Research Report

Young Lives School Survey, 2016-17: Value-added Analysis in India

Caine Rolleston and Rhiannon Moore

Young Lives

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Contents

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Summary

Student outcomes are often used as indicators of the 'quality' or 'effectiveness' of schools and teachers, and indeed as indicators of the quality of education systems more broadly. Student test scores, in combination with relevant contextual data, provide policymakers and educational researchers with a certain amount of information on what is happening in schools or classes where students are performing more or less well, at least in terms of 'levels' of performance. However, they are limited because non-school factors play an important role in determining levels of performance, and also because such cross-sectional data do not provide information on how much *progress* has been made.

Measures of school 'value-added' attempt to address some of the difficulties in assessing school quality based on levels of performance alone. These measures are based on student progress, and aim to isolate and measure the contribution which schools make to improving student learning outcomes. This report uses a value-added framework to examine school effectiveness in Andhra Pradesh and Telangana, using data from the Young Lives 2016-17 school survey.

About Young Lives

Young Lives is an international study of childhood poverty, following the lives of 12,000 children in four countries (Ethiopia, India, Peru and Vietnam) over 15 years. **www.younglives.org.uk**

1. Introduction

1.1. Measuring school effectiveness using 'value-added'

Student outcomes are often used as indicators of the 'quality' or 'effectiveness' of schools and teachers, and indeed as indicators of the quality education systems more broadly. Student test scores, in combination with relevant contextual data, provide policymakers and educational researchers with a certain amount of information on what is happening in schools or classes where students are performing more or less well, at least in terms of 'levels' of performance. However, the conclusions that can be drawn about school 'quality' from such data are limited. This is firstly because non-school factors (such as home economic circumstances) play an important role in determining levels of performance, and secondly because such cross-sectional data do not provide information on how much *progress* has been made. Thirdly, in settings where there is substantial 'school choice', school intakes vary considerably in both observable and unobservable ways as a result of choices, including in terms of motivations and aspirations of students and their parents, factors for which schools have only limited responsibility.

Measures of school 'value-added' attempt to address some of the difficulties in assessing school quality based on levels of performance alone. These measures are based on student progress; that is, changes in levels of performance. The approach intends to 'control' as much as possible for differences in student outcomes which are outside the control of the school (Perry 2016; Rivkin et al. 2005). If successful, the approach is therefore able to isolate and measure the contribution which schools make to improving student learning outcomes. Value-added measures therefore focus on 'the *relative* progress of students in a school over a particular period of time in comparison to students in other schools' (Scheerens et al. 2003: 303; italics in original). By controlling for differences between school intakes, such as the prior attainment of students and their backgrounds, value-added measures are designed to compare students 'like-for-like' as much as possible, so that any remaining differences in outcomes are attributable to the school or to school-level factors (Perry 2016), which can include peer-group effects.

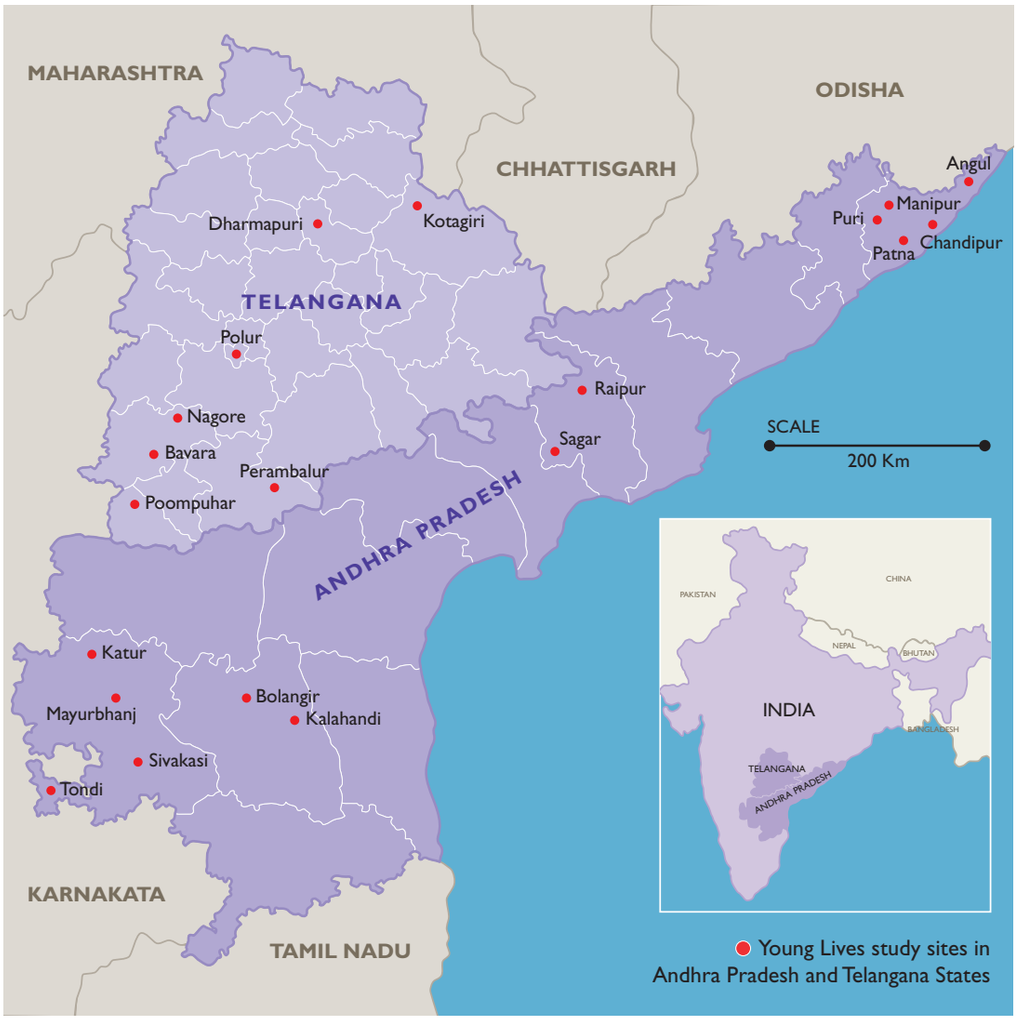
There are two main types of value-added estimates, the difference between them being whether or not students' backgrounds are taken account of in the modelling approach. 'Unconditional' value-added estimates are calculated using data on student outcomes from the beginning and end of a defined period of time only (for example, one school year), while 'contextual' or 'conditional' value-added estimates also take account of student background factors. The latter approach recognises that students are not randomly assigned to schools or classes and that it may be more demanding for schools to make the same progress with a group of less-advantaged students, even when their initial test scores are the same as those of a more-advantaged group (Perry 2016; Ladd 2008). While the 'conditional' approach may be considered 'fairer' to schools if used for the purposes of accountability, it is important to note that this approach in some sense sets lower 'expectations' for students from more disadvantaged backgrounds, which may not be appropriate, depending on the purpose.[1]

1 See Perry (2016) for a discussion in the UK context.

1.2. Young Lives

Young Lives is an international study of childhood poverty which has followed the lives of 12,000 children in Ethiopia, India (the states of Andhra Pradesh and Telangana), Peru and Vietnam since 2002. The study follows two groups of children in each country – the 'Younger Cohort' born in 2001-02, and the 'Older Cohort' born in 1994-95. In all four countries, a sentinel-site sampling design is employed. The Young Lives sample is not nationally representative; in each country, 20 purposively-selected sites were chosen at the beginning of the study to represent national diversity, with a pro-poor bias (Rolleston et al. 2013) (see Figure 1).

