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How price inelastic is demand for gasoline in fuel-subsidizing economies?

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ABSTRACT

In recent years, governments that have historically subsidized domestic fuel consumption face an ever-growing challenge in maintaining fuel subsidies and have embarked on subsidy reform. This paper estimates the price and income elasticity of demand for gasoline in countries where fuel prices are government-subsidized. We make use of biennial panel road-sector data for 32 countries over the 1998–2010 period and find demand for gasoline to be price inelastic both in the short run and long run. We estimate the short-run price and income elasticities at −0.05 and 0.16 and the long-run price and income elasticities at −0.25 and 0.81, respectively. It is our contention that concerned governments should play an active role in identifying and committing to a road map to progressively abandoning fuel subsidies. They should also not be discouraged by relatively small consumption corrections in the short run. A reduction in subsidies can eventually release considerable amount of resources for more crucial and potentially growth-enhancing public services such as education and health.

1. Introduction

In recent years, a number of governments that have historically subsidized domestically consumed fuel have faced an ever-growing challenge in maintaining fuel subsidies and have embarked on subsidy reform. Although the previous literature contends that gasoline demand is, for the most part, price inelastic both in the short run and long run, seemingly small cross-country differences can have significant policy implications. This is particularly important as price adjustments from subsidy reform can be quite large and can be distorted by potential discrepancies in elasticity estimates. We depart from previous research, which either analyzes individual countries or diverse groups of countries, by estimating the price and income elasticities of demand for gasoline in countries where fuel prices are government-subsidized and serve primarily as a remedial political, social, and economic tool. One of the most important features of our contribution is that by distinguishing fuel-subsidizing economies from others, we expect to produce more relevant price elasticity estimates, an impetus for effective policy design and evaluation.

Fuel subsidies are not economically desirable as they stimulate gasoline consumption, resulting in widespread problems, including inefficient and wasteful fuel consumption, increased environmental emissions, the smuggling of fuel across borders, fuel shortages, and budget deficits, amongst others. Furthermore, these policies are not sustainable in the long run as widening fuel shortages and budget deficits chip away at political and financial resources of governments. As a result, many of these countries embark on ambitious fuel subsidy reform policies in an attempt to align their fuel prices with international pricing. Such price alignment is one of the most contentious issues that countries face in their pursuit of subsidy reform. Because such alignments may involve large adjustments, effective policymaking must develop a reasonable understanding of price elasticity of demand for gasoline in addition to corresponding contributing factors.

Demand for gasoline in fuel-subsidizing economies may be more price inelastic than in other countries for a number of reasons. First, gasoline prices may be so inexpensive that their associated expenditure may represent a negligible share of household expenditure. Second, these countries, for various reasons not necessarily related to their wealth, may not have access to alternative energy and transportation options. Third, vehicles and gasoline consumption in these countries may be essential due to infrastructural, geographic, and climatic conditions. Many such economies share a common symptom; their domestic oil refining capacity is inefficient and/or insufficient to accommodate demand for processed fuels. They also do not follow the same pricing schemes, with some countries making rare and infrequent price changes sometimes over several years, and others reviewing their prices on a more frequent basis, typically weekly or monthly (GIZ, 2010). Nevertheless, such countries justify fuel subsidies as a tool for smoothing consumption in reaction to volatile oil prices, for providing access to affordable energy, and for promoting industrial development (World Bank, 2014). In particular, many oil-producing economies have a long history of maintaining generous fuel subsidies as they generally treat natural resources such as crude oil and natural gas "as a national patrimony to be shared – mostly asymmetrically – among the population"

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(Commander, 2012; p. 7). In fact, many, if not most, of such countries maintain fuel subsidies that are so generous that domestic consumption far outweighs domestic refining capacity, thus forcing many to fill the gap with imported fuel.[2]

This paper is organized as follows: Section 2 provides background information about fuel subsidies and subsidy reform. Section 3 summarizes selected previous research. Section 4 describes the data and empirical methodology. Section 5 summarizes our empirical results. Section 6 discusses the results and concludes.

2. Fuel subsidies and subsidy reform

The International Monetary Fund (2013)(IMF) estimates fuel subsidies across all transport sectors of the Middle East and North Africa in 2011 to be valued at about $236.7 billion, representing 8.6% of the region's GDP. Worldwide pre-tax and post-tax spending on subsidies are estimated at around $480 billion and $1.9 trillion, respectively, thus dwarfing spending on crucial and growth-enhancing public services, namely education and health.[3] Annual worldwide deadweight loss, on the other hand, is estimated at about $44 billion (Davis, 2014).

Although these economies are able to supply fuel to their domestic markets at prices below international market levels, the price differential and the related foregone revenues and tax receipts represent a form of subsidy (GIZ, 2007). Fuel subsidies are not limited to countries endowed with abundant natural resources. They may also arise from a number of other factors, including but not limited to weak institutions, a government's attempt to support poor households, incentivizing production, and consumption of other energy sources, or simply bowing to special interest groups (Whitley, 2013). For instance, fuel subsidies can be used as a political tool mutually beneficial to special interest groups and politicians willing to remain in power. Some governments often lack the right institutions to implement policy and thus resort to fuel subsidies to garner political support (Victor, 2009). Similarly, interest groups, which are usually highly organized often capitalize on the lack of institutional capacity to press their respective governments for subsidies in return for political support.

