THE EFFECT OF SUBSIDY REMOVAL ON GASOLINE AND DIESEL FUEL CONSUMPTION AND CARBON EMISSIONS

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Overview

Gasoline and diesel fuel for road transport are the dominant products from a barrel of oil accounting for roughtly half of the barrel in 2015 and around 20% of global carbon emissions. In many countries these two fuels are taxed and sometimes quite heavily. The taxes may be earmarked for road construction and maintenance as in the U.S. or contribute to overall tax revenues as is more common in the European Union. However, in a few countries these fuels have been subsidized most commonly in oil exporting countries as a way to spread their resource wealth a little more widely. However, with increasing concerns over climate change and budgetary pressures, there has been increasing pressure to remove these subsidies. Indeed the G20 countries agreed in principle to phase-out fossil fuel subsidies in 2009. (https://www.reuters.com/article/us-g20-energy/g20-agrees-on-phase-out-of-fossil-fuel-subsidies-idUSTRE58O18U20090926)

Anouti and Dahl (2014) applied price elasticities from Dahl (2012) to estimate the effect the phase out of such subsidies as of 2008 would have on fuel consumption and carbon emissions. They considered four phase out scenarios for 123 countries: 1. Increase prices to remove any fuel subsidies, 2. Also increase prices to include highway maintenance costs, 3. increase prices even further to include externality costs for CO2, traffic accidents, congestion, and local pollutants, and 4. totally rationalize prices to include cost of production, road maintenance and externalities, which in some countries lowered prices. By totally rationalizing prices (scenario 4), to include all externalities required higher gasoline prices in 46 countires, higher diesel prices in 74 countries but reductions in price in the remainder. The increases far outweighed the reductions and they found that total demand for gasoline could be reduced by 8.5 percent and that of diesel by 5.7 percent leading to more than $400 billion in additional government revenue. In addition CO2 emissions from these two fuels would fall by about 6%.

Anouti and Dahl (2018) updated these estimates to 2014 on a total of 119 countries. They applied the same 4 scenarios. Although low oil prices made it politically easier to reduce subsidies for oil products, they found that 17 countries still directly subsidized gasoline and 42 directly subsidized diesel fuel. They found that totally rationalizing fuel prices to include roal maintenance and all externalities would require price increases in gasoline in 46 countires, price increases in diesel in 74 countries but reductions in the remainder of the countries. Again the price increases far outweighed the decreases and consumptions of both fuels fell by a respectable 9% as did CO2 emissions. Again the additional government revenues from these fiscal changes was more than $400 billion.

Although a case can be made for reducing subsidies and internatizing externalities and the above studies suggest they could work, removing subsidies is easier done on paper than at the pump as the recent riots in France illustrate. Such riots have been common across time whenever governments have sought to remove subsidies and it seems not much progress had been made on reducing subsidies by 2014. However, a number of countries have successfully reduced subsidies after 2014. (e.g. India, Indonesia, UAE, Saudi Arabia, Qatar, Bahrain, Oman, and Venezuela https://www.mckinseyenergyinsights.com/insights/impact-of-gasoline-and-diesel-subsidy-reforms-india-case-study/). As more complete data is just now coming available for 2016 our contribution in this paper will be to actually quantify the reduction in subsidies from 2014 and estimate the effect of the reduction.

Methods

As in the previous studies, we will compute the amount of the direct subsidy by developing wholesale prices and adding refining and distribution margins and comparing this to the actual gasoline price in 2016. This will allow us to determine which countries have actually reduced their subsidies and by how much. To measure the effect of the subsidy reduction, we will use the income elasticity at the old price to forecast what gasoline and diesel consumption would have been with the change in subsidy as follows

$$Q_{i2} = Q_i \left(\frac{Y_{i2}}{Y_i} \right)^{\beta_i}$$

Qi is consumption of fuel i in our base year 2014 with i = gasoline and diesel. The gasoline and diesel income elasticities (βi) used in the above formula are adopted from Dahl (2012). They vary by country and as she found that these elasticies changed somewhat as income per capita increased they will be adjusted to updated per capita values.

By identifying countries that have successfully reduced subsidies, we will also consider whether the policies implemnented when oil prices were lower have more recnelty been recinded as oil price have increased and what implementation strategies seemed to have been the most successful. As in the earlier papers, we will also update highway maintenance and externalities to include the latest values available and see whether prices in all countries available have moved towards or away from more rational pricing.

Results

The results from this model will include estimates of subsidies for gasoline and diesel fuel for more than 100 countries. Direct subsidies will be measured as prices below world prices. Indirect subsidies will include a failure to include highway maintenance as well as environmental externalities. For those countries that have reduced subsidies, we will measure the effects of the reduction in subsidies on gasoline and diesel consumption, carbon emissions, the government budget, fuel costs to end users, and consumer welfare. As in the earlier papers, sensititivity tests will be included to test the robustness of the results.

Conclusions

The results from our modelling will allow us to gauge how much progress has been made in rationalizing fuel prices from the higher oil price environment prevailing in the first half of 2014 to the lower prices of 2016. We consider which countries have been most successful and try to identify lessons we can learn from their success. We can uee the results to inform policy makers on what the actual impacts of their polices have been.

References

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