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The Impact of Automatic Progression on Educational Outcomes: An Instrumental Variable Approach

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Abstract

In Brazil, schools run by the States, municipalities and private schools coexist in most cities. This paper examines the impact of the automatic progression policies adopted in Brazilian schools on dropout rates and test scores at the municipality level, considering the endogeneity of the adoption and its impact on the other schools in the same municipality. We explore the fact that State schools tend to follow State policy recommendations and use the share of students in State schools with automatic progression in the other municipalities of the same State as an instrumental variable to automatic progression adoption in each municipality. We find that automatic progression positively impacts average test scores, in contrast with previous literature.

JEL: I28, I21, C26

Key-Words: Automatic Progression, Drop-out Rates, Test scores

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1. Introduction

Despite a consistent reduction from the 1980s onwards, the grade repetition rate is still high in Brazil (Vargas, 2020). In the mid-2000s, the share of students repeating grades in middle school was 4.3% worldwide, 11.6% in Latin America and the Caribbean, and 21% in Brazil (UIS, n.d.). The grade repetitions system was originally designed to improve the learning of students who do not reach a certain learning level, exposing them again to the content and providing additional time for them to catch up with other students (Koppensteiner, 2014). Recent reviews of the literature conclude that grade repetitions have negative effects on school progression and uncertain effects on performance.[3]

The high repetition problem in Brazil was addressed in the end of the 20th century through the implementation of automatic progression systems in elementary education, starting in 1996. In Brazil, State, municipal and private schools can coexist in the same municipality. While schools have some freedom to choose, the decision to adopt automatic progression in State schools is generally made by the State education authority, which is responsible for all State schools of its network (Koppensteiner, 2014).

In this paper we explore this institutional feature of the Brazilian school system to evaluate the effects of the share of students subject to the automatic progression system in the Brazilian municipalities on dropout and test scores using an instrumental variable strategy. In Brazil, schools run by the States, municipalities and private schools coexist in most cities. This paper examines the impact of the automatic progression policies adopted in Brazilian schools on dropout rates and test scores at the municipality level, considering the endogeneity of the adoption and its impact on the other schools in the same municipality. We explore the fact that State schools tend to follow State policy recommendations and use the share of students in State schools with automatic progression in the other municipalities of the same State as an instrumental variable to automatic progression adoption in each municipality.

[3] Jimerson (2001) review the papers published in the 1990s, and Valbuena *et al*. (2021) review only the papers that tried to estimate causal impacts published between 2000 and 2020. Both reviews conclude that the available evidence fail to show that grade retention policies have more benefits than the promotion to the next grade. Moreover, a small but growing literature estimates causal effect of retention on subsequent educational outcomes (see Manacorda, 2012)

The identification assumption we require is that the State recommendation for the adoption of automatic progression only affects the student performance in the municipality through increasing the probability that the State schools in the municipality will also adopt this policy, conditional on municipality fixed-effects and State-specific linear trends. While this hypothesis is not testable, we can assess if this instrument impacts the share of students in schools with automatic progression in municipalities that do not have State schools, as it would be the case if automatic progression policies were driven by correlated shocks across municipalities within each State. We find that there is no impact of the instrumental variable on the explanatory variable in these cases. The main result of the paper is that the automatic progression policy reduces dropout and increase test scores in the municipalities.

Our paper contributes to the branch of the literature that examines the effects of automatic progression policies on learning outcomes. Koppensteiner (2014) assesses the impact of the automatic progression policy among public primary schools in Brazil, reporting negative effects on repetition rates and on test scores using a difference-in-differences approach with school-level data. Namen (2019) finds that cohorts of high school students more exposed to social promotion in Colombia have a lower dropout rate, but also have lower math and language scores. Rodriguez-Segura (2020) finds that while a social progression policy on the first grade of primary school in Costa Rica reduced retentions among students in the first grade, it also increased retention in subsequent grades. On the other hand, Ahsan, Banerjee and Hari (2018) use a difference-in-differences design to conclude that a social promotion policy increased reading and math scores in India. We contribute to this literature by using a different identification strategy that allows us to control for time-varying municipal-level shocks that might be correlated with the schools' decision to adopt automatic progression.

The rest of the paper has three sections. In the second section, we describe our data and econometric methodology. In the third section, we show our results and the fourth section concludes.

2. Data and Methodology

We use a panel of Brazilian municipalities between 2009 and 2017 totaling 4.667 observations in each year.[4] Data on school-level average failure and dropout rates, adoption of automatic progression policy, school infrastructure, student and teacher socio-economic background come from the annual Brazilian School Census. We collect data from public and private middle schools and select only municipalities with at least one school with middle school classes. We complement this dataset with information from mathematics and Portuguese language test scores in 9th grades of elementary school in all public schools with at least 20 students in the class from the National School Performance Assessment (*Prova Brasil*). This assessment uses Item Response Theory (IRT) for item calibration to position every student in a unique scale, making results comparable over time and among different grades (Brazil, 2014; Klein, 2009).

Table 1 displays descriptive statistics of our outcomes. While the mean repetition rate during middle school is 11,8%, average dropout rate is 4,5%. Is worth noting that the repetition rate can reach 60% in some municipalities. Dropout rates varies from 0% to 50%. The mean (sd) score in language is 241 (18), while in math scores is 247 (18).

Table 1 – Descriptive Statistics

	Mean	SD	Min.	Max.
Repetition Rate	0.118	0.073	0.00	0.60
Dropout Rate	0.045	0.042	0.00	0.50
Portuguese Score	241	18.2	168	305
Mathematics Score	247	19.4	188	340

Note – Data from panel of Brazilian municipalities from 2009 to 2017.

