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Redistributing teachers using local transfers

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ABSTRACT

In this paper we show that local redistribution of educational resources via teacher transfers between neighboring public schools can improve equity in access to teachers. Transfers from teacher surplus schools to deficit schools within a 10 km radius in Haryana, a state of India for which we have geo-coded location of schools in 2013, enables 19 percent of deficit schools to meet the minimum requirement. We use the mandated norms in the Right to Education Act in India, to define deficit and surplus schools. In the process we also provide a characterization of schools that are in deficit and those in surplus. We find that connectedness, the social composition of the enrolled students, the income of the neighborhood are important determinants of a school being in deficit. Surplus schools mirror the results on deficit, but not always so: they are far more heterogenous, leading to possibilities that they may in fact be no different than some low shortage deficit schools. Keeping in the background this heterogeneity in surplus schools, we design local transfers between schools and evaluate them on how well they match characteristics of the donor and recipient schools. The chosen algorithm is compared to another transfer rule that reduces the variance of shortages across schools and is found to be better in matching characteristics, that is, the donor and recipient schools are, on an average, matched in characteristics: in terms of the development of the region, its rural/urban location, connectivity and school characteristics. A comparison of transfers that follow our redistribution rule to transfers resulting from an actual transfer policy shows that while our rule removes deficits in rural areas, the actual transfers favored more developed regions.

1. Introduction

As countries move to set new targets for education parameters as a part of the Sustainable Development Goals (SDGs), they are fettered by two persistent problems in schooling outcomes: the quality of primary education[1] and the inequity in access to schools and school inputs. In this paper, we address inequity of access to teachers among those enrolled in public primary schools and suggest a way to redress this shortage in the short run. We focus on India as it ranks poorly on Pupil Teacher Ratios (PTR). In 2014–2015, 27.35 percent of primary schools in India had more than 30 students per teacher (DISE, 2015).

The inequity in access to teachers in the public schooling system can be addressed by recruitment of teachers, by consolidation of multiple schools into one big school and by teacher transfers.[2] Mass recruitment requires larger public funds[3] whereas consolidation increases distances students may have to travel. Hence, we focus on the third mechanism: teacher transfers. Redistribution of teachers has been attempted all over the world and is still considered an important part of education policy.

The main problem with redistribution policies is that teachers prefer not to be posted in remote rural places (Fagernas & Pelkonen, 2012; Kremer, Muralidharan, Chaudhury, Hammer, & Halsey Rogers, 2005). Hence, a patronage-based system exists where powerful politicians and bureaucrats oblige politically-helpful teachers with transfers of their choice, regardless of school need, and punish disobedience with undesirable transfers

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[1] See, for example, the vast literature on the impact of teacher incentives on quality of primary education: Lavy (2009), Muralidharan and Sundararaman (2011), Glewwe, Ilias, and Kremer (2010).

[2] The transfer of teachers to correct imbalance in the distribution of teachers is technically referred to as rationalization. In principle, teacher transfers can also take place due to other reasons: preference of teachers or administrative concerns. When we refer to teacher transfers in this paper, we are referring to rationalization.

[3] Moreover such appointments are intertwined with a debate on what form of hiring is optimal: contractual or permanent (Muralidharan & Sundararaman, 2013).

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(Sharma & Ramachandran, 2009).[4] This often leads to schools in remote places to be deficit in teachers (Mehrotra, 2006).

In this paper we acknowledge such frictions and try to work around them by suggesting rule-based local transfers. These transfers are based on the rule that all teacher redistribution has to take place within a pre-specified distance cut off (5–10 km in this paper) and they must involve the re-allocation of a teacher from a school that has "surplus" teachers to a school that is "deficit" in teachers (we return to this later). Such local transfers have two attractive features: First, for those teachers whose current school posting is driven by a desire to work in a particular area, local transfers may be more palatable and the push back on transfers may be lower. For example, if teachers work in an urban area, then a displacement of 5 to 10 km is likely to keep them within the urban zone and may be acceptable whereas a transfer to a remote rural school or another district in the state may be opposed. In so far as teachers need to invest in a living arrangement that is compatible with their workplace, such local transfers may be least disruptive leading to less opposition and consequent lobbying to oppose such transfers. Second, in so far as development often takes place in clusters, such local transfers may move teachers between schools that match on important dimensions: for example, development of the region and connectedness.

We design transfer rules based on different objectives and show that in all cases the effect of our transfer rules on the distribution of teachers is not negligible. However, while such rule-based transfers make the system transparent, teachers may still oppose them, even though the transfer is local. Acknowledging that, we evaluate teacher transfer rules in terms of how well they match, on various characteristics, the source and destination schools of the transferred teachers. The implicit assumption is that if schools match on observable characteristics, they are equivalent for teachers as long as they are in the same neighborhood.

