Getting Teachers to Remote Locations: Skills versus Preferences. Evidence from India

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Abstract

Whether to hire teachers locally on a contract basis, or via competitive examinations and training as government officials, is a major policy question in developing countries. Recruitment practices can have implications for the competence, motivation and the cost of teachers. This study relies on a Discrete Choice Experiment to assess the job preferences of a sample of 700 future elementary school teachers in the state of Uttarakhand in India. The students have been selected using either district-wide competitive examination or from a pool of locally hired, experienced contract teachers (para-teachers). Skills in English, Arithmetic and Vocabulary are also tested. We find a trade-off between skills and preferences, as teacher students hired using competitive examination have higher skills, but prefer posts in less remote regions. Most of the differences in job preferences between the two groups are explained by geographic origin of the teachers, skills, experience and education.

Keywords: Education, Para-teachers, Discrete Choice Experiment, Skills, Preferences, India

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1 Introduction

Improvements in health and education are of primary importance in enabling people to overcome poverty. However, there are great difficulties in providing good quality public services in remote areas in developing countries. One key problem relates to attracting and retaining educated personnel in these difficult locations.

This study approaches this problem by examining the preferences of teacher trainee students over their future job contracts in the state of Uttarakhand in India. It distinguishes between two types of students: those who have been competitively selected, and those who have previously worked as contract teachers in rural locations, but without teacher training.

In India, recruitment decisions of teachers have traditionally been made at the state level and teachers have been recruited as civil servants on permanent contracts. However, the practice has been critisized for producing unmotivated teachers with little incentives, often absent as they choose to commute to their rural workplace work from far (Sharma, 1999). Rural areas have suffered from a shortage of teachers, and often, also from a lack of commitment and excessive workloads of the existing teaching staff. In an important study, Kremer et al. (2004) find that in their sample of Indian primary schools, 25% of the teachers were absent during unannounced visits. According to Ramachandran et al. (2005), the state of Rajasthan alone lacked 50,000 primary school teachers. Rural areas can lack amenities that urban-educated teachers are used to. Multi-grade teaching, with one classroom and one teacher shared by all pupils, is also common.

Around the world, various approaches have been experimented with to motivate qualified key personnel to work in remote locations. In the area of health care, solutions have included various forms of compulsory service in rural areas after graduation, rotation of location for personnel on permanent contracts, targeting those with personal commitment to work in rural areas and different types of financial and non-financial incentives (for general discussions, see e.g. WHO, 2006). For example, the Indonesian government operated a system for health workers, where the likelihood of a permanent position in an urban, or desired, area was higher if the individual had first worked in a remote area (Chomitz et al. 1998).

To date, there exists little systematic evaluation of the different recruitment practices for teachers. Recent evaluation studies on teacher contracts in developing countries have focused on incentive mechanisms to motivate teachers and monitoring mechanisms to reduce absences (see e.g. Glewwe et al. 2010, Kingdon and Teal, 2007, Muralidharan and Sundararaman, 2008, Banerjee et al. 2010). Another recent strand of literature analyses the recruitment of local teachers, or “para-teachers”, on fixed-term contracts, which is a common

practice in developing countries (see for example Fyfe, 2007).

Indian states have also reacted to teacher absence and shortages by recruiting untrained, temporary contract teachers, who are generally local to the rural areas at low salaries. Despite generally being labelled as 'temporary', such "para-teachers" have become a common and persistent feature in primary schools across India. The hiring practices and pay of para-teachers vary by state. The combination of a lack of formal qualifications, and the temporary nature of the contract may also not be characteristics of all such teachers. [1] Some states promise a regular contract after a successful trial period. Some states also rely more heavily on para-teachers than others. The statistics from the District Information System for Education (DISE) for government-run primary schools for 2008 show for instance that the highest share of para-teachers (54%) is in Jharkand, followed by Uttar Pradesh (40%). The share in Andhra Pradesh is 11%, 9% in Uttarakhand, 3% in Kerala and negligible in Karnataka and Tamil Nadu.[2]

The recruitment of para-teachers is not without controversy. Concerns have been raised regarding the quality of para-teachers as well as the acceptability of their low pay (PROBE 1999, Pandey and Raj Rani 2003, Govinda and Josephine 2004). Regular teachers fear that the arrangement undermines the trained teacher profession. But, there is also a growing demand among para-teachers for access to training and recognition as regular teachers.[3] Several states have experienced legal cases on this front (see e.g. Kingdon and Sipahimalani-Rao, 2010). Some states, such as Uttarakhand and Punjab, have started to accept para-teachers to training programmes to enable them to continue as teachers.

Rigorous evaluations on the effectiveness of the para-teacher schemes in India are still scarce. A recent review by Kingdon and Sipahimalani-Rao (2010) discusses a range of existing studies that focus on different aspects, such as differences in absence rates, teacher effort or pupil outcomes. To mention a few, the study by Kremer et al. (2005) found no statistically significant difference in the absence rates of regular teachers and contract teachers. On the other hand, calculations and regressions based on the SchoolTELLS survey reported in Kingdon and Sipahimalani-Rao (2010), show that the absence rates of para-teachers were half of those of permanent teachers in the state of Uttar Pradesh, but that there was no difference in Bihar.

[1] According to Ramachandran (2008) "In some states such as Kerala, for example, a few 'contract' teachers have been appointed, supposedly as a purely temporary and stopgap measure. At the other end of the spectrum, Madhya Pradesh had (at one point of time and the current policy is not clear) decided to discontinue the appointment of regular teachers and even declared regular teachers as a dying cadre. In between these extremes, we find Maharashtra, where all new primary level teachers are appointed on a three-year contract and with a low honorarium, even though their qualifications are the same as 'regular' primary teachers; after three years, they are eligible for appointment as 'regular' teachers."

[2] Calculated by authors from the school-level DISE database (see Appendix 1). It must be noted that the definition of a para-teacher can vary by state depending on their recruitment policies.

[3] http://www.thaindian.com/newsportal/uncategorized/punjab-teacher-dies-after-setting-herself-ablaze_100316599.html

There are few studies that would rigorously assess the effect of teacher contracts on actual pupil outcomes in India. A study by Goyal and Pandey (2009) uses teacher-specific cross-sectional data for 200 government primary schools in Madhya Pradesh and Uttar Pradesh. They find that, within schools, para-teachers exert higher effort than permanent teachers, but that effort diminishes over time, suggesting a weakening of incentives. Higher effort in general is associated with better test scores. With a cross-sectional survey of public primary schools in the state of Andhra Pradesh, Muralidharan and Sundararaman (2009) find that a randomly added contract teacher improves pupil test scores. However, they examine the addition of a teacher and not the replacement of a regular with a contract teacher, which better portrays the actual wider situation in India. They do not compare the effectiveness of contract teachers and regular teachers, although do observe that contract teachers were less likely to be absent than regular teachers and more likely to be engaged in teaching activity during unannounced visits. Atherton and Kingdon (2010) use child-specific data for 4000 government school pupils in Bihar and Uttar Pradesh. With school fixed effects models, they find that students taught by para-teachers perform better, controlling for child and teacher-characteristics. Disadvantaged students taught by contract teachers also tend to do better than disadvantaged students taught by regular teachers. The limited evidence available therefore suggests that despite lower pay or lack of qualifications, para-teachers may outperform regular teachers in India.

Studies on contract teachers in other countries produce controversial results. To name a few, in a study on several African countries, Bourdon, Frölich and Michaelowa (2007) find that contract teachers do better in teaching low ability children in low grades than high ability children in higher grades. In study using student-level data for Togo by de Laat and Vegas (2005) finds that regular teachers outperform contract teachers. A recent experimental study by Duflo et al. (2010) finds that an additional contract teacher leads to improvements in pupil outcomes in Kenya and that contract teachers exert more effort than regular teachers. However, again this is a study on an additional teacher, not the replacement of a regular teacher with a contract teacher.

A standard explanation offered for the difference in performance relates to the nature of the contract; namely that with a renewable contract, para-teachers are under stricter pressure to perform than those with a permanent contract. Several of the above studies also point to higher effort. This may not all result from the difference in the nature of the contract. Atherton and Kingdon (2010) for instance note that “there is something intrinsic in the contracting of para-teachers that leads them to be equally or more effective than regular teachers, despite their lack of training and experience, and their far lower pay.” However, rigorous studies on the question are still limited and whether the effect is generalisable, or indeed causal, still remains open.

This study sheds more light on the potential differences between para-teachers and permanent teachers by analysing the preferences of students training to become public sector primary school teachers. The teacher selection process in Uttarakhand provides an excellent opportunity to survey former para-teachers and competitively selected teacher students on the same training programme. The main focus is on the potential trade-off between skills and preferences to work in rural locations. The sample consists of approximately 700 students.

There is little existing quantitative analysis on the preferences of teacher students over future contracts in India. The research on para-teachers so far has not emphasized the potential differences in preferences and implications for work motivation. This study relies on a Discrete Choice Experiment (DCE) to analyse the preferences of students regarding different job contracts. The underlying assumption in the study is that preferences are likely to be connected with work motivation and that an improved understanding of preferences is important in designing contracts. Previous studies have found that individuals from more remote areas are in general more willing to return to work in such areas (see e.g. Chomitz et al., 1998, Serneels et al., 2005 and 2010 and Wibulpolprasert and Pengpaibon, 2003). If this would hold for the para-teachers who are primarily from rural areas, it could offer one justification for the para-teacher scheme. However, as the selection of the para-teacher students is less rigorous, there is a potential trade-off between the general skills of these students and their motivation to work in a rural area.