Figure 1. *Young Lives study sites in India*



The household survey has been conducted with Young Lives children and their families every three years since 2002, with Round 5 of the household survey (the latest round) conducted in 2016-17. Child questionnaires, household questionnaires and community questionnaires gather data on household composition, livelihood and assets, household expenditure, child health, access to basic services, and education.

In 2010, school surveys were introduced to explore Young Lives children's experiences of schooling and education in depth. Primary school surveys were conducted in India (2010), Peru (2011), Vietnam (2011-12) and Ethiopia (2012-13), and in 2016-17, a further round of Young Lives school surveys was conducted at upper primary level (in Ethiopia) and secondary level (in India, Peru and Vietnam). This report uses a 'value-added' framework to examine school effectiveness in Andhra Pradesh and Telangana, using data from the 2016-17 school survey.

1.3. Young Lives school survey, 2016-17

Following the Young Lives primary school survey in India (conducted in 2010), Young Lives conducted a secondary school effectiveness survey in India in 2016-17. The survey took place in each of the twenty Young Lives sites, and made use of a two-stage sample design, with stratification by school type: State Government; Tribal/Social Welfare; Private Aided and Private Unaided. The stratified random sample was drawn within each site using DISE-SEMIS 2014-15 as the sampling frame. Sampling was proportional to the total number of schools in each site, although the two smallest groups of schools (Private Aided, and Tribal/Social Welfare) were over-sampled (to include all schools of these types) to ensure sufficient numbers.

The 2016-17 school survey collected data on school effectiveness using three outcome measures: Class 9 students' performance in maths, 'functional' English, and 'transferable skills' (see Azubuike et al. 2017; Iyer and Azubuike 2017). Student performance in maths and English was assessed using repeated measures, with linked cognitive tests administered at the beginning and the end of Class 9 (Wave 1 and Wave 2 of data collection, respectively). Test linking in these two subjects permits students' performance in both waves to be reported on a common scale (based on the use of a number of 'link items' which appear in both tests and using scaling based on item-response modelling). Student questionnaires were employed to collect background information on students, allowing student progress over the course of one year of secondary schooling to be examined in relation to individual, class, teacher and school factors. Further details of the survey design can be found in Moore et al. (2017).

2. Methodology and data

2.1. Estimating value-added

Value-added estimates for schools or classes are calculated using the progress made (change in test scores) by a particular group relative to the whole sample of students and classes/schools. Various approaches may be adopted, depending on the purpose and the assumptions made about the relationship between sample and population concerned. Nonetheless, estimates are typically quite similar when calculated by the various methods. In this study we employ a simple two-level multilevel (hierarchical linear) model with random effects at school level. In some places we also refer to section-level value-added estimates, which are obtained from a three-level multilevel model (school, class and student).

In the analyses below, we include both unconditional value-added, which considers prior attainment at Wave 1 as the only explanatory variable, and contextual value-added, which also includes student background characteristics (see Table 1).

Table 1. *Variables used in value-added model*

	Unconditional value-added	Contextual value-added
Response variable (outcome)	Attainment at end of Grade 9 (Wave 2)	Attainment at end of Grade 9 (Wave 2)
Explanatory variables	Prior attainment (Wave 1)	Prior attainment (Wave 1)
		Age
		Gender
		Wealth (score on composite wealth index)
		Parental education
		Parental literacy
		Caste
		Orphan status

2.2. School survey sample

The design of the school survey focuses on measuring the quality and effectiveness of secondary education in different school management types found within the diverse Indian educational context: State Government; Private Unaided; Private Aided; and Tribal/Social Welfare. For this reason, the sampling strategy employs stratification by school management type (see Moore et al. (2017) for more details). Overall, the school survey included 205 schools, 519 teachers and 8,355 students across 20 Young Lives sites in Andhra Pradesh and Telangana (Table 2).[2]

Table 2. *School, teacher and student sample, by site*

District	Number of Young Lives sites	School types					Teachers	Students in Wave 1 and Wave 2
		Private Aided schools	Private Unaided schools	State Govt schools	Tribal/ Social Welfare schools	Total schools		
West Godavari sites	2	8	5	5	11	29	77	1395
Srikakulam sites	5	1	9	23	17	50	128	2540
Kadapa sites	2	0	2	8	0	10	25	253
Anantapur sites	4	6	8	17	1	32	86	1360
Karimnagar sites	2	6	9	9	3	27	54	798
Mahbubnagar sites	4	0	6	19	4	29	70	993
Hyderabad site	1	8	16	4	0	28	79	1016
Total	20	29	55	85	36	205	519	8355

2 In India, Young Lives sites are at *mandal* level. A *mandal* is an administrative unit below district level.

3. Findings

There is a great deal of variation in estimated value-added across the schools in the Young Lives sample. Figure 2 plots the unconditional value-added for each school, along with the confidence intervals, while Figure 3 shows the same for contextual or conditional value-added (i.e. value-added which includes control variables for differences in student background). The estimates are centred on zero, such that zero represents average rather than nil value-added. Where the confidence interval crosses zero, the value-added estimate may be considered indistinguishable from zero at the 95% confidence level. As can be seen in Figure 2, Private Unaided schools (those in red) add more value in general, while many State Government (blue) and Tribal/Social Welfare schools (black) add less than average value. However, when we control for differences in student background (Figure 3), the pattern becomes slightly less clear, with some State Government and Tribal/Social Welfare schools moving up the school ranking. This suggests that at least part of the reason why Private Unaided schools appear to be more effective is the more advantaged background of their students.

