ISSN No. 2454 – 1427

CDE
February 2017

Poverty Targeting Through Public Goods

Anders Kjelsrud
Email: a.g.kjelsrud@econ.uio.no
University of Oslo

Rohini Somanathan
Email: rohini@econdse.org
Department of Economics
Delhi School of Economics

Working Paper No. 271

http://www.cdedse.org/pdf/work271.pdf

CENTRE FOR DEVELOPMENT ECONOMICS
DELHI SCHOOL OF ECONOMICS
DELHI 110007

Poverty Targeting Through Public Goods

Anders Kjelsrud and Rohini Somanathan

1. Introduction

Although a large fraction of India's rural population lacks access to basic schooling and health care, a rising share of the government budget is allocated to programmes that are restricted to families classified as poor. We know relatively little about how per capita benefits from these targeted programmes compare with those from free or subsidized services at public institutions. This chapter is aimed at such a comparison. We impute the value of benefits to rural families using public schools and health facilities, and compare them to the gains from subsidized fuel and food from the Public Distribution System (PDS). Although our interest is in examining the extent of targeting implicit in these different forms of public spending, our methods can also be used as part of a new methodology for poverty estimation that includes these benefits in measures of household consumption. Poverty lines and estimates based only on private consumption expenditures understate regional disparities in real consumption and poverty because the richer states typically also provide better public services.

In national accounts, government expenditures are used to measure the value of public spending. These expenditures grossly overestimate the value of services received by Indian households because the public education and health sectors are characterized by high salaries, absenteeism, corruption and multiple other inefficiencies. The low quality of public services is reflected in rising private school enrolment and sizable out-of-pocket health expenditures. Twenty-five per cent of children in rural India attend private schools despite their modest means. We provide an alternative approach to estimate the value of public in-kind transfers in which benefits from publicly provided goods are estimated using household willingness to pay for comparable private alternatives.

We rely mostly on data from several National Sample Survey (NSS) rounds. In addition to the widely used consumption survey—conducted every five years—the NSS periodically collects specialized data on other aspects of household behaviour. We use the consumption survey of 2004–05, the survey on educational participation

and expenditures of 2007–08, and the NSS Survey on Morbidity and Health Care from 2004. For health care, we supplement the NSS data with the Indian Human Development Survey (IHDS) from 2004–05 because outpatient services and expenditures are not available through the NSS. All four surveys record total household expenditures and we use these as a measure of the economic standing. In addition, we use test score data for students attending private and public schools to find a set of private schools in each state that are comparable to public schools.

Our strategy is as follows: We first construct consumption quintiles based on the household expenditures and then, for each quintile, we compute implicit benefits from public schooling, health and the PDS by using prices on comparable goods and services. Expenditure quintiles are constructed within each state, so, the first quintile consists of the poorest 20 per cent of households in every state, not the poorest in the country as a whole. Since the efficiency of public spending varies considerably by state, this provides us with a better picture of targeting and does not confound it with state-effectiveness. Using consumption as a proxy for income is problematic because it is influenced by the availability of public goods, and underestimates the real consumption of families with access to public amenities relative to those without. The NSS surveys do not collect income data so we have little choice in this matter. Since transfers are small relative to differences in per capita consumption across quintiles, we hope that these errors of measurement do not affect the quintile in which most households are placed.

For subsidized food grains and kerosene obtained through the PDS, we compute the value of implicit transfers as the difference between what households would have spent for these commodities in the market and what they actually spent. To minimize measurement error resulting from quality variations in purchased grain, we use the difference between median market prices and median PDS prices within states, separately for the three officially defined poverty categories (non-poor, poor and ultra-poor). A majority of households consuming grains through the PDS also purchase the same type of grains in the regular market because allocations are either inadequate or erratic, so this might reasonably approximate the real value of the transfer.

Estimating the value of public schools is more difficult, since most families choose private schools over local public schools because of their higher quality. We would ideally like to use expenditures on private schools that are of a roughly comparable quality to public schools. We identify these based on the performance of children in standardized tests. Each year, the Annual Status of Education Report (ASER) is based on tests administered to about seven hundred thousand children. Since all children in the surveyed households are given the same test, irrespective of the type of school they attend, these tests allow us to construct a comparison group for public school students. For each state, we use the ASER data for 2008 to identify the quintile of the private school test distribution that contains the median score of public school students. We then use the average expenses on private schools for this quintile minus the median expenses of public school attendees as an estimate of the transfer through public schooling.

