ and $\boldsymbol{S}_{st} \times E_{ist}$. Therefore, the following equation is estimated, which does not include the last two terms of the above equation:

$$Y_{ist} = \boldsymbol{\alpha}'\boldsymbol{C}_{ist} + \beta E_{ist} + \boldsymbol{\rho}'\boldsymbol{S}_{st} + \gamma P_{st} + \boldsymbol{\delta}'(\boldsymbol{C}_{ist} \times P_{st}) + \boldsymbol{\lambda}'(\boldsymbol{S}_{st} \times P_{st}) + \tau E_{ist} P_{st} + \varepsilon_{ist} \quad (2)$$

where γ measures the average spillover effect on eligible and ineligible students (ASE) and $\gamma + \tau$ measures the intent to treat effect for eligible students (ITT). Moreover, $\boldsymbol{\delta}$ provides estimates of how ASE varies over $\boldsymbol{C}_{ist}$ and $\boldsymbol{\lambda}$ measures how it varies over $\boldsymbol{S}_{st}$.

Equation (2) can be aggregated up to the school level as:

$$\bar{Y}_{st} = \boldsymbol{\alpha}'\overline{\boldsymbol{C}}_{st} + \beta \bar{E}_{st} + \boldsymbol{\rho}'\overline{\boldsymbol{S}}_{st} + \gamma P_{st} + \boldsymbol{\delta}'(\overline{\boldsymbol{C}}_{st} \times P_{st}) + \boldsymbol{\lambda}'(\overline{\boldsymbol{S}}_{st} \times P_{st}) + \tau \bar{E}_{st} P_{st} + \bar{\varepsilon}_{st} \quad (3)$$

When the outcome variable is enrollment, the school level equation is slightly different, since the left-hand side variable is the total enrollment of disabled or non-disabled students, rather than the average enrollment, for school *s* at time *t*. Thus, the school level equation for enrollment is:

$$Y_{st} = \boldsymbol{\alpha}'\overline{\boldsymbol{C}}_{st} + \boldsymbol{\rho}'\overline{\boldsymbol{S}}_{st} + \eta P_{st} + \boldsymbol{\delta}'(\overline{\boldsymbol{C}}_{st} \times P_{st}) + \boldsymbol{\lambda}'(\overline{\boldsymbol{S}}_{st} \times P_{st}) + \bar{\varepsilon}_{st} \quad (3')$$

where Y_{st} is the total enrollment of disabled or non-disabled students for school *s* at time *t*, and η is the program impact on eligible students (ITT), if the dependent variable is the enrollment of disabled students, or the spillover effect onto non-disabled students (ASE), if the dependent variable is the enrollment of ineligible students.

Both Equation (3) and Equation (3') are estimated using the merged school census and administrative data, and it is still the case that γ is an estimate of the ASE and $\gamma + \tau$ is an estimate of the ITT in Equation (3), and η is an estimate of the ASE or ITT, according to the dependent variable, in Equation (3'). In addition, $\boldsymbol{\delta}$ still measures how ASE varies with student characteristics, and $\boldsymbol{\lambda}$ measures how it varies over school characteristics.

OLS estimates of Equation (3) and Equation (3') will produce unbiased estimates of all parameters in these equations only if the error term $\bar{\varepsilon}_{st}$ is uncorrelated with student characteristics ($\overline{\boldsymbol{C}}_{st}$), school characteristics ($\overline{\boldsymbol{S}}_{st}$), the fraction of students who are eligible for the program ($\bar{E}_{st}$), and the existence of the program at school *s* at time *t* (P_{st}). This assumption, however, is very unlikely to hold, since there may be unobserved school and student characteristics that affect the academic outcomes (Y_{st}). For instance, $\overline{\boldsymbol{C}}_{st}$ may include student innate ability and parental preferences for schooling, and $\overline{\boldsymbol{S}}_{st}$ may include principal and teacher motivations. Since these are not observed, they become part of $\bar{\varepsilon}_{st}$, and because they could be correlated with observed variables in $\overline{\boldsymbol{C}}_{st}$ and $\overline{\boldsymbol{S}}_{st}$, the error term $\bar{\varepsilon}_{st}$ could be correlated with $\overline{\boldsymbol{C}}_{st}$ and $\overline{\boldsymbol{S}}_{st}$. Thus, to minimize bias in the estimated impacts of the Brazilian Inclusive Program on educational outcomes, Equation (3) and Equation (3') add as controls school fixed effects, state-year fixed effects, initial enrollment level-year fixed effects, and separate time trends for schools that eventually participate in the program and for schools that never participate. After controlling for these fixed effects and time trends, P_{st} and all the other observed variables are less likely to be correlated with unobserved variables that determine the academic outcomes. Clustered standard errors at the school level were used for all specifications of the above equation.

Equation (3) and Equation (3') can also assume more flexible forms, including, for instance, not only linear time trends. In the case of the Brazilian Inclusive Program, the coefficients on ITT and ASE are still identified if quadratic and higher power time trends are used. Moreover, since learning accumulates over time and changes in the number of students in one year may have implications for future academic outcomes, the total enrollment, dropping out, repetition, and grade promotion in any year can also be affected by whether the program operated in previous years. Therefore, it is important to consider that the full impact of the program may not be felt in its first year of implementation. This can be done by including lagged terms, denoted as $P_{s,t-1}$, $P_{s,t-2}$, etc., in Equation (3) and Equation (3'). To investigate the dynamics of the program implementation and its impact on academic outcomes in each year after program adoption, lags of the program adoption variable are added to the estimates of Equations (3) and (3'). Specifically, indicator variables are added for years 0-8 after program adoption. These indicator variables are dummies that equal one only in the relevant year, capturing the impacts of the program in each year after implementation. Finally, these yearly effects can be added up to obtain the cumulative

effects. Because the proportion of treated schools increases considerably from 2007 to 2015, the estimates of the impacts by time of program adoption and the cumulative effects are weighted by the proportion of schools that implemented the program in each year.[10]

4.2 Identification Strategy

The identification strategy used in this paper is designed to minimize the three potential sources of statistical endogeneity: (i) omitted variable bias; (ii) reverse causality; and (iii) measurement error. Omitted variable bias refers to the problem of unobserved variables that may be correlated with the implementation of the program and with other observed variables as well. Using time invariant school fixed effects, state-year fixed effects, initial enrollment level-year fixed effects, and separate time trends for schools that eventually participate in the program and for schools that never participate, should minimize bias due to unobserved heterogeneity. Although desirable, it is not possible to control completely for heterogeneity between students; many student characteristics are not available or are difficult to measure, such as student innate ability and motivation.

