IMPACT OF BRAZIL'S *MAIS EDUCAÇÃO* EXTENDED SCHOOL DAY PROGRAM ON ACADEMIC OUTCOMES

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RESUMO

O presente artigo investiga o impacto do programa brasileiro de ampliação da jornada escolar Mais Educação sobre o número de matrículas, taxa de abandono, taxa de aprovação e taxa de reprovação escolar de estudantes do 1º ao 5º ano, 6º ao 9º ano e ensino médio. O Programa Mais Educação foi implementado em escolas públicas de ensino fundamental e médio a partir de 2008 e as instituições participantes tiveram suas jornadas escolares ampliadas de quatro horas diárias para, no mínimo, sete horas diárias. A política faz parte de um esforço nacional para redução das disparidades educacionais e melhoria dos resultados de aprendizagem, especialmente para estudantes em situação de vulnerabilidade social. Utilizando microdados do Censo Escolar e dados administrativos da implementação do programa para o período de 1999 a 2014, os resultados deste artigo sugerem que o programa brasileiro de ampliação da jornada escolar é eficaz na redução das taxas de abandono escolar em todos os níveis de ensino. O programa também mostra-se efetivo no aumento do número de matrículas de alunos do 6º ao 9º ano, mas provoca uma redução nas matrículas de alunos do ensino médio em escolas onde o programa foi implementado. Ademais, as estimativas indicam que o impacto do programa sobre a taxa de aprovação escolar é positivo para alunos do 6º ao 9º ano. O impacto é negativo, no entanto, para estudantes do 1º ao 5º ano, e estatisticamente insignificante para estudantes do ensino médio. Por fim, os resultados apontam para um aumento das taxas de repetição escolar em todos os níveis de ensino como consequência do programa.

Palavras-chave: Programas de Apliação da Jornada Escolar; Resultados de Aprendizagem; Brasil.

ABSTRACT

This paper investigates the impact of Brazil's *Mais Educação* Extended School Day Program on the enrollment, dropout, grade promotion, and repetition rates of students in grades 1-5, 6-9, and 10-12 in Brazilian schools. The *Mais Educação* Extended School Day Program was implemented in public primary and secondary Brazilian schools in 2008, and participating institutions lengthened the school day from a half day (4 hours) to a full day (at least seven hours). The policy is part of a national effort to reduce educational disparities and improve learning outcomes, especially for disadvantaged students. Using school census data and administrative data on the program's implementation from 1999 to 2014, the results of this paper suggest that the Brazilian longer school day program is effective at reducing dropout rates for students in all grade levels. The program is also effective at raising the enrollment of students in grades 6-9, but reduces the enrollment of students in grades 10-12 in schools where the program is available. Moreover, the estimates indicate that the impact on grade promotion is positive for students in grades 6-9. It is negative, however, for students in grades 1-5, and statistically insignificant for grades 10-12. Finally, the program seems to increase repetition rates for students in all grade levels.

***Key words*:** Extended School Day Programs; Academic Outcomes; Brazil.
JEL: I21, I28.

1. Introduction

The extension of the school day has been widely discussed as a mechanism to improve the quality of education (Holland et al., 2015; Bellei, 2009; Link and Mulligan, 1986; Llach et al., 2009). Increasing the time students spend in school is an important decision for policy makers and school administrators especially in face of the argument that a longer school day could produce better academic, social and labor outcomes. While there is a consolidated literature that provides evidence about the impact of school inputs on academic outcomes, researchers have a limited understanding of the effects of extending the school day, especially in developing countries (Hincapie, 2016; Patall et al., 2010; Cerdan-Infantes and Vermeersch, 2007). Therefore, this study attempts to fill this void by evaluating the Brazilian *Mais Educação* Extended School Day Program.

Despite being an old practice in many Latin America countries, the extension of the school day is relatively new in Brazil. The *Mais Educação* Extended School Day Program was implemented in public primary and secondary Brazilian schools in 2008, and participating institutions lengthened the school day from a half day (4 hours) to a full day (at least seven hours). The policy is part of a national effort to reduce educational disparities and improve learning outcomes, especially for disadvantaged students.

Advocates of lengthening the school day argue that spending more time in school may allow teachers to better deliver the curriculum and dedicate more time to support students with low academic performance or who are struggling in the learning process. Moreover, students will likely spend more time in academic activities and less time with no supervision, reducing their exposure to potential risks, for instance, violence, crime, and substance abuse (Jacob and Lefgren, 2003; Lochner and Moretti, 2004; Berthelon and Kruger, 2011). Finally, with longer school days, schools may offer extracurricular activities, such as music, sports, and digital culture, increasing the interest and demand for school, consequently reducing dropout rates (Pires and Urzua, 2015).

On the other hand, the extension of the school day may not improve educational outcomes. For instance, it may be that the instruction during the additional time is of poor quality. Teachers may be required to teach extra hours with little or no additional pay, which may consequently reduce their efforts in providing better classroom instruction. Furthermore, if less prepared teachers are hired to teach during the additional school time, spending more hours in school may not directly translate into more learning. Finally, if the extra hours in school are used mainly for non-academic activities, the impact on educational outcomes could be neutral or even negative. For instance, students may dedicate more time for non-academic activities to the detriment of spending time on homework. Therefore, if not well implemented, longer school days may negatively affect academic outcomes and can, ultimately, reduce promotion rates and/or increase repetition rates.

The recent literature presents mixed evidence regarding the implementation of extended school day programs. Using a difference-in-difference approach, Bellei (2009) estimates the effect of a Chilean extended school day program on high school students academic performance. He finds that the program had a positive effect on academic achievement in both mathematics and language. The author highlights that the program had larger positive impacts on rural students and students enrolled in public schools. In the Chilean context, Pires and Urzua (2015), and Valenzuela (2005), also find positive impacts of extending the school day on academic achievement. Hincapie (2016) analyzes the effect of longer school days on the achievement of students in 5^{th} and 9^{th} grades in Colombia. The paper uses school fixed effects models and finds positive impacts of the policy on math and language scores, especially for students in grade nine. The effects of full-day kindergarten on

academic achievement in the United States are evaluated by Cooper et al. (2010) and Rathbun (2010). Both studies find that the implementation of full-day kindergarten (as opposed to half-day kindergarten) has a positive effect on academic performance.

In the opposite direction, a few studies on the impact of lengthening the school day have also found no or even negative effects on academic outcomes. Arzola (2010) evaluated the program *Jornada Escolar Completa* in Chile and found no statistically significant effect of the program on academic performance in math and language tests. Using propensity score matching and panel data, Aquino (2011) estimates the impact of an extended school day program in Brazil implemented only in public institutions in the State of Sao Paulo. The author finds that there is no statistically significant effect of the program on math test scores and promotion rates, but there is a small and statistically significant impact on language test scores. Xerxenevsky (2012) also uses propensity score matching to estimate the effect of the *Mais Educação* Extended School Day Program on academic performance, restricting the analysis only to the State of Rio Grande do Sul. The author finds no significant effect for 8th grade students, but a statistically significant negative effect on the math test scores of 4th grade students, along with a positive impact on the language test scores of students from the same grade level. The Brazilian program was also evaluated by *Itau Social Foundation* (Fundação Itau Social, 2015). The study provides an extensive review of the program and investigates the impact on dropout rates and academic performance using propensity score matching and a difference-in-difference approach. The study finds no statistically significant impact on academic performance in language test scores and dropout rates and a negative, statistically significant, effect on academic performance in math test scores.

Despite the existence of a few studies evaluating Brazil's *Mais Educação* Extended School Day Program, their findings are doubtful due to many methodological limitations. Moreover, they estimate the impact of the program for a small selected sample and their analyses are limited to a short time interval, which does not allow capturing cumulative effects of the program. Therefore, due to the lack of evidence about the impact of extending the length of the school day, especially in developing countries, and the limited research on the Brazilian program, this study aims to contribute to the literature by investigating the causal relationship between a longer school day and academic outcomes in Brazilian schools, using an identification strategy that mitigates potential endogeneity problems found in the literature. Moreover, most studies focus on the effect of extended school day programs on academic performance in language and math test scores, rather than other academic outcomes, such as enrollment, dropout, promotion, and repetition rates. Therefore, this paper contributes to the existing literature by investigating the impact of Brazil's *Mais Educação* Extended School Day Program on the enrollment, dropout, grade promotion, and repetition rates of students in grades 1-5, 6-9, and 10-12 in Brazilian schools.

