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Energy subsidies, public investment and endogenous growth

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ABSTRACT

We consider impacts of fossil fuel subsidy reforms on economic growth, focusing mostly on the Middle East and North Africa (MENA) countries. The main empirical result is that a country that initially subsidizes its fossil fuels, and then eliminates or reduces these subsidies, will as a result experience higher economic GDP per capita growth, and higher levels of employment and labor force participation, especially among the young. These effects are strongest in countries whose fuel subsidies are high at the outset, such as in the MENA region. Our model predicts that a 20 US$ cents average increase in the gasoline and diesel prices per liter, through removal of subsidies, increase the GDP per capita growth rate by about 0.48% and 0.30%, respectively. In the MENA countries, governments' savings from reduced subsidies seem to be earmarked mainly to health expenditures, education expenditures and public investment in infrastructure. These channels appear to be strong contributing factors to higher long-run growth when fuel subsidies are reduced.

1. Introduction

Little work has been done to date to analyze empirically the relationship between energy subsidies and economic growth, and the channels by which such changes in growth rates could take place. This paper seeks to fill this gap. We aim to demonstrate that economies with efficient energy taxation can expect to grow faster than economies with high energy subsidies. We also use a newly collected data set for our empirical work.

Besides studying how the elimination of energy subsidies promotes economic growth in countries that implement enduring energy price reforms, we also determine the economic channels by which such outcome can take place (e.g. are public subsidy expenditures redirected to increased spending on health, infrastructure, and education, so as to subsequently affect growth?).

Energy subsidies are known for example to encourage energy-intensive and capital-intensive production, and discourage employment (World Bank, 2014). There are several reasons to worry about the consequences of energy subsidies. These subsidies can contribute to fiscal insolvency; divert resources away from productive public investment; lead to major distortions in the production structure; encourage wasteful fossil fuel consumption; benefit mostly high income households who constitute a small proportion of the population; and increase fuel consumption to suboptimal levels. The latter critically contributes to global warming and environmental pollution. Such impacts are likely to affect the overall long-run economic performance and economic growth. Petroleum subsidies can thus cause major environmental and economic problems.

In spite of these immense costs and the ineffectiveness of using resources that could be otherwise used in productive public investments and lead to higher economic prosperity, governments are often reluctant to undertake fossil fuel price reforms. The possible reasons could be because of the belief that subsidies alleviate energy poverty. Others have argued that one reason could be lack of information among citizens. That is, citizens can be aware of fuel prices, but they may have inadequate information about the scale of their countries' fossil fuel subsidies and the size of the support they receive from the government. There could be also special interests because only a small percentage of the population or specific economic sectors (certain industries, exports) benefit from fossil fuel subsidies, and not always the poor population (see Kirit Parikh Report, 2010 for the case of India). Lobby groups usually support the interest of small, special interest groups (Kitschelt and Wilkinson, 2007; Van de Walle, 2003; Ogbu, 2012; Oosterhuis and Umpfenback, 2014). It also known that for certain governments it is easier to subsidize fossil fuels, which requires little administration, than to design effective policies and develop institutional capacity to achieve more critical and necessary economic or social objectives (Pritchett and de Weijer, 2010, Commander, 2012, OECD, 2007, Victor, 2009,

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Whitley and van der Burg, 2015). Strand (2016) finds that when politicians expect to stay on power only for a short time, and rely on a small group of persons to be elected, energy subsidies will be high, and public investments in infrastructure low. According to Commander (2012), other reasons for having subsidies could be to provide income buffering in response to energy price volatility[1]; to give the population a large share of the natural resources as national patrimony; to target some energy sources for diversification (e.g. subsidizing gas more than diesel to for example decrease carbon emissions); and that national oil companies persuade governments to respond to oil price fluctuations through subsidies and to hide the fiscal burden of subsidies (Cheon et al., 2015a, 2015b).

There is also analytical work explaining the motives for why governments avoid to eliminate subsidies: (i) fear of mass unrest or violence should subsidies be removed (Cox, North, and Weingast (2013); North et al. (2007)); and (ii) misaligned electoral institutions that deliver policies to favor only special interest groups instead of the general public (Strand, 2013; Armijo et al., 1994; Bueno de Mesquita et al., 2004; Keefer, 2011); or allows clientelism (Kirtschelt and Wilkinson, 2007). Commander (2012) in basis of the study by Nikoloski (2011), concludes that the most important motive for providing energy subsidies is to alleviate energy poverty followed by to satisfy special interests of small percentage of the population or specific economic sectors.

The main objective of this paper is to test empirically our simple theoretical model (presented in Appendix C) that predicts that when a governments acquires additional resources from removing energy subsidies to make productive public investment, it will foster higher economic growth by i) promoting entrepreneurship, and higher private investment and employment; and ii) improving efficiency in the allocation of its resources.