For health services, we do not have clear outcome measures that can be used to calibrate transfers in this manner. Hospitalization costs vary substantially by ailment, and we compute the difference between median private and public expenses separately for thirteen ailment categories reported in the NSS. Outpatient care is mainly for minor illnesses, and costs vary less systematically by ailment. Because of this and since the IHDS sample is smaller than the NSS sample, we combine all types of outpatient care and use the median difference between private and public expenses.

Our main finding is that transfers through public schooling are more progressive than those through the PDS. This is consistent with studies from a number of countries that show that public amenities tend to be more beneficial to the poor than direct transfers.[1] This is partly because the PDS provides basic marketable goods, and households have little incentive to opt out. With schooling, households cannot simultaneously attend both types of schools, and richer households are more likely to choose private alternatives. Differences in household demographics by income also contribute to making public schooling progressive. Poorer households are larger and have a higher ratio of school-aged children.[2] These demographics do not result in

[1] See Van de Walle and Nead (1995) for a review of public spending and the implications for the poor.
[2] The estimates of monetary gains are presented in per capita terms. We obtain similar results using standard equivalence scales.

higher transfers through the PDS because quotas during this period were fixed at the household level and not in per capita terms. Public health care transfers are similar across different quintiles, mainly because government health spending remains very low. Health centres are scarce and only a small fraction of the population has easy access to government doctors.

The next section summarizes trends in the availability of public schools, health centres and the PDS over the period 1991–2001 in order to provide some context for the subsequent analysis. The following sections focus on utilization rates and our estimates of per capita benefits for each public programme. We conclude with comments on regional patterns and on the types of data that can improve future estimates of implicit transfers using our methods.

2. Trends in Coverage

State priorities across different forms of spending are reflected in the budget shares shown in Figure 1. Education expenditures constitute a little over 3 per cent of GDP, and about 80 per cent of this spending is by the state governments. Health spending at 1 per cent of GDP is very low by international standards. It is 3 per cent of GDP in China, and more than 8 per cent in the United States.[3] Subsidies have more than doubled their share of GDP over the past two decades, going from 1 per cent during the mid-1990s, to about 2.5 per cent in 2012. These include fertilizers, fuels and food transfers through the PDS. These spending patterns are reflected in the physical access to the three programmes we are interested in.

[3] We extract these numbers from the World Bank Databank.

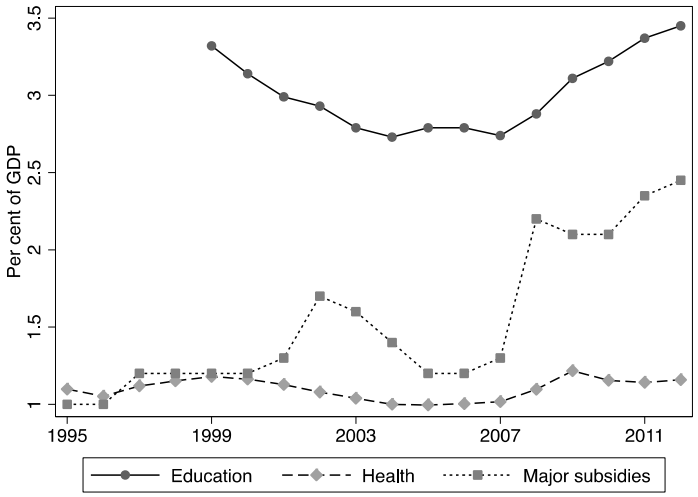

Figure 1: Government expenditure as a fraction of GDP

Sources: Education expenditures are from the Government of India (2014), health from the World Health Organization, and major subsidies from the Indian Economic Surveys.

Historical data on village access to public goods are available in the village directories published as part of each Indian census since 1961. Although the coverage in 1961 is patchy and the amenities listed vary by state, these data suggest that about 40 per cent of villages had primary schools and only 2 per cent had health centres. Starting in 1971, the recording of these data became standardized, making it easier to track access to public amenities. Between 1971 and 1991, many types of physical and social infrastructure expanded rapidly. Over these two decades, the fraction of villages with primary schools increased from about 50 to 75 per cent, and those with high schools doubled, from 4 to 8 per cent. Health access remained very low, with less than 2 per cent of villages having a health centre or hospital in 1991 (Banerjee and Somanathan, 2007).