In Brazil, State, municipal and private schools can coexist in the same municipality. The public education authorities (municipal, State and federal) have administrative autonomy, so that the initiatives and policies implemented in one of the networks do not directly affect the others. After automatic progression is recommended by the State education authority, each State school has the possibility of adopting it or opting out. The data show that, while most of State schools follow the same pattern, there are State schools that adopt automatic progression in States that have never passed any recommendation about

[4] As the municipalities undergo territorial changes over time, we collapsed our data panel to Minimum Comparable Areas (MCA, henceforth municipality).

the policy. Thus, in each municipality, the proportion of schools that adopt the automatic progression system may respond to time-varying shocks to the school and to the municipality itself, such as past school performance or repetition rates.

We deal with this possible endogeneity by exploring the role played by the State education authority. We instrument the proportion of enrollments in schools with automatic progression in each municipality with the proportion of State school enrollments in schools with automatic progression in all other municipalities in the same State. To make the setup clearer, consider the following notation. In each municipality i and year t, the overall share of enrollments in schools with automatic progression (ap_{it}) can be decomposed into the share with automatic progression within each type of schools (State, s, municipal, m, or private, p) and the share of enrollments in each school type, according to:

$$ap_{it} = s_{it}^{s} \times ap_{it}^{s} + s_{it}^{m} \times ap_{it}^{m} + s_{it}^{p} \times ap_{it}^{p} \qquad (1)$$

where s_{it}^{j} is the share of the total enrollments in schools of type $j \in \{s, m, p\}$ and ap_{it}^{j} is the share of the enrollments in type j schools with automatic progression. [5] Thus, ap_{it} depends on the decisions of schools of different administrative dependencies to adopt automatic progression (ap_{it}^{j}) and local competition for students among the school networks (s_{it}^{j}). Both sets of terms depend on municipality-specific factors and dynamics, which might be correlated with the transition rates of the educational system and with students' past performance in national exams.

Policies for automatic progression at the State-level would directly affect ap_{it}^{s}, but they could also indirectly affect the other terms of equation 1 through competition between schools. Even if a change of policy at State-level were homogenous for all the municipalities (e.g., a change in ap_{it}^{s} from 0 to 1, for all i), it would affect each municipality differently, as s_{it}^{s} act as a weight and it varies across municipalities. However, as the choice of adherence to the automatic progression policy is school-

[5] There are also federal schools of basic education, but for simplicity we do not take them into account in our analysis. These schools have significantly lower failure and dropout rates than other schools, so there is little need for automatic approval policies. Besides that, their share in the total enrollments is extremely low (about 0.12% yearly).

specific even among State schools, ap_{it}^{s} may also be responding to local factors and dynamics.

To deal with the possible endogeneity of pc_i, for each municipality i in year t, we use as instrumental variable:

$$p_{-it} = \frac{\sum_{j \neq i} AEnroll_{jt}^{s}}{\sum_{j \neq i} Enroll_{jt}^{s}} \quad (2)$$

where $AEnroll_{jt}^{s}$ represents the number of enrollments in State schools with automatic progression in municipality j and year t, and $Enroll_{jt}^{s}$ is the number of enrollments in State schools in municipality j and year t. As such, p_{-it} measures the share of students in State schools with automatic progression in the other municipalities of the same State. Systematic increases in variable p_{-it} reflect a recommendation of the State secretary of education for the adoption of automatic progression policy. In addition, it is expected that the number of other State schools that adopt the policy will put pressure for the adoption on the schools that have not yet done so. Because of this, p_{-it} can be seen as exogenous to municipality-specific factors determining performance.

In other words, our identification assumption is that the State recommendation for the adoption of automatic progression only affect student performance in the municipality through increasing the probability that the State schools in the municipality will also adopt this policy, conditional on municipality fixed-effects and State-specific linear trends. This hypothesis is not testable, but we can assess its plausibility by testing whether p_{-it} impacts the share of students in schools with automatic progression in municipalities that do not have State schools. If this were the case, p_{-it} would be capturing other State-level changes that impact all municipalities in the same State.

The equation that will be taken to the data is:

$$y_{it} = \beta_0 + \beta ap_{it} + X_{it}'\delta + \alpha_i + \gamma_k \times t + \varepsilon_{it} \quad (3)$$

where y_{it} is the outcome variable in municipality i and year t, X_{it} is a vector of controls, which include municipal averages of socioeconomic characteristics of students (ethnicity, sex, living in rural areas, availability of school public transportation), teachers (gender, ethnicity, education) and municipal GDP, a_i are municipality fixed-effects, γ_k is a State level dummy, t is a linear time trend, and ε_{it} is the error term. As our instrument is defined at the State level, we further control for State level linear trends to account for possible

endogenous State-level responses to dependent variable downturns that might confound with automatic progression policies.

3. Results

3.1 Descriptive Results

We show a brief overview of descriptive statistics to have a better idea of the evolution of the enrollments among administrative dependencies in Brazil in recent years. Table 2 shows the mean share of middle school enrollments in state schools. We observe that the mean share decreases from 55% in 2009 to 49% in 2017, which means a relative reduction of the importance of state schools.

Table 2 – Mean Share of Enrollments in State Schools

Year	%
2009	55.0%
2010	54.3%
2011	53.7%
2012	52.5%
2013	51.6%
2014	50.8%
2015	50.2%
2016	49.8%
2017	49.1%

Note – Data from panel of Brazilian municipalities from 2009 to 2017.

