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Cross subsidy removal in electricity pricing in India

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ABSTRACT

In India electricity price for agriculture is cross subsidized by the industries. The Indian government has started a process through which the extent of cross subsidization is gradually being reduced. The idea is to replace the cross subsidization by 2030 and introduce a rate structure that will increase with the amount of electricity usage. This paper uses the Computable General Equilibrium framework to evaluate the ex-ante impact of these policy changes on the Indian economy. The paper finds that removal of cross subsidies will increase inflation particularly food inflation resulting in a decline in household incomes more so in rural areas. Replacing cross subsidies with a progressive rate structure will compensate for only a small part of the negative effects of the removal of cross subsidies. Four other policy options are also investigated targeting household incomes, food inflation and general inflation. Most of these options do not work as the required increase in budget deficit is unlikely to be bearable to the government. The only feasible option appears to be a direct price subsidy to agricultural sector: in this case food prices are held down, inflation is moderate and effect on household incomes is minimal.

1. Introduction

The average industrial power tariffs in India have increased from INR 4.16/kWh in 2007 to INR 7.64/kWh in 2015. This occurred in part because agricultural power tariffs are cross-subsidized by industrial tariffs. Agricultural tariffs were INR 0.77/kWh in 2007, which amounted to about 18% of industrial tariffs. Although agricultural tariffs increased (to INR 1.83/kWh in 2015), they still amount to only 24% of industrial tariffs. On average, Indian industries pay about 12% more than the average cost of supplying power, while agricultural consumers pay about 55% lower.[1] Consequently, although industries consume more power (365 MWh in 2015) than agriculture (147 million MWh in 2015)[2], power generation and distribution companies struggle financially.

The scenario reported above varies significantly depending on context. States, the central government, and private organizations play roles in India's power sector. There are generation units wholly owned by state governments and the central government, and a significant portion of the total power supply is managed by private organizations. Although power is provided by the central government body through the Power Grid Corporation of India Limited, the distribution units are owned by either state-owned or private corporations. In such a situation, the structure of power tariffs throughout India is not homogenous. The tariffs structures vary across states and across sectors. For the end consumer, the tariff is based on the category and state to which the consumer belongs. In 2015, the agricultural tariff varied between INR 1.19/kWh and INR 2.50/kWh while the industrial tariff varied between INR 3.99/kWh and INR 10.02/kWh. For the DISCOMs, the tariff varies across states and the source of generation (conventional or renewable). The Electricity Act of 2003 created a framework for setting electricity tariffs and defined rules and regulations for all organizations in the power sector. The Act also entrusted the responsibility of approving tariffs to the Central Electricity Regulatory Commission (CERC) for units owned by the central government and units selling power to more than one state and to State Electricity Regulatory Commissions (SERCs) for units selling power within a single state. The exact method for determining power tariffs is largely left to SERCs and the CERC, which publish rates and guidelines for different entities to fix their tariffs from time to time.

Variations in power tariffs between states are also significant. For instance, for state-owned units in the state of Maharashtra, power tariffs are determined by the Maharashtra Electricity Regulatory Commission (MERC). There are several power generators and distribution licensees in Maharashtra, such as Tata Power, with a licensed area that is part of central Mumbai. The tariff Tata Power places upon different consumers in this distribution area is regulated and approved by the MERC. Reliance Infrastructure, Brihanmumbai Electric Supply & Transport (BEST), and Maharashtra State Electricity Distribution Company (MahaVitaran) are the other players that distribute power to Mumbai. While Tata Power and Reliance Infrastructure are private organizations, BEST and MahaVitaran are state-owned companies. The tariffs charged by all these Distribution Companies (DISCOMs) is regulated by the MERC. In Gujarat, the Madhya Gujarat Vij Company Limited is a leading DISCOM that supplies power to

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[1] Except the northeastern states (with the exception of Assam), where industrial power tariffs are also significantly subsidized.

[2] Source: Ministry of Agriculture, Govt of India (ON643) & (16361) and Central Electricity Authority, Ministry of Power, Govt of India

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central Gujarat, while Dakshin Gujarat Vij Company Limited supplies power to southern Gujarat. Both are state-owned DISCOMs and their tariffs are regulated by the Gujarat Electricity Regulatory Commission. Each SERC has its own priorities and sets tariffs and subsidies accordingly, although within the limits set by the National Tariff Policy of 2006.

There are two tariff systems in India, one for the consumers which they pay to the DISCOMS and the other one is for the DISCOMS which they pay to the generators, which is discussed later on.

The distribution utilities continued to face financial constraints due to a variety of reasons – power theft, inefficiencies, high overheads etc. One of the major reasons is the reluctance of state governments to revise tariffs periodically and the supply of electricity to certain category of consumers at free of charge or well below the cost of supply. As a result of this, distribution utilities were forced to borrow funds from the financial institutions in the past few years on short term basis to manage their operations. The level of such short term borrowings as well as the payment to power generation companies accumulated to un-sustainable level and financial institutions refused to further continue lending the distribution utilities (Planning Commission, Govt of India, 2014).

The approximate accumulative losses of all DISCOM companies in India amount to over INR 3000 billion and they are bleeding for about INR 800 billion every year[3]. They incur losses of about Re 1 per unit of power. These losses occur due to a variety of reasons such as cross subsidies, 23% Aggregate Technical & Commercial (AT&C) losses as of 2014–15[4], more supply to the subsidized agriculture sector as agriculture is becoming more mechanized and industry is increasing its captive generation capacity. With removal of cross-subsidy, one of the factors contributing to the ill-health of DISCOMs shall be taken care of. However, the losses on account of the high AT&C losses will continue to remain a factor in impacting the financial; heath of the DISCOMs.