The changes since 1991 are shown in Table 1. As in the previous two decades, school coverage increased much faster than health. By 2011, over 80 per cent of villages had a primary school and 15 per cent had a high school. In contrast, only 4 per cent had a primary health centre, the smallest public facility with a doctor. Village-level primary health sub-centres did increase, but these facilities do not have the personnel or the equipment to treat major ailments. Until 2011, the village directories did not distinguish between private and public facilities. Health centres and sub-centres are

official categories within the public health system, but schools can be either public or private. In 2011, public and private facilities were separately listed for all amenities and we report only public schools for that year. Very few villages have private schools but no public school in 2011, suggesting that the figures for 1991 and 2001 do reflect access to public facilities but we cannot be sure of this. This is one reason for our presenting figures on the fractions of villages with schools rather than the average number of schools per village.

	1991	2001	2011
Schooling			
Primary	0.74	0.78	0.81
Middle	0.23	0.30	0.44
High	0.08	0.11	0.15
Health care			
PHC	0.03	0.04	0.04
PHS	0.07	0.12	0.18

Table 1: Expansion of public services, unweighted village shares

Source: Census village directories, different years

The PDS was first started in 1939, in response to war-related food shortages. Its original objective was to provide food security in periods of acute scarcity and rising prices. Under the system, the government procures grain from farmers and traders, and sells it to households through 'fair price shops'. Thereby, the system provides both consumers and producers subsidies by pushing up market prices through procurement and by subsidizing purchases. The PDS has now reached a staggering scale with about 4,00,000 fair price shops reaching 160 million families, with about 10 per cent of total food production going through this system.[4]

The functioning of the distribution system has been riddled by corruption resulting in high costs and low benefits. Over time, attempts have been made to improve geographical outreach to tribal and remote areas and, in 1997, the PDS officially

[4] The figures for shops and families are taken from the current government website epds.nic.in and the food production share from Mooij (1998).

became a targeted programme, with prices and allocations determined by the poverty category in which a household was classified. Most states introduced different coloured ration or entitlement cards for the different levels of disadvantage. The categories were initially simply APL and BPL (above and below the poverty line, respectively). In 2004, the Antyodaya Anna Yojana (AAY) was launched to provide ultra-poor in each village with higher allocations. Subsidies to APL households have been gradually phased out. The Central government provides most of the funding for the PDS through its grain procurement and storage network and the states are responsible for transport and distribution.

Figure 2 uses data administrative data on grain allocations from the Central government and the amounts lifted by the states. Allocations rose slowly during the 1990s and then rapidly during the early of the following decade. Offtakes by the states did not keep pace and this probably led to the subsequent cutback in allocations. Notwithstanding this decline, both allocations and offtakes doubled between 1991–92 and 2011–12. The overall effectiveness and outreach of the distribution system seems to have improved in recent years, especially in the previously underperforming states of Bihar, Chhattisgarh and Odisha (Drèze and Khera 2013, 2015; Himanshu and Sen 2013).

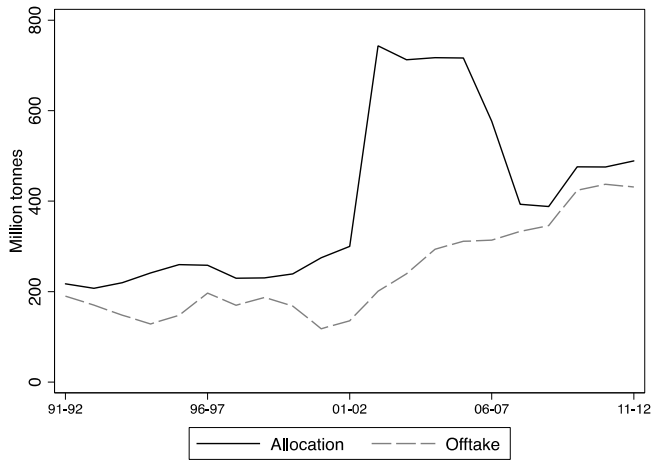

Figure 2: Annual allocations and offtakes of PDS grains

Source: Published data, Ministry of Consumer Affairs, Food and Public Distribution.

