Reducing subsidies on household fuels in India: how will it affect the poor?[☆]

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Abstract

Kerosene and LPG are widely used in households in India for lighting and cooking. These fuels have historically been subsidized. As part of the restructuring of the energy sector, the government is committed to limiting these subsidies. This paper examines the impact of reducing energy subsidies on the welfare of the poor. The paper uses data from nationally representative surveys of over 100,000 households. The paper concludes that the case for reducing LPG subsidies is strong. Although the kerosene subsidy is an inefficient means of subsidizing fuel use by the poor, reduction in it will need to be supported by other policies that would limit the adverse impacts.

1. Introduction

Most of the world's poor rely on biomass energy for cooking and do not have access to electricity (Barnes and Halpern, 2000; Barnes et al., 1997). While the use of modern fossil fuels is limited in developing countries, their supply is often subsidized in an attempt to widen the use of convenient fuels. This paper examines household consumption expenditure data from a nationally representative survey to analyze the distribution of subsidy on kerosene and LPG in India. Historically, these subsidies arose from a pricing scheme (called the

administered pricing mechanism) that taxed certain fuels and subsidized others within a largely state-owned energy sector. Recent policy initiatives have sought to limit such subsidies. It is therefore of interest to assess the impact of reducing subsidies on the welfare and energy consumption of the poor.

Through the administered price mechanism, energy prices in India have historically been subject to extensive government intervention. Moreover, the energy sector has itself been largely state-owned. This picture is changing in some respects. As the restrictions on entry of private players (including foreign multinationals) have been lifted, the private sector is growing although it is small relative to the public sector. Exploration and the refining sector have been opened up to the private sector while deregulation of the marketing sector is ongoing. Second, at the end of March 2002, the government discontinued the administered pricing mechanism for all petroleum products. As a result, the government no longer directly controls the prices of petroleum products.[1] However, some fuels, most

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[1]However, the government can and does exercise influence on the

notably kerosene and LPG continue to be subsidized. In such cases, the government reimburses the firms for the cost of the subsidy. The cost to the government is now carried as a line item in the budget and is called the petroleum subsidy.[2]

In 2002–2003, the petroleum subsidy was Rs. 65 billion (or US $ 1.3 billion) which is about one-quarter of 1% of the country's GDP and a little over 1% of the expenditures of the central government.[3] Kerosene and liquefied petroleum gas (LPG) are two major fuels that are subsidized by the government. These are fuels that are primarily used by households for cooking or lighting or both. As a part of the reforms in the oil sector, the stated goal of the government is to reduce but not eliminate kerosene and LPG subsidies. The subsidy rate would be limited to 33% and 15%, respectively, on kerosene and LPG.

The subsidies on both kerosene and LPG are universal and not targeted. The subsidised kerosene is distributed through the public distribution system (PDS), and LPG is sold by dealers working with state-owned oil companies. The kerosene subsidy comes with a quantity constraint as well: households are allotted quotas that vary by the state and sector they live in and whether they have an LPG connection or not.[4] For LPG, there is no such quantity rationing. However, in the past there have been long waiting lists for getting an LPG connection. Recently, however, the government has been actively pursuing market expansion for state oil companies and has virtually eliminated the LPG waiting list.

The usage of subsidized fuels is analyzed in this paper using household level consumption expenditure surveys from the National Sample Survey Organization (NSSO). Previous work on fuel consumption patterns have typically used small household surveys limited to urban areas (Alam et al., 1998; Kulkarni et al., 1994; Ravindranath and Ramakrishna, 1997; Reddy and Reddy, 1994). The consumption surveys that we use are nationally representative and cover over 100,000 households in both urban and rural sectors.

2. Data sources

We use the 50th and 55th rounds of the consumption expenditure survey of the National Sample Survey Organization (NSSO) conducted in 1993–1994 and 1999–2000. These surveys are conducted during the agricultural year in India, which begins in July and ends in the month of June the following year. The national sample survey uses a stratified two-stage sampling design, first sampling clusters (which are villages in rural areas and urban blocks in urban areas) and then selecting 10 (or 12 as in the case of the 55th round) households within each cluster (called FSUs or first-stage sampling units). The survey elicits consumption expenditures and consumption quantity for the household for the month preceding the date of survey. The date of survey varies between the FSUs as the survey is done at four different times (corresponding to quarters) within the 12 months from July to June.