Figure 2. *School unconditional value-added, sorted by school rank*

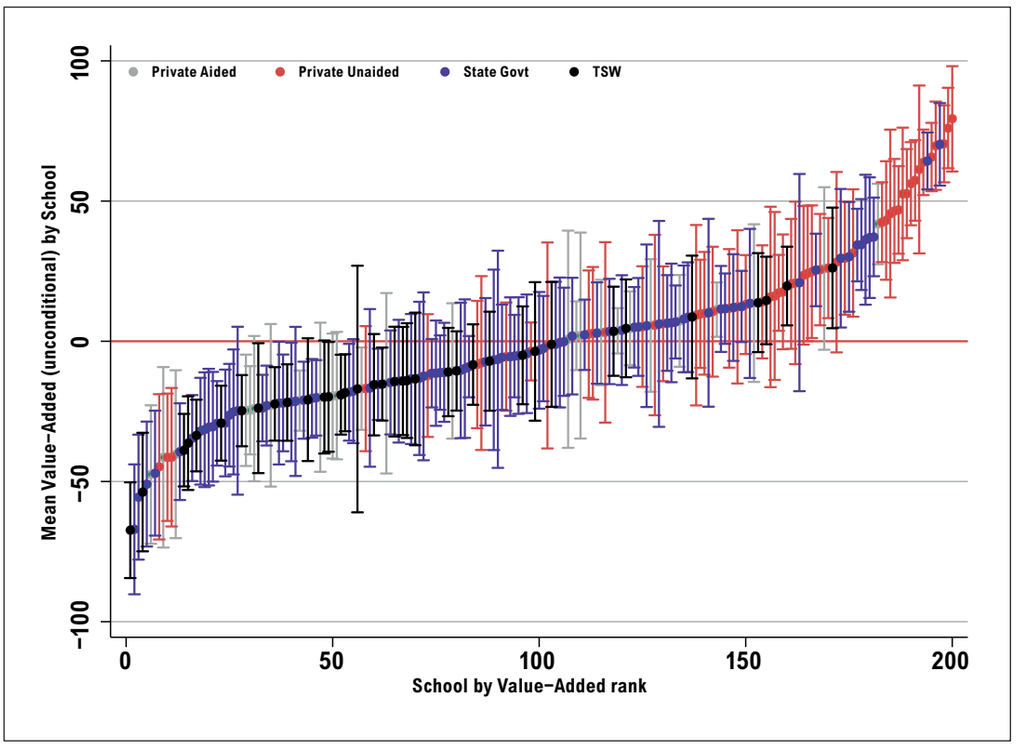
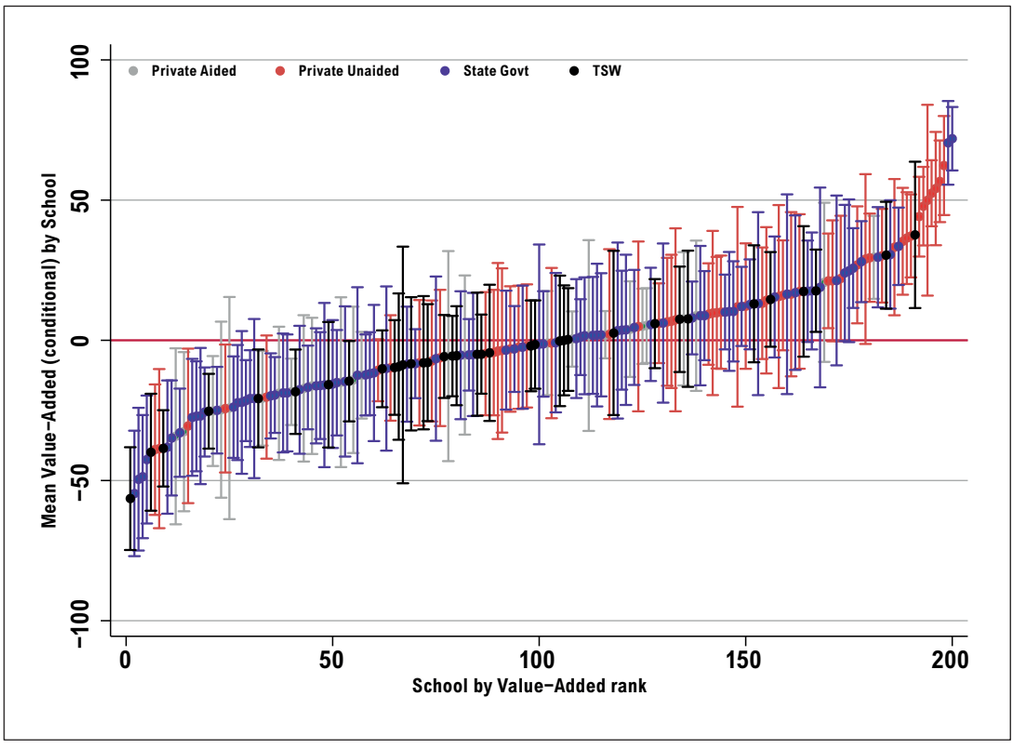


Figure 3. *School contextual value-added, sorted by school rank*



3.1. Value-added and starting scores

As shown in Figures 4 and 5, there is a positive relationship in both maths and English between average school test scores at the start of Grade 9, and the amount of value added by the school; that is, schools with higher performance add more value or are more effective. This suggests that gaps in performance between lower and higher-performing schools will continue to widen over time.

Figure 4. *School value added by mean school maths score at the start of Class 9*

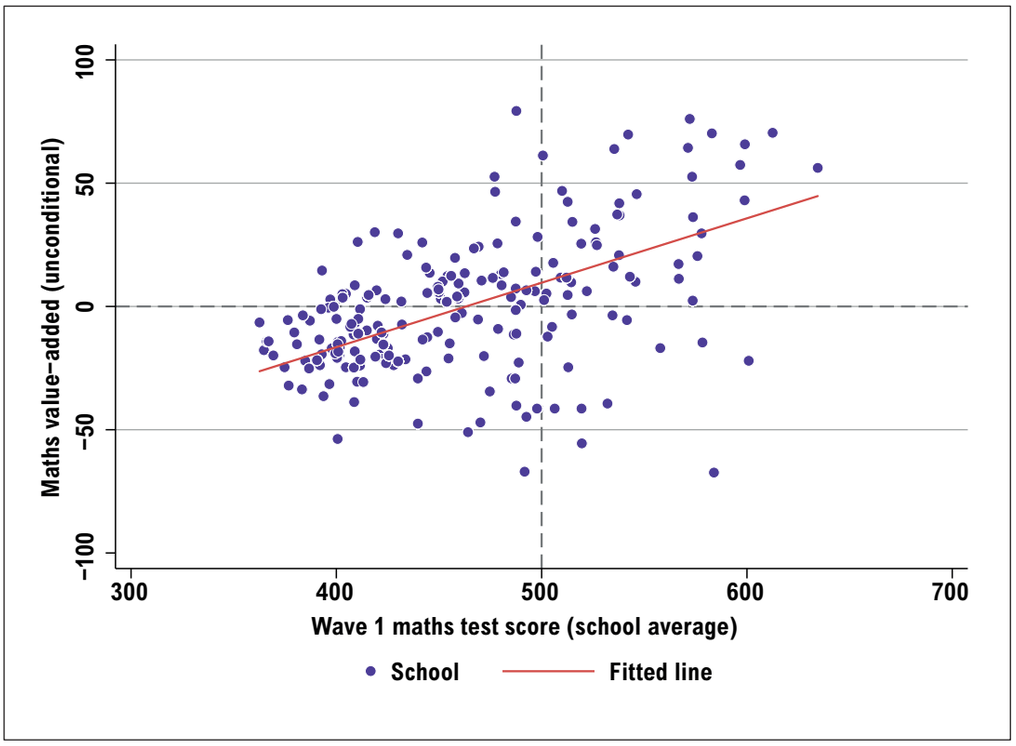
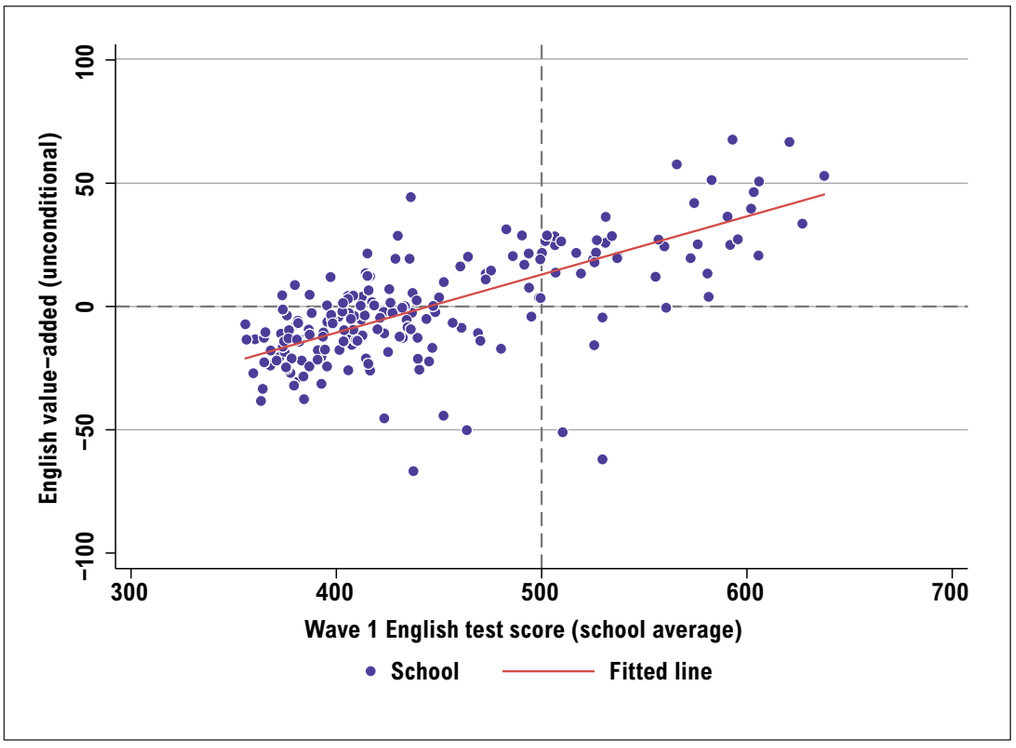