3. Utilization Rates

The distribution of implicit transfers from public programmes depends on access and eligibility, utilization rates, and the quality of goods and services on offer. In this section, we present utilization rates for within-state consumption quintiles. We use the terms consumption and income interchangeably in the following discussion since we view the former as a proxy for the latter and it is the income elasticity of transfers that we are interested in. The sets of households that are represented by these quintiles may vary slightly since our analysis combines surveys and samples for multiple years. Transfers for the PDS are based on the NSS Consumer Expenditure Survey of 2004–2005, those for education on the NSS Participation and Expenditure in Education Survey of 2007–08; hospitalization rates are based on the NSS Survey on Morbidity and Health Care 2004; and outpatient visits on the Indian Human Development Survey 2004–05.

Table 2 displays enrolment rates for private and public schools. Government-aided schools are classified as public. Almost 90 per cent of primary-school-aged children were enrolled in at the time of the survey in 2007–08 and, although primary school enrolment increases with income, it is above 80 per cent even for the poorest quintile. Moreover, even among the richest 20 per cent of households, about two-thirds of children of primary-school-going age attend public school. Secondary school enrolment is lower and rises more steeply in income. About half of the poorest households within each state are enrolled, as compared to 80 per cent of the richest. Unlike primary enrolment in public schools, public secondary enrolment increases monotonically. These enrolment patterns result in the fraction in public elementary schools is decreasing in income, while the fraction in public secondary schools is increasing in income. This has important implications for the extent of targeting implicit in school spending at different grade levels.

	6–11 years		12–18 years	
Quintile	Public	Private	Public	Private
1	77.0	6.4	48.3	5.0
2	77.4	10.6	51.9	7.2
3	75.8	14.3	54.2	8.3
4	73.2	18.0	56.1	12.8
5	65.0	27.8	58.9	19.6
All	75.4	12.2	52.9	9.1

Table 2: School Enrolment

Source: NSS Participation and Expenditure in Education Survey, 2007–08. Government-aided schools are included as public.

Table 3 presents healthcare utilization rates. The first two columns show the share of individuals hospitalized during the 365 days prior to the Survey. Of the surveyed population, 2.3 per cent were inpatients, about half of whom went to a government facility. Cols 3 and 4 show usage rates for outpatient treatment of minor illnesses (fever, cough and diarrhoea), in the 30 days preceding the Indian Human Development Survey. The use of public facilities is very low but roughly even across quintiles. Richer households use much more private care.

	Inpatient		Outpatient	
Quintile	Public	Private	Public	Private
1	0.9	0.8	2.0	9.2
2	1.0	1.1	2.2	11.5
3	1.0	1.2	2.4	12.8
4	1.0	1.5	2.6	14.2
5	1.1	2.2	2.3	14.6
All	1.0	1.3	2.3	12.4

Table 3: Visits to health clinics

Source: NSS Survey on Morbidity and Health Care 2004; and Indian Human Development Survey 2004–05.

PDS utilization is shown in Table 4. One-fourth of households report consumption of food grains from the PDS and three-fourths report subsidized kerosene consumption. In spite of this being a targeted programme, 13 per cent of households in the highest quintile report purchases of PDS cereals. Kerosene purchases are similar across all consumption groups. The last two columns in the Table show the fractions that possess BPL and AAY cards that define allocations under the scheme. Almost 38 per cent of the families in the poorest quintile hold a BPL ration card, and about 6 per cent, an AAY card. The numbers in the Table reveal serious targeting gaps: 12 per cent of the households within the richest quintile have a BPL card which classifies them as poor. Another source of mis-targeting is the access of non-cardholders. About 36 per cent of households reporting PDS consumption do not possess a ration card, and half of these are in the two richest quintiles.

	Any consumption		**Ration cards**	
Quintile	Grains	Kerosene	BPL	AAY
1	36.2	77.5	37.5	5.7
2	29.2	77.4	32.0	3.3
3	25.4	75.9	27.3	2.2
4	20.7	75.0	21.1	1.9
5	12.7	69.4	12.3	1.0
All	24.8	75.1	26.0	2.8

Table 4: Usage of the PDS

Source: NSS Consumer Expenditure Survey 2004–05

4. Imputed benefits

We now turn to our methods for imputing the benefits for publicly provided services and subsidized goods from the PDS. A standard approach to valuing the benefits from public goods is to use the costs of providing them.[5] This is acknowledged to be problematic in many contexts, but is particularly so for a country like India where available evidence suggests little correlation between public expenditures and

[5] See Van de Walle and Nead (1995) for a useful overview of this and similar approaches.

outcomes. For schooling, for example, there is little or no correlation between tests scores and teacher salaries (Kingdon 2010; Kingdon and Sipahimalani-Rao 2010). Costs are determined as much by political considerations and collective bargaining as by the quality of services provided.

