Impact Of School Consolidation On Enrollment and Achievement: Evidence From India

Vinitha Rachel Varghese*

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Abstract

I study the impact of school consolidation on enrollment and achievement, using its staggered roll out in the Indian state of Rajasthan. Across the years 2014, 2016 and 2017, Rajasthan merged many of its grade 1-5 schools to grade 6-10 schools to create grade 1-10 'model' schools. 23% of the government schools got eliminated in the process. Media reports suggested that consolidation led to declining enrollment levels and teacher layoffs. Combining the government orders on consolidation and administrative data on schools, I rule out that consolidation had a negative impact on enrollment or number of teachers. I find that consolidation decreased the number of schools in a village by one, increased the proportion of children studying in a school with a principal by 0.1 and increased the number of teachers in a village by 0.7. I also find that consolidation increased school enrollment in a village by 2%, in particular girls' enrollment by 2%. I further show that consolidation decreased the proportion of high scorers among grade 5 students by 0.08 and did not decrease the proportion of high scorers among grade 8 students by more than 0.02. School consolidation is a policy worth pursuing in contexts which are concerned about a large number of schools.

*Varghese (vvargh2@uic.edu) can be reached at UH 725, Department of Economics, University of Illinois Chicago (UIC), Chicago, Illinois, USA - 60607. I thank Darren Lubotsky, Benjamin Feigenberg, Javaeria Quereshi, Ben Ost and Annemie Maertens for support throughout this project. I thank Eduardo Medina-Cortina, Anoop Ebey Thomas and Ankit Aggarwal for data related support. I thank Kunal Sen, Abhiroop Mukhopadhyay, Peter Mathews, Rute Martins Caeiro, Rodrigo Oliveira, Kalle Hirvonen, Miri Stryjan, Michael Danquah and Rahul Lahoti for their helpful comments and suggestions. I acknowledge the data translation work done by Shailam Longitudinal Research Private Limited, Lucknow, India and the UIC Department of Economics for funding the same.

Introduction

School consolidation refers to the concept of closing down small community schools and reallocating the students and teachers from these schools to better-resourced schools. (Berry and West, 2010) refers to school consolidation as an 'organizational revolution that remade American public education'. Until 1930s, schools in the U.S were small and employed a single teacher. In the four decades which followed, nearly two-thirds of the U.S schools were eliminated through school consolidation. Large scale school consolidation is not a novel concept for developed countries.

School consolidation is not as familiar in emerging economies like India. Until recently, educational reforms in India were access-oriented. Most of the educational policies were aimed at making sure every child has access to a school. This resulted in massive school constructions over decades. India currently has a large number of schools. As an illustration, India has 1.5 million schools for its 280 million students in comparison to China which has 266,000 schools for 220 million students (CPI, 2018). Many of the schools are grade 1-5 schools, owing to Indian government's focus of universalization of primary education, with no principal and with one or two teachers. At present, many states across the country deem this large number of schools as a concern and are currently resorting to school consolidation.

Rajasthan is the first Indian state to implement school consolidation at-scale. Rajasthan consolidation comprised of merging a grade 1-5 school with a nearby grade 6-10 school to create a grade 1-10 school. The newly created grade 1-10 schools are called *Adarsh* (model) schools. Students and teachers of the closed grade 1-5 school are reallocated to the model school. Every model school has a principal. The teacher requirement in the model school is reevaluated after consolidation and necessary adjustment is made by hiring more teachers.

During the process of consolidation, 23% of government schools got eliminated. To the best of my knowledge, there exists no empirical evidence on the impact of Rajasthan school consolidation. Media reports suggested that consolidation led to declining enrollment levels and teacher lay-offs. Combining the government orders on consolidation and administrative data on schools, I rule out that consolidation had a negative impact on enrollment or number of teachers.

Rajasthan implemented school consolidation in a staggered manner across years 2014, 2016 and 2017. I exploit the variation in the implementation timing by using a two-way fixed effects (TWFE) model to estimate the impact of consolidation. The identifying assumption of the TWFE model is that in the absence of consolidation, the outcome would have evolved similarly in villages where consolidation happened today relative to villages where consolidation happens in the near future and to villages

where consolidation does not happen. Sun and Abraham (2021) recently demonstrated that TWFE is appropriate only if the treatment is homogeneous and is a one-time shock. I use the method proposed by Callaway and Sant'Anna (2021) to generate my table estimates. This method is an improvement over TWFE estimates since it addresses both heterogeneous impact and growing effect of treatment.

I find that school consolidation in Rajasthan decreased the number of schools in a village by one and increased the proportion of children attending a school with a principal by 0.1. Consolidation also increased the number of teachers in a village by 0.7. I also find that consolidation increased school enrollment in a village by 2%, in particular girls' enrollment by 2%. I further show that consolidation decreased the proportion of high scorers among grade 5 students by 0.08 and did not decrease the proportion of high scorers among grade 8 students by more than 0.02.

These findings contribute to multiple strands of literature. The first is to the literature on school consolidation. There is no other paper, to the best of my knowledge, which has looked at the impact of school consolidation on enrollment outcome. Most papers on consolidation are in the developed contexts where enrollment in not a margin where change is expected, unlike India. There are prior papers which have studied the impact of consolidation on student achievement but the results are mixed. Beuchert et al. (2018) finds a negative impact, De Haan et al. (2016) finds a positive impact and Izadi (2015) and Liu et al. (2010) find that consolidation has no adverse effect on achievement. There is limited work on school consolidation in developing contexts (Liu et al., 2010; Hannum and Wang, 2022) and none of them are based in India. To the best of my knowledge, there is no other paper which has studied the merger of grade 1-5 to grade 6-10 schools. Consolidations in prior work correspond to the merger of multiple grade 1-5 schools.

The second strand of literature to which I contribute to, is the literature on impact of school size on achievement. In this broad area, I contribute to the studies which support small schools for better learning outcomes (Andrews et al., 2002; Leithwood and Jantzi, 2009). The third strand of literature to which I contribute to is the literature on impact of school configuration on school achievement(Jacob and Rockoff, 2011; Holmlund and Böhlmark, 2019).

The remainder of the paper proceeds as follows. Section I describes the motivation for implementing school consolidation, the specifics of Rajasthan consolidation policy and anecdotal evidence on the impact of the same. Section II outlines a standard conceptual framework to help explain how school consolidation affects enrollment and achievement. Section III describes the data sources and sample used. Section IV details the empirical strategy that I use to estimate the causal effect of school consolidation on enrollment and achievement. Section V discusses the results and their interpretations. Section VI concludes.

I. Background and Details of Rajasthan School Consolidation

In this section, I describe the motivation for implementing school consolidation, the specifics of Rajasthan school consolidation policy and anecdotal evidence on the impact of the same.

India witnessed an increase in the number of schools in response to its access-oriented reforms. Until recently, educational reforms in India focused on ensuring school access to every child. This was expedited by the Sarva Shiksha Abhiyan (SSA) program which started in 2001 and the Right to Education (RTE) Act which was passed in 2009. These resulted in India establishing a large number of schools. As an illustration, India has 1.5 million schools for its 280 million students in comparison to China which has 266,000 schools for 220 million students (CPI, 2018). However, this resulted in the existence of many schools with low enrollment, limited facilities and inadequate teachers Bhatnagar and Bolia (2019). In order to address this concern, many Indian states resorted to school consolidation to make better use of limited resources. I present a few news headlines in support of this in Figure 1. The specifics of school consolidation varied by state.

In the state of Rajasthan, government primary or upper primary schools functioning very close to a government secondary or higher secondary school suffered from low enrollment. These schools did not have separate teachers by grade since the RTE Actrequires a minimum enrollment of one hundred and twenty one children to allot five teachers to a primary school. The quality of education in these schools were thus compromised. In order to ensure qualitative improvement in school education, Rajasthan created model schools (also known as *Adarsh* schools) by consolidating primary or upper primary schools to nearby secondary or higher secondary schools within the same village.

Beginning in 2014 and subsequently in 2016 and 2017, school consolidations took place across Rajasthan on agreement with the Department of Elementary Education and Department of Secondary Education. Prior to consolidation, it is likely that the primary or upper primary schools did not have a principal since the RTE Act required a minimum enrollment of one hundred and fifty children to allot a principal to a primary school. After consolidation, the principal or principal of the recipient secondary or higher secondary school becomes responsible for all administrative and academic duties across merged primary and upper primary grades as well.

With consolidation, all assets of the upgraded schools including land and buildings are transferred to the recipient school. To the extent possible, all classes across grades 1-10 (1-12) are conducted in the same building or campus as the recipient school. In exceptional cases where all classes cannot be conducted in the same campus due to inadequate space or inconvenience to students, some classes are conducted in buildings of the upgraded schools after receiving approval from the Department of Secondary Edu-

cation. Every model school has classes from grades 1-10 (1-12). Even when consolidation merged a grade 1-5 school with a grade 9-12 school, grades 1-12 will be offered in the model school by arranging admission for grades 6-8. The number of teachers required in the model school are reevaluated after consolidation and necessary adjustments follow. Until the adjustments are made, teachers of upgraded schools continue to work in the recipient school.

In figure 2, I present the number of government schools in Rajasthan across the period of analysis. There is a 9% increase in the number of government schools in the years 2010 - 2013 due to at-scale school constructions owing to the RTE Act. School consolidation in Rajasthan is associated with a 23% decline in the number of government schools between 2013 and 2017. These trends stay so, when I restrict the sample among villages which appear across all ten years of the analysis, as in Appendix Figure A1. In figure 3, I further present the dis-aggregated number of government schools categorized by grades to which they cater to, across the period of analysis. The increase in number of schools during RTE years is driven by grade 1-5 and grade 6-10 schools. The consolidation years from 2013 to 2017 correspond to shifting away from all other types of schools to grade 1-10 schools. The number of grade 1-10 schools in 2017 is five times what it is in 2013. In figure A2, I show that these trends stay so, when I restrict the sample among villages which appear across all ten years of the analysis.

I present more details on Rajasthan consolidation in Table 1. 12100 model schools got created across the three waves of consolidation. Majority of the model schools (86%) were formed in 2014. Most of the consolidations involved merging a single primary or upper primary school to a nearby high school. However, 22% of model schools in 2014, 8% in 2016 and 11% in 2017 were created by upgrading multiple elementary schools. 4% of model schools in 2014, 29% in 2016 and 24% in 2017 were created by merging all girls' elementary schools to coed high schools. There are 11194 villages where at least one model school was created through consolidation.

There is no empirical evidence on the impact of Rajasthan school consolidation. There exists anecdotal evidence but they are not in favor of consolidation. The media reports suggest that consolidation led to declining enrollment levels and teachers layoffs. I present some news headlines in Figure 4 in support of this.

II. Conceptual Framework

In this section, I outline a standard conceptual framework to help explain how school consolidation affects enrollment and achievement.

Rajasthan school consolidation involves the merger of a grade 1-5 school to a nearby grade 6-10 school to create a grade 1-10 model school. Teachers and students from the upgraded grade 1-5 school are re-allocated to the model school. The decision about schools involved in a consolidation lies with the state government. The government anticipated three changes to the school system with the establishment of these consolidated model schools. First, the number of schools in a village will decline mechanically after consolidation. Second, the number of children who study in a school with a principal will increase since all model schools have a principal. Third, number of teachers in a village will increase as model schools have to readjust its number of teachers on reevaluating the post-consolidation increase in enrollment.

When a grade 1-5 school gets consolidated to a nearby grade 6-10 school, there is a decline in the number of schools in the village. In majority of the villages, the number of schools will decline by one since 80% of the consolidations involved the closing of a single grade 1-5 school. The reduced number of schools could lead to a decline in enrollment if adequate arrangements are not made to accommodate the children of the closed schools into model schools. This is relevant in the context of India where education is guaranteed but not compulsory. A parent can choose to not send their child to school. The reduced number of schools can lead to a decline in achievement of students of both closed and recipient schools if recipient school resources are inadequate for the increased number of children.

Consolidation leads to an increase in the number of children who study in a school with a principal. Only 38% of the school going children in a village attended a school with a principal at baseline. With consolidation, the government mandated that all model schools will have a principal. The presence of a principal could ensure increased quality monitoring at the school. This could encourage more parents to send their children to school. The presence of a principal could also signal increased safety in the school which could lead to increased school enrollment among girls. The government anticipated that the presence of a principal will ensure higher quality education and thus will improve school achievement.

The government indicated that the number of teachers in the model schools will be readjusted after consolidation, if necessary. With consolidation, the teachers of the closed schools have to start working in the recipient schools with immediate effect. After consolidation, the government promised to reevaluate the teacher requirements in the model schools and to make any necessary readjustments. At baseline, 73% of grade 1-5 schools only had one or two teachers. However, if any positive adjustment is done by hiring more teachers, it would signal increased education quality. This could encourage more parents to send their children to school. If number of teachers increases and if it translates into higher learning outcomes, it could reflect in increased school achievement.

Rajasthan school consolidation corresponds to the merger of a grade 1-5 school to a nearby grade 6-10 school to create a grade 1-10 model school. This is expected to reduce the number of schools in a village and increase the number of children studying in a school with a principal. Consolidation may also lead to a change in the number of teachers. School enrollment and in particular, girls' school enrollment can increase. The impact of consolidation on student achievement is ambiguous.

III. Data & Sample Construction

In this section, I describe the data sources and sample used to study the effects of school consolidation on school enrollment and learning outcomes.

A. *Data Sources*

I construct a school-level panel dataset for the Indian state of Rajasthan, combining government orders on school consolidation with education outcomes. I match an annual census of schools, the Unified District Information System for Education (U-DISE, 2008-2017) to State government orders on school consolidation (2014, 2016, 2017). I match school names across the two data sources using a custom fuzzy matching script based on the Levenshtein algorithm.