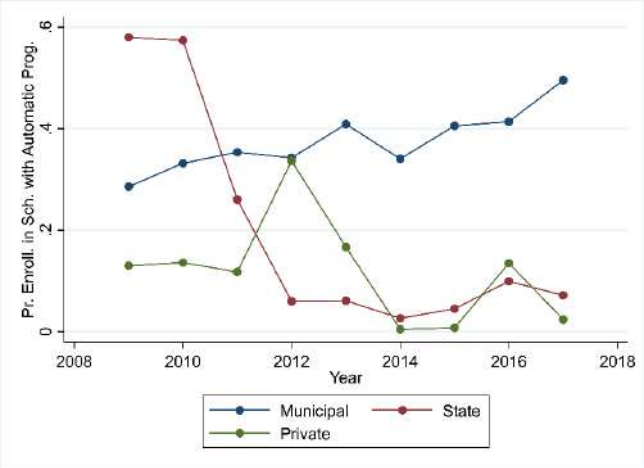
We also show the evolution of the average proportion of enrollments in schools with automatic progression in Figure 1, for a selected state in each Brazilian geographic region and for each school network (municipal, state and private). The selected states are Amazonas in the North region, Rio Grande do Norte in the Northeast region, São Paulo in the Southeast region, Santa Catarina in the South region and Mato Grosso in the Midwest region. Overall, we observe a diversity of patterns across states with respect to the proportion of enrollments in schools with automatic progression. Private schools have greater variations and fluctuations in the proportion in the period. In the states of Amazonas, Rio Grande do Norte and Santa Catarina, respectively in panels (a), (b) and (d), state schools show a pattern of reduction in proportion for most of the period. In the state of Amazonas, there is a strong reduction in the period, especially between 2010 and 2012 (from 57% to 6%), and a gradual increase in municipal schools (from 28% to 49%). In the state of Rio Grande do Norte, after an increase in the proportions at the beginning of

the period (from 7% to 12%), we observed a gradual reduction among state schools and a relative stability among municipal schools until 2016. Between 2016 and 2017, there is a strong growth in the proportions in the three school networks, reaching 39%, 35% and 17% respectively in municipal, state and private schools. In the state of Santa Catarina, we observe that the proportions in the three networks are generally comparatively smaller (ranging between 1% and 21% in the period).

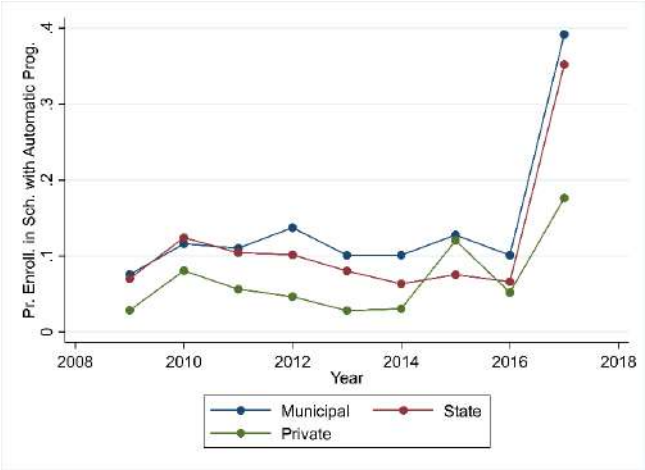
In the states of São Paulo and Mato Grosso, respectively in panels (c) and (e), state schools have the highest proportions of enrollments in schools with automatic progression among the school networks, close to one, and with relative stability over the period. In São Paulo, municipal and private schools show a strong reduction in the proportions between 2009 and 2012, a slow growth between 2012 and 2016, and a strong growth between 2016 and 2017. In Mato Grosso, the proportions among municipal and private networks are comparatively smaller and show relative stability in the period.

Figure 1 – Average Proportion of Enrollments in Schools with Automatic Progression by School Network in Selected States

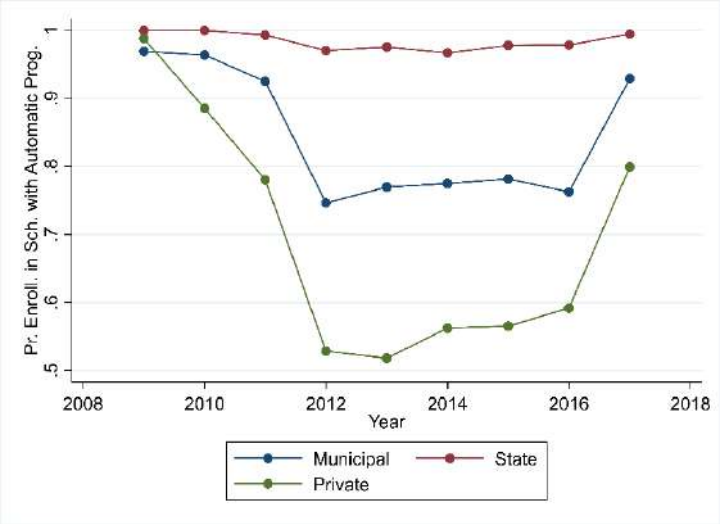
a) Amazonas



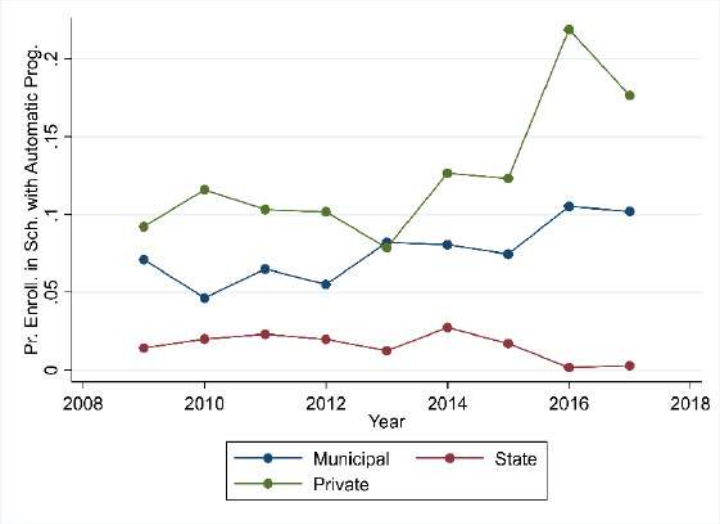
b) Rio Grande do Norte


Pr. Enroll. in Sch. with Automatic Prog.
0
.1
.2
.3
.4
2008
2010
2012
2014
2016
2018
Year
Municipal
State
Private

