Value Subtraction in Public Sector Production: Accounting Versus Economic Cost of Primary Schooling in India

Lant Pritchett and Yamini Aiyar

Abstract

We combine newly created data on per student government expenditure on children in government elementary schools across India, data on per student expenditure by households on students attending private elementary schools, and the ASER measure of learning achievement of students in rural areas. The combination of these three sources allows us to compare both the "accounting cost" difference of public and private schools and also the "economic cost"—what it would take public schools, at their existing efficacy in producing learning, to achieve the learning results of the private sector. We estimate that the "accounting cost" per student in a government school in the median state in 2011/12 was Rs. 14,615 while the median child in private school cost Rs. 5,961. Hence in the typical Indian state, educating a student in government school costs more than twice as much than in private school, a gap of Rs. 7,906. Just these accounting cost gaps aggregated state by state suggests an annual excess of public over private cost of children enrolled in government schools of Rs. 50,000 crores (one crore=10 million) or .6 percent of GDP. But even that staggering estimate does not account for the observed learning differentials between public and private. We produce a measure of inefficiency that combines both the excess accounting cost and a money metric estimate of the cost of the inefficacy of lower learning achievement. This measure is the cost at which government schools would be predicted to reach the learning levels of the private sector. Combining the calculations of accounting cost differentials plus the cost of reaching the higher levels of learning observed in the private sector state by state (as both accounting cost differences and learning differences vary widely across states) implies that the excess cost of achieving the existing private learning levels at public sector costs is Rs. 232,000 crores (2.78% of GDP, or nearly US$50 billion). It might seem counterintuitive that the total loss to inefficiency is larger than the actual budget, but that is because the actual budget produces such low levels of learning at such high cost that when the loss from both higher expenditures and lower outputs are measured it exceeds expenditures.

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Introduction

It is widely accepted that public service delivery in India is riddled with inefficiency. Yet, despite this widespread agreement, there are relatively few estimates of the total excess costs of service provision over the achievable cost for the same quality of service. Prime Minister Rajiv Gandhi infamously guess-estimated in the 1980s that a mere 15 paise of every rupee spent on development actually reached the poor. Nearly three decades later, policy debates in India continue to repeat this guess-estimate. Empirical estimates of inefficiency have focused on either the magnitude lost to corruption and or to leakage in reaching the poor from mis-targeting. For instance, studies of the food subsidy suggest that only 40% of the total food grains allocated reach the poor with, of course, large variations across states.

While leakage through corruption and mis-targeting is important, what the infamous quote from Rajiv Gandhi was alluding to, but which is now much less debated, is the high administrative cost of the provision of public services. The delivery of public services in India is supported by front-line government officials both administrative and direct service providers (e.g. policemen, teachers, nurses. engineers). The total wage bill for the Indian government in 2011-12 accounted for 25.5% of government expenditure or 6.2% of GDP. [1] The question is not whether this wage bill is, in some abstract and/or ideological way, "too high" or "too low" but whether Indian citizens are getting what they pay for—do the front-line providers actually provide for the wages they receive? We show that in basic education Rajiv Gandhi's estimate was not far off—the public sector costs are five times too high—so only 20 paise are needed to deliver what now costs the taxpayer a rupee.

The most obvious example, and which therefore has drawn the most attention, is absenteeism. Obviously if someone is paid and just doesn't show up, taxpayers didn't get what they paid for. Widespread absenteeism among both teachers and health workers has been well documented in India for well over a decade. [2] The most recent of these is a follow up study to the 2003 absenteeism study (Muralidharan, Das, Holla, Mohpal 2014) that visited the same schools in 2010 as in 2003 found that absence in rural areas has declined only from

[1] Wage bill figures obtain from RBI data.

[2] The original PROBE Education Report (1998) in the BIMARU states reported high levels of absenteeism, such that effective teaching hours were two hours a day, 150 days a year. This was followed by a round of studies in health and education (Chaudhury et al 2006) and a follow up of the PROBE report plus various sources such as ASER.

26.2 percent to 23.6 percent. They estimate the fiscal cost this *excess* absence (over and above an achievable rate) at 9,000 crores of rupees ($1.5 billion) just in basic education.[3]

But even if providers are present they are frequently not using their time either effectively or with professional competence. All of the studies that document absence also document that much of time present in the school isn't devoted to any teaching activity (PROBE 1998, Chaudhury et al 2006). Even when teachers are present and engaged with students studies of classroom practices find low levels of correct use of even the basic "child friendly" pedagogical techniques (Bhattacharjea, Wadwha, Banerji 2011, Das 2014) and high levels of dubious practices such as corporeal punishment (Desai et al 2008).

But even if teachers were present and technically efficient they could be cost inefficient if the salaries paid are in excess of what is needed to attract, retain and motivate staff of sufficient quality. When excess wages are paid the actual wage bill can be decomposed into the "needed wage" and a "rent" (in the economist's sense) (or "subsidy" in more common parlance) which raises the accounting cost of schooling.

The difficulty in assessing the efficiency of public services stems from observing costs of public sector and private sector providers delivering a sufficiently similar service (including quality) in sufficiently similar conditions to know not just the actual reported cost but also how much lower than cost could have been. This paper contrasts the actual or *accounting* cost and the *economic* cost—or lowest cost to obtain a given quantity and quality—in the provision of elementary education in India by comparing actual per student government expenditure on elementary education with cost data on students attending private schools. We then use these data sets to adjust for the quality of education using learning data in both government and private schools drawn from the ASER survey.

What does it cost to educate a child in India? This question is not as straightforward as it seems as the word "cost" has two completely different meanings: "accounting cost" (the total expenditures actually attributed) and "economic cost" (the *lowest* expenditure).

The "accounting cost" or "budgetary cost" of a student-year of publicly provided schooling is just the *total cost* arrived at from adding up the actual expenditures from various (central

[3] Absence of staff at health clinics—especially higher level staff like doctors-- is, if anything, worse (Chaudhury et al 2006) and sometimes much worse (e.g. Duflo et al in Rajasthan, Dhaliwal and Hanna (2013) in Karnataka).

and state) government budget categories attributed to primary schooling divided by the number of students. This defines "cost" in a purely *descriptive* sense.

Economists in contrast define "economic cost" of a year of schooling of specified quality *to be* the *lowest possible spending.* Economic cost is *conceptual* not descriptive. Standard economic theory as a *positive* theory of behavior is that, under some conditions, decision making agents actively seek to minimize costs and hence would like accounting costs to reach economic costs. If that were a correct description of how agents actually behaved, then accounting costs should approach economic costs.[4]

But actual government spending behavior in general (Pritchett 2000) and in the field of education in particular (Filmer and Pritchett 1999) is incompatible with cost minimization as a positive theory of government behavior. This implies that "accounting cost" may be much higher than "economic cost" and many actions may raise "accounting costs" without changing "economic costs." Suppose a government allocated expenditures under a schooling budget head, the education department withdrew the cash, locked it into a box and sank it deep into the ocean. That pure inefficiency of dumping cash into the ocean would add to "accounting cost" as descriptive but not change "economic cost" at all—and the gap is cost inefficiency. While this example may seem outlandish, Indonesia recently doubled teacher pay, a policy step that will cost billions and increase expenditures per student massively. A rigorous evaluation shows *exactly* zero impact of this doubling of teacher pay on student learning (or anything else) (de Ree, Muralidharan, Pradhan and Rogers 2014). We would argue such actions do not change the *economic* cost of education but rather a political decision to transfer money to teachers was recorded as an addition to the *accounting* cost of schooling.

We make two contributions to current understandings of education financing in India.

First, we combine newly created data on accounting costs—the actual expenditure per child—from government budgets complied by Accountability Initiative with data, also from the Accountability Initiative, on the cost of a year of private schooling from household surveys to create estimates of the "raw" cost difference between a year of government schooling and a year of private schooling. We find (as have many other authors) that the

[4] This is true of profit maximizing firms but is not limited to firms or to profit maximization as it is also true of output maximizing organizations, whether they are non-profit, public sector, or not.

typical Indian state spends twice as much per year of schooling as parents spend when they send their children to private school (but with wide variation across states).

Second, we illustrate how to adjust costs for the quality of schooling and implement a simple version of that adjustment. Since learning performance in private schools is higher than in public schools the "raw" cost differential potentially *understates* the true "economic cost" differential to produce equivalent learning. Our adjustment takes the measures of learning performance from the ASER assessment of reading and arithmetic in rural areas across states. We show that spending Rs. 10,000 more per student, in either the government or private sector, is associated with another 10 percent of students above a (low) learning competence threshold. Using this association of costs and learning outcomes we can calculate state by state the hypothetical cost of achieving the private schooling learning performance at the existing public sector accounting costs. The total quality adjusted cost gap is much larger, such that to achieve private results at existing public sector cost structures would typically require nearly doubling spending.

The crude calculation at the "national" level (the actual calculations are state by state) is that the excess cost per child of achieving a learning level of 71.2 percent of students with minimal competence on the ASER combined reading and mathematics assessment (the currently observed level in the private sector) is the sum of the accounting cost excess of 7,900 (public more expensive than private) per child plus an additional Rs. 17,000 per child of spending needed to close the 17.1 percentage point learning gap (current public sector student competence is only 54.1 percent). This implies the total cost of a year of schooling in the public sector to produce a year of schooling of the same quality as a private school is around Rs. 30,900 (roughly the Rs 6000 the private sector spends plus the Rs. 7,900 raw cost difference plus Rs. 17,000 to get to private sector learning outcomes) for a total excess cost over the achievable of Rs. 24,900 per child (30,900 less 6,000). This excess cost per student times 90 million children in government schools is 224,100 crores.

I. The accounting cost of a year of government schooling across Indian states

The Accountability Initiative (AI) of the Center for Policy Research has estimated the accounting cost of a year of elementary education in India by identifying the different budgetary sources through which elementary education is financed and calculating the magnitude of each. To understand the methodology behind these calculations, it is

important to understand the budgeting system for elementary education in India. The elementary education budget is financed by the state and Government of India (GoI) budgets. State government budgets, channeled through state education line departments are the primary source of elementary education funds. The second most important source of financing is the Government of India's (GoI) which finances elementary education through centrally sponsored schemes (CSS) such as Sarva Shiksha Abhiyan (SSA) and the Mid-Day Meal Scheme (MDM).[5] In addition, State government's draw on funds from other schemes and programs such as the special component plan for Scheduled Castes and the Tribal Sub-Plan to finance elementary education activities targeted at specific beneficiary groups. Finally, State budgetary expenditure also includes statutory transfers determined by the Finance Commission (the constitutional authority mandated to recommend the vertical and horizontal share of finances between the center and state governments). In 2010, the 13th Finance Commission awarded Rs.24,000 crore to support the implementation of elementary education programs across the states.

Calculating the total elementary education budget thus requires collating budgetary allocations and expenditure across all these different sources of elementary education financing. To make these calculations, Accountability Initiative used two primary sources: State budget documents and the Approved Annual Work Plan and Budget (AWP&B) for SSA allocations (the AWP&B is the government's official document that records state-wise approved SSA budgets). State budget documents were used to collect data on allocations and expenditure for finances that flow directly from the state treasury in to the education line ministry. This includes the state government contribution to SSA, allocations and expenditures for MDM and funds received by the education line department for schemes run by other departments such as tribal welfare. The Indian budget process operates on an annual basis, but with two sub-cycles every year. The first cycle begins at the start of the financial year (April 1) when budgetary allocations for each line department are made by the Ministry of Finance. These allocations are referred to as Budget Estimates (BE). Based on these estimates, line departments release funds to state governments. In December of every year, line ministries are expected to re-visit their budgetary allocations and arrive at "Revised Estimates"(RE). The RE are based on fiscal performance through the year and a projected estimate of expenditure likely to be incurred through to the end of the fiscal year (March 31).

[5] Centrally sponsored schemes are a mechanism through which the government of India channels special purpose funds to state governments. Funds channeled through CSS are spent based on programs that are designed and monitored by GoI. The total state budgetary allocation for SSA is determined by GoI. Once budgets are allocated, finances are shared between state governments and GOI in a 35:65 ratio.

The RE also includes any additional grants that might be given to state governments over and above the budgeted estimates. The RE is thus a more realistic estimate of the total accounting cost of government. Actual expenditures are computed only with a 2 year lag. Thus RE is often used as a proxy for actual expenditure. The accounting costs presented here use RE figures for the 2011-12 fiscal year.

GOI funds for SSA are deposited directly in to an SSA specific bank account. Thus to calculate GoI's contribution toward elementary education, the total funds released by GoI in to the SSA account need to be computed separately. GoI releases to state bank accounts are recorded in the AWP&B and the SSA website. Since the final expenditure figures are not disaggregated into expenditure from GoI revenues versus the state share of SSA, these documents on GOI releases were sourced to calculate the total GoI contribution to the accounting cost of education. The GoI figures were calculated based on releases made up to September 2011 (about 50% of more of the annual GoI funds released to states).Thus the GoI release used to calculate per child cost may be an under-estimation of total per-child expenditure by GoI for the year.[6]

Once the actual accounting cost was calculated, the per-student cost was derived by dividing the state accounting cost by the total enrolment in government elementary schools in 2011-12. The enrolment numbers were obtained from DISE State Report Cards, a national data base on education data maintained by GoI. Table 1, column 2, presents the total per student accounting cost by state in 2011-12 for India and Figure 1 shows the state by state per student expenditures, sorted from highest to lowest. [7]

[6] In late 2014, these numbers were updated based on actual expenditure data. However, the difference between RE numbers and actual expenditure is not significant. The updated numbers are available on Dongre,A. and Kapur, A. (2014) " How much does India spend on educating children?", Accountability Initiative, PAISA working paper, www.accountabilityindia.in Note that public expenditure per student enrolled in elementary sections of government schools as estimated here is an over-estimation since the numerator includes expenditure on private aided schools, while denominator doesn"t include students in private aided schools. This over-estimation is a matter of concern mainly for states like Kerala, Maharashtra and Tamil Nadu where a significant proportion of students are enrolled in such schools. The other option was to include number of students in private aided schools in the denominator. However, money towards private aided schools is only for teacher salaries, and would have resulted in underestimation of public expenditure per student enrolled in government schools. Further, this would have created problems in estimating private expenditure on EE,

[7] Union territories were not included in this analysis. Budget data for Arunachal Pradesh was not available at the time of collating this data and thus has been excluded from the analysis.

The bulk of the states have expenditures per student between 9,000 and 20,000 and the median budgetary expenditure per student in a government school is Rs. 14,615.[8] There are a few states with very high expenditures per student, such as Goa (44,654), Kerala (35,721) and Himachal Pradesh.[9] There are also a few low expenditure states, particularly West Bengal, Jharkhand and Bihar, all less than Rs. 7,000.

Table 1: Budgetary expenditures on primary education per student enrolled and per capita household expenditures

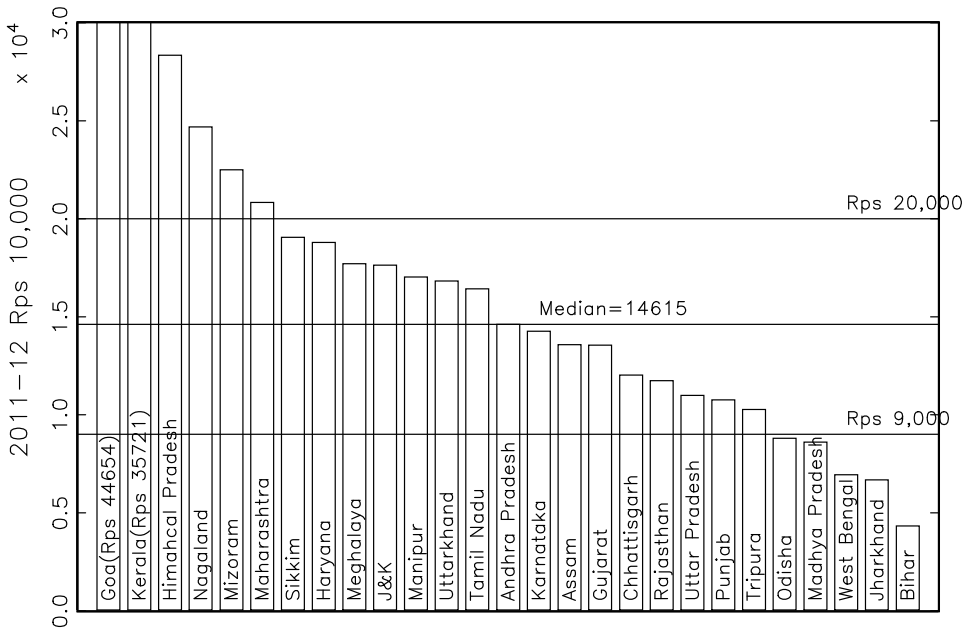
State	**Per student expenditures, Rs. 2011-2012, Revised Expenditures (sorted high to low)**	**Household monthly expenditures per capita (MPCE) using MMRP.**		**Ratio of per student expenditure to annualized (MPCE*12) per capita expenditures**	
		Rural	Urban	Rural	Urban
	2	3	4	5	6
Goa	44654	2408	3051	154.5%	122.0%
Kerala	35721	2669	3408	111.5%	87.3%
Himachal Pradesh	28344	2034	3259	116.1%	72.5%
Nagaland	24683	2059	2284	99.9%	90.1%
Mizoram	22495	1644	2568	114.0%	73.0%
Maharashtra	20838	1619	3189	107.3%	54.5%
Sikkim	19060	1565	2608	101.5%	60.9%
Haryana	18798	2176	3817	72.0%	41.0%
Meghalaya	17709	1475	2436	100.1%	60.6%
J&K	17640	1743	2485	84.3%	59.2%
Manipur	17032	1502	1483	94.5%	95.7%
Uttarakhand	16830	1726	2339	81.3%	60.0%
Tamil Nadu	16435	1693	2622	80.9%	52.2%
Andhra Pradesh	14615	1754	2685	69.4%	45.4%
Karnataka	14268	1561	3026	76.2%	39.3%
Assam	13584	1219	2189	92.9%	51.7%
Gujarat	13562	1536	2581	73.6%	43.8%
Chhattisgarh	12025	1027	1868	97.6%	53.6%
Rajasthan	11746	1598	2442	61.3%	40.1%
Uttar Pradesh	10997	1156	2051	79.3%	44.7%
Punjab	10761	2345	2794	38.2%	32.1%
Tripura	10270	1334	2144	64.2%	39.9%
Odisha	8803	1003	1941	73.1%	37.8%
Madhya Pradesh	8601	1152	2058	62.2%	34.8%
West Bengal	6940	1291	2591	44.8%	22.3%
Jharkhand	6675	1006	2018	55.3%	27.6%
Bihar	4332	1127	1507	32.0%	24.0%
Median	14615	1565	2485	80.9%	51.7%

Sources: Accountability Initiative (2013) and NSS 68th round data for MPCE (MMRP method).