U-DISE is an annual census of primary and middle schools in India. For every primary and middle school in the country, U-DISE provides data on enrollment, exam completion and infrastructure. U-DISE is administered annually by the National Institute of Educational Planning and Administration and can be accessed via this link[1]. U-DISE has enrollment data by social categories, by gender and by grade. Adukia et al. (2020) successfully replicated national survey-based enrollment statistics using the U-DISE enrollment data thus suggesting that U-DISE data are reliable.U-DISE also has information on examinations at the end of primary and middle school grades. This includes the number of students that appeared for the exam, that passed the exam and that scored high marks. U-DISE also has data on number of teachers in a school, number of classrooms and whether the school has separate toilets by gender. Since the year 2013, U-DISE also reports enrollment in high school grades.One of the limitations of U-DISE is that it does not report the total number of school-aged children in a neighborhood because of which I am unable to calculate enrollment rates.

I use consolidation orders issued by Rajasthan Government's Department of Education to identify treat-

[1] http://14.139.60.146/DownloadRawData/RawData/RawData.aspx

ment status of schools by year[2]. The orders have names of schools which are closed and names of schools to which children and teachers of closed schools are reallocated. I use the issue date on these orders to identify the year in which a school gets consolidated. If the order issue date for a school is on or before September 30th of a year, I consider that the school gets consolidated in that year. U-DISE data of that year reflects post-consolidation information since U-DISE reporting is done on September 30th of every year. For orders issued after September 30th of a year,I consider that the school gets consolidated the following year. The orders also report corresponding villages, blocks and districts in which consolidation takes place. It is noteworthy to know that the closed school(s) and recipient school in a consolidation are located within the same village.

B.*Sample Construction*

In this section, I describe the steps and restrictions that I impose on the data to build the analytical sample. In Figure 5, I present the first step where I match schools in the State government consolidation orders to the U-DISE data. There are 27142 schools in the State consolidation orders. I exclude all 478 schools located in one of the districts named Dhaulpur which has missing observations in the U-DISE data. I match the remaining 26664 schools with the schools in the U-DISE data using a custom fuzzy matching script based on the Levenshtein algorithm. 64% of the schools get matched across the State consolidation orders and U-DISE data. This translates into 17048 schools. Out of the 17048 schools which are matched across consolidation orders and U-DISE, 8186 are recipient schools and 8862 are closed schools. In the matched data, 90% of the recipient model schools were formed in 2014, 8% in 2016 and 2% in 2017. These 17048 schools directly affected by consolidation are 6% of the total of 294,373 schools reported in the U-DISE data.

As discussed in Section II, first wave of Rajasthan school consolidation is preceded by the implementation of the RTE Act. The RTE Act led to an increase in the number of schools throughout India in the years 2009 - 2013. 13% of the consolidated schools and 9% of the remaining schools of Rajasthan were established during these years. Villages where schools were established during RTE Act years could have a differential trend in enrollment, in the years leading to consolidation. I look into this in Figure 6.

In the first panel of Figure 6, I present the pre-consolidation trend in school enrollment for villages where at least one school was established during RTE Act years. Among villages where a new school was started during RTE Act years, consolidation happened in those villages which historically had

[2]These orders can be accessed via this link

higher enrollment but declined during the years preceding consolidation. In the second panel of Figure 6, I present the pre-consolidation trend in school enrollment among villages where no school was established during RTE Act years. There exists no pre-trend for this sample of villages. In the third panelof Figure 6, I present pre-consolidation trend in school enrollment for the full sample of villages. The inclusion of villages where a school was established during RTE Act years creates a pre-trend which can bias my estimates.

In figure 7, I present the restrictions that I impose on the matched data based on observations from Figure 6. There are 60783 villages in the data out of which 1 village has missing information about the establishment year of its schools. Out of the remaining 60782 villages, 14149 have at least one school which was established during RTE Act years. I exclude these villages from the sample. 31649 villages out of the remaining 46633 villages do not appear across all ten years of the analyses. I exclude these villages from the analytical sample. The estimation sample thus has 14984 villages out of which 12632 villages never had a consolidation event. Of the remaining 2352 villages, 2125 villages had their earliest consolidation event in 2014, 181 had in 2016 and 46 had in 2017.

In Table 2, I present baseline village-level summary statistics of the analytical sample, by consolidation status. Villages which had the earliest consolidation in 2014 and those which had the earliest consolidation in 2016 are similar across most baseline characteristics. On average, each of these villages has 4 schools of which 3 are government schools. There are around 480 school going children in a village. Percentage of girls among school going children is 45% in 2014 consolidated villages and 47% in 2016 consolidated villages. Each village has 19 teachers across all its schools. There are 10 children in each village who take the grade 5 exams and around 66% of them score more than 60%. There are 9 children in each village who take the grade 8 exams and half of them score more than 60%.

Villages which had the earliest consolidation in 2017 are smaller in terms of number of schools and enrollment than other consolidated villages. On average, there are 2 schools in each village of which 1 is a government school. There are 200 school going children in a village. 49% of school going children are girls. Each village has 10 teachers. There are 3 children in each village who take the grade 5 exams and 2 of them score more than 60%. Similarly, there are 3 children in each village who take the grade 8 exams and 2 of them score more than 60%.

Villages which were never consolidated are even smaller than 2017 consolidated villages in terms of enrollment. On average, there are 2 schools of which 1 is a government school. There are 140 school going children in a village. 48% of school going children are girls. Each village has 5 teachers. There are 2 children in each village who take the grade 5 exams and 1 of them score more than 60%. Similarly, there are 2 children in each village who take the grade 8 exams and 1 of them score more than 60%.

IV. Empirical Strategy

In this section, I detail the empirical strategy that I use to estimate the causal effect of school consolidation on outcomes of interest.

In this paper, I study how consolidation of schools affects enrollment and achievement. The staggered roll out of consolidation in Rajasthan allows me to use a two-way fixed effects (TWFE) model to identify these effects. I use the method proposed by Callaway and Sant'Anna (2021) to produce the table estimates.

In Table 2, I show that the baseline characteristics of villages consolidated in different years are not similar. However, this doesn't pose any threat to my identification. A TWFE model will produce causal estimates if common trends assumption is satisfied. In Section V, I show that each of the outcome variables has common trends in the pre-consolidation period across the villages consolidated in different years. This supports the credibility of my TWFE estimates in identifying the effect of school consolidation on enrollment and achievement.

The identifying assumption to the TWFE model is that, in the absence of school consolidation, the outcome would have evolved similarly in villages where consolidation happened today relative to villages where consolidation happens in the near future and to villages where consolidation does not happen. I also include village fixed effects. Village fixed effects separate the effect of consolidation from outcomes related to sorting of villages into consolidation. My empirical specification takes the following form:

$$Y_{vt} = \alpha_0 + \sum_{j=-m}^{-2} \beta_j D_{v,t+j} + \sum_{j=0}^{n} \beta_j D_{v,t+j} + \gamma_v + \mu_{dt} + \varepsilon_{vt} \tag{1}$$

where Y_{vt} is the outcome (for eg. School enrollment in a village) in village v in year t. γ_v is village fixed effects and μ_{dt} is district-year fixed effects. I cluster standard errors at the village level. The variable $D_{v,t+j}$ is an indicator if the village v at time t is j years after consolidation. For non-consolidated villages, $D_{v,t+j}$ remains 0 across all years. Common trends assumption is satisfied if the coefficients β_js bounce around 0 for all years prior to consolidation. The coefficients of interest are β_js for $j = \{0,1,2,...,n\}$. The coefficients β_js for years prior to and after consolidation are plotted in the figures presented in Section V.

Sun and Abraham (2021) demonstrated that the coefficients β_js cannot be considered as reliable measures of dynamic treatment effects. They argue that standard TWFE estimation, as outlined above, is

appropriate if the treatment is homogeneous and is a one-time shock. School consolidation need not be a one-time shock. An example is if consolidation leads to increased enrollment in the village, private schools could respond by increasing their school inputs to attract even more children to school. This can lead to further increase in school enrollment in the village. In this case, consolidation's effect on enrollment is not a one-time shock.

Callaway and Sant'Anna (2021) proposes a method which improves the TWFE estimates, by addressing both heterogeneous impact and growing effect of treatment. In this method, cohort and time specific average treatment effects on the treated are first estimated using two-period, two-group difference-in-difference estimators. These estimates are then aggregated by weighting them by the size of each treatment cohort to produce summary treatment effect estimates. It aggregates the cohort-specific treatment effect parameters only by the share of treated units unlike TWFE which weights the parameters by treatment variances as well. This aggregate estimate is thus more appropriate than TWFE estimates when there is treatment heterogeneity. This estimate only uses untreated comparison groups and thus is not biased by time-varying treatment effects. This estimate is thus more appropriate than TWFE estimates when there is a growing effect of treatment. I use the method proposed by Callaway and Sant'Anna (2021) to generate table estimates of the impact of consolidation on enrollment and achievement.

V. Results

In this section, I discuss the findings of the paper. I begin by looking at the impact of school consolidation on intermediate outcomes. Following this, I look at the impact of school consolidation on the student outcomes namely school enrollment and schooling quality.

A. *Effect of school consolidation: Intermediate outcomes*

A.1. Effect on number of schools in the village

In order to study how school consolidation affects the number of schools in a village, I estimate Equation 1 where the outcome variable Y_{vt} is the number of schools in a village.

Figure 8 illustrates the coefficients of this estimation. The coefficients $D_{v,t+j}$ bounce around zero in the years prior to consolidation. The coefficients $D_{v,t+j}$ for $j = \{0,1,2,3\}$ yield the causal effect of school consolidation on number of schools in a village, j years after consolidation happens in the village.

Number of schools in a village decline by 0.9 due to school consolidation.

Government orders on consolidation were to be implemented with immediate effect. The number of schools in a village decline by 0.9 in the same year in which the orders are issued. This decline is persistent three years after consolidation.This suggests that consolidation is not a temporary intervention which gets reversed in the subsequent years. The decline in the number of schools could lead to a decline in the number of school enrolled children if adequate arrangements are not made to accommodate the children from closed schools. If children reallocated from closed schools strain the resources of recipient schools, average learning outcomes could decline.

Column (1) of Table 3 presents table estimates of the impact of school consolidation on number of schools in a village. I use Callaway and Sant'Anna (2021) methods to generate the average treatment effect on the treated (ATT) estimate. This is estimated on the analytical sample which consists of 14984 villages over 10 years. The ATT estimate indicates that school consolidation leads to a 0.97 decline in the number of schools in a village. With a baseline mean of 4.28 schools per village, this translates into a 23% decline in the number of schools per village due to consolidation.

A.2. Effect on proportion of children attending a school with a principal

72% of the closed schools are primary schools. On average, the baseline enrollment in a closed school is 98. The RTE Act requires a minimum enrollment of 150 children to allot a principal to a primary school. Thus, it is likely that many of the closed schools did not have a principal. With consolidation, the children of closed schools are reallocated to secondary schools which have a principal. The government orders on consolidation mandate that the principal of the recipient school is responsible for all administrative and academic duties across merged grades as well. In order to see if school consolidation affects the proportion of children attending a school with a principal, I estimate Equation 1.

The outcome variable, Y_{vt} is the proportion of children in a village, among school enrolled, who attend a school with a principal. Figure 9 presents the coefficients of this estimation. The coefficients $D_{v,t+j}$ bounce around zero in the years prior to consolidation. The coefficients $D_{v,t+j}$ for $j = \{0,1,2,3\}$ yield the causal impact of school consolidation on the proportion of children in a village studying in a school with a principal, j years after consolidation happens in the village. There is an additional restriction on the sample used to generate these coefficients. The analysis is restricted to villages where none of the government schools experienced a change in the presence of principal during the RTE Act years. In the absence of this restriction, the outcome of interest does not have common pre-trends as shown in Figure A3.

School consolidation does not affect the outcome in the year of consolidation. However, in subsequent years, the proportion of children who attend a school with a principal increases. After one year of consolidation, there is a 0.05 increase in the proportion of children in a village who attend a school with a principal. The proportion increases by 0.1, two years after consolidation and by 0.2, three years after consolidation. Having a principal could signal more accountability towards quality of education imparted by the school. This could persuade more parents to send their children to school and school enrollment could increase. The government anticipated that the presence of a principal will ensure higher quality education and thus will improve school achievement.

Column (2) of Table 3 presents table estimates of the impact of school consolidation on the proportion of children in a village, among school enrolled, who attend a school with a principal. I use Callaway and Sant'Anna (2021) methods to generate the average treatment effect on the treated (ATT) estimate. This is estimated on a sample of 4226 villages over 10 years. The ATT estimate indicates that school consolidation leads to a 0.1 increase in the proportion of children who attend a school with a principal. At baseline, 38 percent of the children in a village study in a school with a principal. This increases to 48 percent because of consolidation.

A.3. Effect on number of teachers

With consolidation, teachers of the closed schools are reallocated to the recipient model school. The government orders indicated that the number of teachers required in the model school will be reevaluated after consolidation and, necessary adjustments will be made. Until the adjustments are made, teachers of upgraded schools continue to work in the recipient model school. In order to see if consolidation leads to this adjustment, I estimate Equation 1.

The outcome variable, Y_{vt} is the total number of teachers across all schools in a village. Figure 10 presents the coefficients of this estimation. The coefficients $D_{v,t+j}$ bounce around zero in the years prior to consolidation. The coefficients $D_{v,t+j}$ for $j = \{0,1,2,3\}$ yield the causal impact of school consolidation on the number of teachers in a village, j years after consolidation happens in the village. There is an additional restriction on the sample used to generate these coefficients. The analysis is restricted to villages which did not experience any change in the total number of teachers during the RTE Act years. In the absence of this restriction, the outcome of interest does not have common pre-trends as shown in Figure A4.