Using school census data and administrative data on the program's implementation from 1999 to 2014, the results of this paper suggest that the Brazilian longer school day program is effective at reducing dropout rates for students in all grade levels. The program is also effective at raising the enrollment of students in grades 6-9, but reduces the enrollment of students in grades 10-12 in schools where the program is available. Moreover, the estimates indicate that the impact on grade promotion is positive for students in grades 6-9. It is negative, however, for students in grades 1-5, and statistically insignificant for grades 10-12. Finally, the program seems to increase repetition rates for students in all grade levels.

The rest of this paper is organized as follows. Section 2 provides the description of the *Mais Educação* Extended School Day Program. In Section 3, the data and descriptive statistics are presented. Section 4 provides the empirical framework along with the estimation and identification strategies. The results are presented and discussed in Section 5, and Section 6 concludes and makes suggestions for future research.

2. Description of the *Mais Educação* Extended School Day Program

The *Mais Educação* Extended School Day Program was launched in 2007 and implemented in 2008 in Brazilian public schools. It is a federally funded nationwide program in which participating schools extend the school day to at least seven hours, as opposed to 4-5 hours, through optional extra academic and non-academic activities. Schools receive the financial resources to implement the program on a year-by-year basis, and every year they must indicate six activities they will include in the following areas: academic tutoring; environmental education; sports; human rights in education; arts education; digital culture; health promotion; communication and media; natural sciences education; and economic education.

All public schools with at least 100 enrolled students are eligible to participate in the program. Due to financial resource restrictions, however, priority is given to schools with a low Development Index of Basic Education (*Índice de Desenvolvimento da Educação Básica* – IDEB), which measures the quality of education based on students' performance on the System of Assessment of Basic Education (*Sistema de Avaliação da Educação Básica* – SAEB). Schools indicate whether they want to participate in the program and the Ministry of Education makes the decision on which schools will implement the program. In schools with *Mais Educação*, it is possible that not all students are treated. Schools may decide not to have all students participate, and students and their parents may decide not to participate. When this decision is made by schools, they must indicate which students will participate in the activities of the extended school day, and those with low socio-economic background must be prioritized.

Table 1 shows the total number of participating schools in each year from 2008 to 2014, and the corresponding proportion relative to the total number of schools. In 2008, less than 1% of all Brazilian schools participated in the program. This proportion was significantly higher in 2014, by which time more than 18% of all schools had implemented the extended school day program.

3. Data and Descriptive statistics

In order to estimate the impact of the *Mais Educação* Extended School Day Program on academic outcomes, this study uses Brazil's school census and administrative data from 1999 to 2014. Each year, the Brazilian school census collects data on school, teacher, and student characteristics, along with education outcomes, such as total enrollment, promotion, repetition, and dropping out rates. The census is administered to over 250,000 public and private schools, from preschools to high schools, as well as professional education and adult education schools. Data on Brazil's *Mais Educação* Extended School Day Program, which are not available in the school census, were obtained directly from program management at the Ministry of Education and comprise all schools that implemented the program in each year since 2008. The available data do not indicate how many students participate in the program, which implies that this study can estimate only the impact of program adoption, rather than the impact of participation in the program.

To create a panel of schools, school census data from 1999 to 2014 were used. The year of 2006 was excluded due to missing data on most outcomes evaluated in this paper.[1] Columns 1 and 2 of Table 2 show the total number of schools in Brazil from 1999 to 2014 and schools with at least one student enrolled in grades 1-5, 6-9, and 10-12.[2] The total number of schools decreased from 1999 to 2007, reflecting the policy of merging small schools into larger ones and closing schools with unsatisfactory outcomes. From 2008 to 2015, in contrast, the number of schools increased. One of the reasons was the higher level of investments in education after 2007, when the Fund for the Development of Basic Education (*Fundo de Manutenção e Desenvolvimento da Educação Básica* – FUNDEB) was created. This Fund requires an investment of 20% of tax revenues from states and municipalities.

The last column of Table 2 presents the total number of schools for which there are panel data. Therefore, in 2014 there are 239,975 schools with grades 1-5, 6-9 and/or 10-12, of which 101,063 have data for all years from 1999 to 2014. The panel of schools was built using data only on schools with regular education for grades 1-5, 6-9, and/or 10-12, which reduced the sample by less than 4%. The reason for this restriction is that there is no detailed information in the school census on school, teacher, and student characteristics for the other modalities of education, such as youth and adult education and special education.

To evaluate the impact of the *Mais Educação* Extended School Day Program, only participating schools that implemented the program in any year and continued to participate over time were considered as treated schools, which reduces the final panel data to 90,721 schools. The exclusion of schools that left the program after adopting it avoids the issue of considering them in the control group even after belonging to the treatment group in previous years. Table 3 shows the total number of schools and schools participating in the program for the period 2008 to 2014, after balancing the panel. In 2014, 54.5% of schools with grades 6-9 participated in the program. The proportion is lower for schools with grades 1-5 and 10-12: 41.2% and 30%, respectively.

Descriptive statistics for all outcomes and school and student variables included in the analysis are presented separately for eventually treated and never treated schools with grades 1-5, 6-9, and 10-12 in Table 4. It is important to highlight that comparisons between treated and untreated schools may lead to misleading interpretations if the existence of time trends before the program implementation is not taken into account. For instance, one may infer that the program increases dropout rates in all grade levels, which may not be true. Moreover, most school and student characteristics of the treated and untreated schools are statistically significantly different, so these characteristics are controlled for during the estimation process. Some student variables, such as race and area of residence are available only from 2005 to 2014 and from 2007 to 2014. To address the missing data problem, the mean values for the period 2005-2014 (2007-2014) were calculated and assigned to observations from 1999 to 2004 (1999 to 2005). Although not ideal, this imputation process was necessary to allow the use of relevant student characteristics.

Figures 1 to 4 show the educational outcomes evaluated in this study for treated and never treated schools for grades 1-5, 6-9, and 10-12. The average enrollment for eventually treated and never treated schools over the period 1999 to 2014 is presented in Figure 1.

[1] In 2006, some methodological changes were introduced in the school census format preventing the collection of many education outcomes. Estimates that include 2006 using imputation for the missing data are very similar to those presented in this paper and are available from the author upon request.

[2] In Brazil, schools may offer classes for more than one group of grades simultaneously. Considering the data used in this paper, there are 93,444 schools with students from grades 1-5. Among these schools, 52,797 offer both groups of grades 1-5 and 6-9, and 15,821 of these also offer classes for students in grades 10-12. Additionally, from the total of 59,712 schools with grades 6-9, 21,900 also have students in grades 10-12. Finally, of the 101,063 schools with panel data, 15,503 have simultaneously grades 1-5, 6-9, and 10-12.

Regardless of the level of schooling, the average enrollment decreased over time. The decline was larger in schools with grades 6-9, with reductions of 38.4% and 41.4% in treated and never treated schools, respectively. The average enrollment in treated schools with grades 1-5 and 6-9 is higher than in untreated schools (except in 1999 for schools with grades 6-9). In contrast, treated schools with grades 10-12 have lower average enrollment than never treated schools.

Figure 2 presents the grade promotion rates for eventually treated and never treated schools from 1999 to 2014. Treated schools in all grade levels have lower grade promotion rates than never treated ones. For both types of schools and all groups of grades, however, the grade promotion rates are higher in 2014 than in 1999. Schools with grades 1-5 had the largest increase in this outcome over the period 1999 to 2014, raising 23.1% in treated schools and 21% in never treated schools.

The repetition rates for treated and never treated schools are presented in Figure 3. Over the period 1999 to 2014, the repetition rates increased in both treated and never treated schools with grades 6-9 and 10-12. The increase was larger in the latter: 90.5% in treated schools and 54.7% in never treated schools. A reduction in repetition rates is observed, however, in schools with grades 1-5. The outcome decreased 44% and 53.2% in eventually treated and never treated schools, respectively. Figure 3 also shows that treated schools had higher repetition rates than never treated schools, especially after the program's implementation, suggesting that the program increased repetition in all grade levels.

Finally, Figure 4 shows the dropout rates for eventually treated and never treated schools. For both types of schools and all grade levels, the dropout rates decreased over time. Schools with grades 1-5 had the largest decline: 86.6% in treated schools and 84.2% in untreated schools. As can be seen in the figure, the dropout rates for treated schools are higher than for never treated schools in all grade levels and over the whole period of the analysis. After 2008, however, the outcomes for both types of schools with grades 10-12 got closer, suggesting that the program reduced dropout rate for those grade levels.

