Revisiting Energy Subsidy Calculations: A Focus on Saudi Arabia

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The global debate surrounding fossil fuel subsidies has become more contentious due to climate change. Many governments offer subsidies in the form of below-market energy prices to spur industrialization and support lower-income households. While some governments do this through direct transfers to producers or consumers, other governments forgo revenues that could have been attained from selling energy at higher prices instead. Countries that fall in the latter category are typically energy exporters that experience large rents.

After reviewing various definitions of energy subsidies, we adopt one that compares an oil exporter's domestic energy prices with its costs, including opportunity costs. Applying this definition along with exhaustive energy price and quantity data, we estimate the magnitude of Saudi Arabia's energy subsidies from 2007 to 2018, a period that encompasses rapid domestic socio-economic growth and two waves of energy price reform.

We first apply the conventional price-gap method, where the price gap is some fixed reference price minus the domestic price. If a fuel is traded internationally, its market price is used as the reference price. If it is not, then the production cost is used instead. We find that total energy subsidies peaked in 2012 at 85 billion 2019$ (2019 U.S. dollars), with crude oil, diesel, and gasoline constituting 70% of the total. In 2016, as global oil prices fell and the first wave of energy price reform kicked in, total energy subsidies declined to 39 billion 2019$. The second wave in 2018 mainly reduced electricity and gasoline subsidies, although total energy subsidies increased to 47 billion 2019$ due to a recovery in international oil prices.

However, the price-gap method does not consider how subsidy removal affects domestic consumption, fuel exports, and international market prices. For example, removing the crude oil subsidy in Saudi Arabia would reduce domestic crude oil demand, freeing up more crude oil for export. The resulting increase in supply on the international market will depress global oil prices, thus reducing the newly reformed domestic crude oil price, which would now be directly linked to the international price. A lower domestic crude oil price would alter domestic demand and exports again. This process would repeat until a new equilibrium is reached.

In this vein, we propose a method for calculating the implicit subsidy that accounts for these market responses. The implicit subsidy, or foregone revenue, consists of the revenue obtained from selling the fuel locally and globally at the new international market price, minus the lost revenue on the initial exported quantity that is now sold at the new relatively lower international market price. If domestic demand does not respond to higher prices, and thus there are no additional exports, our method collapses to the simple price-gap equation.

Our method demonstrates that the magnitude of total energy subsidies in oil exporters such as Saudi Arabia, in which a large share of subsidies represents forgone revenues, may be considerably lower than the value estimated by the simple price-gap method. For instance, the implicit crude oil subsidy in 2018 amounted to $8.6 billion using the price-gap method. If the short-run domestic price elasticity of crude oil demand is -0.06 and Saudi Arabia exported all the domestically saved

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The Energy Journal, Vol. 44, No. 1

crude oil (due to subsidy removal), we demonstrate using our method that the crude oil subsidy would fall to around $4.6 billion, 46% smaller than the price-gap estimate.

This study contributes to the literature in several ways. We not only provide comprehensive estimates for energy subsidies in Saudi Arabia by fuel and over time, but we also introduce a method that produces more realistic estimates of implicit energy subsidies for oil-exporting countries. Given that our method only requires ex-post information about the past and little additional data, it can add significant value to future studies of global energy subsidies.