The Effect of School Merger on Student Academic Performance: Evidence from India

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Abstract

The merger of schools has been one of the most widespread education reforms in recent years; however surprisingly little research has directly investigated the effectiveness of school merger as a reform strategy in developing countries. We present the first evidence of school merger, which occurred when policymakers in India merged schools to improve the quality of education. Using Difference –in differences approach we exploit variation stemming from school merger to analyse the impact on student achievement as measured by test scores. For each student we observed test scores two years prior to school merger and up to three years after. We find that school merger makes a positive and statistically significant impact on student achievement in the short term, and that these impacts become more pronounced with time. Furthermore, we also investigate the heterogeneous impact of school merger on different type of students. Our findings appear to be statistically significant and positive for both merger-guest and host students.

Key Words: Education, Difference in Difference, Merger Policy

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I. Background

Education is the most important leveller for social, economic and political transformation. Academic and policy interest in improving schools stems directly from an understanding of the value of human capital creation to both people and society (Hanushek, 2005). Over the past four decades, developing nations have significantly expanded their education system. Despite significant progress in boosting enrolment and increasing years of schooling since 1960, 260 million children of primary school age are still not enrolled in schools. (UNDP, 2018). The poor quality of education in developing countries is a further cause for concern. Six out of 10 children and adolescents are not achieving a minimum level of proficiency in reading and math (UNDP, 2018). Grade repetition and dropping from school at an early age are common, teachers are often absent from classrooms, and many children learn much less than the learning objectives set in the official curriculum (Lockheed and Verspoor (1991), Harbison and Hanushek (1992), Hanushek (1995), Glewwe (1999)).

In recent years, governments across the globe have enforced structural changes to schools and students in an attempt to improve student performance. The relationship between schooling inputs and education outcomes is of fundamental importance to education policy and has been the subject of numerous empirical studies worldwide. (Hanushek 2002; Hanushek and Luque 2003).

Previous research has focused on specific variables that affect student outcomes, such as teacher characteristics. (Rivkin, et.al. 2005), peer effects (Hanushek et al. 2003), class size (Angrist and Lavy 1999; Hoxby 2000), or birth order and family size (Hanushek 1992).

However, Concerns have been raised during policy discussions that supplying more inputs without considering efficiency may not be the most effective method for ensuring that everyone has access. In the context of limited state capacity and limited resources, school merger is gaining popularity in many developed and developing nations. In this process, a number of independent small schools are being shut down and their human and physical resources are being transferred to a single integrated school.

In this paper, we estimate the short-term impact of school merger by examining the school merger policy implemented by the state of Rajasthan in India in the year 2014–15. Our results suggest that school merger positively impact the student outcome.

Existing Literature on school merger mainly used data from developed word (Leithwood and Jantzi 2009 & Brucheret, 2018), and very limited studies are available for developing countries. (Liu.et.al. 2010). Moreover, some of the latest attempts to determine the effects of the consolidation of schools have produced inconsistent results (Humlum and Smith's, 2015b; Leithwood and Jantzi 2009; Liu et.al. 2010).

This paper examines the impact of school merger on individual student academic performance using a difference in differences methodology on student level data. In comparison to other previous studies, we are able to track the change in individual student test scores throughout a school merger process. For each student we track academic performance two years before the merger and then up to three years after. The merger of schools we consider was the result of school reforms initiatives of state government of Rajasthan that took place in academic year 2014-15. To improve the education quality and better utilization of resources, 17000 out of 80000 schools were shut down or merged with other schools. This process of merger resulted in a rise in school size at the individual level. Moreover, unlike in developed nations, the consolidation of schools in India was not primarily aimed at low-performing schools. Hence similar to Beuchert et al. (2018), we are able to explore heterogeneous impacts that extend beyond the effect on low-performing students, guest students, and host students. We are able to track the development of individual student performance over the course of school merger. Furthermore, the richness of our student level panel data enables detailed heterogeneity analysis, which can be informative about the impact of merger on different types of students. Both displaced students (Guest) whose school was closed and transferred to another school and receiving students (Host) whose school expanded have been examined to analyse the effects of the merger. In addition, to this we also analyse the peer effect on student achievement.

We found that individual student performance measured by test scores increased by 3.14% of SD in year 2018 due to merger. Furthermore, comparing the five year student achievement gains, the results indicate that the positive effect of merger increases over time.

We contribute to the existing literature by utilising variation from school merger in a setting where the decision to close a school and merge it into another school is not based on performance. Additionally empirical evidence of impact of merger policy in India is almost negligible. Taking advantage of natural experiments that occurred in Rajasthan, we tried to estimates the causal effect of the school merger policy on both displaced and receiving student performance. The majority of the existing literature on school merger relied on data from developed countries, but we cannot simply generalise the same results to a developing country like India, where the quality of schools and learning outcomes matter even more.

Moreover, following Rajasthan, several other Indian states also announced merger of schools to improve the student performance. Recently government of India announced that schools of three other Indian states Orissa, Jharkhand and MP will be merged under NITI Aayog's Sustainable Action for Transforming Human Capital in Education (SATH-E) project. SATH-E which has been termed as consolidation and rationalization of schools, under this over 40,000 schools of these three states will be merged (NITI Aayog, 2020). As large-scale school consolidations are planned to be implemented in multiple Indian states, the policy will impact a large number of Indian students. Therefore, it is important to examine the potential impact of merger policy on students' academic performance.

The remaining sections of this paper are organised as follows. Section II begins by discussing why school consolidation may have an effect on student achievement. Section III then describe the institutional context and merger policy, followed by Section IV's description of the data and presents the empirical analysis. Section V presents the results of difference in differences analyse and peer effect. Finally, Conclusion is in section VI.

II. Why school consolidation can impact the student academic performance

Bigger is better the old faith (Swidler, 2005). The justifications for school consolidation are primarily based on economies of scale. Governments are choosing school merger as a school reform policy to increase efficiency and rational use of resources, particularly teachers. School consolidation increases school size, increases monitoring, and reduces costs. School mergers may have an impact on the composition of peer groups, which may be another goal of the merger.