4. Empirical Strategy

This section explains how the impact of the *Mais Educação* Extended School Day Program on academic outcomes is estimated. In order to identify the effects of the program, this study relies on the assumption that, after controlling for school fixed effects, state-year fixed effects, initial school size-year fixed effects,[3] separate time trends for schools that eventually participate in the program and for schools that never participate, and 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 academic outcomes evaluated.

4.1 Estimation and Identification Strategies

[3] In Brazil, there are 27 states, which implies that the interaction between states and years generates 405 different fixed effects. To account for different levels of initial school size and to allow the program impact to be different over time due to changes in unobserved student and school characteristics that influence the impact, all regression estimates are also controlled for initial enrollment level-year fixed effects. All schools are classified in ten different categories according to their initial enrollment levels, and then these categories are interacted with years, which implies that each interaction between categories and years gets a fixed effect.

The estimation strategy presented in this section relies on a panel data approach with fixed effects to evaluate the impact of the *Mais Educação* Extended School Day Program on educational outcomes. Let Y_{ist} be an educational outcome (total 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 ($\boldsymbol{C}_{ist}$), school and teacher characteristics ($\boldsymbol{S}_{st}$), and whether a school is treated by the program at time t (P_{st}). The linear model at the individual level is given by:

$$Y_{ist} = \alpha + \boldsymbol{\beta}'\boldsymbol{C}_{ist} + \boldsymbol{\rho}'\boldsymbol{S}_{st} + \gamma P_{st} + \boldsymbol{\delta}'(\boldsymbol{C}_{ist} \times P_{st}) + \boldsymbol{\theta}'(\boldsymbol{S}_{st} \times P_{st}) + \varepsilon_{ist} \quad (1)$$

where α is a constant and ε_{ist} is an error term with mean zero.

Eq. (1) allows the impact of the program to vary by student and school characteristics. Most importantly, if one of the variables in $\boldsymbol{C}_{ist}$ is program participation, then the coefficient $\boldsymbol{\delta}$ on the interaction term corresponding to that variable gives the average impact of program participation (ATT), and γ measures spillover effects onto non-participants in schools with the program. The interaction terms $\boldsymbol{C}_{ist} \times P_{st}$, in turn, still capture differential impacts according to student characteristics and $\boldsymbol{S}_{st} \times P_{st}$ capture heterogeneous effects according to school characteristics.

4.1.1 School level estimation

The school level equation is obtained by summing Eq. (1) over all i:

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

where $Y_{st} = (1/N_{st})\sum_{i=1}^{N_{st}} Y_{ist}$; $\boldsymbol{C}_{st} = (1/N_{st})\sum_{i=1}^{N_{st}} \boldsymbol{C}_{\boldsymbol{ist}}$; $\varepsilon_{st} = (1/N_{st})\sum_{i=1}^{N_{st}} \varepsilon_{ist}$; and N_{st} is the number of students in school s at time t. In this aggregated school level estimation, redefining the $\boldsymbol{C}_{st}$ and $\boldsymbol{S}_{st}$ variables as deviations from their means implies that γ measures the average treatment effect (ATE) of the availability of program, and $\boldsymbol{\delta}$ and $\boldsymbol{\theta}$ estimate how different this effect is per student and school variables, respectively. Note that, when the outcome variable is enrollment, the school level equation is slightly different, since the left-hand side variable is total enrollment for school s at time t rather than the average enrollment. Therefore, when estimating the impact of the program on enrollment, the only difference is that $Y_{st} = \sum_{i=1}^{N_{st}} Y_{ist}$ rather than $Y_{st} = (1/N_{st})\sum_{i=1}^{N_{st}} Y_{ist}$.

The school census provides some student and school characteristics, but many other student and school variables are not provided. Thus, there may be unobserved variables that influence both academic outcomes (Y_{st}) and the program availability in a given school (P_{st}), such as student innate ability, parental preferences for schooling, and principal and teacher motivations, and thus are related to the error term. To see the implications of having unobserved variables for estimation, let $\boldsymbol{C}^*_{st}$ and $\boldsymbol{S}^*_{st}$ be unobserved student and school variables, respectively, while C_{st} and S_{st} now indicate only observed student and school variables, respectively. Eq. (2) can be modified to:

$$Y_{st} = \alpha + \boldsymbol{\beta}'\boldsymbol{C}_{st} + \boldsymbol{\beta}^{*\prime}\boldsymbol{C}^*_{st} + \boldsymbol{\rho}'\boldsymbol{S}_{st} + \boldsymbol{\rho}^{*\prime}\boldsymbol{S}^*_{st} + \gamma P_{st} + \boldsymbol{\delta}'(\boldsymbol{C}_{st} \times P_{st}) + \boldsymbol{\delta}^{*\prime}(\boldsymbol{C}^*_{st} \times P_{st}) + \boldsymbol{\theta}'(\boldsymbol{S}_{st} \times P_{st}) + \boldsymbol{\theta}^{*\prime}(\boldsymbol{S}^*_{st} \times P_{st}) + \varepsilon_{st}$$

$$= \alpha + \boldsymbol{\beta}'\boldsymbol{C}_{st} + \boldsymbol{\rho}'\boldsymbol{S}_{st} + \gamma P_{st} + \boldsymbol{\delta}'(\boldsymbol{C}_{st} \times P_{st}) + \boldsymbol{\theta}'(\boldsymbol{S}_{st} \times P_{st}) + [\boldsymbol{\beta}^{*\prime}\boldsymbol{C}^{*}_{st} + \boldsymbol{\rho}^{*\prime}\boldsymbol{S}^{*}_{st} + \boldsymbol{\delta}^{*\prime}(\boldsymbol{C}^{*}_{st} \times P_{st}) + \boldsymbol{\theta}^{*\prime}(\boldsymbol{S}^{*}_{st} \times P_{st}) + \varepsilon_{st}]$$
(2')

In Eq. (2') all unobserved variables, together with ε_{st}, are the overall error term. To obtain consistent estimates of Eq. (2') using OLS, one would have to assume that the terms in the brackets are uncorrelated with all observed student and school variables. This assumption, however, is very likely to fail. Therefore, to control for unobserved characteristics that affect the academic outcomes and may be correlated with program implementation and observed variables, this paper uses school fixed effects, state-year fixed effects, separate time trends for schools that eventually participate in the program and for schools that never participate, and initial enrollment level-year fixed effects.[4] Thus, the student and school unobserved characteristics are approximated by:

$$\boldsymbol{C}^{*}_{st} = \varphi_{c,s} + (\psi_{c,k} \times t) + \nu_{c,st}$$
$$\boldsymbol{S}^{*}_{st} = \varphi_{s,s} + (\psi_{s,k} \times t) + \nu_{s,st}$$
(3)

where $\varphi_{c,s}$ and $\varphi_{s,s}$ are school fixed effects, which pick up time invariant differences of schools and their students; $\psi_{c,k} \times t$ and $\psi_{s,k} \times t$ capture both year fixed effects that vary over states and over initial enrollment level and time trends that vary over school program's adoption (where *k* denotes state, school enrollment level, or program adoption); and $\nu_{c,st}$ and $\nu_{s,st}$ are error terms with means of zero.

Substituting Eq. (3) into Eq. (2'), the terms in brackets become:

$$\varphi_s + (\psi_k \times t) + \nu_{st} + \varphi_{s(P)}P_{st} + \left(\psi_{k(P)} \times t \times P_{st}\right) + (\nu_{st(P)} \times P_{st})$$
(4)

where $\varphi_s = \beta^{*\prime}\varphi_{c,s} + \rho^{*\prime}\varphi_{s,s}$, a school fixed effect; $\psi_k = \beta^{*\prime}\psi_{c,k} + \rho^{*\prime}\psi_{s,k}$, a state-year and initial enrollment level-year fixed effects and time trends for school program's adoption; $\nu_{st} = \beta^{*\prime}\nu_{c,st} + \rho^{*\prime}\nu_{s,st}$, an average of the deviation terms; $\varphi_{s(P)} = \delta^{*\prime}\varphi_{c,s} + \theta^{*\prime}\varphi_{s,s}$; $\psi_{k(P)} = \delta^{*\prime}\psi_{c,k} + \theta^{*\prime}\psi_{s,k}$; $\nu_{st(P)} = \delta^{*\prime}\nu_{c,st} + \theta^{*\prime}\nu_{s,st}$. Note that the $\varphi_{s(P)}$ term allows the school fixed effect to differ for schools with and without the program. It is used in the estimation only when the program is in operation. The $\psi_{k(P)}$ term represents state-year, initial enrollment level-year fixed effects, and time trends for school program's adoption that are in effect only when a school is operating the program. The term is important in the sense that it allows the program impact to be different over time, with different rates in each state and initial enrollment levels, due to changes in unobserved determinants of that impact.