The sample for the 50th round consists of 115,394 households in 11,601 FSUs representing a total population of 177.9 million households. The rural sample consists of 69,225 households, representing a population of 132.2 million households. The corresponding figures for the urban sample are 46,169 and 45.7 million, respectively. The 55th round sampled 120,309 households in 10,104 FSUs, representing a total population of 188.7 million households. The rural sample in the 55th round consists of 71,385 households that represent a population of 137.4 million households. The corresponding figures for the urban sample are 48,924 and 51.4 million, respectively. For all the tables reported here, we computed figures for both the 1999–2000 and the 1993–1994 survey. However, to conserve space, we report in most cases, only the 1999–2000 figures unless there are important differences between the two years.

The consumption surveys provide two kinds of information on fuel use. First, each household is identified with a "primary" fuel that is used for cooking and similarly for lighting. Second, for the reference period of a month, households report the actual consumption of fuels in both quantity and value terms. As the primary fuel is presumably identified on its share in total fuel consumption, it might seem that the primary fuel data is redundant given the consumption data.[5] However, this is not so as the consumption data does not separate out fuel consumption by final use of cooking or lighting. This is an issue for dual use fuels such as kerosene. It is therefore valuable to use both

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(footnote continued)

pricing decisions of public sector enterprises.

[2]Earlier, the profits or losses from the cross-subsidization constituted the so-called oil pool deficit which was carried on the books of the state-owned oil enterprises.

[3]These figures are overestimates of the cost to the government because they are inclusive of taxes and import duties (UNDP/ESMAP, 2003).

[4]See UNDP/ESMAP (2003), for the state and sector wise household kerosene quotas.

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[5]The instructions to the field investigators state: " If more than one type of energy is utilized, the primary or principal one on the basis of its use will have to be identified and the corresponding code will be noted in the appropriate box." We created an independent set of primary fuel codes based on the share of the fuel in total fuel expenditures. These corresponded very closely to the reported primary fuel codes.

types of information in understanding fuel consumption patterns.

One limitation of the data set is that it does not report total household income. However, it does provide data on total household consumption expenditure which is what we use in examining the distribution of fuel subsidies across households. These household expenditures are adjusted for differences in prices and cost of living across states and across rural and urban sectors.

3. Patterns of fuel use: the rural–urban divide

Fuel consumption patterns display a clear rural–urban divide. In Table 1, an overwhelming 86% of all rural households in 1999−2000 use some form of biomass (firewood or dungcake) as their primary fuel for cooking. On the other hand, less than a quarter of urban households use biomass as their primary cooking fuel. This suggests two things. First, subsidies for modern fossil fuels are inherently biased towards the urban sector. Second, in spite of such subsidies for many decades they have failed to shift fuel consumption patterns away from biomass in rural areas. An important reason for this could be that subsidized fuel is not always available to the poor. Indeed, as we will show later for the case of kerosene (Tables 15 and 16 and in Section 7), the data suggest that households buy from the market even when they have not exhausted their subsidized quota.

The first conclusion is qualified by the figures in Table 2 which presents the distribution of households by their primary lighting fuel. Whether in the rural or urban sector, households essentially choose between two alternative fuels for lighting: electricity or kerosene. Kerosene is a primary lighting fuel in only 10% of urban households while it has the same status in over 50% of rural households. From these tables, it can therefore be seen that while urban households access fuel subsidies through their choice of fuels for cooking, rural house-

Table 1
Primary cooking fuel usage, percentage of households

Code	Primary cooking fuel	1999–2000	
		Rural	Urban
1	Coke, coal	1.52	4.12
2	Firewood and chips	75.44	22.24
3	Gas (coal, oil or LPG)	5.40	44.09
4	Gobar gas	0.31	0.5
5	Dungcake	10.61	2.06
6	Charcoal	0.04	0.14
7	Kerosene	2.70	21.67
8	Electricity	0.08	0.40
9	Others	2.67	0.74
10	No cooking arrangement	1.09	4.24

Table 2
Primary lighting fuel usage, percentage of households

Code	Primary lighting fuel	1999–2000	
		Rural	Urban
1	Kerosene	50.49	10.23
2	Other oil	0.25	0.11
3	Gas	0.06	0.12
4	Candle	0.08	0.04
5	Electricity	48.35	88.86
6	Others	0.11	0.06
7	No lighting arrangement	0.47	0.32

holds receive fuel subsidies through their use of kerosene for lighting.

While the data on choice of primary fuels is useful to highlight the rural–urban differences in the usage of cooking and lighting fuels, it is not very useful in assessing the extent to which households use subsidized fuels. This is because even if a household does not use, say, kerosene as a primary fuel for cooking or lighting, it may use this fuel as a secondary fuel. Therefore, it is better to directly examine usage and consumption data.

