

JUNE 2016 | NUMBER 53

## The Environmental Cost of Global Fuel Subsidies

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In August 2015 the United Arab Emirates (UAE) raised domestic gasoline and diesel prices by 25 percent. UAE's energy minister, Suhail Al-Mazrouei, explained that the change was about "building a strong economy that is not dependent on government subsidies." Then, at the beginning of 2016, Saudi Arabia raised domestic gasoline and diesel prices by 40 percent in an effort to "achieve wide structural reforms in the national economy and reduce its dependence on oil."

These are unprecedented increases for two of the world's largest oil producers. Cheap gasoline and diesel have long been permanent fixtures throughout the Middle East and Northern Africa, so when the two largest OPEC producers reduce fuel subsidies, this is a significant change not just for UAE and Saudi Arabia, but for all of OPEC and beyond.

Subsidy reform is happening now because of low crude oil prices. As recently as 2014 crude oil prices were above \$100/barrel, but since plummeting at the end of 2014 have remained below \$50/barrel and as of March 2016 were just above \$30/barrel, the lowest price since 2003. Low crude oil prices reduce government revenue in oil-producing economies, increasing budget deficits and making fuel subsidies harder to afford. This financial urgency was the main motivation for UAE and Saudi Arabia to reduce subsidies and is usually a major motivation for energy subsidy reform.

Much less emphasized in the policy discussion, however, are the large external costs from gasoline and diesel subsidies. Removing fuel subsidies helps balance government budgets, but it also yields enduring benefits in the form of reduced emissions of carbon dioxide and other externalities. Worldwide the transportation sector is responsible for 23 percent of total energy-related carbon dioxide emissions (more than seven gigatons annually), so getting prices right in this sector is critical.

My research paper quantifies the environmental and other external costs of global fuel subsidies using the latest available data and estimates from the World Bank and International Monetary Fund. Under baseline assumptions about supply and demand elasticities, current subsidies cause \$44 billion in external costs annually. This includes \$8 billion from carbon dioxide emissions, \$7 billion from local pollutants, \$12 billion from traffic congestion, and \$17 billion from accidents.

To put these estimates into context, I also calculate the economic inefficiency caused by these subsidies; in economics lingo, these are known as deadweight losses. Fuel subsidies are inefficient because they lead to excess consumption, enabling purchases for which the private benefits are lower than private cost. This inefficiency occurs with or without externalities and reflects the lost value in the economy whenever fuels are sold to buyers

with low willingness-to-pay. Dead-weight loss is found to be \$26 billion annually, so combined with external costs, the total economic cost of fuel subsidies is \$70 billion annually.

My work then turns to discuss prospects for alternative fuel vehicles in countries that heavily subsidize gasoline and diesel. The current vehicle stock in heavily energy subsidized economies is, not surprising, overwhelmingly composed of gasoline and diesel vehicles. The paper reviews the relevant academic literature to evaluate the potential prospects for electric vehicles (EVs), natural gas vehicles, and flex-fuel vehicles operating with biofuels.

Although it might be possible to diversify the vehicle stock with sufficient government incentives, this approach is unlikely to cost-effectively reduce externalities. Alternative fuel vehicles do little to reduce traffic congestion and accidents, the two largest components of externalities. In addition, incentives for alternative fuel vehicles only indirectly address carbon dioxide and local pollutants and do so at a high cost per vehicle.

The particular country context also matters a great deal. One of the key findings in an emerging literature on EVs is that the environmental impact depends on the

local electricity generation portfolio. Most countries that subsidize fuels also have relatively carbon-intensive electricity, so a transition to electric vehicles would be unlikely to significantly reduce carbon dioxide emissions. Overall, the analysis points to “green” vehicle incentives being a poor substitute for subsidy reform.

The paper contributes to a growing literature on global fuel subsidies. Most of the work has focused on quantifying the dollar value of subsidies, but studies have also calculated deadweight loss and studied distributional effects. Other work estimates external damages from energy for 156 countries and uses these estimates to calculate the total economic and environmental cost of global energy subsidies. My work leans heavily on these previous studies, while doing a deeper dive on the transportation sector and with much more emphasis on heavily energy-subsidized economies.

## NOTE

This research brief is based on Lucas W. Davis, “The Environmental Cost of Global Fuel Subsidies,” National Bureau of Economic Research Paper no. 22105, March 2016, <http://www.nber.org/papers/w22105>.