Recent work by the International Monetary Fund (2013) indicates that on a "pre-tax" basis,[2] subsidies to petroleum products, electricity, natural gas, and coal reached $480 billion in 2011 (0.7% of global GDP or 2% of global government revenues). It further reports that the costs of subsidies are even higher among oil exporters, which account for about two-thirds of the global energy subsidies. On a "post-tax" basis, subsidies are much higher at $1.9 trillion (2½ percent of global GDP or 8% of global government revenues). A prominent feature of energy markets in many countries of the Middle East and North Africa (MENA) region is the existence of energy subsidies, for a range of energy goods including motor fuels, electricity, and natural gas. The World Bank (2014) has indicated that even after reforms, energy subsidies in Egypt, Tunisia and Yemen still account for more than 5% of their GDPs. This numbers are even higher for Algeria, Iran, Iraq and Saudi Arabia, more than 10% of their GDPs. Reforming energy prices in the MENA region, by letting energy consumers face prices which are higher and closer to their optimal levels, is likely to lead to measurable benefits for these countries.

Most analysis, both theoretical and empirical, of energy pricing reform to date has focused on fiscal and environmental/climate impacts of such reform (e.g. Perry and Small, 2005), and on the effect on household welfare (e.g. Gangopadhyay, et al., 2005; Arze del Granado et al., 2012; Parry et al., 2014; Coady et al., 2015). We here instead focus on analyzing how fuel taxation will affect economic growth.

Even though the relationship between economic growth and fossil fuel subsidies, is a very important economic policy topic today, hardly any work exists to shed light on it. The related existing empirical literature concentrates on effects of energy prices or energy consumption on GDP, and not on effects of energy taxes or subsidies which are the core here. Note that subsidies, in contrast to prices, allows us to evaluate price distortions, especially when these subsidies are obtained by comparing the domestic retail price with the prices at the international level.

The study that is closest to our work is the contribution of Bretschger (2015) who presents an endogenous growth model in which energy is a production input. He finds that the effect of higher energy prices on economic growth can be either positive or negative, depending on the degree of input substitution between energy and labor in the consumer good sector. Bretschger tests his model using a balanced panel of 37 countries and 7 5-year periods. Most of these are *developed countries*. By contrast, the endogenous growth model that we have in mind analyzes the positive impacts of removing energy subsidies on production efficiency, real profits, employment and economic growth. Also, within the same line of reasoning, public spending on infrastructure and R & D using energy subsidy savings, plays roles in enhancing economic growth. We test empirically the following hypothesis: *for a country that initially subsidizes heavily energy consumption, elimination of these subsidies can have positive impacts on its economic growth, and on the channels by which growth is affected.*

In addition, our analysis contrasts Bretschger (2015) study in two different ways. First, it concentrates on developing countries with special focus on the MENA region. Many countries in this region are among the largest subsidizers of energy consumption. We however also consider other World Bank regions, and the OECD countries. Second, it characterizes countries according to their different fossil fuel policies by using Koplow's (2009) definition of subsidies or "price gap." Many related studies use this price-gap to quantify large deviations in energy prices within a country from world energy competitive prices. For fossil fuel importers, Koplow's price gap is equal to the domestic fuel retail price minus the average U.S. retail price, minus 10 US$ cents per liter. For the fossil fuel exporters, the price gap is equal to the domestic fuel retail price minus the average U.S. retail price, but now minus 20 US$ cents per liter. The price gap is *negative* when fuel is *subsidized*, or *positive* when fuel is *taxed*. As we will show, several countries tax their consumption of fossil fuels, but many subsidize fossil fuels, which means that their domestic fossil fuel prices are too low relative to international prices.[3]

Why to use the price gap approach? There are several reasons: its simplicity, ease of measurement and comparison across countries, and the limited data requirements imposed.[4] This price gap measure is also crucial, not only for the purpose of our study but in general, for quantifying pricing distortions across countries. We should also remark

[1] This has been an important policy for India in which the government has not been allowing a full pass through from oil price shocks to consumer prices following different mechanisms and strategies. The Kirit Parikh Report (2010) explains extensively these strategies followed over several years by the Indian government, and recommends to avoid control of energy prices.

[2] The IMF defines and constructs the "pre-tax" subsidy as the transfer to bridge the gap between domestic and supply cost. Coady et al. (2016) argue that since petroleum products are internationally tradable products, the supply cost when the petroleum product is imported is equal to the international fob price of the product plus the domestic transport and distribution costs. If the petroleum product is exported, the supply cost is the revenue forgone by not exporting the product, which is then the international fob price minus the cost of transporting the product abroad and domestic distribution costs. The IMF also calculates the post-tax subsidy that includes in addition an estimate of negative externalities from energy consumption, known as the Pigouvian tax. See also Parry and Small (2005) and Clements et al. (2013) for further details.

[3] We attempt to measure subsidies as closed as possible to the IMF's "pre-tax" subsidy (see Footnote 2). Note that the U.S. retail price data includes 10 US$ cents average gasoline or diesel tax, in addition to the costs of transportation and distribution in the U.S. (U.S. Energy Information Administration). To be close to the IMF's pre-tax subsidy, we consider the US prices as the international price and subtract the average taxes of 10 US$ cents to obtain the price gap for the importing countries of petroleum products. The price gap for exporters will subtract not only the 10 US$ cents taxes, but also the costs of transportation and distribution which we approximate to be 10 US$ cents in similar fashion as the IMF estimates its price gap for exporters of the petroleum product. We remark that we do not use the IMF's data on taxes because there are no data before 2003.

[4] Rather than having to analyze hundreds of individual energy-related policies in specific countries, we can focus on comparing the subsidy policies across countries. Note also that often, countries lack the capability or will to provide accurate information on energy-related government activities. See Koplow (2009) for further discussion.