Finally, the equation estimated in this paper is given by the substitution of Eq. (4) into Eq. (2'):

$$Y_{st} = \boldsymbol{\beta}'\boldsymbol{C}_{st} + \boldsymbol{\rho}'\boldsymbol{S}_{st} + \gamma P_{st} + \boldsymbol{\delta}'(\boldsymbol{C}_{st} \times P_{st}) + \boldsymbol{\theta}'(\boldsymbol{S}_{st} \times P_{st}) + [\varphi_s + (\psi_k \times t) + \nu_{st} + \varphi_{s(P)}P_{st} + \left(\psi_{k(P)} \times t \times P_{st}\right) + \left(\nu_{st(P)} \times P_{st}\right) + \varepsilon_{st}]$$
(2")

[4] School invariant and student invariant time fixed effects are not used since they are already captured by the state-year fixed effects.

Eq. (2") allows for estimation of the unbiased impact of the *Mais Educação* Extended School Day Program on educational outcomes and addresses the identification problem by controlling for school fixed effects, state-year and initial enrollment level-year fixed effects, separate time trends for schools that eventually participate in the program and for schools that never participate, and student and school observed characteristics. Therefore, after controlling for these fixed effects and observed variables, P_{st} is unlikely to be correlated with unobserved variables that determine the academic outcomes. Clustered standard errors at the school level were used for all specifications of Eq. (2").

Estimates of Eq. (2") can be made more flexible. For instance, the separate time trends for schools that eventually participate in the program and for schools that never participate need not be linear. In the case of the *Mais Educação* Extended School Day Program, the coefficients of Eq. (2") are still identified if quadratic and higher power trends are used.

5. Results

Estimates of the impact of the *Mais Educação* Extended School Day Program on (log) enrollment, grade promotion, repetition, and dropout rates, are presented in Tables 5 to 8. For each academic outcome and group of grades, two distinct specifications are estimated, the second one being the most complete by incorporating all school, teacher, and student characteristics. Both specifications control for school fixed effects, state-year and initial enrollment level-year fixed effects, and separate time trends for schools that eventually participate in the program and for schools that never participate. All estimates use clustered standard errors at the school level and the grade promotion, repetition, and dropout variables are measured in a 0-100 scale. In what follows, the discussion of the results will emphasize the most complete specification.

Table 5 reports the estimated results for (log) enrollment for schools with grades 1-5, 6-9, and 10-12. The estimates indicate that the program raises enrollment of grade 6-9 students by 1.7%. The impact is negative, however, for students in grades 1-5 and 10-12. The total enrollment was reduced by 0.2% in schools with grades 1-5 and by 1.5% in schools with grades 10-12. The estimates are not statistically significant in the first group, though. The negative effect for students in grades 10-12 should not be surprising since, in face of the longer school day, older students may decide to enroll in schools without the program and, consequently, with less hours of academic activities, to dedicate more time to working.

It is important to highlight that the negative impact for enrollment of students in grades 10-12 does not necessarily mean that those students are dropping out of school. Since the estimates compare schools with and without the program, the results may reflect that students in those grade levels are migrating from schools with longer school days to schools with less hours of classes. Similarly, the positive effect for students in grades 6-9 does not automatically imply that the enrollment in those grade levels are higher in the whole country due to the program. The only interpretation one may infer is that the program raised the enrollment of students in grades 6-9 in schools that implemented the longer school day, when compared to schools without the program. Moreover, one may not directly draw a relationship between the impact of the program on total enrollment and on dropout rates of the same year. The reason for that is because the enrollment variable available in the school census in a given year is defined as the sum of the enrollment in the previous year and the number of entering students, minus the number of students who dropped out or graduated in the previous year.

The impact of the program on grade promotion rates is presented in Table 6. The regression estimates suggest that the program is effective at raising the promotion for grade 6-9 students by 0.2 percentage points. In contrast, the program seems to reduce the grade

promotion for students in grades 1-5 by 0.1 percentage points, reflecting a small and marginally statistically significant negative effect of the extended school day program for those students. Although unexpected, this effect could be explained by the fact that the priority for the program's implementation is given to schools with a low Development Index of Basic Education, in which students have poor academic performance. Thus, in the presence of the program, students that already had low educational achievement may dedicate more time to activities other than academic ones, which prevents them from improving their academic outcomes.

Table 7 shows the results for repetition rates. The regression estimates indicate that the program increases repetition rates regardless of the grade level. The negative effect is highest for students in grades 6-9, for whom the program increases repetition by 0.3 percentage points. As previously mentioned, the program may worsen academic outcomes of students that already performed badly since they may have less time to dedicate to academic assignments if non-academic activities are developed in the extra time of schooling. Moreover, if less prepared teachers are hired to teach during the additional school time, students may be negatively affected by the worse classroom instructions.

Finally, the estimated effects of the program on the dropout rates are shown in Table 8. For all grade levels, the program seems to reduce dropout rates. Students in grades 6-9 benefited most from the program, with an impact of 0.5 percentage points. One possible reason for this effect is that the extended school day program may prevent students from dropping out by offering extracurricular activities that increases the interest and demand for school.

In order to check the validity of the results in Tables 5 to 8, a placebo test is conducted. The test was performed using data only from 1999 to 2007 and consists of in assigning the values of the treatment variable from the first year of the program (2008) to the year immediately before that, checking for any statistically significant effect. Ideally, one would not find any effect of the program placebo variable, since it would represent that unobserved changes prior to the treatment are not fully captured by the control variables. Table 9 shows the results for the placebo test for all grade levels and all outcomes. For grades 1-5, statistically significant effect at the 10% level is observed for the placebo program variable affecting repetition rate. The placebo program variable is also statistically significant at the 5% level for grades 6-9 when repetition and dropout rates are evaluated. Finally, three out of four coefficients in grades 10-12 are statistically significant, two at the 1% level and one at the 5% level of significance. Thus, the placebo test indicates that some results may be treated with caution, especially for grades 10-12.

6. Conclusion

This study aimed to estimate the impact of the Brazilian *Mais Educação* Extended School Day Program on the academic outcomes – specifically on total enrollment, grade promotion, repetition, and dropout rates – of students in grades 1-5, 6-9, and 10-12.

Using school census data and administrative data on program's implementation from 1999 to 2014, the results of this paper suggest that the Brazilian longer school day program is effective at reducing dropout rates for students in all grade levels. The program is also effective at raising the enrollment of students in grades 6-9, but reduces the enrollment of students in grades 10-12 in schools where the program is available. Moreover, the estimates indicate that the impact on grade promotion is positive for students in grades 6-9. It is

negative, however, for students in lower grades. Finally, the program seems to increase repetition rates for students in all grade levels.

The overall results of this study suggest that the extended school day program in Brazil has been effective at reducing dropout rates, but at the same time, it has increased repetition rates in all grade levels. It is possible that schools are adopting non-academic activities rather than academic ones, becoming more attractive for students and reducing dropping out. However, those activities may reduce the time students dedicate to homework which, ultimately, may increase repetition rates and reduce grade promotion. Therefore, while the findings of this paper indicate that the Brazilian extend school day program provides positive effects for some outcomes, especially for students in grades 6-9, they raise some concerns about the mechanisms through which the program has been implemented, since unexpected effects are observed in most outcomes evaluated. This means that school administrators and policy makers should take into account possible problems in the actual program design. Finally, further research, perhaps using a randomized control trial, would be useful to assess the impact of the Brazilian program and to provide better understanding of its impacts.