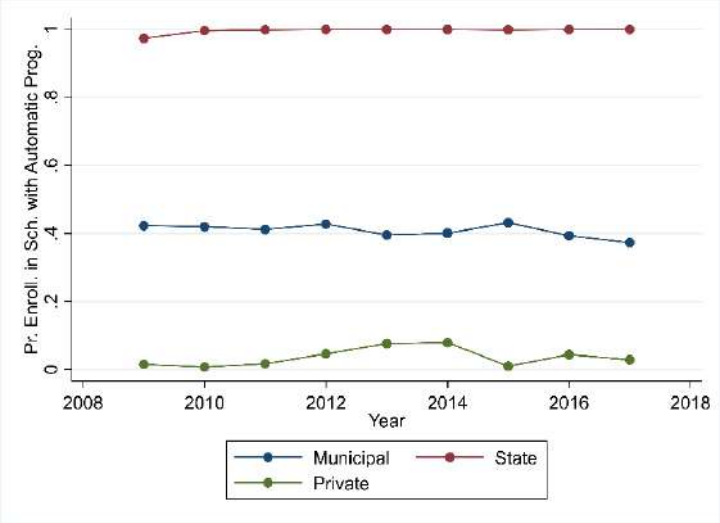
c) São Paulo



d) Santa Catarina



e) Mato Grosso



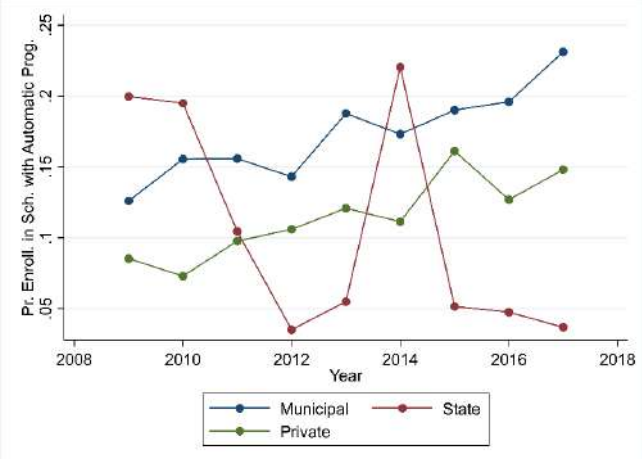
Note - Data from panel of Brazilian municipalities from 2009 to 2017.

Figure 2 shows the proportion of enrollments in schools with automatic progression by Brazilian region. In the North, Northeast and South regions, respectively in panels (a), (c) and (d), the proportions among municipal and private schools increase in the period. In the North region, that proportion increase from about 8.5% to 15% in private schools and from 13% to 23% in municipal schools. In state schools, on the other hand, the proportion drops from about 20% in 2010 to less than 5% in 2013 and remains at this level over the following years, except in 2014, which shows a relevant increase, caused by the variation in the state of Pará. In the Northeast region, the proportions of enrollments in automatic progression remain relatively stable until 2014 and then increase from that year onwards. The South region has relatively smaller proportions of enrollments in automatic progression. State schools have the lowest proportions, varying from 1.3% in 2009 to 0.3% in 2017. Among municipal schools, the proportion is relatively stable at 6% in the period, and among private schools, the proportions are higher, going from 8% in 2009 to 11% in 2017.

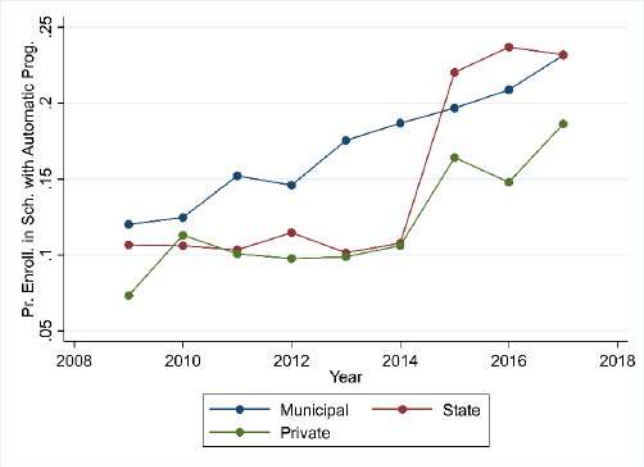
In Southeast and Midwest regions, respectively in panels (c) and (e), the proportions of enrollments on in automatic progression are the highest among school networks and remains with relative stability over the period. In the Southwest region, he proportion increases at the beginning of the period to just under 90% and remains at this level until the end of the period. Among municipal or private schools, there is a reduction in the proportion between 2009 and 2012, from when it starts to increase, reaching respectively 68% and 53% in 2017. In the Midwest region, state schools show proportions of 21% at the beginning of the period, increasing slightly to 22% in 2017. Municipal schools show variations of the proportion over the period, from 14.5% in 2009 to 13.5% in 2017. The proportion among private schools shows a large increase, from 4% in 2009 to 5% in 2017, but still maintains the lowest level among the networks in that region.