Conant (1959) was the first to propose that large, "all-encompassing" schools might be beneficial. Large schools are expected to produce positive results as a result of improved infrastructure, greater specialisation of teachers, a more diverse composition of teachers and students, improved monitoring, economies of scale, and better time allocation between teaching and administrative work. Larger schools may provide their teachers with a broader curriculum and more rewarding job opportunities. This may attract more qualified and experienced teachers (Barter, 2006). In addition to this, proponents claim that Students may find interaction with a small number of teachers stifling. If a student has the same teacher for multiple years, the teacher's expectations for the student may become fixed after the first year, preventing student growth. In a larger school where teachers are more numerous each year, students receive a fresh start from teachers who specialise in a single grade and this will impact the student performance.

On the other hand, some argue that smaller schools foster stronger relationships between students and teachers, provide a safer and more welcoming environment for teachers and students, and improve the learning environment. Consequently, there are financial, social, and psychological reasons why school size influences the learning outcomes of students.

Presently the results are mixed for impact of school size on student academic performance. For example Sander (1993) found that school size has a beneficial effect on ACT scores, and Barnett, Glass, Snowden, and Stringer (2002) demonstrate that large schools are more cost-effective. Humlum and Smith (2015a) employ multiple estimators and instruments by utilising population and school catchment area registry data. Combining evidence from various identification strategies, the authors appear to conclude that larger schools (in countries with small average school sizes) do not harm students.

On the other hand Strang(1987) highlights the isolating impacts of huge, bureaucratic schools. According to him, the specialty that larger schools offer comes at a cost; a student now has five or six teachers, none of whom knows him or her well.

Alberg and Walberg (1994) observed that small schools foster a stronger connection between student and community. Palincsar and Brown (1986) document the advantages of the small schools techniques of mixed-age grouping, peer tutoring, and reciprocal learning in which students teach each other. Recent studies based on quasi-experimental design also found inconsistent results. Bradley and Taylor (1998) investigate the impact of school size on student performance in UK. A significant positive link was found between the size of a high school and the performance of the student. Using two years performance data (1994/95 and 1995/96) Barnett et al. (2002), found positive relationship between the size of school and performance of students in Northern Ireland secondary schools. Similarly , Haan et al.(2015) found positive impact of school consolidation on student achievement in Netherlands.

On the contrary, other studies found negative impact of larger schools (Andrews et al. 2002; Summers and Wolfe, 1977; Lee and Smith,1997). Berry and West (2010) found that student studied in smaller schools have higher returns to education and completed more years of schooling. Leithwood and Jantzi (2009) estimate that larger schools have greater dropout rates and lower attendance rates, and reduced involvement of students and out-of-school activities. Using an instrumental variable method Kuziemko (2006) examine the variation derived from aggregate school grade data on school mergers, student background and outcomes. She finds that small schools are more beneficial than large schools for student outcomes.

Studies by Schwartz et al. (2013) and Barrow et al. (2015) are also based on instrumental variable methods. Utilizing the distance between the student's residence and the nearest small high school as an instrument for school selection, they report favourable effects of attending a small high school on various outcomes. The effectiveness of small school reform in New York City is investigated by Schwartz et al. (2013). They found significant heterogeneity in the school's effects. Their results suggest that newly established small schools have a positive effect on student achievement and graduation rates. Barrow et al. (2015) investigate the impact of introducing new small high schools on student performance in Chicago's public schools. They discovered that students from small schools are more likely to complete school and graduate, whereas test scores are unaffected by reform. Similarly Abdulkadirolu et al. (2013) examine the effects of attending a small high school, but are able to identify the causal effect using assignment lotteries. They discover positive effects of small high school size on a variety of outcomes, such as course grades and college enrolment.

Jacquce et al. 2015 examine the school district size on expenditure and test score for Oklahoma. They found economies of scale in expenditure but found negative impact on test scores.

However, only a few of the aforementioned studies examine the effects of consolidation beyond changes in school size. Recent articles (Liu et al. 2010, Engberg et al. 2012, Brummet 2014) examine the short-term effects of consolidation on displaced and receiving students. Engberg et al. (2012) investigate school closures in an anonymous urban school district in the United States, whereas Brummet (2014) investigates school closures in Michigan. They found that on average school closing in does not harm the education performance of displaced students and students from relatively low performing school experience positive gain. Another study by Beuchert et al. (2016) examine the effect of school consolidations in Denmark from 2010 to 2011 on student achievement, measured by test scores, by utilising variation caused by the consolidations. They monitored each student's enrolment and test scores for one year prior to school consolidation and up to four years afterward. They observed that school consolidation has a negative short-term effect on academic achievement, with the effects being most pronounced for students exposed to school closures. Moreover, students who began their education in small schools experience the worst outcomes. The effects appear to fade over time, implying that some of the effect is caused by interruption.

All of the studies discussed above conducted in developed nations. Very few studies are there for developing countries. Such as Liu et al. (2010) examines the Chinese government's school consolidation policy. Liu et al. (2010) investigate the shutdown of small primary schools in rural Chinese settings and assess the short-term effects of school merger on guest and host students. They discovered a modest but positive impact of China's merger policy on students. (2010).

In India, we found three studies which discussed the consolidation of schools in Rajasthan. Bardoli and shukla (2019) examines the implementation and immediate, quantifiable effects of Rajasthan's merger policy. They found that after the merger, school infrastructure improved, but the enrolment in the consolidated schools declined when compared to the public schools.

Similarly, Palit and Mitra (2014) examine the rationalisation of schools in India using Rajasthan as a case study. The authors examine the adherence of the merger policy with RTE standards and the short-term impact on the community.

Rao et.al. (2017) examine the school closures and mergers in three different states of India namely Telangana, Odisha and Rajasthan. The study employed mainly qualitative techniques of data collection. They found that considerable population of those who were attending schools before mergers drop out from school after merger. Based on focus group discussions they found in educationally advanced districts and urban centres, school closures are both a cause and a result of the privatisation of education. They also suggest that considerable population of those who were attending schools before mergers drop out from school after merger.

