

A DYNAMIC STOCHASTIC GENERAL EQUILIBRIUM (DSGE) ANALYSIS OF THE IMPACT OF ELECTRICITY SUBSIDY REMOVAL ON BANGLADESH ECONOMY

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Overview

Subsidies on electricity sector have been an important issue for Bangladesh because of the cost of providing them. Energy subsidies exceeded 3% of GDP in Bangladesh (IMF, 2013). These subsidies could also create distortions which would have negative impact on welfare. Moreover, they send false price signal that encourage overconsumption of fuel, delay the adoption of energy-efficient technologies, and crowd out high-priority public spending, including spending on physical infrastructure, education, health and social protection.

Despite of the wide literature on Dynamic Stochastic General Equilibrium (DSGE) models, to our knowledge there is no model that focuses on a detailed disaggregation of the energy sector. This feature is particularly important for developing countries perspective as energy supply in these countries comes from both private and public energy generating companies and most of the developing countries are now opt for fuel mix options in generating energy to reduce dependency on mono-fuel option. In addition to consider this disaggregation, this paper also investigate the impact of electricity subsidy removal on a small, oil importing developing country.

The model offer richness including household consumption of electricity along with non-electricity oriented consumption and service consumption in the utility function in addition to electricity use at the firm level in industry and service sector. Our model further includes endogenous electricity generating production functions where electricity is produced both publicly and privately for the economy as part of reform process. The basic model is driven by five different shocks: energy price shocks and productivity shocks affects the industrial output and energy output in three electricity generating firms.

In order to obtain quantitative results, the usual practice is to calibrate models to a particular economy and we simulate the model for Bangladesh economy. Electricity is the most widely used form of energy in Bangladesh. In Bangladesh, about 70% of the population currently has access to electricity. However, generating and supplying electricity for the mass people remains an unresolved challenge for Bangladesh and government has implemented significant efforts to increase the electricity generation capacities. The recent improvement in power generation comes largely from the privately owned Quick Rental (QR) power plants which are powered by imported oil. The other responsible authorities for generating electricity in Bangladesh are Bangladesh Power Development Board (BPDB) along with its subsidiaries and privately owned Independent Power Producer (IPP) companies. Both BPDB and IPP use natural gas to generate electricity. A competitive market environment has been created in Bangladesh for electricity generation and recently, nearly 58% of total electricity production originates from public sector power plants, whereas the private sector provides the rest 42%. Bangladesh Energy Regulatory Commission (BERC) is the responsible authority to fix the electricity prices for all the economic agents in Bangladesh.

Methods

To find a numerical solution, model calibration is necessary. Hence, the model is calibrated following Kydland and Prescott (1982). The data needed to calibrate the model for Bangladesh economy comes from Bangladesh Bureau of Statistics (BBS), Bangladesh Economics Review (BER), World Development Indicator (WDI), Bangladesh Labour Force Survey (BLFS), Bangladesh Power Development Board (BPDB), Bangladesh Petroleum Corporation (BPC), Summit Power Limited, Dutch Bangla Power and Associates Limited and Bangladesh Tax Handbook.

Parameter values are specified in different ways. Wherever possible, parameter values are taken from the available data sources. In some cases, the parameters are chosen freely from the literature and thus are not implied by the steady state restrictions. The other parameters are obtained by calibration in a way that the real picture of the economy is extrapolated as the steady state trajectory.

We run the program Dynare version 4.4.3, which is a pre-processor and a collection of Matlab routines to solve and simulate the model and to approximate the dynamics of our model economy (See Stéphane Adjemian et al., 2011 for the methodological details). These routines linearize the system around its deterministic steady state and perform a second order Taylor approximation.

Results

Our model is calibrated for Bangladesh economy and the main contribution of this paper to the literature, comes in the form of analytical and numerical results. Our results reveal that household welfare varies inversely with the level of subsidy offered to the electricity generator. A 10% reduction of electricity subsidy results an overall household welfare increases by 0.36% and GDP and electricity increases by 0.09 %. Since the private electricity producers face less subsidy than before they reduce their oil import by 19% which lowers private electricity generation by 7%. However, the government generation increases by 1%. Our findings imply that the private and public sectors react inversely to subsidy reductions. The total use of gas has increased by 1.59%. Although the electricity price reform is necessary (Jamash, 2006), the removal of fuel subsidies creates a huge burden on electricity-intensive industries which led to disruption in production. As a result industrial production decreases by a small margin (-0.051%) in Bangladesh.

Conclusions

Electricity subsidy is very high in Bangladesh which causes fiscal burden. At present government provides 30% subsidy to the electricity generating firms for importing oil from the rest of the world. In order to bring the fiscal burden under control, this paper proposes a reduction of 10% subsidy as a step of reform instruments.

Our results suggest that fossil-fuel subsidies can act as a barrier to the development and deployment of renewable energy technologies which can play a very important role to mitigate energy crisis in Bangladesh. So, it is worthwhile that government could offer incentives to new electricity generators who would enter in the market planning to produce electricity with renewable technology or existing electricity generating companies intending to convert from using traditional fuel to renewable energy in producing electricity. This will make government firm more efficient, reduce dependency on mono fuel option and allow generating more electricity. The analysis will be of interest to policy-makers and researchers working on barriers to renewable energy technology and relevant not only for Bangladesh but also for many other developing countries sharing a similar electricity sector.

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