Instead of using provision costs, we rely on the demand for these goods and services. We make use of the fact that they have privately provided counterparts and use the expenditures of households purchasing these. We impute values separately for each state and since we need a reasonable number of observations for both public and private usage, we restrict ourselves to the seventeen major states.

Benefits from the PDS can be easily imputed since the grains distributed are also available in the market. Most households that consume either rice or wheat through the PDS also purchase the same goods in the market, so access to the PDS does not change the marginal prices faced by them. We assume that this is in fact the case, and treat benefits as pure income transfers. The NSS Consumer Expenditure Surveys include information on both quantities and expenditures on different goods, and we compute unit values as expenditures over quantities and use these as our measure of prices. To reduce the risk of measurement error in the household level unit values, we base our analysis on the median unit values within each state separately for market and PDS purchases. For rice and wheat, we also compute these median separately for the three poverty categories—APL, BPL and AAY. We compute household level transfers as the per capita amount consumed, multiplied by the difference between this measure of market price and the PDS price.[6]

The valuation of public schooling is made difficult by the potentially large differences in the quality of public and private schools. We adjust for quality using the distributions of test scores for students attending the two types of schools, as in Kjelsrud and Somanathan (2016). Each year, a large and nationally representative

[6] There are many ways to compute these price measures. Based on the NSS data, Himanshu and Sen (2013) use the actual price paid for each household with consumption from the regular market, and the average unit value within the NSS first stage unit (consisting of roughly six households) for households without market purchases. Drèze and Khera (2013) use the median unit value within states and sectors, but experiment with using the 25th percentile of the unit value distribution instead of the median (and find very similar results).

household survey is administered in rural India as part of the Annual Status of Education Report (ASER). As part of the Survey, all children in a household are given tests, roughly at the level of Grade 2. We use ASER data for 2008 to match the timing of the NSS Education Survey. These data cover more than 700,000 children and include scores on reading and math as well as two other cognitive exercises (telling the time and word problems with actual currency notes). We perform a principal component analysis on the test scores for third grade students and use the first component as an index of school quality. This is done separately for public and private schools in each state.

To compute transfers, we find the median of this distribution for public school students in each state and determine the quintile of the private school score index distribution in which this lies. For most states, the median falls in the first or the second quintile. We then use the NSS Education Survey to compute quintiles of the private school cost distribution for each state under the category, tuition and expenses on books and uniforms. Since the cost of schooling varies by grade levels, we do this separately for children in grade levels 1 to 5, and 6 to 12. We use the average private school cost for the quintile identified from the test score comparison as a measure of the value of public schooling. The imputed transfer for each child attending public school is this value minus the median expenditure on public schooling. All figures are calculated at the state level. To enable a comparison of these transfers with those from the PDS, we convert them to monthly per capita amounts.[7]

The above procedure would yield conservative estimates of transfers if more able students attended private schools since the public and private score distributions would then reflect both ability and school quality, and our approach attributes all differences to quality. We know very little about the nature of this selection for private schools in Indian villages and do not adjust for it.

Health care, like schools, varies in quality but we do not have a clear outcome variable such as test scores which we can use to calibrate our estimated transfers to

[7] We obtain some negative values, mainly in Jharkhand and West Bengal, and set these to zero. These probably result from measurement error combined with low–cost private schooling. Also, we do the imputation exercise separately for pure government schools and government–aided private schools.

the appropriate part of cost distribution for those using private care. The best we are able to do is to compute values separately for different types of ailments reported in our data. The NSS Health Care Survey reports treatment costs for thirteen ailment categories.[8] For each of these, we compute the median cost for public and private hospitalization within each of the major states. We then simply assign values to patients hospitalized at government healthcare facilities as the difference between these medians for the particular ailment category. For outpatient care, we do not separate by ailment mainly because the IHDS is a much smaller survey, and also because the pooling of various ailments is more reasonable for outpatient care since most of these are defined as minor illnesses and their costs appear to be more similar. The implicit per capita transfer for outpatient care is the difference between the median cost of private and public treatment.