Figure 5. *School value-added by mean school English score at the start of Class 9*



3.2. Value-added comparisons

Comparing across different types of schools, it is clear that Private Unaided schools add considerably more value on average than other school types, even when we control for differences in student background (Table 3). When we control for student background in the form of contextual value-added, these gaps narrow a little, as shown in Figures 6 and 7, although Private Unaided schools continue to add considerably more value in both maths and English. It may not, however, be immediately concluded that all of the remaining gap in value-added is attributable casually to private management of schools, since there remain unobserved differences between students across school types which are linked to school choice.

Table 3. *School value-added by school type*

Maths				
School type	**Mean Wave 1 score**	**Mean Wave 2 score**	**Mean school value-added (unconditional)**	**Mean school value-added (contextual)**
Private Aided	472	481	-3.09	-3.82
Private Unaided	535	575	29.66	17.84
State Government	456	473	-2.05	0.07
Tribal/Social Welfare	412	439	-15.33	-5.87
Total	500	530	2.04	2.20

English				
School type	**Mean Wave 1 score**	**Mean Wave 2 score**	**Mean school value-added (unconditional)**	**Mean school value-added (contextual)**
Private Aided	454	462	2.10	0.00
Private Unaided	555	567	29.55	19.81
State Government	423	427	-8.37	-6.63
Tribal/Social Welfare	402	421	-6.57	0.79
Total	500	510	1.61	1.42

Figure 6. *Maths value-added by school type*

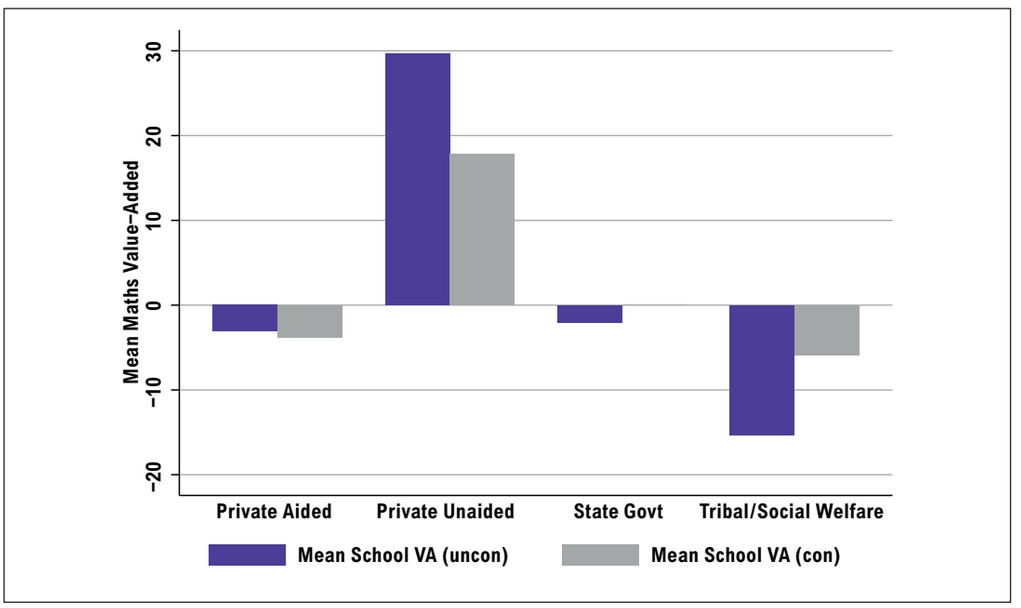
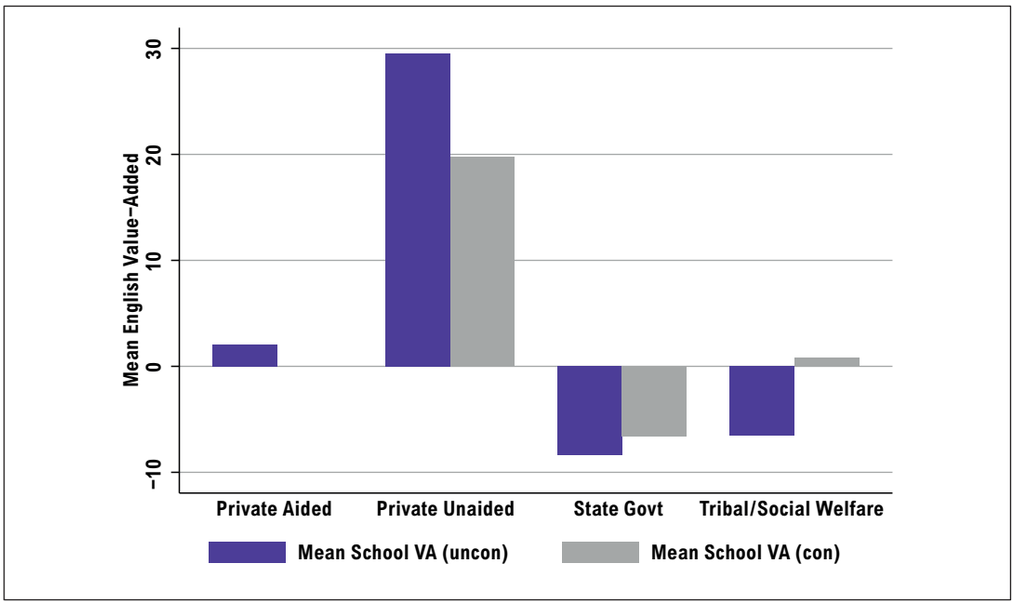


Figure 7. *English value-added by school type*



3.3. Other school characteristics

School management is not the only factor associated with differences in school value-added. As shown in Figures 8 and 9, larger schools (those with more sections in Class 9) appear to be more effective in both maths and English, both unconditionally and when we control for differences in student background. Again, however, we may not readily interpret these differences as necessarily causal, not least because school size is associated with school-management type.

