Rationalizing Transport Fuel Pricing Policies with Effects on Global Fuel Consumption

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Overview

Transport fuel policies have been shaped by country's self-interests as well as the historical context, often unrelated to the consumption of those fuels. For example, the high transport fuel taxes in Europe originated from the need to fund post World War II reconstruction plans. Across those countries, lower diesel taxes aimed at keeping down freight transport rates and making local industry more competitive. In the U.S., gasoline taxes have been mainly earmarked for road maintenance. Whereas across most major oil exporting countries transport fuel subsidies are more typically a social transfer. Today, a confluence of factors including budgetary pressures and growing concerns about associated consumption externalities, is building momentum towards rationalizing the pricing of transportation fuels to reflect direct and indirect costs. In this paper, we aid policy makers by quantifying the expected effect of implementing these schemes on global transport fuel consumption. Our analysis includes 124 countries accounting for more than 98% of global road transport fuel consumption.

Methodology

We will evaluate the impact of the following direct price policy scenarios on the demand for gasoline and diesel transport fuels:

1. Remove fuel subsidies: we raise all subsidized gasoline to the production cost, leaving all other prices at current levels;
2. Add highway maintenance costs to production for any country pricing below this level, leaving all other prices at current levels;
3. Add external costs to production and highway maintenance costs for any countries pricing below this level, leaving all other prices at current levels; and
4. Case 3 except any prices above case 3 are lowered to the case 3 numbers.

Such analysis has been aided by the historical survey, Dahl (2011), which contains country level price elasticities for gasoline and diesel fuel by income and price group. For each scenario, we will be measuring the new quantity demanded induced by a change in price levels from the current retail prices (P_i) to the policy scenario price (P_{i2}). Holding constant all other variables such as income and population we use the following formula:

$$Q_{i2} = Q_i \left(\frac{P_{i2}}{P_i} \right)^{\beta_i(P_i, P_{i2})}$$

Q_i is consumption of fuel i in our base year 2008 with i = gasoline and diesel. The gasoline and diesel price elasticities (β_i) used in the above formula are adjusted according to any changes induced by the price level changes in each scenario as developed by Dahl (2011).

Expected Results

A major contribution of this study is the development of the price vectors for each policy scenario. Thus, we quantify the amount of the fuel subsidies, the highway maintenance cost, and the externalities by country. In addition, our results will include the reduction of highway transport fuel consumption by fuel, by country, and by policy.

Conclusions

Our results will quantify the effects of current irrational fuel pricing policies on fuel consumption and environmental emissions as well as providing inputs into partial and general equilibrium analysis of fuel and climate policies. Although our analysis is focused on fossil energy, the methodology could be applied in any context where fuels are irrationally priced such farm policies that subsidize ethanol and biodiesel. Fuel quantity restrictions could also be analysed, if they can be converted into price effects. In addition future work could make the analysis dynamic by taking into account increasing income and population.

References

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