4. Kerosene subsidies: usage

Through the PDS, the government supplies kerosene at prices that are below costs. Till February 1993, this was the only source of kerosene. Since then, private firms have been permitted to import and sell kerosene. There are no subsidies for the kerosene sold by such private suppliers. The PDS is a government controlled retail-marketing network consisting of fair price shops and kerosene depots.[6] To assess its geographic spread we consider a household to have access to the PDS if there is at least one household (including itself) in its neighborhood that purchases kerosene from the PDS.[7] The results are in Table 3. As can be seen, the PDS covers almost the entire country.

The relevance of kerosene subsidies to a household depends on whether it uses kerosene. Table 4 displays the percentage of households that use kerosene in each expenditure decile group and for the sector as a whole. The proportion of kerosene users declines as total

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[6]For a description of the kerosene distribution system, see Bhatia (1988).

[7]Such a measure is a lower bound to the access enjoyed by the household because it is possible that even though households have access, nobody in the neighborhood buys PDS kerosene. This could be for various reasons including the possibility that none of the households use kerosene whether from the market or from the PDS. However, the fact that our measure suggests near universal coverage implies that the picture is not going to change much with more refined measures.

Table 3
Percentage of households with access to the PDS

	1999–2000
Rural (%)	95
Urban (%)	89

Note: A household is said to have access to the PDS if there is at least one household (including itself) in its neighborhood that purchases kerosene from the PDS. As discussed in footnote 1, this measure is a lower bound to the access to PDS.

Table 4
Proportion of households that use kerosene by sector and Decile Group

Expenditure Decile[a]	Rural, 1999–2000	Urban, 1999–2000
1	0.96	0.92
2	0.98	0.93
3	0.97	0.88
4	0.97	0.85
5	0.97	0.79
6	0.96	0.73
7	0.95	0.64
8	0.94	0.58
9	0.93	0.47
10	0.85	0.33
All	0.95	0.71

[a]Expenditure deciles consist of equal proportions of households (10%) ranked by total household expenditure corrected for inter-state price differentials.

consumption expenditure increases but the fall is small in rural areas. In urban areas, the fall is pronounced after the 5th expenditure decile. As kerosene in rural areas is largely used for lighting, the high proportion of kerosene users in the upper expenditure groups is indicative of the limited use of electricity. In urban areas, kerosene is largely used for cooking and the switch to LPG at higher expenditure levels seems to be the reason for the observed pattern. From these data, it is clear that a universal kerosene subsidy of the present kind can be progressive in urban areas (unless it is so large that it distorts the fuel preference in a significant way) but not in rural areas where kerosene use is equally prevalent among all expenditure groups.

Table 5 displays information about the percentage of all households that purchase kerosene from the PDS in 1999–2000 and who thus receive the kerosene subsidy. From the last row, it can be seen that three-quarters of all rural households and nearly half of urban households accessed the PDS for kerosene. To put these figures in perspective, consider the coverage of the food subsidy program which is the largest consumption subsidy program in India. In terms of budgetary expense, the food subsidy program is four times more costly than the petroleum subsidy. Yet the NSSO consumption survey

shows that only about a third of all households receive food subsidies. In contrast, the kerosene subsidy has a far greater coverage. Table 6 considers the percentage of all kerosene using households that purchase kerosene from the PDS. The resulting participation rates are expectedly greater than in Table 5. The difference is particularly striking for the urban sector where many households do not use kerosene. Thus, it can be concluded that if a household uses kerosene, then it is very likely to use the subsidy program. This is not to suggest that all households who want the subsidy are getting it; indeed, there are instances of households who are unable to access PDS kerosene.

Table 5
Proportion of all households that use the PDS by Expenditure Deciles: 1999–2000

Expenditure Deciles[a]	Rural	Urban
	In entire population	In entire population
1	0.73	0.64
2	0.78	0.67
3	0.78	0.65
4	0.79	0.60
5	0.78	0.56
6	0.78	0.51
7	0.78	0.41
8	0.77	0.34
9	0.75	0.25
10	0.66	0.17
All	0.76	0.48

[a]Expenditure deciles consist of equal proportions of households (10%) ranked by total household expenditure corrected for inter-state price differentials.

Table 6
Proportion of kerosene using households that use the PDS by Expenditure Deciles: 1999–2000

Expenditure Deciles[a]	Rural	Urban
	In population of kerosene users with access to PDS	In population of kerosene users with access to PDS
1	0.76	0.70
2	0.79	0.73
3	0.80	0.74
4	0.81	0.71
5	0.80	0.70
6	0.81	0.70
7	0.82	0.64
8	0.82	0.58
9	0.81	0.53
10	0.78	0.52
All	0.80	0.68

[a]Expenditure deciles consist of equal proportions of households (10%) ranked by total household expenditure corrected for inter-state price differentials.

