

Reforming Fossil Fuel Prices in India: Dilemma of a Developing Economy

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The Reserve Bank of India (RBI) has expressed concern that elimination of fuel subsidy could cause a spike in inflation.¹ Elsewhere, it is estimated that a 10 per cent increase in price of crude petroleum could raise the wholesale price index (WPI) based inflation by 2 percentage points.² Price reform propositions for the fossil fuel sector often evoke sharp reaction.

Anand (2014) presents estimates for increase in total cost of farming resulting from a proposed change in fossil fuel prices. Use of fossil fuels in farming has direct and indirect components and increase in total costs is presented as a multiple of direct input costs of fossil fuels in farming. *Direct* input of fossil fuel constitutes purchase of diesel by farmers to run farm machinery and equipment. But, two important *indirect* linkages are through use of (a) fertilisers and (b) power or electricity.

Over time, direct use of fossil fuels on farms has risen and indirect use particularly for non-energy purposes is also growing. *Column 6 in table 1* shows that despite significant decline over years, the magnitude of the multiple for total to direct use of fossil fuel in farming is quite large. But, *fossil fuel* and *energy* intensities are declining for the aggregate Indian economy (*columns 3 and 4, table 2*). However, these are rising for Indian agriculture (*column 5, table 2*). Thus, revision of fossil fuel prices acquires greater significance for Indian agriculture than for rest of the economy.

Expenditure incurred on purchase of fuel is a product of (a) number of units purchased and (b) price per unit. The economic impact of price increase of fossil fuels would also depend on the relative price structure for all inputs to produce a good or service. If all prices increase at the same rate, then relative prices are unchanged, and the proportion of fuel cost in total cost of product also remains unchanged. But, if price of fossil-fuels rises steeper than the average price of farm produce, then the proportion of fuel cost in total cost also rises. Conversely, if input price increases at a lower rate than output price, then input cost proportion in total cost is lowered.

Table 1: Direct and Indirect Use of Fossil-fuel on Farms (in ktoe)

Year	Direct Use	Indirect Use in (one stage removed only)			Total to Direct Multiple (2+3+4+5)/2	Proportion of Fin. Cons. of Oil Pr. and Nat. Gas in Agri. (%)
		Power	Fertilisers			
			Domestic	Imported		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1990	1244	3852	9239	2813	13.8	2.1
1998	3719	7690	14713	3441	7.9	4.1
2007	6747	8064	12273	6521	5.0	5.0
2011	8022	10001	12952	9644	5.1	4.8

Source: Author's own computations; Basic Data: Energy Balance Tables (International Energy Agency), Fertiliser Statistics (Fertiliser Association of India).

Notes: ktoe: kilo tonnes of oil equivalent

Table 2: Energy consumption and GDP in India

Year	Primary Energy Supply in kgoOE per 1000 INR of GDP		Final Consumption of Energy in kgoOE per 1000 INR of GDP of		GDP at Constant 2004-5 Prices at Factor Cost (crore INR)	Share of Agriculture in GDP at 2004-5 Prices, (%)
	Total	Fossil Fuels	Economy	Agriculture		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1990-1	23.50	13.01	18.67	1.40	1347889	29.5
1998-9	20.22	12.81	14.49	2.37	2087828	24.4
2007-8	15.52	10.75	10.29	2.40	3896636	16.8
2011-2	14.29	10.33	9.39	2.64	5243582	14.1

Source: GDP data from http://mospi.nic.in/Mospi_New/upload/NAS13.htm; <http://www.iea.org/statistics/statisticssearch/report/?country=INDIA&product=balance&year=2011>

Notes: kgoOE: kilogram of oil equivalent; INR: Indian rupee; One crore equals 10 million or 100 lakhs. *Column 5* does not include non-energy use of fossil fuels.

Data on price indices,³ to supplement quantity (or technical) use depicted in *tables 1 and 2*, reveals that with 1993-4 as base year (index = 100), in 1998-9 the index for *fuel and power* (148.5) grew slower than the index for *food articles* (159.4). But, in 2007-8, the index for *fuel and power* (338.9) grew significantly faster than the index for *food articles* (230.2). Thus, *relative change in fossil fuel prices may have subdued the quantity multiple in 1998-9 but aggravated it in 2007-8*.

These findings are validated by an alternative approach that utilises a three-sector input-output (I-O) model for the Indian economy representing *farming, fossil fuels, and rest of economy* in 1998-9 and 2007-8. Note that Indian I-O tables are value transactions and obviate the need to combine disparate assessment on quantity and price impacts.

The analysis reveals that in 2007-8, the direct input of fossil fuels in farming had grown 1.9 times its level in 1998-9. Further, fossil fuels sector is assessed to portray strong forward linkages. Thus, *total effect of a given change in fossil fuel prices was (3.99) 6.7 times its direct impact in (1998-9) 2007-8*.

Data collated from reports of Commission for Agricultural Costs and Prices (CACPC) revealed that a 10 per cent increase in fossil fuel price could cause a 0.56 per cent average increase in direct input cost of farming. Total cost of farming then, could increase by $(0.56 \times 6.7) = 3.75$ percentage points. Given the extant weight of commodities, the WPI could rise by about 4.3 percentage points with 0.7 percentage points contributed by farm sector.

Disaggregated analysis for the farming sector reveals significant differences across crops. But, even at the aggregate level, Anand (2014) has implications for monetary policy when one finds that second round effects (following from indirect use of fossil fuel in farming) on food inflation are significantly large. Further, there are profound implications for fiscal policy and administration, when reduction in fuel subsidy (or upward revision in fuel price) may have far-reaching implications for (a) setting support prices in agriculture, (b) circumscribing expenditure on food subsidy, and (c) administering the law on food security.

Reference

Anand, Mukesh 2014. Direct and Indirect Use of Fossil Fuels in Farming: Cost of Fuel-price Rise for Indian Agriculture, Working Paper No.132, NIPFP, New Delhi (February).

3. Downloaded from <http://www.rbi.org.in/scripts/PublicationsView.aspx?id=15160>

1. http://articles.economicstimes.indiatimes.com/2012-08-07/news/33083665_1_food-inflation-fuel-subsidy-governor-d-subbarao

2. RBI (2011), *Price Situation*, Reserve Bank of India Monthly Bulletin, May 2011, pp 636-45. In partial setting, analogous outcome could derive from a 10 per cent depreciation in currency, leaving the international USD denominated price unchanged.