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Table 1 – Number of Schools Participating in the *Mais Educação* Extended School Day Program, 2008-2014

Years	Treated schools (all grade levels)	% of all schools
2008	1,380	0.55
2009	4,638	1.82
2010	9,661	3.72
2011	13,032	4.94
2012	28,075	10.47
2013	40,007	14.71
2014	50,874	18.41

Table 2 – Number of Schools in Brazil's School Census from 1999 to 2014

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)
(1)	(2)	(3)	(4)
1999	266,645	250,173	250,173
2000	261,988	246,601	177,104
2001	264,735	241,809	166,886
2002	256,986	237,292	157,350
2003	253,405	234,761	150,350
2004	248,257	233,266	144,845
2005	248,103	232,182	138,494
2007	237,387	233,704	126,506
2008	250,350	235,107	122,964
2009	255,445	236,584	118,345
2010	259,831	237,357	114,041
2011	263,833	238,092	110,670
2012	268,244	238,868	107,941
2013	272,049	239,453	104,356
2014	276,331	239,975	101,063

Table 3 – Total Number of Schools and Schools Participating in the *Mais Educação* Extended School Day Program After Balancing the Panel, 2008-2014

Years	Schools with grades 1-5			Schools with grades 6-9			Schools with grades 10-12		
	Total	Treated	%	Total	Treated	%	Total	Treated	%
2008	80,234	426	0.5	41,425	412	1.0	16,307	130	0.8
2009	79,852	1,715	2.1	41,774	1,345	3.2	16,431	367	2.2
2010	79,520	3,147	4.0	41,834	2,604	6.2	16,639	776	4.7
2011	79,252	5,067	6.4	41,829	4,209	10.1	16,803	1,164	6.9
2012	78,698	15,259	19.4	41,902	11,876	28.3	16,865	2,334	13.8
2013	78,086	25,388	32.5	41,972	17,444	41.6	16,911	3,133	18.5
2014	77,611	31,944	41.2	41,605	22,660	54.5	16,945	5,076	30.0

Table 4 – 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)	190.5	112.6	263.5	251.2	353.4	378.5
	(180.5)	(158.7)	(257.6)	(244.8)	(312.5)	(407.6)
Grade promotion rate (%)	80.8	82.9	79.4	86.7	76.7	83.6
	(15.3)	(18.5)	(13.8)	(13.6)	(12.9)	(13.1)
Repetition rate (%)	13.2	11.7	11.9	8.4	9.7	8.6
	(10.7)	(13.5)	(9.7)	(9.3)	(8.5)	(8.0)
Dropout rate (%)	5.9	5.3	8.7	4.9	13.6	7.8
	(8.8)	(10.0)	(10.0)	(9.3)	(11.0)	(9.7)
Geographic region (%)						
North	13.2	14.2	12.0	7.8	10.8	4.3
	(33.9)	(34.9)	(32.5)	(26.8)	(31.0)	(20.3)
Northeast	52.0	41.0	43.9	19.8	25.2	18.9
	(50.0)	(49.2)	(49.6)	(39.9)	(43.4)	(39.1)
South	12.0	14.6	16.0	23.4	18.7	19.5
	(32.4)	(35.3)	(36.6)	(42.3)	(39.0)	(39.6)
Central-West	5.4	4.7	7.5	8.0	10.4	7.1
	(22.6)	(21.2)	(26.3)	(27.1)	(30.5)	(25.7)
Southeast	17.4	25.5	20.7	41.0	34.9	50.2
	(37.9)	(43.6)	(40.5)	(49.2)	(47.7)	(50.0)
Rural (%)	48.8	62.5	38.7	21.7	10.9	3.7
	(50.0)	(48.4)	(48.7)	(41.2)	(31.2)	(18.9)
Electricity (%)	94.4	82.1	98.0	97.2	99.7	99.6
	(23.0)	(38.3)	(13.9)	(16.6)	(5.3)	(6.5)
Water (%)	97.3	96.0	98.3	99.1	99.6	99.5
	(16.2)	(19.5)	(13.0)	(9.7)	(6.2)	(7.0)
Sewage (%)	95.5	87.8	97.5	97.1	99.3	99.3
	(20.7)	(32.7)	(15.5)	(16.9)	(8.5)	(8.1)
Offers meal (%)	98.6	85.1	98.4	69.9	97.4	59.9
	(11.9)	(35.6)	(12.7)	(45.9)	(15.8)	(49.0)
Class size (units)	23.6	18.9	27.0	26.4	32.1	31.6
	(9.6)	(11.9)	(8.8)	(9.3)	(8.6)	(9.6)
Library (%)	34.1	29.5	52.5	67.3	73.7	78.1
	(47.4)	(45.6)	(49.9)	(46.9)	(44.0)	(41.4)
Computer lab (%)	28.6	24.4	44.4	59.8	68.9	78.6
	(45.2)	(43.0)	(49.7)	(49.0)	(46.3)	(41.0)
Science lab (%)	5.7	10.8	14.7	35.9	38.4	55.4
	(23.2)	(31.1)	(35.4)	(48.0)	(48.6)	(49.7)
Computer (units)	5.1	6.1	8.3	16.0	14.0	24.9
	(14.7)	(20.8)	(17.5)	(30.7)	(16.1)	(41.2)
Internet (%)	31.2	30.3	43.2	62.4	65.7	79.6
	(46.3)	(46.0)	(49.5)	(48.4)	(47.5)	(40.3)
Teacher with college degree (%)	41.2	39.2	71.4	81.8	89.5	92.7
	(39.1)	(41.0)	(36.0)	(30.1)	(21.3)	(16.4)
Student variables						
Female (%)	46.6	46.6	49.5	49.0	53.8	53.0
	(6.1)	(9.6)	(6.9)	(8.7)	(7.1)	(7.7)
White (%)	18.8	25.0	17.0	30.0	24.9	32.5
	(21.3)	(27.5)	(20.9)	(28.3)	(24.9)	(27.7)
Black (%)	3.8	3.1	3.1	2.2	3.0	2.2
	(6.9)	(7.2)	(6.1)	(4.8)	(4.9)	(3.9)
Pardo (%)	36.0	31.9	28.7	20.6	24.6	18.9
	(26.5)	(28.4)	(24.8)	(22.7)	(21.9)	(20.2)
Yellow (%)	0.5	0.5	0.6	0.5	0.8	0.6
	(2.6)	(2.7)	(2.9)	(2.5)	(3.4)	(2.3)
Indigenous (%)	0.7	1.5	0.6	1.2	0.8	0.5
	(6.3)	(10.7)	(5.8)	(9.2)	(6.7)	(4.8)
Non-declared skin color (%)	40.2	37.9	50.1	45.4	45.9	45.3
	(32.5)	(33.2)	(34.6)	(35.3)	(34.9)	(34.4)
Lives in rural area (%)	6.7	8.1	5.8	3.6	3.1	1.6
	(24.2)	(26.8)	(22.1)	(17.4)	(14.1)	(9.4)
Observations	503,800	702,647	310,156	276,572	69,439	161,041
Number of schools	33,587	46,843	20,677	18,438	4,629	10,736

Notes: Standard deviations in parentheses.

Table 5 – Estimates of the Program Impact on Log of Enrollment: Results for Schools with Grades 1-5, 6-9 and 10-12, 1999-2014

Variables	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program adoption	-0.010***	-0.002	0.028***	0.017***	-0.021**	-0.015*
	(0.004)	(0.003)	(0.004)	(0.003)	(0.009)	(0.008)
School variables						
Rural		-0.062***		-0.050***		-0.027*
		(0.006)		(0.007)		(0.015)
Electricity		-0.040***		0.010		0.034
		(0.004)		(0.009)		(0.041)
Water		0.021***		0.015**		-0.029
		(0.004)		(0.007)		(0.027)
Sewage		-0.002		0.018***		0.005
		(0.004)		(0.007)		(0.016)
Offers meal		0.010***		0.018***		0.001
		(0.003)		(0.004)		(0.005)
Class size		0.012***		0.030***		0.024***
		(0.000)		(0.000)		(0.001)
Library		0.012***		0.006***		0.014***
		(0.002)		(0.002)		(0.004)
Computer lab		-0.011***		-0.006**		0.072***
		(0.002)		(0.002)		(0.004)
Science lab		0.009**		-0.001		0.027***
		(0.004)		(0.003)		(0.004)
Computer		0.001***		0.001***		0.000***
		(0.000)		(0.000)		(0.000)
Internet		0.046***		0.021***		0.041***
		(0.002)		(0.002)		(0.004)
Teacher with college		-0.014***		-0.025***		0.013
		(0.002)		(0.004)		(0.009)
Student variables						
Female		0.141***		-0.027*		0.041
		(0.012)		(0.016)		(0.031)
Black		0.045***		0.058**		0.059
		(0.015)		(0.023)		(0.044)
Pardo		-0.029***		-0.002		0.016
		(0.007)		(0.009)		(0.015)
Yellow		-0.042		-0.010		0.014
		(0.027)		(0.035)		(0.055)
Indigenous		-0.004		0.033		0.050
		(0.017)		(0.028)		(0.069)
Non-declared skin color		-0.024***		0.002		0.010
		(0.005)		(0.005)		(0.009)
Lives in rural area		0.069***		0.111***		0.090***
		(0.004)		(0.005)		(0.011)
Observations	1,205,726	836,948	582,397	536,662	229,830	225,983
R-squared	0.911	0.915	0.913	0.924	0.904	0.917
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 6th power are used.