There is no adjustment to the number of teachers in the year of consolidation. In the subsequent years, number of teachers in the village increases. Number of teachers increase by 0.4 after one year

of consolidation. The number of teachers increase by 1 in two years and by 2 in three years after consolidation. In FigureA5, I also show that the pupil:teacher ratio in a village decreases by 1, two years after consolidation and stays so in the third year. An increased number of teachers could encourage parents to send their children to school. This could increase school enrollment. An increased number of teachers allows for grade and/or subject specialization. This could lead to an improvement learning outcomes.

Column (3) of Table 3 presents table estimates of the impact of school consolidation on the total number of teachers in a village. I use Callaway and Sant'Anna (2021) methods to generate the average treatment effect on the treated (ATT) estimate. This is estimated on a sample of 4090 villages over 10 years. The ATT estimate indicates that the number of teachers in a village increases by 0.7 because of consolidation. With a baseline mean of 10.48 teachers per village, this translates into an 7% increase in the number of teachers in a village due to consolidation.

B. *Effect of school consolidation: Student outcomes*

B.1. Effect on school enrollment

Every village has one less school because of consolidation. This can lead to a decline in school enrollment if the displaced children are not accommodated in the remaining schools. The consolidation orders mandated that all children of the closed schools have to be admitted in the recipient model school. School enrollment will remain unchanged, even with a decline in the number of schools, given this mandate. Consolidation leads to a 0.1 increase in the proportion of children in a village, attending a school with a principal. On consolidation, the government anticipated that a model school will offer a higher quality of education to the displaced children with the presence of a principal. A principal is responsible for all academic and administrative duties in the recipient school. The presence of a principal can ensure improved infrastructure and personnel by increased monitoring. Consolidation also leads to an increase of 0.7 teachers, on average, in each village. A school with a principal and more teachers can persuade more parents to send their children to school. This will lead to an increase in school enrollment. Having a principal can also signal increased safety in the school. This will lead to an increased enrollment among girls.

In order to study how consolidation affects school enrollment, I estimate Equation 1. The outcome variable, Y_{vt} is log school enrollment in a village. Figure 11 presents the coefficients of this estimation. The coefficients $D_{v,t+j}$ bounce around zero in the years prior to consolidation. School enrollment in a

village increases by 1 percent in the year of consolidation and it persists one year later. Consolidation increases the school enrollment by 2 percent in two years and by 3 percent in 3 years. In Figure A6, I show that the increase in school enrollment due to consolidation stays so on adding more pre-period event years and also on running the estimation on an unbalanced panel of villages.

Column (1) of Table 4 presents table estimates of the impact of school consolidation on the total school enrollment in a village. I use Callaway and Sant'Anna (2021) methods to generate the average treatment effect on the treated (ATT) estimate. This is estimated on a sample of 14,984 villages over 10 years. The ATT estimate indicates that school enrollment in a village increases by 2 percent because of consolidation. With a baseline mean of 473.20 school enrolled children in a village, this translates into 9 additional children going to school in a village due to consolidation.

In Figure 12, I look at how consolidation affects school enrollment of girls versus boys, in a village. The left panel presents the coefficients of the estimation of Equation 1 on log enrollment of girls in a village. The right panel presents the coefficients of the estimation of Equation 1 on log enrollment of boys in a village. The coefficients $D_{v,t+j}$ bounce around zero in the years prior to consolidation in both the panels. The school enrollment among girls increases by 1 percent in the year of consolidation and it persists one year later. Consolidation increases the school enrollment among girls by 3 percent in two years and by 4 percent in 3 years. The school enrollment among boys are unaffected by consolidation.

Columns (2) and (3) of Table 4 present the table estimates of the impact of consolidation on school enrollment among girls and boys, respectively. The ATT estimate indicates that school enrollment of girls in a village increases by 2 percent while that of boys does not change. This suggests that the increase in school enrollment in a village due to consolidation is driven by girls. I discussed earlier that having a principal to monitor the quality of schooling could encourage more parents to send their children to school. Presence of a principal could also increase the confidence of parents about the safety of children at the school. Muralidharan and Prakash (2017) has shown that reduced safety costs can lead to increased enrollment among girls, in similar context. These table estimates are consistent with this finding.

B.2. Effect on school achievement

Every village has one less school because of consolidation. However, this has not led to any decline in school enrollment. The possibility of displaced children not being accommodated in the remaining schools, can thus be ruled out. Contrary to media reports, consolidation led to a 2 percent increase in school enrollment in a village. This could adversely affect the teaching effectiveness if the number

of teachers are not adjusted accordingly. I find that consolidation was followed by adjustment of the number of teachers which led to an increase in the number of teachers in a village by 0.7. Consolidation also increased the proportion of children attending a school with a principal, by 0.1. The government anticipated that the presence of a principal will provide better quality education to the children who has moved to the recipient school due to consolidation. It needs to be tested if the presence of a principal and the increased number of teachers, due to consolidation, translated into better learning outcomes.

In order to study how consolidation affects achievement, I estimate Equation 1. U-DISE data has two measures on achievement. The first is the proportion of children in a village who score more than 60 percent in grade 5 exams, among exam takers. The second is the proportion of children in a village who score more than 60 percent in grade 8 exams, among exam takers. I use each of these variables as the outcome variable, Y_{vt}. In the left panel of Figure 13, I present the coefficients of the estimation on proportion of high scorers in grade 5 exams. Proportion of high scorers in grade 5 exams remain unchanged in the year of consolidation and in the subsequent year. Consolidation reduces the proportion of high scorers in grade 5 exams by 0.01 in the second year and by 0.04 in the third year, although these estimates are not statistically significant.

Column (1) of Table 5 presents table estimates of the impact of consolidation on proportion of high scorers in grade 5 exams, in a village. I use Callaway and Sant'Anna (2021) methods to generate the average treatment effect on the treated (ATT) estimate. This is estimated on a sample of 14,984 villages over 5 years as the outcome measure is available only in years 2009, 2014, 2015, 2016 and 2017. The ATT estimate indicates that proportion of high scorers in grade 5 exams decline by 0.08. At baseline, 64 percent of the grade 5 exam takers in a village score above 60 percent. This declines to 56 percent due to consolidation. This implies that the presence of a principal or the increased number of teachers has not translated into increased achievement among grade 5 students.

In the right panel of Figure 13, I present the coefficients of the estimation on proportion of high scorers in grade 8 exams. Proportion of high scorers in grade 8 exams, in a village are not affected by school consolidation. Column (2) of Table 5 presents table estimates of the impact of consolidation on proportion of high scorers in grade 8 exams, in a village. I use Callaway and Sant'Anna (2021) methods to generate the average treatment effect on the treated (ATT) estimate. This is estimated on a sample of 14,984 villages over 5 years as the outcome measure is available only in years 2009, 2014, 2015, 2016 and 2017. The ATT estimate indicates that proportion of high scorers in grade 8 exams has not increased by more than 0.03 due to consolidation.

Consolidation does not increase achievement. This finding is in line with six of the seven studies on school size and student performance reviewed by Andrews et al. (2002) which found decreasing

returns to scale. According to Cotton (1996), reasons for superior performance of students in small schools have not been established definitely. Speculative explanations focuses on non-academic factors associated with a smaller school like a greater sense of community belonging among students, closer interaction with adults and more parental involvement.

VI. Discussion and Conclusion

Until recently, India has been focusing on providing school access to each of its children. Its access-oriented reforms with special attention to universalization of primary education resulted in India having a large number of grade 1-5 schools with one or two teachers and with no principal. Multiple states of the country deem this as a concern and have resorted to school consolidation. National Education Policy (NEP 2020), which is India's first attempt to shift its focus from school access to school quality, also advocates school consolidation to channelize its resources more efficiently (Kumar and Varghese, 2022). Media reports have not been in favor of school consolidation and it is imperative that there is empirical evidence on a policy which is quickly emerging as a nation-wide one.

In order to provide empirical estimates to the impact of consolidation, I exploit the staggered roll out of the policy in the Indian state of Rajasthan. Rajasthan is the first state to implement school consolidation at scale. Combining government orders on consolidation with administrative data on schools, I find that school consolidation leads to a decline in the number of schools in a village and to an increase in the number of children attending a school with a principal. I also find that consolidation leads to an increase in the number of teachers. I further show that consolidation increases school enrollment, particularly that of girls. Consolidation does not affect school achievement of children who have been studying in the recipient school. I find that school achievement among children who move to the recipient school declines.

I view these results as encouraging. One common criticism against school consolidations is that it reduces access to school. Rajasthan school consolidation, by merging a single grade 1-5 school to a nearby grade 6-10 school than merging multiple grade 1-5 schools, ensures that school access is not compromised. This is supported by the result that enrollment has not declined, in spite of the fact that school enrollment is not compulsory in this context. It is also encouraging that the student achievement of children already studying in the recipient school is not declining.

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Figures & Tables

Figure 1: News headlines on consolidation in multiple Indian states

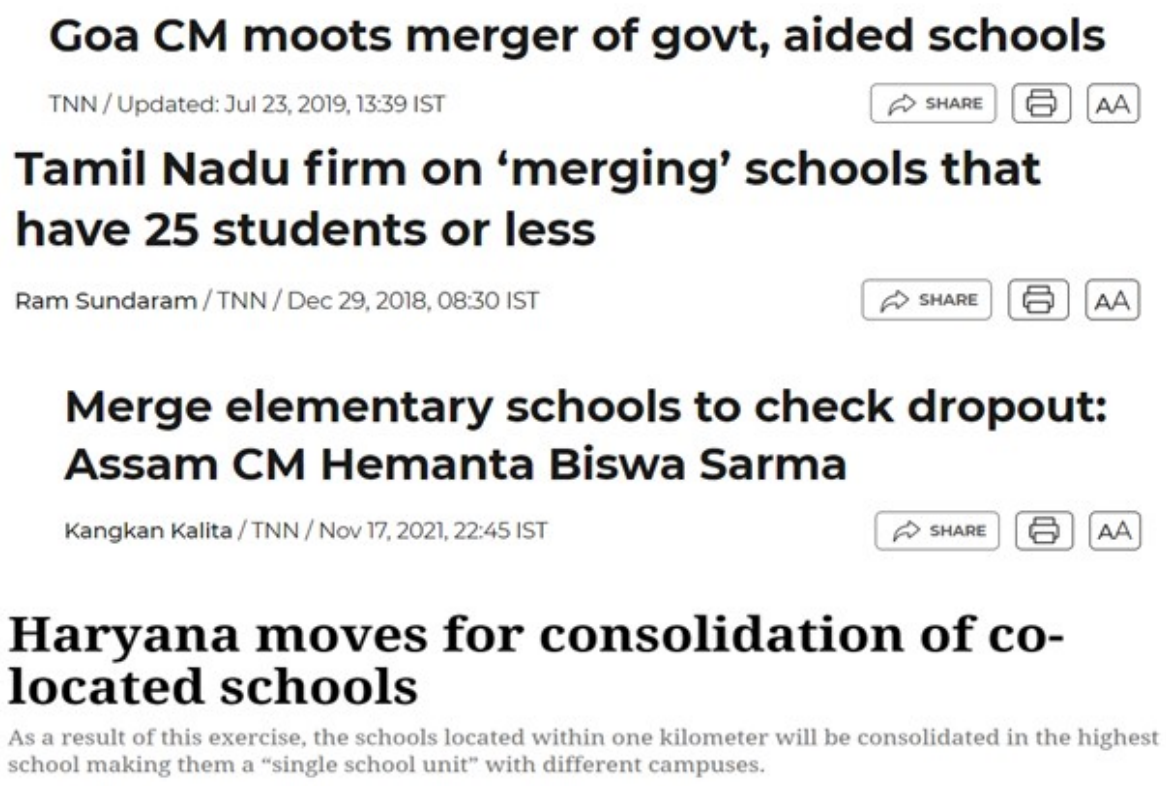
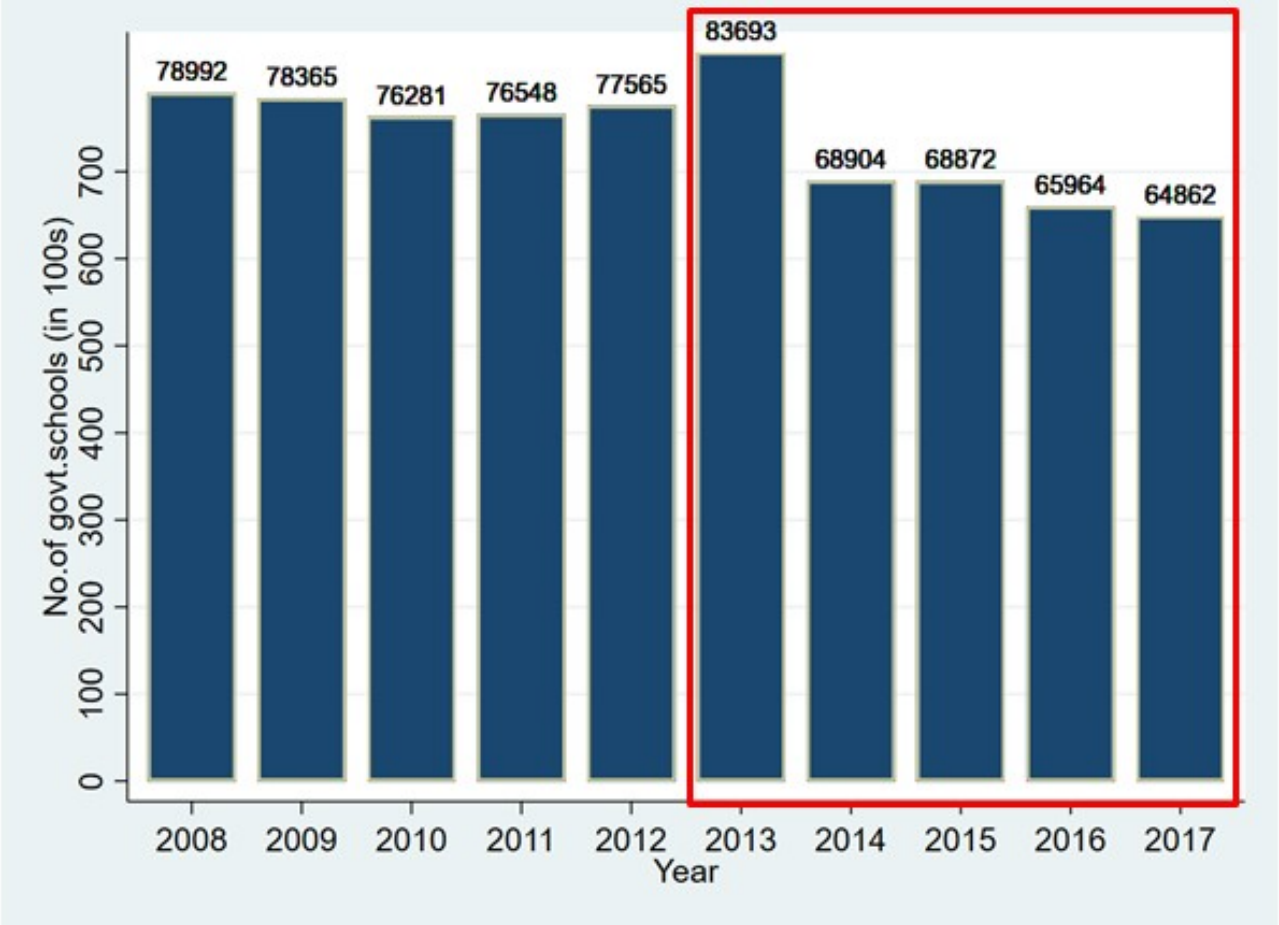