There is also rather little systematic evidence on teachers' skills in India so far. One exception is the SchoolTELLS survey, which revealed significant gaps in the knowledge of Mathematics among public sector primary school teachers in 2007-08 in Bihar and Uttar Pradesh (see Banerji and Kingdon, 2010). This study reports the findings from a simple skills test that both types of teacher students participated in. This measures general/subject knowledge and not teaching skills as such. It is recognised that the two do not necessarily coincide, but here the focus in on subject knowledge. However, recent evidence by Metzler and Woessman (2010) from Peruvian primary schools shows that one standard deviation increase in teacher test scores in subject knowledge raises student test scores by 10 percent of a standard deviation.

The use of DCEs is relatively new to the study of employment contracts. A DCE is a stated preference methodology, which indirectly measures the valuations of different options in utility terms. The methodology has generally been used by health economists to assess customer preferences with regard to health care. However, so far there are only a limited number of studies, which have used such an approach as a tool to understand public sector worker preferences (see e.g. Penn-Kekana et al., 2005, Hanson and Jack, 2008, Mangham and Hanson, 2008). These studies have broadly focused on the ways to attract workers to rural areas. They have not paid particular attention to contract type, but have focused on pay,

location, benefits, training opportunities and working conditions. The choice of location has generally been a binary one. Generally, wage equivalents of preferences over different job attributes have been estimated. Hanson and Jack (2008) for instance study the preferences of Ethiopian health workers. They report that health workers had a clear preference for the capital area over other locations and pay was a more significant factor than other benefits for choosing a rural/non-capital location. Doubling of wages in rural areas would have induced a substantial change in doctors' willingness to work in rural areas. They also study the significance of personal characteristics for preferences, mainly gender, marital status and the number of children.

In the DCE in this study, the students were presented with pairs of contracts from which they were asked to select the one they prefer. A logit model is then used to examine how the preferences of former para-teachers differ from those of the competitively selected students and how personal characteristics affect preferences. Given the problems posed by remote location, particular attention is paid to preferences over location, involving four location categories, and how this is affected by personal characteristics. Other contract features relate to pay, contract type, criteria for transfers from one location to another and pupil-teacher ratios.

This study finds that there are significant differences in general skills between the two groups. Overall, standard students obtain higher scores in all sub-tests. The DCE also reveals significant differences in the job preferences of the two groups. A crucial one relates to the preferences concerning location. In particular, para-teachers are less averse to working in remote locations, and in contrast with standards students, they do not value district capitals as places of employment. Thus, the study confirms a trade-off between skills and preferences, when para-teachers are hired locally. Some of this difference in preferences can be explained by life-cycle factors such as teaching experience and having children. In that regard, it is possible that the preferences of standard students will converge somewhat towards those of para-teachers, as the standard students set up families and gain more experience. However, other factors such as location of origin, education and skills also explain the average differences in preferences.

Section 2 describes the background to primary education and teacher training in India and Uttarakhand. Section 3 discusses the data and reports on the descriptive statistics and general perceptions of both types of students. Section 4 presents the details of the Discrete Choice Experiment used in the study. Finally, Section 5 reports the results, and Section 6 concludes.

2 Primary education and teacher recruitment in India and Uttarakhand

In 1993, the Supreme Court of India ruled that all children below the age of 14 have the legal right to primary education (see e.g. Edge, 2000). This was reinforced by the Right to Education Bill of 2005. The India-wide education programme, Sarva Shiksha Abhiyan (SSA) aims to achieve the goal of universal primary education (see e.g. Mehta, 2004). One of its key objectives is decentralisation and it has greatly increased the prevalence of para-teachers in public sector primary schools.

The Annual Status of Education Report[4] is currently possibly the most reliable source of nation-wide performance data on primary school students in India. According to the 2009 report, on average 64 per cent of school children in rural India within classes 3-5 have elementary reading skills, but there is great state level variation. The figure in the state of Uttar Pradesh is 48%, whilst that in Himachal Pradesh is 82% and in Madhya Pradesh 88%. The state of Uttarakhand has been a somewhat above average performer, with 74% of pupils in classes 3-5 with elementary reading skills in the 2009 ASER survey. There is however considerable within state variation in Uttarakhand as shown in Table 1 below. The districts in bold are covered by our survey.

Table 1 Percentage of primary school students with elementary skills in Uttarakhand

District	**Grades 3-5**		
	Reading	**Maths**	**English**
Pithoragarh	90.3	84.4	23.8
Nainital	**86.8**	**76.3**	**23.1**
Champawat	84.6	67.4	36.7
Almora	**82.6**	**79.8**	**20.9**
Chamoli	**77.6**	**68.2**	**10.5**
Garhwal	77.4	66.8	19.9
Rudraprayag	**73.1**	**56.7**	**14.5**
Tehri Garhwal	72.0	53.2	28.9
Uttarkashi	69.2	46.9	19.2
Bageshwar	66.1	57.8	10.5
Dehradun	**64.1**	**50.8**	**28.6**
Haridwar	**64.0**	**53.4**	**33.8**
Udham Singh Nagar	**58.3**	**41.6**	**20.6**

Source: Annual Status of Education Report (2009). Ordered by "reading" score. The data are collected at the household level, so pupils in both public and private schools are included. Districts in bold are covered by our survey.

Uttarakhand formed part of the state of Uttar Pradesh until 2000. In the 2001 Census, the state is reported to have 8.5 million inhabitants, and 90% of the population depends on agriculture.[5] The state is relatively small

[4] http://www.asercentre.org/
[5] http://www.india.gv.in/knowindia/st_uttaranchal.php

geographically in comparison to many other Indian states, but its territory consists mainly of mountains. Travel times can be long even between short distances, and therefore remote locations pose a clear challenge for teacher recruitment.

In Uttarakhand, training for public sector primary school teachers is provided exclusively by public sector training institutes, the District Institutes for Educational Research and Training (DIETs). The State Council for Educational Research and Training (SCERT) oversees the DIETs. The DIETs organise both full-scale teacher training programmes as well as shorter training courses for existing teachers and inspectors. A new two-year programme, the Basic Teaching Certificate (BTC) was initiated in April 2010.[6] The BTC training is required to be able to work as a regular teacher in a public sector primary school. There are a total of 13 DIETs in Uttarakhand, of which 3 are so called "mini-DIETs", given that they are located in districts with a smaller number of schools.

Para-teachers have been used to staff schools in Uttarakhand, in particular in rural and more remote locations. In this case, these teachers have generally had the characteristics of a standard "contract teachers": they do not have formal teaching qualifications and are employed on a contract basis with significantly lower salaries than those of regular teachers. However, the government has recently decided to end the recruitment of para-teachers and offer BTC training for the existing para-teachers to enable them to become regular teachers. The current starting salary of a regular teacher in Uttarakhand has recently been raised to approximately Rs. 17,000 per month. A "cost of living" allowance as well as "a hill area" allowance are provided in some circumstances, and a "housing allowance" if appropriate government accommodation is unavailable.[7] The starting salary is considerably higher than in some other states, although there have been recent increases elsewhere as well following the recommendations of the Sixth Pay Commission (see e.g. Kingdon, 2010). However, recent discussions suggest that the state of Punjab for instance still pays only approximately Rs. 5000-6000 for its regular public sector teachers.[8] In Uttarakhand, para-teachers have been paid up to Rs. 6000 per month in recent years.

There are currently approximately 200 students in each DIET[9] on the new training programme, of which roughly half are former para-teachers. Almost all students in the district specific DIETs come from the same district. They will also be recruited as teachers in the same district.

[6] There has been a ten-year break in the provision of regular training programmes. (see Godiyal and Nautiyal, 2008).
[7] Source: Communication with officials at Uttarakhand Sarva Shiksha Abhiyan office.
[8] Source: Communication with officials in the SCERT in Punjab.
[9] The numbers are smaller (roughly 100) in the "mini" DIETs.

The former para-teachers were selected to the programme at the village level. The number of years of teaching experience appears to have been one decisive factor for their selection, but there are other less well-defined criteria as well. The "standard" students were selected on the basis of a composite entry score. This is based on the performance in an entrance exam as well as other merits (such as existing degrees, education) or quota-related characteristics, but the female-male ratio should be 50:50 (see Godiyal and Nautiyal, 2008). We were reported that upon completion of the programme, the former para-teachers are supposed to be sent back to their original location, and the others will be sent to a rural location for 10 years. The choice of initial location can be based on merit and success in the BTC programme, but this is a somewhat murky area. [10]

Teacher transfers are another controversial issue in India and undoubtedly also in Uttarakhand. In a summary of her research, Béteille (2009) explains how half of the teachers she surveyed in the states of Rajasthan, Madhya Pradesh and Karnataka agreed that transfers require connections and 30 percent believed that they would have to pay to obtain the post they wanted. Ramachandran et al. (2005) report that in their survey, the share of teachers explicitly wanting a transfer was not large. However, mass transfers occurred now and then. In 2005, the government in Rajasthan transferred 20,000 teachers in one occasion, which generated general unrest. To quote the authors:

"Discussions with trade union leaders revealed that transfers and posting were big business in Rajasthan. Intensive lobbying followed bulk transfers and it was rumoured that political middlemen demanded Rs. 5,000 to Rs. 25,000 to cancel the transfer or ensure a good posting."

3 Data and descriptive statistics

The survey was carried out in DIETs in seven districts of Uttarakhand. The state of Uttarakhand was chosen for its manageable size, but also the introduction of a new teacher-training programme, including both former para-teachers and competitively selected students. The survey was conducted in May 2010, right after the students (both standard students and former para-teachers) had entered the BTC programme.