Table 6 – Estimates of the Program Impact on Grade Promotion Rate: Results for Schools with Grades 1-5, 6-9 and 10-12, 1999-2014

Variables	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program adoption	-0.140**	-0.124*	0.209**	0.162*	0.189	0.058
	(0.069)	(0.066)	(0.092)	(0.089)	(0.191)	(0.190)
School variables						
Rural		-0.014		0.148		-0.012
		(0.132)		(0.171)		(0.355)
Electricity		2.022***		1.228***		0.607
		(0.138)		(0.285)		(1.212)
Water		-0.970***		-0.005		-0.196
		(0.148)		(0.202)		(0.686)
Sewage		0.455***		0.399*		0.317
		(0.134)		(0.207)		(0.454)
Offers meal		-0.017		-0.134		-0.268**
		(0.090)		(0.089)		(0.106)
Class size		-0.070***		-0.142***		-0.133***
		(0.002)		(0.005)		(0.007)
Library		0.141***		0.195***		-0.272***
		(0.040)		(0.052)		(0.083)
Computer lab		0.518***		0.675***		0.489***
		(0.040)		(0.050)		(0.086)
Science lab		-0.442***		-0.031		0.041
		(0.064)		(0.064)		(0.081)
Computer		-0.006***		-0.001		0.005***
		(0.001)		(0.001)		(0.001)
Internet		-0.824***		0.274***		0.582***
		(0.041)		(0.051)		(0.087)
Teacher with college		0.530***		-0.157		-0.067
		(0.058)		(0.098)		(0.210)
Student variables						
Female		5.108***		7.934***		10.434***
		(0.274)		(0.338)		(0.476)
Black		-2.030***		-4.149***		-2.363**
		(0.464)		(0.626)		(1.099)
Pardo		-0.069		-1.265***		-1.608***
		(0.185)		(0.224)		(0.333)
Yellow		2.121**		-0.592		1.630
		(0.840)		(0.839)		(1.279)
Indigenous		0.080		0.895		-2.233
		(0.856)		(1.070)		(2.467)
Non-declared skin color		-0.506***		-0.789***		-1.239***
		(0.116)		(0.131)		(0.182)
Lives in rural area		-1.996***		-0.168		-0.282
		(0.096)		(0.136)		(0.287)
Observations	1,201,584	834,429	579,925	534,782	227,617	223,926
R-squared	0.620	0.699	0.619	0.644	0.675	0.682
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 effect of a one percentage point increase in an explanatory variable on the dependent variable, since the latter was multiplied by 100. [1] Time trends from the 1st to the 6th power are used.

Table 7 – Estimates of the Program Impact on Repetition Rate: Results for Schools with Grades 1-5, 6-9 and 10-12, 1999-2014

Variables	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program adoption	0.257***	0.216***	0.333***	0.299***	0.239*	0.244*
	(0.055)	(0.053)	(0.072)	(0.071)	(0.144)	(0.143)
School variables						
Rural		-0.056		-0.142		-0.277
		(0.100)		(0.125)		(0.242)
Electricity		-1.129***		-0.082		0.484
		(0.114)		(0.173)		(0.668)
Water		0.765***		0.012		-0.655
		(0.122)		(0.154)		(0.617)
Sewage		-0.168		0.017		-0.905***
		(0.111)		(0.146)		(0.345)
Offers meal		0.046		-0.004		0.572***
		(0.068)		(0.064)		(0.076)
Class size		0.031***		0.054***		0.025***
		(0.002)		(0.003)		(0.004)
Library		-0.089***		0.058		0.067
		(0.031)		(0.039)		(0.059)
Computer lab		-0.275***		0.051		0.660***
		(0.030)		(0.038)		(0.059)
Science lab		0.186***		-0.093*		0.121**
		(0.047)		(0.049)		(0.058)
Computer		0.003***		-0.001**		-0.005***
		(0.001)		(0.001)		(0.001)
Internet		0.515***		-0.019		0.522***
		(0.031)		(0.039)		(0.058)
Teacher with college		-0.282***		0.986***		0.678***
		(0.047)		(0.071)		(0.128)
Student variables						
Female		-3.876***		-3.918***		-4.569***
		(0.222)		(0.248)		(0.317)
Black		0.055		0.489		-1.629**
		(0.389)		(0.456)		(0.778)
Pardo		0.111		0.209		0.520**
		(0.156)		(0.175)		(0.247)
Yellow		-0.954		0.179		0.095
		(0.677)		(0.613)		(0.847)
Indigenous		-0.199		-0.140		-0.198
		(0.756)		(0.705)		(1.742)
Non-declared skin color		0.392***		0.308***		0.196
		(0.100)		(0.110)		(0.146)
Lives in rural area		1.758***		-0.224**		0.900***
		(0.084)		(0.111)		(0.223)
Observations	1,201,584	834,429	579,925	534,782	227,617	223,926
R-squared	0.496	0.601	0.519	0.543	0.529	0.530
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 effect of a one percentage point increase in an explanatory variable on the dependent variable, since the latter was multiplied by 100. [1] Time trends from the 1st to the 6th power are used.

Table 8 – Estimates of the Program Impact on Dropout Rate: Results for Schools with Grades 1-5, 6-9 and 10-12, 1999-2014

Variables	Grades 1-5		Grades 6-9		Grades 10-12	
	(1)	(2)	(1)	(2)	(1)	(2)
School program adoption	-0.117***	-0.092**	-0.542***	-0.461***	-0.427***	-0.302**
	(0.038)	(0.036)	(0.061)	(0.057)	(0.155)	(0.154)
School variables						
Rural		0.070		-0.006		0.289
		(0.092)		(0.122)		(0.314)
Electricity		-0.893***		-1.146***		-1.091
		(0.093)		(0.244)		(1.002)
Water		0.205**		-0.007		0.850
		(0.097)		(0.137)		(0.535)
Sewage		-0.287***		-0.416**		0.588
		(0.090)		(0.164)		(0.369)
Offers meal		-0.029		0.139**		-0.304***
		(0.064)		(0.065)		(0.087)
Class size		0.040***		0.088***		0.108***
		(0.002)		(0.004)		(0.006)
Library		-0.052**		-0.252***		0.205***
		(0.025)		(0.037)		(0.068)
Computer lab		-0.243***		-0.725***		-1.149***
		(0.022)		(0.034)		(0.070)
Science lab		0.256***		0.125***		-0.162**
		(0.036)		(0.042)		(0.065)
Computer		0.003***		0.002***		0.001
		(0.000)		(0.000)		(0.001)
Internet		0.309***		-0.255***		-1.104***
		(0.023)		(0.035)		(0.073)
Teacher with college		-0.249***		-0.830***		-0.611***
		(0.034)		(0.071)		(0.176)
Student variables						
Female		-1.232***		-4.016***		-5.866***
		(0.177)		(0.257)		(0.369)
Evening class		1.976***		3.660***		3.991***
		(0.313)		(0.461)		(0.901)
Black		-0.042		1.056***		1.088***
		(0.112)		(0.150)		(0.254)
Pardo		-1.167**		0.414		-1.725*
		(0.502)		(0.597)		(1.031)
Yellow		0.119		-0.754		2.431
		(0.471)		(0.866)		(1.986)
Indigenous		0.114*		0.481***		1.043***
		(0.064)		(0.076)		(0.127)
Non-declared skin color		0.239***		0.392***		-0.618***
		(0.048)		(0.084)		(0.237)
Lives in rural area		-1.232***		-4.016***		-5.866***
		(0.177)		(0.257)		(0.369)
Observations	1,201,584	834,429	579,925	534,782	227,617	223,926
R-squared	0.476	0.558	0.589	0.611	0.651	0.658
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 effect of a one percentage point increase in an explanatory variable on the dependent variable, since the latter was multiplied by 100. [1] Time trends from the 1st to the 6th power are used.

