Implications of energy subsidy reform in India

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\textbf{A B S T R A C T}

This paper analyses welfare impact of energy subsidy reform in India based on the data from 1970-71 to 2014-15. To this end, Auto Regressive Distributed Lag (ARDL) model and Error Correction Model (ECM) have been estimated to quantify the short-run and long-run price and the income elasticity of various energy products. The results show that the price elasticity of demand for all fossil fuels is low, but the respective income elasticity is higher. Therefore, an increase in the general price level caused by the subsidy reform will lead to the erosion of real income and will have related welfare implications in India. The results also reveal that energy expenditure will obviously increase and hence energy consumption will decline depending upon the extent of the withdrawal of subsidy. Therefore, policy makers in India, while undertaking further reforms, must ensure that the subsidy reaches to those who truly deserve, so that the socioeconomic casualty of reforms can be minimized along with achieving fiscal goals.

1. Introduction

The intervention of government in the functioning of modern market economies to influence the process of resource allocation with policy tools, such as subsidy, remains to be a bone of contention in the discourse of political economy. However, the market for non-renewable energy resources is one of the areas that have witnessed active intervention of governments all over the world, especially in developing countries through comprehensive subsidization of energy consumption. For instance, the total global fossil fuel subsidy was $550 billion in 2013 (\textit{World Energy Outlook}, 2014). With the intention of achieving socioeconomic goals such as eradication of the energy poverty, fair distribution of national resources, and protection of price competitiveness of domestic firms, the governments have started intervening in the energy market (Liu and Li, 2011) and (\textit{International Institute for Sustainable Development (IISD)}, 2012\textsuperscript{a}). However, the subsidization policy has attracted global scrutiny in the recent past due to various reasons\textsuperscript{b} (Lin and Jiang, 2011; Anand et al., 2013) and Solaymani and Kari (2014). For example, the burgeoning demand for non-renewable energy resources has resulted in the increase in the subsidy bill of the government. It causes fiscal strain on the exchequer and has also led to macroeconomic issues such as crowding out of private investment, inflation, and inadequate allocation to social spending (Saunders and Schneider, 2000). That is why the Parikh Committee report\textsuperscript{2} (2010) and Kelkar committee report\textsuperscript{b} (2012), for instance, have suggested a gradual phasing out of energy subsidy to deal with its negative macroeconomic implications in India.

According to \textit{WEO} (2014), the global demand for energy resources is projected to increase by 37\% with the increase in per-day demand for oil from 90 Million Barrels (MB) in 2013 to 104 MB/day by 2040. Nearly 60\% of the total global energy demand by 2030 will be accounted by Asia (except Japan and Korea) along with South America, the Middle East, and Africa. There are issues such as the poor implementation of the subsidy scheme in the form of extending the benefit to the non-poor, often either driven by political considerations or due to institutional deficiencies. These are the major reasons for making subsidy regime unsustainable (\textit{World Bank}, 2008; Lin et al., 2009; Lahoti et al., 2012; Dartanto, 2013).\textit{WEO} (2014) has observed that the total world fossil fuel subsidy to the tune of $550 billion in the year 2013- which is four times more than...
the subsidy provided to renewable energy resources ($120 billion) – is holding back the investment in improving the energy efficiency and renewable resources. It is against this background that various governments all over the world have initiated reform measures to do away with the practice of subsidizing the use of non-renewable energy resources (Bazilian and Onyeyi, 2012). Okiogbo and Enkebe (2011) and Clements et al. (2013) have argued that energy subsidy reforms across the world are successful only in such countries where certain optimal approaches have been adopted. For example, the comprehensive assessment of costs and benefits, reforming in phases, public campaign to educate the people, and sufficient welfare programs to mitigate the impact of reforms on deserving people were all a part of the optimal approaches.

The government of India has initiated several measures since 2010 to reform its non-renewable energy subsidy program. These measures are expected to have an impact on various sections and sectors of the economy which are outlined in the next section (Gangopadhyay et al., 2005). In this paper, we make an overall assessment of the welfare implications of the energy subsidy reforms in India (Coady et al., 2015). Specifically, we examine the impact of reform on the general price level, the volume of energy consumption, and the expenditure incurred on energy resources. Compared to the previous studies, this study is all the more important as it is the most comprehensive study of the impact of energy subsidy reform in India to date as the variety of energy resources examined here. Also, it provides the extent of the likely impact of energy subsidy reform, and thereby enables the policy makers to take informed decisions while undertaking reform measures (Clements et al., 2013).

To this end, we have estimated an Auto Regressive Distributed Lag (ARDL) model and an Error Correction Model (ECM) to determine price elasticity of demand for various energy products covering the period from 1970–71 to 2014–15. The results show that with the complete removal of energy subsidy, the general price level increases in the range of 3.8% and 1.38% respectively during the high and low oil price regime. Therefore, the price of the crude oil in the international market will determine the impact of subsidy reform on the welfare of the people. Due to the inelastic demand for all energy products, a reduction in subsidy results in a marginal reduction in the consumption, and a substantial increase in the amount spent on these products.