The specific context of India is important as India has undertaken a significant reform in its education system through the Right to Education Act in 2009 (RTE). This act calls for teacher transfers to redress problems of inequity in access to teachers. There is mixed evidence, though, on the impact of such policies. In India, Operation Blackboard (OB), a central government program launched in 1987, lead to a de facto redistribution of teachers from larger schools to one-teacher schools.[5] While such a program had positive effects on the children's attendance outcomes, only one quarter of the OB teachers were in fact sent to the intended place (Chin, 2005). The problem of such misallocation of teachers is also well documented in other developing countries in Africa (Mulkeen, 2006) and increases the cost of teacher redistribution.

In the context of this paper, the concept of surplus and deficit are derived from mandated pupil-teacher ratio (PTR) requirements under the RTE Act. The act states that there needs to be no less than 2 teachers for a school with 1–60 students, no less than 3 teachers for a school with 61 to 90 students, no less than 4 teachers for a school with 91 to 120 students, no less than 5 teachers for a school with 121 to 200 students and that the school should maintain a pupil teacher ratio of 40 if it has more than 200 students.[6] We classify schools that do not meet the minimum teacher requirement under RTE Act as "deficit" schools, whereas "surplus" schools as those that would meet the mandated requirement even if some teachers were transferred out.

We provide results from various possible redistributions using data on the census of public primary schools in Haryana, a northern state of India for which detailed geocoded location of all schools is publicly available. In 2013, 32.6 percent of government schools did not meet the PTR as mandated by the Right to Education Act. We design redistribution rules in the state using four algorithms. While all four algorithms are local, they differ in the protocol of how the transfers are sequenced and have different objectives. The first two algorithms attempt to reduce the proportion of schools that are deemed to be in deficit. The difference between the two algorithms is that while one of them specifies that transfers should take place first between the most surplus schools and the schools that have the least shortage of teachers, the other algorithm specifies that transfers should take place first from schools that have the least surplus to schools with the lowest deficits. The first algorithm is motivated by the assumption that schools with the largest surplus may be least affected by transfers of teachers. The second algorithm is motivated by the consideration that the schools with the least surplus may be closest in characteristics to schools with least shortfalls, hence similar. The third algorithm minimizes the variance of shortage across schools and this is achieved by transferring teachers from schools with highest surplus to schools with highest shortfall. An underlying assumption in this paper is that for the algorithms to be practical, the source and destination school should not be too different. Hence, we evaluate the algorithms on the basis of whether, on an average, the source and destination schools match each other in terms of characteristics. In addition, we compare the aforementioned three algorithms to a fourth one, where the destination school is matched to a source school, on the basis of observable characteristics (classrooms, toilets, qualification of teachers, proportion of students who belong to disadvantaged communities, and age of the school).

With the matching criterion in mind, we show that our best algorithm is one where transfers take place from the most surplus schools to the least deficit schools. We find that on important dimensions: connectedness of the school, development of the area around the school, location (whether it is in the rural district), school infrastructure, demographics of the students and the qualification of the teachers, there is no statistical difference between the source and the destination school. Thus, this local redistribution mechanism may make a large number of transfers palatable by not changing drastically the environment in which teachers currently work.

Using this algorithm, we show that transfers within 5 km result in a 14 percent reduction in the proportion of deficit schools (422 schools out of 3041 deficit schools meet the law post transfer). At the 10 km range, almost 19 percent of the deficit schools meet the minimum teacher requirement (the corresponding number of schools is 568). This is a considerable decrease in deficit schools without new recruitment and results in extra teachers to 71,395 students in the deficit schools.

It may be contended that while government redistribution rules are opaque, education departments do follow such kind of rules. To examine this, we contrast results of the local redistribution mechanism suggested by our paper to a real transfer policy that was carried out in the same state after 2011. Fixing school enrolments at their 2011 level, we find that while the actual redistribution may have resulted in 26 percent of the deficit schools meeting the PTR requirements (by 2013), a 5 and 10 km redistribution would have addressed the deficit in a larger proportion of schools (38 and 48 percent respectively). Moreover, while the actual policy resulted in a larger proportion of deficit schools meeting the threshold in developed areas, the local redistribution rule

[4] Beteille (2009), in her study of 2340 public school teachers, across 930 randomly selected schools in selected districts of three states of India (Rajasthan, Madhya Pradesh and Karnataka) found that in every district over 50 percent of teachers agreed that if a teacher wanted to be transferred, he/she would need connections. Moreover, over 30 percent of teachers in every district agreed that they would still have to pay some money to get the posting they want. These concerns are not restricted to India.

[5] Operation blackboard paid for 140,000 teachers to be appointed to one-teacher primary schools. However, the policy turned out, de facto, to be a redistribution as the average number of teachers per primary section did not increase (Chin, 2005).

[6] The number of students refers to enrolled students.