The empirical research on the impact of school consolidation on student performance is sparse and the results are more mixed. Despite the intensity of the debate and the significance of the issues surrounding the school merger programme, the literature on the Indian primary school merger programme is almost devoid of evidence-based empirical research. This allows us to examine the impact of the school consolidation policy on student learning.

III. **Institutional Context**

(a) **Education Status in India**

India has one of the world's largest public school systems, with more than a million schools run by the central and state governments. (UDISE, 2016). Although India has made significant progress toward its goal of universal education, there is still a long way to go. The literacy rate India is only 74 percentages. Further, the government has been able to increase school enrolment, mostly because of the Right to Education Act, but this hasn't yet led to an increase in learning outcomes. According to the 2018 World Development Report,' schooling' is not the same as 'learning,' and this is a primary concern of education system of India.

In order to achieve the goal of universal access of education, the government of India has started several initiatives including Sarva Sikhsa Abhiyan[4], Mid Day Meal[5], Operation Blackboard[6], Rashtriya Madhymik Shiskha Abhyian[7] Merger of Schools, etc. The common goals are to increase access by expanding quality school education, to promote equity by including disadvantaged groups and weaker sections, and to enhance the quality of education. (LARRDIS, 2013).Even though these initiatives have greatly improved enrolment (Figure 1) and retention rates over the years, they haven't gone far enough to improve learning (Figure2).

4 Launched in 2001 Sarva Shiksha Abhiyan(SSA) is one of India's major flagship programmes for universalization of elementary education.

5 . Launched in 1995, this was expected to enhance enrolment, retention, attendance of children in schools apart from improving their nutritional levels.

6 . Launched in 1987, to provide minimum required necessary services to all primary schools in the nation.

7 Launched in 2009-10 to raise minimum level of education, ensure good quality education and reduce gender gap in education.

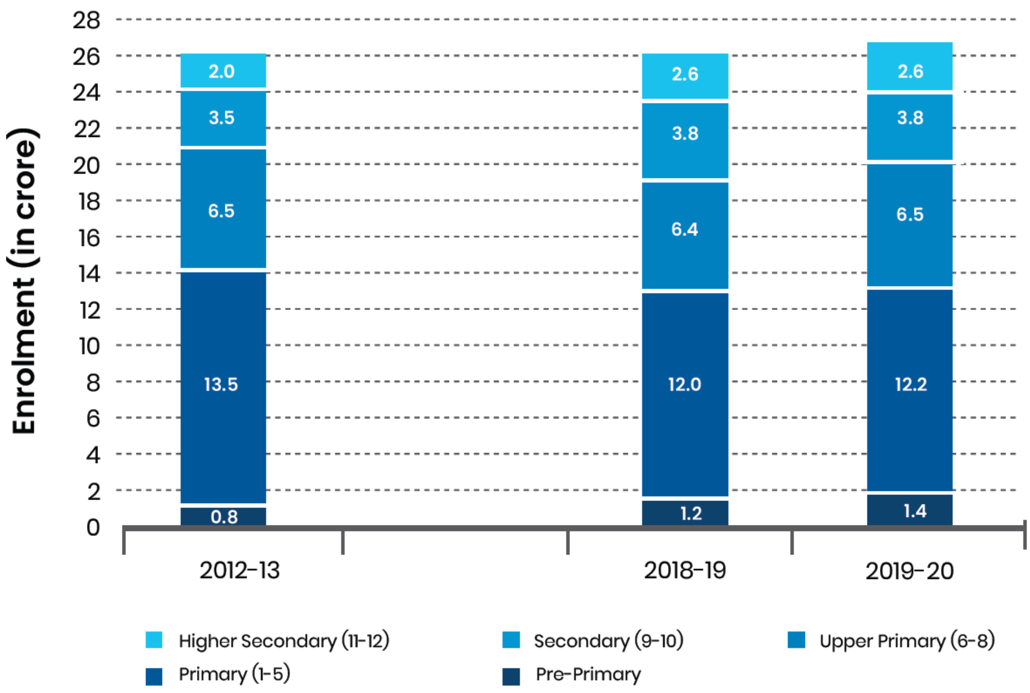
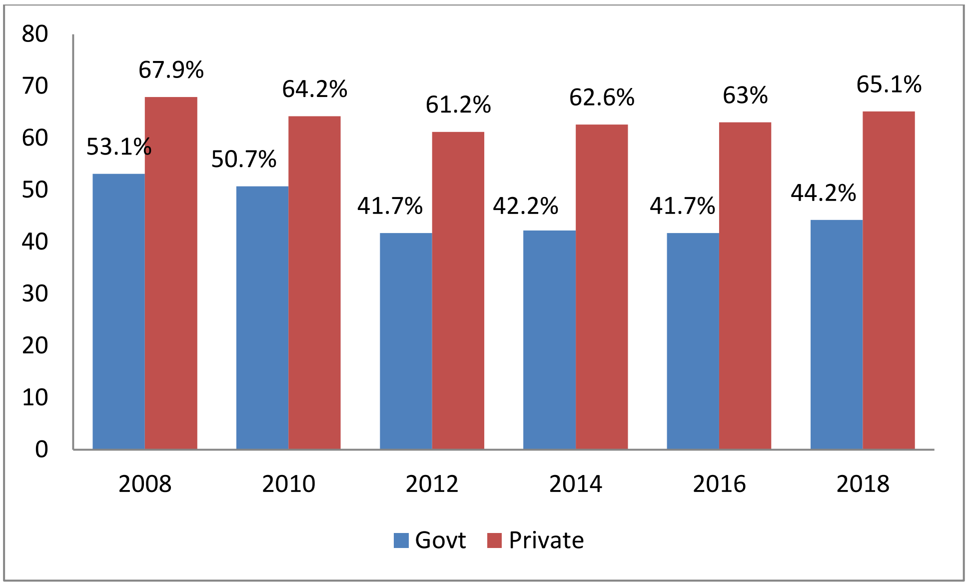


Figure 1 - School Enrolment in India 2012-13, 2018-19 and 2019-20 (in crore)

Source- UDISE+

Figure 1 shows total enrolments in India for years 2012-13, 2018-19, and 2019-20 for different levels of education namely, pre primary, primary,upper- primary, secondary and higher secondary. A comparison of enrolment at different levels of educations shows that total enrolment in schools has incresed in 2019-20 compared to 2018-19 by 1.6%.

