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Household welfare implications of fossil fuel subsidy reforms in developing countries

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HIGHLIGHTS

- That the welfare impact of the removal of fossil fuel subsidy are positive for governments.
- However the impact on private households is rather mixed.
- Where the welfare impact is negative, governments can preserve household welfare.
- This can be done by compensating households while still retaining some fiscal savings.

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ABSTRACT

With over 200 countries reaching an agreement with the stated aim of restricting global warming to "well below 2° C above pre-industrial levels" – the most comprehensive climate change agreement was recently signed. Though most of the hard work lies ahead, it marks an important first step for the collective global community to address climate change. Fossil fuels continue to remain one of the largest contributors to greenhouse gas emissions and for many developing countries high levels fossil fuels continues to enable an overconsumption of fossil fuels. Given the sensitivity of governments to subsidy reforms, this study examines the household welfare implications of the removal of fossil fuel subsidies. It finds that while welfare implications are unambiguously positive for government the results are mixed for private households, although in an overwhelming majority of cases, the results are positive. However, even in the cases where the welfare implications are negative for private households we find that it is possible for governments to carry out the reforms in such a way as to be welfare improving to households incomes by compensating them with some of the fiscal savings gained from the subsidy reform.

1. Introduction

1.1. Developing country governments apply energy subsidies to achieve various socio-economic objectives

High and rising energy prices along with volatility of internationally traded energy prices have motivated several developing-country governments to introduce energy subsidies in a bid to protect the real incomes of the poor and allow for consumption smoothing among households.[1] Energy subsidies are also provided to foster industrial development, notably in energy exporting economies, which inevitably attracts investment in energy intensive sectors. Further, given the critical role modern forms of energy (including from fossil fuels) play in all sectors of an economy (from industry to social services), energy subsidies are implemented in many countries in an effort to make modern forms of energy accessible to the poor who might otherwise be denied their benefits. The problem is real and widespread. In 2011, nearly 1.3 billion people globally, 95% of which were located in Sub Saharan Africa and Asia, lacked access to electricity and more than 2.6 billion relied on traditional use of biomass for cooking. However, while energy subsidies might have been introduced for altruistic reasons, in several economies political-economic considerations have been the main motivation for keeping them afloat. For many oil exporting economies, governments may sustain low oil prices because their citizens consider the offer of low oil prices a right. However, in other economies, particularly those with weak institutions, subsidies are sustained because it is one way the government sees to redistribute its wealth (Cheon,

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[1] To smooth consumption some economies have adopted market-based risk management mechanisms such as long-term contracting and market-based conditional contracts (World Bank, 2009).

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0301-4215/

Urpelainen and Lackner, 2013).

1.2. Subsidies tend to be expensive policy tools

Unless introduced to explicitly correct a market failure, subsidies distort economic incentives and contribute to the misallocation of resources. Among developing economies consumption fossil fuel subsidies tend to be the most pervasive form of energy subsidies.[2] In the Middle East and North Africa where energy subsidies are pervasive, the energy intensity of GDP is among the highest globally. In Egypt, Turkmenistan and Venezuela, all of whom have some of the highest subsidization rates, use more than twice as much energy per unit of economic output than do Colombia and Peru that have minimal energy subsidies. The IEA estimates that in 2009, the low prices associated with direct subsidies of fossil-fuels generated some $312 billion in excess consumption of what are scarce global resources, and by extension bias investments against more sustainable forms of energy. Furthermore, while energy subsidies encourage investment in energy intensive activities they can depress investment in the downstream energy sub-sector, especially if subsidies are imposed by forcing a below market price on producers which are not otherwise compensated for. This tends to boost demand and reduce supply, thereby aggravating the energy deficit. In some cases, however, governments compensate producers for lost revenues to incentivize investment. However, inevitably this has fiscal implications (see fiscal discussion below).