Table 7
Sources of kerosene supply: 1999–2000

Sector	Percentage of kerosene using households buying from PDS alone (%)	Percentage of kerosene using households buying from market alone (%)	Percentage of kerosene using households buying from the PDS and market (%)
Rural	61	20	19
Urban	46	32	22

Tables 5 and 6 also display the participation rates by expenditure deciles. Here we see that in the rural sector the usage of subsidized kerosene is quite uniform across all expenditure deciles. Households in the higher expenditure deciles use the PDS as intensively as households in the lower expenditure deciles indicating a lack of targeting. But in the urban sector, the participation rate drops off in the higher expenditure deciles. However, the decline is modest when it is conditioned for kerosene use (Table 6). Therefore, the targeting that is achieved in the distribution of kerosene subsidies is largely because the higher expenditure groups do not use kerosene. The scope of this kind of targeting is very limited in rural areas because all expenditure groups use kerosene.

Table 7 examines the importance of the different sources of supply in a household's purchase of kerosene. This information is presented only for kerosene using households as it is not relevant for other households. In 1999–2000, as many as 61 per cent of rural households that purchased kerosene depended exclusively on PDS. The rest are evenly divided between an exclusive reliance on the market or a combination of the PDS and the market. On the other hand, the market is a more important supply source in urban areas. Preference for the market source increases for higher expenditure groups. Thus, the drop in participation rates in PDS among higher expenditure groups of urban sector is not only because the richer groups shift out of kerosene but also because they shift out of PDS kerosene. Among the top 4 deciles, about 40 per cent of kerosene users obtain their supplies from the market. The corresponding figure for rural areas is about half of that. This is probably because higher expenditure groups in the urban sector are willing to pay for the convenience associated with purchases from the market.

5. Kerosene subsidies: quantity

From the quantity and value of kerosene consumption reported by households, we can compute the prices paid by households for purchasing kerosene. Table 8 presents the average kerosene price paid by households in the urban and rural sectors. We have such informa-

Table 8
Price of kerosene (Rs/l)

	Market price	Subsidised price
Rural	9.24	4.40
Urban	9.70	3.80

Table 9
Monthly per capita consumption of subsidized kerosene (l): All households, 1999–2000

Expenditure Decile[a]	Rural: All households	Urban: All households	Rural: PDS consuming households	Urban: PDS consuming households
1	0.37	0.63	0.50	0.92
2	0.43	0.76	0.54	1.08
3	0.46	0.85	0.58	1.24
4	0.49	0.89	0.62	1.33
5	0.52	0.87	0.66	1.39
6	0.58	0.81	0.73	1.43
7	0.64	0.69	0.80	1.33
8	0.67	0.80	0.85	1.81
9	0.73	0.48	0.93	1.40
10	0.81	0.30	1.12	1.40
All	0.57	0.71	0.73	1.30

[a]Expenditure deciles consist of equal proportions of individuals (10%) ranked by per capita expenditure corrected for inter-state price differentials.

tion by decile expenditure groups (not reported here) and we find little variation in kerosene prices (market or subsidized) across decile groups. Overall the evidence is consistent with absence of quality differentiation within kerosene. The absence of price variation means that the per unit kerosene subsidy is uniform across households within a sector. As a result, the distribution of kerosene subsidy is the same as the distribution of subsidized kerosene purchases.

In Table 9, we present the average quantities purchased from the PDS by sector and decile group. The averages are computed for the entire population in the relevant category (sector and/or decile) and also for the population that uses the PDS in the relevant category. The first figure, which is the unconditional average, is useful for gauging the distribution of kerosene subsidies given the consumption patterns of fuels. The second figure is useful in assessing the quantities distributed through the PDS and the performance of PDS in reaching the poorer expenditure groups relative to the richer groups.

In per capita terms, urban areas consume 20% more subsidized kerosene than rural areas (last row of Table 9). As the per unit subsidy is largely the same across sectors, this means that urban areas receive that much more subsidy than rural areas in per capita terms. When

seen by decile group, per capita purchases of PDS kerosene steadily increase with expenditure decile in rural areas. The rural subsidy is therefore regressive. In the urban sector, per capita purchases of PDS kerosene peak in the middle decile groups and then slowly decline until they fall off sharply in the top deciles. This is largely because the higher expenditure groups in urban areas have shifted out of kerosene. This can be seen by looking at the per capita PDS kerosene purchases of households that use the PDS (4th and 5th columns of Table 9). Conditional on PDS use, urban sector purchases in 1999–2000 also increase with expenditure decile except for a small drop in the top 2 deciles.