Regarding reverse causality, in which the educational outcomes could also cause program availability, there appears to be little reason to worry about it. As mentioned above, the decision on whether a specific school will participate in the program is made based on the existence of at least one student with special educational needs enrolled in that school. The State or local Department of Education are the only ones responsible for choosing and registering the schools that will implement the program; there is no participation by school principals or parents in this process.

Finally, measurement error in the treatment variable is likely to be minimal since this paper uses administrative data for the program implementation variable. Only the administrative data, along with the original files from the Brazilian Ministry of Education, were used to determine the school treatment variable in order to avoid any possible misreported information in the school

[10] The weights were obtained from the ratio of treated schools in each year and the total number of schools in the last year of the panel (2015). In 2012, for instance, 22,460 schools with grades 1-5 implemented the inclusive program, which represented 92.1% of the 24,400 treated schools with grades 1-5 in 2015. Thus, the coefficient on the program variable lagged three years for schools that had the program in 2012 was weighted by 0.921.

census. Still, other information in school census may have measurement error, but there is little to do to correct any possible attenuation bias.

5. Results

The estimated results of the impact of Brazil's Multifunctional Resources Classroom Inclusive Program on (log) enrollment, dropout, repetition, and grade promotion rates, are presented in this section. Tables 3 to 9 report the regression results for estimates of Equations (3) and (3'), in which each educational outcome is regressed on school, teacher, and student characteristics.[11] School fixed effects, state-year fixed effects, initial enrollment level-year fixed effects, as well as separate time trends for schools that eventually participate in the program and for schools that never participate, are included in all of the regressions. Moreover, all estimates use clustered standard errors at the school level, and the dropout, repetition, and grade promotion variables are measured on a 0-100 scale.

5.1 Main Results

Table 3 reports the estimates of Equation (3') in which the outcome variable is the (log) enrollment of disabled or non-disabled students in grades 1-5, 6-9, and 10-12. For each grade level, two regression specifications were estimated, the second one including all school and student variables. Because the estimation results are very similar for both specifications, the discussion below will focus on the most complete specification. The results do not show the estimated coefficients on the control variables. These coefficients were omitted in order to economize on space and, more importantly, to focus on the variable of interest: the school program participation variable.

The estimates indicate that the program raises enrollment of grades 1-5 disabled students by 5.9%. The impact of school program participation is also positive and statistically significant for disabled students in grades 6-9, implying that the program raises their enrollment by 2.4%. The

[11] While one might worry about possible collinearity of the program participation variable and the accessible restroom and accessibility variables, regression estimates excluding the accessibility variables do not change the results. These estimates are available from the author upon request.

estimates are statistically insignificant, however, for disabled students in grades 10-12. Thus, the program seems not to affect the enrollment of older disabled students.

Table 3 – Estimates of the Program Impact on Log of Enrollment of Disabled and Non-Disabled Students: Results for Schools with Grades 1-5, 6-9 and 10-12, 1999-2015

Dependent variable: log of enrollment of disabled students						
Variable	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program participation	0.060***	0.059***	0.025***	0.024***	-0.006	-0.007
	(0.006)	(0.006)	(0.007)	(0.007)	(0.010)	(0.010)
Observations	1,354,224	1,136,939	720,981	704,511	288,417	288,407
R-squared	0.832	0.832	0.799	0.798	0.736	0.736
Dependent variable: log of enrollment of non-disabled students						
Variable	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program participation	0.033***	0.031***	0.025***	0.021***	0.008	0.009
	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)
Observations	1,353,713	1,136,491	720,960	704,500	288,415	288,405
R-squared	0.908	0.904	0.910	0.908	0.900	0.902
School and student characteristics	No	Yes	No	Yes	No	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Trend x ever program adoption[1]	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the school level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. [1]Time trends from the 1st to the 5th power are used.

Table 3 also presents the spillover effect of the inclusive program on the enrollment of non-disabled students. The results indicate that the program is effective at raising the enrollment of non-disabled students by 3.1% in schools with grades 1-5 and by 2.1% in schools with grades 6-9. The program has no effect, though, for students with no special educational need in grades 10-12. This positive spillover effect suggests that the presence of disabled students in regular schools should not necessarily raise concerns about special-education placements. Furthermore, a growing awareness of the importance of inclusive education may be leading parents to enroll their children in schools with the program.

To investigate whether the positive effects of the inclusive program on the enrollment of disabled and non-disabled students are driven by migration of students across schools with and without the program rather than by increases in the overall enrollment, the data were aggregated up to the *municipio* level (Table 4). The results provide evidence that the program raises the total enrollment of disabled students in grades 1-5 and 6-9 in *municipios* with participating schools.

More specifically, in *municipios* with schools that implemented the program, the enrollment of disabled students in grades 1-5 and 6-9 increased by 11.0% and 10.5%, respectively. By contrast, the enrollment of disabled students in grades 10-12 in *municipios* with participating schools is reduced by 4.6 percentage points. Note that these impacts are for all disabled students, not just students participating in the program, as some eligible students may not be treated in schools with the program. Regarding the negative results for grades 10-12, students' education at higher levels may often be sacrificed due to many reasons, such as work, marriage, and housework, and a longer school day for disabled students may discourage parents from enrolling their children in schools with the program.