Figure2-



% of children of Class 5 who can read a class II level text, government vs private schools

Source- ASER(2018)

Figure 2 shows that in 2008, 68% of std V student in private schools could read a std II level text. This went down to 61% in 2012 and then went up again to 65% by 2018. Similarly, in 2008 53% students in government schools can read std II level text or 15% lower than the 68%children in private schools. By 2018, this gap has widened to 21 percentage point on a national scale.

The Annual Status of Education Reports (ASER) released by an Indian non-governmental organisation (Pratham) has persistently highlighted the poor learning levels of Indian students. In 2005, the first ASER showed that three out of five children in class 5 could read a class 2 textbook. In 2016, only one out of two children could do this. In the same period, the learning outcomes for basic arithmetic (such as subtraction and division) also led to a sharp decline, from 48.6 percentage of class 5 students who could perform division in 2005 to 26 percentage in 2016. Between the years 2005 and 2016, the overall learning outcomes experienced a decline, going from 61 percentage to 48 percentage. (ASER, 2005; ASER,2016).

In addition to this, the number of schools with fewer than 50 students has increased by over 10 percentage points over the past two decades in India. A third of our schools today have fewer than 50 students, while only one-fifth have more than 200.

Similarly, between 2011-12 and 2014-15, the number of government school enrolment in Rajasthan, the largest state of India, decreased significantly from 130 million to 119 million. This results in an increase in the number of small schools. In addition, vacancies and an unequal distribution of teachers have plagued government schools in Rajasthan. In 2013-14, the number of teacher student ratio at the elementary level was less than one, despite a healthy pupil teacher ratio (PTR) of 23 students per teacher. Moreover, maximum government elementary schools in Rajasthan were taught by one or two teachers only.

Small schools dispersed throughout the region necessitated that each block level education officer manage approximately 275 elementary schools across 30 to 40 Gram Panchayats. As a result, regular monitoring of elementary schools proved difficult.

Also, there were not many secondary schools in Rajasthan that offered all classes from 1to 10^{th} or 1^{st} to 12^{th} in one school. In order to complete all grades, students were required to switch schools, resulting in dropouts in higher classes (from grade V to VI, grade VIII to IX, and grade X to XI).

(b) **Merger of School in Rajasthan**

The problem of small schools' isolation has been identified in the draft National Education Policy (NEP) released in May 2019, and the creation of' school complexes' has been proposed as a possible solution. A "school complex," as the draft NEP calls it, would allow for the consolidation of multiple public schools into a single administrative and organisational structure without necessitating physical relocation.

Each separate school of adequate size will continue to operate within the larger school complex, or it will be combined with another school. It is anticipated that a "school complex" will enable better resource allocation by allowing for better sharing of teachers and availability of libraries and playgrounds , as well as well-maintained laboratories and ICT facilities.

Rajasthan was among the first Indian state governments to integrate schools extensively. The initial rounds of school consolidations in Rajasthan were announced by the government in the 2014–2015 school year. As a result, almost 2,000 schools merged with other primary schools and 14,600 primary schools were consolidated with secondary schools. In 2016-2017, an additional 3,000 primary schools merged with other primary schools, and 2,000 primary schools became secondary schools. According to the Rajasthan Education Directorate, approximately 22,000 schools have been consolidated between 2014-2015 and 2018-2019(Bardoli & Shukla, 2019).

The education department in Rajasthan cited two main reasons for school closures: (1) low enrolment, and (2) the presence of multiple primary and upper-primary schools within the same revenue village. A school that has been merged with another will no longer operate independently. All classes will fall under the jurisdiction of the integrated school. If space is limited at the merged school, individual buildings will be preserved and classes will be held in the old structures. However, the government also announced that according to RTE, there must be a primary school and an upper primary school within 1 kilometre and 2 kilometres, respectively. The school should be demerged if the merger violates these standards.

All of the closed schools' permanent and temporary assets, like land, buildings, furniture, teaching materials, and so on, will be managed by the consolidated school. Any unused physical property (such as a school building) must be utilised in accordance with the Directorate of Education's instructions following consolidation.

In the case of primary to secondary consolidation, the expanded school must either be a secondary school or a higher secondary school. In the event that a primary school is merged with a secondary or higher secondary school, extra resources and inputs must be made available to ensure the smooth development of students from class one through twelve.

(c) Implementation Process

In Rajasthan, schools have been merged in three different ways: (a) Primary to Primary schools, (b) from primary to secondary schools, and (c) from secondary to Higher secondary schools. Two State Education Directorates in Bikaner are in charge of everything that has to do with merging schools. The 'Directorate of Elementary Education' is in charge of managing the merger of primary schools with other primary schools, while the 'Directorate of Secondary Education' is the central body of managing the merger of secondary schools with other secondary schools. Each Directorate is responsible for monitoring different stages of the merger of primary and secondary schools into a single institution.

The Block Education Office drafts proposals with a list of schools to be closed and the names of schools with which they will be merged. Some proposals also indicate whether or not the RTE distance requirements will be satisfied. At the district level, proposals are then aggregated and sent to the Directorate of Education in Bikaner.

The State Education Department issues final orders to the Directorate of Education following the inspection and verification of proposals for compliance with RTE standards. Instructions are then sent to the appropriate districts, which in turn send similar instructions to block offices, and orders are ultimately carried out by sending the necessary instructions to schools.

In the first phase, 14,982 primary schools and 2096 upper primary schools-a total of 17,078 schools - were proposed to be merged. Finally, in the first drive, 12,944 primary and 1,728 upper primary schools were merged.

Since 2014, the reduction in the number of government elementary schools in Rajasthan is evidence of school consolidation. The number of government primary schools in Rajasthan decreased by 30 percent between 2013-14 and 2016-17.