1.3. Energy subsidies tend to be regressive, especially when provided on a universal basis

Many studies find that when imposed in a non-targeted fashion the economic benefit of subsidies are concentrated on the richest households because they consume more of the subsidized product than poor households (Table 1). Studies reviewed by the World Bank (IEG, 2009) across developing countries found that only 15–20% of subsidies benefitted the poorest 40% of the population, a result that confirms an earlier study (Coady et al., 2006). Del Granado et al. (2010), in a study of 20 developing countries, showed that on average only $3 of every $100 in gasoline subsidies accrued to the bottom 20% income group, with the highest income group receiving some 40% of the subsidies. World Bank (2014) also observed that in Haiti some 83% of petrol and diesel subsidies went to the richest 10%, while the bottom 10% only received 0.1%. Soile and Mu (2015) find that in Nigeria, the top 20% households enjoy twice as much as the benefit of fuel subsidies. These results are also confirmed in several other studies.

1.4. Energy subsidies may induce fiscal pressures

In 2012, fuel subsidies alone (measured on a pre-tax basis as the difference between the local and international prices of oil products) represented 2.5% of developing country GDP or 9.2% of government revenues according to IMF data (see Table 2). Subsidization rates were highest among oil exporters, particularly those in the Middle East and North Africa, and in Latin American and the Caribbean region. These estimates, however, represent a lower bound estimate as they do not include other forms of fossil subsidies. Undoubtedly, where revenues remain constrained, fossil fuel energy subsidy expenditures can contribute to fiscal pressures particularly in the non-resource rich economies with limited fiscal space. Government expenditures on fossil fuel subsidies divert resources from more productive sectors (such as infrastructure where this remains a binding constraint) and other pro-poor sectors of the economy including health and education.

1.5. The full economic costs of subsidies, including from damage to the environment, are likely to be even higher

Economic costs such as through the misallocation of resources, lost growth and reduced employment are less explicit. Plante (2013), using a two-sector small open economy model, finds that the introduction of fuel subsidies leads to welfare losses, with the bulk of the welfare losses accruing due to the distortion in relative prices. Their results show that regardless of how the subsidy is financed it leads households and firms to over-consume, drives up wages in the economy and drives up production in the traded sector. Beyond the misallocation costs, the detrimental environmental costs due to pollution and global warming is likely to be even more damaging hence requiring the need to internalize the marginal social cost of fossil fuels to reflect the cost to society (IMF, 2013).[3] Several studies point to the reduction in C02 emissions and energy intensity in production from the reduction in energy subsidies (Solaymani and Kari, 2014; Lin and Jiang, 2011; Moshiri, 2015). The phasing out of energy subsidies at the global level is estimated to yield a decrease in carbon emission by between 5–7% and a real income increase of 0.1% (OECD, 2000; G20 Secretariat, 2009). Nonetheless, outcomes will differ by country. For instance, Khalid et al. (2014) find that in Nigeria that while a reduction in the subsidy generally results in an increase in Nigerian GDP, it can have a detrimental impact on household income, and in particular on poor households. However, accompanying the subsidy reduction with income transfers aimed at poor households or domestic production of petroleum products can alleviate the negative impacts on household income. Similarly, in Indonesia, the 100% removal of fuel subsidies and the reallocation of 50% of them to government spending, transfers and other subsidies could decrease the incidence of poverty by 0.277% points (Dartanto, 2013). While a number of recent papers have focused on individual countries using different analytical frameworks, this study will be using a consistent framework to analyze the welfare impact of subsidy reforms for 20 developing countries.

2. Model and data

Various approaches have been adopted in the analysis of the economic impact of subsidy removal. These include partial equilibrium approaches such as effective rate of assistance, price gap approach, input-output framework and computable general equilibrium methodology. To carry out our analysis of the potential welfare impacts of subsidy reforms we use a computable general equilibrium methodology. CGE models are based on the Arrow-Debreu General Equilibrium model, hence specify behavioral relations among rational economic agents (households, producers, savers, government), which have economy-wide impacts. CGE model applications have been extensively used to carry out a wide variety of counterfactual policy simulations from trade policy reforms to environmental impact analysis, and are well-suited to capture the impact of subsidy reforms. The GTAP model remains one of the most widely used global CGE model used for running multi-country policy scenarios and is well suited for examining the welfare impacts of the removal of fossil fuel subsidies in developing countries. It provides a consistent methodological framework that allows us to compare the outcome of fuel subsidy

[2] In high-income countries production subsidies are higher.

[3] Post tax estimates from the IMF (2011) are some three times larger than pre-tax estimates.