Table 4 – Estimates of the Program Impact on Log of Enrollment of Disabled and Non-Disabled Students at the *Municipio*-Level: Results for Schools with Grades 1-5, 6-9 and 10-12, 1999-2015

Dependent variable: log of enrollment of disabled students						
Variable	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program participation	0.119***	0.110***	0.112***	0.105***	-0.045**	-0.046**
	(0.039)	(0.039)	(0.032)	(0.032)	(0.021)	(0.021)
Observations	73,123	72,714	80,386	80,046	79,315	78,315
R-squared	0.872	0.871	0.854	0.854	0.812	0.811
Dependent variable: log of enrollment of non-disabled students						
Variable	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program participation	0.042***	0.031**	0.016	0.007	0.012	-0.004
	(0.016)	(0.014)	(0.016)	(0.009)	(0.011)	(0.008)
Observations	73,123	72,714	80,385	80,045	79,315	78,315
R-squared	0.975	0.974	0.940	0.968	0.911	0.957
School and student characteristics	No	Yes	No	Yes	No	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Trend x ever program adoption[l]	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the *municipio* level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. [l]Time trends from the 1st to the 5th power are used.

The impact of the inclusive program on the enrollment of non-disabled students at the *municipio* level is presented in the bottom panel of Table 4. The results show that the program is effective at raising the enrollment of non-disabled students in grades 1-5 by 3.1%. Thus, these estimates suggest that the program raises the enrollment of non-disabled students in those grade levels by attracting more students who were out of school into participating schools.

The estimated effects of the program on the dropout, repetition, and promotion rates are shown in Table 5.

Table 5 – Estimates of the Program Impact on Dropout, Repetition, and Grade Promotion Rates: Results for Schools with Grades 1-5, 6-9 and 10-12, 1999-2015

Dependent variable: dropout rate						
Variables	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program participation	-0.027	-0.049	-0.066	-0.037	-0.201*	-0.162
	(0.034)	(0.036)	(0.051)	(0.052)	(0.120)	(0.121)
School program participation x disability		0.009		-0.028**		-0.097**
		(0.006)		(0.011)		(0.046)
Observations	1,132,780	1,132,780	702,322	702,322	286,078	286,078
R-squared	0.551	0.551	0.627	0.627	0.652	0.652
Dependent variable: repetition rate						
Variables	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program participation	0.031	0.047	-0.111	-0.021	-0.167	-0.152
	(0.054)	(0.059)	(0.071)	(0.073)	(0.105)	(0.106)
School program participation x disability		-0.007		-0.090***		-0.038
		(0.010)		(0.016)		(0.038)
Observations	1,132,780	1,132,780	702,322	702,322	286,078	286,078
R-squared	0.571	0.571	0.542	0.542	0.527	0.527
Dependent variable: grade promotion rate						
Variables	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program participation	-0.003	0.002	0.177**	0.058	0.368**	0.314**
	(0.065)	(0.070)	(0.085)	(0.087)	(0.145)	(0.147)
School program participation x disability		-0.002		0.118***		0.135**
		(0.012)		(0.019)		(0.059)
Observations	1,132,780	1,132,780	702,322	702,322	286,078	286,078
R-squared	0.686	0.686	0.644	0.644	0.682	0.683
School and student characteristics	Yes	Yes	Yes	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Trend x ever program adoption[1]	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the school level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. The estimated coefficients are the direct effects on the dependent variables, since the latter were multiplied by 100. [1]For grades 1-5, time trends from the 1st to the 5th power are used; for grades 6-9, time trends go from the 1st to the 4th power; and for grades 10-12, time trends from the 1st to the 3rd power are used.

For each outcome and grade level, two specifications are presented. In the first specification, the interaction term between school program participation and proportion of eligible students ($\bar{E}_{st}P_{st}$) is omitted from Equation (3). Hence, the coefficient on the school program participation variable measures the impact of school program adoption on the dependent variable for eligible and ineligible students combined. In the second specification, the impact of the program is estimated including the interaction term between the school program participation variable and the proportion of disabled students. Thus, the coefficient on the interaction term

indicates the differential effect of the school program participation for disabled students in relation to non-disabled peers in schools that adopted the program; the overall impact for disabled students is obtained by summing the coefficients on the interaction term and on the school program participation. Lastly, the coefficient on school program participation measures the average spillover effect onto all students, both eligible and ineligible.

The regression estimates show that the program is effective at reducing the dropout rate of disabled students by 0.03 percentage points for grades 6-9 and by 0.1 percentage points for grades 10-12. The results also indicate that the program reduces the repetition rate of eligible students in grades 6-9. The impact of the program on grade promotion rate is positive and statistically significant for students in grades 6-9 and 10-12. The program raises the grade promotion rate of all grade 6-9 students (both eligible and ineligible) by 0.2 percentage points. When accounting for differential effects, the estimates indicate that disabled students in grades 6-9 are the only ones benefitting from the program. For students (eligible and ineligible) in grades 10-12, the program raises the grade promotion rate by 0.4 percentage points. The results also show that the inclusive program raises the grade promotion rate of disabled students in grades 10-12 by 0.5 percentage points (0.314 + 0.135 = 0.449). The spillover effect for students in those grade levels is also positive, with the program raising grade promotion by 0.3 percentage points.