Figure 8. *School maths value-added by number of sections in Class 9*

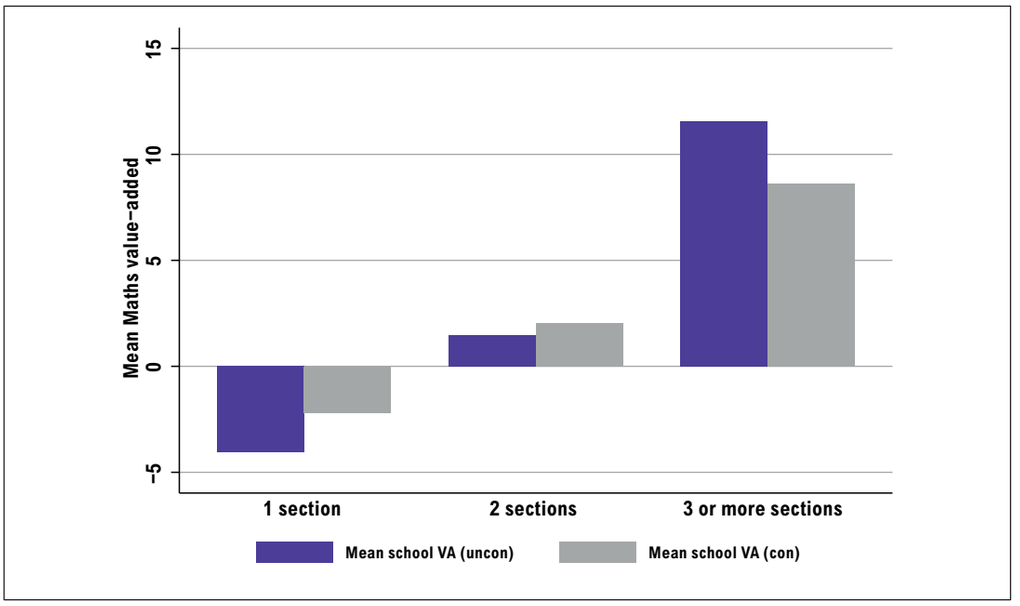
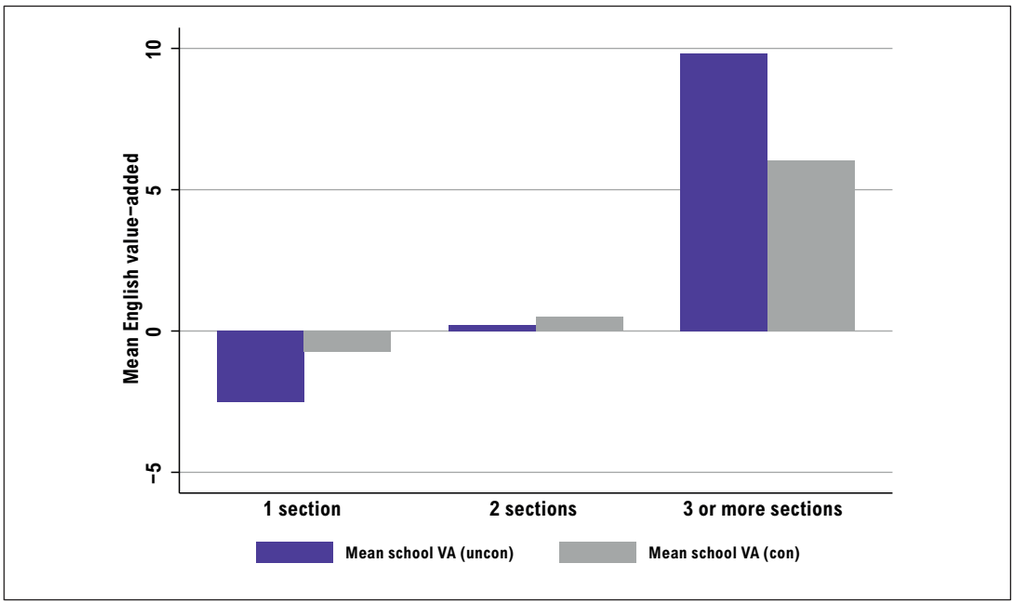


Figure 9. *School English value-added by number of sections in Class 9*



Focusing this analysis more specifically on different types of schools, however, the same pattern is found within Private Unaided schools and State Government schools (see Figures 10 and 11). This suggests that smaller schools are less effective than larger schools regardless of school type in this sample, while recognising that school size is linked to a number of other characteristics of schools and to the populations they serve, only part of which can be accounted for using our data.

Figure 10. *School value-added by number of Class 9 sections (Private Unaided schools only)*

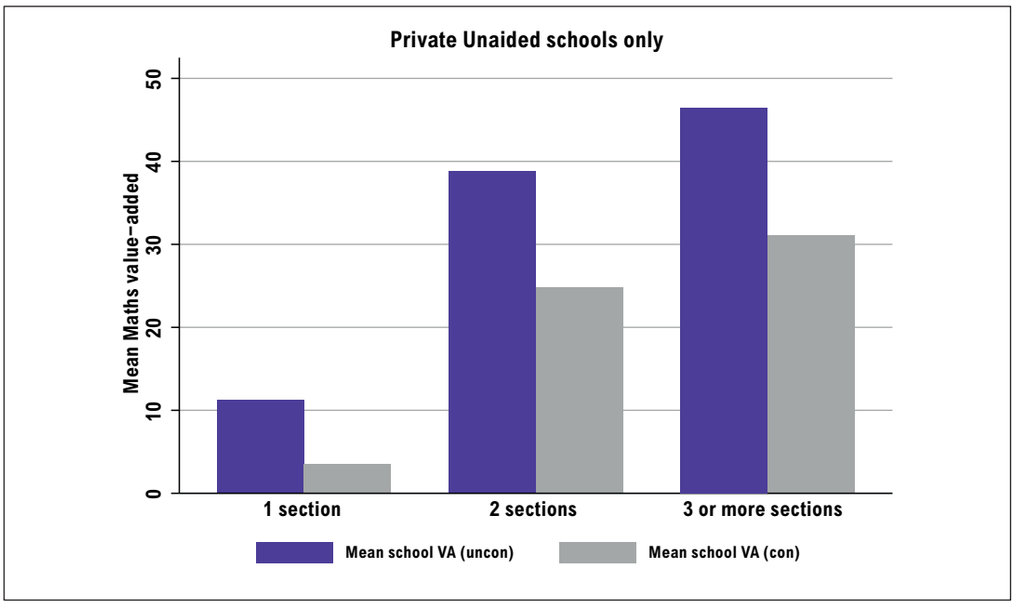
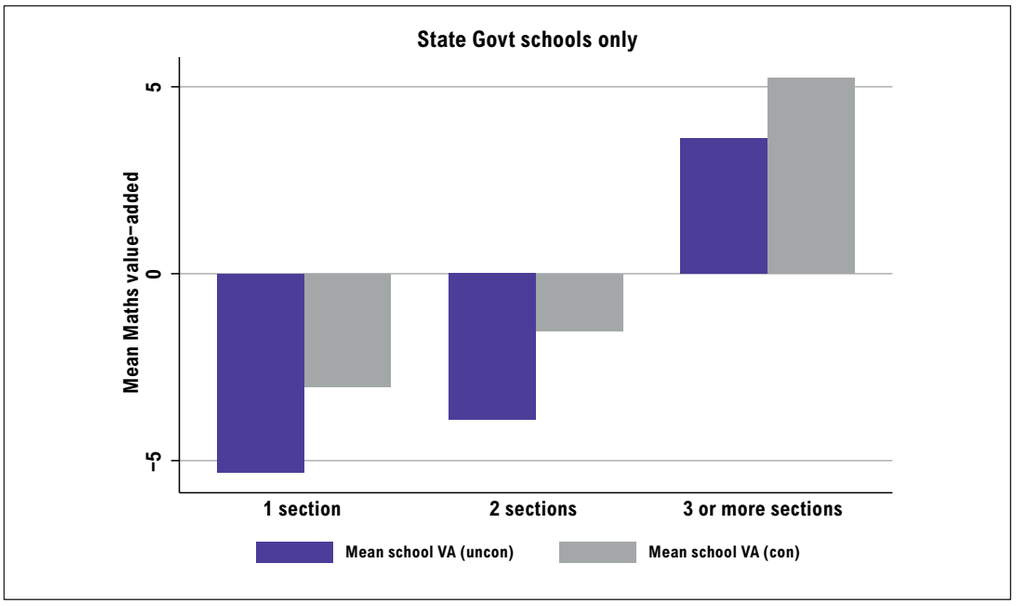