[8] We use medians, not means (arithmetic averages) throughout for two reasons. First, there are extreme outliers in various dimensions (e.g. Goa on costs) and the median is a measure of the central tendency of a distribution that is robust to extreme observations. Second, an "average" across states of India that is not population weighted (or weighted by number of students) is the "average" state not the "average person" in India and given the variation in population sizes between UP or Bihar and Nagaland or Manipur a "state average" across India can be misleading by giving equal weight to small and large states. Below when we produce aggregates we use state by state calculations and add up by enrollments but for descriptive statistics we used medians due to its more desirable influence function (e.g. that the precise values for small states cannot affect the measure of central tendency).

[9] For the remaining exercises we usually exclude Goa for three reasons. First, the expenditure data are so high it is a huge outlier and affect all of the graphs. Second, it is a small state and atypical in a number of ways. Third, our learning data from ASER used below are only "rural" areas and in a small dense state like Goa we are not confident the urban-rural divide is very useful.

Figure 1: Budgetary allocation (RE) per student in government schools, by state, Rps 2011–2012



Source: Data from Accountability Initiative, PAISA National Report (2013).

That the median expenditure is Rs. 14,615 per child per year raises the question "compared to what?" Conceptually, the government takes resources, transforms them through administrative processes into services, and then offers them "in-kind" to citizens at reduced (or zero) price. Blattman and Niehaus (2014) suggest that the total per person cost of goods and program services provided "in kind" should be compared to the impact of providing that amount to the person or household in cash. How much does the government spend in accounting cost to produce a year of schooling compared to what households are spending on their array of priorities such as food, clothing, transport, housing? Columns 5 and 6 of Table 1 and Figures 2 and 3 show the Monthly Per Capita Expenditures (MPCE) times 12 (for a crude annualized figure) from the 68th round of the NSS survey state by state for rural and urban areas respectively. The median ratio in rural areas across the states shown is 81 percent. As nominal incomes are higher in urban areas the median across states of this ratio in Figure 3 is lower at 49 percent. In the typical state in India the amount the government spends on schooling for one child for one year is 80 percent of what the average rural household spends per person on *everything*—food, clothing, electricity, transport, etc. As a cash transfer, Rs. 14,615 per child could double a child's food expenditures. Put a different way, the maximum household receipt for MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) is Rs. 10,000 (if the household works the maximum 100 days

at an average wage rate of Rs. 100 per day), which even if MGNREGA has a 40 percent overhead to the wage bill is the same cost as schooling for one child.

Figure 2: State ratio of per student expenditure to annualized mean per capita rural consumption expenditures

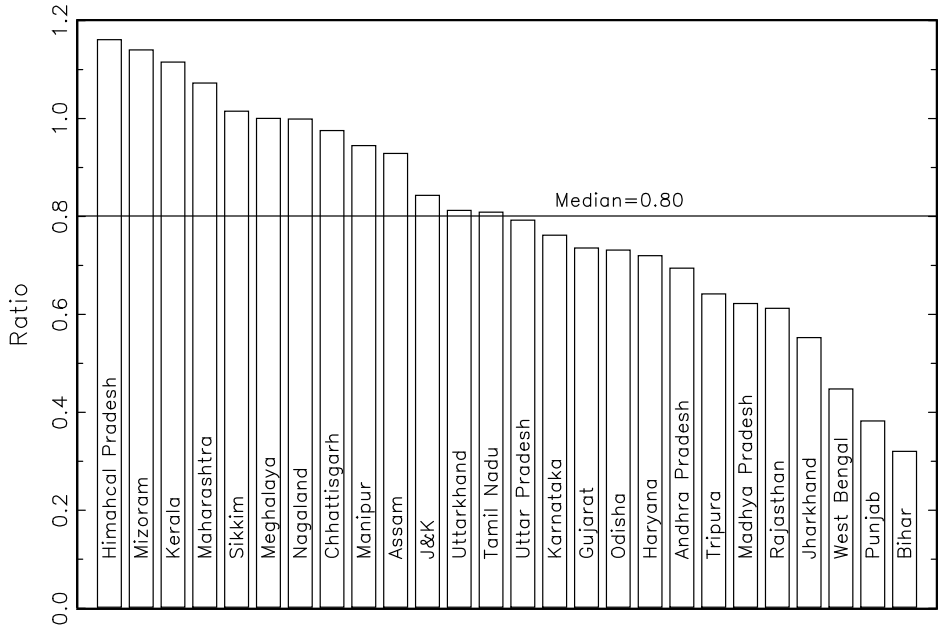


Figure 3: State ratio of per student expenditure to annualized mean per capita urban consumption expenditures

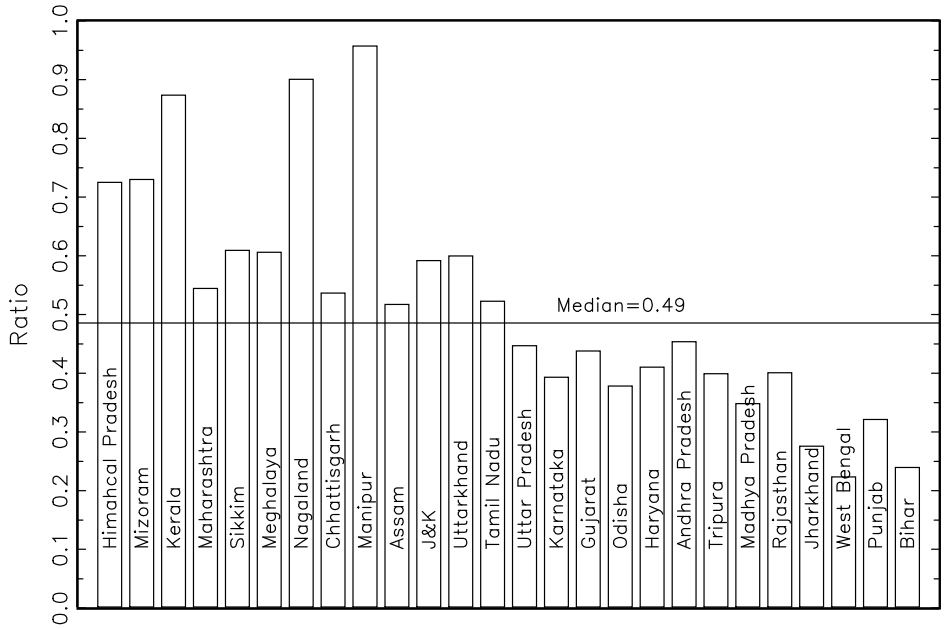


Table 2: Government expenditure per capita versus private expenditure per student					
State/UT	Excess of government over private expenditure per student (sorted high to low)	Per student allocation (RS 2011-12, Revised Expenditures)	Private expenditure per student	Ratio, public to private expenditure per student	Percent of rural children enrolled in private school
Goa	39,170	44,654	5,484	8.1	49.2
Kerala	30,308	35,721	5,413	6.6	59.6
Nagaland	17,575	24,683	7,108	3.5	38.5
Himachal	17,215	28,344	11,129	2.5	28.9
Mizoram	16,424	22,495	6,071	3.7	24.8
Maharashtra	14,877	20,838	5,961	3.5	35.4
Meghalaya	14,208	17,709	3,501	5.1	47.9
Manipur	11,895	17,032	5,137	3.3	67.3
Uttarkhand	11,136	16,830	5,694	3.0	36.6
J&K	10,652	17,640	6,988	2.5	43.7
Haryana	9,849	18,798	8,949	2.1	49.2
Andhra	9,108	14,615	5,507	2.7	36.5
Tamil Nadu	8,916	16,435	7,519	2.2	29
Karnataka	7,906	14,268	6,362	2.2	21.9
Uttar Pradesh	7,890	10,997	3,107	3.5	48.5
Sikkim	7,850	19,060	11,210	1.7	28.7
Assam	7,031	13,584	6,553	2.1	16
Gujarat	6,981	13,562	6,581	2.1	11.8
Rajasthan	6,874	11,746	4,872	2.4	41.1
Chhattisgarh	6,068	12,025	5,957	2.0	13.5
Madhya	4,735	8,601	3,866	2.2	18.2
Odisha	3,042	8,803	5,761	1.5	6.2
Jharkhand	1,979	6,675	4,696	1.4	15.5
Punjab	1,679	10,761	9,082	1.2	45.1
Tripura	1,516	10,270	8,754	1.2	3
West Bengal	151	6,940	6,789	1.0	6.9
Bihar	-298	4,332	4,630	0.9	6.4
Median	**7,906**	**14,615**	**5,961**	**2.2**	**29.0**
Source: Accountability Initiative (2013) for public and private expenditures and ASER 2012 for data private enrollment.					

II. Comparing accounting cost with expenditures on private schools

The cost per child in private schooling cannot be constructed from budgetary data in the same way that government schools cost was computed. The alternative is to estimate the expenditures that people who send children to private schools undertake. This gives the accounting cost to parents of a year of private schooling.

The accounting cost or expenditure per pupil was also computed by the Accountability Initiative.[10] Private expenditure numbers are drawn from the National Sample Survey (NSS). Private expenditure, as recorded in the NSS, includes expenditure on school fees, exams fees, tuition fees and any other fees; conveyance; books; stationery; and uniforms. The 64th round of the NSS undertaken in 2007-08 collected detailed data related to education expenditure. We use this data to calculate the expenditure incurred by households for sending a student to private schools in any of the classes from 1 to 8.[11] Next, we updated the per student private expenditure numbers by using inflation numbers calculated on the basis of state specific GDP deflators, indicated below.[12] This produces an estimate of per student private expenditure in 2011/12 rupees.

Table 2 shows the comparison of the expenditures per student in government schools contrasted with the estimated expenditures per student of children in private schools and the fraction of children in rural areas enrolled in private schools (the corresponding figures for private share of enrollment in urban areas or for combined would be much higher but ASER data, which we use below for measures of learning, only reflect rural totals).

Figures 4a and 4b show that the gap between public and private expenditures per student in the typical (median) state (which happens to be Karnataka) is 7,906, because public expenditures per student are Rs.14,628 and private expenditures per student are only Rs. 6,362. Public budgetary expenditures per student are typically more than twice as high (the median ratio of 2.2) as the private expenditure per student.

There are wide variations across the states in this measure of excess public sector costs. In Maharashtra, for instance, government expenditures are much higher than typical (20,838

[10] This section draws on Dongre, A. and Kapur, A. (2014) " How much does India spend on educating children?", Accountability Initiative, PAISA working paper, www.accountabilityindia.in

[11] Education in India: 2007-08 – Participation and Expenditure, NSS 64th round, July 2007-June 2008

[12] Data on GSDP has been obtained from Central Statistical Organization website, downloaded in July, 2013.

per pupil, well above the median of 14,615) but private expenditures are low (Rs. 5,961) so the difference of Rs. 14,877 is almost twice the cross-state median. In contrast, Bihar has extremely low public sector costs, only Rs. 4,322 (less than a third the median state cost of Rs. 14,615) and hence has slightly *lower* costs in public than private schools.

There are three obvious reasons why "accounting cost" expenditures in the public sector are so high relative to private expenditures.

First, total cost per student can be mechanically decomposed into teacher cost per student and non-teacher cost per student and teacher cost per student can again be mechanically decomposed into compensation per teacher and teachers per students. Accountability Initiative has unpacked the elementary education budget for 6 states between 2009-10 and 2013-14. On average, the bulk of the elementary education budget, between 70% and 80%, is allocated to teacher salaries. So teacher cost per student is likely to be the major source in variation in per student costs, both across sectors and states.

Every empirical study ever done of the issue shows that public sector teacher wages are far higher than private sector wages, a gap the Sixth Pay Commission award almost certainly increased. A 2010 study by Kingdon estimates that regular (civil service, non-contract) government school teachers make *20 times* more than private sector teachers. This accounts for the generally low cost of private schooling and some of the state variation. In 2011-12, Bihar, for instance allocated 41% of its education budget to teacher salaries compared with 75% in Maharashtra. Bihar's low spending on teacher salaries is on account of the fact that in 2006 Bihar created a new cadre of Panchayat (local government) teachers who were hired at a significantly lower pay structure than the regular teacher cadre.

Figure 4a: State by state government accounting cost per student less private expenditure

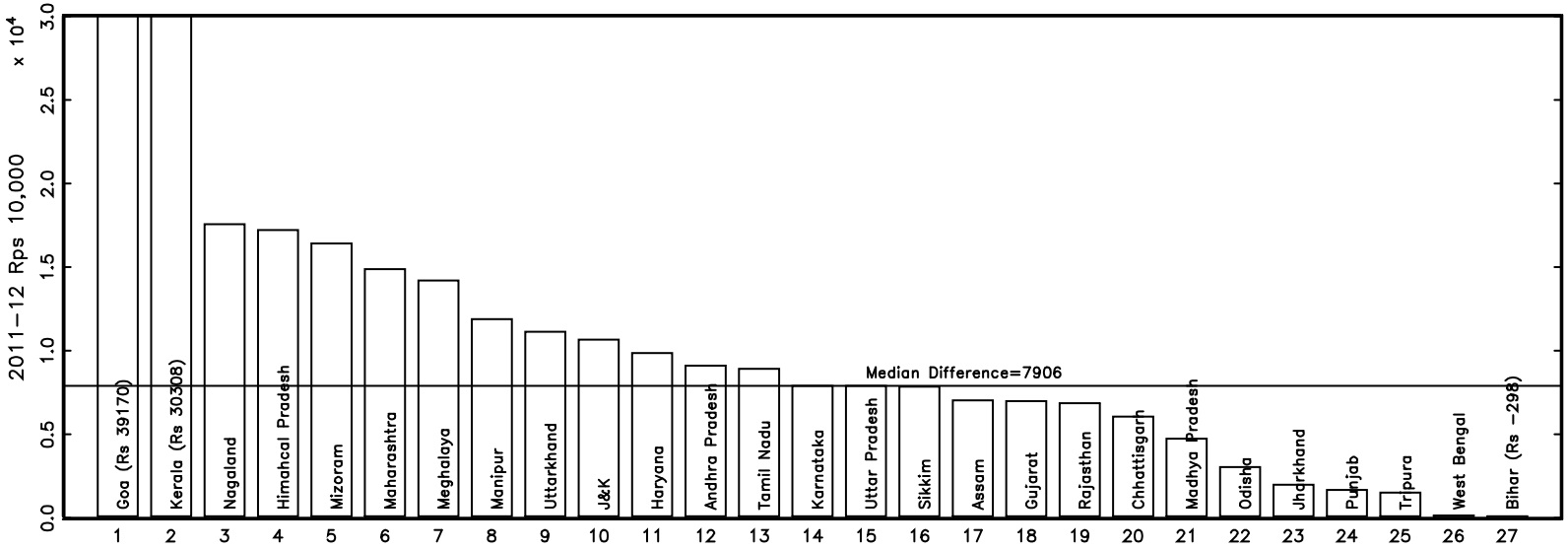
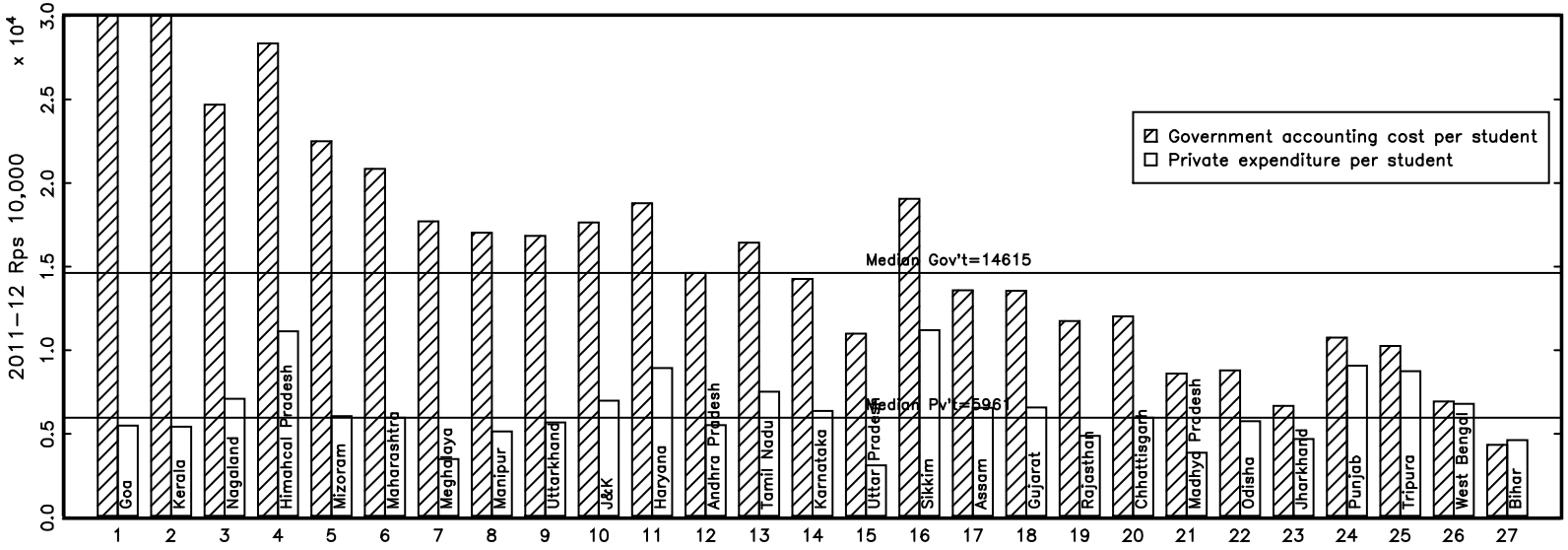


Figure 4b: State by state government accounting cost and private expenditure per student



Of course this raises the question of whether these high teacher wages are truly an "economic cost" (higher wages are necessary to achieve better outcomes) or merely an "accounting cost" that transfers resources from taxpayers and from other uses for citizens to a "rent" for teachers. We return to this question below.

Second, if the public sector loses students but retains the same (or smaller) teaching force then costs of teachers per student mechanically goes up. India is seeing a slow and steady shift away from government schools toward private schools. According to ASER (2012) private school enrolment is increasing at a rate of 3 percentage points per year. One of the consequences of a demographic slowing of the total number of school aged children plus a sharp rise in the proportion of children in private school is that the absolute number of children enrolled in government schools has fallen over time, in some states quite substantially. This raises the teacher cost per student.

Third, the public sector can just be ineffective in reducing costs of all types, because there is little or no pressure on reducing costs.

III. Adjusting cost differentials for quality differentials

So far we have only compared the average costs of *schooling* and there has been no discussion at all about the cost of *education*. Without incorporating any measure of *learning* we cannot talk about the differences in the cost of *education*. There are massive differences in the price of anything—a house, a car, a meal—depending on its *quality*. *Economic cost* is a conceptual function that shows the *best* that can be achieved—either the best output for a given cost or the lowest cost for any given outcome.