Simultaneously, there has been a significant expansion in the number of secondary and higher secondary schools (grades I to X or I to XII). From a minuscule 100 in 2013-14 to 9,419 in

2016-17, the number of senior secondary schools with grades I to XII increased.(Bardoli & Shukla, 2019)

IV. Data and Empirical Analysis

We have collected student specific data from randomly selected 39 schools in the Alwar district of Rajasthan. Of these 8 are in urban areas and 31 in rural areas. In this way we cover entire alwar district. In the selected schools, we have collected data of all the students that were in grade 2 in 2012-13 and tracked their performance over the next 5 years. Specifically, we collect data for 5 years, viz., 2012-13, 2013-14, 2015-16, 2016-17 and 2017-18. In 2012-13 all the schools were non-merged. Of these 27 were merged in 2014-15. Thus, our data comprises of two years before the merger and three years after the merger. The students who were in grade 2 in 2012-13 reached grade 7 by the year 2017-18.

From each of the sample school we have collected student specific, household specific and school specific characteristics from year 2012 to 2018. We have collected two types of student data i.e. non merger student (control) and merger student (treatment).

Non merger students are those whose school was not merged and remained same during the study period. On the other hand students whose school shut down and merge with new school called merger students. We further divide merge students into guest and host groups. If students from a closed school transferred to a new school that stayed open during the merger process, we refer those students as guest students.

On the other hand, students, whose school remained open and expanded during the period, we called them host student. To examine the impact of policy on student performance we track the each type of student performance in class 2^{nd} and 3^{rd} which is pre- merger period and class 5^{th}, 6^{th} and 7^{th} after merger. Interviews with school administration and UDISE (Unified District Information System) data set provide us the school level information.

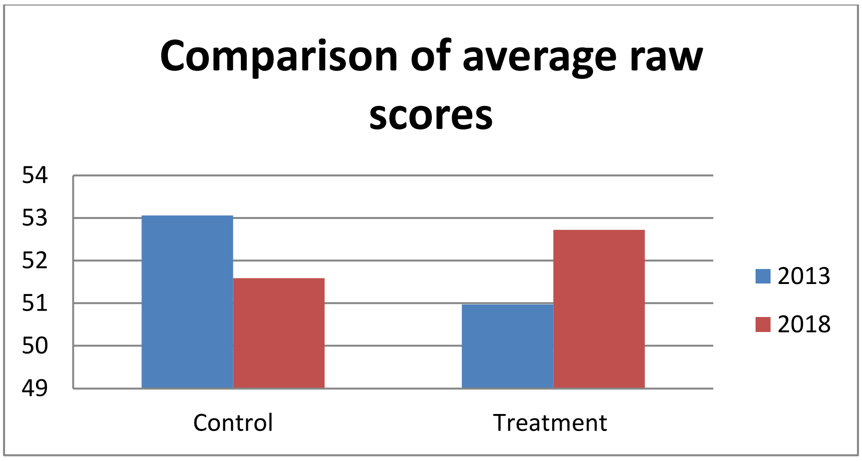
UDISE initiated in 2012-13 is one of the largest Management Information Systems on School Education in India. It provides information for various variables for more than 1.5 million schools both public and private, such as type of school, location, opening and closing date of school, infrastructure etc. we collect the information from schools and matched the same with official data. Based on this process we have identified 13 non merged and 27 merged schools.

Number of observations in our data is 3450. Of the sample, 955 students (28%) belonged to the non merger group and 2495 students (72%) from merger group.

Descriptive statistics show that 53 % of sample students are girls. The annual report (2019-20) published by the ministry of education, shows same figures. That is, girls in government schools are more than male students at all India level in primary classes (UDISE). Data on school qualities such as number of rooms, number of teachers, computers, and library and playground facility collected from school visit and UDISE data as well.

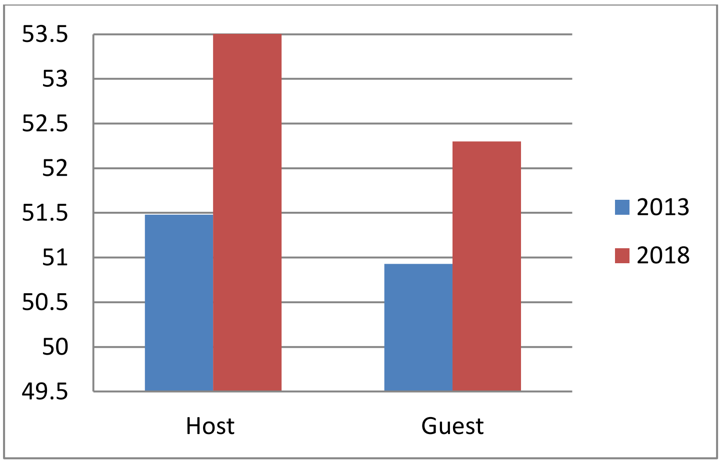
Our key variable is student performance which is calculated from student records available in schools. Each school in Rajasthan maintains a student register for each year's academic performance of individual student. After the online entry of each student and daily attendance along with photograph like initiatives has been started by government of Rajasthan, data inflation problem is negligible in schools. Therefore we can rely on school record for enrolment and grades. As discussed, we have collected the students' performance data of merger (both guest and host) and non-merger students. Figure 3 shows the comparison of average raw scores of students of merger schools (Treatment) and non-merger schools (Control) and figure 4 shows the relative performance of guest and host students.

Figure 3 - Average raw score of student's overtime by Merging status



Source- author's own calculation from data

Figure 4- Average raw scores of Host and Guest students in 2013 and 2018



Source- author's own calculation from data

Figure 3 shows the comparison of average raw scores of merger and non-merger students over a period of time. The average grade of merger students has clearly increased from 2013 to 2018. However, during the same time period, non-merger students' average grades fell. Similarly, when we compared the average grades of host and guest students, we found that the average grades of host students are higher than those of guest students. Even though the average grades of host students were higher than those of guest students before the merger, both sets of students' grades improved afterward.