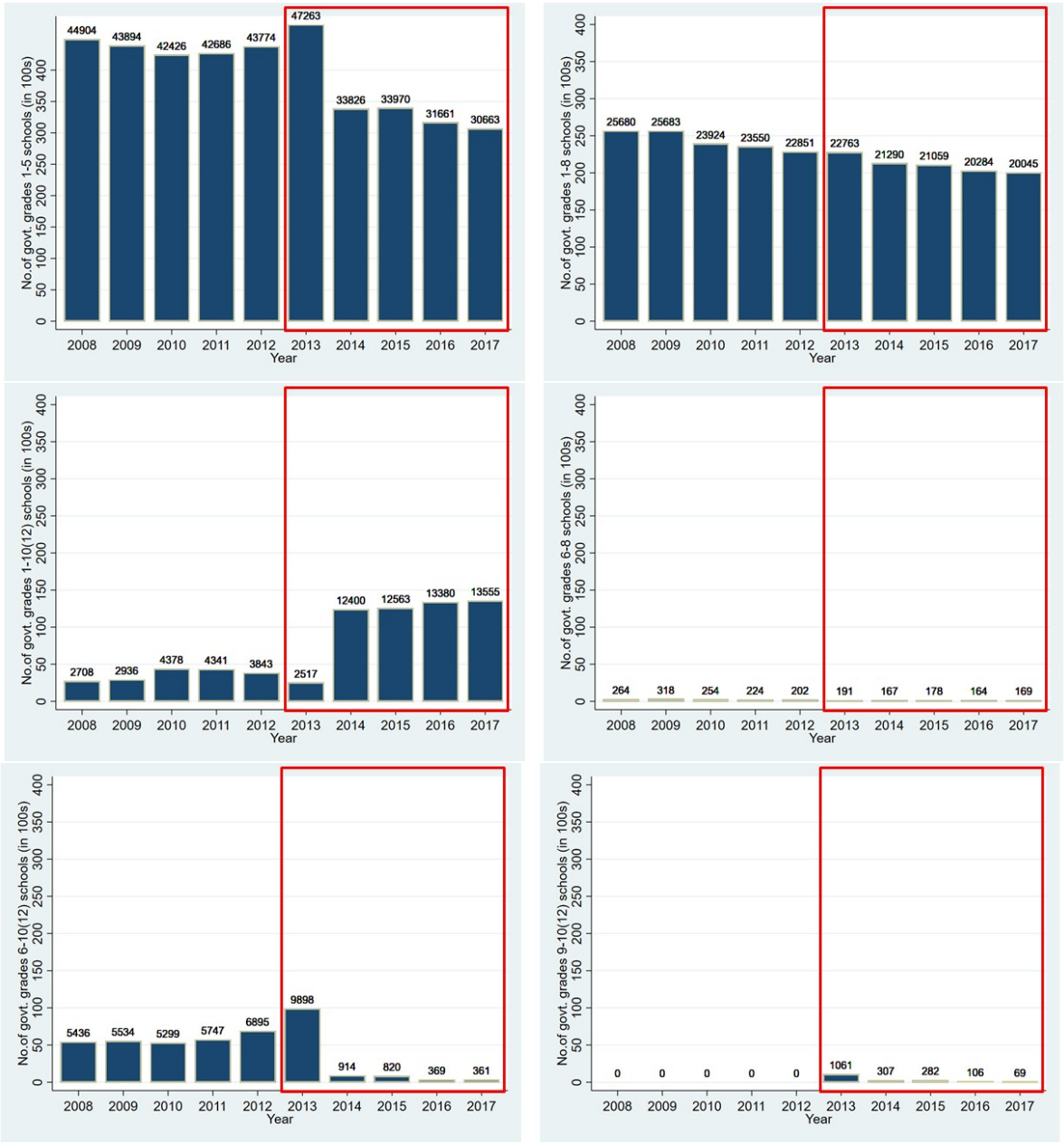
Figure 2: Number of govt.schools over years: Rajasthan



Notes: This figure presents the number of government schools in Rajasthan during the period of analysis. The years of particular interest are 2014, 2016 and 2017 where number of government schools in Rajasthan declined. These years correspond to the three waves of school consolidation.

Source: U-DISE data from 2008-2017. Corresponds to 51539 villages across 32 districts.

Figure 3: Number of govt. schools by type over years: Rajasthan



Notes: These figures present the number of government schools by type, during the period of analysis. The schools are categorized into types based on the grades to which they cater to. The years of particular interest are 2014, 2016 and 2017 which correspond to the three waves of school consolidation.

Source: U-DISE data from 2008-2017. Corresponds to 51539 villages across 32 districts.

Table 1: Details of Rajasthan school consolidation

	2014 consol.		2016 consol.		2017 consol.	
	N	%	N	%	N	%
Panel A: *School level*						
No.of model schools	10399	100	1325	100	376	100
Multiple elem.schools merged	2284	22.0	100	7.5	40	10.6
Girls' only school merged	390	3.8	387	29.2	89	23.7
Panel B: *Village level*						
No.of consolidated villages	9524	100	1295	100	375	100
High school (HS) as recipient	9521	99.9	1295	100	375	100
Upper primary (UP) school as recipient	1	0.01	0	0	0	0
HS & UP schools as recipients	2	0.02	0	0	0	0

Notes: This table reports the number of model schools created due to consolidation and number of villages where at least one consolidation occurred. Across the three waves of consolidation, the table reports the number of observations and the share as a percentage of the total number of observations reported in the first row.

Figure 4: News headlines on Rajasthan school consolidation

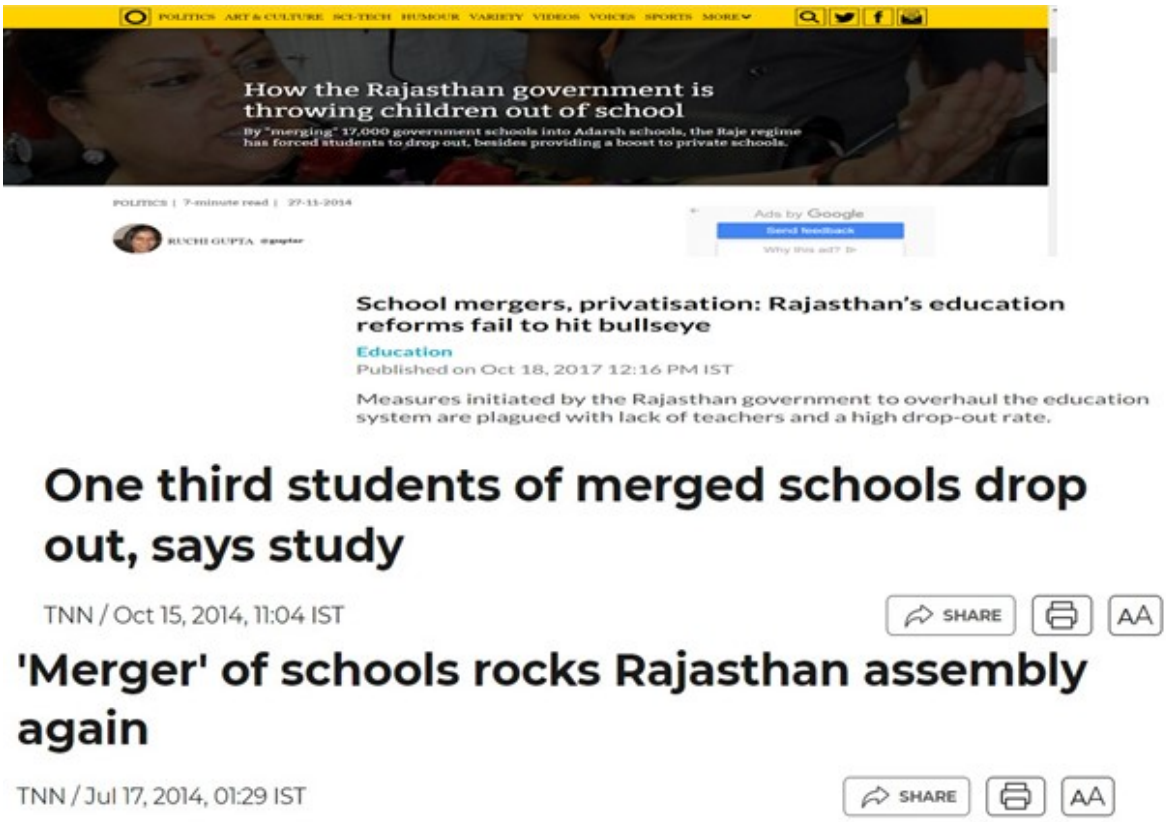
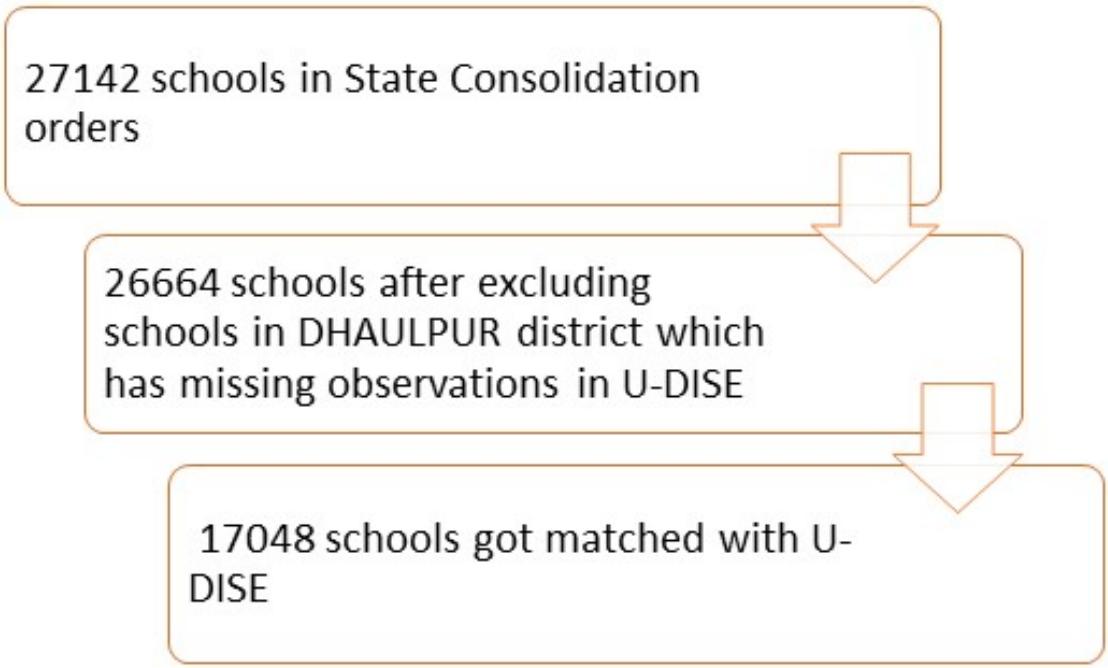
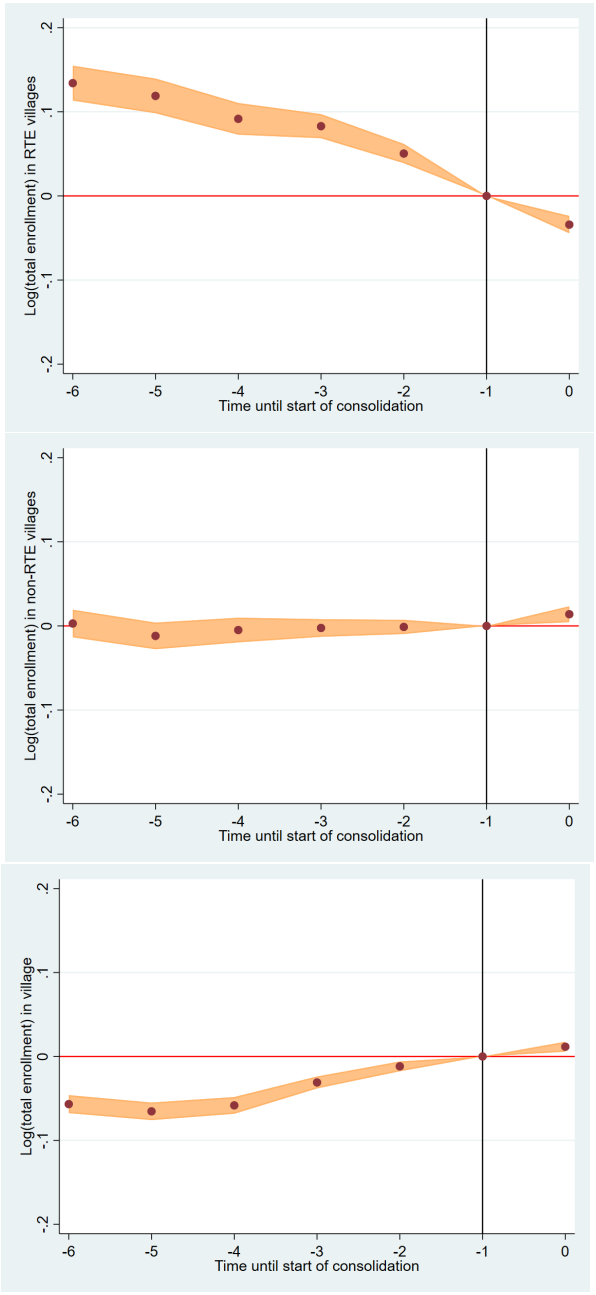