Table 5 shows estimates of implicit transfers from public schooling, health care and the PDS for the expenditure quintiles, expressed as average per capita monthly values. We see that families in the poorest quintile gain, on average, about four times as much from public primary schools as families in the richest quintile. Gains from government middle and high schools are less progressive because enrolment rates for these grades are increasing in income. Benefits from both inpatient and outpatient public health care are very limited due to the limited coverage of public facilities. Finally, the monetary gains from subsidized grains through the PDS decrease in the household expenditure but less steeply than the benefits from public primary schooling. Kerosene transfers are regressive.

Some have advocated changes in the PDS to introduce self-selection mechanisms into the programme. This could potentially be done by, for example, providing millets or fortified flour—grains consumed primarily by the poor—instead of rice and wheat, grains consumed by the rich and the poor alike.[9] This idea does not however seem to attract much political support, in contrast to the idea of circumventing mis-targeting

[8] The ailment categories are: gastro-intestinal, cardiovascular diseases, eye ailments, febrile illnesses, tuberculosis, bronchial asthma, disorders of joints and bones, diseases of kidney/urinary system, gynaecological disorders, neurological disorders, accidents/injuries/burns/fractures/poisoning, cancer and other tumours, and other ailments.

[9] See Dutta and Ramaswami (2004) for a theoretical discussion on this.

by making the PDS more inclusive. The recent National Food Security Act, passed by the Lok Sabha (the Lower House of the Indian Parliament) in 2013, intends to provide 75 per cent of the rural population and 50 per cent of the urban population with an assured minimum entitlement of grains per person per month. There is also growing evidence that the introduction of universal—or close to universal—access in some states is associated with improvements in the distribution system in these states which can also benefit the poor (Khera 2011; Drèze and Sen 2013, Chap. 7).

	Government schooling		**Government health care**		**The PDS**	
Quintile	Grade 1–5	Grade 6–12	Inpatient	Outpatient	Grains	Kerosene
1	9.5	10.0	2.5	1.7	8.0	2.4
2	7.7	9.8	3.0	1.8	6.9	2.8
3	6.0	9.7	2.6	1.9	6.3	3.0
4	4.3	7.5	3.1	2.0	5.6	3.1
5	2.3	7.0	3.3	1.4	3.7	3.3
All	6.0	8.8	2.9	1.7	6.1	3.0

Table 5: Average monthly per capita expenditure benefits

Our focus so far has been on within-state distributions of benefits from public spending. Figure 3 shows how average per capita benefits across states vary by state GDP per capita. Some of the richer states—most notably Punjab, Haryana, Maharashtra and Gujarat—transfer very little. Yet, the overall relationship between transfers and per capita income seems to be positive. This pattern implies that regional disparities in consumption levels and poverty are likely to be underestimated in standard approaches that ignore differences in the quality and distribution of public goods.