Table 9 – Placebo Test: Estimates of the Program Impact for Schools with Grades 1-5, 6-9 and 10-12, 1999-2007 (Schools with Program in 2008 Assigned to 2007)

Variables	Grades 1-5	Grades 6-9	Grades 10-12
Dependent variable: log enrollment			
Program adoption (placebo)	-0.015	0.009	0.094**
	(0.021)	(0.019)	(0.041)
Observations	473,960	263,966	112,187
R-squared	0.942	0.943	0.930
Control variables	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
Dependent variable: grade promotion rate			
Program adoption (placebo)	-0.531	-0.154	-3.737***
	(0.451)	(0.553)	(1.029)
Observations	472,498	262,895	110,500
R-squared	0.718	0.698	0.698
Control variables	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
Dependent variable: repetition rate			
Program adoption (placebo)	0.673*	1.171**	-0.102
	(0.374)	(0.472)	(0.763)
Observations	472,498	262,895	110,500
R-squared	0.632	0.579	0.552
Control variables	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
Dependent variable: dropout rate			
Program adoption (placebo)	-0.142	-1.017**	3.839***
	(0.329)	(0.428)	(0.987)
Observations	472,498	262,895	110,500
R-squared	0.583	0.680	0.686
Control variables	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 effect of a one percentage point increase in an explanatory variable on the dependent variable, since the latter was multiplied by 100 (except log enrollment). [1] Time trends from the 1st to the 6th power are used.

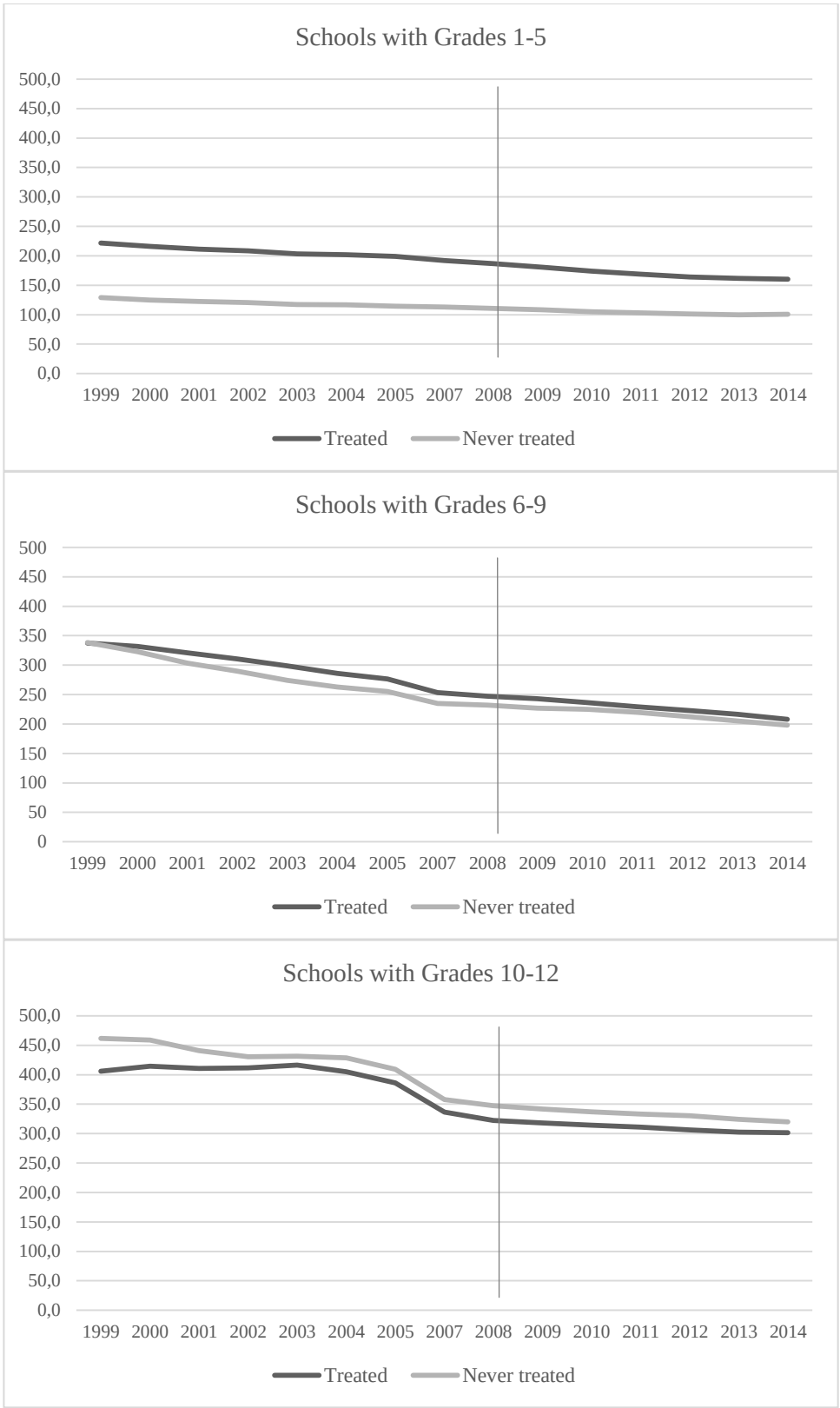

Figure 1 – Average Enrollment for Schools with Grades 1-5, 6-9, and 10-12, 1999-2014

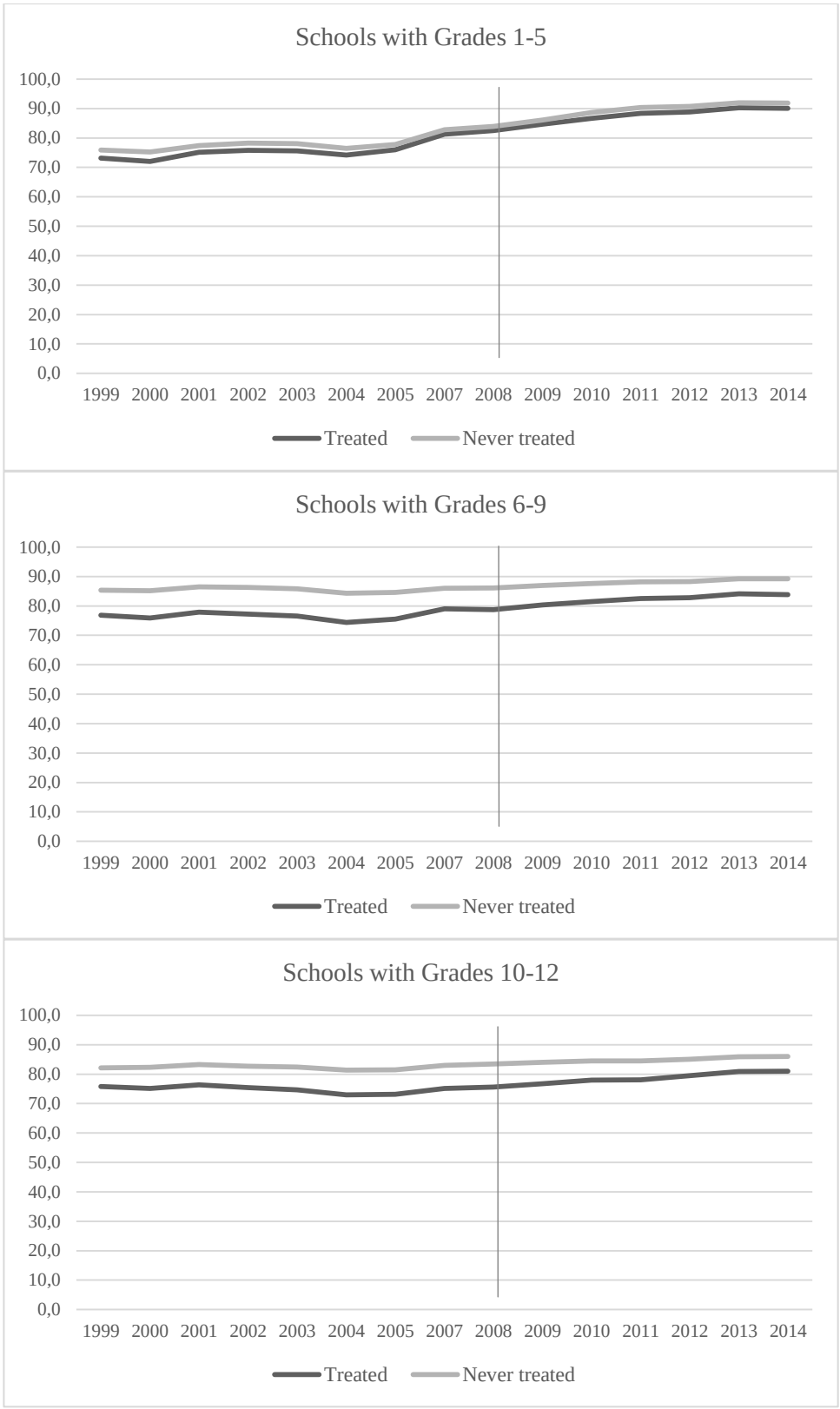

Figure 2 – Grade Promotion Rates for Schools with Grades 1-5, 6-9, and 10-12, 1999-2014