Since the students had only recently entered the training programme, it can be assumed that the programme itself had not yet significantly shaped their skills or preferences. Thus, it provides a picture of para-teachers "as they are" and standard students in the first stage of their career. One differentiaring factor between the two groups of students is that para-teachers have more teaching experience. However, compared to the existing studies on para versus permanent teachers already working in schools, there is rather little

[10] Source: Communication with various education officials in Uttarakhand.

difference in the mean age between the two groups. The study captures all teachers at an entry point to their careers as regular public sector teachers. Although the selection process of the students can be somewhat specific and general circumstances may differ, it is expected that the results are relevant to other Indian states. Directly for those contemplating the hiring, or training, of para-teachers, and also to those pondering teacher preferences and recruitment practices in general.

The main criteria for the choice of districts were diversity in geography and diversity in pupil outcomes (as seen above in Table 1). It was considered appropriate to sample two geographically "flat" districts (Haridwar and Udham Singh Nagar) where conditions resemble those of other Northern Indian States. In addition, the district including the state capital was included (Dehradun). Out of the remaining four sampled districts, two can be considered remote mountain districts (Chamoli and Rudraprayag) and two less remote, mountainous districts (Almora and Nainital). More details of the data collection process are presented in Appendix 1.

The questionnaire given to the participants consisted of three parts. Part A focused on the general background of the students and their perceptions on the recruitment and work of teachers. This was followed by the discrete choice experiment (part B) and a timed general skills test (part C). The questionnaire was available in both English and Hindi (the main language in the state). This section reports on the responses to part A as well as the results of the skills tests. The replies to the DCE are described in Section 4.

The survey questionnaire, including the DCE section, was designed after discussions with a range of Indian education officials and academics, including officials in the state of Uttarakhand. The design was also influenced by findings in existing literature referred to above.

Profile of students

A total of 707 students participated in the survey of whom 39% said they entered the BTC programme as para-teachers. Table 2 summarises the data on the background and characteristics of the students separately for the former para-teachers and the standard students. There are some significant differences.

Whereas 61% of the standard students are from rural areas, 97% of the former para-teachers say they come from rural areas. Para-teachers are also much more likely to be married and have on average more children. The average age of a para-teacher is 33 years, and that of a standard student is 29 years. The parents of para-

teachers are less educated and come from homes with fewer possessions on average, with the exception of land. Former para-teachers have on average 8.2 years of teaching experience, while standard students have an average of 1.7 years of teaching experience, in the latter case typically from the private sector. Approximately half of the standard students have worked as a teacher in the private sector, whereas the corresponding figure is 15% for the para-teachers. The wage that para-teachers had earned as private sector teachers was less than half of the wage earner by the standard students. This is likely to be explained by location, but potentially also differences in skills. Almost everyone who had worked as a para-teacher reported a current standard salary of 6000 Rs. per month. Some noted that the standard salary had initially been lower, around Rs. 2500 per month. There are no striking differences between the religion or caste status of the former para-teachers and the standard students (not reported in the table). Almost all of the students are hindus and in both student categories, about 40% belong to a scheduled caste or tribe, or other backward caste.

Table 2 Summary statistics

	STANDARD STUDENTS					PARA-TEACHERS				
Variable	**Obs**	**Mean**	**St. Dev**	**Min**	**Max**	**Obs**	**Mean**	**St. Dev**	**Min**	**Max**
Female*	425	0.52	0.5	0	1	277	0.5	0.5	0	1
Birth year	413	1981.3	3	1970	1987	251	1977.7	3.6	1966	1985
Married*	424	0.47	0.5	0	1	276	0.89	0.31	0	1
# Children	425	0.52	0.8	0	4	277	1.74	1.07	0	5
Father's Education[1]	405	3.7	1.22	1	5	249	2.72	1.25	1	5
Mother's Education[1]	411	2.45	1.3	1	5	252	1.64	0.87	1	5
Parents own:										
House*	426	0.91	0.29	0	1	278	0.72	0.45	0	1
Car*	426	0.1	0.3	0	1	278	0.04	0.2	0	1
Land*	426	0.55	0.5	0	1	278	0.68	0.47	0	1
Computer*	426	0.28	0.45	0	1	278	0.05	0.23	0	1
Teaching Experience[2] (years)	402	1.73	2.25	0	15	257	8.18	2.32	0	16
Private sector teacher*	415	0.55	0.5	0	1	267	0.16	0.37	0	1
Monthly private pay (Rs.)	228	4165	3423	500	25000	41	2011	2657	300	15000
MSc Degree*	424	0.8	0.4	0	1	276	0.55	0.5	0	1
Rural*	421	0.61	0.49	0	1	271	0.97	0.16	0	1
Skills test:										
Countries (#)	425	16.89	4.43	3	33	278	14.72	4.01	7	26
Arithmetic (#)	422	30.01	7.96	5	40	273	24.13	8.44	3	40
English (#)	424	10.87	3.67	0	22	277	8.54	3.6	1	20.5
Skills 1st PC	421	0.29	0.92	-2.44	2.62	272	-0.45	0.95	-2.71	2.11

* dummy variable, [1] = less than primary school (1), primary school (2), secondary school (3), higher secondary school (4), university degree (5). [2] = experience in private or public sector school. A total of 707 individuals, selection status is unknown for 3 students.

The competition for places in the BTC programme is considered fierce for the standard students. The surveyed students all already hold at least a bachelor level degree. In terms of education, 80% of the

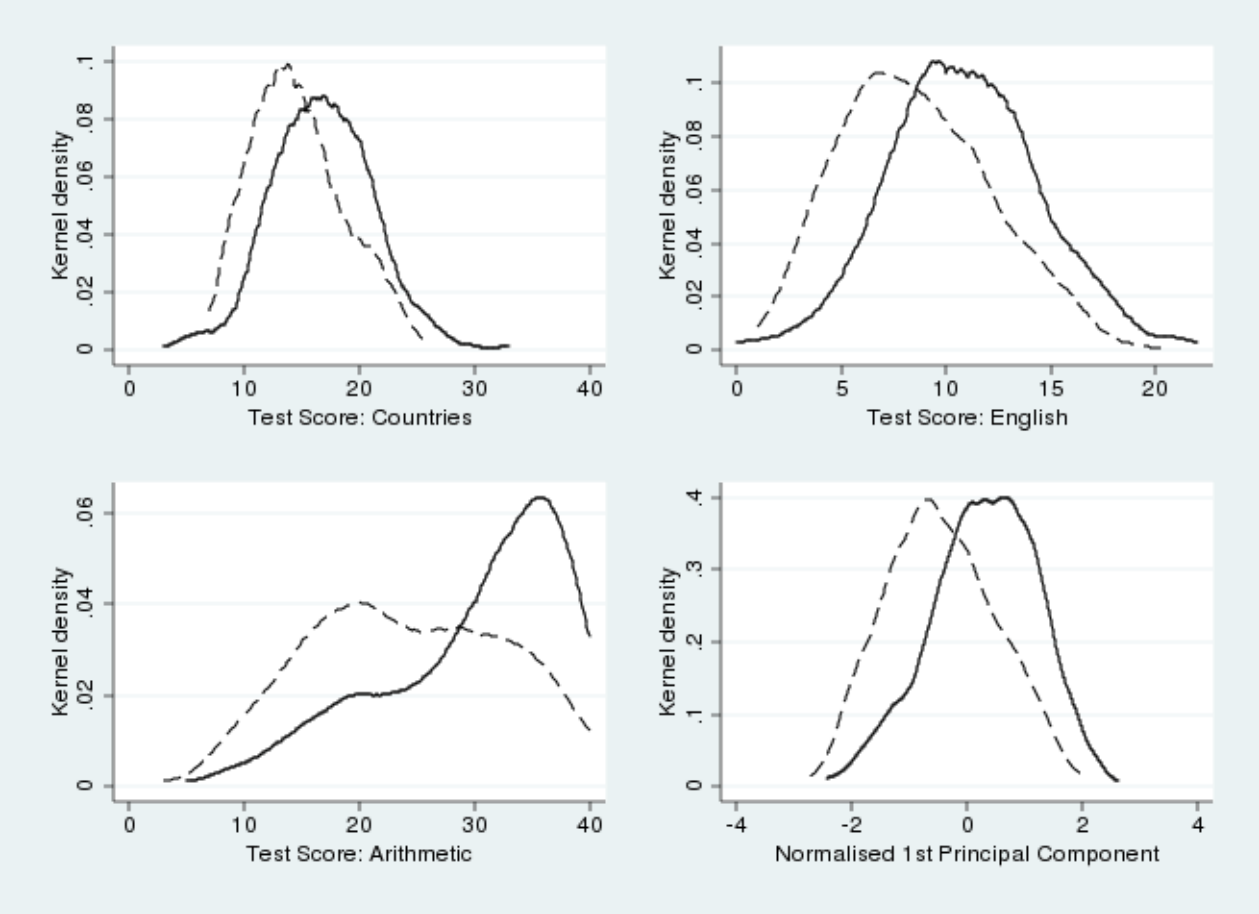
standard students hold a Masters degree, while 57% of the para-teachers hold a Masters degree. India-wide statistics show that on average para-teachers have higher educational qualifications than permanent teachers, but this is likely to be due to the fact that para-teachers are on average younger than permanent teachers currently teaching in schools. Despite the relatively high stated levels of education, 34% of those in the sample say they would be studying for another degree had they not been accepted to the BTC. Attractive work is scarce and the teaching profession desirable.

Skills

The surveyed students were asked to participate in a voluntary timed test of simple generic skills, which focused on knowledge of countries, English, and Arithmetic. A detailed description of the tests and their first principal component can be found in Appendix 2. The test was not designed to test whether teachers' skills matched the expected level of those of relevant students, but moreover to demonstrate a general level of knowledge in the three areas. The average scores obtained by the two groups are shown in Table 2 and Figure 1 below shows the distributions of the test scores across the two groups. This is a general skills test not designed to specifically test for teaching skills. As mentioned above, teachers' subject knowledge can affect learning, but teaching skills evidently also depend on various other factors, overall motivation potentially being a very important one.