Figure 5 illustrates how to produce a money-metric measure of the total gap between two cost functions that combines the raw cost gap and translates the learning gap into a money-metric cost equivalent.[13] The starting point is the raw cost gap between accounting cost in public sector and private cost (Exp(Gov't)-Exp(Pvt)). But there is also a learning gap (L(Gov't)-L(Pvt), which could be positive or negative, but in this case it students in government schools have lower scores. But the "learning gap" is in learning metric units. To convert that into a cost equivalent we ask: "If the public sector increased its costs along some observed relationship of costs to learning outcomes by how much would costs have to increase (horizontal axes) to reach equivalent learning quality (vertical axis) as that already

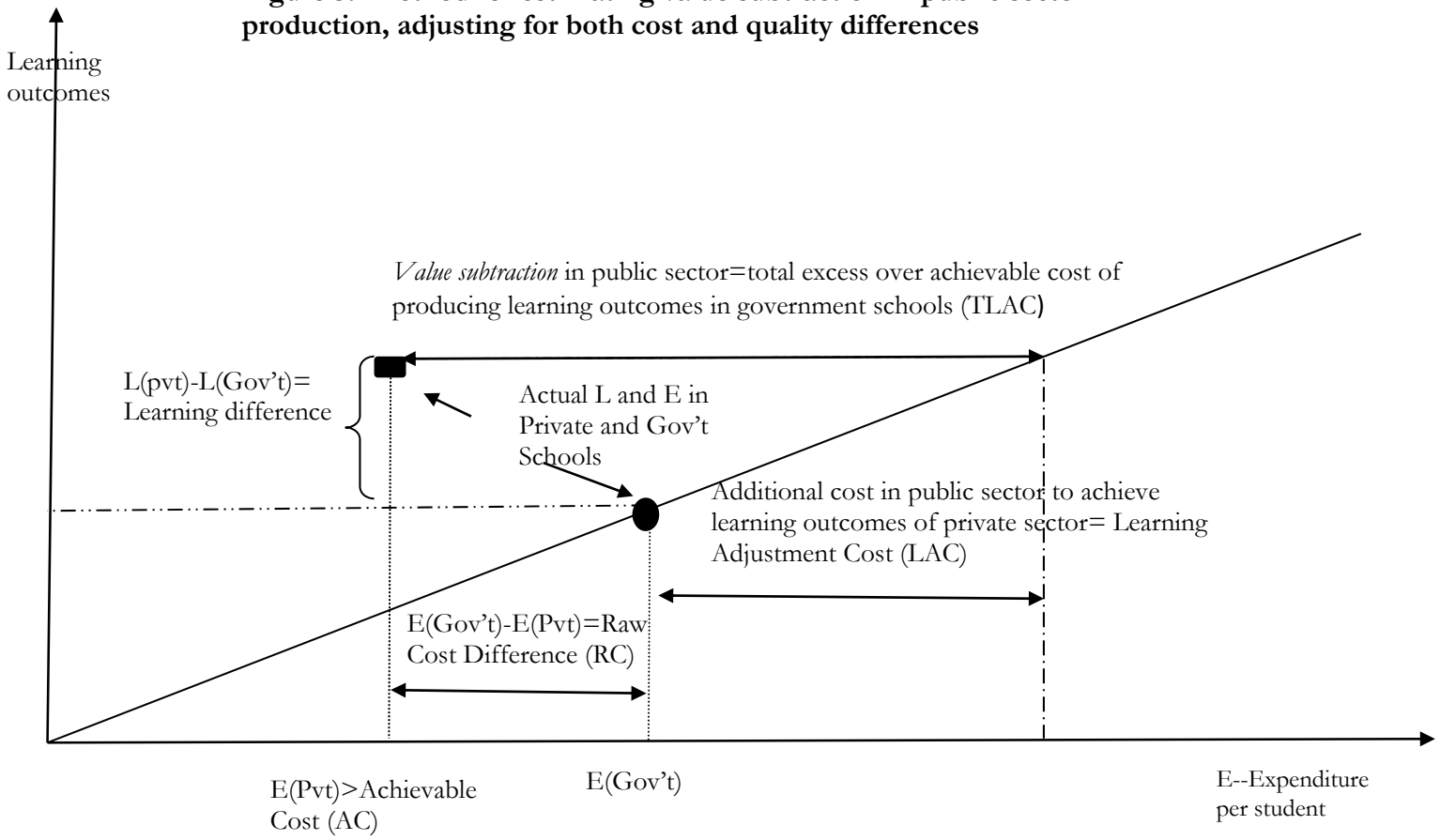
[13] We thank Gulzar Natarajan for the formulation of the graph.

observed in the private sector?" This is the Learning Adjustment Cost (LAC). The sum of the raw cost (RC) plus the learning adjustment cost (LAC) produces the total learning adjusted cost (TLAC) differential. [14] This is an estimate of "value subtraction" as it is the total excess cost of utilizing resources to produce learning at the actual efficacy of the government schools versus an achievable alternative.

We are going to empirically *illustrate* these calculations with data from India on observed costs and the public sector and with observations on the quality of learning. We emphasize that these calculations are *illustrative* of *how* to calculate quality adjusted cost differentials and give *indicative* results and are not intended to be *definitive* estimates. We are fully aware of (and will highlight some of) all of the many gaps between the calculation as we are able to do it currently in rough and ready form and the conceptual ideal. Nevertheless, we believe the rough and ready illustrative calculations do capture an important missing element in the current discussions about budgets and costs—which is that a substantial fraction of what the public sector currently classifies as "costs" of education are actually just using the education budget to transfer rents from general citizens and taxpayers to selected individuals.

[14] There are several other conceptually similar ways of measuring the gap between the cost functions. One, we could have estimated what it would cost the private sector to achieve the observed government levels of learning, which would adjust the private sector costs down, rather than government sector costs up to estimate the horizontal gap between the cost functions. We did not do this because we think most people want to imagine learning outcomes in India getting better, not worse (even at lower cost) and because technically it didn't work with simple linear estimates of the costs (explained below). Two, there is nothing special about measuring the productivity gap in cost functions in money metric terms, we could have estimated the gap between cost functions in "vertical" distance in learning units by adjusting the learning gap for the additional learning that could be had in the private sector for instance to get a total gap. We find this is both less intuitive and moreover does not immediately lead to money-metric comparisons that could be used across sectors.

Figure 5: Method for estimating value subtraction in public sector production, adjusting for both cost and quality differences



In order to implement this calculation we need a measure of education outcomes. Education of course is a large complex process of preparing a child for adulthood and has many elements ranging from emotional maturation, to socialization, to cognitive skills, to creativity and critical thinking. By using a measure that just captures reading and math skills we are not asserting these are the only, or even necessarily the most important, education outcomes—but they are indisputably one set of education outcomes that are widely accepted as goals that schooling is intended to achieve and articulated as goals of the schooling system in official curricula.

We use two measures of the learning from the ASER results for 2011 and 2012:

- Fraction of children enrolled in standard V who can read a simple story
- Fraction of children in standard V who can do at least subtraction.[15]

The ASER data provide these separately for children who report attending government or private school. We use the average across the years 2011 and 2012 to get estimates that are recent but also smoothed out over year-to-year variation. We report the reading results, the mathematics results, and the simple average of the two.

As with all else about India, there is substantial variation across the states. The median state has learning results on these two domains about 15 percentage points lower in government than in private schools (about 10 percentage points in reading (45.7 versus 65.2 and 19 percentage points in math 58.8 versus 77.8). In many states the gap is less than 10 percentage points (e.g. Kerala, Tamil Nadu, West Bengal, Andhra Pradesh) while in other states the gap is large, at 30 percentage points or more (e.g. Jharkhand, Uttar Pradesh, Madhya Pradesh).

[15] ASER measures a child's highest competency and the highest measured competency is doing simple division problems and the next highest is doing multiple digit subtraction. We use the sum of those whose highest level of mathematics performance is either subtraction or division.

Table 3: Learning outcomes from ASER 2011 and 2012 in rural India show substantial public-private gaps, varying widely across states.

	Average of read and math		Excess private over gov't (**sorted high to low)**	Standard V children who can read simple story		Standard V children subtraction or above		Percent rural children in private school
State/UT	Gov't	Private		Gov't	Private	Gov't	Private	
J&K	34.1	71.3	37.1	23.8	60.2	44.5	82.4	43.7
Madhya Pradesh	32.6	66.0	33.4	30.4	65.2	34.7	66.8	18.2
Uttar Pradesh	28.3	60.6	32.3	27.8	59.9	28.8	61.2	48.5
Jharkhand	42.8	75.0	32.2	35.0	71.8	50.7	78.3	15.5
Haryana	54.9	84.7	29.8	49.7	80.2	60.2	89.3	49.2
Rajasthan	37.0	66.6	29.6	33.6	62.0	40.3	71.2	41.1
Odisha	45.8	74.2	28.4	42.2	68.5	49.4	79.9	6.2
Bihar	54.1	79.2	25.0	45.7	74.6	62.5	83.7	6.4
Manipur	58.8	83.3	24.4	47.7	75.5	69.9	91.1	67.3
Gujarat	49.5	70.5	20.9	47.0	65.3	52.1	75.6	11.8
Chhattisgarh	44.5	63.1	18.6	43.3	60.4	45.7	65.7	13.5
Assam	38.2	55.8	17.6	33.7	50.4	42.6	61.2	16
Uttarakhand	57.1	73.5	16.4	53.2	69.2	61.0	77.8	36.6
Karnataka	51.1	66.2	15.1	44.3	56.0	57.9	76.3	21.9
Nagaland	64.4	78.8	14.4	45.3	70.2	83.4	87.4	38.5
Meghalaya	53.8	66.6	12.8	52.1	63.4	55.4	69.8	47.9
Himachal Pradesh	75.2	85.1	9.8	70.8	80.2	79.6	89.9	28.9
Tripura	56.1	64.2	8.1	45.7	68.2	66.5	60.2	3
Kerala	69.4	77.0	7.5	66.3	71.9	72.6	82.0	59.6
Tamil Nadu	41.7	49.0	7.4	30.7	32.3	52.6	65.7	29
West Bengal	53.6	60.3	6.7	48.7	55.5	58.4	65.1	6.9
Andhra Pradesh	67.9	74.3	6.5	58.4	63.0	77.3	85.7	36.5
Maharashtra	58.7	64.6	5.8	58.7	64.1	58.8	65.0	35.4
Punjab	73.3	78.5	5.2	70.7	72.7	75.9	84.4	45.1
Mizoram	79.2	83.6	4.5	66.8	73.7	91.5	93.5	24.8
Goa	60.7	64.1	3.4	45.1	50.3	76.2	77.8	49.2
Sikkim	68.3	71.2	2.9	55.1	64.6	81.5	77.8	28.7
Median	**54.1**	**71.2**	**15.1**	**45.7**	**65.2**	**58.8**	**77.8**	**29.0**

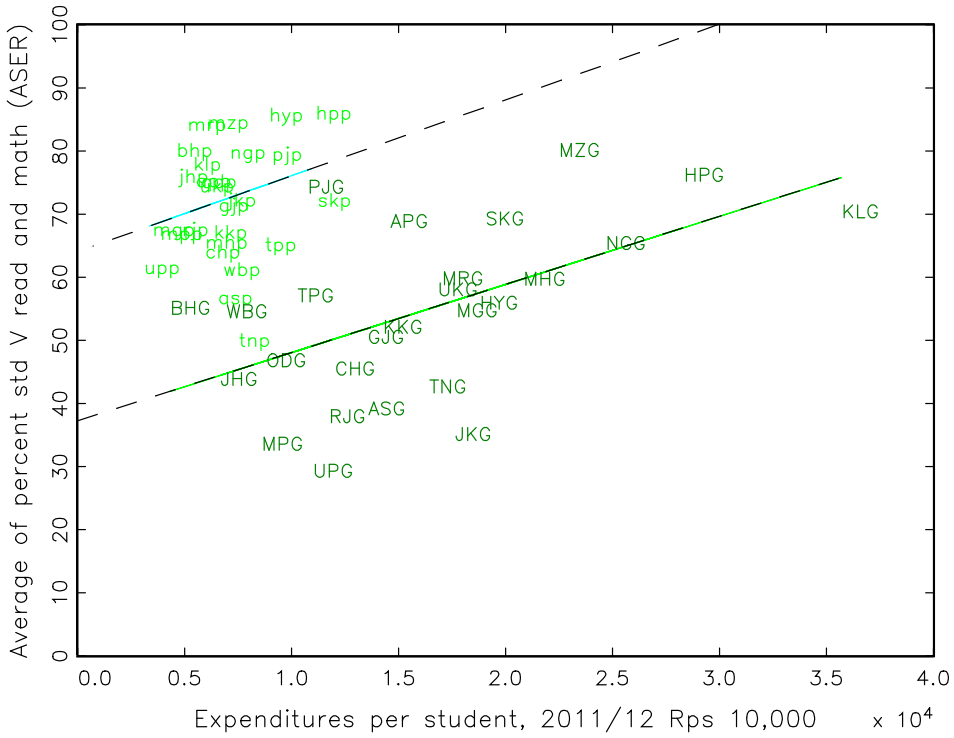
Source: ASER reports.

We use these cross state results to estimate the simple bivariate association between learning outcomes and cost per student in both the government and private schools. Figure 6 shows the simple bivariate scatter plot between expenditure per student by state and learning

outcomes in the government (shown in upper case with "G") and private sector (lower case with "p").

This graph illustrates the gap between public and private in both costs and learning outcomes. For instance, Himachal Pradesh has one of the highest average learning scores for the public sector, at 75.2 percent, but in so doing spends Rs. 28,344 per child. In the private sector in the same state the average spending is Rs. 11,129 and scores 85.1 percent (almost ten percentage points higher). And in the next door state of Uttarakhand the private expenditure per child is Rs. 5,694 and hence less than Himachal Pradesh's public spending by a factor of 5) and yet learning outcomes are close (73.5 vs 75.2).

Figure 6: Bivariate association across states of India between expenditures per student and ASER learning outcomes (average of reading and math)



Source: Accountability Initiative (2013) for expenditures, ASER (various) for learning.

Using these data we can estimate the simple bivariate relationship between learning outcomes and expenditures separately for reading, math, and combined in the government and the private sector. The results in Table 4 are, given the wide range of estimates of association between budgets and student outcomes in the literature, at least somewhat

robust, in that across both measures of Reading and Math (and hence the combined) the estimates of "rupees per year associated with additional 10 percentage point gain in learning performance" are quite similar, ranging between Rs. 7,201 for Math in the Private sector to Rs. 10,347 for Reading in the Government schools.

Table 4: Results of simple bivariate association between learning outcomes (percent in standard V with competency) and expenditures per student across states

	Government			Private		
	Both	Read	Math	Both	Read	Math
Constant	37.26	32.91	41.61	64.09	60.19	67.98
t-statistic	6.60	6.14	6.18	12.15	12.42	10.33
Cost (*10,000)	10.80	9.66	11.94	12.01	10.14	13.89
t-statistic	3.25	3.07	3.01	1.53	1.40	1.41
Rupees per 10 percentage point gain	9,257	10,347	8,374	8,323	9,859	7,201
N	26	26	26	26	26	26
R-Squared	0.336	0.337	0.289	0.303	0.497	0.122

Source: Author's calculations.

As we emphasized above, we are going to use these results to *illustrate* how a "cost function" estimate can be used to adjust for simultaneous differences in costs and quality. We will come back below to all of the methodological reasons why the simple association is unlikely to uncover a reliable causal relationship, but for now we will use it in the sense of "suppose this *were* a causal relationship, how would we use it."

Our calculation of the *total learning outcome adjusted cost difference* (TLAC), which we compute for an "Indian average" and for each state, is (given the linearity) just simple arithmetic. We describe the calculation using the averages across the available states (these will differ slightly from the medians reported above)[16] and Figure 7 is an empirical implementation of the conceptual illustration in Figure 5.

Figure 7a shows graphically that private schools have much lower costs while achieving substantially higher learning outcomes (in rural areas)—average per student costs are Rs. 6,431 while standard V students average 70.9 percent on reading and math. Government

[16] Here for simplicity we use averages, not medians. The average of the states is not an "all India" or "Indian average" as (a) this would be properly be population weighted and (b) we are not using all states/UTs (e.g. Delhi is not in our data and Goa is excluded). We use the average because the nature of OLS regressions is that the averages for public and private lie on the regression line by construction so the figures are cleaner using the unweighted average.

schools have expenditures of Rs. 15,491 while only achieving 53.5 percent averaged reading and math performance. Neither the raw difference in performance nor the raw difference in costs alone captures the true inefficiency in the government schools.

One calculation is to ask what learning performance would be at equivalent levels of expenditures. Using the regressions in Table 4 we can calculate what private learning would be if expenditures were at the government level.

$$Pred\ Pvt\ Learning = \alpha_{pvt} + \beta_{pvt} * Gov't\ Cost$$

$$Pred\ Pvt\ Learning = 82.7 = 64.09 + (.001201) * 15491$$

Alternatively, we could ask what government learning outcomes would be at private costs.

$$Pred\ Gov't\ Learning = 44.2 = 37.26 + (.00108) * 6431$$

The "raw" or observed performance differential is 17.4 percent but the adjusted differential is 26.7 percentage points at actual private costs and 29.2 percentage points at government costs. This is illustrated in Figure 7b which shows the simple mechanics of using the linear relationships between costs and learning outcomes to adjust the learning gaps.

There is the same issue with comparing the raw differences in costs. The average in this sample of states of government spending is Rs. 15,491 and the private sector spends Rs. 6,431 but this accounting cost gap doesn't take into account the quality difference. The linear relationship can be used to turn "learning gaps" into "cost gaps" by asking the hypothetical: "How much would the government have to spend in order to achieve the same learning outcomes as the private sector?" Again, this is just simple arithmetic using the regression results above:

$$Actual\ Private\ Learning = \alpha_{govt} + \beta_{govt} * (Pred\ gov't\ cost)$$

$$Pred\ gov't\ cost\ at\ pvt\ learning = 31129 = (70.9 - 37.26)/(.00108)$$

This is illustrated in Figure 7c as simply finding the point on the government learning outcome/expenditure relationship at which learning is predicted to be the observed private average of 70.9 (neither surprisingly nor coincidentally, this is close to the actual spending of states that are at or above that level of learning, e.g. Himachal Pradesh and Kerala).

These calculations produce a nice decomposition of the total cost at which government schools would produce learning quality equal to the current private sector average. The total hypothetical cost of Rs. 31,129 can be broken into three components:

a) The private sector cost (which, under strong assumptions is the "efficient" cost but is at least greater than "achievable cost" (AC) at market prices) of Rs. 6,431.

b) The raw or accounting cost difference (RC) of Rs. 9,060 between private and government and,

c) The hypothetical cost to make up the learning gap between government learning at government cost and private learning of Rs. 15,638 (learning adjustment cost--LAC).