Table 1 shows a sample of such countries, which we use in our study, and reports relevant statistics for the year 2010. It is interesting to note that of the 32 listed countries, thirteen are net exporters of crude oil and net importers of gasoline. Such countries have to import gasoline at world prices and provide it domestically at a lower subsidized price to support their price control policy, while exporting crude oil to cover the cost of such subsidies. Iran is an important case where energy subsidies represent more than three times the spending on education and health services combined. Prior to its 2010 subsidy reforms, which raised gasoline price to about $0.38 cents per liter, gasoline barely cost $0.10 per liter (Fassihi, 2010). Such a low price, reduces fuel efficiency, exerts pressure on Iran's domestic refining capacity, and forces the country to import processed fuels (gasoline) at world prices and provide them to the domestic market at the subsidized price. In fact, fuel (energy) efficiency, as measured by GDP per unit of energy use, declined in Iran from 7.3 in 1980 to 4.7 in 2009, whereas it increased for the world from 4.2 to 5.4 and for the United States from 3.2 to 5.9 during the same period.[4] Fuel subsidies also contribute to increased political tensions with neighboring Turkey and Pakistan from the smuggling of fuel across borders (GIZ, 2007).

Table 1
Countries with fuel subsidies (2010).

Country	Income	Net gasoline exports	Net crude oil exports
Afghanistan	361	−25	0
Algeria	2232	0.65	1091
Angola	5172	1928	−29
Azerbaijan	2345	5	908
Bahrain	11,236	6	−225
Brunei	17,225	−1	148
China	2426	121	−4693
Djibouti	2600*	−0.64	0
Egypt	1976	−25	36
Ghana	360	−8	−32
Indonesia	1145	−219	−50
Iran	13,300*	−117	2362
Iraq	736	−38	1914
Kazakhstan	2482	−14	1287
Kyrgyz Republic	376	−7	0
Kuwait	23,1150	0.61	1395
Libya	15,000*	2	1378
Malaysia	5169	−75	85
Nigeria	541	−118	2341
Oman	11,345	0.82	705
Philippines	1383	−34	−162
Qatar	32,356	19	1106
Saudi Arabia	9499	−20	6844
Sudan	550	9	389
Suriname	2737	−2	8
Syria	1526	−21	152
Turkmenistan	7422	35	14
UAE	21,088	−50	2142
Uzbekistan	942	0.75	0
Venezuela	5528	9	1645
Vietnam	723	−40	215
Yemen	609	−8	175

Notes: income represents GDP per capita in 2005 international dollars and is from the World Bank's WDI. Oil and gasoline data are from the U.S. Energy Information Administration and are in thousand barrels per day. Data denoted with an asterisk are from the CIA World Factbook.

Arze del Granado et al. (2012) find that subsidy reform has a substantial impact on households in developing countries. They estimate a $0.25 increase in fuel prices to result in a decrease in real income by about 5.4% in Africa, 3.2% in South and Central America, 4.6% in Asia and Pacific, and 7.8% in the Middle East and Central Asia.[5] On the other hand, in a more recent study, Plante (2014) finds that a reduction of fuel subsidies (as a share of domestic output) can increase welfare drastically. For instance, reducing subsidies from 10% to 1% of domestic output can reduce the welfare cost of subsidies by up to 93% in net oil exporting economies and by about 99% in net oil importing economies both when oil use is high and when price elasticity is low.

Hammar et al. (2004) and Rietveld and van Woudenberg (2005) provide interesting empirical insight on fuel subsidies and taxation. The first study highlights the fact that fuel taxation is politically contentious especially in countries where fuel consumption is high. In such countries, raising taxes on fuel (or removing subsidies) would garner strong opposition. This is particularly true in countries where lifestyles are extremely dependent on private ownership of vehicles and where the urban architecture and public transportation are not adequate. Hammar et al. (2004) make use of data for OECD countries to identify the determinants of gasoline taxes (and consequently fuel prices). They find gasoline taxes to be inversely related to gasoline consumption, income, and pre-tax gasoline price, and positively related to taxation as a share of GDP and to governmental debt as a share of GDP. The authors argue that low gasoline prices contribute to high gasoline consumption, which in turn contributes to lower gasoline prices (from increased resistance to higher taxes). It is important to note that while these findings may suggest endogeneity between gasoline prices and

[2] Table 1 shows a group of 32 fuel-subsidizing countries, which we use in our analysis. Of these countries, nineteen are net importers of gasoline.

[3] According to the IMF, a pre-tax subsidy represents the difference between the international price (adjusted for transport and distribution costs) and the price paid by consumers, whereas a post-tax subsidy represents the pre-tax subsidy plus a tax that captures revenue needs and an adjustment for negative consumption externalities.

[4] Source: World Bank World Development Indicators.

[5] In this study, fuel prices are for electricity, LPG, kerosene, and gasoline. The estimated impact represents the direct and indirect welfare impact of fuel price increases.