Overall, there are significant differences between the groups in all tests. The differences are particularly large in the arithmetic test. The mode for standard students in the arithmetic test is 35 (out of 40 problems) and that for para-teachers is 20 (out of 40 problems). It is difficult to determine what represents a "good" score in the arithmetic test for primary school teachers, but based on the responses it was apparent that students who scored below 20 were struggling with arithmetic computations – either by making many mistakes or by running out of time. Some students did well with addition and subtraction, but were discouraged by multiplication or division. The full arithmetic test can be found in Appendix 2.

Figure 1 Differences in skills between para-teachers and standard students: Kernel densities



Notes: Solid line: standard students, dashed line: para-teachers.

4 Discrete choice experiment: econometric model

In the experiment, all students were presented with pairs of contracts from which they had to select the one they prefer. These represented hypothetical contracts with characteristics that were deemed to be generally important and relevant for a teacher's job. To elicit a sufficient amount of information regarding their preferences over the characteristics (attributes) of the contracts, the selection was repeated multiple times with different levels of the contract attributes. In our case, the number of contract pairs was 12 (see Appendix 3 for a justification). The contract attributes and their levels are presented in Table 3 below. An example contract pair is presented in Appendix 3. This section of the questionnaire was not timed; the students were given the amount of time they required to complete the section. All students received the same contract pairs to choose from.

There are limitations to how many attributes can be chosen to be able to estimate the DCE. The results described in the next section show that the chosen attributes had a statistically significant contribution to

individuals' choices. The incorporation of pay was considered necessary, as it was likely to be of fundamental importance and necessary to calculate monetary valuation of other attributes. The attributes and their levels were chosen to be relevant and approximately realistic for the state of Uttarakhand and India to a large extent. As mentioned, it was considered appropriate to include more than two location categories. For instance, from the perspective of recruitment policy, it would be useful to know to what extent students prefer to work in their home village or town. An attribute on the contract type was also considered important, given the concerns with permanent contracts and increased tendency to recruit teachers on a contract basis in India. The few existing studies on job preferences by public sector workers referred to above have tended to ignore this dimension. The attribute levels for the contract types incorporate both geographic rotation and permanence of the contract. Given the political nature of teacher recruitment and transfers, we considered it appropriate to include an attribute on transfer policies. Formulating a DCE question on the topic was challenging, but we wanted to understand how teachers value merit-based transfers as opposed to ones based on 'connections and influence'. The final attribute, the teacher-pupil ratio, is included as a general indicator of the demand level of the job.

Table 3 DCE: Contract attributes, and their levels

Pay[11]	Location	Contract	Transfers	Staff and pupils
Rs. 13000 per month	Remote village	Fixed term contract, renewable every 7 years.	Depend on connections and influence	2 teachers, 75 pupils
Rs. 17000 per month	Village / Small town	Permanent, must transfer every 7 years.	Depend on merit	2 teachers, 14 pupils
Rs. 21000 per month	Your home village/ town	Permanent, possibility to transfer after 7 years.		
	District capital area			

A discrete choice (logit) regression model is then used to analyse the relative importance of different attributes in choices and especially, whether location options significantly affect choices. As explained below, the analysis allows one to assess on what terms teachers would be willing to trade one job characteristic for another.

[11] 1 USD ~ 74 Rupees. The current teacher starting salary in Uttarakhand is 17-18.000 Rs per month.

The model

Assume that utility from a job contract can be characterised by a function

(1) $U_{ci} = \alpha + \beta' X_c + \delta \otimes X_c Z_i' + u_{ci}$,

where contract $c = \{A,B\}$, $i = 1 \ldots N$ refers to individuals. X is a vector of attribute levels, and Z is a vector of personal characteristics.

Now, the utility gain from contract B over contract A for individual i, $U_i(B)$, is:

(2) $U_i(B) = U_{Bi} - U_{Ai} = \beta'(X_B - X_A) + \delta \otimes (X_B - X_A) Z_i' + (u_{Bi} - u_{Ai})$

Suppose the individual chooses contract B if $U_i(B) > 0$. This takes place with the probability

(3) $$\begin{aligned} P_i(B) &= P[U_i(B) > 0] \\ &= P[\beta'(X_B - X_A) + \delta \otimes (X_B - X_A) Z_i' + (u_{Bi} - u_{Ai}) > 0] \\ & P[u_{Ai} - u_{Bi} < \beta(X_B - X_A) + \delta \otimes (X_B - X_A) Z_i'] \\ & F[\beta'(X_A - X_B) + \delta \otimes (X_B - X_A) Z_i']. \end{aligned}$$

The random component u_{ci} may be hypothesised to consist of three additive components: an individual specific component (v_i), a contract specific component (e_c) and a true iid random term (ε_{ci}). Of these the, individual specific term cancels out in equation (3). The contract specific component can be assumed to be zero, unless the respondents have a consistent tendency to be more or less likely to respond to contract A instead of B, for instance due to their placement. Appendix 3 describes the methodology in more detail.

Equation 3 can be estimated for instance with a Logit or Probit model. The results are virtually the same using either, and this paper uses Logit for all estimations. The levels of the contract attributes are treated as separate dummy variables in the regression analysis, except for pay which enters as a continuous variable with three values. The actual regression models are based on differenced variables as specified in Equations (2)-(3). Since the explanatory variables represent the differences between the attribute levels of two contracts, it is unnecessary to include individual effects (such as random effects). In order to interpret the results, it is not necessary to estimate the marginal effects, which would not have a meaningful interpretation.

One downside of a discrete choice experiment is that the interview setting does not constitute a real, but a stated choice. Some studies have been carried out to assess the reliability of stated preference in predicting actual behaviour, and they tend to show good correspondence (e.g. Adamowicz et al., 1994). In the context of health worker preferences, Chomitz et al. (1998) find a "strong qualitative consistency" between stated and revealed preference. Further, the questions can be constructed so as to extract the maximum amount of information from the respondents, and the consistency of the responses can be evaluated in some cases (see e.g. Mangham et al., 2008, Street et al., 2005).

5 Results

The results of the discrete choice estimations are shown in Table 4. The coefficients in the table are the estimated β:s and δ:s of Model (1)-(3), and they measure whether the attribute levels make respondents more likely to choose contract B. Reference groups (for dummy variables) are excluded from the models. For location, the reference group is "Remote village". For the contracts, the reference group is "Fixed term contract, renewable every 7 years". For transfers, the base category is "Transfers based on connections and influence", and for pupils and staff, the excluded category is "2 teachers, 75 pupils" ("Large class size"). Thus, the estimated parameters refer to preferences compared to these categories – a significant positive estimated coefficient measures how much the option is preferred in relation to the excluded category. The differences between the preferences of the standard students and the para-teachers are measured by the eight interaction terms in Model 1 of Table 4.

Preferences of standard students versus para-teachers

The basic preference parameters for both standard students and para-teachers are presented in the first column of Table 4. The model utilises all available data. So far, the estimation ignores the observable characteristics of students with the exception of para-teacher status. In the framework of equation (3), a para-teacher dummy is the only variable included in *Z*.

With the exception of "small class size", the coefficients for all job attribute levels are statistically significant, which implies that they affect choices and are relevant. As the main purpose of this study is to assess the differences between the two types of students, focus is on the difference between the coefficients for the two groups of students, or the interaction terms.

From the perspective of this study, possibly the most important results relate to preferences over locations. Both groups regard the "Remote village" as the least desirable option. However, the results suggest that para-teachers do not value the "District Capital" over the "Remote village" option, which is the reference group. This can be seen by testing whether the sum of the estimated coefficients .636-.574 = .063 is

significantly different from zero, which it is not (p = .44). At the same time, while para-teachers value their "Home town/village" significantly more than the "Remote village" (1.021-.445>0), the preference for "Home village/town" is much stronger for standard students (p = .00). This observation is somewhat more surprising considering the fact that para-teachers are often mothers, or fathers, of a settled family and have been working in their home area. On the other hand, the para-teachers may have been selected from less desirable locations to begin with, and the result could reflect the willingness of some para-teachers to move out from their current village/town. They may also simply value change having worked in their home village for several years.