Figure 2 – Average Proportion of Enrollments in Schools with Automatic Progression by School Network in the Brazilian Regions

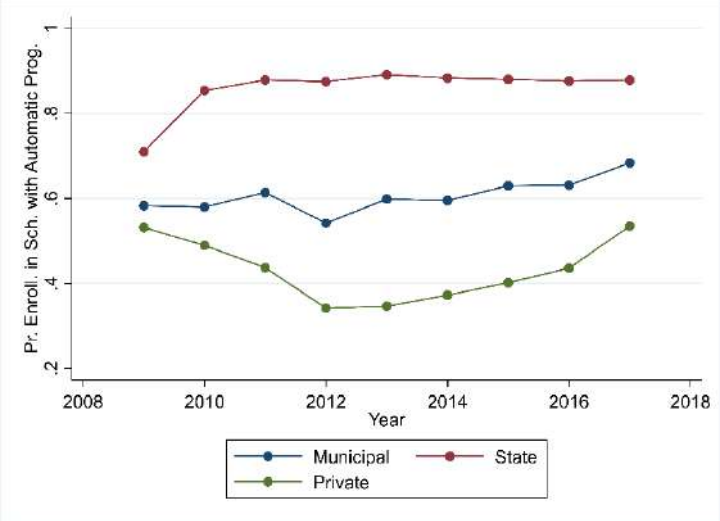
a) Norte



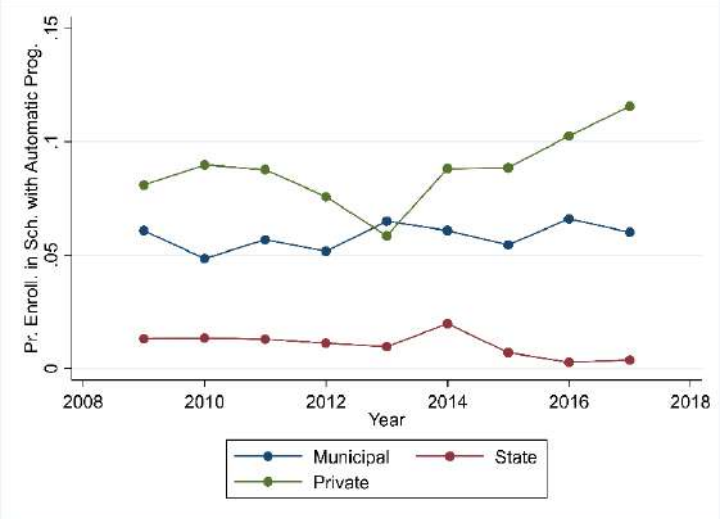
b) Nordeste



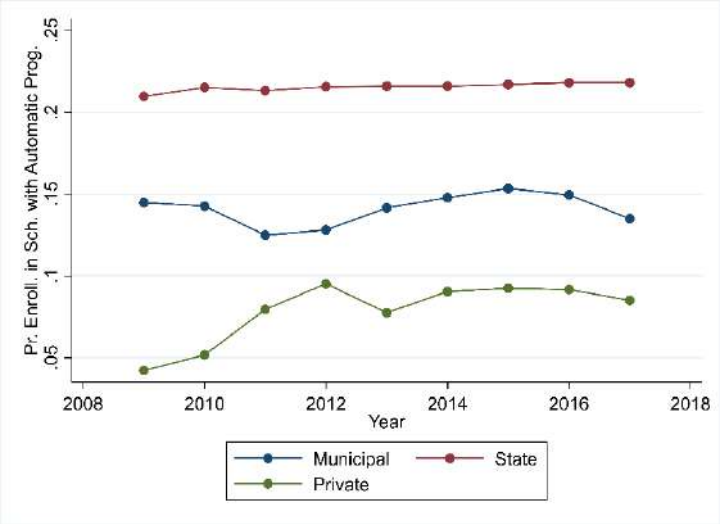
c) Sudeste



d) Sul



e) Centro-Oeste



Note - Data from panel of Brazilian municipalities from 2009 to 2017.

In Table 3, we show the distribution of middle school enrollments among groups of municipalities classified according to the presence of state, municipal and private schools. We observe that the share of municipalities with state and municipal schools only and those with the presence of the three administrative dependences have a reduction on their shares over time. On the other hand, the groups whose shares are increasing most quickly are those with municipal schools only or municipal and private schools. Despite state schools are receding in recent years among the Brazilian municipalities, they remain present in 77% of the municipalities in 2017.

Table 3 – Mean Share of Enrollments in State Schools

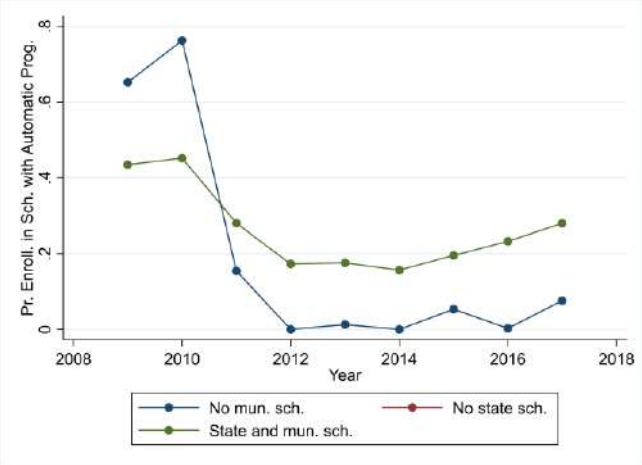
Year	Mun. with State Schools Only	Mun. with Municipal Schools Only	Mun. with State and Municipal Schools Only	Mun. with Municipal and Private Schools Only	Mun. with State and Private Schools Only	Mun. with State, Municipal and Private Schools	Total
2009	18.7%	7.5%	28.8%	3.1%	8.5%	33.4%	100.0%
2010	18.8%	8.0%	27.4%	3.9%	8.4%	33.5%	100.0%
2011	18.9%	8.2%	26.8%	4.3%	8.5%	33.2%	100.0%
2012	19.2%	9.4%	25.6%	5.0%	8.3%	32.5%	100.0%
2013	19.2%	9.9%	25.0%	6.4%	8.3%	31.2%	100.0%
2014	19.3%	10.5%	24.3%	7.6%	8.2%	30.1%	100.0%
2015	19.5%	11.3%	22.6%	8.8%	8.4%	29.4%	100.0%
2016	19.4%	12.1%	21.5%	9.6%	8.5%	28.9%	100.0%
2017	19.4%	13.0%	20.5%	10.3%	8.7%	28.1%	100.0%