Summary statistics

Table 1 summarizes the number of observations, mean values of the dependent and independent variables used in the study for non-merger and merger schools respectively.

Table 1 – Summary Statistics

Variable	Non-Merger (2013)	Merger (2013)	Non- Merger (2018)	Merger (2018)
	Mean	Mean	Mean	Mean
Teacher	8.14	4.05	8.08	14.74
Rooms	6.83	4.02	6.82	9.13
Toilets	4.85	3.77	4.86	6.63
Grade	53.06	50.97	51.59	52.72
Income	52005	74485	52005	74485

The summary statistics of merger and non-merger schools for year 2012 and 2018 is presented in table 1. To understand the data more closely we also draw kernel density graph for both types of schools. Figure 4 and 5 shows the kernel density graph of student's performance in 2013 and 2018 respectively.

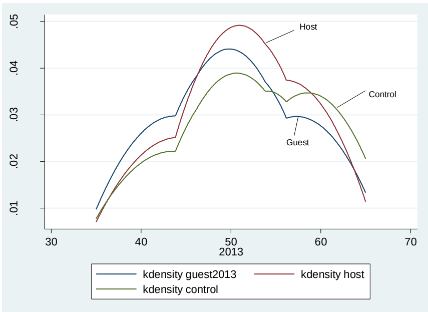


Figure 5

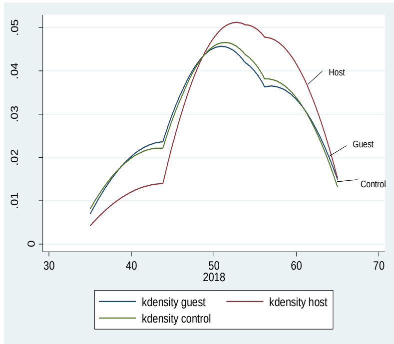


Figure 6

Kernel density plots of distribution of average raw score in 2013 and 2018 by merging status

Figure 5 and 6 shows the distribution of marks of students by school types in 2013 and 2018. Figure 6 shows that after merger policy there is significant change in marks of merger and non-merger students as compare to academic Year 2012-13.

Empirical Model

The potential endogeneity of school resources and selection into and out of schools poses the greatest difficulty in determining the impact of school consolidation or any policy change that affects school inputs. For example, if school closures are based on a school's past track record or to change a peer group in a school, comparison between merger and non-merger students, is likely to give biased estimates of the impact of a school merger on displaced students.

In such situations where estimates are typically biased due to endogenous variation caused by omitted variables or selection, a natural experiment would be an appropriate method.

The appropriate answer to this issue of inference is to conduct a natural experiment in which participants are exposed to a treatment at random. Due to random assignment, the treatment and control groups should be statistically equal on all characteristics except for treatment exposure; hence, any changes in outcomes may be attributed only to the treatment. In our case, merger of school is an exogenous shock. Selection of schools for merger is not based on performance. Moreover, the merger policy applied to some schools but not others. So this naturally creates a treatment and control group. Students from merged schools, both guest and host, constitute the treatment group, while students from non-merged schools represent the control group. Here we used difference –in –differences methodology to exploit the variation in student outcomes.

We now discuss the econometric model used to estimate difference in differences model that incorporate merger effects to estimate the average treatment effect of the policy. The student i performance at the $time\ t\ =\ 2013, 2014, 2016,2017,2018$ indicated by Y_{it}.

We estimate the following regression

$$Y_{it} = \beta_0 + \beta_1 S_i + \beta_2 S_{i*}\, D_t + \alpha_t + \varepsilon_{it}$$

Y_{it} -is the student i performance in period t. $D_t\ is$ an indicator variable that equals one if t =1 (2016,2017,2018) and 0 otherwise and S_i is the indictor variable if student i belongs to merge school or not. α_t is year fixed effect and ε_{it} is random error term.

The parameter β_2 captures the effect of merger on student achievement.

Independent variables -

Merger- we define a dummy variable merger that is equal to one for a student who belongs to a school that merged in 2014 and zero otherwise.

Post-merger Period We creates dummies that take value one for year 2016, 2017 and 2018 and zero otherwise.

Interaction term - We also create three interaction terms where we interact merger*2016, merger*2017 and merger*2018. The coefficient of the each of these interaction terms provides the difference in differences estimate of the impact of merger in each of these three years on the dependent variable. According to hypothesis we would expect the coefficient of merger*2016, merger*2017 and merger*2018 to be positive. Furthermore if effectiveness of merger policy was increasing overtime we would expect that the coefficient of the latter interaction term would be larger than the former.

School Location– School is situated in urban or rural area included as a control variable in our analysis.

Modern Technology- School has access to modern technology such as ICT lab or not included as a dummy variable in our analysis

Number of Teachers- We include the number of teachers as a control variable to analyse the impact of the number of teachers on student Performance.

Rooms- Number of rooms in school also included as an explanatory variable.

Library- Availability of Library included as a covariate.

Income- Father Income also included as an independent variable.

Caste – To analyse the impact of social status we used Caste as an independent variable. Here we divide the students based on four castes- General, OBC, SC and ST

Dependent variable- student performance during the academic year is our dependent variable. Student performance is based on the final assessment of the students in an academic year. Schools provide a letter grade ranging from A to D for each student as final assessment. For uniformity, the letter grades were converted into percentage using standard conversions[8].

Parallel Trend Assumption

It is important to remember that the identification of causal effects using DID relies on the assumption that the average change in academic performance after and before the school merger would have been the same for the treatment and control groups if the school merger had not occurred (Liu.et.al., 2010). This is formally known as the parallel trend assumption.

Following Duflo(2003) and Liu et.al., (2010) we test the parallel trend assumption. For this we took the data of merger student who were in 2nd and 3rd grade in year 2013 and 2014 (i.e. before merger) and compare the same with non-merger students for same time period. As suggested by Dufflo(2003) if the coefficient of Placebo_ interaction is insignificant then we can conclude that parallel trend assumption is valid for the sample data. Results for placebo test are presented in table 2.