Figure 5: Sampling: Matching schools across State consolidation orders and U-DISE data



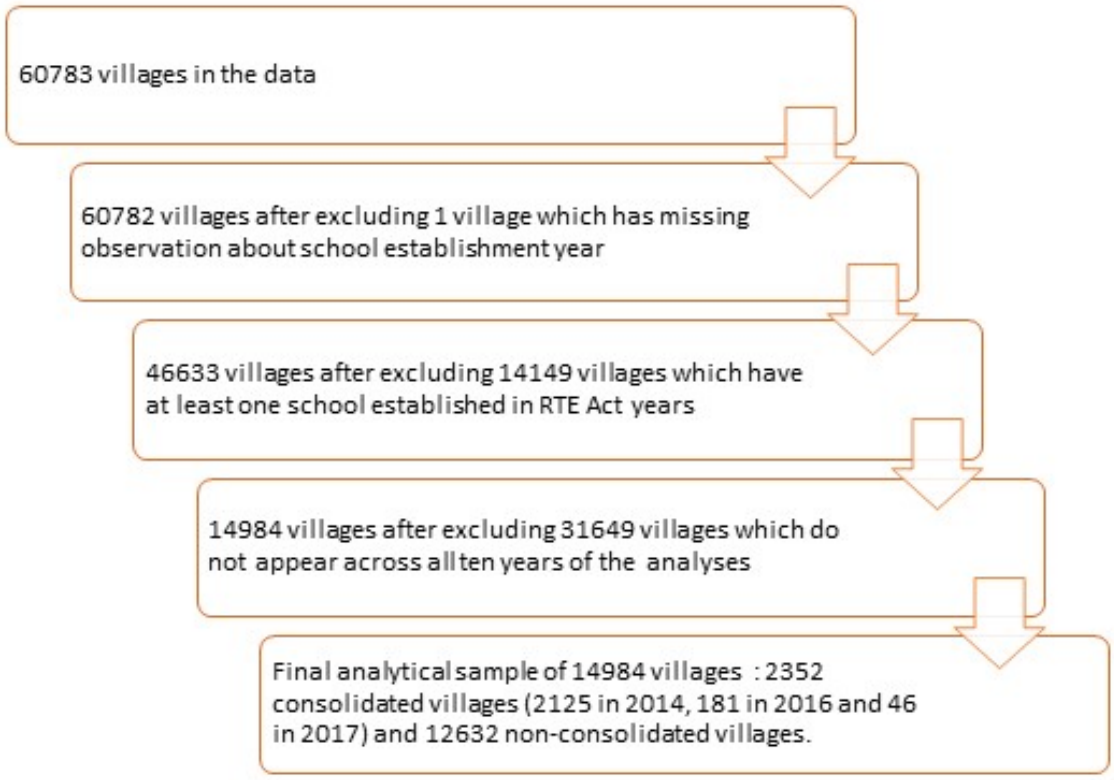
Notes: This figure presents the first step in building the analytical sample from the State consolidation orders. I match the school names across the State consolidation orders and U-DISE data using a custom fuzzy matching script based on the Levenshtein algorithm.

Figure 6: Sampling: Pre-trends in school enrollment in RTE villages versus non-RTE villages



Notes: These figures present the pre-consolidation trend in school enrollment among villages where at least one school was established during RTE Act years 2009 - 2013, among villages where no school was established during RTE Act years and among all villages,. This is restricted to event years which exist across all villages.

Figure 7: Sampling: Restrictions imposed to build the analytical sample



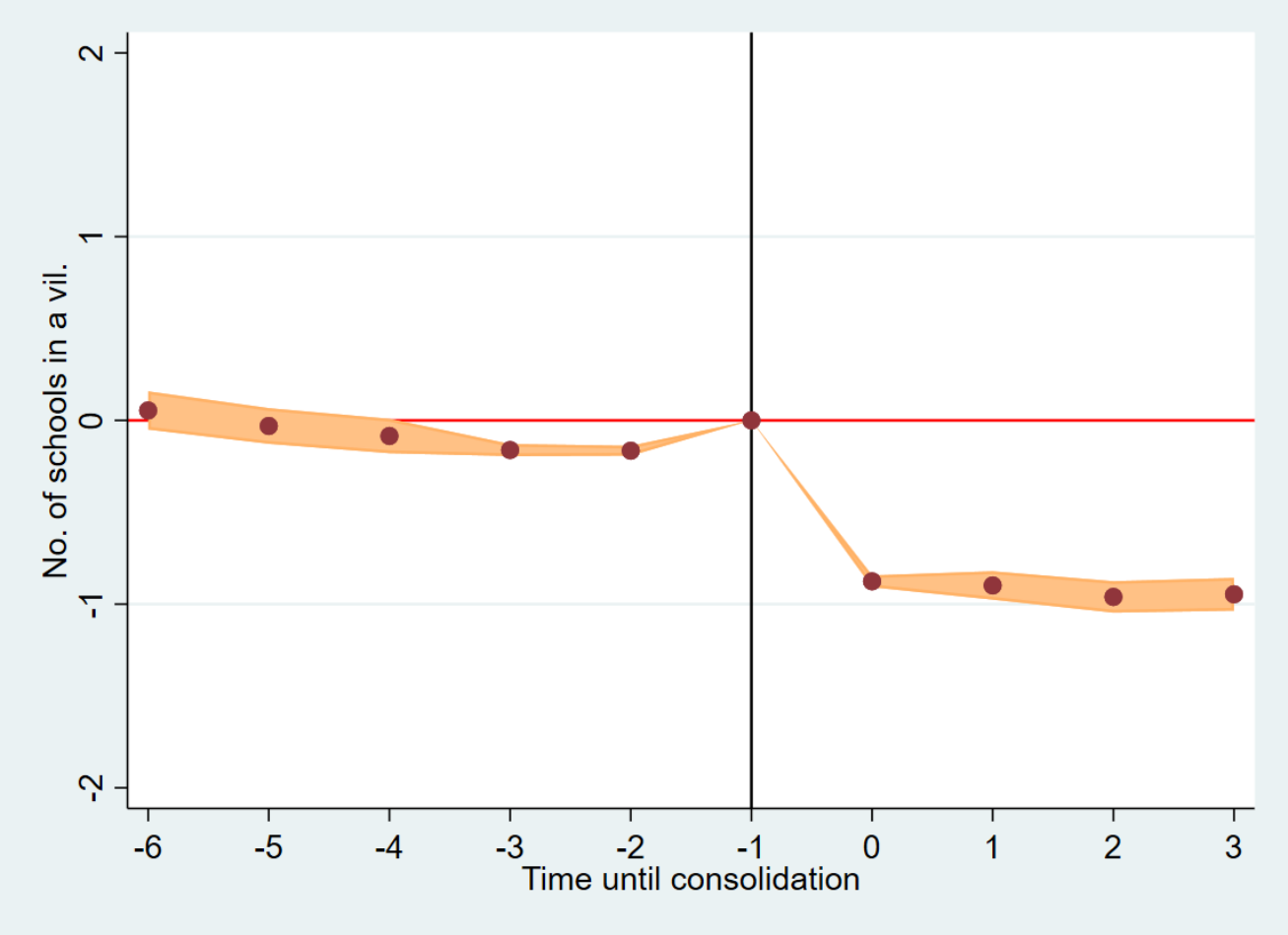
Notes: This figure presents the restrictions that I impose on the matched dataset to build the analytical sample.

Table 2: Baseline village-level summary statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variable	Non-consol.	2014 consol.	2016 consol.	2017 consol.	2014 vs non	2016 vs non	2017 vs non	2014 vs 2016	2016 vs 2017	2014 vs 2017
No.of schools	1.59	4.34	4.03	2.24	2.75***	2.44***	0.65***	0.31	1.79***	2.10***
	(1.31)	(3.91)	(2.82)	(1.62)	(0.04)	(0.10)	(0.19)	(0.30)	(0.43)	(0.58)
No. of govt. schools	1.44	3.28	3.06	1.74	1.84***	1.62***	0.30**	0.22	1.32***	1.54***
	(0.91)	(2.79)	(2.24)	(1.12)	(0.03)	(0.07)	(0.13)	(0.21)	(0.34)	(0.41)
No. of pvt.schools	0.13	0.99	0.93	0.46	0.85***	0.80***	0.32***	0.06	0.47***	0.53**
	(0.59)	(1.49)	(1.05)	(0.78)	(0.02)	(0.05)	(0.09)	(0.11)	(0.17)	(0.22)
Total enrollment	142.47	483.38	421.83	205.43	340.90***	279.36***	62.96**	61.55	216.39***	277.94***
	(188.42)	(517.45)	(339.38)	(133.16)	(6.16)	(14.33)	(27.81)	(39.16)	(51.08)	(76.37)
Prop.of girls among enrolled	0.48	0.45	0.47	0.49	-0.03***	-0.01	0.01	-0.02***	-0.02	-0.04***
	(0.08)	(0.07)	(0.07)	(0.08)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Number of teachers	5.31	18.88	17.22	9.54	13.57***	11.91***	4.24***	1.66	7.68***	9.34***
	(7.53)	(20.07)	(13.36)	(7.88)	(0.24)	(0.57)	(1.11)	(1.52)	(2.06)	(2.97)
Takers in grade 5 exams(2009)	2.49	9.52	6.77	2.91	7.03***	4.28***	0.42	2.75*	3.85***	6.60**
	(10.13)	(20.23)	(9.69)	(4.70)	(0.28)	(0.76)	(1.49)	(1.52)	(1.47)	(2.98)
High scorers in grade 5 exams(2009)	1.31	6.25	4.27	1.54	4.95***	2.96***	0.24	1.99	2.72***	4.71*
	(6.09)	(16.69)	(6.74)	(3.13)	(0.20)	(0.46)	(0.90)	(1.25)	(1.02)	(2.46)
Takers in grade 8 exams(2009)	1.43	8.80	7.33	2.98	7.36***	5.90***	1.55	1.47	4.35**	5.82*
	(7.49)	(20.56)	(11.71)	(6.06)	(0.24)	(0.57)	(1.11)	(1.55)	(1.79)	(3.04)
High scorers in grade 8 exams(2009)	0.73	4.74	3.79	1.80	4.01***	3.06***	1.07*	0.95	1.99**	2.94
	(4.20)	(14.70)	(6.51)	(3.92)	(0.16)	(0.32)	(0.62)	(1.10)	(1.00)	(2.17)
Observations	12,632	2,125	181	46	14,984	14,984	14,984	14,984	14,984	14,984