Figure 11. *School value-added by number of Class 9 sections (State Government schools only)*



As Figure 12 shows, schools in urban areas add more value in English on average, both unconditionally and when we control for differences in student background. However, the pattern is less clear for maths (Figure 13); unconditional value-added is higher in urban areas, but when we control for student background there is much less difference between urban and rural areas.

Figure 12. *School English value-added by locality*

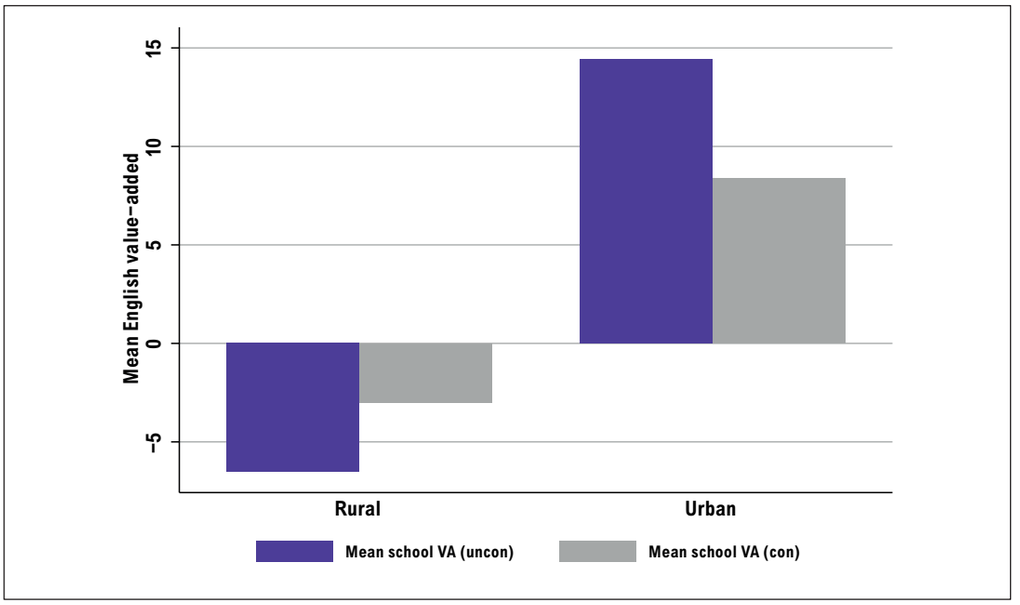
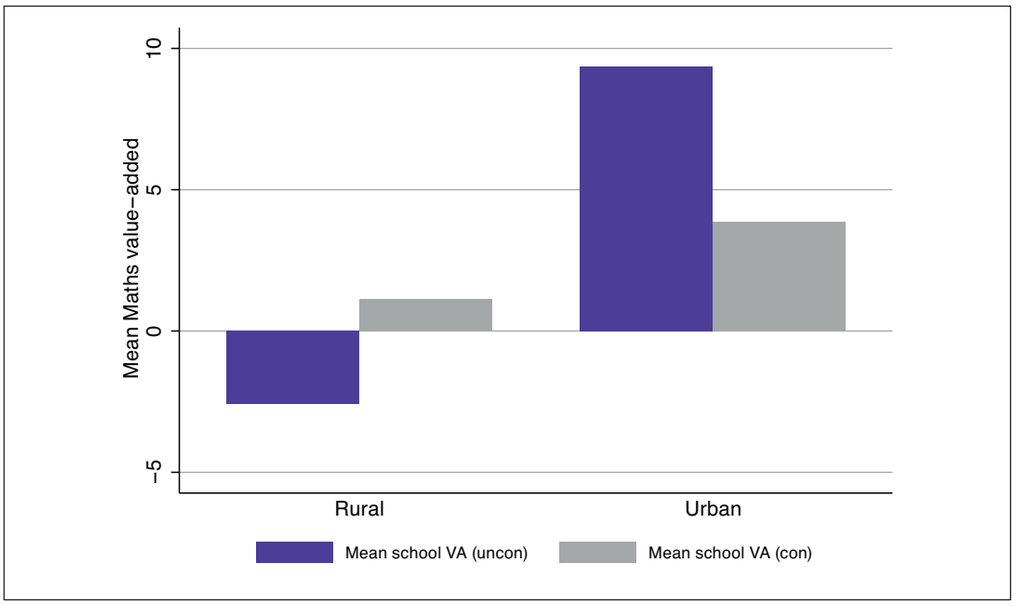


Figure 13. *School maths value-added by locality*



Medium of instruction is related to the value-added by the school. As Figure 14 shows, schools and sections which teach in English medium add more value in English than schools or sections teaching in Telugu.