The importance of PDS can be seen from its share of total kerosene purchases (in quantity terms). This is shown in Table 10. Among kerosene users, the PDS share varies between 57 and 71 per cent (urban–rural). For those who buy from the PDS, the PDS share is much higher and the market source is used to supplement kerosene purchases at the margin. This suggest that kerosene users are largely of two kinds: those who buy from the market and those who largely purchase from the PDS. Table 11 shows the average share of PDS in kerosene purchases for each of the expenditure deciles. In rural areas, the PDS share is invariant to the expenditure decile. In the urban areas, the PDS share declines with expenditure decile indicating the importance of market sources of kerosene for higher expenditure groups.

Table 10
Share of PDS in kerosene budget

Sector	Among all kerosene users: 1999–2000 (%)	Among PDS kerosene users: 1999–2000 (%)
Rural	71	89
Urban	57	84

Table 11
Share of PDS in kerosene budget by decile group of all kerosene users, 1999–2000

Expenditure Decile[a]	Rural	Urban
1	69	62
2	71	62
3	71	61
4	71	59
5	71	58
6	72	58
7	73	53
8	73	49
9	72	46
10	69	47

[a]Expenditure deciles consist of equal proportions of households (10%) ranked by total household expenditure corrected for inter-state price differentials.

Table 12 presents decile wise aggregate consumption of subsidized kerosene as well as the decile share in the sectoral total. In the rural sector, the subsidy is uniformly distributed among the expenditure deciles. In the urban sector, the lower expenditure deciles obtain a greater share of the subsidy. This, as we have noted, is because higher expenditure groups in the urban sector have shifted out of kerosene and in particular, PDS kerosene in favor of market kerosene and LPG. Thus the urban subsidy on kerosene is to some extent self-targeted.

6. Kerosene subsidy: illegal diversions

It is often thought that a sizeable portion of kerosene supply through the PDS never reaches households. At some point in the marketing chain, kerosene is illegally diverted to the market to arbitrage the price difference between the subsidized supply and the market supply. The diverted supply could be resold to households (at prices higher than the subsidy price) or be used by the non-household sector. If this is true then it means that part of the subsidy meant for households is appropriated by others. Thus, the cost of transferring a rupee of subsidy is higher than what it would be if leakages were absent.

It is generally believed that the diverted kerosene is principally used to adulterate diesel on account of the price differences between the two fuels (Bhatia, 1988; World Bank, 2000). Kerosene can also be used to adulterate gasoline; however, diesel adulteration is regarded as the more important because diesel use is considerably more than gasoline and also because kerosene can be added to diesel in much greater volume than to gasoline before the resulting mixture loses its automotive properties. In 1999–2000, high-speed diesel oil sold in the major metros for Rs. 10 to Rs. 12 per liter (which was little above the market price of kerosene at around Rs. 10) while PDS kerosene sold at prices between Rs. 3 and Rs. 4 per liter.

It is hard to get reliable estimates directly of leakages because of its underground nature. One method would be to compare the aggregate kerosene supplies through the PDS as reported in official figures with aggregate household consumption of PDS kerosene. Estimates of the latter can be obtained from NSSO data. Table 13 reports these figures for 1993–1994 and 1999–2000. The difference between these figures is the non-household consumption of kerosene. As PDS kerosene is supplied only to households, the consumption in non-household sector represents the leakages or the illegal diversions.

Table 13 shows that 50% of government supplies never reached households. This figure is remarkably stable between the years 1993–1994 and 1999–2000. In

Table 12
Distribution of subsidized kerosene by expenditure Decile Group (1999/2000)

Decile	Rural sector		Urban sector	
	Consumption (l)	As a proportion of sectoral total	Consumption (l)	As a proportion of sectoral total
1	31,472,722	0.08	20,584,875	0.13
2	35,355,605	0.09	23,060,199	0.14
3	36,607,104	0.09	22,965,260	0.14
4	37,904,447	0.10	22,556,787	0.14
5	40,588,373	0.10	20,230,461	0.12
6	41,852,864	0.11	16,519,668	0.10
7	42,027,431	0.11	17,072,347	0.10
8	43,368,237	0.11	10,148,331	0.06
9	43,565,990	0.11	6,885,509	0.04
10	40,758,903	0.10	4,188,792	0.03
Total	393,500,000	1.00	164,200,000	1.00

Table 13
Kerosene consumption and leakages: '000 tons

	Aggregate supplies of PDS[a]	Aggregate household consumption of PDS kerosene	Leakage	Leakage as % of supplies (%)
1993–1994	8704	4428	4276	49
1999–2000	10731	5354	5377	50

[a] *Source*: UNDP/ESMAP (2003).