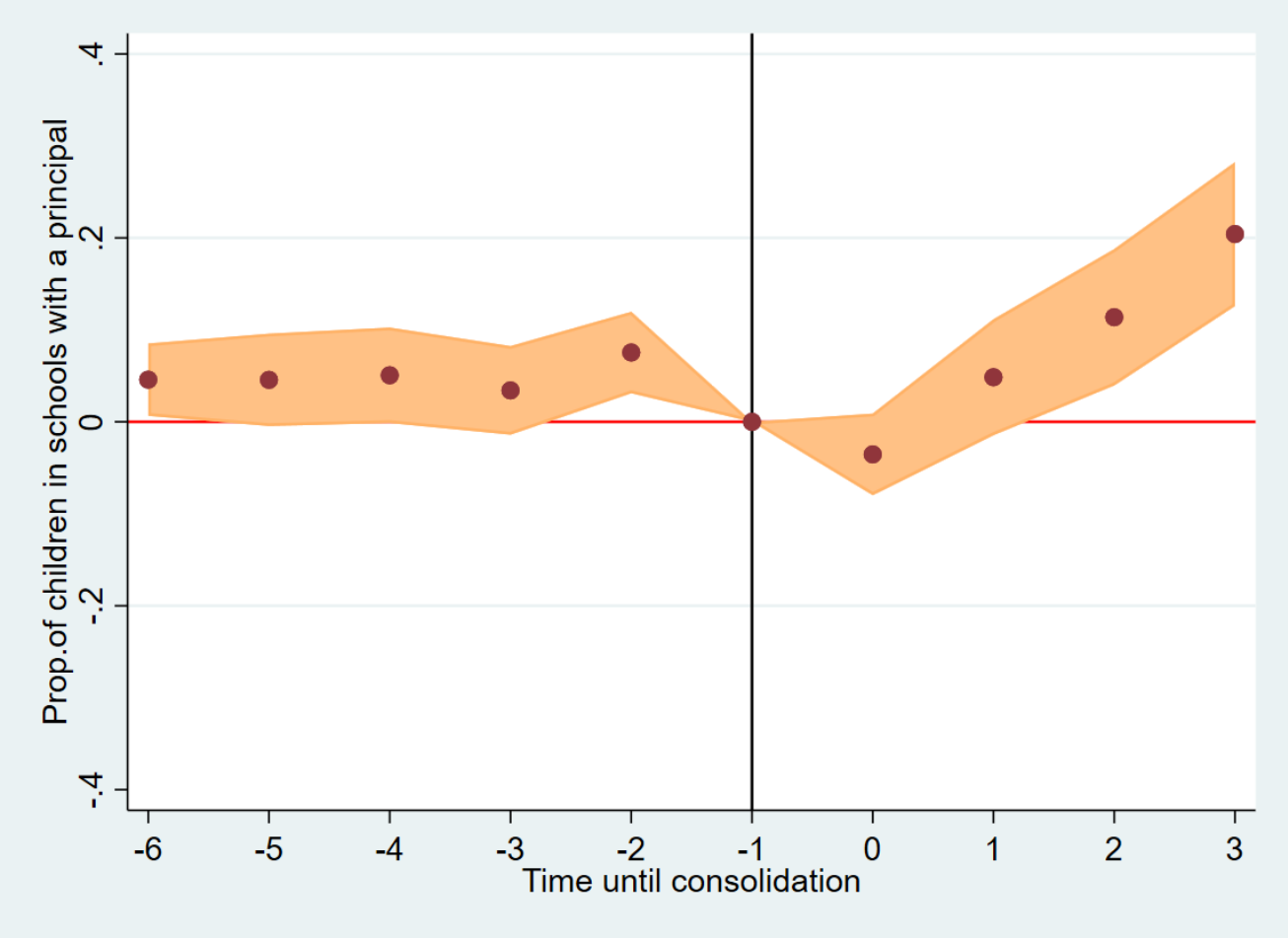
Columns (1) - (4) of this table present village level summary statistics at baseline in villages which had the earliest instance of consolidation, across the three waves of consolidation and in non-consolidated villages.
Columns (5) - (10) present differences and the statistical significance of the differences in baseline characteristics across villages with different consolidation status.
Data on Takers and High scorers in grade 5 and grade 8 exams were first available in 2009.

Figure 8: Intermediate outcome of consolidation: Number of schools in a village



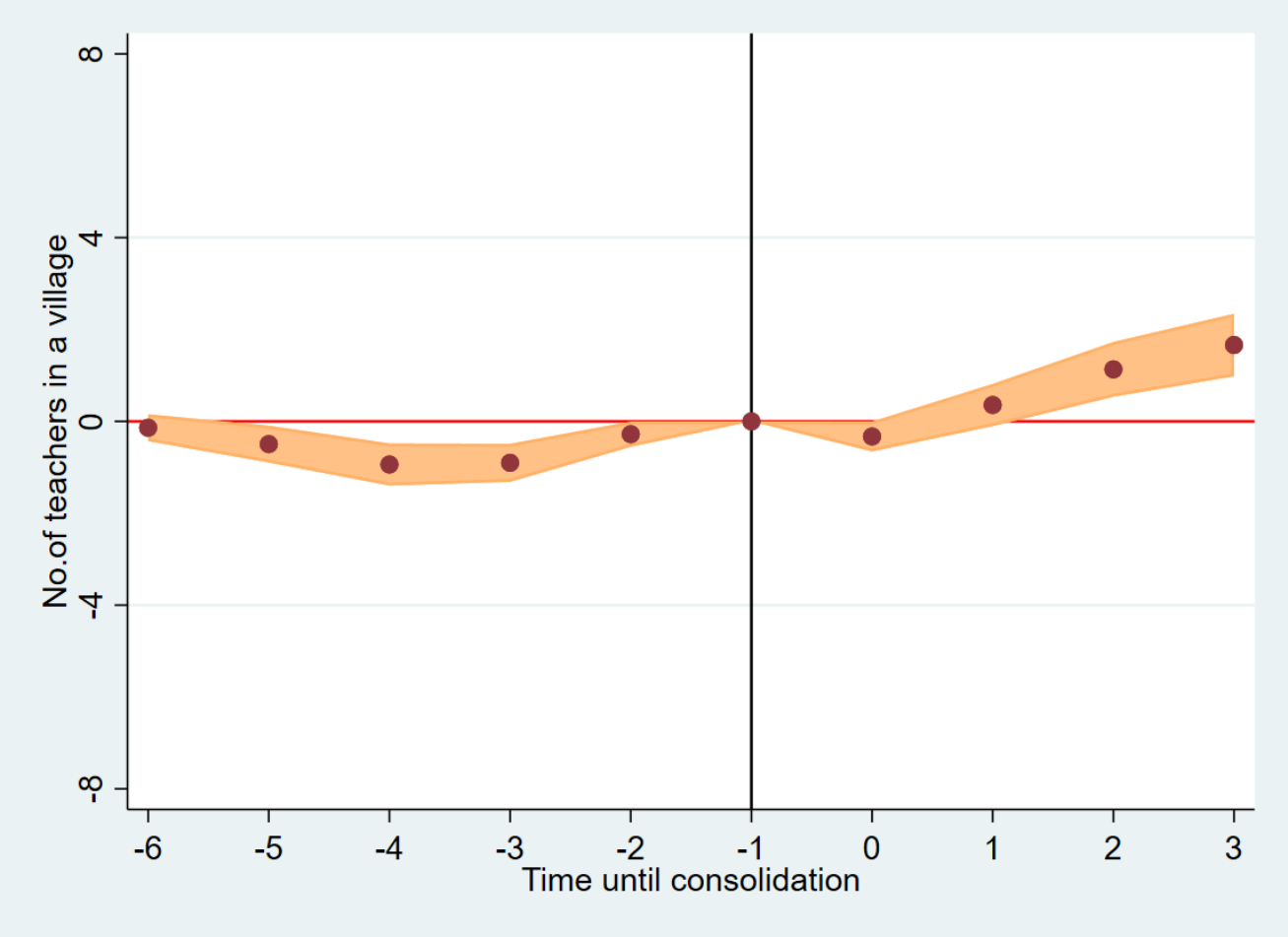
Notes: This figure presents the estimates of the impact of school consolidation on the number of schools in a village as estimated by Equation 1. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages.
Sample: Sample includes 14984 villages where 2352 are consolidated (2125 villages consolidated in 2014, 181 villages consolidated in 2016 and 46 in 2017) and 12632 are never consolidated.

Figure 9: Intermediate outcome of consolidation: Proportion of children studying in a school with a principal



Notes: This figure presents the estimates of the impact of school consolidation on the proportion of children in a village, among school enrolled, studying in a school with a principal as estimated by Equation 1. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages. This is also restricted to villages where none of the government schools experienced a change in the presence of principals during the RTE Act years.
Sample: Sample includes 4226 villages where 176 are consolidated (144 villages consolidated in 2014, 22 villages consolidated in 2016 and 10 in 2017) and 4050 are never consolidated.

Figure 10: Intermediate outcome of consolidation: Number of teachers in a village



Notes: This figure presents the estimates of the impact of school consolidation on total number of teachers in a village as estimated by Equation 1. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages. This is also restricted to villages which did not experience any change in the total number of teachers during the RTE Act years.
Sample: Sample includes 4090 villages where 226 are consolidated (194 villages consolidated in 2014, 29 villages consolidated in 2016 and 3 in 2017) and 3864 are never consolidated.

Table 3: Impact of school consolidation - Intermediate outcomes

	(1)	(2)	(3)
	No.of schools	Prop.of children with a principal	No.of teachers
ATT	-0.97***	0.10***	0.70***
	[-1.03,-0.90]	[0.05,0.15]	[0.29,1.12]
Baseline mean	4.28	0.38	10.48
N	149,840	42,260	40,900

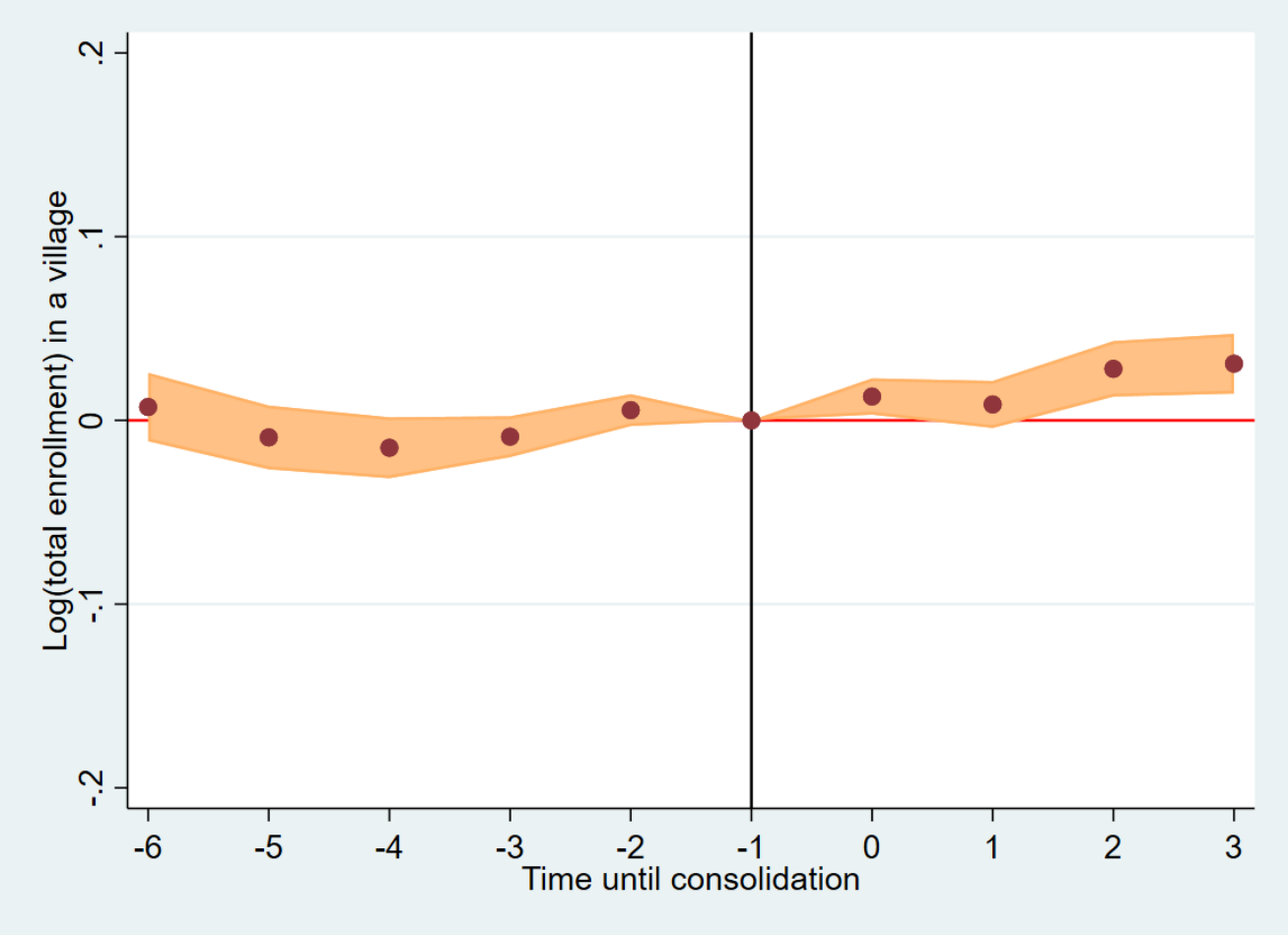
95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: This table presents ATT estimates of the impact of school consolidation on immediate outcomes, using Callaway and Sant'Anna (2021) methods. Column (1) corresponds to number of schools in a village. Column (2) corresponds to proportion of children in a village, among school enrolled, who attend a school with a principal. Column (3) corresponds to total number of teachers across all schools in a village. Baseline mean of the outcome variables, in the consolidated villages are reported.

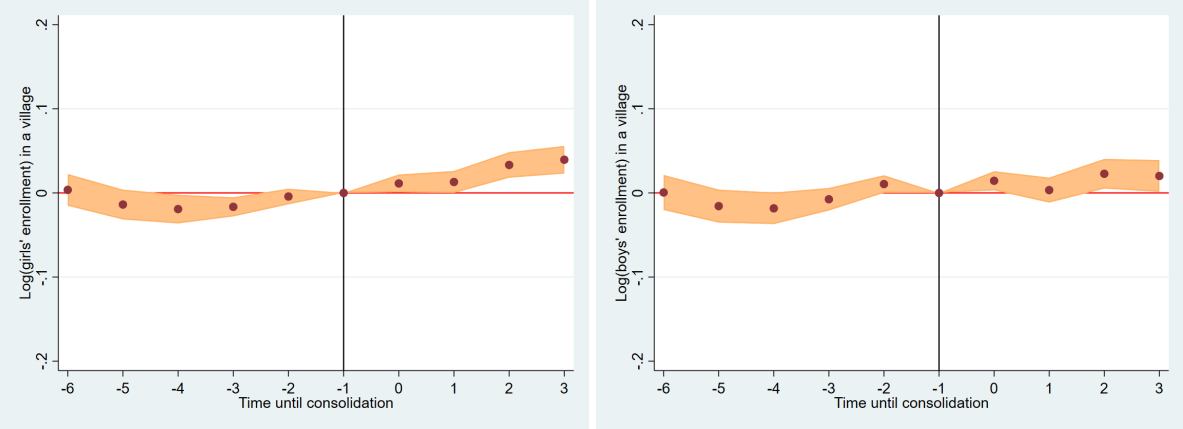
Sample: Column (2) is restricted to villages where none of the government schools experienced a change in the presence of head teachers during the RTE Act years. Column (3) is restricted to villages which did not experience any change in the total number of teachers during the RTE Act years.