Table 2- Parallel Trend Assumption

Variable	Coefficient
Placebo_Interaction	0.28 (0.26)
Constant	51.55*** (.08)
Observations	1380
No. of Students	693

Note: *p<0.1;**p<0.05; ***p<0.01.

[8] Conversion A= 65, B=55, C= 45, D=35 (Thanuja, K.(2014)

It clear from table 2 that coefficient of placebo_ interaction term is insignificant. It shows that parallel trend assumption is valid for our sample. Before the merger policy, the average change in marks for merger and non-merger students was same, and if the merger policy had not been implemented after 2014-15, the average change in marks for both types of students would have been identical.

V. Results of Difference in Differences Analysis

Table 3 presents the results from the DID model on the effect of schools merger policy on students achievements.

Table 3

Variable	Model1	Model 2	Model3	Model 4	Model 5	Model 6
Merger*2016	1.19 (0.84)	2.16 * (1.14)	0.37 (1.10)	1.10 (0.82)	2.20* (0.91)	0.74 (0.61)
Merger*2017	1.80** (0.88)	2.67** (1.20)	1.08 (1.16)	1.64** (0.86)	2.76*** (0.93)	1.08* (0.64)
Merger*2018	3.14*** (0.87)	3.96*** (1.24)	2.52* (1.21)	2.94*** (0.85)	4.21*** (0.94)	2.44*** (0.65)
Income				0.31*** (0.01)		
OBC				-1.10*** (0.48)		
ST				-1.07 (1.55)		
SC				-2.27** (0.90)		
Teacher					-0.04 (0.34)	0.06* (0.36)
Classroom					0.13** (0.52)	-0.11* (.06)
Location					3.19*** (0.29)	2.19 (2.34)
Playground					0.73** (0.33)	0.23 (0.38)
Library					-1.51 (0.41)	
ICT lab					0.29 (0.36)	
Constant	52.90*** (0.48)	54.54*** (0.61)	51.53*** (0.58)	53.28*** (1.07)	53.01*** (0.66)	51.63*** (0.32)
Observations	3130	1467	1657	3117	3035	3075
No of Students	694	325	365	694	694	694
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Student Fixed Effect	No	No	No	No	No	Yes

Note: *p<0.1;**p<0.05; ***p<0.01. Robust standard errors are presented in parentheses. In column 1, the dependent variable is the performance of all students, whereas in columns 2 and 3, the dependent variables are the performance of male and female students, respectively. In Column 4& 5 we use student and school specific variables respectively whereas student level fixed effect used in column 6.

Table 3 presents the results from the DID model on the effect of schools merger policy on students achievements. We estimate three models differ in the dependent variable. All models include time trend variable. In model 1, we include three interaction terms Merger*2016, Merger*2017 and Merger*2018 to measure the differential effects of merger in three years after the policy went into effect. Model 2 shows the results for impact of merger policy on student performance if student is male. Similarly model 3 presents the impact of merger on student performance if student is female. In Model 4 & 5 we used student and school specific control variables while in model 6 we use student level fixed effect also. The result of DID analysis demonstrate that all the models perform fairly well. we obtain positive coefficient on the Merger*Year terms, providing robust evidence that performance of students in merger schools were not fall relative to non -merger schools. Similar to Liu et.al.(2010), we failed to reject null hypothesis that merger of schools impact positively the performance of merger students. In our results we found in model 1 merger policy positively impact performance of students in our sample area in academic year 2015-16.

The estimated effect is 1.19, which means being exposed to merger increase the student test score by 1.19% of SD. Further, we found that in academic year 2016-17 impact of policy is increased. We found positive and statistically significant impact of merger on student performance in 2017. More specifically, We found that due to merger there is 1.80 point increase in student performance in academic year 2016-17. This shows that policy impact is stronger in academic year 2017 as compare to 2016. Further, in academic year 2017 -18 we found positive and strongly significant result. Our results suggested that in the third year of policy, student performance in merger school increased by 3.14 points. Possible reason for stronger impact in 2018 is that with time students and teachers adjusted in new school as compare to 2016. With increased monitoring at school level, improved the performance of students.

To gain a deeper understanding of the effects of consolidation, we investigate the heterogeneous effects of being exposed to school merger. Model 2 presents the results of student performance if student is male. Contrary to Liu et.al (2010) we found positive and statistically significant impact of merger policy on male student for all three years. Our results demonstrate that in year 2016 and 2017 academic performance of male student improved by 2.16 and 2.67 points respectively. In 2017-18, again we found strongly significant impact of policy as the male student performance improved by 3.96 points due to school merger.

Model 3 presents the results of impact of merger policy on girl child. It is interesting to note that our results show that there is non- negative impact of merger policy on girl child. In other words we found that merger policy do not impact girl student negatively. Besides, we found positive and strongly significant impact of policy in academic year 2017-18. Our results demonstrate that there is 2.52 point increase in girl student performance due to policy.

We also examine the student specific control variables in model 4. Our results show that income also positively impact the student outcome. We also analysis the impact of student social status measured in caste on test score. We found compared to general category students, students from marginal group impacted negatively from merger. In Model 5 we include the school level characteristics as control variables. We found negative but insignificant impact of number of teachers on student outcome. However, we found positive and statistically significant impact of number of classrooms on student outcome. Similarly, we found positive and statistically significant impact of location of school on student outcome. We found if school is located in urban area there will be positive impact on student performance. Further, we found positive impact of availability of playground on student outcome. In model 6 we use student level fixed effect to control the student level unobserved heterogeneity. Here also we found positive impact of merger on student performance. Our results show that due to merger student performance has increased by 2.44 points in the 2017-18 school year.

In sum up we found that merger students' performance did not fall compare to non-merger schools. We found strongly positive impact of merger policy on student performance. This positive impact becomes stronger over the period of time.

In addition to raw test scores, following Liu.et.al (2010) we also standardize raw scores. For this we subtract the mean grade of five years, from each individual observation and divide the result from standard deviation. Following literature we call this variable, Z score.

In table 4 we present the difference in differences results using z score.