5.2 Impact by Time of Program Adoption and Cumulative Impact

To explore the dynamics of program implementation and its impact on the academic outcomes of disabled and non-disabled students, as well as the program cumulative impacts, additional estimates including lags of program adoption are presented in Tables 6 to 9. These estimates include indicator variables for years 0-8 after program adoption. These variables for program adoption are dummies that equal one only in the relevant year, indicating the impact of the program for each year after program adoption. Tables 6 to 9 also show estimates of the cumulative effects, that are obtained by summing all individual effects for each year.[12] Since the proportion of disabled students was not constant over the years, the estimates of the impact of the program on dropout, repetition, and grade promotion rates, are focused on the whole set of students, with no distinction

[12] Due to lack of space, Table 6 presents the cumulative impact of school program participation on the enrollment of disabled and non-disabled students for only eight years of the program.

between the impact for eligible students and the spillover effect onto ineligible (and onto eligible) students.

Table 6 presents the estimates of the program impact on (log) of enrollment of disabled and non-disabled students by time of adoption and the cumulative effect after eight years of program implementation. Two different specifications for each group of grades are presented, the second including all schools and student characteristics. In what follows, the discussion will focus on the most complete specification. The disaggregation of the program impact by time of adoption reveals that the inclusive program raises the enrollment of disabled students in grades 1-5 from the year of program adoption to the third year after that. The impact is negative, however, after the fifth year. After eight years of program, the cumulative impact for schools with grades 1-5 is positive, raising the enrollment of disabled students by 13.4%. For grades 6-9, the impact of the inclusive program also accumulates over time. The program raises the enrollment of disabled students from the year of adoption to the eighth year after program implementation, reaching a 31.1% increase after eight years of program. For non-disabled students in grades 1-5 and 6-9, the impact of the program is positive and statistically significant from the year of adoption to the eighth year after program implementation. The results indicate that the cumulative effect is higher for non-disabled students in grades 1-5 and 6-9 than for disabled students. The intuition behind this difference is that the inclusive program has a very large positive spillover effect onto ineligible students, increasing also overall enrollment.

Estimates of the impact of the program on dropout rates over time are shown in Table 7. The results suggest that the program raises the dropout rates of students in grades 6-9 in the third, fourth, fifth, and sixth years after program adoption. After eight years of program, the estimates indicate that the dropout rate among these students has increased by 0.8 percentage points. Note that this is the impact for all students, with no distinction between the effect for eligible and ineligible students. For students in grades 10-12, the program seems to reduce the dropout rates from the first to the eighth year after program adoption. The cumulative impact suggests a 4.2 percentage point reduction in dropping out after eight years of the program.

Table 6 – Estimates of the Program Impact on Log of Enrollment of Disabled and Non-Disabled Students by Time of Adoption and Cumulative Impact

Dependent variable: log of enrollment of disabled students						
Variable: School program participation	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
Year of program adoption	0.060***	0.056***	0.028***	0.025***	0.007	0.006
	(0.005)	(0.006)	(0.006)	(0.006)	(0.009)	(0.009)
1st year after program adoption	0.048***	0.043***	0.041***	0.037***	-0.011	-0.011
	(0.007)	(0.007)	(0.007)	(0.007)	(0.012)	(0.012)
2nd year after program adoption	0.051***	0.042***	0.054***	0.044***	-0.022	-0.023
	(0.008)	(0.008)	(0.009)	(0.009)	(0.015)	(0.015)
3th year after program adoption	0.035***	0.021**	0.056***	0.043***	-0.026	-0.028*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.016)	(0.016)
4th year after program adoption	0.037***	0.015	0.078***	0.059***	-0.006	-0.009
	(0.009)	(0.009)	(0.010)	(0.010)	(0.018)	(0.018)
5th year after program adoption	-0.002	-0.021***	0.046***	0.031***	-0.003	-0.005
	(0.007)	(0.007)	(0.007)	(0.007)	(0.012)	(0.012)
6th year after program adoption	0.007	-0.015**	0.064***	0.049***	0.017	0.015
	(0.007)	(0.007)	(0.007)	(0.007)	(0.011)	(0.011)
7th year after program adoption	0.004	-0.004	0.024***	0.019***	0.001	0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
8th year after program adoption	-0.001	-0.003***	0.005***	0.004***	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cumulative impact (8 years of program)						
School program participation	0.238***	0.134***	0.395***	0.311***	-0.042	-0.055
	(0.045)	(0.048)	(0.049)	(0.049)	(0.080)	(0.080)
Observations	1,354,224	1,136,939	720,981	704,511	288,417	288,407
R-squared	0.832	0.832	0.799	0.798	0.736	0.736
Dependent variable: log of enrollment of non-disabled students						
Variable: School program participation	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
Year of program adoption	0.033***	0.032***	0.033***	0.027***	0.011*	0.012*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)
1st year after program adoption	0.043***	0.042***	0.049***	0.041***	0.011	0.012
	(0.004)	(0.004)	(0.005)	(0.005)	(0.009)	(0.009)
2nd year after program adoption	0.056***	0.055***	0.076***	0.059***	0.014	0.013
	(0.006)	(0.006)	(0.007)	(0.006)	(0.012)	(0.012)
3th year after program adoption	0.076***	0.072***	0.095***	0.071***	0.018	0.016
	(0.008)	(0.007)	(0.008)	(0.008)	(0.015)	(0.015)
4th year after program adoption	0.083***	0.080***	0.125***	0.096***	0.021	0.016
	(0.009)	(0.008)	(0.010)	(0.009)	(0.019)	(0.018)
5th year after program adoption	0.064***	0.063***	0.101***	0.077***	0.019	0.016
	(0.007)	(0.007)	(0.008)	(0.008)	(0.014)	(0.014)
6th year after program adoption	0.063***	0.066***	0.105***	0.082***	0.019	0.018
	(0.007)	(0.007)	(0.008)	(0.007)	(0.013)	(0.013)
7th year after program adoption	0.022***	0.022***	0.035***	0.027***	0.002	0.001
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
8th year after program adoption	0.004***	0.004***	0.008***	0.006***	0.000	0.000
	(0.002)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)
Cumulative impact (8 years of program)						
School program participation	0.446***	0.436***	0.627***	0.486***	0.115	0.105
	(0.044)	(0.043)	(0.048)	(0.047)	(0.088)	(0.087)
Observations	1,353,713	1,136,491	720,960	704,500	288,415	288,405
R-squared	0.908	0.904	0.910	0.908	0.900	0.902
School and student characteristics	No	Yes	No	Yes	No	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Trend x ever program adoption[1]	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the school level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. [1]Time trends from the 1st to the 5th power are used.