the supply of subsidized foodgrains, leakages in the range of 15–30% have been reported (Dutta and Ramaswami, 2001). Therefore, even in relation to the other commodities delivered through the PDS, the leakages in kerosene are staggering. In 1999−2000, the government reported an expenditure of Rs. 78 billion on account of the kerosene subsidy. The leakages figures suggest that households receive at most only half of that amount.[8]

7. Utilization of kerosene quotas

One important element determining the use of rationed fuel is its availability. As stated before, we have assumed so far that PDS kerosene is available in a cluster if there is at least one household in the cluster that consumes PDS kerosene. There could be two

[8]Earlier estimates of kerosene leakage in the 1970s and early 1980s are lower (see Bhatia, 1988). They range from 13% to 33%. These estimates follow different methodologies and do not use the NSS consumption data. The leakage at any point of time also depends on the price differential between kerosene and diesel at that time.

problems with this assumption. First, even if the household has a ration card, i.e., is entitled to buy PDS kerosene, it may not be able to do so. This could be because supplies are irregular or, even if they are regular, much of it could be diverted to the open market as we discussed in the previous section. Second, a household may not be entitled to PDS kerosene. This is especially true for many migrant households that move from place to place or, undertake seasonal migration. PDS entitlements come from possessing ration cards and, to get ration cards, one needs a permanent address. It is difficult to form any estimates of the extent of the problem for the second type of households.

Table 14 gives the state-wise break up of quotas, the average purchase by households that use PDS kerosene and the resultant average underutilization of the quota. The figures cover the rural and urban sectors separately. The first thing to note is that in 7 of the 15 states, the rural quota is the same as that of the urban quota. In the remaining 8 states, the urban quota is higher than the rural quota. The state of West Bengal has the lowest household quota for both rural and urban areas.

Recall that the use of kerosene is for different purposes in the two sectors; it is primarily a lighting fuel in rural areas and a cooking fuel in urban areas. Hence, one cannot draw an immediate conclusion about policy discrimination between rural and urban areas by considering the quota differences in the two sectors within the same state. However, one can form some hypotheses by looking at the degree to which quotas are utilized in the states and across sectors. The column(s) titled "Percentage utilization of quota" is the ratio between the average purchase from PDS and the quota.

In both the sectors of West Bengal, and in urban Madhya Pradesh, average PDS consumption is higher than the quota. In Madhya Pradesh, the amount by which PDS purchases exceed entitlement is quite small. In West Bengal, and for both sectors, the excess

Table 14
Kerosene Consumption and Leakages (litres per month per household)

State	Rural			Urban		
	Quota[a]	Average purchase from PDS[b]	Percentage utilization of quota	Quota[a]	Average purchase from PDS[b]	Percentage utilization of quota
Andhra Pradesh	3	2.94	97.88	10	6.99	69.86
Assam	5	3.18	63.64	5	3.31	66.19
Bihar	5	2.92	58.35	5	3.54	70.72
Gujarat	10	7.11	71.13	16	9.33	58.30
Haryana	6	4.67	77.83	10	5.52	55.20
Karnataka	4	3.56	88.92	8	6.95	86.88
Kerala	6	3.53	58.85	6	3.80	63.28
Madhya Pradesh	5	3.79	75.82	5	5.69	113.73
Maharashtra	10	4.86	46.30	19	11.25	59.88
Orissa	4	2.51	62.83	4	3.60	90.07
Punjab	20	6.02	30.11	20	9.94	49.70
Rajashthan	10	4.37	43.66	10	6.51	65.10
Tamil Nadu	5	3.65	72.99	15	8.16	54.38
Uttar Pradesh	8	3.46	43.27	8	4.60	57.45
West Bengal	1	3.56	355.69	2	4.50	225.09

[a]Quota figures are from UNDP/ESMAP (2003).
[b]Household purchases are calculated from the NSS data for those who buy PDS kerosene.

purchase is quite significant. West Bengal also has miniscule entitlements suggesting either of one of two things. There is so much demand for kerosene by those who use them that they buy off the entitlements of those who do not want to exercise their quota. Alternatively, given such small quotas, households resort to obtaining spurious ration cards to be able to buy more than they are entitled to.

An immediate observation is that, in all states that have the same quota in both rural and urban sectors, the degree of quota utilization in urban areas is more than in rural areas. Alternatively, barring Maharashtra, in all states where the urban quota is higher than the rural quota, the degree of quota utilization in rural areas is higher than in the urban sector. However, if we leave West Bengal and urban Madhya Pradesh aside, what is probably more important is that in both sectors of all the other states, the average utilization ratio is less than 100 per cent. A possible explanation is that the quotas are too high. However, when we consider the fact that people buy from the market even when they have not utilized their full quota, it points to the more plausible explanation that the availability of PDS kerosene is less than what the quota amounts are. The average purchase from PDS columns in Table 15 are the same as that for Table 14. We include a third column for each sector that gives the average PDS purchase of those who buy from the market as well as from PDS shops. Note that the average PDS purchase of these households is less than what they are entitled to from PDS shops. This clearly suggests that the PDS quota is not always available.