Note – Data from panel of Brazilian municipalities from 2009 to 2017.

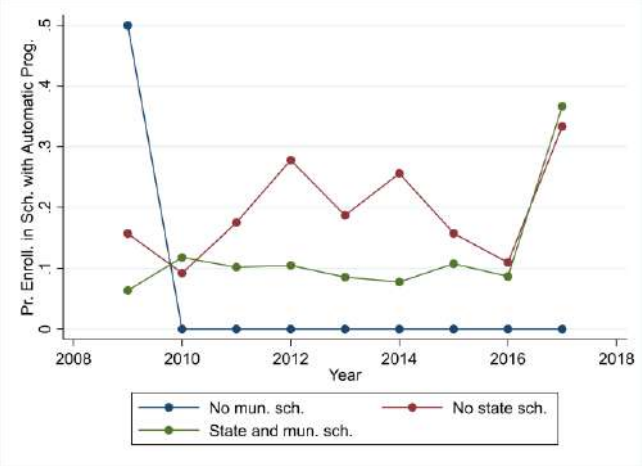
We also show the average evolution of the proportion of enrollments in public schools with continued progression by groups of municipalities for some selected states in Figure 3. We observe that in the states of Amazonas, Rio Grande do Norte and Santa Catarina, respectively in panels (a) , (b) and (d), municipalities with state and municipal schools show less intense oscillations than in municipalities where there is only one of those school networks. In Rio Grande do Norte, there are only two municipalities without municipal schools and for that reason, there is an extreme variation in the average proportion in this group. On the other hand, in the states of São Paulo and Mato Grosso, respectively in panels (c) and (e), the municipalities where there are no municipal schools are those in which the proportions of enrollments in automatic progression remain more stable, while in the municipalities where there are no state schools, the oscillations have greater magnitudes.

Figure 3 – Average Proportion of Enrollments in Schools with Automatic Progression by Groups of Municipalities in Selected States