Table 7 – Estimates of the Program Impact on Dropout Rate by Time of Adoption and Cumulative Impact

Program Effects	Grades 1-5	Grades 6-9	Grades 10-12
Program adoption	0.001	0.047	-0.341***
	(0.034)	(0.048)	(0.133)
1st year after program adoption	-0.017	0.035	-0.317*
	(0.046)	(0.057)	(0.170)
2nd year after program adoption	-0.038	0.079	-0.579***
	(0.061)	(0.070)	(0.218)
3th year after program adoption	-0.008	0.142*	-0.680***
	(0.074)	(0.074)	(0.253)
4th year after program adoption	-0.004	0.170**	-0.840***
	(0.083)	(0.084)	(0.306)
5th year after program adoption	0.021	0.106	-0.737***
	(0.067)	(0.066)	(0.223)
6th year after program adoption	0.027	0.170***	-0.613***
	(0.067)	(0.063)	(0.215)
7th year after program adoption	-0.005	0.054**	-0.122**
	(0.023)	(0.022)	(0.056)
8th year after program adoption	-0.004	0.007	-0.015*
	(0.007)	(0.007)	(0.008)
Observations	1,132,780	702,322	251,159
R-squared	0.551	0.627	0.659
Cumulative Program Effects	Grades 1-5	Grades 6-9	Grades 10-12
Program adoption	0.001	0.047	-0.341***
	(0.034)	(0.048)	(0.133)
1 year of program	-0.016	0.082	-0.658**
	(0.077)	(0.098)	(0.282)
2 years of program	-0.054	0.161	-1.238***
	(0.134)	(0.160)	(0.480)
3 years of program	-0.062	0.304	-1.918***
	(0.206)	(0.228)	(0.714)
4 years of program	-0.066	0.474	-2.758***
	(0.286)	(0.306)	(0.999)
5 years of program	-0.045	0.580	-3.495***
	(0.350)	(0.366)	(1.204)
6 years of program	-0.018	0.750*	-4.109***
	(0.414)	(0.423)	(1.401)
7 years of program	-0.023	0.804*	-4.231***
	(0.435)	(0.441)	(1.443)
8 years of program	-0.027	0.811*	-4.245***
	(0.441)	(0.445)	(1.448)
School and student characteristics	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes
Trend x ever program adoption [1]	Yes	Yes	Yes

Notes: Robust standard errors clustered at the school level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. The estimated coefficients are the direct effects on the dependent variable, since the latter was multiplied by 100. [1]For grades 1-5, time trends from the 1st to the 4th power are used; for grades 6-9, linear time trends are used; and for grades 10-12, time trends go from the 1st to the 3rd power.

Table 8 reports the estimates of the program impact on repetition rate in each year after program adoption, as well as the cumulative effects. In the year of adoption, the program is

effective at reducing the repetition rate of students in grades 6-9 by 0.8 percentage points. For those students, the effect is higher and statistically significant in the subsequent three years, then it reaches 0.3 percentage points in the sixth year after program adoption. The results suggest that the negative impact for students in grades 6-9 accumulates over time, reaching a 1.8 percentage point reduction in the repetition rate after eight years of the program. In contrast, there is no effect of the program on repetition in grades 1-5 or 10-12.

Finally, Table 9 displays estimation results for the grade promotion rate. The coefficients on program effects are statistically significant only for students in grades 6-9 and 10-12. For schools with grades 6-9, the program raises the promotion rate by 0.2 percentage points in the year of program adoption, after which the impact reaches 0.4 and 0.2 percentage points in the second and third years after program adoption, respectively. The cumulative effects show that the extent of the dynamics of the grade promotion response to adoption of the inclusive program is determined within five years for grades 6-9. At most, the program increases the grade promotion rate by about 1%. In grades 10-12, the program raises promotion until the seventh year after implementation. Moreover, the cumulative impact for schools with grades 10-12 is quite large, raising grade promotion in schools that implemented the program by 5.1 percentage points after eight years.

Table 8 – Estimates of the Program Impact on Repetition Rate by Time of Adoption and Cumulative Impact

Program Effects	Grades 1-5	Grades 6-9	Grades 10-12
Program adoption	0.002	-0.275***	-0.085
	(0.055)	(0.067)	(0.116)
1st year after program adoption	0.061	-0.414***	-0.238
	(0.071)	(0.077)	(0.151)
2nd year after program adoption	0.030	-0.290***	-0.226
	(0.091)	(0.091)	(0.195)
3th year after program adoption	0.106	-0.314***	-0.180
	(0.109)	(0.095)	(0.222)
4th year after program adoption	0.142	-0.161	-0.202
	(0.118)	(0.106)	(0.273)
5th year after program adoption	0.084	-0.088	0.035
	(0.094)	(0.082)	(0.198)
6th year after program adoption	0.002	-0.270***	0.056
	(0.095)	(0.078)	(0.194)
7th year after program adoption	0.015	-0.011	-0.048
	(0.032)	(0.030)	(0.050)
8th year after program adoption	0.002	-0.003	0.004
	(0.011)	(0.010)	(0.009)
Observations	1,132,780	702,322	251,159
R-squared	0.551	0.542	0.659