This implies that the learning achievement adjusted cost difference between private and public is more than twice as high, at Rs. 24,698, than the raw cost difference of Rs. 9,060.

The individual steps of our cost decomposition for the averages of our data is shown in Figure 7d which starts from the private cost and learning results, moves to government cost, drops to government learning at government cost, then moves along the estimated cost/learning relationship to reach the average private learning.

The usefulness of this decomposition of the costs into an "achievable" (if not "efficient" cost (the actual private sector) (AC), the accounting cost difference (RC) and the "learning adjustment" is revealed in the state by state results (LAC), which show very different patterns across states (the figures for each state are in the appendix).

West Bengal and Bihar have very low public sector costs and hence have low "raw" cost differentials with the private sector (even modestly negative in the case of Bihar). But whereas West Bengal also has a very low observed learning gap between public and private (only 6.7 percentage points) and hence the cost to make up the learning gap is modest (Rs. 6,174). In contrast, in Bihar the rural private schools have a 25 percentage point advantage over the government schools and hence the incremental cost to eliminate this gap is very large (Rs. 23,165) and hence the total excess cost of government schools is large even though the raw cost difference is small.

Figure 7a: Raw cost and learning outcomes differences, Government and Private

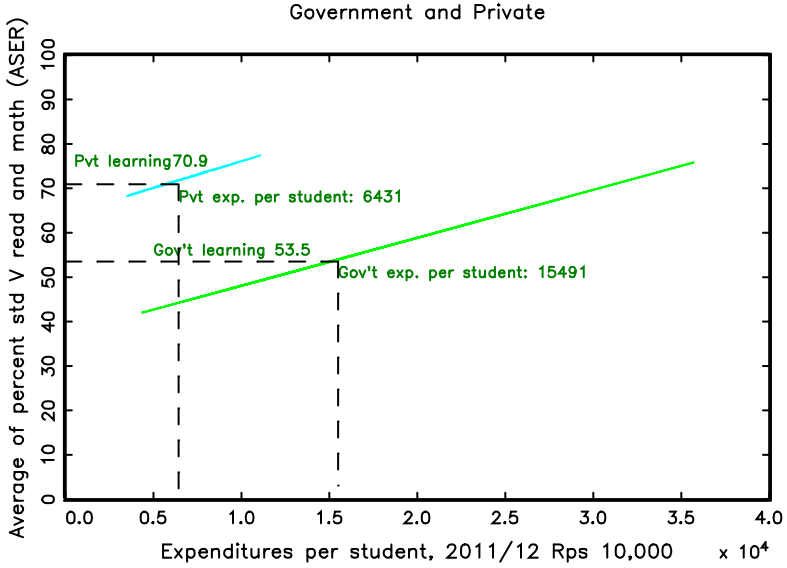


Figure 7b: Learning gaps adjusted for cost differences Government and Private

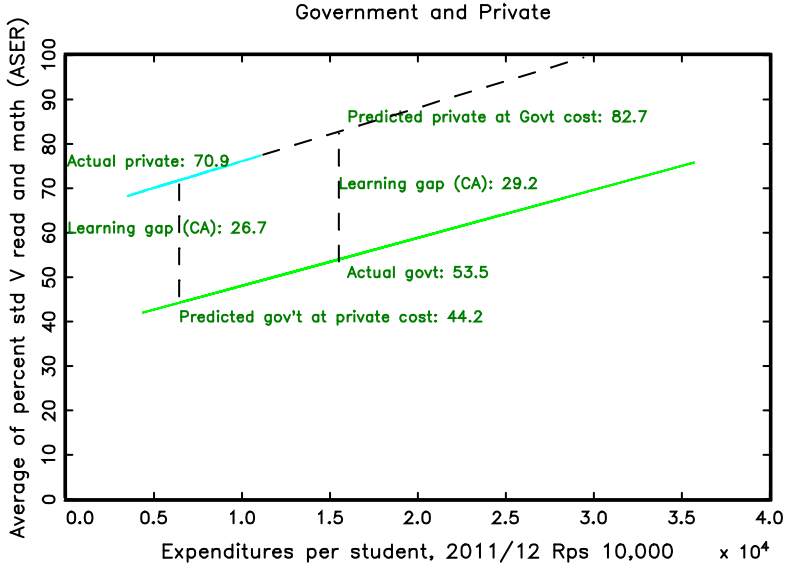


Figure 7c: Achieving Private Learning Outcomes at Government Costs

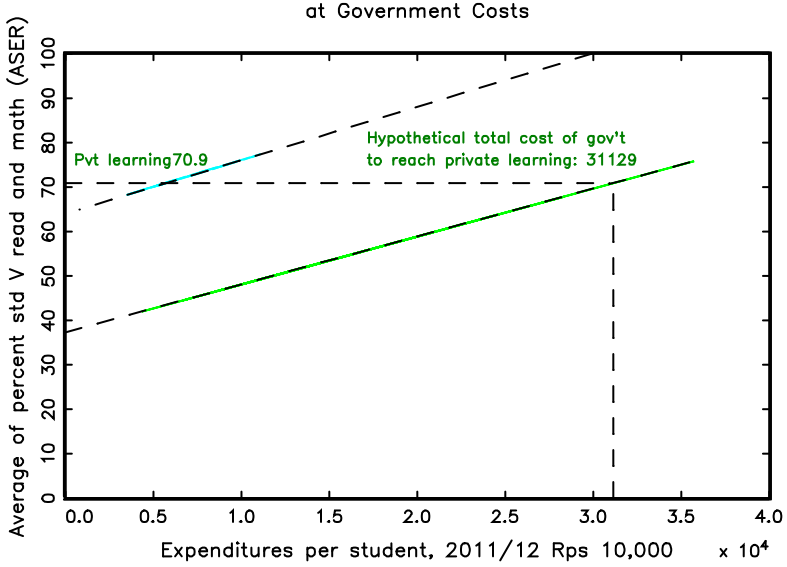
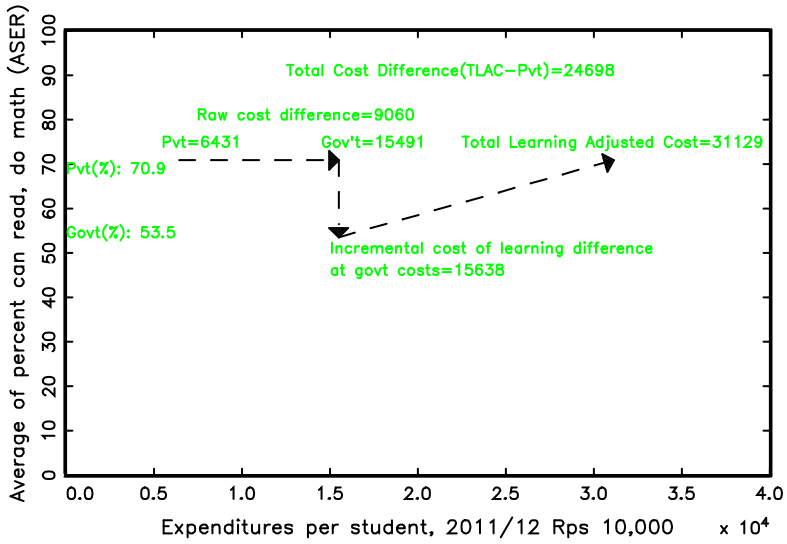


Figure 7d: Total Cost of Government to acheive Private Learning (Private, Excess, and Learning Adjustment)



In Table 2 comparing just the raw cost differentials one might conclude that since Andhra Pradesh had a larger cost gap than Uttar Pradesh (Rs. 9,108 vs Rs. 7,890) that its government schools were less efficient. But the learning gap between rural children in government vs private schools is only 6.5 percentage points in AP versus 32.3 percentage points in UP. Hence on total excess public cost AP does well, ranking fifth lowest at Rs. 15,094 whereas UP is next to last at Rs. 37,761. The learning adjusted results produce quite different rankings than the pure raw cost differentials that fail to adjust for quality.

III.B Implications of excess unit costs for total fiscal cost

We calculate the total costs by the simple procedure of multiplying the raw cost and total learning adjusted cost (TLAC=RC+LAC) by the number of students attending schools under government management. Under the hypothetical that students in government schools could reach the same learning achievement at private sector costs this is the estimate of the total cost of using public production and in-kind delivery. Alternatively, this can be thought of as the "value subtraction" of moving production from its achievable (if not efficient) levels into the public sector cost structure (particularly the wage structure of teachers).

The total excess raw or accounting cost (unadjusted for quality) is 50,050 crores (Table 6). This is a sum across the states and hence is weighted by total government school enrollment, but roughly the result is that there are 90 million children and the enrollment weighted raw cost difference is Rs. 5,550 per student for a total of Rs. 50,000 crores. [17]

Hence, even without any adjustment for quality, this excess cost is .6 percent of GDP or 1 percent of total consumption. Moreover, this 4.8 percent of Government Final Consumption Expenditures, so 1 in every 20 dollars the government spends as final consumption is the excess cost of elementary education.

Obviously when we adjust for quality to arrived at the total learning adjusted costs—the cost it would take the government at its current cost structures to achieve the current learning levels of private school students (at optimistic assumptions about the incremental cost of learning gains)—the numbers are even more dramatic. The total learning adjusted cost increases to a whopping 231,955 crore or nearly 2.8% of GDP.

[17] The much lower value of the "enrollment weighted" and the simple average raw cost difference is because Bihar has the second largest government enrollment (over 15,000,000) and a small negative raw cost differential.

Table 5: State by state results in estimates of value subtraction in the public sector production of learning							
State Names	Total (hypothetical) learning adjusted cost (TLAC) =AC+RC+LAC (sorted, low to high)	Achievable cost of private learning outcomes (AC)= Private sector cost	Raw cost difference gov't less private (RC)	Raw difference in learning outcomes (in percentage above a threshold)	Incremental cost to achieve observed private learning outcomes (LAC)	Total excess public sector cost (TLAC-AC)	Quality adjustment as fraction of total cost (LAC/TLAC)
West Bengal	13,114	6,789	151	6.7	6,174	6,325	47.1%
Punjab	15,579	9,082	1,679	5.2	4,818	6,497	30.9%
Tripura	17,793	8,754	1,516	8.1	7,523	9,040	42.3%
Sikkim	21,749	11,210	7,850	2.9	2,689	10,539	12.4%
Andhra P	20,602	5,507	9,108	6.5	5,987	15,094	29.1%
Tamil Nadu	23,250	7,519	8,916	7.4	6,815	15,731	29.3%
Maharashtra	26,239	5,961	14,877	5.8	5,401	20,278	20.6%
Mizoram	26,623	6,071	16,424	4.5	4,128	20,553	15.5%
Karnataka	28,204	6,362	7,906	15.1	13,936	21,842	49.4%
Bihar	27,497	4,630	-298	25.0	23,165	22,866	84.2%
Chhattisgarh	29,196	5,957	6,068	18.6	17,171	23,239	58.8%
Assam	29,903	6,553	7,031	17.6	16,319	23,351	54.6%
Meghalaya	29,592	3,501	14,208	12.8	11,883	26,091	40.2%
Himachal P	37,457	11,129	17,215	9.8	9,113	26,328	24.3%
Gujarat	32,927	6,581	6,981	20.9	19,365	26,346	58.8%
Uttarakhand	32,053	5,694	11,136	16.4	15,223	26,359	47.5%
Odisha	35,059	5,761	3,042	28.4	26,256	29,298	74.9%
Nagaland	38,057	7,108	17,575	14.4	13,374	30,948	35.1%
Jharkhand	36,472	4,696	1,979	32.2	29,797	31,776	81.7%
Rajasthan	39,183	4,872	6,874	29.6	27,437	34,311	70.0%
Manipur	39,662	5,137	11,895	24.4	22,630	34,525	57.1%
Madhya P	39,527	3,866	4,735	33.4	30,926	35,661	78.2%
Kerala	42,682	5,413	30,308	7.5	6,961	37,269	16.3%
Haryana	46,394	8,949	9,849	29.8	27,596	37,445	59.5%
Uttar P	40,868	3,107	7,890	32.3	29,871	37,761	73.1%
J&K	52,021	6,988	10,652	37.1	34,381	45,034	66.1%
Median	**30,978**	**6,016**	**7,898**	**15.8**	**14,579**	**26,210**	**48.5%**

Table 6: Total excess raw cost (RC) and total excess total learning adjust cost (TLAC) in Rs. crore					
State Names	Total number of students in government management **Col. I**	Raw cost difference **Col. II**	Total excess raw cost (crores) **Col III=I*II**	Excess public sector cost per student, learning adjusted **Co. IV**	Total learning adjusted cost (in crores) **Col V=I*IV (sorted)**
Uttar P	15,049,354	7,890	11,874.4	37,761	56,828.6
Bihar	15,596,685	-298	-465.2	22,866	35,664.1
Madhya P	6,829,830	4,735	3,233.6	35,661	24,355.8
Rajasthan	5,019,135	6,874	3,450.4	34,311	17,221.2
Jharkhand	3,892,148	1,979	770.3	31,776	12,367.8
Maharashtra	5,704,915	14,877	8,487.2	20,278	11,568.6
Odisha	3,909,652	3,042	1,189.2	29,298	11,454.6
Gujarat	4,210,871	6,981	2,939.8	26,346	11,094.1
Assam	3,054,579	7,031	2,147.7	23,351	7,132.6
Karnataka	3,066,719	7,906	2,424.6	21,842	6,698.3
Andhra P	3,970,814	9,108	3,616.4	15,094	5,993.7
Chhattisgarh	2,446,959	6,068	1,484.7	23,239	5,686.4
West Bengal	8,875,151	151	134.0	6,325	5,613.7
Haryana	1,404,802	9,849	1,383.6	37,445	5,260.3
Tamil Nadu	2,410,068	8,916	2,148.9	15,731	3,791.4
J&K	723,555	10,652	770.8	45,034	3,258.4
Kerala	574,749	30,308	1,741.9	37,269	2,142.0
Uttarakhand	575,848	11,136	641.3	26,359	1,517.9
HP	403,280	17,215	694.3	26,328	1,061.8
Punjab	1,360,923	1,679	228.5	6,497	884.2
Meghalaya	276,064	14,208	392.2	26,091	720.3
Manipur	159,055	11,895	189.2	34,525	549.1
Nagaland	142,891	17,575	251.1	30,948	442.2
Tripura	338,676	1,516	51.4	9,040	306.2
Mizoram	133,395	16,424	219.1	20,553	274.2
Sikkim	64,058	7,850	50.3	10,539	67.5
Total (in crores)			50,049.7		231,955.0
Percent of GDP			0.60%		2.78%
Percent of PCE			0.99%		4.59%
Percent of GFCE			4.80%		22.25%

III.C Caveats of method

There are two big caveats to our illustrative calculations of the learning adjusted cost differentials in private and government sectors, which fortunately work in offsetting directions (one biasing up, one biasing down).

The first caveat is that in comparing the private and government learning outcomes we don't adjust for student selection effects and hence our estimates are not estimates of "true" learning productivity effects across the two sectors. It is obvious that if higher socio-economic status of a child's household is associated with better learning outcomes (and it typically is) and if children in private schools are more likely to be from higher socio-economic status (and they typically are) then the differences in costs and learning outcomes reflects both higher productivity of private schools and the demographic composition of students. Conceptually the learning-cost relationship for private schools should be adjusted at least for the same socio-economic composition of the government schools and at best for the whole of selection effects.

While acknowledging that this biases our estimates up and agree that the estimates would be better with adjustment for selectivity, the adjustment for selectivity would not substantially over-turn our results. Our results span the possible range in that the "raw cost" differential is what the cost differential would be assuming 100 percent of the difference in learning is selection and our base case TLAC results are assuming 0 percent selection so the "true" magnitude will lie somewhere in between. The key question is: "how much of the observed cross-sectional difference in learning between public and private schools is due to selection effects?"

There are five different empirical studies that speak to this question—though none conclusively with state by state results. French and Kingdon (2010) use ASER data to estimate public-private differences and they find that the OLS difference pooled across India and across years of ASER is .228 (with essentially no socio-economic controls) and the household fixed effect differences estimate, which is their best estimate of the selection corrected causal impact, is .180 which suggests (but not proves) that only 20 percent of the OLS effect (which, with few controls is essentially the difference in means) is selection. Desai et al 2008 estimate a coefficient on private school with OLS (not correcting for selection on unobservables) and using instruments and find for reading and math estimated separately the coefficient on private is roughly 80 percent of that of the OLS so selection only reduces the private effect by 20 percent. However, in this case the OLS estimates had a

relatively complete set of controls (e.g. for caste, parental education) so this is an estimate of the difference between selection on controlled for observables (OLS) and selection on non-observables (IV). Muralidharan and Sundararaman (2014) do a rigorous experiment and find the causal impact of attending a private school is .23σ versus a cross sectional difference of .65σ so the causal effect is 35 percent of the total difference so selection could account for two thirds of the difference. This has the advantage of being experimental but the disadvantage of being specific to one state, Andhra Pradesh and hence not nationally representative as we would expect this gap to be larger in more dysfunctional states (e.g. UP) and smaller in better performing states. Desai et al (2008) also do a calculation of predicting reading scores across states and between public and private based on an "equivalent" socio-economic status of children. On their learning metric they find a 12 percent excess of private over public, while the difference on our completely and totally non-comparable score is about 31 percent (71 private versus 54 public) which is consistent with 37 percent of the total effect due to causality and 63 percent selection (these are now heroic assumptions). Singh (2015) uses a long panel tracking the same children over time in Andhra Pradesh and finds that 20 to 50 percent of the observed private-public sector learning differences is due to a causal impact of private schooling. So the empirical estimates are consistent with a range of the observed difference in learning due to causally superior learning production in the private sector between 35 percent and 80 percent. No one thinks none of the public-private difference is due to differences in composition but also no one thinks 100 percent is compositional. But again, we are first to emphasize that differences in observed learning that are due to selection effects would cause our estimates of total learning adjusted costs to be biased upwards by confounding causal effects and selection effects.

The second caveat is that we use the bivariate association across states to estimate the learning gains from additional spending. If states which spend more per capita also have characteristics that would lead them to have better learning outcomes then this biases upward the estimate of the learning gain from additional spending and hence biases downward the estimates of learning adjusted cost (since the learning gap is divided by this coefficient). We feel this is an important issue, for three reasons.

First, a recent analysis by Accountability Initiative shows that, once one accounts for state fixed effects there is no correlation between the quantum of expenditure per student and quality of learning. Using roughly the data we used for the bivariate association the fixed effects find that an increase of Rs. 10,000 in per-student allocation increased the proportion

of students in Standard 3-5, who can read Standard 1 text, by a mere 2 percentage points (roughly a fifth the magnitude of our estimates).[18]

Second, the recent experience of India with massive increases in budgetary expenditures combined with zero measured learning gain (if anything, by ASER data there is *less* learning) suggests the learning gains from the recent additional spending in the public sector have in fact been, at best, modest. So again the cross-sectional bivariate association may overstate the gains from more spending.