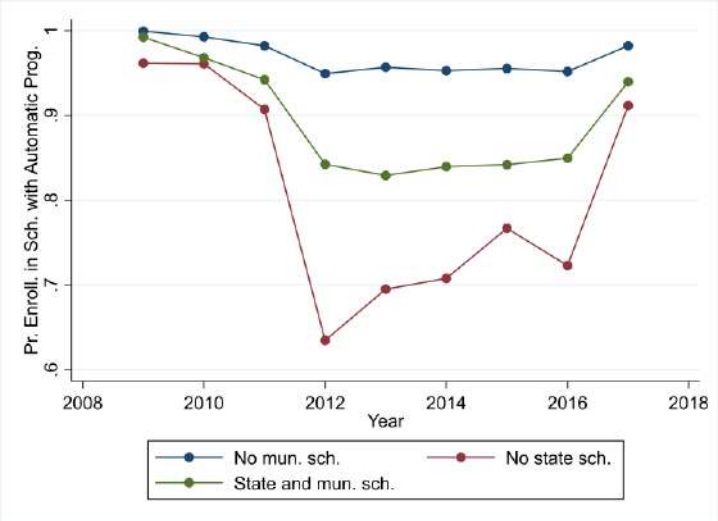
a) Amazonas



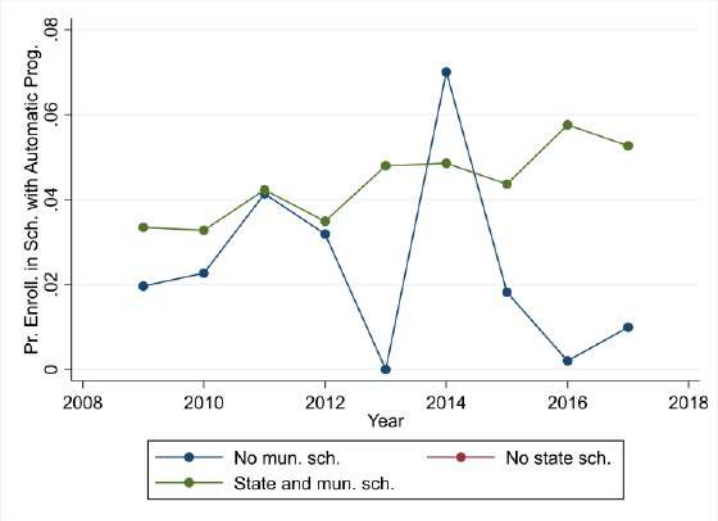
b) Rio Grande do Norte



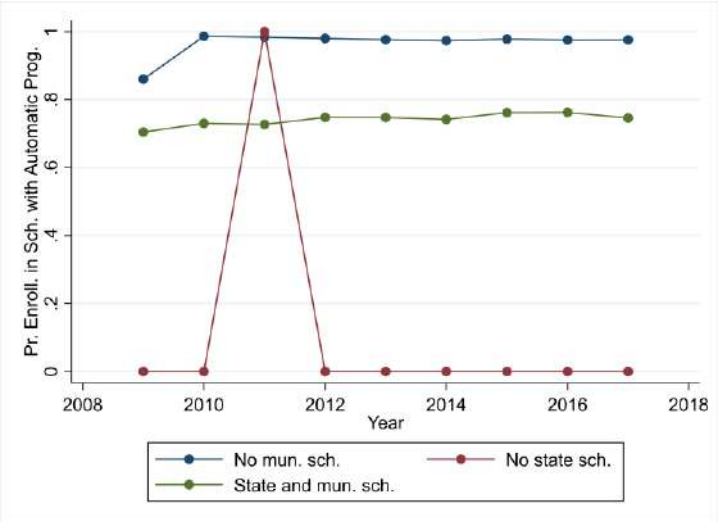
c) São Paulo



d) Santa Catarina



e) Mato Grosso



Note - Data from panel of Brazilian municipalities from 2009 to 2017.

3.2 First Stage

The first stage estimates are displayed in Table 4, which shows that the proportions of school enrollments in schools with automatic progression in the municipality and the instrumental variable are positively and strongly correlated. Column (1) displays the results for all the municipalities, while column (2) uses the sample of municipalities that only have State schools. We highlight that point estimates are positive and F statistics are high in those two samples, even after controlling for State-specific linear time trends. Column (3) shows the results of a placebo test using the sample of municipalities that only have municipal schools. As the instrumental variable captures recommendations of the State secretary of education for State schools to adopt the automatic progression policy, there should be no correlation between the instrument and the share of schools adopting this policy in municipalities where there are no State schools. Column 3 shows that this indeed the case.

Table 4 - First stage regressions

	Dependent Variable: Proportion of Enrollments in Schools with Automatic Progression in the Municipality		
	All Municipalities	**Mun. with State Schools Only**	**Mun. with Municipal schools Only**
	(1)	**(2)**	**(3)**
Proportion of State schools' enrollments in schools with automatic progression in other municipalities of the same State	0.428**	1.195**	0.0404
	(0.0237)	(0.0608)	(0.0225)
Observations	38,007	10,466	6,280
Number of Mun.	4265	1229	941
F-test	326.4	386.3	3.229

Note – Table reports estimates of the impact of the proportion of enrollments in schools with automatic progression in the municipality and the instrument described in equation (2). Regressions further control for municipality-level students and teachers characteristics, GDP, municipality and year fixed-effects, and State-specific linear trends. All municipalities are included in column 1, municipalities with only State schools in column 2, and municipalities with only municipal schools in column 3. Cluster robust standard errors in parenthesis. Significance: ** $p < 0.01$, * $p < 0.05$.

Table 5 shows additional first-stage results relating the instrumental variable and the shares of enrollments in each type of schools (State, municipal or private) and on the

shares of enrollments in schools with automatic progression in type of school, that is, on each term in equation (1). In the first, third and fifth rows, we observe that the instrument generates small changes in the composition of enrollments by administrative dependence (the terms s_{it}^{j} of equation (1)). While the share of municipal schools increases slightly, the estimates for the State and private school networks are negative, although the result for the municipal network is not significant at the level of 5%.

In addition, the second, fourth and sixth rows show the effects of the instrumental variable on the proportion of schools with cycles in the total enrollment per type of school (the terms pc_{it}^{j} of equation (1)). In the fourth row, we observe that the effects are positive among State schools, which brings evidence that the increase in the proportion of enrollments in schools with cycles among State schools in other municipalities has the effect of increasing the adoption of automatic progression policy among State schools inside the municipalities. In the second and sixth rows, we observe that there is a positive effect also among municipal and private schools, which is consistent with the hypothesis of spreading the effects via competition between the school networks.

Table 5 – Indirect Effects of the Instrument through School Competition

Dependent Variable	Est. Coef.	SE	Obs.	Dep. Var. Mean
Share of enrollments in Municipal Schools	0.007*	(0.003)	38,384	0.436
Automatic Progression in Municipal Schools	0.061**	(0.018)	27,756	0.264
Share of Enrollments in State Schools	-0.006	(0.003)	38,384	0.519
Automatic progression in State schools	1.023**	(0.029)	31,962	0.372
Share of Enrollments in Private schools	-0.001	(0.001)	38,384	0.045
Automatic Progression in private schools	0.055**	(0.011)	17,617	0.031

Note – Regression estimates of the correlation between the instrument described in equation (2), the shares of each administrative dependency in middle school enrollments, and the share of automatic progression in each of those administrative dependencies. Regressions further control for municipality-level averages students and teachers' characteristics, municipal GDP, municipality and year fixed-effects, and State-specific linear trends. Sample municipalities between 2009 and 2017 in all columns. Cluster robust standard errors in parenthesis. Significance: ** $p < 0.01$, * $p < 0.05$.

3.3 Main Results

Table 6 displays the results of the two-stage estimation for the failure and dropout rates. In the first row, we observe that the result for the overall sample is negative and statistically significant. That result implies that an increase of one standard deviation on the proportion of enrollments with automatic progression would lead to a 2.7 percentage points (pp.) reduction in the failure rate in the overall sample. This effect amounts to about 23% of the average failure rate in the sample, of 11.7%. In the sample of municipalities with only State schools in the second row the result is also negative and statistically significant and implies that an increase of one standard deviation in the enrollments in schools with automatic progression reduces failure rate in 3.9 pp., or 47% of the average failure rate in that sample.