Cumulative Program Effects	Grades 1-5	Grades 6-9	Grades 10-12
Program adoption	0.002	-0.275***	-0.085
	(0.055)	(0.067)	(0.116)
1 year of program	0.063	-0.689***	-0.324
	(0.117)	(0.129)	(0.244)
2 years of program	0.093	-0.979***	-0.549
	(0.200)	(0.205)	(0.415)
3 years of program	0.198	-1.293***	-0.729
	(0.302)	(0.284)	(0.615)
4 years of program	0.340	-1.454***	-0.931
	(0.413)	(0.375)	(0.862)
5 years of program	0.424	-1.542***	-0.896
	(0.500)	(0.444)	(1.039)
6 years of program	0.426	-1.812***	-0.840
	(0.587)	(0.508)	(1.211)
7 years of program	0.440	-1.823***	-0.888
	(0.615)	(0.528)	(1.248)
8 years of program	0.442	-1.827***	-0.884
	(0.622)	(0.532)	(1.253)
School and student characteristics	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes
Trend x ever program adoption [1]	Yes	Yes	Yes

Notes: Robust standard errors clustered at the school level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. The estimated coefficients are the direct effects on the dependent variable, since the latter was multiplied by 100. [1]For grades 1-5, time trends from the 1st to the 4th power are used; for grades 6-9, linear time trends are used; and for grades 10-12, time trends go from the 1st to the 3rd power.

Table 9 – Estimates of the Program Impact on Grade Promotion Rate by Time of Adoption and Cumulative Impact

Program Effects	Grades 1-5	Grades 6-9	Grades 10-12
Program adoption	-0.003	0.228***	0.426***
	(0.065)	(0.079)	(0.159)
1st year after program adoption	-0.044	0.379***	0.556***
	(0.086)	(0.093)	(0.206)
2nd year after program adoption	0.008	0.211*	0.805***
	(0.112)	(0.111)	(0.267)
3th year after program adoption	-0.097	0.171	0.860***
	(0.136)	(0.117)	(0.310)
4th year after program adoption	-0.138	-0.009	1.042***
	(0.149)	(0.132)	(0.378)
5th year after program adoption	-0.105	-0.018	0.702**
	(0.120)	(0.104)	(0.275)
6th year after program adoption	-0.029	0.099	0.558**
	(0.121)	(0.099)	(0.267)
7th year after program adoption	-0.010	-0.043	0.170**
	(0.041)	(0.037)	(0.071)
8th year after program adoption	0.002	-0.003	0.011
	(0.013)	(0.012)	(0.011)
Observations	1,132,780	702,322	251,159
R-squared	0.686	0.644	0.684

Cumulative Program Effects	Grades 1-5	Grades 6-9	Grades 10-12
Program adoption	-0.003	0.228***	0.426***
	(0.065)	(0.079)	(0.159)
1 year of program	-0.047	0.607***	0.982***
	(0.142)	(0.157)	(0.341)
2 years of program	-0.039	0.818***	1.787***
	(0.246)	(0.253)	(0.585)
3 years of program	-0.136	0.989***	2.647***
	(0.375)	(0.356)	(0.871)
4 years of program	-0.274	0.980**	3.689***
	(0.517)	(0.473)	(1.223)
5 years of program	-0.379	0.963*	4.391***
	(0.630)	(0.563)	(1.475)
6 years of program	-0.408	1.062	4.949***
	(0.743)	(0.648)	(1.719)
7 years of program	-0.418	1.019	5.119***
	(0.779)	(0.674)	(1.773)
8 years of program	-0.415	1.015	5.130***
	(0.789)	(0.679)	(1.779)
School and student characteristics	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes
Trend x ever program adoption [1]	Yes	Yes	Yes

Notes: Robust standard errors clustered at the school level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. The estimated coefficients are the direct effects on the dependent variable, since the latter was multiplied by 100. [1]For grades 1-5, time trends from the 1st to the 4th power are used; for grades 6-9, linear time trends are used; and for grades 10-12, time trends go from the 1st to the 3rd power.

5.3 Robustness Checks

In order to check whether the estimated impacts of the program observed in Tables 6 to 9 are reliable, two robustness checks were conducted. The first is a placebo test that checks for the existence of unobserved changes in schools close to the time of the implementation of the program that affect the educational outcomes but are not fully accounted for by the control variables (Table 10). The test was performed by using data from only 1999 to 2005 and creating a placebo variable that equals one in 2005 for the 943 schools, out of 98,307 schools in the sample, that had the program in 2007 and zero otherwise. If unobserved changes occurred in 2005 and are not captured by the control variables, then regressing the educational outcomes on that placebo variable and the covariates would result in a significant impact of the program placebo variable. Table 10 shows that the coefficients on the placebo variable are not statistically significant, which suggests that the program effects observed in Tables 6 to 9 are due to the program itself.

Table 10 – Placebo Test: Estimates of the Program Impact for Schools with Grades 1-5, 6-9, and 10-12, 1999-2005 (Schools with Program in 2007 Assigned to 2005)

Variables	Log of enrollment of disabled students	Log of enrollment of non-disabled students	Dropout	Repetition	Grade promotion
Schools with Grades 1-5					
School program participation $_{t+1}$	-0.000	0.002	0.151	0.147	-0.298
	(0.009)	(0.011)	(0.210)	(0.256)	(0.325)
Observations	597,951	597,782	597,214	597,214	597,214
R-squared	0.985	0.951	0.544	0.578	0.680
Schools with Grades 6-9					
School program participation $_{t+1}$	0.006	0.019	-0.085	0.059	0.026
	(0.012)	(0.019)	(0.273)	(0.337)	(0.420)
Observations	286,109	286,102	285,477	285,477	285,477
R-squared	0.978	0.936	0.688	0.587	0.705
Schools with Grades 10-12					
School program participation $_{t+1}$	-0.037	-0.005	0.787	-0.038	-0.749
	(0.022)	(0.042)	(0.902)	(0.684)	(1.081)
Observations	109,442	109,442	107,929	107,929	107,929
R-squared	0.973	0.941	0.696	0.559	0.709
School and student characteristics	Yes	Yes	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes	Yes	Yes
Trend x ever program adoption[1]	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the school level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. The estimated coefficients are the direct effects on the dependent variables, since the latter were multiplied by 100 (except log of enrollment). [1]For grades 1-5, time trends from the 1st to the 5th power are used; for grades 6-9, time trends go from the 1st to the 4th power (except for the equations of enrollment of disabled and non-disabled students, which used time trends from the 1st to the 5th power); and for grades 10-12, time trends from the 1st to the 3rd power are used (except for the equations of enrollment of disabled and non-disabled students, which used time trends from the 1st to the 5th power).