Third, there is a massive empirical literature on the relationship between costs and learning outcomes that finds very mixed results and often finds zero association of learning and public sector costs.

Table 7 shows that these two forces are offsetting. Suppose the simple bivariate regressions of learning on cost for public and private sectors both overstate the private productivity advantage by a factor of 2 (that is, selection explains 50 percent of the difference, which is in the range of 35-80 percent) and also overstate the learning gains from additional public spending also by a factor of 2 (just to choose round numbers). In this scenario the estimated total cost of achieving learning of 70.9 percent in reading and math *rises* to Rs. 37,447 from the base case.

If we adjust for the selection effect alone the total learning cost adjusted difference declines, assuming 50 percent of the difference is selection it declines from Rs. 31,141 to Rs. 18,724. If we assume that two-thirds of the observed difference is generated by selection—the lowest the data support--the TLAC falls to Rs. 14,585. This still implies that the raw cost differential of Rs. 7,900 understates the true cost gap by almost half. While it is instructive to examine the extreme cases, we feel it is tendentious to adjust for only one of the known biases, the selection effect on estimating the learning productivity advantage of private schools, and not adjust for the upward bias in the learning-cost relationship.

[18] Dongre, A. and Tewary, V. (2013) "Do Schools Get Their Money?" PAISA National Report, www.accountabilityindia.in

Table 7: Robustness of the estimate of total learning adjusted costs			
		Estimated learning gain per rupee at base case	Twice as costly to produce learning gains (estimate of impact of spending biased upward by factor of two)
	β_{govt}	0.00108	0.00054
	Implied rupees per unit learning gain	926	1,851
α_{govt} (Level of government cost function)	37.3	31,141 (Base case result)	62,282 (Same cost function difference, less learning per rupee)
Public private gap in is half as large (due to selection overstating the true productivity in learning gaps) ($\alpha_{pvt} = 64.09$ so base case gap is 64.09-27.36=26.83, 50.57=37.26+(26.83/2)	50.6	18,724 (Adjusting cost functions for selection, base case learning per rupee)	37,447 (Adjusting cost function for selection and less learning per rupee)
Source: Author's calculations			

III.D Robustness of comparators

Our results use the private sector as a comparator for "achievable cost" but given the ideological heat that "public vs private" debates create, we emphasize that nothing hinges on using the private sector for "achievable cost" as the same basic point about the enormous magnitude of the excess costs to education from rents to teacher wages can be made just using variations *within* the public sector within India.

A recent study by Atherton and Kingdon (2013) compares teachers hired as civil service teachers and as contract teachers in the state of Uttar Pradesh. Their empirical results suggest that equivalently qualified teacher hired as a civil servant is associated with much *higher* costs and much *lower* learning outcomes for students than hiring that same person as a contract teacher. An experimental study in Andhra Pradesh found that the civil service teachers made five times as much and produced similar outcomes (Muralidharan and Sundararaman 2013b). Another recent study from Punjab Pakistan (Bau and Das 2014)

found that contract teachers were paid half as much as produced similar (if not better) learning outcomes. This is consistent with a long history of experiences in India, such as the Education Guarantee Scheme (EGS) in Madhya Pradesh, showing that locally hired teachers can perform at least as well as civil service teachers, at a fraction of the cost.

Accountability Initiative's PAISA survey records the average salary for civil service teachers in 6 states in India in 2013 at Rs. 26,551 per month while the average salary for contract teachers in the same states was Rs. 6,775. A crude calculation at the national level is that with those wage differences the annual cost per child of a year of schooling (holding non-teacher costs and teacher per pupil fixed) could be lower by Rs. 11,000 per child suggesting a total fiscal cost from excess payments to teachers (payments that produce nothing of value for students, parents or taxpayers) from the roughly 90 million students in government schools is Rs. 99,000 crores.

Similarly, we could use just the variation across government schools within Indian states. Bihar and West Bengal produce about nationally average learning results in government schools (53.9 percent of students) but with costs less than half those of the median state, an average of only Rs. 5,636 per child across the two states. If we calculate the total raw and learning adjusted excess cost using the average of these two states costs and learning outcomes (rather than the private sector) as the benchmark for "achievable cost" we find that the raw excess cost is Rs. 46,701 crore and the total learning adjusted excess cost is Rs. 110,585. This is lower than the Rs. 231,955 crore using the private sector state by state as a benchmark because the learning achieved is so much lower (and hence in many states the learning adjusted cost is lower than the raw excess cost as their learning performance exceeds that of West Bengal and Bihar).

Using the private sector, contract teachers, or Indian states the point is pretty simple: if you pay teachers five times too much and get nothing from those additional wage payments the magnitude of fiscal waste is massive.

IV. Total excess costs versus other expenditures

Public debate on the efficiency of government spending in recent years has focused on the issue of wasteful and regressive subsidies like electricity or the mis-targeting of targeted subsidies, like food, or slippage and leakage in specific programs like MGNREGA. Yet the excess costs of providing low learning outcomes in elementary education at high cost produce fiscal costs larger than India's *total* subsidy bill.

Just the *raw excess* cost on elementary education (unadjusted for quality) is very nearly as much as the *total* cost of high profile programs – many of which have been at the center of recent public debates on leakage and mis-targeting in government programs. The Government of India allocation for food subsidy in 2011-12 was Rs. 60,573 crore. Similarly, the MGNREGA, which routinely makes its way to headlines over charges of corruption and is often cited as a program that promotes fiscal profligacy, the *total* fiscal spend on MGNREGA in 2011-12 was Rs. 37,598 crore. This is considerably less than just the raw excess cost of government schools (unadjusted for quality). So while a great deal of attention has been given to operational and targeting deficiencies of MGNREGA the entire scheme could be financed from the just the *raw* excess cost in schooling.

Adjusted for quality—which adds up the losses from the raw excess cost and the losses from lower output--is 2.8 percent of GDP which is bigger than the Government of India's subsidy bill including the 3 *major* subsidies – fuel, fertilizer and food (2.6% of GDP in FY 2013).[19]

And while much public attention has remained focused on the issue of inefficiency and leakage related to the subsidy bill, the real inefficiency of an ineffective frontline that is unable to deliver quality education when a similar set of workers is able to deliver higher levels of quality at far lower costs remains hidden from public debate.

[19] http://www.idfcmf.com/gamechangers/wp-content/uploads/2013/07/Subsidy.pdf

Table 8: Total excess cost of learning Vs. MGNREGA, state by state			
State Names	Total raw excess cost (in crores)	Total learning adjusted cost (in crores)	MGNREGA* Expenditure 2011-12 (in crores)
Uttar Pradesh	11,874.4	56,828.60	5,062.22
Bihar	-465.2	35,664.10	1,513.41
Madhya Pradesh	3,233.6	24,355.80	3,398.27
Rajasthan	3,450.4	17,221.20	3,182.79
Jharkhand	770.3	12,367.80	1,143.57
Maharashtra	8,487.2	11,568.60	1,588.14
Odisha	1,189.2	11,454.60	1,032.17
Gujarat	2,939.8	11,094.10	649.49
Assam	2,147.7	7,132.60	748.27
Karnataka	2,424.6	6,698.30	2,190.16
Andhra Pradesh	3,616.4	5,993.70	4,093.93
Chhattisgarh	1,484.7	5,686.40	2,046.80
West Bengal	134.0	5,613.70	3,004.04
Haryana	1,383.6	5,260.30	316.60
Tamil Nadu	2,148.9	3,791.40	2,886.50
J&K	770.8	3,258.40	388.85
Kerala	1,741.9	2,142.00	1,005.03
Uttarakhand	641.3	1,517.90	397.64
Himachal Pradesh	694.3	1,061.80	504.06
Punjab	228.5	884.2	159.26
Meghalaya	392.2	720.3	281.09
Manipur	189.2	549.1	281.18
Nagaland	251.1	442.2	503.87
Tripura	51.4	306.2	945.60
Mizoram	219.1	274.2	204.77
Sikkim	50.3	67.5	70.94
Total (in crores)	50,049.7	231,955.00	37,598.66
Authors calculations and MGNREGA DMU reports available on www.nrega.nic.in			

Our approach also illustrates that the usual discussions of "benefit incidence" which argue that general subsidies to electricity are "regressive" because they benefit richer households while the costs of education have "progressive" benefit incidence because children from poorer households are more likely to enroll in government schools is analytically completely

wrong. The "benefit" of a year of schooling is better approximated by economic than accounting cost and the "rent" is not a "benefit" to those enrolled in government schools but to teachers. The Accountability Institute data for six states give an average civil service salary of Rs. 26,551 which if this were the sole income for a family of four and there were zero savings could produce consumption expenditures of 6,658 per person per month. The 95th percentile of reported consumption expenditures in Rural India (the top coded category) were those above Rs. 2,625 in rural areas and Rs. 6,015 in urban areas. So a substantial share of the budget for basic education in India accrues as a rent to people near the top of the income distribution (or worse—as it may be that these rents are extracted from teachers as payments to people likely even better off than they are).

V. Conclusion

Increasing spending on elementary education is politically popular. The overall elementary education budget more than doubled from Rs. 68,503 crore to Rs. 147,059 crore from 2007/08 to 2012/13. The Bharitiya Janta Party (BJP) government elected in 2014 included in its election manifesto the goal of increasing education spending (including elementary) to 6% of GDP. If one believes that more spend buys more education then it is easy to be in favor of greater spending on education.

However, we argue that conceptually most of spending under the budget heads for schooling is not a "cost" of education but rather a subsidy or rent going to excess wage payments which bring no education benefit. It may seem difficult to believe that the additional resources buy nothing at all. After all, many claim that "high wages" for teachers are an important component of quality education systems. But many strands of recent research show that wages only buy greater service when they are part of an overall system of accountability that demands performance.

We want to stress that we believe we have no reason to believe that the levels of excess costs relative to achievable costs for the same outputs are unique to education. It is even possible education is one of the *better* sectors—as we point out the estimates of absence and lack of quality are just as compelling for health clinics as for schools (Dhaliwal and Hanna 2013, Das et al 2012). We are focused here on education because it is a large and fiscally important sector but also because it has estimates of public sector unit costs, private sector unit costs and a measure of quality. But we suspect that if it were feasible, similar excess accounting

and economic costs would be found in other publicly provided services (e.g. ambulatory curative care, water and sanitation, policing).

The real challenge in India today lies in moving the debate on costs and public service delivery beyond issues of corruption and leakage to the more fundamental questions about how the frontline bureaucracy is organized and motivated.

India's newly elected government rode to power on the promise of "minimum government and maximum governance." The provision of maximum governance requires grappling with complex issues of administrative reform – from political interference to administrative discipline to the question of incentives and accountability – across the administrative chain. For the moment, much of the focus of policy debate and promised action has been on "minimum government" through the reduction (and eventual erosion of the subsidy bill). But if the government is serious about achieving maximum governance, the government must shift focus and begin investing in building the administrative frontline. Enabling this shift is the greatest challenge to achieving "maximum governance."