Figure 11: Impact of consolidation: School enrollment



Notes: This figure presents the estimates of the impact of school consolidation on school enrollment in a village as estimated by Equation 1. The dependent variable is the log of the number of school enrolled children in a village. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages. Figure A6 presents similar figures for all event years and also for a larger set of villages.

Figure 12: Impact of consolidation: School enrollment among girls versus boys



Notes: These figures present the estimates of the impact of school consolidation on school enrollment in a village, separately for girls and boys as estimated by Equation 1. In the first panel, the dependent variable is the log of the number of school enrolled girls in a village. In the first panel, the dependent variable is the log of the number of school enrolled boys in a village. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages.

Table 4: Impact of school consolidation on school enrollment in a village

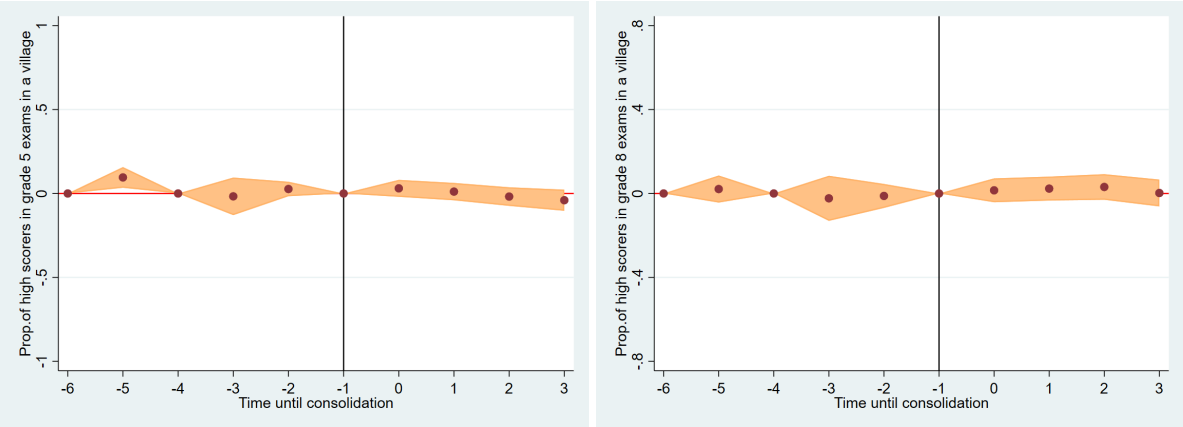
	(1) Total enrollment	(2) Girls' enrollment	(3) Boys' enrollment
ATT	0.02**	0.02***	0.01
	[0.01,0.03]	[0.01,0.03]	[-0.00,0.02]
Baseline mean	473.20	211.44	261.76
N	149,840	149,840	149,840

95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: This table presents ATT estimates of the impact of school consolidation on school enrollment, using Callaway and Sant'Anna (2021) methods. Column (1) corresponds to total school enrollment in a village. Column (2) corresponds to school enrollment of girls in a village. Column (3) corresponds to school enrollment of boys in a village. Baseline mean of the outcome variables, in the consolidated villages are reported.

Figure 13: Impact of consolidation: School achievement



Notes: This figure presents the estimates of the impact of school consolidation on school achievement in a village as estimated by Equation 1. The dependent variable is the proportion of children who scored more than 60 percent in grade 8 exams in a village, among those who took the exams. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages. The data on the outcome measure is available only in years 2009, 2014, 2015, 2016 and 2017. These coefficients are thus missing in event years $j = -6, -4$.
Sample: Sample includes 14,984 villages across 5 years.

Table 5: Impact of school consolidation on achievement

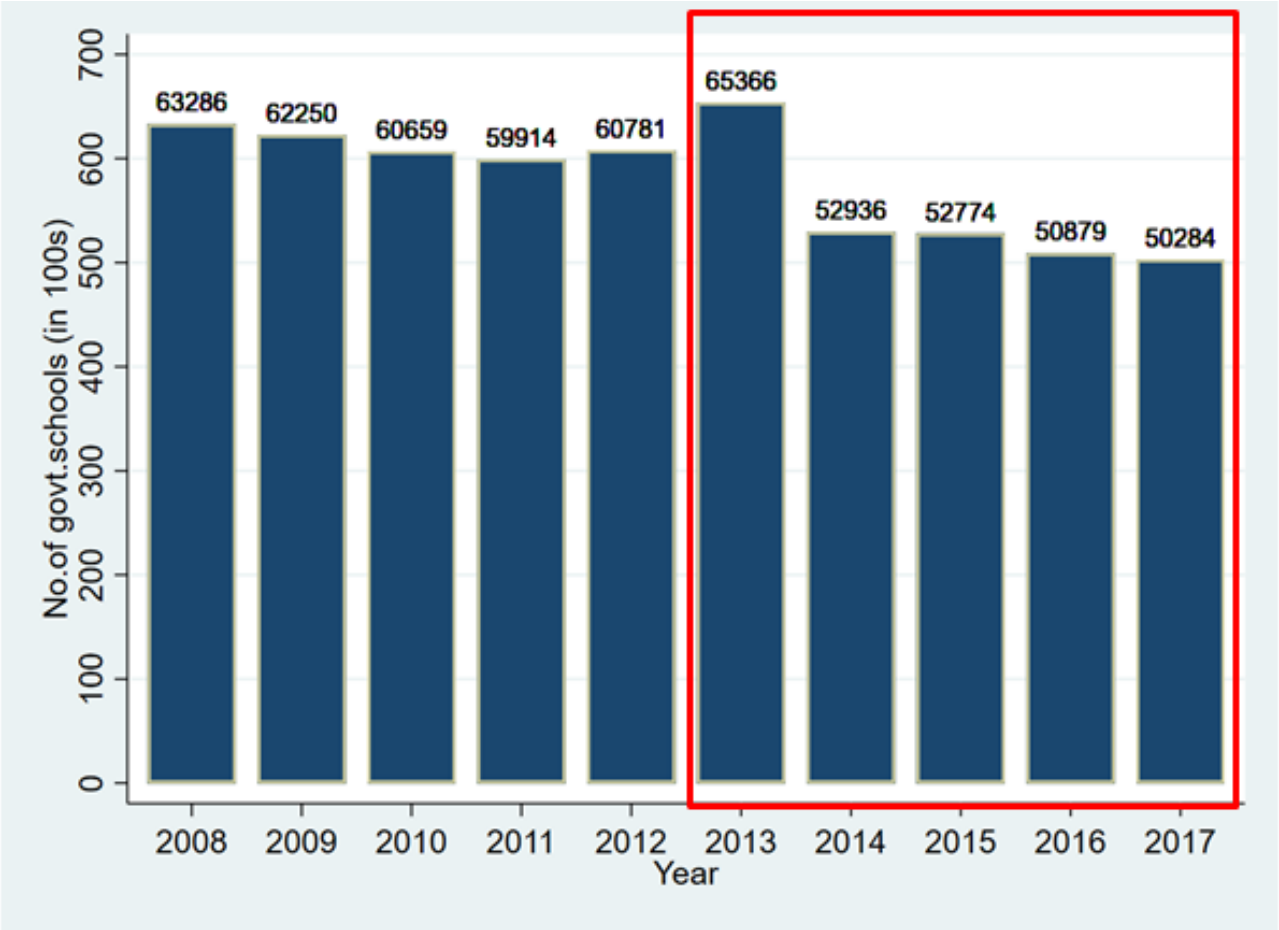
	(1)	(2)
	Prop.of high scorers in grade 5 exams	Prop.of high scorers in grade 8 exams
ATT	-0.08***	0.01
	[-0.11,-0.05]	[-0.02,0.03]
Baseline mean	0.64	0.51
N	74,920	74,920

95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: This table presents ATT estimates of the impact of school consolidation on achievement using Callaway and Sant'Anna (2021) methods. Column (1) corresponds to proportion of children who scored more than 60% in grade 5 exams in a village, among those who took the exams. Column (2) corresponds to proportion of children who scored more than 60% in grade 8 exams in a village, among those who took the exams. Baseline mean of the outcome variables, in the consolidated villages are reported.

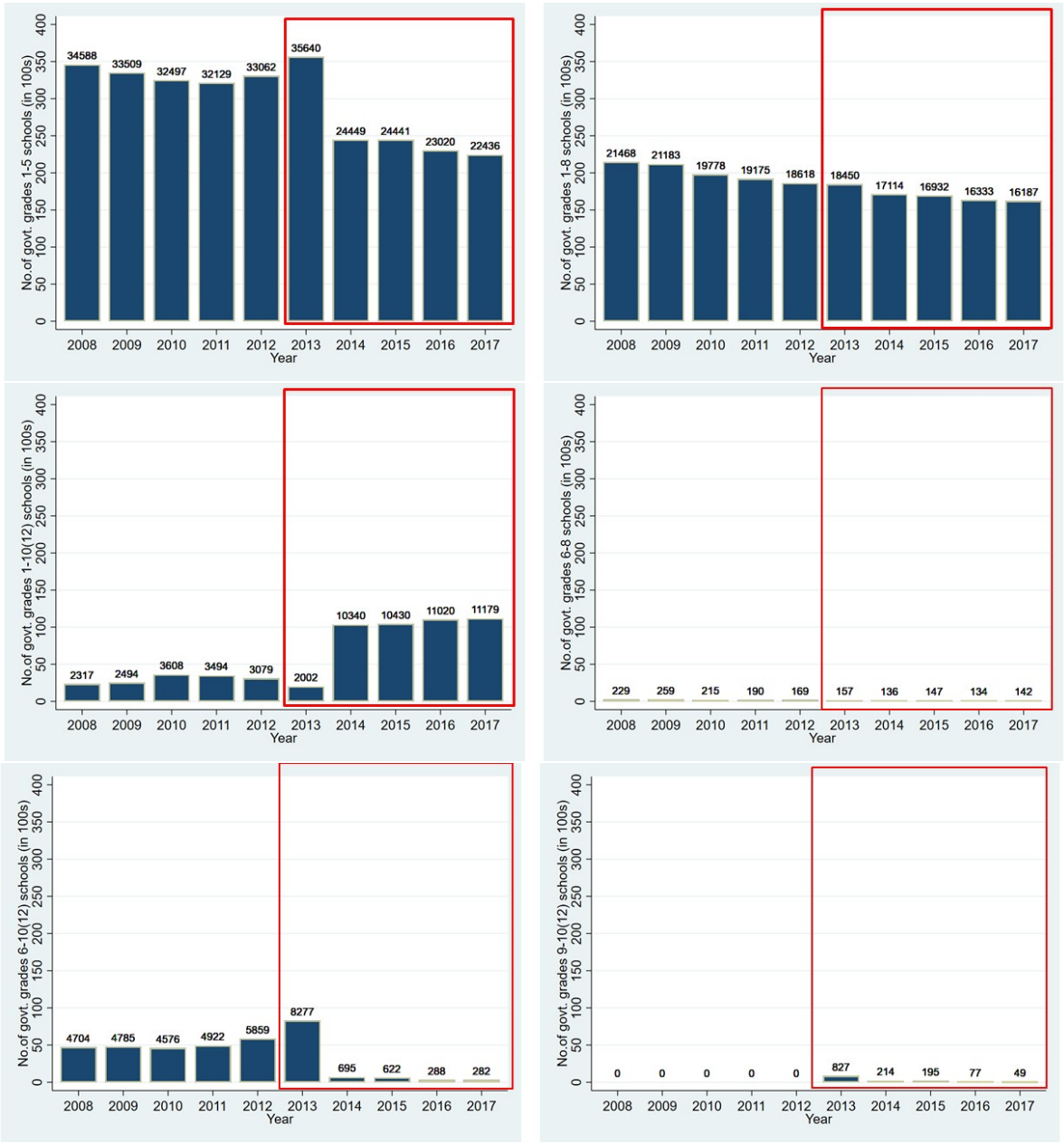
Figure A1: Number of govt.schools over years among villages which appear across all ten years of analysis: Rajasthan



Notes: This figure presents the number of government schools in Rajasthan among a restricted sample of villages which appear across all years of the analysis. The years of particular interest are 2014, 2016 and 2017 where number of government schools in Rajasthan declined. These years correspond to the three waves of school consolidation.

Source: U-DISE data from 2008-2017. Corresponds to 29948 villages across 32 districts.