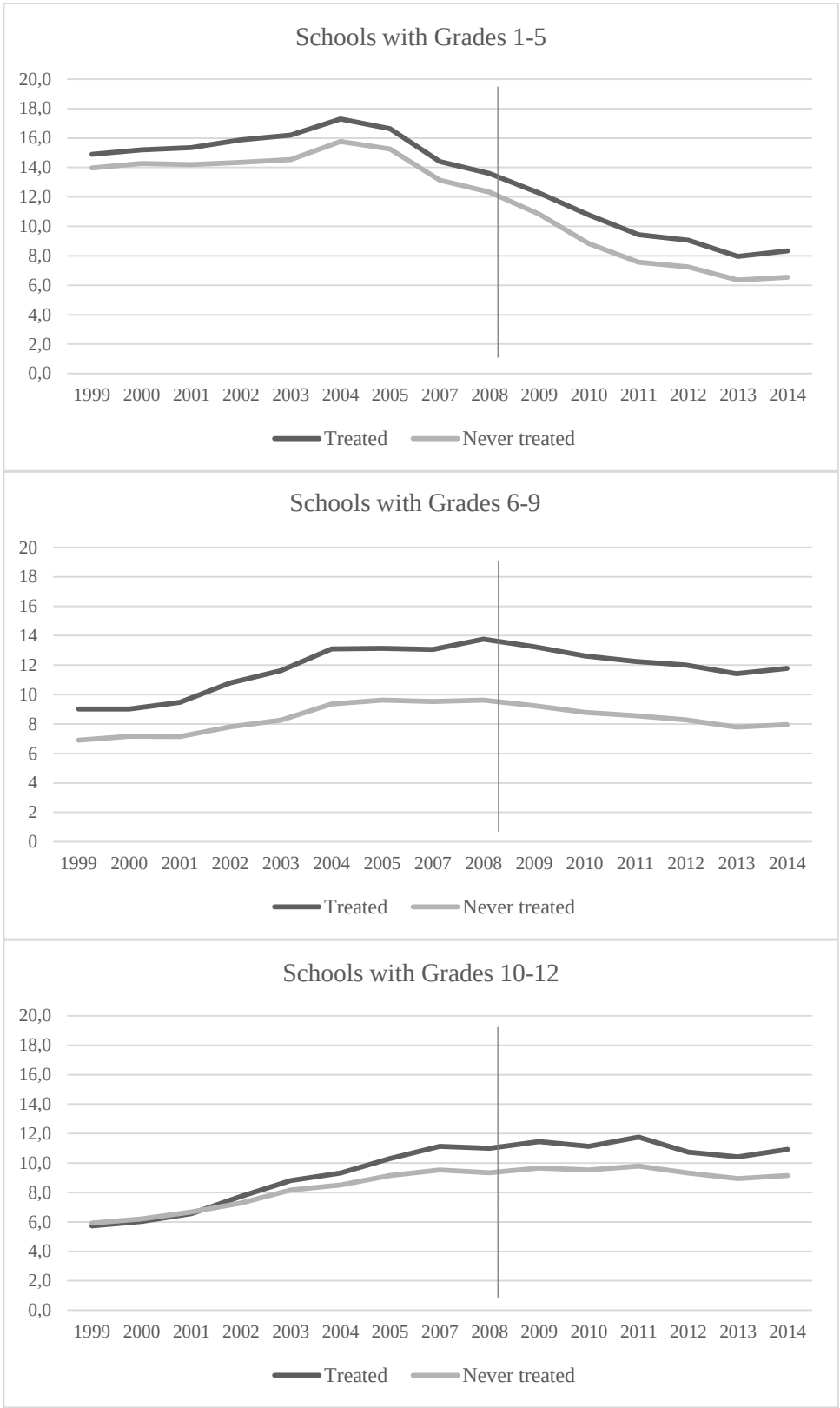

Figure 3 – Repetition Rates for Schools with Grades 1-5, 6-9, and 10-12, 1999-2014

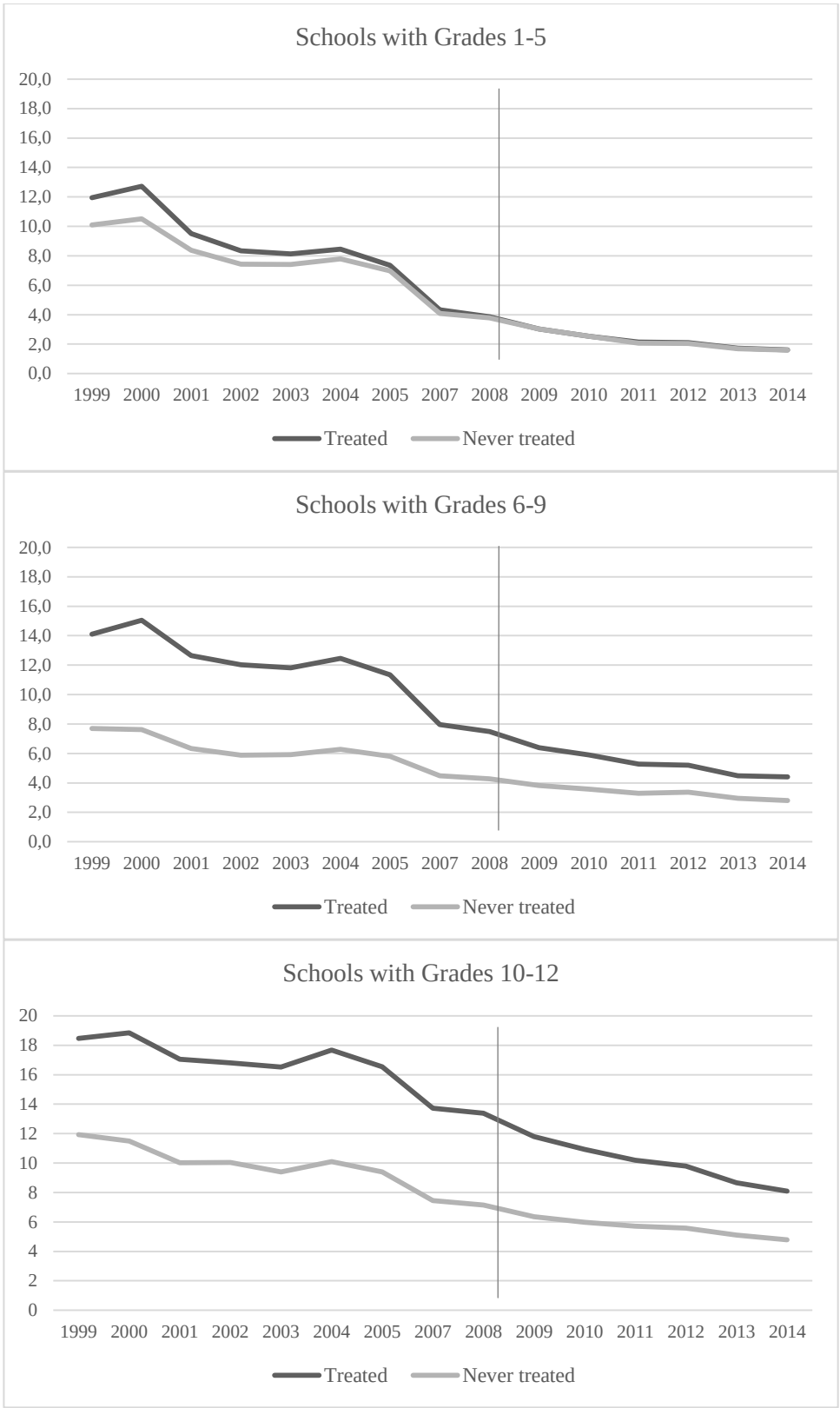

Figure 4 – Dropout Rates for Schools with Grades 1-5, 6-9, and 10-12, 1999-2014