Second, since smaller schools have a higher probability of having the inclusive classroom but no participating students, this could lead to a downward bias in the previously estimated results. Thus, all regressions presented in Tables 6 to 9 were replicated after excluding the smallest 15% and 30% of schools with grades 1-5 and the smallest 10% and 15% of schools with grades 6-9 and 10-12 (Table 11). The choices on the percentiles of the distribution to be excluded for each group of grades was based on the distributions of treated schools. For each group of grades, the number of students in the smallest 5% and 10% of schools that were treated was identified and, afterwards, these numbers were used as cutoffs when deciding the percentiles to be removed from the data including treated and untreated schools. The findings presented in Table 11 indicate that this paper's estimates are robust to these sample restrictions.

Table 11 – Robustness Check: Estimates of the Program Impact after Excluding the Smallest Schools with Grades 1-5, 6-9, and 10-12, 1999-2015

Variables	Log of enrollment of disabled students		Log of enrollment of non-disabled students		Dropout		Repetition		Promotion	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Schools with Grades 1-5										
School program participation	0.064***	0.068***	0.039***	0.039***	-0.007	-0.003	0.088	0.107*	-0.081	-0.105
	(0.006)	(0.007)	(0.003)	(0.003)	(0.036)	(0.036)	(0.056)	(0.056)	(0.067)	(0.068)
School program participation x disability					0.004	0.003	-0.012	-0.005	0.008	0.002
					(0.006)	(0.007)	(0.008)	(0.008)	(0.011)	(0.011)
Observations	1,047,593	930,166	1,047,355	929,985	1,044,867	927,878	1,044,867	927,878	1,044,867	927,878
R-squared	0.828	0.822	0.905	0.901	0.579	0.594	0.602	0.623	0.708	0.720
Schools with Grades 6-9										
School program participation	0.029***	0.032***	0.018***	0.017***	-0.026	-0.012	-0.034	-0.024	0.060	0.036
	(0.007)	(0.007)	(0.003)	(0.003)	(0.050)	(0.051)	(0.073)	(0.075)	(0.086)	(0.088)
School program participation x disability					-0.039***	-0.047***	-0.090***	-0.089***	0.130***	0.136***
					(0.013)	(0.013)	(0.016)	(0.017)	(0.020)	(0.021)
Observations	646,327	602,772	646,322	602,767	644,698	601,344	644,698	601,344	644,698	601,344
R-squared	0.795	0.794	0.904	0.898	0.660	0.674	0.568	0.579	0.672	0.684
Schools with Grades 10-12										
School program participation	-0.005	-0.007	0.008	0.008	-0.183	-0.190	-0.131	-0.132	0.314**	0.322**
	(0.011)	(0.011)	(0.005)	(0.005)	(0.121)	(0.123)	(0.108)	(0.111)	(0.147)	(0.149)
School program participation x disability					-0.127**	-0.115**	-0.035	-0.048	0.162**	0.163**
					(0.051)	(0.055)	(0.045)	(0.049)	(0.066)	(0.072)
Observations	266,574	246,699	266,574	246,699	264,556	244,900	264,556	244,900	264,556	244,900
R-squared	0.733	0.733	0.900	0.892	0.657	0.655	0.537	0.540	0.686	0.682
School and student characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enrollment 1999-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trend x ever program adoption[1]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the school level. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. The estimated coefficients are the direct effects on the dependent variables, since the latter were multiplied by 100 (except log of enrollment). Grades 1-5: (1) Estimates after excluding the smallest 15% of schools; (2) Estimates after excluding the smallest 30% of schools. Grades 6-9 and 10-12: (1) Estimates after excluding the smallest 10% of schools; (2) Estimates after excluding the smallest 15% of schools. [1]For grades 1-5, time trends from the 1st to the 5th power are used; for grades 6-9, time trends go from the 1st to the 4th power (except for the equations of enrollment of disabled and non-disabled students, which used time trends from the 1st to the 5th power); and for grades 10-12, time trends from the 1st to the 3rd power are used (except for the equations of enrollment of disabled and non-disabled students, which used time trends from the 1st to the 5th power).

6. Conclusion

This paper investigates the effects of Brazil's Multifunctional Resources Classroom Inclusive Program on the enrollment, dropping out, repetition, and grade promotion of disabled and non-disabled students in primary and secondary schools. The program provides schools with specialized pedagogical materials, furniture, and computers to improve the learning environment, socialization and overall academic and personal development of students with disabilities and special educational needs.

Based on school level data and fixed effects estimations, this study finds that the inclusive program is effective at raising the enrollment of disabled and non-disabled students in grades 1-5 and 6-9. The *municipio* level estimates demonstrate that most of these results reflects an increase in the overall enrollment due to the program rather than migration of students across schools with and without the program. The study also finds that the program reduces the dropout rates of disabled students in grades 6-9 and 10-12, reduces the repetition rates of disabled students in grades 6-9, and raises the promotion rates of disabled students in grades 6-9 and 10-12. Moreover, the program has positive spillover effects for students in grades 10-12, raising their promotion rate by 0.3 percentage points.