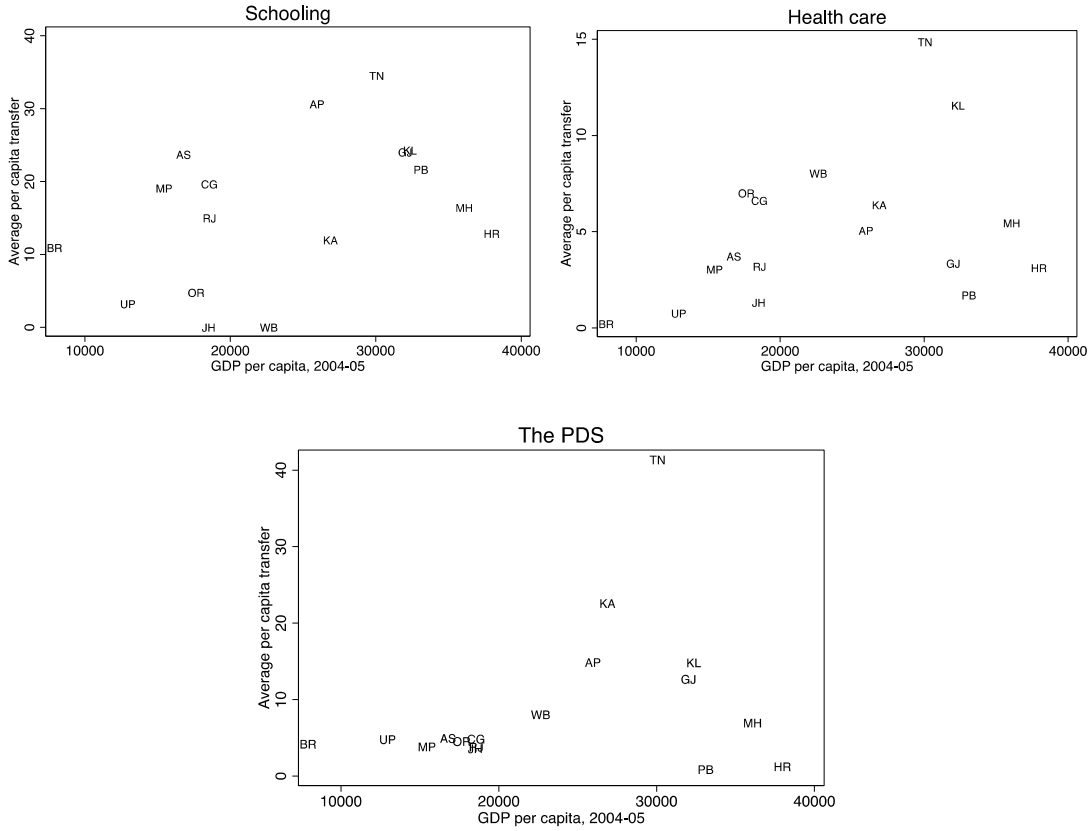

Figure 3: Average imputed benefits, by states

5. Conclusion

We set out to compare the distribution of gains from public services with those from targeted transfers. We find that public schooling is more progressive than spending on subsidized food grains. Self-selection and household demographics are the two main reasons for this. A similar comparison for health facilities is more difficult at this stage because of the limited prevalence of health centres relative to schools, and the difficulty in measuring the quality of services provided. From a policy perspective, our findings suggest that efforts to stimulate school enrolment for all, preferably by raising government school quality, are likely to be pro-poor policies.

Our comparison of public schooling and the PDS is based on the current structure of the two programmes. The National Food Security Act has instituted entitlements for individuals rather than households. The new system is in the process of being rolled out in many states. Since poor households tend to be larger, this change is likely to

make the PDS more progressive. On the other hand, if the public system manages to effect significant changes in quality, richer households may remain within it, leading to smaller selection effects. Our results underscore that we need to look beyond eligibility to utilization when estimating the degree of progressivity of public programmes.

Finally, there are striking differences across the Indian states in the effectiveness of programmes and the degree of targeting implicit in them. The reasons for this need further investigation.

References

Banerjee, A. and R. Somanathan. (2007). 'The Political Economy of Public Goods: Some Evidence from India', *Journal of Development Economics*, 82 (2), 287–314.

Drèze, J. and R. Khera. (2013). 'Rural Poverty and The Public Distribution System', *Economic & Political Weekly* (henceforth *EPW*), 48 (45–46), 55–60.

———(2015). 'Understanding Leakages in the Public Distribution System'. *EPW,* 50 (7), 39–42.

Drèze, J. and Sen, A. (2013). *An Uncertain Glory: India and Its Contradictions.* Princeton University Press.

Dutta, B. and B. Ramaswami. (2004). 'Reforming Food Subsidy Schemes: Estimating the Gains from Self-targeting in India', *Review of Development Economics*, 8(2), 309–24.

Government of India. (2014). 'Analysis of budgeted expenditure on education'. Ministry of Human Resource Development.

Himanshu and A. Sen. (2013). 'In-kind food transfers: Impact on poverty', *EPW,* 48 (45–46), 46–58.

Khera, R. (2011). 'Revival of the Public Distribution System: Evidence and Explanations', *EPW,* 46(44), 36–50.

Kingdon, G. (2010). 'The Implications of the Sixth Pay Commission on Teacher Salaries in India'. RECOUP Working Paper, 29.

Kingdon, G. and V. Sipahimalani-Rao. (2010). 'Para-teachers in India: Status and Impact', *EPW* 45(12), 59–67.

Kjelsrud, A. and R. Somanathan. (2016). 'Incorporating public transfers into the measurement of poverty'. Working paper.

Mooij, J. (1998). 'Food Policy and Politics: The Political Economy of the Public Distribution System in India', *The Journal of Peasant Studies*, 25 (2), 77–101.

Van de Walle, D. and K. Nead. (1995). *Public Spending and the Poor: Theory and Evidence.* World Bank Publications.