The Environmental Cost of Global Fuel Subsidies

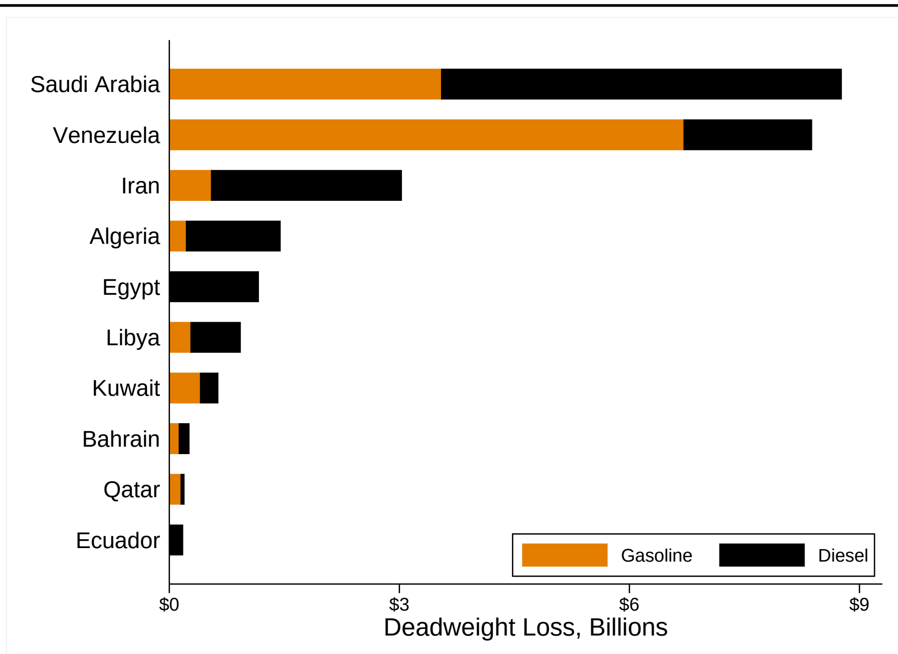
*Lucas W. Davis**,

Despite increasing calls for reform many countries continue to provide subsidies for gasoline and diesel. Subsidizing transportation fuels is inefficient because it enables transactions for which the buyer's willingness-to-pay is below private cost. This inefficiency is known as deadweight loss. Subsidizing fuels also imposes externalities. Excess gasoline and diesel consumption leads to increased carbon dioxide emissions, local pollutants, traffic congestion, and accidents. These external costs are in addition to deadweight loss, so the two areas need to be added together to calculate the total economic cost of fuel subsidies.

This paper quantifies the deadweight loss and external costs from global gasoline and diesel subsidies. The paper first describes a conceptual framework for evaluating the welfare cost of fuel subsidies, including providing graphical and analytical definitions of deadweight loss and external costs. These welfare costs are then estimated using the latest available data from the World Bank and International Monetary Fund. The paper reports fuels prices, aggregate subsidies, deadweight loss, and external costs.

Total global deadweight loss from fuel subsidies is estimated to be $26 billion annually. Deadweight loss is split roughly evenly between gasoline ($12.5 billion) and diesel ($13.5 billion). Saudi Arabia takes the top spot with $8.8 billion in deadweight loss with Venezuela right behind with $8.4 billion. These two countries, Saudi Arabia and Venezuela, represent about two-thirds of total global deadweight loss.

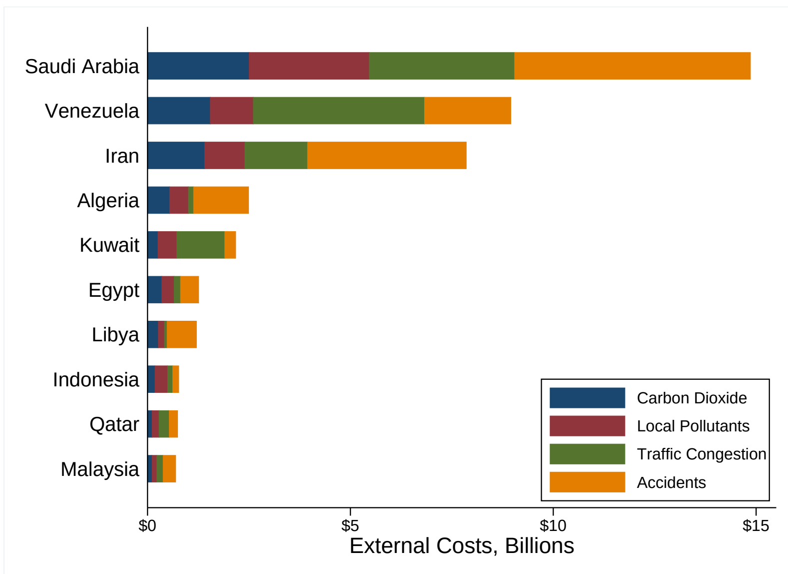
Figure 1: Annual Deadweight Loss from Fuel Subsidies, Top Ten Countries



Total external damages from fuel subsidies are estimated to be $44 billion annually. This includes $8 billion from carbon dioxide emissions, $7 billion from local pollutants, $12 billion from traffic congestion, and $17 billion from accidents. Combined with total deadweight loss ($26 billion), the total economic cost of fuel subsidies is estimated to be $70 billion annually.

Traffic congestion and accidents area a surprisingly large part of total external costs. Riyadh, Caracas, Tehran, and even Kuwait City are well-known for traffic jams and this is visible in the form of large traffic congestion costs in Saudi Arabia, Venezuela, Iran, and Kuwait. Accidents are estimated to be particularly costly in Saudi Arabia, Iran, Algeria, and Libya reflecting high baseline levels of vehicle accident fatalities. These externalities are rarely mentioned in policy discussions about fuel subsidies but they are quantitatively important components, as will come to no surprise to those who have spent time driving or being a pedestrian in Riyadh or Caracas.

Figure 2: Annual External Costs from Fuel Subsidies, Top Ten Countries



The paper 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- powered vehicles. Reviewing the relevant academic literature, the paper concludes that although it would 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 ameliorate traffic congestion and accidents, two of the largest external costs from driving. 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 paper contributes to a growing literature on global fuel subsidies. Most of the work has focused on quantifying the dollar value of subsidies (IEA, 2012, 2014; Clements et al., 2013), but studies have also calculated deadweight loss (Davis, 2014; Coady et al., 2015) and studied distributional effects (IEA, 2011; del Granado et al., 2012; Sterner, ed, 2012). Most recently, (Parry et al. 2014) estimated external damages from energy for 156 countries and (Coady et al. 2015) used these estimates to calculate the total economic and environmental cost of global energy subsidies. This paper leans heavily on these previous studies, while doing a deeper dive on the transportation sector and with particular emphasis on heavily energy subsidized economies.