The organization of the remainder of the paper is as follows. Section 2 presents the review of literature. The background of energy reforms in India is outlined in Section 3. The details regarding data and empirical model used here are furnished in Section 4. The Section 5 presents empirical results. Section 6 presents the discussion of the results, and the Section 7 that concludes the paper.

2. Literature review

The focus of the previous studies on energy subsidy was largely on the impact of the removal of consumer subsidy on the economy. Since the consumer subsidies were dominant in the developing countries compared to the producer subsidies in the developed countries, the literature reviewed here are mostly on the developing countries. In an early study, Burniaux et al. (1992) have found that the abolition of energy subsidy will reduce the demand for and the price of the non-renewable energy resources in the international market by 2050. Birol et al. (1995) shows that Algeria, Iran and Nigeria have benefited from subsidy reform via enhanced oil saving capacity which can be used in the future. The increased oil revenue due to this policy could be used for the purpose of development in the country. In addition to finding that the fossil fuel subsidy reforms facilitate carbon emission reduction (Anderson and McKibbin, 2009), have also reported that the efficiency in the use of the energy resources could also be achieved by the reduction of energy subsidy. Evidence from developing and transition economies cited by Saunders and Schneider (2000) shows that the subsidy reform influences the price, and this price effect is transmitted to consumption, production and trade in these economies, and along with it, this effect is being transmitted to other countries having external linkages with the reformed countries.

The estimates of Saboohi (2001) from Iran have indicated that the cost of living of households in different expenditure groups is increased both in rural and urban areas as a result of the subsidy reform, and the impact is substantial on low-income groups in the rural area. Similar evidence is provided by Battacharya and Batra (2006) while observing that freeing of the domestic energy prices from a government controlled pricing system with a massive subsidization will lead to a sustained impact on the general price level, and thereby will have a negative impact on the economic agents like households and industry. Likewise, Clements et al. (2003) have showed, based on the evidence from Indonesia, that poor urban households are the most affected by the petroleum price liberalization. In the short run, the reform results in the increase in price level and a decrease in the household consumption, and this leads to the decline in the output of firms in sectors other than petroleum. Gangopadhyay et al. (2005) have reported that the benefits of LPG and kerosene subsidy in India are largely enjoyed by people in higher expenditure groups than the lower expenditure groups in urban as well as rural areas. Moreover, the urban area received more subsidy on a per-capita basis than the rural area, implying that the subsidy has failed to affect the practice of the biomass usage. A considerable diversion of subsidized kerosene to rural areas has also been noted.

Ref. Burniaux et al. (2009) have shown that the gradual removal of fossil fuel subsidies in 20 non-OECD countries will enable these countries to reduce their demand for such energy resources by 2050, apart from their contribution to environmental pollution. However, the reduced demand in these countries will lead to a decrease in the price of these resources in the global market as a result of which the demand for them may increase elsewhere, mitigating the beneficial impact of the energy subsidy reform on the environment. Lin and Jiang (2011) have analyzed the energy subsidy reform in China based on the price-gap approach. The Empirical results of the study have shown an increase in the price of the energy resources and a decrease in the energy consumption. In addition, Liu and Li (2011) have found, in this regard, that a gradual removal of subsidy on a priority basis will be more desirable for China. For example, the rolling out the removal of subsidy for coal first, and after that undertaking the removal of other subsidies on fuel items like oil.

Striking a different note, Bazilian and Onyeyi (2012) have analyzed the impact of the subsidy reform on business in Nigeria. They argue that in an environment characterized by severe electricity constraint, the energy subsidy removal, all on a sudden, will affect the firm’s ability to access energy services. It further increases the already existing high cost of production, and reduces demand followed by an increase in the price level on account of the subsidy removal. Moreover, the energy subsidy reform will be detrimental to the business, if the government does not undertake alternative measures in the form of ensuring quality, energy supply or other services. Therefore, they suggest that sufficient preparatory initiatives, such as the development of adequate energy infrastructure, should be undertaken before the subsidy reform measures are rolled out. Lin and Li (2012) have assessed the potential impact of the energy subsidy reform on China as well as on other countries closely integrated with China to find out possible ways to mitigate the impact. The study has reported that the subsidy removal would have a negative impact on the overall output in China and a positive impact on the overall output of other regions of the world giving the subsidy. In fact, they found that the measures such as export subsidy and reduction in capital tax would help mitigate the negative impact of the fuel subsidy removal on Chinese output.

According to Anand et al. (2013), elimination of the subsidies would entail a substantial increase in the retail price level in India, particularly for kerosene and LPG, and the subsidy reform would also result in the decrease in the real income of both the lower income and...
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