Further investigation of the program impact by time of adoption and its cumulative effects shows that the full impact of the program is not completely felt in the year of program adoption, but rather accumulates over time. These results point to the existence of a long-term effect of the Brazilian inclusive program, which can last, for some outcomes, up to eight years.

The findings of this study suggest that, in general, Brazil's Multifunctional Resources Classroom Inclusive Program benefits students with special educational needs or disabilities, especially those enrolled in grades 6-9 and 10-12, with no negative spillover effects onto non-disabled students. Thus, the results provide further evidence that inclusive education may generate positive impacts for disabled students with no negative externalities on the academic outcomes of regular students. From a policy perspective, it should be noted that the program's current design still requires improvements in order to target younger disabled students enrolled in grades 1-5, whose academic outcomes (dropout, repetition, and grade promotion rates) were not affected by the program. Finally, although this study evaluates the impact of the inclusive program on several

academic outcomes of disabled and non-disabled students, future research can extend the analysis by assessing also the program's impact on academic performance.

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Appendix

Table A – Average Enrollment of Disabled and Non-Disabled Students in Treated and Never Treated Schools with Grades 1-5, 6-9 and 10-12, 2007-2015

Years	All schools		Treated schools		Never treated schools	
	Non-disabled students	Disabled students	Non-disabled students	Disabled students	Non-disabled students	Disabled students
Schools with grades 1-5						
2007	158.8	1.5	237.9	3.1	123.6	0.8
	(180.8)	(5.3)	(202.7)	(7.6)	(157.9)	(3.7)
2008	154.5	1.6	231.5	3.5	120.3	0.8
	(175.4)	(5.3)	(196.9)	(7.6)	(153.1)	(3.6)
2009	149.6	2.0	224.4	4.1	116.5	1.0
	(169.1)	(5.5)	(190.6)	(7.8)	(147.0)	(3.7)
2010	143.5	2.5	214.8	5.4	112.0	1.2
	(162.1)	(6.1)	(182.4)	(8.4)	(141.2)	(4.1)
2011	139.2	2.9	208.9	6.2	108.6	1.4
	(157.5)	(6.2)	(177.0)	(8.6)	(137.4)	(4.0)
2012	135.2	3.1	203.1	6.7	105.6	1.5
	(153.9)	(6.4)	(172.7)	(8.8)	(134.7)	(4.0)
2013	132.9	3.2	200.0	6.9	103.9	1.6
	(152.1)	(6.4)	(170.5)	(9.0)	(133.3)	(4.0)
2014	132.2	3.4	197.9	7.1	104.0	1.8
	(152.9)	(6.5)	(170.0)	(9.1)	(135.4)	(4.1)
2015	130.1	3.5	194.6	7.3	102.5	1.9
	(151.4)	(6.5)	(167.9)	(8.9)	(134.6)	(4.2)
Schools with grades 6-9						
2007	263.0	0.9	294.0	1.3	243.0	0.7
	(248.4)	(3.5)	(251.7)	(4.4)	(244.2)	(2.8)
2008	257.6	1.1	287.5	1.6	238.4	0.8
	(243.0)	(3.5)	(245.7)	(4.3)	(239.3)	(2.8)
2009	251.8	1.4	282.3	2.0	232.2	1.1
	(237.1)	(4.1)	(238.6)	(4.8)	(234.0)	(3.4)
2010	245.7	1.9	274.7	2.8	227.1	1.3
	(230.0)	(4.6)	(230.0)	(5.5)	(228.2)	(3.9)
2011	238.6	2.3	264.3	3.4	222.2	1.5
	(223.1)	(4.7)	(222.5)	(5.7)	(221.9)	(3.8)
2012	230.4	2.8	255.5	4.3	214.6	1.8
	(215.6)	(5.2)	(215.6)	(6.3)	(214.1)	(4.1)
2013	222.2	3.1	246.2	4.7	207.0	2.1
	(208.0)	(5.5)	(208.9)	(6.5)	(206.1)	(4.4)
2014	213.2	3.5	237.7	5.3	197.7	2.3
	(196.9)	(5.7)	(200.8)	(6.8)	(192.8)	(4.5)
2015	206.7	3.9	233.5	6.0	189.8	2.6
	(188.8)	(6.0)	(194.7)	(7.2)	(183.0)	(4.6)
Schools with grades 10-12						
2007	369.1	0.5	420.4	0.7	344.7	0.4
	(359.7)	(2.4)	(396.8)	(3.6)	(338.0)	(1.6)
2008	354.6	0.6	400.6	0.9	332.9	0.5
	(342.1)	(2.1)	(372.8)	(3.1)	(324.3)	(1.5)
2009	347.5	0.8	395.8	1.2	324.9	0.6
	(333.7)	(2.3)	(365.1)	(3.2)	(315.4)	(1.6)
2010	341.6	1.0	385.0	1.5	321.2	0.7
	(323.7)	(3.1)	(354.8)	(4.6)	(306.1)	(1.9)
2011	337.5	1.2	377.5	1.8	318.9	0.9
	(318.1)	(2.6)	(346.4)	(3.4)	(302.2)	(2.0)
2012	333.6	1.6	374.0	2.4	314.8	1.2
	(311.9)	(3.1)	(339.2)	(4.1)	(296.5)	(2.4)
2013	327.9	1.8	369.0	2.7	308.8	1.4
	(306.0)	(3.3)	(333.6)	(4.2)	(290.4)	(2.7)
2014	324.1	2.2	365.2	3.2	305.1	1.7
	(302.3)	(3.6)	(329.7)	(4.5)	(286.7)	(3.0)
2015	311.1	2.5	350.5	3.7	292.8	1.9
	(291.1)	(4.0)	(320.0)	(4.9)	(274.8)	(3.3)

Note: Standard deviations in parentheses.