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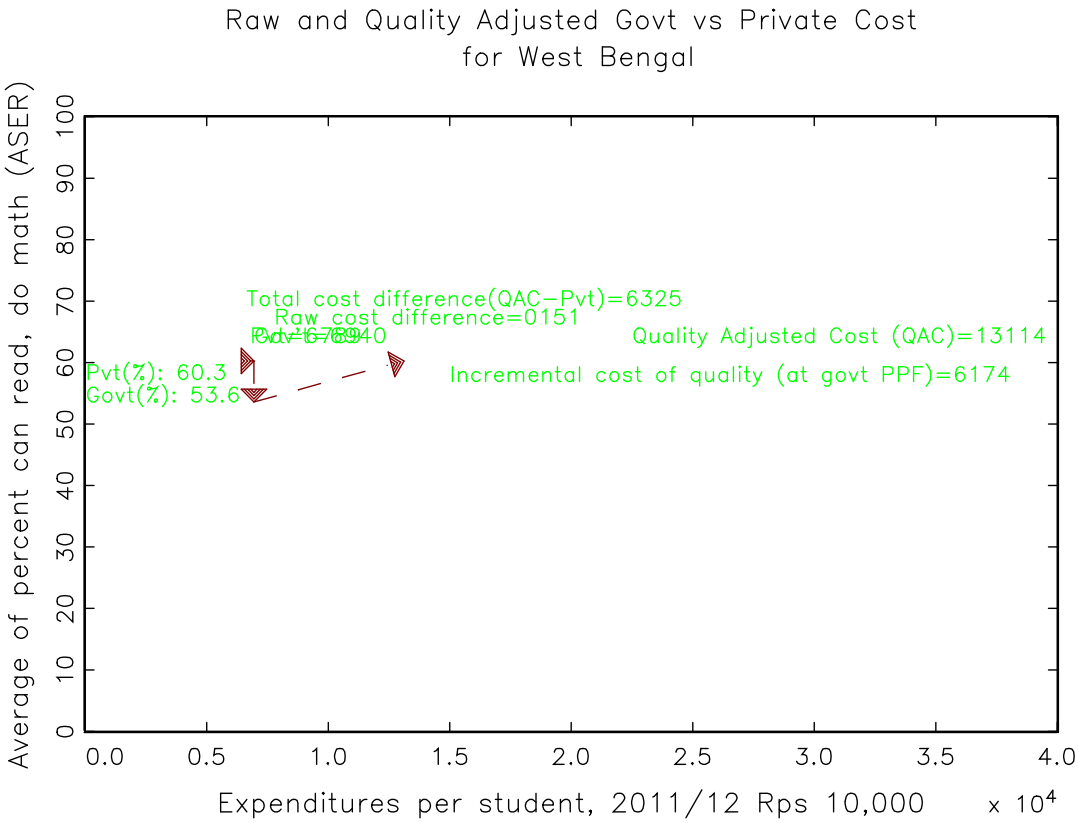
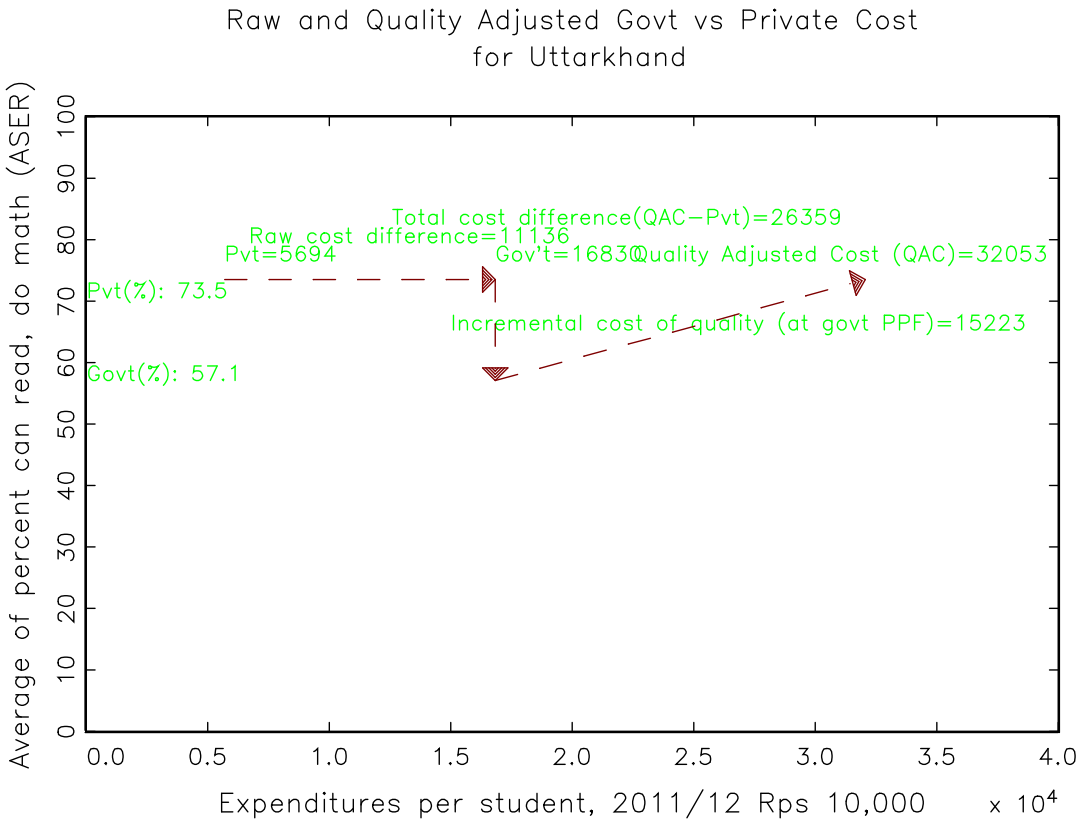
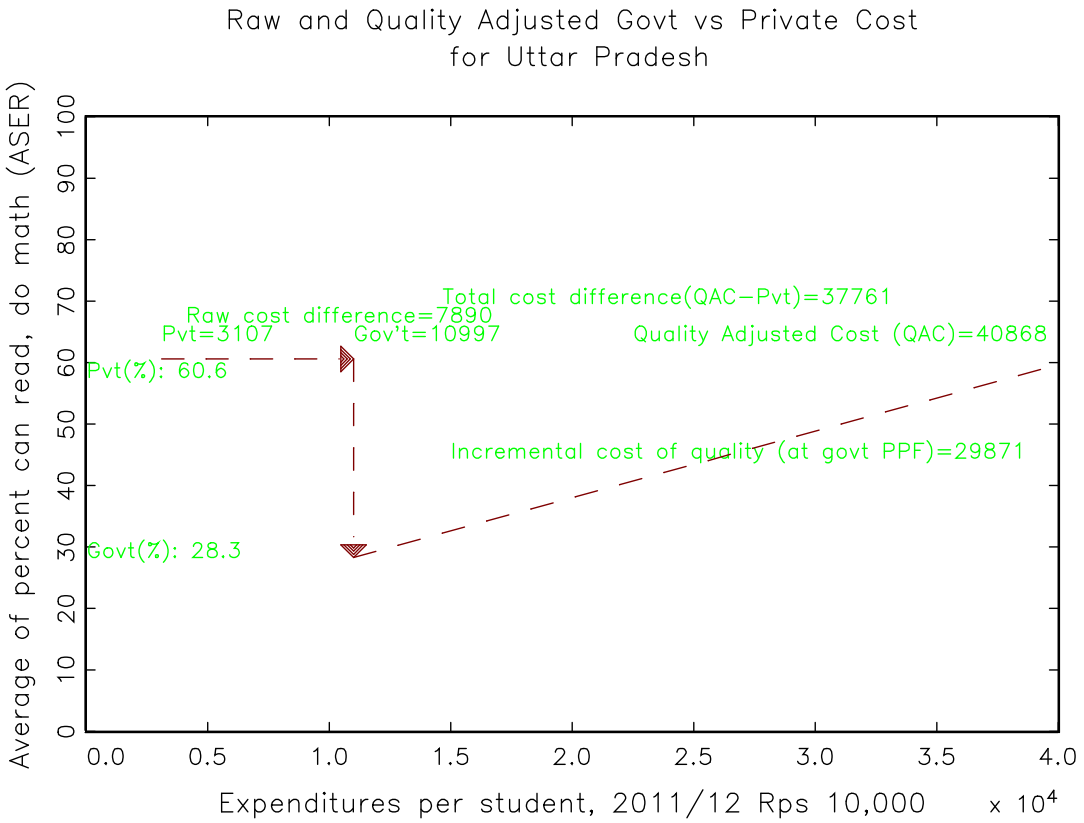
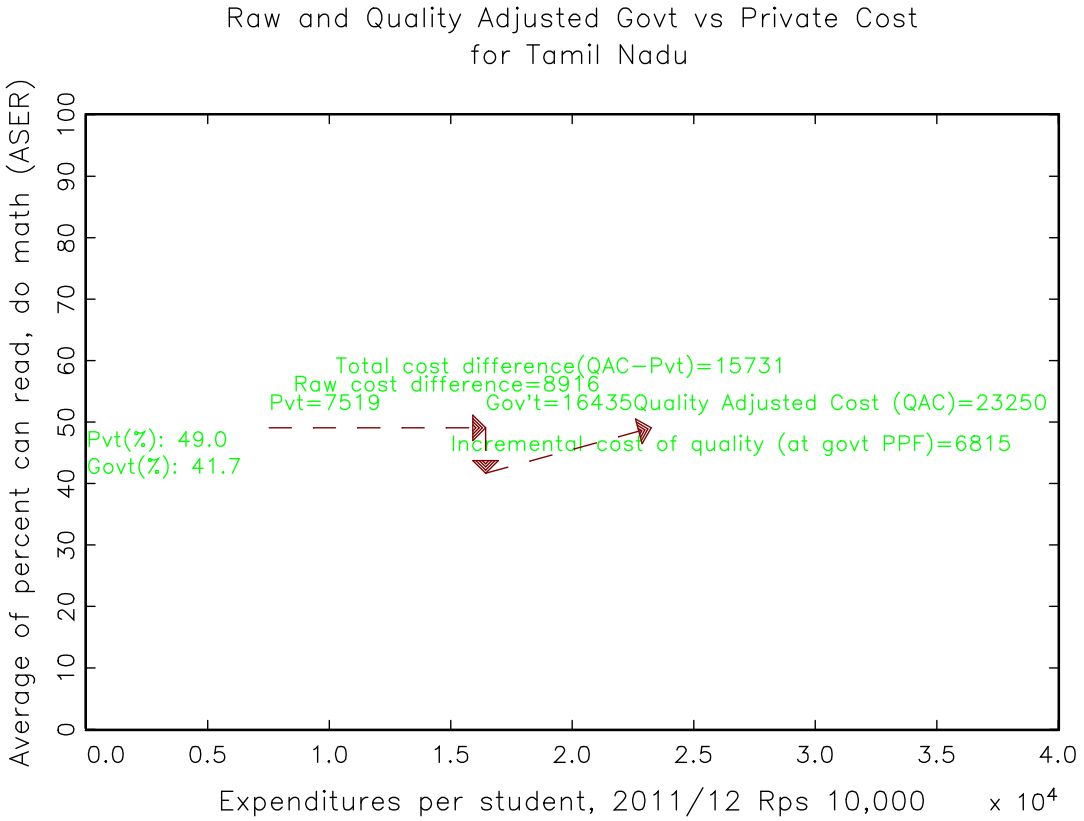
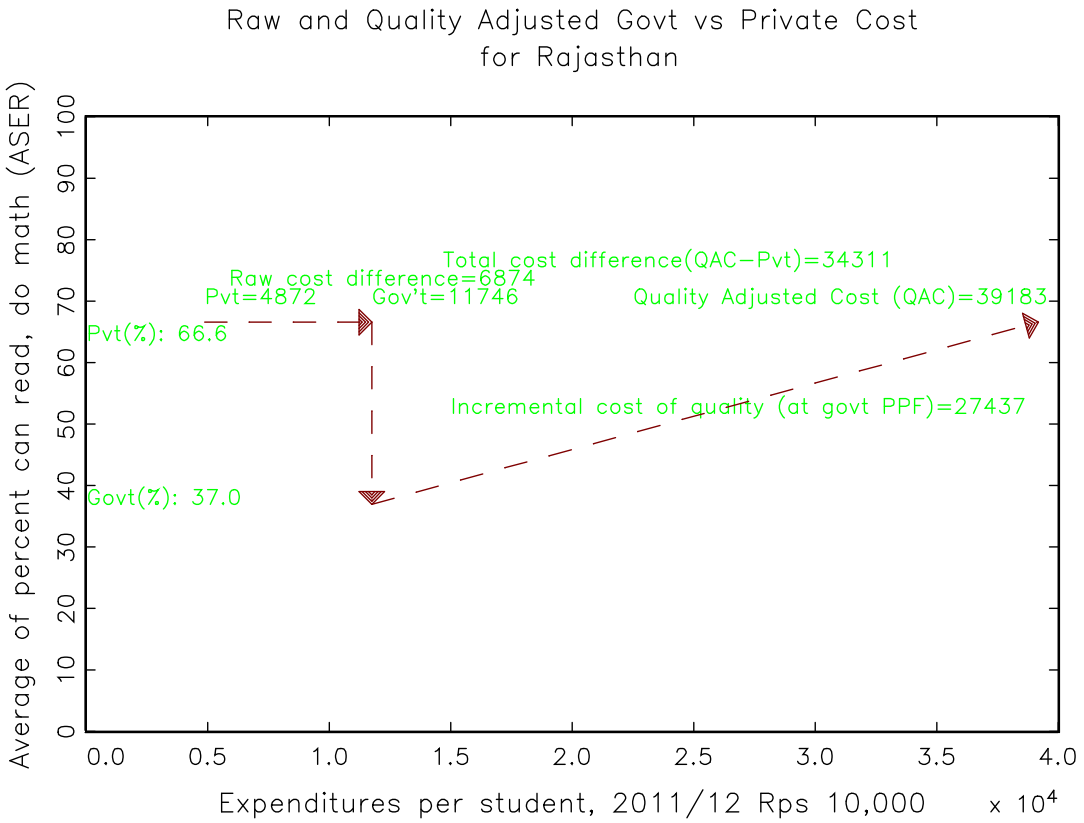
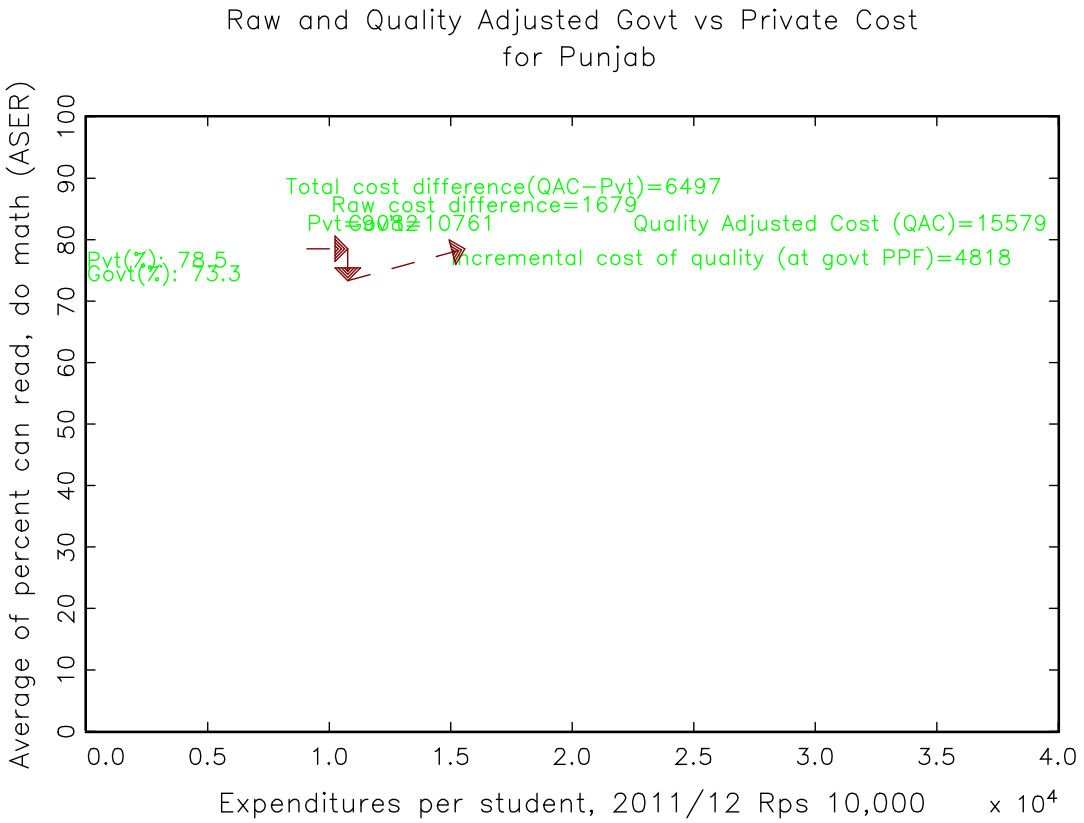

Raw and Quality Adjusted Govt vs Private Cost
for West Bengal
Average of percent can read, do math (ASER)
0
10
20
30
40
50
60
70
80
90
100
Total cost difference(QAC−Pvt)=6325
Raw cost difference=0151
Quality Adjusted Cost (QAC)=13114
Pvt(%): 60.3
Govt(%): 53.6
Incremental cost of quality (at govt PPF)=6174
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Expenditures per student, 2011/12 Rps 10,000
x 10^4

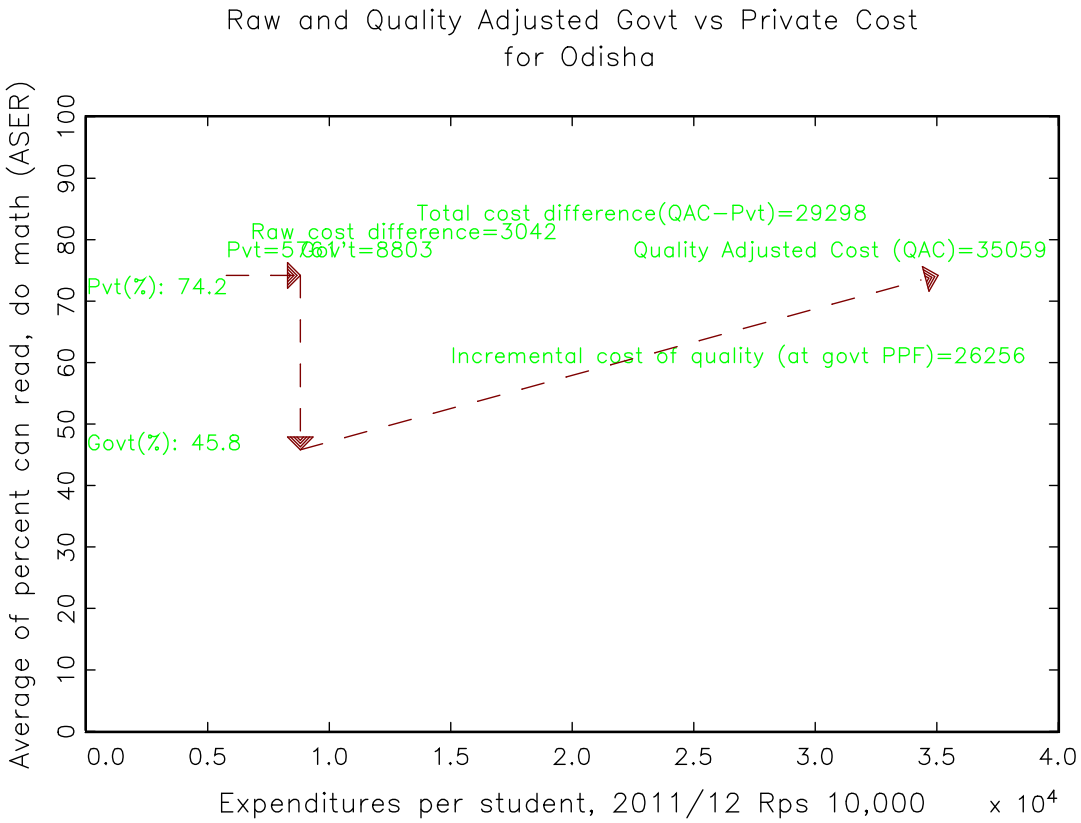

Raw and Quality Adjusted Govt vs Private Cost
for Uttarkhand
Average of percent can read, do math (ASER)
0
10
20
30
40
50
60
70
80
90
100
Total cost difference(QAC−Pvt)=26359
Raw cost difference=11136
Pvt=5694
Gov't=16830
Quality Adjusted Cost (QAC)=32053
Pvt(%): 73.5
Incremental cost of quality (at govt PPF)=15223
Govt(%): 57.1
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Expenditures per student, 2011/12 Rps 10,000
x 10^4

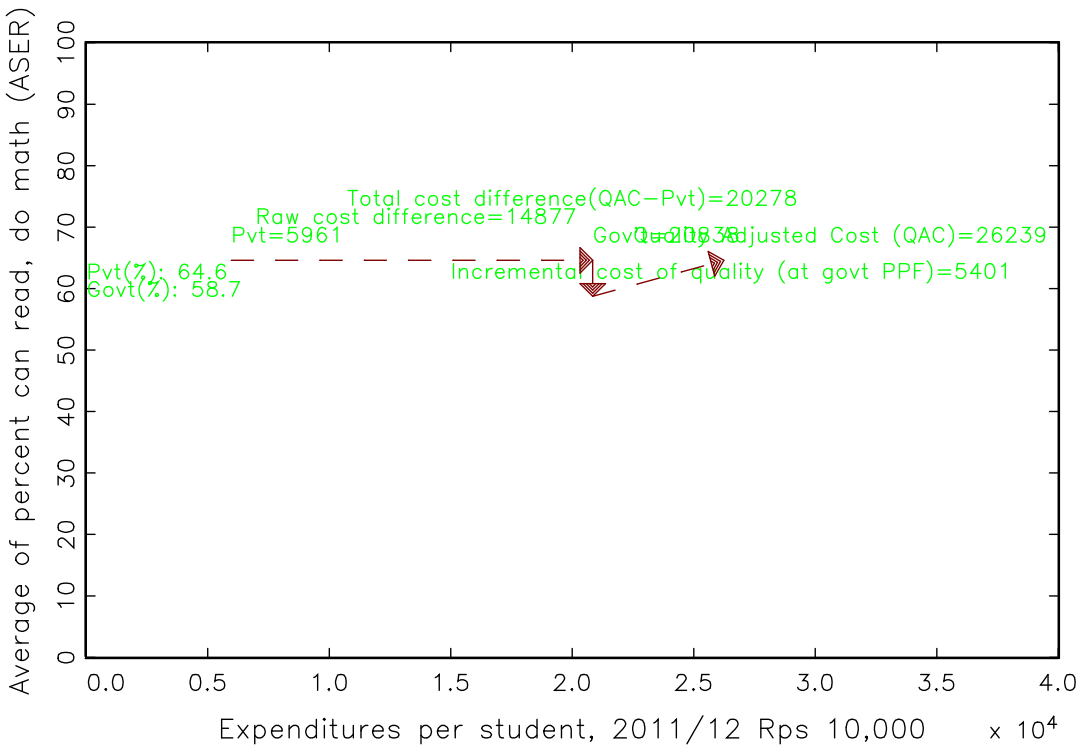

Raw and Quality Adjusted Govt vs Private Cost
for Uttar Pradesh
Average of percent can read, do math (ASER)
Total cost difference(QAC−Pvt)=37761
Raw cost difference=7890
Pvt=3107
Gov't=10997
Quality Adjusted Cost (QAC)=40868
Pvt(%): 60.6
Incremental cost of quality (at govt PPF)=29871
Govt(%): 28.3
Expenditures per student, 2011/12 Rps 10,000
x 10^4

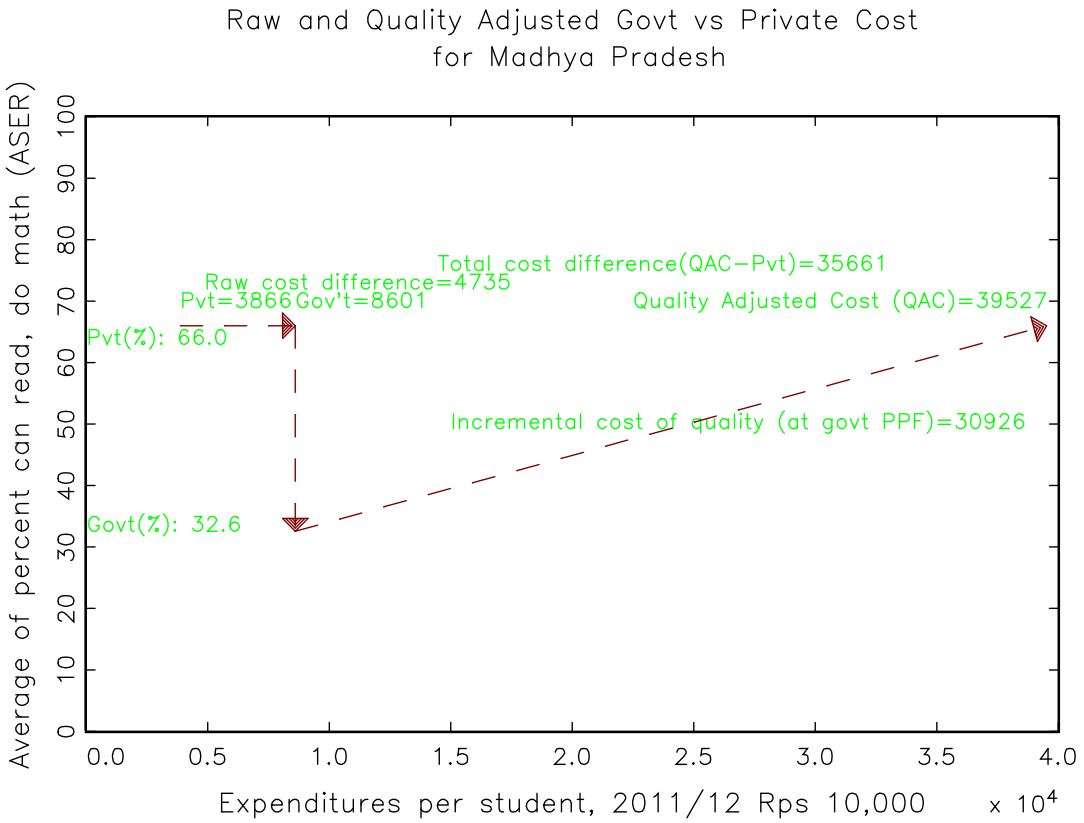

Raw and Quality Adjusted Govt vs Private Cost
for Tamil Nadu
Average of percent can read, do math (ASER)
Total cost difference(QAC−Pvt)=15731
Raw cost difference=8916
Pvt=7519
Gov't=16435Quality Adjusted Cost (QAC)=23250
Pvt(%): 49.0
Incremental cost of quality (at govt PPF)=6815
Govt(%): 41.7
Expenditures per student, 2011/12 Rps 10,000
x 10^4