This is true for both the rural and urban sectors and in all states.

8. LPG subsidy: usage and quantity

LPG is sold at subsidized prices by the state-owned energy enterprises. LPG sold by the private sector does not involve a subsidy. Although supply shortages have occurred in the past, households do not face a tight rationing constraint in procuring supplies from state-owned enterprises. As a result, the private sector is a fringe player and active only in regions where the public sector is for some reason absent. It is therefore legitimate to treat the reported LPG use in the consumption survey as arising from subsidized supplies.[9]

It is usually thought that LPG is the fuel choice of rich households. This statement needs to be qualified on two grounds. First, as Table 16 shows, LPG is not the most favored choice (at 29 per cent) of even the highest expenditure decile in rural areas. Second, the same table shows, that in urban areas, LPG is chosen by the majority of households in each of the deciles 6–10. In rural India, biomass is more easily available and access to LPG more difficult than in urban areas. This may explain the lower use of LPG among all expenditure

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[9]About 95% of the LPG market belonged to the subsidized supplies of the state-owned oil companies in 1999–2000 (UNDP/ESMAP, 2003).

Table 15
Kerosene Consumption and Leakages (litres per month per household)

State	Rural			Urban		
	Quota[a]	Average Purchase from PDS[b]	Average PDS Purchase of those who buy from market[c]	Quota[a]	Average Purchase from PDS[b]	Average PDS Purchase of those who buy from market[c]
Andhra Pradesh	3	2.94	2.93	10	6.99	9.68
Assam	5	3.18	2.86	5	3.31	3.15
Bihar	5	2.92	2.68	5	3.54	3.27
Gujarat	10	7.11	7.52	16	9.33	10.59
Haryana	6	4.67	5.11	10	5.52	5.26
Karnataka	4	3.56	3.44	8	6.95	8.58
Kerala	6	3.53	3.32	6	3.80	4.28
Madhya Pradesh	5	3.79	3.53	5	5.69	5.67
Maharashtra	10	4.86	5.18	19	11.25	13.27
Orissa	4	2.51	2.17	4	3.60	3.72
Punjab	20	6.02	5.79	20	9.94	8.68
Rajashthan	10	4.37	3.61	10	6.51	6.79
Tamil Nadu	5	3.65	4.23	15	8.16	8.60
Uttar Pradesh	8	3.46	2.81	8	4.60	5.57
West Bengal	1	3.56	3.05	2	4.50	4.30

[a]Quota figures are from UNDP/ESMAP (2003).
[b]Household purchases are calculated from the NSS data for those who buy PDS kerosene.
[c]Household PDS purchases calculated from the NSS data for those who buy PDS kerosene as well as from the open market.

Table 16
% of Households that use LPG

Expenditure Decile[a]	1999–2000	1999–2000
	Rural	Urban
1	0	7
2	0	15
3	1	25
4	1	35
5	2	43
6	3	54
7	4	58
8	8	62
9	14	69
10	29	78
All	6	45

[a]Expenditure deciles consist of equal proportions of households (10%) ranked by total household expenditure corrected for inter-state price differentials.

Table 17
Monthly Per Capita Consumption of LPG—All Households (kgs)

Expenditure Decile[a]	All	All	LPG using Households	LPG using Households
	Rural	Urban	Rural	Urban
1	0.00	0.12	3.28	1.56
2	0.00	0.25	1.05	1.74
3	0.01	0.44	1.32	1.89
4	0.02	0.71	1.61	2.28
5	0.03	0.94	1.94	2.24
6	0.04	1.28	1.61	2.47
7	0.07	1.67	1.68	2.59
8	0.16	1.95	1.84	2.79
9	0.25	2.44	1.91	3.12
10	0.82	3.30	2.56	3.72
All	0.14	1.31	2.18	2.78

[a]Expenditure deciles consist of equal proportions of individuals (10%) ranked by per capita expenditure corrected for inter-state price differentials.

classes. In urban areas, on the other hand, LPG access is easier while the availability of biomass is more difficult than in rural areas. Therefore, one reason why LPG is not the majority choice among the lower deciles in the urban sector could be the lumpiness in the cost of buying LPG. LPG is sold in a cylinder of 14 kilos which is, roughly, a month's supply at a time.