Table 4 – Difference in differences regression results analysing the impact of merger on students by Z scores

Variables	All	Male	Female
Merger*2016	0.44 (0.44)	1.09* (0.66)	0.84 (0.58)
Merger*2017	0.87 (0.46)*	1.23* (0.70)	0.70 (0.62)
Merger*2018	2.25*** (0.48)	2.44*** (0.72)	2.17*** (0.65)
Constant	51.61*** (0.15)	54.48*** (0.72)	51.54*** (0.70)
Number of Observation	3130	1467	1657
Number of Students	694	330	370
Fixed Effect	Yes	No	No
Time Fixed Effect	Yes	Yes	Yes

Note: *p<0.1;**p<0.05; ***p<0.01. Robust standard errors are presented in parentheses.

It is clear from the results presented in table 4 that using Z scores also we found positive and significant impact of merger policy on student academic performance. Similar to previous results, we found merger students benefited from merger policy. However, it will be more interesting to see that how merger policy impacted merger- guest and host students. More specifically we want to examine how merger policy impacted to those students who moved from one school to another school and to those students whose school expanded due to merger policy. Table 5 presented the difference –in difference results analysing the impact of merger on guest and host students.

Table 5- Difference –in- differences Regression Results

Variables	Guest Student	Host Student
Merger*2016	-0.41 (0.63)	0.63 (0.65)
Merger*2017	-0.29 (0.64)	0.37 (0.64)
Merger*2018	1.36** (0.68)	2.10*** (0.66)
Constant	50.74*** (0.43)	51.32*** (0.45)
Observations	1343	958
No of Students	303	196
Prob>F	0.1000	0.007
Time Fixed Effect	Yes	Yes

Note - *p<0.1;**p<0.05; ***p<0.01. Robust standard errors are presented in parentheses. Dependent variable is test score of guest and host students. Control group is performance of non-merger students.

Table 5 demonstrate the results of difference in differences regression, analysing the impact of merger policy on merger-guest and merger-host students. Here we estimate the impact of merger on guest and host students compared to non-merger students. Similarly to Liu et al. (2010), we found negative coefficient of merger-guest students during the first two years of policy implementation, but none of them are statistically significant.

In third year i.e. academic year 2017-18 we found strongly significant and positive result for merger –guest students. In other words, due to merger, guest student performance improved by 1.36 point. On the other hand we found, non-negative impact of merger policy on host students. Similar to guest students, we found in 2018, host students' performance improved by 2.10 points. The most likely explanation for these results is that before the merger, guest students' performance was poor compared to host and control students. As they moved to a new school, it took them some time to get used to the new environment. Because of this, in the initial years of a policy's implementation doesn't have a significant effect on performance. But once the transition period is over, the merger policy has a positive effect on guest students' performance.

Source Variables of Student Performance

In the previous section, we found positive impact of merger policy on student outcome. However policymakers might also be interested which are the specific variables that impact student performance in merge schools. Following, Liu et.al. (2010) we call these variables "source variables". Table 6 presents the panel data regression results, analysing the impact of source variables on merged student academic performance.

Table 6 - Relationship between dimensions of merger and student performance

Variable	No. of Teacher	No. of classrooms	Library	Urban	ICT Lab
Results	0.03** (0.014)	0.04** (0.23)	0.89*** (0.22)	2.14 (2.43)	-0.07 (0.34)
Constant	50.89*** (0.17)	50.97*** (0.31)	50.65*** (0.17)	50.37*** (1.01)	51.28*** (0.14)
Observations	2301	2246	2301	2301	2301

Note: *, **, *** indicate that the mean is statistically different from the mean of the nonconsolidated schools at the 10, 5, and 1 percentage levels, respectively. Standard errors are presented in parentheses. Dependent variable is student performance over the period of time. Student level fixed effect is applied in all models.

Table 6 shows the results of panel data regression analysis. In all models we use student specific fixed effect to calculate the impact of different schools inputs on student outcome. In order to find the sources of academic performance in both merged and non-merger schools, we conduct linear regression analysis. We use student-specific fixed effects in all models to calculate the impact of various school inputs on student outcome. Here, our dependent variable is student performance. We found positive and statistically significant impact of number of teachers on student performance. With an increase in the number of teachers, the teacher-student ratio will improve, allowing the availability of separate teachers for each class. These results are consistent with other studies.(eg. Goyal & Pandey 2012; Case & Deaton , 1999; Hedges, 1994).

Similarly we found positive relationship between student performance and number of rooms. The possible reason for this is that different grades students sit in different classrooms so this increase the efficiency of teaching. Similarly we found positive and significant impact of availability of library on student performance. Further, school location also impacts the student performance. We found positive impact of school location. In other words, if school is located in urban area than it impact student performance positively.

In conclusion, we found that the number of teachers, the number of classrooms, the availability of a library, and the location of a school positively affect student achievement.

VI. Conclusion

This paper adds to the existing literature on the effect of merger and scale on student academic performance by taking advantage of a natural experiment in the state of Rajasthan in India.

In this paper we have tried to examine change in academic performance of students when the schools that they went to in grade two and three one of their primary education years were merged. Despite a perception that is commonly found in the literature and the popular press, our results suggest that there is positive effect of merging itself on overall academic performance of the students from merger schools.

Our data set allow us to separately examine the effect of merger on merger-guest and merger-host students. Comparing the change over time of the test scores of students from merger-host and merger- guest group, with those of students from schools that was not involved in any school merger during the study period, we can reject the hypothesis that primary school merger harms the student performance. Our findings are comparable to those of Liu et al. (2010), who examined the school consolidation policy in China. We found the estimated effect of merger on student test scores is 1.80% of a SD. This effect of merger increased in next year by 3.14 % of a SD. In particular, the positive effect of merger is greater for host students than for guest students.

We also found positive and significant impact of merger on girl child. Along with other changes in schools following a merger, school distance does not increase, ensuring that the merger has no negative effect on accessibility.

Considering the characteristics of the school that students attend after the merger, we observed that the number of teachers, the availability of a library, different classrooms, and location of school impact the student performance positively.

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