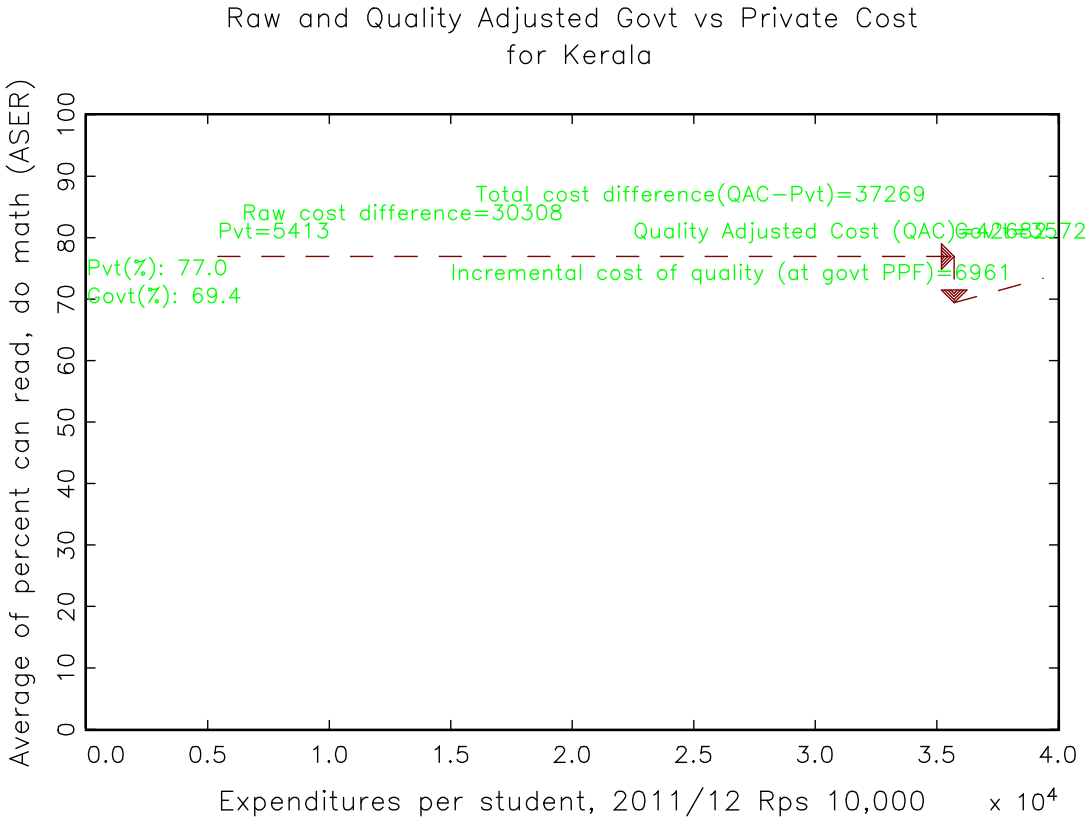

Raw and Quality Adjusted Govt vs Private Cost
for Rajasthan
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=34311
Raw cost difference=6874
Pvt=4872
Gov't=11746
Quality Adjusted Cost (QAC)=39183
Pvt(%): 66.6
Incremental cost of quality (at govt PPF)=27437
Govt(%): 37.0

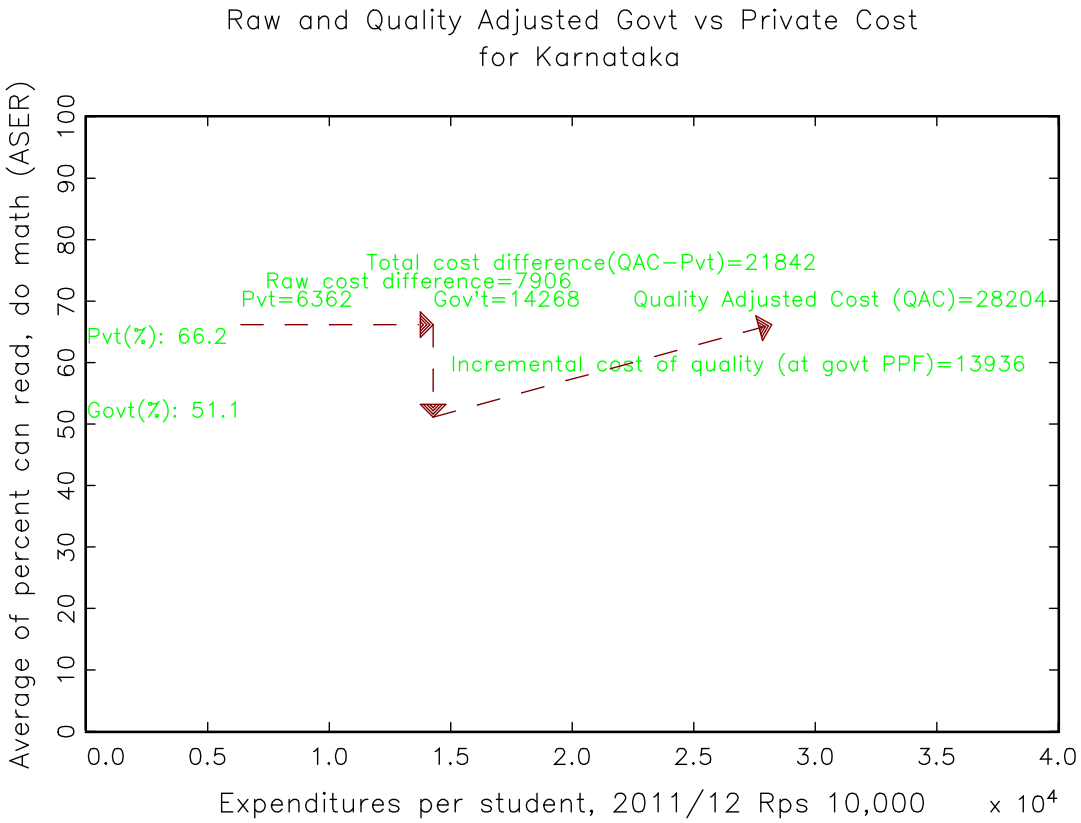

Raw and Quality Adjusted Govt vs Private Cost
for Punjab
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=6497
Raw cost difference=1679
Quality Adjusted Cost (QAC)=15579
Incremental cost of quality (at govt PPF)=4818
Pvt(%): 78.5
Govt(%): 73.3

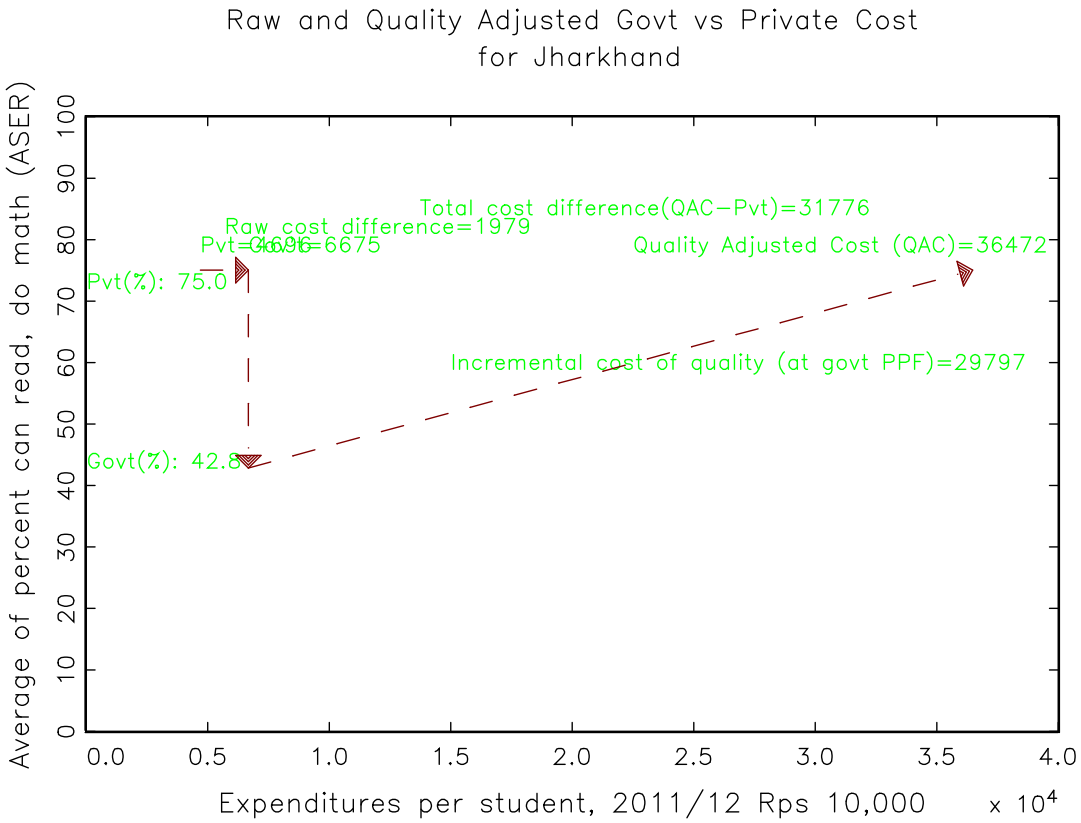

Raw and Quality Adjusted Govt vs Private Cost
for Odisha
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=29298
Raw cost difference=3042
Pvt=5761
Govt=8803
Quality Adjusted Cost (QAC)=35059
Pvt(%): 74.2
Incremental cost of quality (at govt PPF)=26256
Govt(%): 45.8

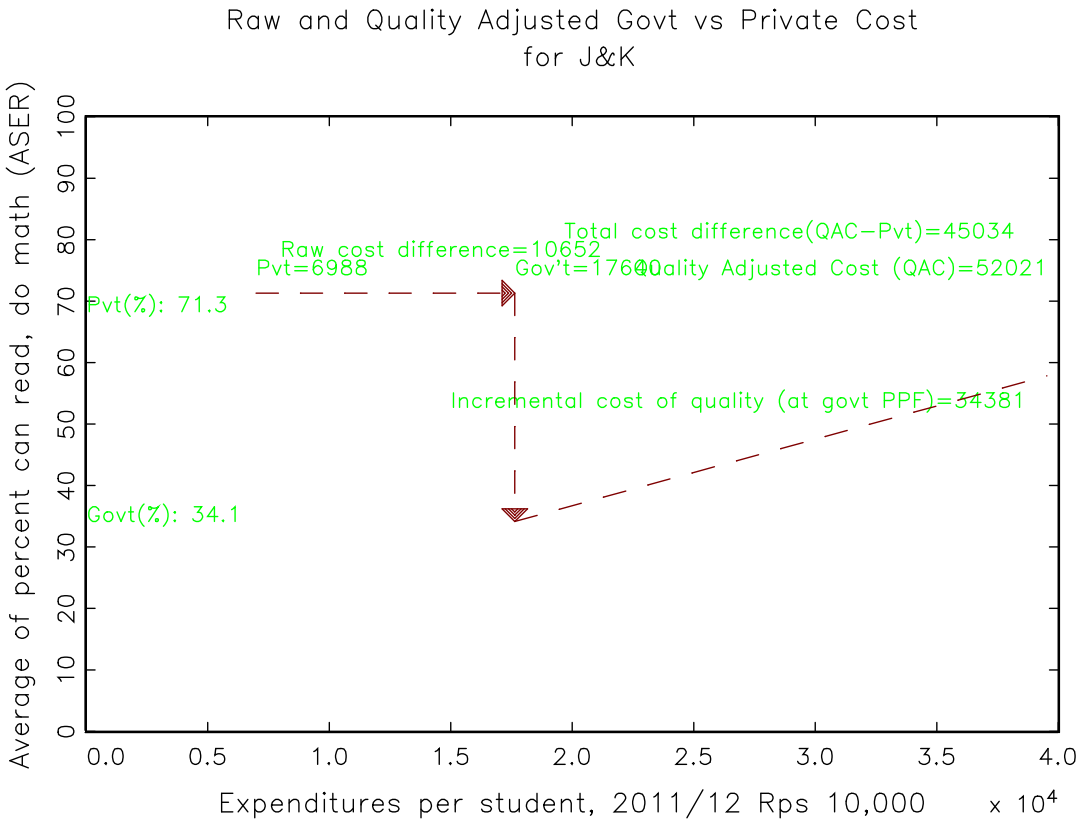

Raw and Quality Adjusted Govt vs Private Cost
for Maharashtra
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=20278
Raw cost difference=14877
Pvt=5961
Govt=20838
Quality Adjusted Cost (QAC)=26239
Pvt(%): 64.6
Incremental cost of quality (at govt PPF)=5401
Govt(%): 58.7

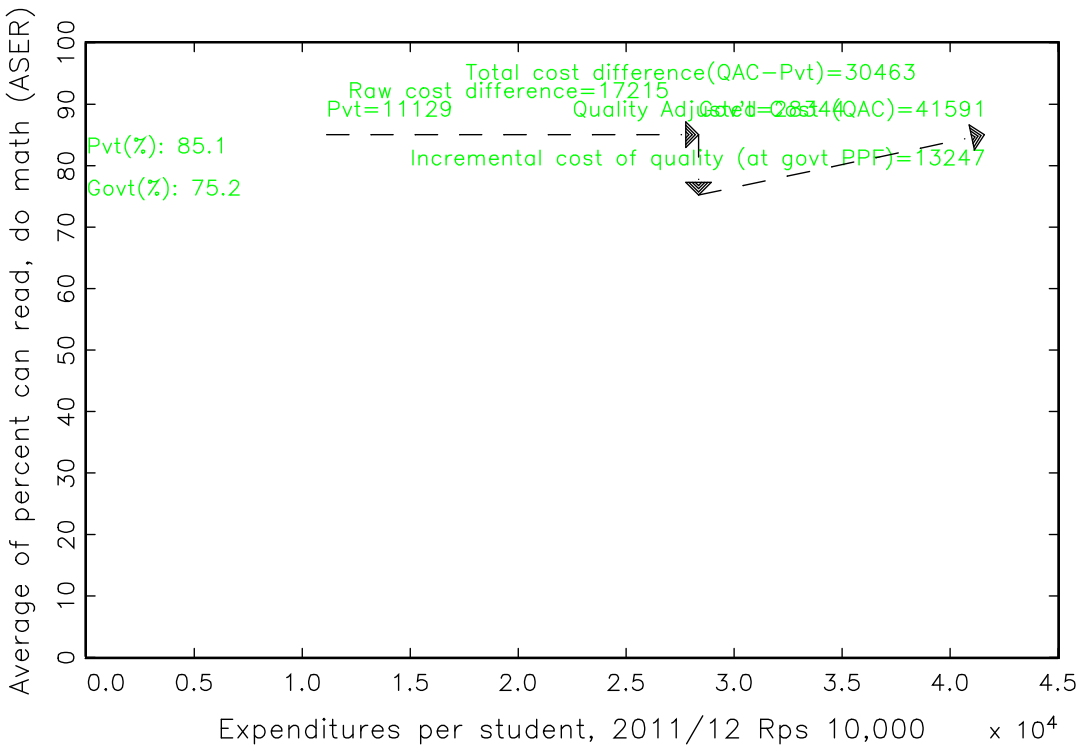

Raw and Quality Adjusted Govt vs Private Cost
for Madhya Pradesh
Average of percent can read, do math (ASER)
Total cost difference(QAC−Pvt)=35661
Raw cost difference=4735
Pvt=3866 Gov't=8601
Quality Adjusted Cost (QAC)=39527
Pvt(%): 66.0
Incremental cost of quality (at govt PPF)=30926
Govt(%): 32.6
Expenditures per student, 2011/12 Rps 10,000
x 10^4

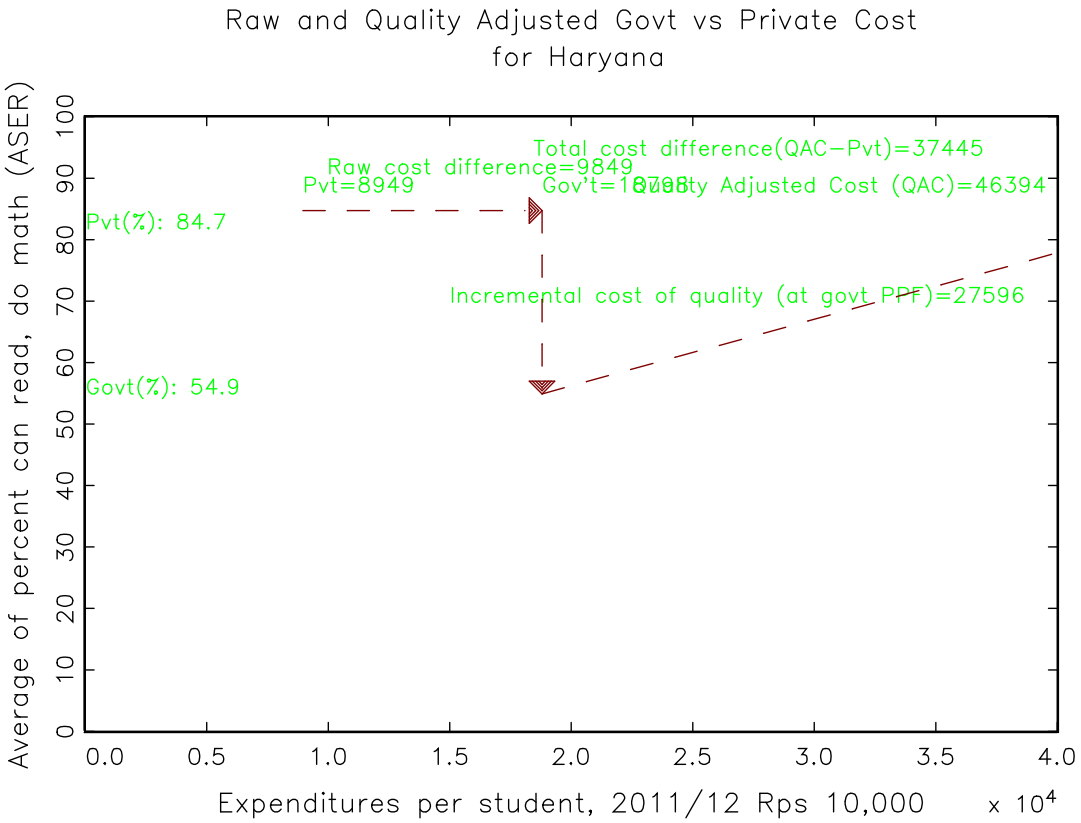

Raw and Quality Adjusted Govt vs Private Cost
for Kerala
Average of percent can read, do math (ASER)
Total cost difference(QAC−Pvt)=37269
Raw cost difference=30308
Pvt=5413
Quality Adjusted Cost (QAC)=42682
Pvt(%): 77.0
Incremental cost of quality (at govt PPF)=6961
Govt(%): 69.4
Expenditures per student, 2011/12 Rps 10,000
x 10^4