Table 4 Logit estimates of the DCE Model

	(1)	(2)	(3)	(4)
	Basic	**Basic, sample (2)-(4)**	**Life-cycle controls**	**All controls**
Contract attributes				
Pay (1000 Rs)	0.129	0.128	0.139	0.131
	[0.008]**	[0.008]**	[0.013]**	[0.022]**
Location: Village / Small Town	0.573	0.593	0.680	0.703
	[0.065]**	[0.067]**	[0.113]**	[0.185]**
Location: Home village / town	1.021	0.995	1.143	0.918
	[0.068]**	[0.070]**	[0.119]**	[0.192]**
Location: District capital area	0.636	0.646	0.731	0.748
	[0.067]**	[0.069]**	[0.117]**	[0.190]**
Contract: Permanent, with rotation	0.545	0.570	0.532	0.719
	[0.047]**	[0.048]**	[0.081]**	[0.133]**
Contract: Permanent	0.735	0.739	0.730	0.741
	[0.070]**	[0.072]**	[0.121]**	[0.198]**
Transfers: Based on merit	1.052	1.032	1.023	0.801
	[0.052]**	[0.054]**	[0.091]**	[0.148]**
Small class size	-0.064	-0.071	-0.009	-0.156
	[0.041]	[0.042]+	[0.071]	[0.116]
Interaction terms				
Para × Pay (1000 Rs)	-0.029	-0.021	-0.013	-0.007
	[0.012]*	[0.013]+	[0.016]	[0.018]
Para × Village / Small Town	-0.129	-0.201	-0.116	0.027
	[0.104]	[0.107]+	[0.136]	[0.152]
Para × Home village / town	-0.455	-0.432	-0.333	-0.055
	[0.105]**	[0.108]**	[0.138]*	[0.154]
Para × District capital area	-0.574	-0.630	-0.551	-0.236
	[0.105]**	[0.109]**	[0.138]**	[0.155]
Para × Permanent, with rotation	-0.058	-0.086	-0.053	0.006
	[0.074]	[0.076]	[0.097]	[0.108]
Para × Permanent	-0.151	-0.123	-0.093	0.024
	[0.108]	[0.112]	[0.144]	[0.161]
Para × Based on merit	-0.405	-0.374	-0.342	-0.237
	[0.081]**	[0.084]**	[0.107]**	[0.119]*
Para × Small class size	-0.086	-0.107	-0.068	-0.119
	[0.064]	[0.066]	[0.084]	[0.095]
Kids × Permanent, with rotation			-0.280	-0.216
			[0.085]**	[0.090]*
Kids × Based on merit			-0.206	-0.168
			[0.095]*	[0.100]+
Experience × Home village / town			-0.260	-0.382

Experience × Permanent, with rotation			[0.142]+ 0.238	[0.146]** 0.243
Female × Pay (1000 Rs)			[0.098]*	[0.100]* -0.023
Female × Village / Small Town				[0.014]+ 0.224
Female × Home village / town				[0.116]+ 0.656
Female × District capital area				[0.120]** 0.316
Female × Permanent, with rotation				[0.119]** -0.269
Female × Based on merit				[0.083]** 0.276
Female × Small class size				[0.092]** 0.231
Skills × Pay (1000 Rs)				[0.073]** 0.014
Skills × Home village / town				[0.007]+ 0.202
Skills × Permanent				[0.065]** 0.207
Skills × Based on merit				[0.067]** 0.146
MSc × District capital area				[0.049]** 0.250
Rural × Village / Small Town				[0.125]* -0.281
Rural × District capital area				[0.139]* -0.541
				[0.144]**
DCE responses	8198	7735	7735	7735
Individuals	685	665	665	665

**,*,+ : significant at the 1%, 5% and 10% significance levels. Kids = dummy for having children, Experience = teaching experience dummy, Skills = First principal component of skills test, Rural = dummy for rural home location, District HQ = distance of home village from the district capital in kilometers. To save space, results are reported only for variables, which are statistically significant in at least one of the columns.

Para-teachers and standard students both clearly prefer a permanent contract over a fixed term contract, but the aversion of rotation is not particularly strong. In fact, para-teachers are indifferent regarding whether the contract includes rotation, as long as the contract is permanent, i.e. (.545-.058)-(.735-.151) is not significantly different from zero ($p = .34$). Standard students on the other hand value a permanent contract without rotation over a permanent contract with rotation ($.735-.545 \neq 0$, $p = .024$).

Both groups clearly prefer jobs where transfers are based on merit rather than connections and influence, and this tendency is particularly strong among the standard students. With respect to class size, the standard students are indifferent in terms of whether they are placed in a school with 14 or 75 pupils per two teachers. Para-teachers on the other hand, actually prefer the larger school ($-.064-.086 < 0$, $p = .003$). Our prior assumption was that the teachers would prefer smaller schools due to a lighter workload, but it may be that

the teachers truly prefer more students in order for their work to have a larger impact. An alternative explanation is that the respondents associate the larger student body with other job features such as a better school building and facilities, as these are not specified in the alternative contracts. The difference in the number of students between the two levels was deliberately large[12], but the choices may have been different had the difference been smaller.

Explaining the differences

The results of the first model suggest that para-teachers and standard students differ in their preferences in some important respects. However, it is important to examine whether these differences are of a fundamental nature or simply due to observable differences that become less significant over the life cycle. For instance, we know from above that para-teachers have considerably more teaching experience, are more likely to be married and have more children than the standard students. To what extent would these differences explain the differences in preferences? Is it possible that in a few years, when normal teachers have gained more experience, and had more children, the preference difference disappears?

Column 3 of Table 4 shows estimates for models that include interaction terms between the job attributes and two "life-cycle" variables, dummy variables for whether the individuals have children and teaching experience. This lowers the number of available observations as not everyone reported all the details on characteristics. Interaction terms with all contract attributes were included, but the estimated coefficients are only shown when they are statistically significant at least at the 10% significance level.

A dummy variable for teaching experience in the private or public sector is included instead of the actual years of teaching experience, as the correlation of the latter with para-teacher status is very strong.[13] Control variables for age and marital status were not highly statistically significant after experience and the dummy for children were included. Column 2 shows the results of the specification in column 1 with the sample used in columns 3 and 4. The changes in the significances of the variables are not large.

A comparison of the estimates in columns 2 and 3 shows that "life-cycle" characteristics explain the difference in preferences between para-teachers and standard students only partly. This conclusion is based on the observation that several of the coefficients on the para-teacher interaction terms still remain statistically significant after controlling for life-cycle factors. The valuation of a contract with rotation as opposed to temporary, and a contract with meritocratic transfers as opposed to ones based on connections, fall with children. Both of these can be consistent with the fact that having children makes moving more difficult, and individuals are less interested in rotation and transfers, and thus become more indifferent

[12] Based on DISE 2008 data, 10% of two-teacher public sector schools in Uttarakhand have 75 students or more, and 10% have 14 students or less.
[13] Care was taken not to include interaction terms that would lead to significant multicollinearity.

between transfer options. Since para-teachers have on average more children, these factors could explain the differences in the preferences of para-teachers and standard students, although in this case their contribution does not appear to be particularly large. The other life-cycle factor examined is teaching experience. The results show that with experience, teachers are more indifferent between home and a remote location, although still prefer home. This can explain partly why para-teachers are more indifferent between home and remote location than permanent teachers, possibly because they have already taught in their home location for a long period. With experience, the valuation of a permanent contract with rotation also rises, although adding this control does not clearly lead to a large change in the interaction term for para-teacher status as one moves from columns (2) to (3).

The model in column 4 of Table 4 shows the results of a model with interaction terms for a larger number of personal characteristics. In addition to the life-cycle variables, all job attribute variables are interacted with a female dummy, the first principle component for skills, a dummy variable for a Masters degree and a dummy for rural home location. In principle, other interaction terms could have been included as well, but their relevance was questionable in particular since there is a risk of significant multicollinearity with an increasing number of interaction terms. Given the number of interaction terms, again only coefficients that are statistically significant at least at the 10% significance level, are shown.

The results show that the preferences of women differ significantly from those of men. However, this is unlikely to explain the differences between the preferences of para-teachers and standard students, since the gender balance is approximately equal in both groups. Women dislike remote locations more than men. They have a significantly higher preference for home location, but also for villages/smaller towns and the district capital as opposed to the base category “Remote village”. This corroborates with our discussions with district level education officials who noted that women are generally less likely to be placed in remote locations. In our sample, women also have a stronger preference for a permanent contract without rotation as opposed to a permanent contract with rotation or a temporary contract. Women value pay slightly less than men, and small class size and meritocratic transfers more. An intuitive explanation cannot be provided for all these differences, but given that women generally have less power in the society the preference for transfers based on merit seems understandable.

Standard students are more educated and the remaining interaction terms show that a Masters degree raises the preference for district capital. A larger share of para-teachers comes from rural areas and a rural home location lowers the preference for district capital or small village/town as opposed to a remote location. The scores of the standard students in the skills test are on average higher than those of para-teachers. A higher score raises the preference for higher pay, home location, the preference for a permanent contract without rotation and meritocratic transfers.

After all of the different characteristics are controlled for, most of the coefficients for the para-teacher interaction terms become statistically insignificant. The exception is the remaining significantly lower preference of para-teachers for meritocratic transfers. This may be explained by the features of the selection process for the para-teachers. Thus, the differences in the preferences of para-teachers and standard students appear to be largely explained by observable characteristic. Differences in teaching experience and family size appear to explain some of the differences. However, rural origin, skills and qualifications also play a clear role in explaining why para-teachers and standard students on average differ in their preferences over job contracts.

Monetary valuations

Finally, the results show that both groups clearly appreciate higher pay and that this tendency is somewhat stronger for standard students. In the model, pay has been measured in thousands of rupees. An additional benefit of estimating the 'preference for money' is that it allows us to compute the monetary equivalents of different job characteristics, based on the estimated utility impacts of the contract features.

At this point it is important to be clear about the assumptions underlying the estimates. Since the utility function is assumed to be linear, the estimates assume perfect substitutability between contract attributes. While this is a simplification, it allows for simple comparisons of contract features. For example, in the case of standard students, an additional 1000 rupees per month increases utility on average by .129, and being located in the district capital instead of a remote village increases utility by .636. These figures suggest that $1000\times(.636/.129) = 4930$ rupees per month would be the amount that would make a teacher equally content with a remote village as with a district capital, assuming that all other job features are similar. The figure of 4930 is of course a ratio of two estimates, and holds some uncertainty. It is also estimated from the whole sample of standard students, and there may be considerable individual differences in how either money or specific locations are valued.

In Table 5 below, the estimated monetary equivalents of different contract features have been computed for both normal, and para-teachers. These sums could be thought of as guidelines on how much attractive job features are worth in monetary terms per month, and consequently how much lower pay teachers would be willing to accept for a job with attractive features. Standard errors are not calculated, but this shows that in monetary terms, both students value merit-based transfers most, followed by home village location and permanent contracts without rotation.