Table 17 (2nd and 3rd columns) presents the per capita consumption of LPG by expenditure decile and for both sectors. The figures in this table reflect the distribution of LPG subsidy. As might be expected the per capita consumption of LPG increases with expen-

diture decile. The disparity between urban and rural consumption is large. The third and fourth columns of Table 17 present the per capita consumption of LPG of households that consume it (i.e., ignoring households with zero LPG consumption). There is once again a positive relationship between per capita consumption and expenditure decile. Thus, the positive relation in the first two columns of Table 17 is because (a) more households in higher expenditure deciles use LPG and (b) when they use it, they use a greater quantity in per capita terms than lower expenditure deciles.

The trends in per capita consumption explain the figures in Table 18, which displays the distribution of LPG consumption by expenditure deciles. Since all LPG use in 1999−2000 was subsidized, the figures in the table also represent the distribution of LPG subsidy. In the rural areas, 50% of subsidy goes to the top expenditure decile. In the urban sector, the higher expenditure groups receive more of the LPG subsidy. However, the distribution of subsidy within the top 5 deciles is more even than in the rural sector. This reflects the fact that LPG use is quite common in the higher expenditure deciles of the urban sector unlike the rural sector which still prefers to use biomass fuels. Finally, from the quantity data it is clear that the distribution of LPG subsidy is heavily skewed in favor of the urban sector.

Table 19 reports how the aggregate consumption of LPG from official sources matches with aggregate household consumption. As can be seen the NSS estimates are within 5% of the official aggregates indicating that the problem of leakages is not serious in the case of LPG.

Table 18
Distribution of Subsidised LPG by Expenditure Decile

Expenditure Decile[a]	Rural		Urban	
	Consumption	As % of sectoral total	Consumption	As % of sectoral total
1	52,916	00	4,511,636	01
2	467,238	00	9,114,228	03
3	762,306	01	17,183,652	06
4	1,614,442	02	23,020,697	08
5	2,872,509	03	29,704,120	10
6	3,586,543	04	36,887,906	12
7	7,001,074	07	39,672,402	13
8	11,882,598	12	42,298,686	14
9	21,412,281	22	47,816,501	16
10	46,674,765	48	54,177,950	18
All	96,326,671	100	304,400,000	100

[a]Expenditure deciles consist of equal proportions of households (10%) ranked by total household expenditure corrected for inter-state price differentials.

Table 19
Leakages in LPG Consumption: '000 tons

	Aggregate consumption[a]	Aggregate household consumption
1993–1994	2423	2552
1999–2000	4974	4808

[a]*Source*: UNDP/ESMAP (2003).

9. Concluding remarks

Kerosene and LPG use are subsidized in India. It is sometimes argued that a subsidy is a good instrument to shift fuel consumption patterns away from biomass to modern fossil fuels. Such a shift generates social externalities because it reduces the pressures for deforestation and also the indoor air pollution that is associated with biomass use. For this argument to work, subsidies should be utilized by the poor (who are more likely to use biomass) and by rural households (who face lower prices for biomass). However, this is not true of either the kerosene or the LPG subsidy.

The LPG subsidy is largely used by the higher expenditure groups in the urban sector. It is regressive and is unlikely to have had much effect on biomass use. Kerosene on the other hand is widely used and is more likely to displace biomass use. However, on a per capita basis, the urban sector receives a larger subsidy, which may not have been a desired objective. The limited availability of subsidised kerosene in rural areas biases its use in lighting rather than cooking. Further, the rural subsidy is regressive as higher expenditure groups receive more subsidized kerosene than lower income groups. The kerosene subsidy is also very expensive as about half of the subsidized kerosene supplies is diverted and never reaches consumers. The strongest case for a kerosene subsidy comes from the urban sector where the subsidy use is greater among the lower expenditure groups thanks principally to the fact that higher expenditure groups shift out of kerosene to other fuels. The subsidization of the urban poor could be even larger if the poor had equal access to subsidized kerosene.

These arguments suggest that the LPG and kerosene subsidy are very ineffective in improving the welfare of the poor and in affecting biomass use. However, while it easy to recommend the removal of the LPG subsidy, a more cautious approach is justified towards the reduction of kerosene subsidies. This is because about 50% of rural households use kerosene primarily to light their homes. As a lighting source, kerosene is not only of poorer quality but is also known to be more expensive than electric lighting (Barnes et al., 1997). Therefore, it seems likely that households using kerosene for lighting do not have access to reliable electricity. In the absence of substitution possibilities, a reduction in kerosene subsidy will lead these households to experience a large welfare loss. The short-term policy option would be to consider means by which the illegal diversions could be substantially reduced such as the use of kerosene vouchers.[10] The longer-term policy option would be to expand the rural electrification network on a sustainable basis.

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[10]The use of kerosene vouchers is also discussed in Alam et al. (1998).

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