Table 6 – Effects of Automatic Progression on Failure and Dropout Rate

Sample	Est. Coef.	SE	Obs.	Dependent Var. Mean
Failure Rate				
All municipalities	-0.0629**	(0.00793)	38,007	0.117
Municipalities with State Schools Only	-0.0783**	(0.0124)	10,466	0.0825
Municipalities with Municipal Schools Only	-0.0519	(0.125)	6,280	0.129
Dropout Rate				
All municipalities	0.00605	(0.00342)	38,007	0.0455
Municipalities with State Schools Only	-0.0182**	(0.00381)	10,466	0.0290
Mun. with only municipal schools in 2009	0.0606	(0.0697)	6,280	0.0555

Note – Instrumental variable regression estimates of the failure rate of public schools in the municipality on the proportion of State schools with automatic progression. Regressions further control for municipality-level averages of public middle school students and teachers' socioeconomic characteristics, and log municipal GDP, municipality and year fixed effects, and for State-specific linear trends. Sample municipalities between 2009 and 2017 in all columns, all municipalities in columns 1 and 4, municipalities with only State schools in 2009 in columns 2 and 5, and municipalities with only municipal schools in 2009 in column 3 and 6. Standard errors robust to municipality level clusters in parenthesis. Significance: ** $p < 0.01$, * $p < 0.05$.

The result for dropout rates in all municipalities in the fourth row is close to zero, however the result for the sample of municipalities with only State schools in the fifth row is negative and statistically significant at 1% level. A one standard deviation increase in the

coverage of the automatic progression policy would imply a 0,9 pp. decrease in dropout rate, 31% of the sample average. Results in the third and sixth rows, for the sample of municipalities with only municipal schools, are small and not statistically significant.

Table 7 shows the results for Portuguese language and math scores of the national exam carried out by students of the last grade of public middle schools, the *Prova Brasil* exam. The impact of automatic progression in State schools on scores is positive and significant across all samples, once we control for State-specific trends. When we do not control for those trends, the result is small and not significant as in column 1, or even negative, as in column 4.

Table 7 – Effect of Automatic Progression on Math and Language Test Scores

Independent Variables	**Dependent Variable**					
	Portuguese Language Scores			**Mathematics Scores**		
	All municipalities		**Mun. with State Schools Only**	**All municipalities**		**Mun. with State Schools Only**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Proportion of enrollments in schools with automatic progression	-0.848	23.46**	27.54**	-4.914**	24.87**	28.06**
	(1.506)	(2.004)	(2.820)	(1.489)	(2.111)	(2.941)
State-specific trends	No	Yes	Yes	No	Yes	Yes
Observations	20,715	20,715	5,692	20,715	20,715	5,692
R-Squared	0.000	-0.261	-0.171	-0.003	-0.289	-0.192
Dep. Var. Mean	241.2	241.2	248.5	246.4	246.4	255.1
Number of Mun.	4253	4253	1202	4253	4253	1202

Note – Instrumental variable regression estimates of average test scores of public schools in the municipality on the proportion of State schools with automatic progression. Regressions further control for municipality-level averages of public middle school students and teachers' socioeconomic characteristics, and log municipal GDP, municipality and year fixed effects, and for State-specific linear trends. Sample municipalities between 2009 and 2017 in all columns, all municipalities in column 1, municipalities with only State schools in 2009 in column 2, and municipalities with only municipal schools in 2009 in column 3. Standard errors robust to municipality level clusters in parenthesis. Significance: ** $p < 0.01$, * $p < 0.05$.

In column 2, the result is positive and significant and indicates that an increase of one standard deviation in the proportion of State schools with automatic progression implies an increase of 10.1 points in the Portuguese language score (4.2% of the mean). In column

3, the effect is similar in the sample of municipalities with only State schools. A one standard deviation increase in the coverage of automatic progression among enrollments implies an increase of 13.5 points, 5.5% of the sample average. The effects on math scores in columns 5 and 6 have similar magnitudes in each sample.

These results contrast with those of previous studies (Koppensteiner, 2014; Namen, 2019; Rodriguez-Segura, 2020), which find negative effects of policies of automatic progression on school performance. Our instrumental variable specification without State-specific linear trends led to negative estimates of the impact of automatic progression on test scores (columns 1 and 4). The main difference of our specification relative to previous studies is the inclusion of those State specific linear trends and the instrumental variables approach.

4. Conclusion

In this study, we use an instrumental variable approach to examine the impact of an automatic progression policy in Brazilian State schools on failure and dropout rates, and on test scores. We instrument the share in each municipality of middle school enrollments in schools which adopted automatic progression with the share of enrollments in State schools that adopted that policy in all other municipalities in the same State. As our instrument is defined at the State level, we further control our estimations for State-specific linear trends, to account for exogenous State level responses to failure and dropout rates that might confound with automatic progression policies. The results show an overall negative impact on the failure rate and no significant effect on the dropout rate, except in municipalities with only State middle schools. The impact on test scores is positive and significant, in contrast with previous articles on the same theme. We test the robustness of our instrument with a placebo test in a sample of municipalities with no State schools and which might not respond to a recommendation of the State secretary of education or to the peer pressure of an increase in the adoption of the automatic progression policy on State schools. Moreover, we verify that the effects are stronger in municipalities no municipal schools.

We conclude that the automatic progression policy was able to reduce failure rates and to stimulate school permanence in general. Despite previous studies that showed otherwise, our results indicate that when State-specific linear trends are taken into account

in our instrumental variables approach, the automatic progression might increase stimuli to perform well, despite lifting the threat of retention.

5. Declaration of Interest

None.

6. Acknowledgements

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