Table 5 Valuations of job attribute levels per month in relation to base category (thousands of rupees)

	Standard students	Para-teachers
Location: Village / Small Town	4,430	4,407
Location: Home village / town	7,896	5,624
Location: District capital area	4,922	0,623
Contract: Permanent, with rotation	4,212	4,836
Contract: Permanent	5,683	5,793
Transfers: Based on merit	8,138	6,429
Pupils and staff: 2 teachers, 14 pupils	-0.494	-1.492

Notes: The estimated valuations are expressed in relation to the base categories, which are: (1) Location: Remote village, (2) Contract: Fixed term contract, renewable every 7 years, (3) Transfers: Based on connections and influence, (4) Pupils and staff: 2 teachers, 75 pupils.

6 Conclusions

Attracting qualified public sector workers to remote locations is a universal challenge for developing, as well as many developed countries. One common policy with regards to teachers, growing in importance in India and elsewhere, is to hire educated locals to run schools in remote places on a contract basis, even if their selection may be based on less stringent criteria.

The use of para-teachers has remained controversial in India, and little is still known about their relative effectiveness, motivation and skills with respect to regular, trained teachers. The few existing studies on the effects of these teachers on pupil outcomes suggest that current para-teachers in schools may outperform existing regular teachers and that para-teachers exert more effort and are absent less often. However, this evidence is still limited and there is little firm evidence on possible reasons for these differences.

This study contributes towards a further understanding of the potential differences between para-teachers and standard students and their potential work motivation. We have provided measurements of two key dimensions for teachers, which typically remain unobservable to researchers: preferences and skills. As far as we know, this is the first study that provides evidence based on a discrete choice experiment on the preferences of regular and para-teachers in India. Rather little has also been written on quantitative measurements of teachers' skills. The measurement of both preferences and skills is bound to be controversial and dependent on assumptions, but they are both likely to be of significance for policy formulation.

The key differences between the preferences of para-teachers and standard students are as follows. Para-teachers do not value the district capital more than a remote village as a place of employment, whereas the standard students value the district capital significantly more. Both types of students have a strong preference to work in their home village, or town, in relation to all other options, but this preference is weaker for para-teachers. In short, para-teachers, who almost all come from rural areas, prefer rural areas in general and standard teachers less so. Higher pay and a permanent contract are valued significantly by both. However, the standard students value pay somewhat more and have a stronger preference for permanent contracts without rotation as opposed to permanent contracts with rotation. Some of the differences can be explained by "life-cycle" factors, namely years of experience and children. However, differences in home location, education and skills explain much of the differences in the preferences between the two groups on average.

In terms of our primary skills measure, the para-teachers perform on average 0.74 standard deviations worse than the standard students selected in a competitive written test. The differences between the two groups were particularly apparent in arithmetic computations. This finding corresponds with results from the SchoolTELLS survey, which measured teachers' subject skills in relation to the expected level required from the students (see e.g. Banerji and Kingdon, 2010). A key implication of the results is that the use of para-teachers is likely to include a considerable trade-off between general skills and the willingness and motivation to work in a more remote location. On the other hand, the variation in skills was broad in both groups. Whether and to what extent the differences in these skills translate into better, or worse, teaching at the primary level may be difficult to assess, but it is unlikely that the differences are irrelevant.

As a counterbalance to lower skills, para-teachers have preferences that might help them adapt better to more difficult locations. Therefore, para-teachers may be more content with the type of employment available in general in the public primary school system in Uttarakhand, and around India. This study shows that as far as preferences are concerned, para-teachers are likely to be more motivated in remote and disadvantaged areas. However, the average difference in general skills could support the practice of providing relevant teacher training for para-teachers as well.

One difference between the preferences of standards students and para-teachers persists, irrespective of control variables in the regression models: standard teachers appreciate merit-based transfers relatively more than para-teachers. In the survey, merit-based transfers were contrasted with transfers based on "connections and influence". This may be because para-teachers have benefited from "connections and influence" in gaining the position as a para-teacher, or the position in the BTC training in the first place. It is not implausible that local hiring procedures are less scrutinized, than centralised ones. However, both students still strongly value meritocratic transfers.

References

Adamowicz, W., Louviere J. and Williams M. (1994). Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities. *Journal of Environmental Economics and Management*, 26(3), pp. 271-292.

Atherton, P. and Kingdon, G. (2010). The Relative Effectiveness and Costs of Contract and Regular Teachers in India, Centre for the Study of African Economies, Working Paper 15.

Banerjee, A.V., Banerji, R., Duflo, E., Glennerster, R. and Khemani, S. (2010). Pitfalls of Participatory Programs: Evidence From a Randomized Evaluation in Education in India. *American Economic Journal: Economic Policy*, 2(1), 1-30.

Banerji, R. and Kingdon, G. (2010). How Sound are Our Mathematics Teachers? Insights from the SchoolTELLS Survey. In Learning Curve. A Newsletter from Azim Premji Foundation, March.

Béteille, T. (2009). Absenteeism, Transfers and Patronage: The Political Economy of Teacher Labor Markets in India. Executive summary of dissertation, Stanford University.
http://blogs.worldbank.org/files/africacan/beteilleexecsummary(1).pdf

Chomitz, K.M., Setiadi, G, Azwar, A. and Widiyarti, N.I. (1998). What Do Doctors Want? World Bank Policy Research Working Paper, 1888.

Duflo, E., Hanna, R. and Ryan, S.P. (2010). Incentives Work: Getting Teachers to Come to School. Mimeo, MIT Economics Department.

Duflo, E., Dupas, P. and Kremer, M. (2009). Additional Resources versus Organizational Changes in Education:Experimental Evidence from Kenya. Mimeo, MIT Economics Department.

Edge, K. (2000). India's District Primary Education Program (DPEP). Decentralization and School-Based Management Resource-Kit Case Studies, World Bank, Washington D.C.

Fyfe, A. (2007). The Use of Contract Teachers in Developing Countries: Trends and Impact. Working Paper, International Labour Office, Geneva

Glewwe, P., Kremer, M., and Ilias, N. (2010). Teacher Incentives. *American Economic Journal: Applied*

Economics, 2(3), 205-27.

Godiyal, S. and Nautiyal, R.C. (2008). Status of Teacher Education in Uttarakhand. E-journal of All India Association for Educational Research (EJAIAER)

Govinda, R. and Josephine, Y. (2004). Para Teachers in India: A Review. UNESCO. Paris.

Goyal, S. and Pandey, P. (2009). Contract Teachers. Report 28. South Asia Human Development Sector, World Bank.

Hanson, K. and Jack, W. (2008). Health Worker Preferences for Job Attributes in Ethiopia: Results of a Discrete Choice Experiment. Unpublished mimeo, Georgetown University.

Kingdon, G. and Teal, F. (2007). Does Performance Related Pay for Teachers Improve Student Achievement? Evidence from India, *Economics of Education Review*, 26(4), 473-86.

Kingdon, G. (2010). The Impact of the Sixth Pay Commission on Teacher Salaries: Assessing Equity and Efficiency Effects, RECOUP Working Paper 29.

Kingdon, G. and Sipahimalani Rao, V. (2010). Para-Teachers in India: Status and Impact. *Economic and Political Weekly,* 45(12), 20-26.

Kremer, M., Muralidharan, K., Chaudhury, N., Hammer, J. and Rogers, F.H. (2005). Teacher Absence in India: A Snapshot. *Journal of the European Economic Association*, 3(2-3), 658-667.

Mangham, L. and Hanson, K. (2008). Employment Preferences of Public Sector Nurses in Malawi: Results from a Discrete Choice Experiment. *Tropical Medicine & International Health*, 13(12), 1433-1441.

Mangham L., Hanson K. and McPake B. (2008). How to do (or not to do) … Designing a Discrete choice Experiment for Application in a Low-Income Country, *Health Policy and Planning*, 1-8.

Mehta, A.C. (2003). Elementary Education in India: Where do We Stand. New Delhi. NIEPA.

Mehta, A. (2004). Elementary Education in India. Where Do We Stand? *DISE Analytical Report 2004.* National Institute of Educational Planning and Administration, New Delhi.

Metzler, J. and Woessman, L. (2010). The Impact of Teacher Subject Knowledge on Student Achievement.

Evidence from Within Teacher Within Student Variation. IZA Discussion Paper 4999.

Muralidharan, K. and Sundararaman, V. (2009). Teacher Performance Pay: Experimental Evidence from India, NBER Working Paper 15323.

Muralidharan, K. and Sundararaman, V. (2010). Contract Teachers: Experimental Evidence from India. Unpublished Mimeo, University of San Diego, Department of Economics.

Pandey, S. (2006). Para-teacher scheme and quality education for all in India: policy perspectives and challenges for school effectiveness, *Journal of Education for Teaching: International Research and Pedagogy*, 32(3), 319-334.

Pandey, S. and Raj Rani (2003). Professional Support Systems and Classroom Performance of Para Teachers. New Delhi, NCERT.

Penn-Kekana, L., Blaauw, D., Tint, K.S, Monareng, D. and Chege, J. (2005). Nursing Staff Dynamics and Implications for Maternal Health Provision in Public Health Facilities in the Context of HIV/AIDS. UN Population Council.

Ramachandran, V., Pal, M., Jain, S., Shekar, S. and Sharma, J. (2005). Teacher Motivation in India. Educational Resource Unit India.

Ramachandran, V. (2008). What is 'Para' about Some Teachers? Educational Resource Unit, New Delhi.

Ratcliff, G., Ganguli, M., Chandra, V., Sharma, S., Belle, S., Seaberg, E. & Pandav, R. (1998). Effects of literacy and education on measures of word fluency. *Brain and Language*, 61, 115–122.