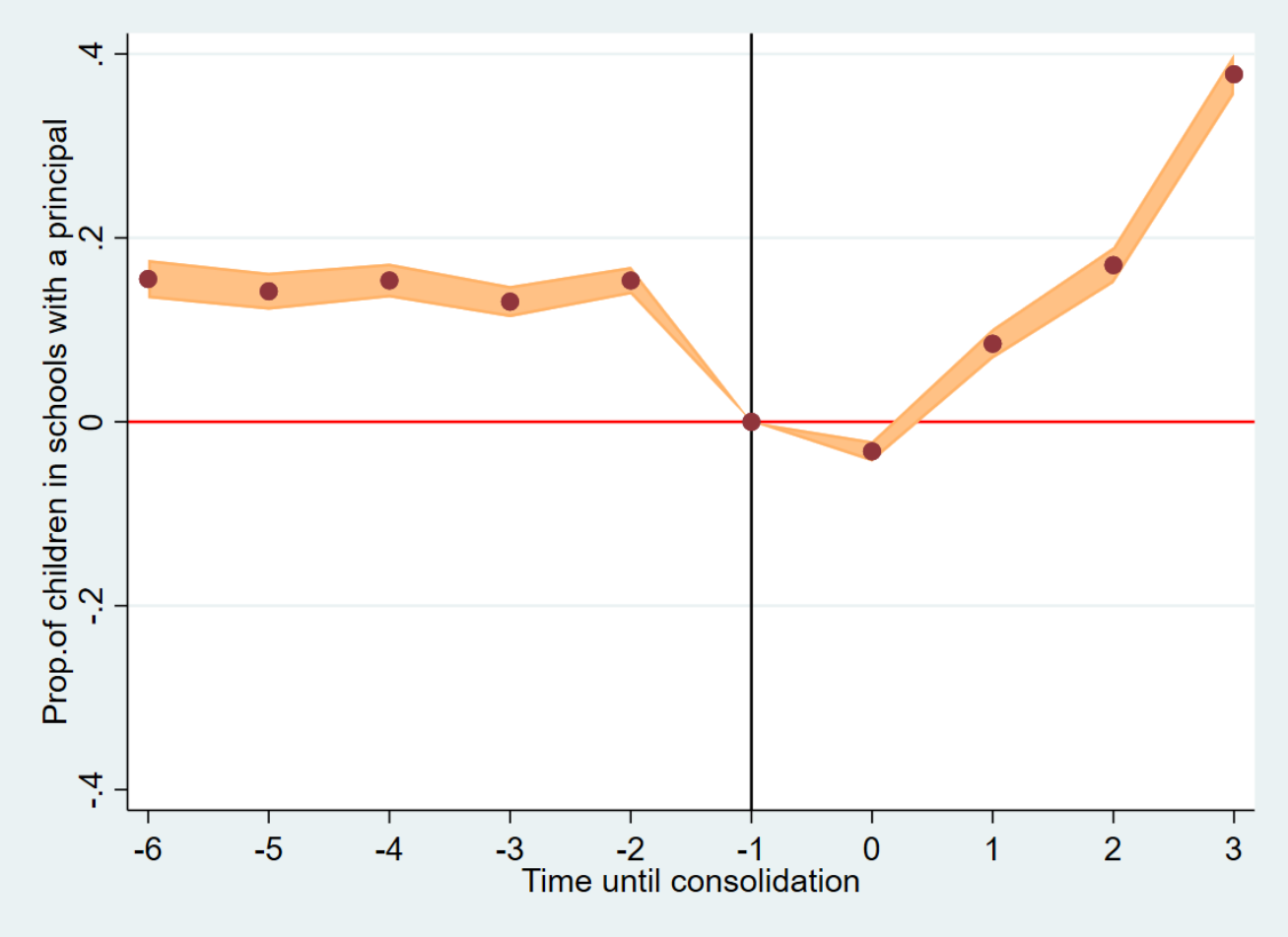
Figure A2: Number of govt. schools by type over years: Rajasthan



Notes: These figures present the number of government schools by type among a restricted sample of villages which appear across all years of the analysis. The schools are categorized into types based on the grades to which they cater to. The years of particular interest are 2014, 2016 and 2017 which correspond to the three waves of school consolidation.

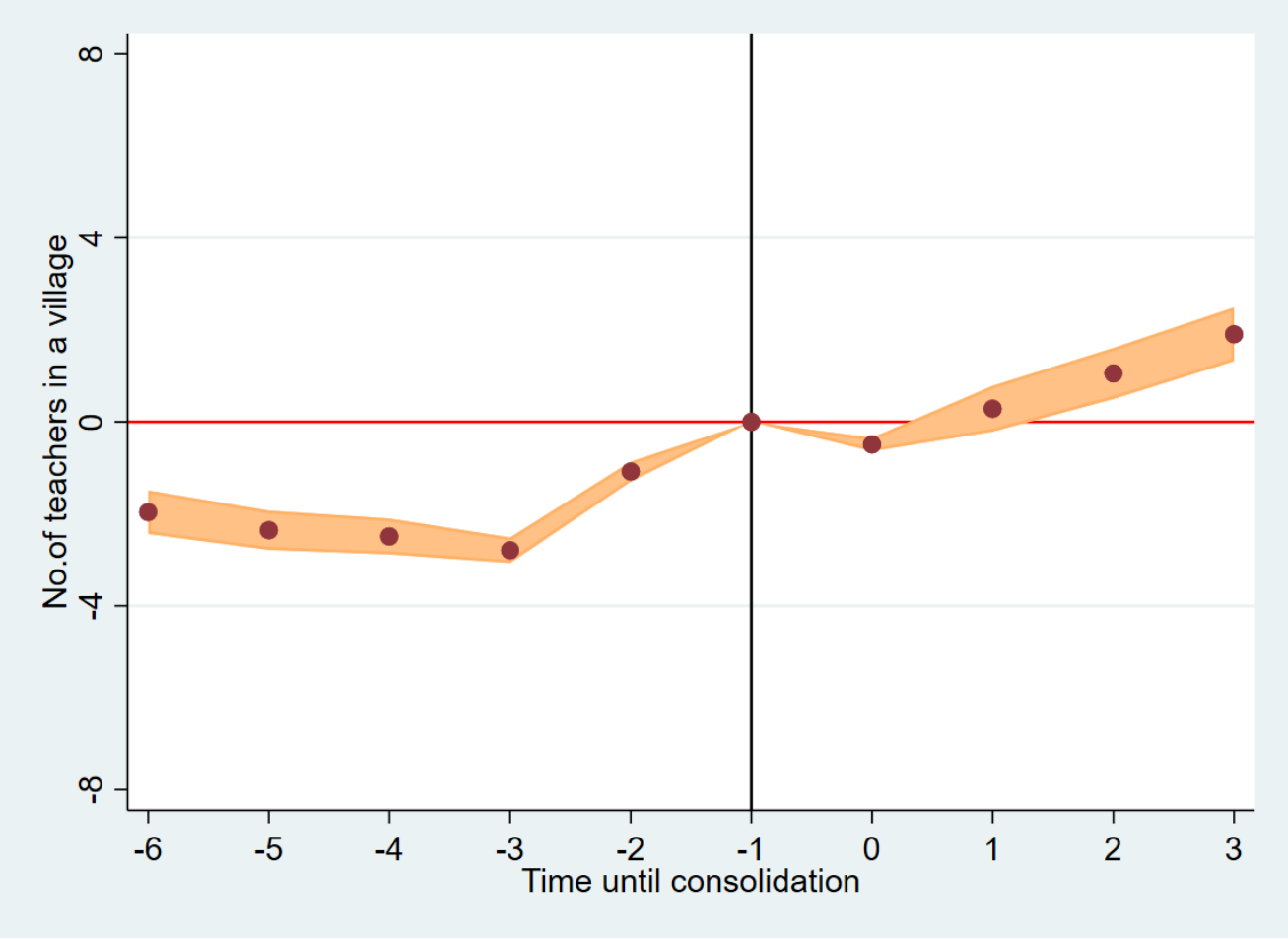
Source: U-DISE data from 2008-2017. Corresponds to 29948 villages across 32 districts.

Figure A3: Intermediate outcome of consolidation: Proportion of children studying in a school with a principal



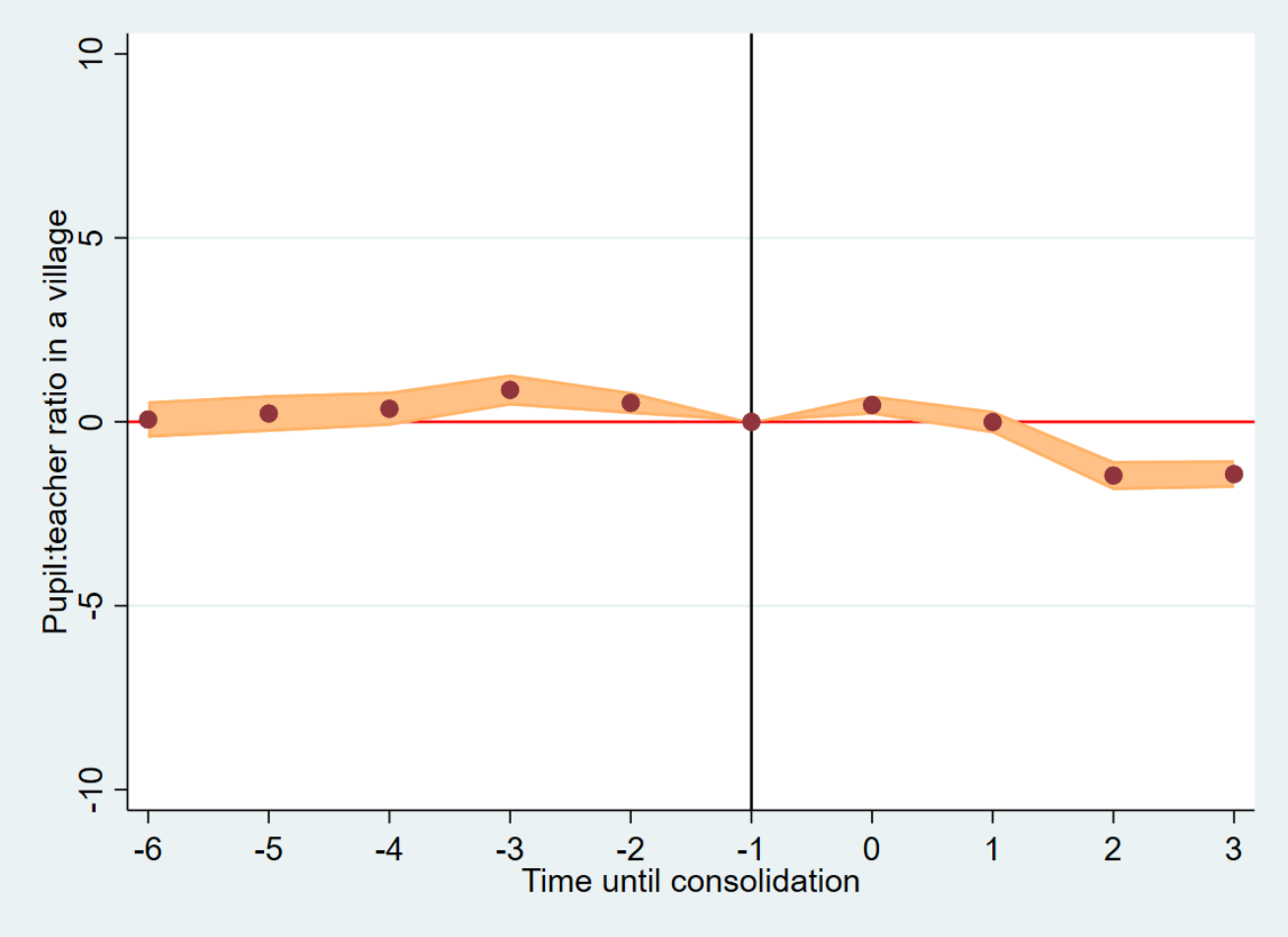
Notes: This figure presents the estimates of the impact of school consolidation on the proportion of children in a village, among school enrolled, studying in a school with a principal as estimated by Equation 1. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages.
Sample: Sample includes 14984 villages where 2352 are consolidated (2125 villages consolidated in 2014, 181 villages consolidated in 2016 and 46 in 2017) and 12632 are never consolidated.

Figure A4: Intermediate outcome of consolidation: Number of teachers in a village



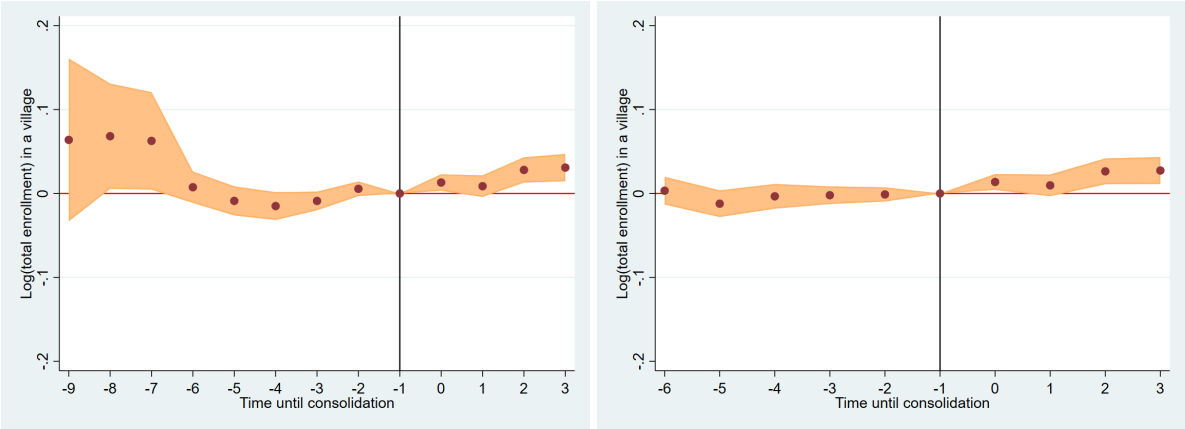
Notes: This figure presents the estimates of the impact of school consolidation on total number of teachers in a village as estimated by Equation 1. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages.
Sample: Sample includes 14984 villages where 2352 are consolidated (2125 villages consolidated in 2014, 181 villages consolidated in 2016 and 46 in 2017) and 12632 are never consolidated.

Figure A5: Intermediate outcome of consolidation: Pupil:teacher ratio in a village



Notes: This figure presents the estimates of the impact of school consolidation on pupil:teacher ratio in a village as estimated by Equation 1. The specification includes year fixed effects, village fixed effects and district*year fixed effects. s.e are clustered at the village level. In the pre-period, this is restricted to event years which exist across all villages.
Sample: Sample includes 14984 villages where 2352 are consolidated (2125 villages consolidated in 2014, 181 villages consolidated in 2016 and 46 in 2017) and 12632 are never consolidated.

Figure A6: Impact of consolidation: School enrollment - more event years and larger sample of villages



Notes: These figures are similar to Figure 11. The first panel presents the estimates of school consolidation on school enrollment where all available pre-period event years are included. The second panel presents the estimates of school consolidation on school enrollment in a village among an unbalanced panel of villages.