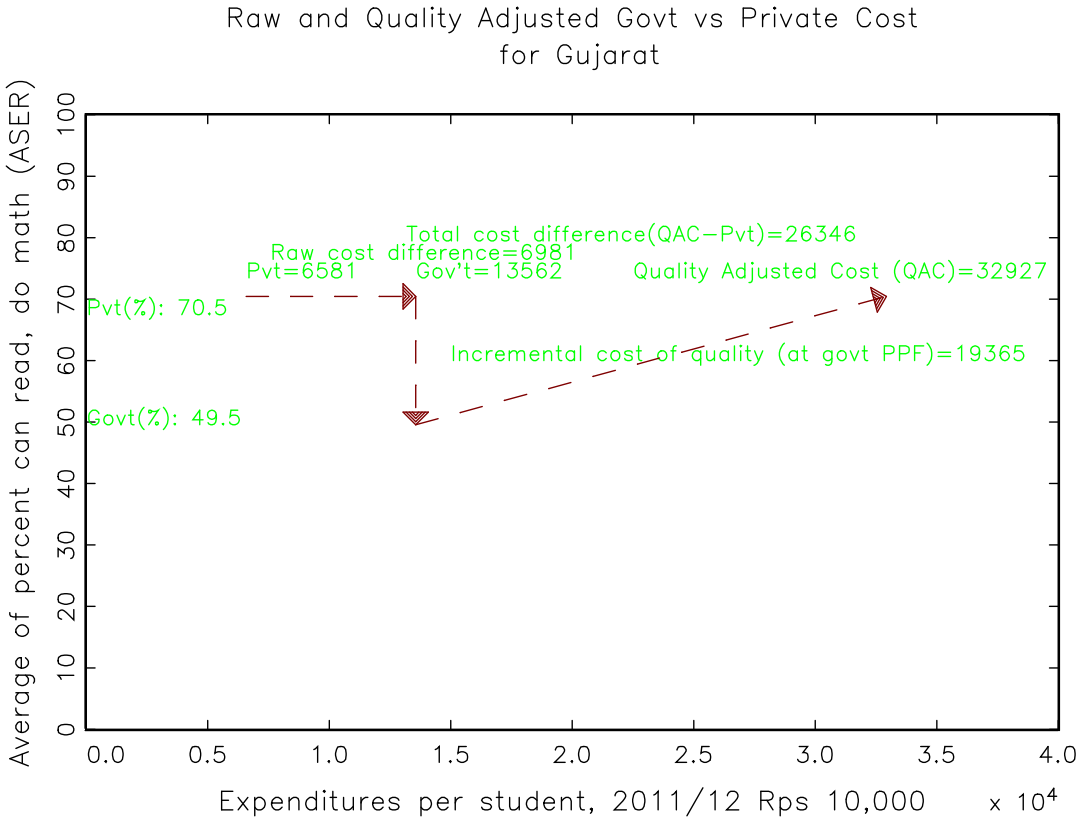

Raw and Quality Adjusted Govt vs Private Cost
for Karnataka
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=21842
Raw cost difference=7906
Pvt=6362
Gov't=14268
Quality Adjusted Cost (QAC)=28204
Pvt(%): 66.2
Incremental cost of quality (at govt PPF)=13936
Govt(%): 51.1

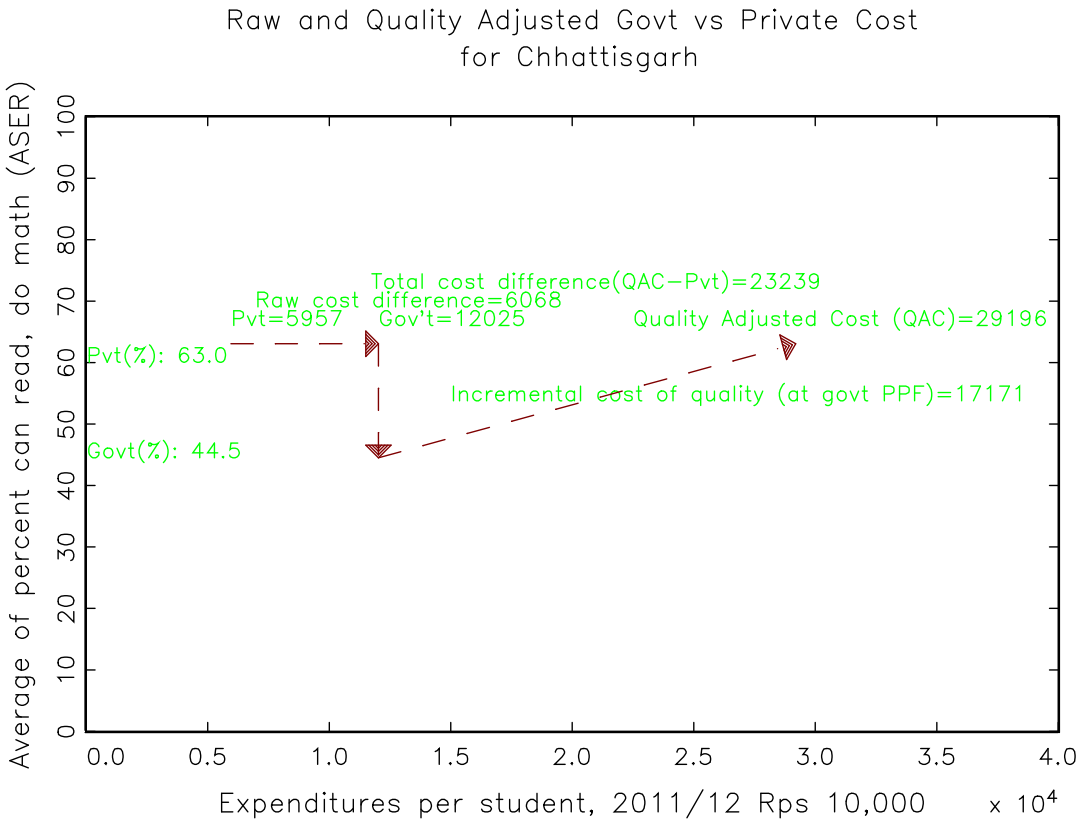

Raw and Quality Adjusted Govt vs Private Cost
for Jharkhand
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=31776
Raw cost difference=1979
Quality Adjusted Cost (QAC)=36472
Pvt(%): 75.0
Incremental cost of quality (at govt PPF)=29797

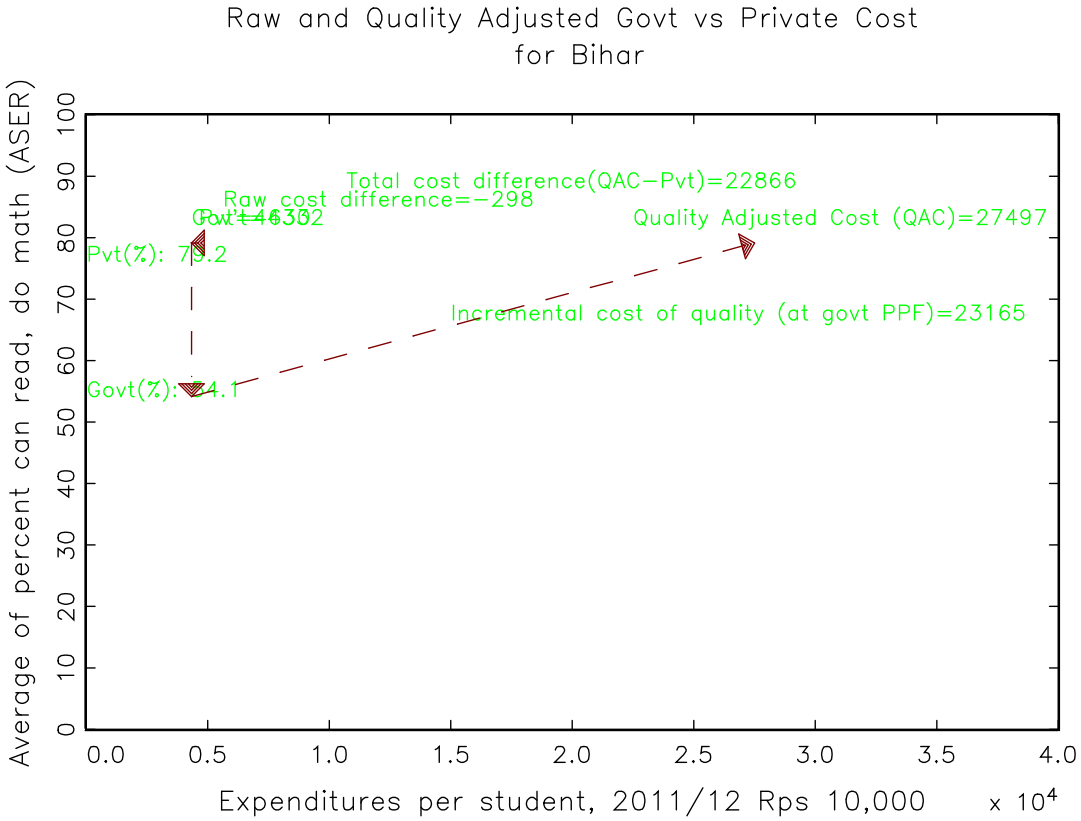

Raw and Quality Adjusted Govt vs Private Cost
for J&K
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=45034
Raw cost difference=10652
Pvt=6988
Gov't=17640
Quality Adjusted Cost (QAC)=52021
Pvt(%): 71.3
Incremental cost of quality (at govt PPF)=34381
Govt(%): 34.1

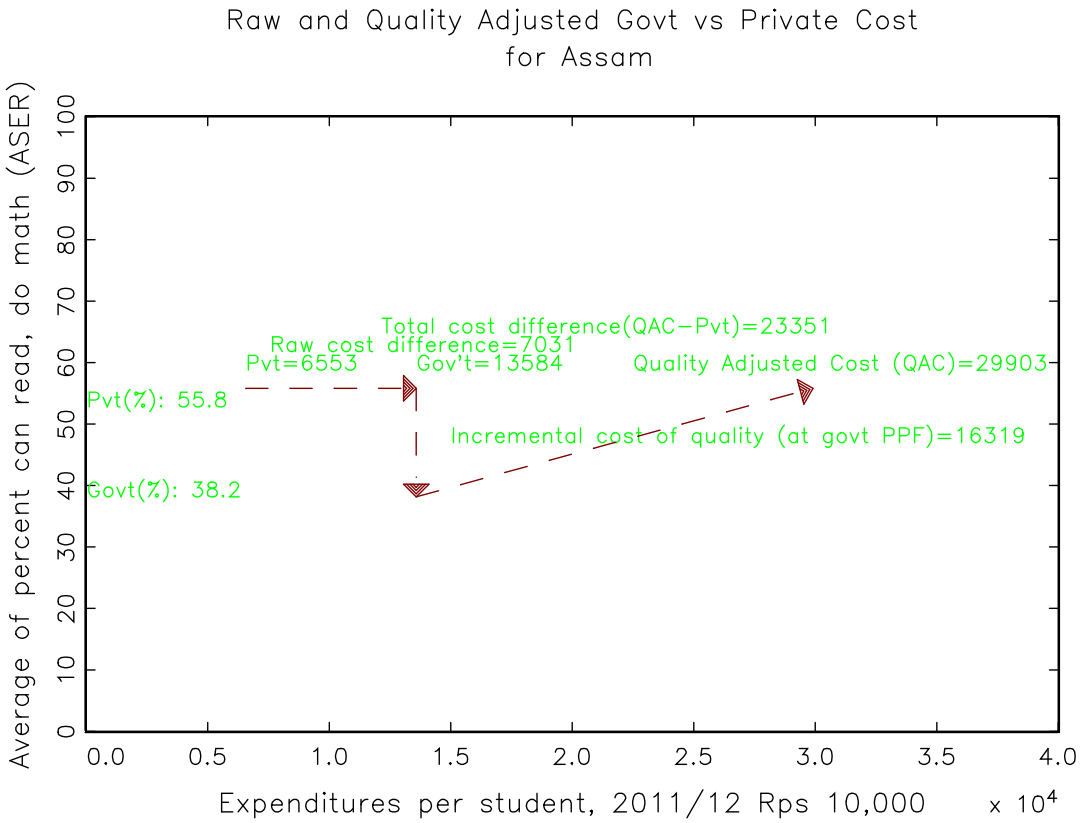

Raw and Quality Adjusted Govt vs Private Cost
for Himachal Pradesh
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=30463
Raw cost difference=17215
Pvt=11129
Quality Adjusted Cost (QAC)=41591
Pvt(%): 85.1
Incremental cost of quality (at govt PPF)=13247
Govt(%): 75.2

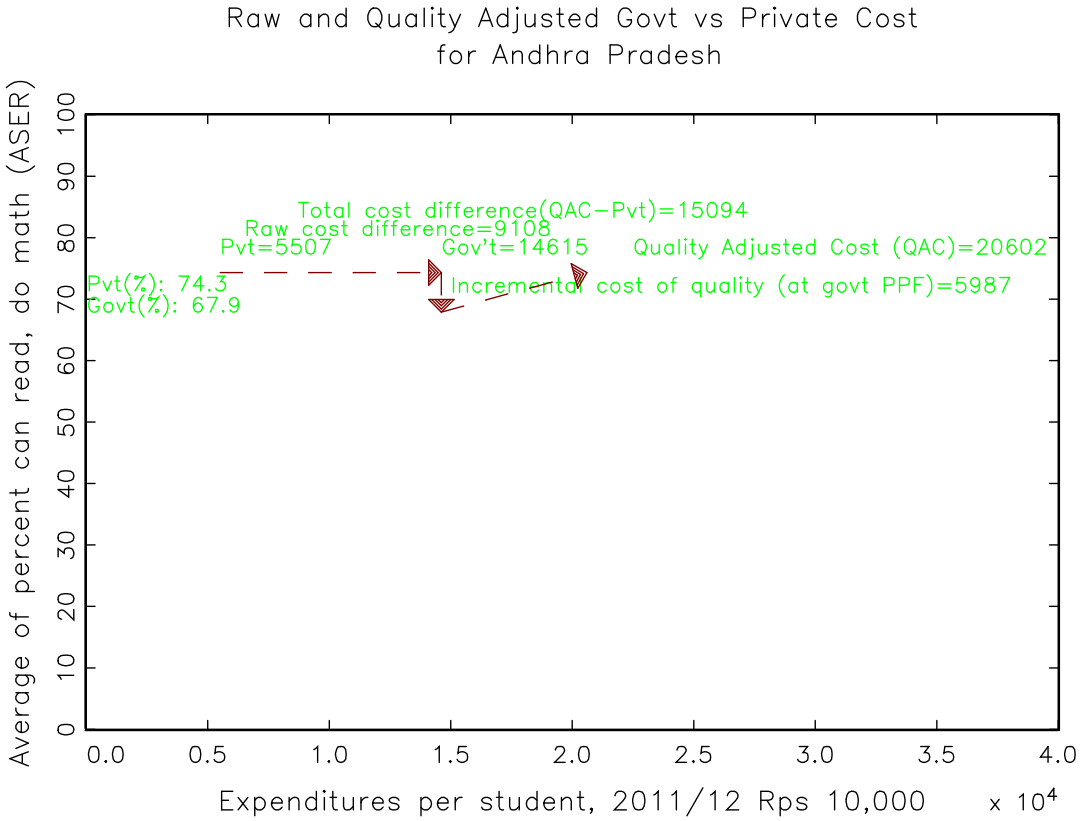

Raw and Quality Adjusted Govt vs Private Cost
for Haryana
Average of percent can read, do math (ASER)
0
10
20
30
40
50
60
70
80
90
100
Total cost difference(QAC−Pvt)=37445
Raw cost difference=9849
Pvt=8949
Gov't=18708
Quality Adjusted Cost (QAC)=46394
Pvt(%): 84.7
Incremental cost of quality (at govt PPF)=27596
Govt(%): 54.9
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Expenditures per student, 2011/12 Rps 10,000
x 10^4


Raw and Quality Adjusted Govt vs Private Cost
for Gujarat
Average of percent can read, do math (ASER)
0
10
20
30
40
50
60
70
80
90
100
Total cost difference(QAC−Pvt)=26346
Raw cost difference=6981
Pvt=6581
Gov't=13562
Quality Adjusted Cost (QAC)=32927
Pvt(%): 70.5
Incremental cost of quality (at govt PPF)=19365
Govt(%): 49.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Expenditures per student, 2011/12 Rps 10,000
x 10^4


Raw and Quality Adjusted Govt vs Private Cost
for Chhattisgarh
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=23239
Raw cost difference=6068
Pvt=5957
Gov't=12025
Quality Adjusted Cost (QAC)=29196
Pvt(%): 63.0
Incremental cost of quality (at govt PPF)=17171
Govt(%): 44.5


Raw and Quality Adjusted Govt vs Private Cost
for Bihar
Average of percent can read, do math (ASER)
Expenditures per student, 2011/12 Rps 10,000
x 10^4
Total cost difference(QAC−Pvt)=22866
Raw cost difference=−298
Quality Adjusted Cost (QAC)=27497
Pvt(%): 79.2
Incremental cost of quality (at govt PPF)=23165
Govt(%): 74.1


Raw and Quality Adjusted Govt vs Private Cost
for Assam
Average of percent can read, do math (ASER)
0
10
20
30
40
50
60
70
80
90
100
Total cost difference(QAC−Pvt)=23351
Raw cost difference=7031
Pvt=6553
Gov't=13584
Quality Adjusted Cost (QAC)=29903
Pvt(%): 55.8
Incremental cost of quality (at govt PPF)=16319
Govt(%): 38.2
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Expenditures per student, 2011/12 Rps 10,000
x 10^4


Raw and Quality Adjusted Govt vs Private Cost
for Andhra Pradesh
Average of percent can read, do math (ASER)
0
10
20
30
40
50
60
70
80
90
100
Total cost difference(QAC−Pvt)=15094
Raw cost difference=9108
Pvt=5507
Gov't=14615
Quality Adjusted Cost (QAC)=20602
Pvt(%): 74.3
Incremental cost of quality (at govt PPF)=5987
Govt(%): 67.9
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Expenditures per student, 2011/12 Rps 10,000
x 10^4