Rosselli, M., Ardila, A., Salvatierra, J., Marquez, M., Matos, L. & Weekes, V. A. (2002). A cross-linguistic comparison of verbal fluency tests. *International Journal of Neuroscience*, 112, 759–776.

Serneels P., Lindelöw M., Garcia-Montalvo J. and Barr, A. (2005). For Public Service or Money Understanding Geographical Imbalances in the Health Workforce. World Bank Policy Research Working Paper 3686.

Serneels, P., Montalvo, J.G., Pettersson, G., Lievens, T., Damascene Butera, J. and Kidanu, A. (2010).. Who Wants to Work in a Rural Health Post? The Role of Intrinsic Motivation, Rural Background and Faith-Based Institutions in Ethiopia and Rwanda. *Bulletin of the World Health Organisation*, 88, 342-349.

Sharma, R. (1999). What Manner of Teacher - Some Lessons from Madhya Pradesh. *Economic and Political Weekly*, June 19, 1999.

Street, D., Burgess, L. and Louviere, J. (2005). Quick and Easy Choice Sets: Constructing Optimal and Nearly Optimal Stated Choice Experiments. *International Journal of Research in Marketing*, 22, 459-470.

Thurstone, L. L. (1938). Primary mental abilities. Chicago: University of Chicago Press.

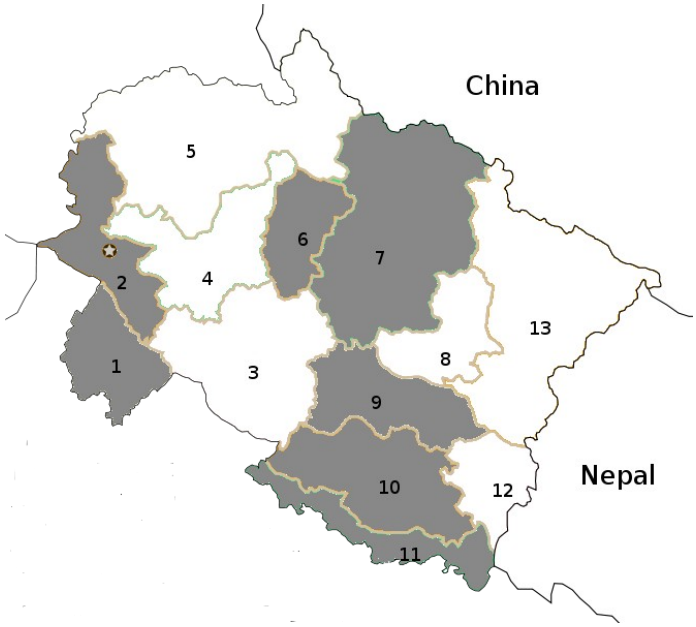
WHO (2006): World Health Report 2006: Working together for health. Geneva: World Health Organization.

Wibulpolprasert S. and Pengpaibon P. (2003). Integrated strategies to tackle the inequitable distribution of doctors in Thailand: four decades of experience. *Human Resources for Health*, 1(12).

APPENDIX 1 DATA COLLECTION

The research team visited the teacher training centres (DIETs) of 7 districts out of 13 in the state in May 2010 (see Figure A1). 120 forms were printed for each school with the aim of randomly sampling 50% of both standard students and para-teachers from each district, or roughly 50+50 from each district. Table A1 shows the final sample sizes, and how the selection of students was carried out.

Figure A1 Sampled districts of Uttarakhand



Notes: The sampled districts are shaded. (1) Haridwar, (2) Dehradun, (3) Tehri Garhwal , (4) Tehri, (5) Uttarkashi, (6) Rudraprayag, (7) Chamoli, (8) Bageshwar, (9) Almora, (10) Nainital, (11) Udham Singh Nagar, (12) Champawat, (13) Pithoragarh

District Information System Data (DISE)

Data on schools of Uttarakhand referred to in a few occasions was obtained from the DISE 2008 database. The data was provided by National University of Educational Planning and Administration in Delhi (NUEPA).

Table A1 Sample size and notes on data collection

District	Sample sizes: Standard students	Sample sizes: Para-teachers	Randomisation	Notes on conditions
Almora	43	49	Randomised from student register	Students had chairs, no tables
Chamoli	62	56	Questionnaires distributed in classrooms in random fashion	Standard students had chairs, no tables. Para-teachers sat on the floor.
Dehradun	51	41	Randomised from student register	Most students had tables and chairs, some just chairs
Haridwar	63	43	Randomisation by staff, criteria unknown	Students had chairs, no tables
Nainital	50	47	Randomisation by staff, criteria unknown	Students had tables and chairs
Rudraprayag	86	0	All standard students present were included. Only 8 para-teachers in the school, so not covered.	Students had chairs, no tables
Udham Singh Nagar	71	42	All standard students present were included, and half (1 classroom out of 2) of para-teachers covered.	Students had tables and chairs

APPENDIX 2 SKILLS TESTS

As part of the survey, the teacher students filled a three-part timed skills test. The parts are referred to here as Countries, English and Arithmetic. The test was designed so that it would not consume much time and would be easy to implement, fast to mark, and would leave as little room as possible for cheating.

In the 'Countries' test, the students had to write down as many countries as they could in 90 seconds. They could use any language they wished, and most used Hindi, while some used English. The students were not told that they should write down the names of countries prior to the beginning of the test, but simply "items from an announced category". An example using animals was given. The scoring of the test was based on the number of items written down, regardless of whether they were real countries or not.[14] The average score across 704 responses was 16.03, with a standard deviation of 4.4 and a range of 3 to 33. The 'Countries' test would be classified in research literature as a test of semantic fluency. The origins of such a test can be traced to Thurstone's Word Fluency Test for verbal ability (Thurstone, 1938). It may be useful in examination of, for example, language, executive functioning, and speed of information processing. It has been found that education and age have an impact on the number of items written down, whereas gender usually as only a small effect (Ratkcliff et al 1998). In our context, this can be seen as a test of general knowledge, verbal skills, and a proxy for the quality of education.

In the 'English' test, the students had to first write down as many English words beginning with an "F" as they could in 60 seconds, and next, as many beginning with an "S" as they could in 60 seconds. The scoring was based on the average number of proper nouns for the two letters, allowing for minor spelling mistakes. Numbers only up to 10 ('Four', 'Five', 'Six', 'Seven') were accepted. The correlation between the two sets of produced words was 0.74 across 702 respondents. The average combined score was 9.96 with a standard deviation of 3.82. Further details are shown in Table A2 below. The 'English' test has a similar origin as the 'Countries' test as a measure of verbal fluency, but it is typically applied to people in their native language. As in our case virtually all respondents are native Hindi speakers, the tests serve as an ad-hoc test for English skills (for discussion on mono- and bilingual respondents, see Roselli et al, 2002).

[14] This scoring method was based on convenience of not having to go through hundreds of responses in two languages. Based on responses given in English, this does not appear to be a concern – only a few respondents gave occasional responses that were not actual countries, such as "Rome" or "Taliban".

Table A2 Scores for the English vocabulary tests.

	Obs	Mean	S.D.	Min	Max
English-F	702	10.28	3.90	0	24
English-S	704	9.62	4.29	0	24
Average	702	9.96	3.82	0	22

Correlation of F and S = 0.7364, 702 obs.

The 'Arithmetic' test consisted of 40 calculations based on addition, subtraction, multiplication and division, at an increasing order of difficulty. The problems should be relatively easy for a person who is familiar with and seasoned in arithmetic computations, such as primary school teachers. The respondents were given 4 minutes to answer as many as they could. They were not allowed to use a calculator, but could use scrap paper and a pen to perform the calculations. The average number of solved calculations for 696 responses was 27.71 with a standard deviation of 8.64. The scores ranged from 3 to 40. 16 respondents achieved the full score of 40.

Table A3 Summary scores of the three skills components

	Obs	Mean	S.D.	Min	Max
Countries	704	16.04	4.40	3	33
English	702	9.96	3.82	0	22
Arithmetic	696	27.71	8.64	3	40

Table A4 Correlations over the skills measures (obs=694)

	Countries	English
English	0.40	
Arithmetic	0.47	0.51

A principal component analysis of the skills measures was carried out. The first principal component was constructed and normalised to have a mean of zero and a standard deviation of one. This is the primary measure of skills used in the paper.

Table A5 Correlation of the 1st principal component with the tests

Subtest	**Correlation with 1st PC**
Arithmetic	0.83
English	0.80
Countries	0.77

Figure A2 Distribution the test scores and the 1st principal component.