Figure 14. *School and section value-added by medium of instruction*

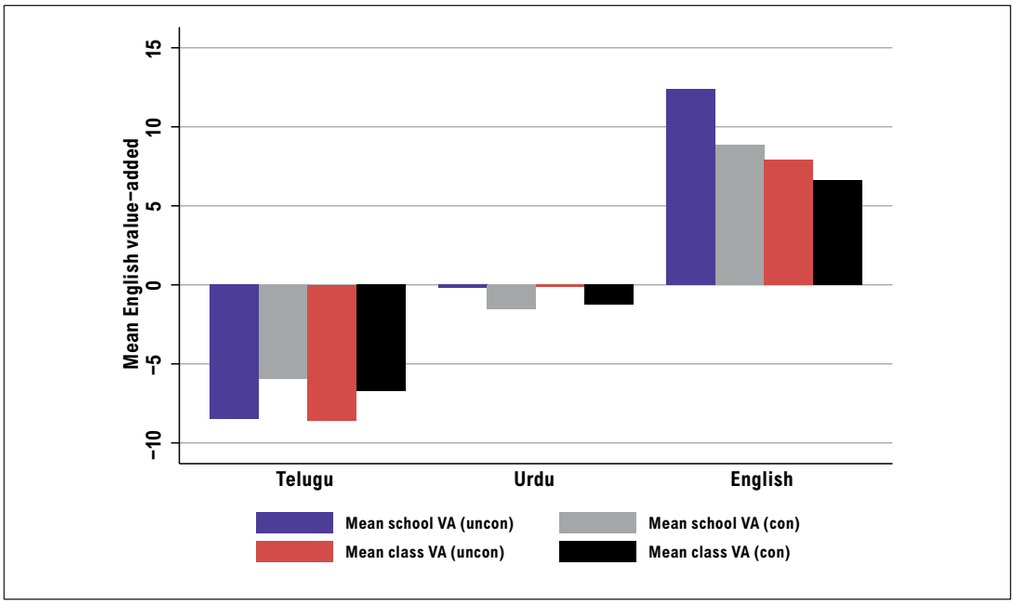
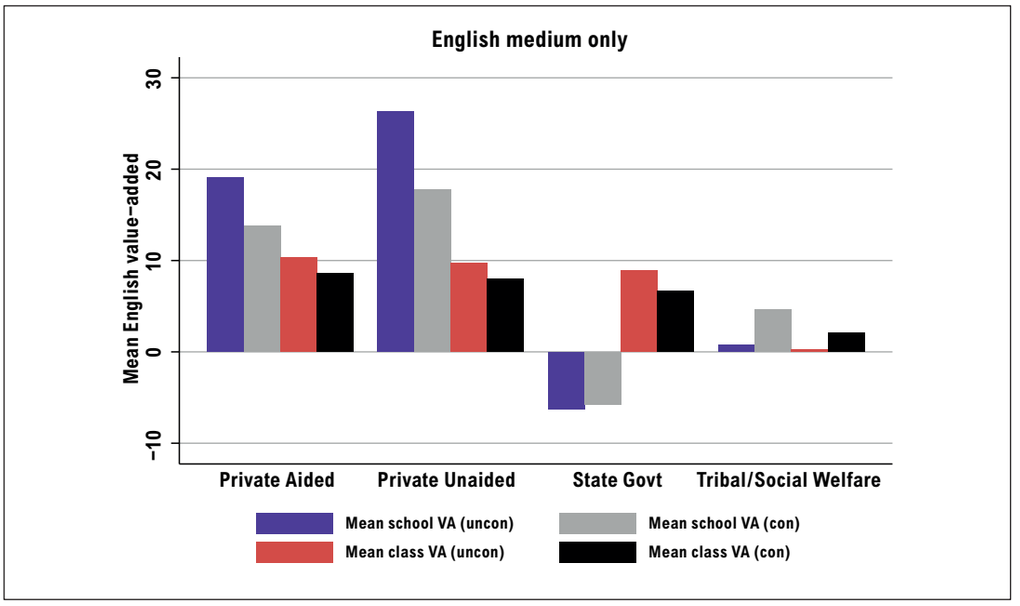


Figure 15. *School and section English value-added by school type (English medium only)*



This pattern can also be seen across different school management types which are teaching in English (Figure 15), suggesting, perhaps unsurprisingly, that teaching in English medium increases student learning in English in all school types. Following the introduction of English medium sections in selected government schools in Andhra Pradesh and Telangana, this is a finding of potential policy relevance.

3.4. Who attends schools which add more value?

We can build upon this analysis further to understand more about students attending those schools which add the most value. As we can see in Figures 16, 17 and 18, children from the poorest households, those with less-educated mothers, and girls, are considerably more likely to attend less effective schools. This suggests that children are 'sorted' into more effective schools, based on the extent of their home background advantage.