1.1. Details of the tariff systems in India

There are two tariff systems, one for the consumer which they pay to the DISCOMS and the other one is for the DISCOMS which they pay to the generating stations. First the discussion is about the **tariff of electricity** for the consumer i.e. the cost consumer pay to the DISCOMS. The total cost levied on the consumer is divided into 3 parts usually referred as 3 part tariff system.

Total cost of electrical energy (INR)=fixed cost +semi fixed cost +variable cost

$$=(a + b*kW + c*kWh)$$

Here, a=fixed cost independent of the maximum demand and actually energy consumed. This cost takes into account the cost of land, labour, interest on capital cost, depreciation etc.

b=constant which when multiplied by maximum kW demand gives the semi fixed cost. This takes into account the size of power plant as maximum demand determines the size of power plant. These demand charges are intended to recover the cost of facilities (such as power transformers, wires and power plants) available to provide the maximum amount of electricity which customer may require at any time.

c=a constant which when multiplied by actual energy consumed kWh gives the running cost. This takes into account the cost of fuel consumed in producing power. Thus the total amount paid by the consumer depends on its maximum demand, actual energy consumed plus some constant sum of money.

The tariff system existent in India for the DISCOMS is regulated by CERC and SERCs. This tariff system is called availability based tariff (ABT). It is a tariff system which depends on the availability of power. It is a frequency based tariff mechanism which tends to make the power system more stable and reliable. This tariff mechanism also has of 3 parts: Fixed charge+capacity charge+UI (Unscheduled interchange). The fixed charge is same as that discussed above. The capacity charge is for making the power available to them and depends on the capacity of plant and the third one is UI. If every things goes well, power demand is equal to power supplied and the system is stable and frequency is 50 Hz. But practically this rarely happens. One or more state overdraws or one or more Generating Station under supplies. This can lead to deviation in frequency and system stability. If demand is more than supply, frequency dips from normal and vice versa. UI charges are incentive provided or penalties imposed on the generating stations. If the frequency is less than 50 Hz, implies demand is more than supply, then the Generating Station which supplies more power to the system than committed is given incentives. On the other hand, if frequency is above 50 Hz, implying supply is more than demand, incentives are provided to Generating Station for backing up the generating power. Hence it tries to maintain the system stability. For further details on ABT, please refer to National Power Training Institute, 2009.

Here the discussion is on mainly the first type of tariff i.e. the tariff that the end consumers pay to the DISCOMS.

Recently, the Indian government has shown interest in reducing the extent of cross subsidization of tariffs. Between 2007 and 2015, the agricultural power tariff was increased by 138%, compared to the 47% increase in the industrial power tariff. As a substitute for cross subsidies, the government proposed a low base rate for both agriculture and industry (National Tariff Policy, 2006). The rate then became progressive; in other words, it increases with the amount of electricity consumed. The Electricity Amendment Bill of 2014, which further amended the Electricity Act of 2003, aimed to fully remove cross-subsidization in the electricity sector in India, requiring each SERC to specify a timeline for reduction of cross-subsidies. Some states have proactively started removing cross-subsidies. For example, the state of Maharashtra, which has one of the highest industrial power tariffs in India, is seeking to reduce its industrial power tariff by around 30% by decreasing farmers' need for the state to supply cheap electricity. It plans to give solar water pumps to farmers and reduce their dependence on conventional energy[5].

For simulation purposes, the above scenario has considerably simplified in order to make the analysis tractable. It is assumed that different states and organizations have uniform mean rates[6]. The broad research question is as follows: What are the effects of substituting cross subsidization with a progressive rate structure? This broad research question was split into two separate questions: What is the possible effect of increase in electricity tariffs (i) without changing the rate structure (cross subsidization) and (ii) with change in the rate structure (progressive rate structure)? The answers to the two research questions were combined to obtain the overall results.

The four industrial sectors that contribute the most to the manufacturing GDP of India were selected for analysis. As of 2011–12, these industrial sectors included chemicals and chemical products (12.2%), machinery and equipment (11.1%), basic metals (9.7%), and textiles (9.2%)[7]. The agriculture sector was also considered, as it contributed to almost 17% of the overall GDP of India in the same period[8]. Before running the simulations, first it is estimated whether these industries experienced constant or increasing returns to scale using firm-level data.

2. Literature review

Energy subsidies have resulted in excessive and inefficient energy use, contributing to price volatility and discouraging much-needed investment

[3] Interview with Ashok Khurana, Director General, Association of Power Producers at http://m.moneycontrol.com/news/economy/need-to-dealdiscom-losses-onstate-level-expert_1506161.html

[4] http://powermin.nic.in/upload/loksabhatable/pdf/LS19032015_Eng.pdf

[5] http://articles.economictimes.indiatimes.com/2015-02-10/news/59005191_1_power-tariff-solar-water-pumps-state-grid

[6] Since the basis of the CGE model is the SAM and the SAM is constructed at a national level (and not at individual state level), hence a uniform power tariff is assumed at India level for the sake of this analysis. This power tariff is an average tariff based on weighted average tariffs of each state (and category of consumer) and the weights used are the power consumed by each state (and category of consumer).

[7] https://data.gov.in/catalog/manufacturing-gdp-sector-and-employment-projections

[8] According to the Central Statistics Office.