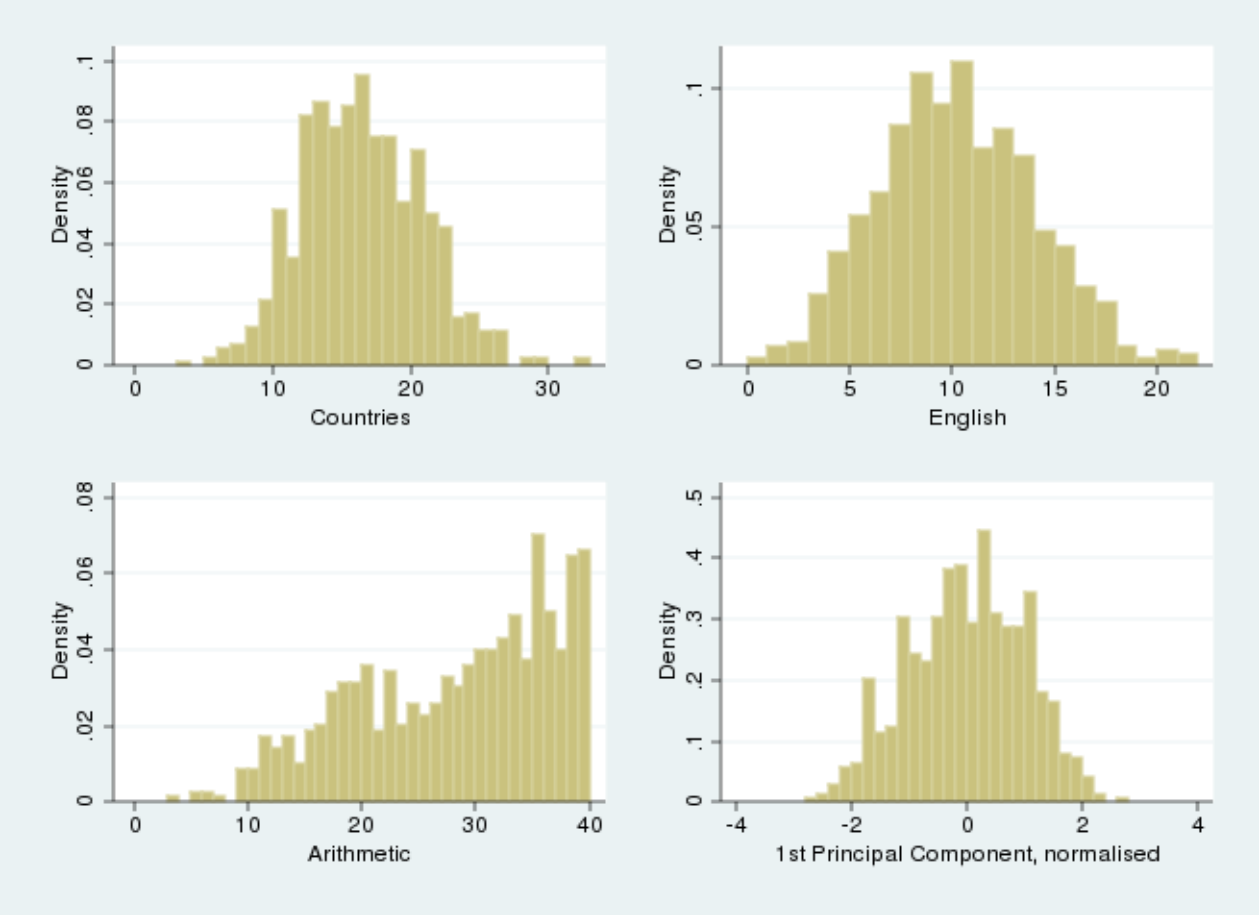


Figure A3 Test for Arithmetic

Time allowed: 4 minutes. / समय: 4 मिनट

Solve as many as you can. Calculators are not allowed.
आप जितने अधिक प्रश्न हल कर सकते हों, करें। कैलकुलेटर के प्रयोग की अनुमति नहीं है।

16 + 25	= _____	632 + 244	= _____
14 + 87	= _____	522 – 245	= _____
34 – 15	= _____	366 + 241	= _____
43 – 17	= _____	753 – 283	= _____
87 – 53	= _____	279 + 245	= _____
62 + 52	= _____	846 – 639	= _____
42 – 29	= _____	247 + 473	= _____
59 + 31	= _____	472 – 183	= _____
32 + 17	= _____	652 + 573	= _____
87 – 74	= _____	470 – 265	= _____
18 : 3	= _____	42 * 11	= _____
6 * 7	= _____	22 * 7	= _____
80 : 5	= _____	240 : 15	= _____
4* 13	= _____	492 : 12	= _____
5 * 13	= _____	37 * 21	= _____
52 : 4	= _____	44 * 52	= _____
23 * 3	= _____	861 : 3	= _____
96 : 4	= _____	536 : 8	= _____
66 : 3	= _____	27 * 67	= _____
43 * 3	= _____	72 * 86	= _____

Notes: The actual size of the test was A4.

APPENDIX 3 DESIGN OF DISCRETE CHOICE EXPERIMENT

In this study the job contracts have five attributes, and the attributes have up to four levels as follows:

a) Pay: 0 - “Rs. 13000 per month”, 1 - “Rs. 17000 per month”, 2 - “Rs. 21000 per month”
b) Location: 0 - “Remote village”, 1 - “Village / Small town”, 2 - “Your home village / town”, 3 - “District capital area”
c) Contract: 0 - “Fixed term contract, renewable every 7 years”, 1 - “Permanent, must transfer every 7 years, 2 – “Permanent, possibility to transfer after 7 years”
d) Transfers: 0 - “Depend on connections and influence”, 1 - “Depend on merit”
e) Staff and pupils: 0 - “2 teachers, 14 pupils”, 1 - “2 teachers, 75 pupils”

Thus, there are total of 144 possible contracts arising from combinations {a0,a1,a2}×{b0,b1,b2,b3}×{c0,c1,c2}×{d0,d1}×{e0,e1}. Further, there are a total of (144*144-144)/2 = 10296 possible contract pair comparisons.

Out of the 10296 possible contract pairs, 12 pairs were selected using the principles from Street, Burgess and Louviere (2005) as guidance.

Out of the 144 possible contracts (full factorial), a fractional factorial of 24 contracts is first selected. This is a sub-group for which the levels of attributes are orthogonal. These 24 contracts are shown in Table A6.

Combining the 24 contracts into 12 pairs randomly should produce unbiased estimates of the β and δ parameters in equation 3. However, random choice is likely to produce a design with very low efficiency, or large standard errors for the estimated parameters. In the literature on DCEs, some methods for obtaining efficient pairings have been discussed for instance by Street et al. (2005) and Burgess and Street (2005). It has also been argued that sample size can substitute for a poor experimental design (Lusk and Norwood 2005). In any case, the ‘optimality’ of any design can be challenged if assumptions, such as the absence of interaction effects for the X variables, fail.

Table A6 24-Fractional factorial. Contract number and attribute levels

#	a	b	c	d	e
1	0	0	1	0	0
2	0	0	1	1	1
3	1	0	0	1	1
4	1	0	2	0	0
5	2	0	0	0	1
6	2	0	2	1	0
7	0	1	0	1	0
8	0	1	2	0	1
9	1	1	0	0	0
10	1	1	2	1	1
11	2	1	1	1	0
12	2	1	1	0	1
13	0	2	1	0	0
14	0	2	1	1	1
15	1	2	0	1	1
16	1	2	2	0	0
17	2	2	0	0	1
18	2	2	2	1	0
19	0	3	0	1	0
20	0	3	2	0	1
21	1	3	0	0	0
22	1	3	2	1	1
23	2	3	1	1	0
24	2	3	1	0	1

In this study, 12 contract pairs were selected from the 24 contracts using a 'Monte Carlo' type approach: The 24 contracts were combined into 12 matched pairs repeatedly (10000 times) by an algorithm that attempted to minimise the overlap of attribute levels between pairs as recommended by Huber and Zwerina (1996). The algorithm involves randomly pairing a contract with another contract with a minimal overlap of attribute levels, and continuing the pairing until all contracts are paired.

In the next step, a set of the resulting "low-overlap" pairings (i.e. different sets of 12 pairs) was used to simulate choices for 500 respondents with identical utility functions (corresponding to the random utility model).[15] Thus for each pairing, 500*12 = 6000 artificial choices were created. These choices were then predicted with a Logit model, and the precision of the estimates was evaluated (the larger the determinant of the information matrix, the more precise). Finally, out of the evaluated pairings, the pairing with the most precise estimates was selected.

[15] It was assumed that each level improvement within an attribute increases the utility by the same amount compared to the lower level (with reference to Equation 3, fixed term contract gets δ=1, permanent with rotation gets δ=2, Permanent without rotation δ=3 and so on).

The final selected pairings of contract numbers are as follows:

(16,5), (9,1), (24,7), (15,6), (10,17), (12,19), (22,18), (21,2), (4,14), (11,20), (3,13), (23,8)

When repeated, the method may arrive at different final pairings due to the partial randomness of the process, and the fact that not all possible combinations are evaluated (given the large number). However, the selected pairings should produce fairly efficient estimates.

Figure A4 Sample page of the DCE

1) Please consider the following job opportunities:/कृपया निम्नलिखित नौकरी के अवसरों पर विचार करें:

	Job A
Pay वेतन	Rs. 17000 per month 17000 रुपए प्रतिमाह
Location स्थान	Your home village / town आपका गांव / कस्बा
Contract नौकरी का अनुबंध	Permanent, possibility to transfer after 7 years स्थाई, और 7 वर्ष बाद स्थानातंरण की संभावना
Transfers स्थानांतरण	Depend on connections and influence सिफारिश और पहुंच पर आधारित
Staff and pupils स्टाफ और छात्रों की संख्या	2 teachers, 75 pupils 2 शिक्षक, 75 छात्र

	Job B
Pay वेतन	Rs. 21000 per month 21000 रुपए प्रतिमाह
Location स्थान	Remote village कोई दूरस्थ गांव
Contract नौकरी का अनुबंध	Fixed term contract, renewable every 7 years निश्चित अवधि का अनुबंध, जिसका हर 7 वर्ष बाद नवीकरण किया जा सकता ह
Transfers स्थानांतरण	Depend on connections and influence सिफारिश और पहुंच पर आधारित
Staff and pupils स्टाफ और छात्रों की संख्या	2 teachers, 14 pupils 2 शिक्षक, 14 छात्र

Given a choice, which of the above opportunities would you choose? Please circle:

Job A / Job B

यदि आपको अपनी पसंद चुनने का विकल्प दिया जाए, तो ऊपर दिए गए अवसरों में से आप किसे चुनेंगे? कृपया नीचे अपनी पसंद पर गोले का निशान लगाएं:

नौकरी A / नौकरी B