Figure 16. *Mean maths value-added by student wealth quintiles*

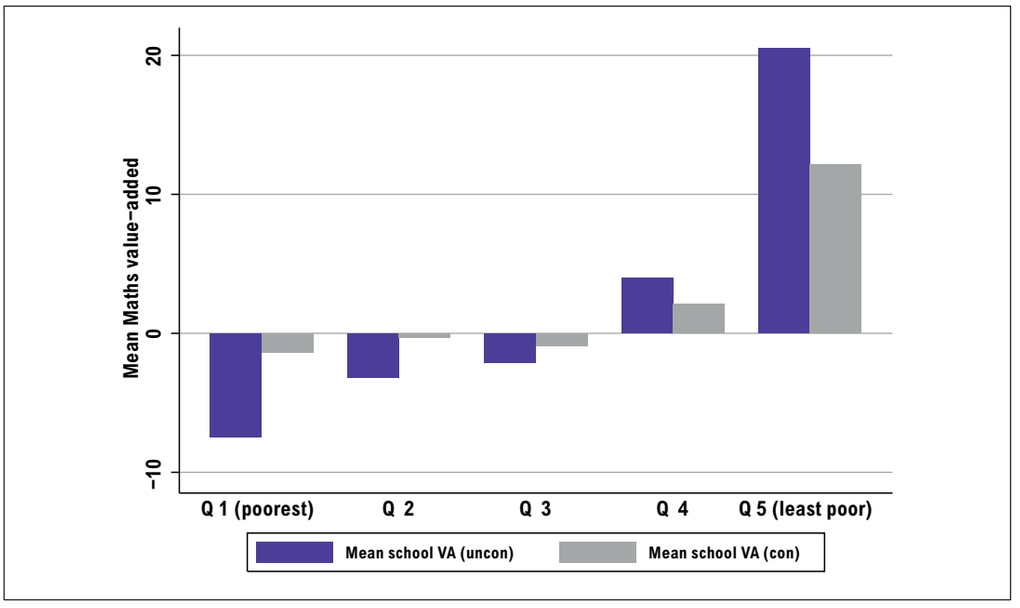


Figure 17. *Mean maths value-added by gender*

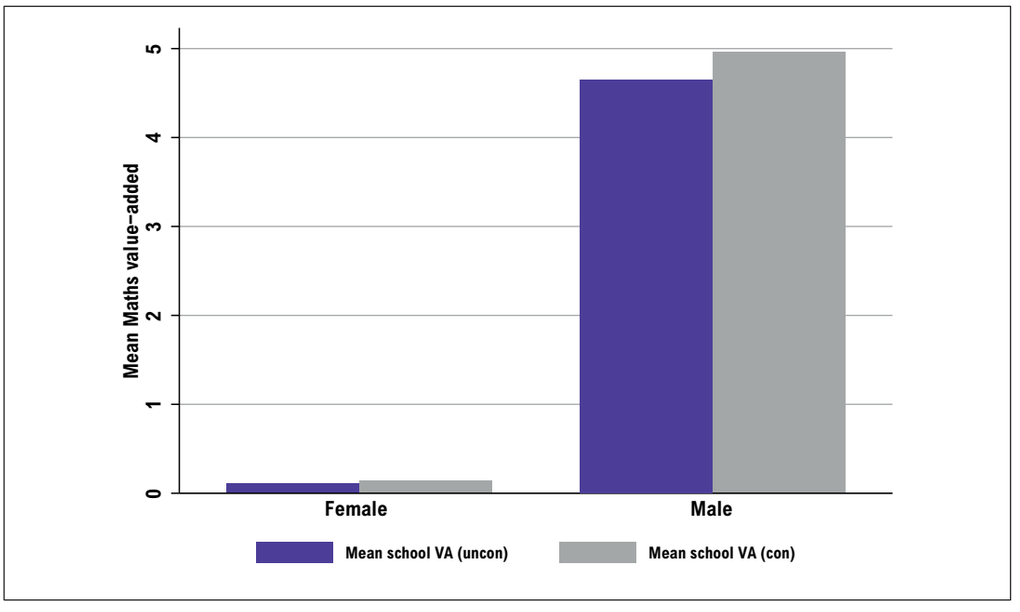
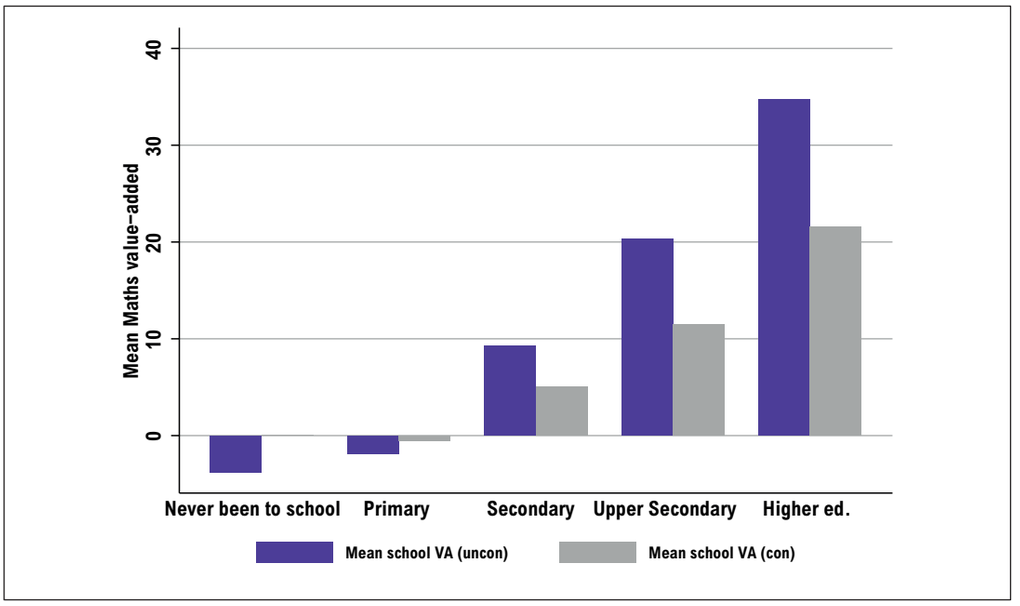
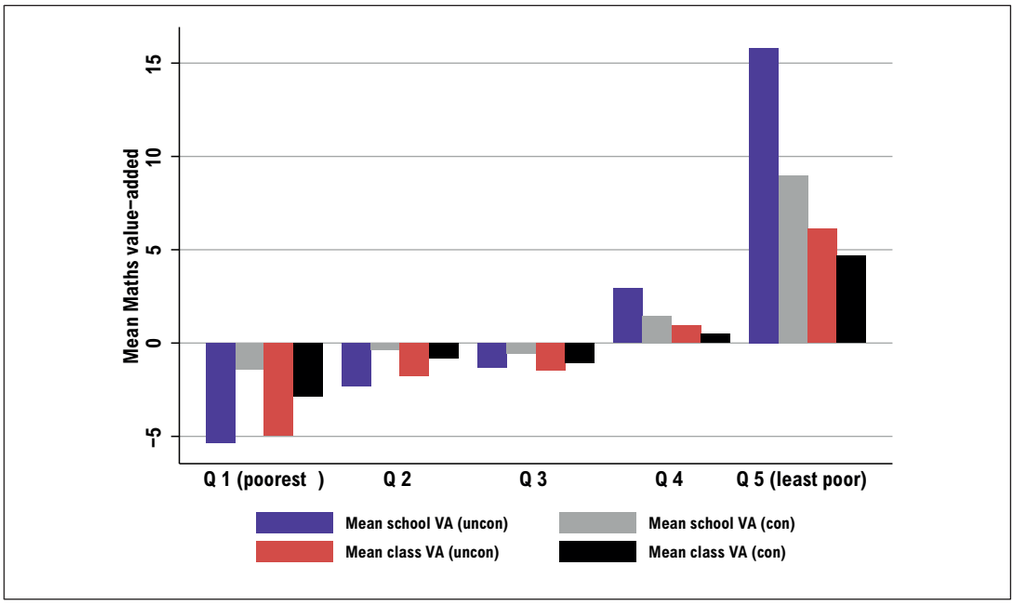


Figure 18. *Mean maths value-added by mother's education*



As Figure 19 shows, it is clear that in addition to sorting *into* schools, a similar kind of 'sorting' taking place within schools, with the poorest children experiencing the double disadvantage of attending less effective schools and studying in less effective sections within those schools.

Figure 19. *Mean school and section maths value-added by wealth quintile*



4. Summary and implications

Examination of patterns of value-added in this sample of schools teaching Class 9 in Andhra Pradesh and Telangana provides evidence of important inequalities in learning progress both between and within schools and school types. Most notably, gaps in learning outcomes observed at the beginning of Class 9 between students in State Government and Private Unaided schools are found to widen further during the school year, partly due to apparently greater effectiveness of private schools. Across the whole sample, schools with higher initial performance tend to show more learning progress, a pattern which also suggests potentially widening 'learning gaps' over time. Moreover, in general across the whole sample, more advantaged students in terms of economic circumstances and parental education, as well as boys when compared to girls, are found to attend more effective schools. Part of the greater progress made in Private Unaided schools, and other school types which show greater than average value-added, such as large schools when compared to smaller schools, is attributable to differences between students attending different schools in terms of their home advantage. But 'contextual value-added' models show that sizeable gaps in effectiveness remain after conditioning on students' backgrounds.

Schools in the sample have relatively homogeneous intakes, while there is considerable heterogeneity between schools, owing to a comparatively extensive range of 'school choice'. 'Sorting' of students into schools by socio-economic advantage may be expected to increase learning gaps if less advantaged students are sorted into less-effective schools, as the evidence suggests. While schools instructing in English are found, as might be expected, to produce greater learning gains in that subject, the evidence shows that this also applies to government school sections which teach in English, a result of a fairly recent policy shift. Where policy for government schooling is concerned, the evidence presented here draws attention to the need to mitigate the effects of school 'sorting' for disadvantaged students. Learning progress in schools attended by disadvantaged students is low in Class 9, with potentially very negative effects for these students in the Board examinations and for later outcomes. But equally, starting scores at the beginning of Class 9 are already very significantly lower, as a result in part of low learning progress in earlier years of schooling. Our findings lend some indicative support to the suggestion that very small schools face particular issues of effectiveness, and that to some extent discrimination exists with respect to school choice for girls. While overall the evidence shows that many government schools are relatively ineffective by comparison with private schools, it nonetheless finds that this pattern is far from universal and that there are a number of highly effective schools in the government sector. The heterogeneity of effectiveness in the government sector is, arguably, the key finding from this value-added analysis which requires policy attention, potentially through efforts and initiatives aimed at 'raising the floor' of achievement and progress by setting minimum standards or benchmarks, and through more robust mechanisms of quality assurance and quality control.

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Young Lives

An International Study of Childhood Poverty

About Young Lives

Young Lives is an international study of childhood poverty, involving 12,000 children in 4 countries over 15 years. It is led by a team in the Department of International Development at the University of Oxford in association with research and policy partners in the 4 study countries: Ethiopia, India, Peru and Vietnam.

Through researching different aspects of children's lives, we seek to improve policies and programmes for children.

Young Lives Partners

Young Lives is coordinated by a small team based at the University of Oxford, led by Professor Jo Boyden.

- *Ethiopian Development Research Institute, Ethiopia*
- *Pankhurst Development Research and Consulting plc, Ethiopia*
- *Centre for Economic and Social Studies, Hyderabad, India*
- *Save the Children India*
- *Sri Padmavathi Mahila Visvavidyalayam (Women's University), Andhra Pradesh, India*
- *Grupo de Análisis para el Desarollo (GRADE), Peru*
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