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Energy prices and economic growth in Pakistan: A macro-econometric analysis

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ABSTRACT

The paper empirically examines the impact of energy prices on economic growth in Pakistan using various channel variables. For this purpose, a macroeconometric model is estimated using GMM estimation technique using quarterly data for the period 1991–2011. The results indicate that the overall effect of energy prices on growth is negative, confirming results from existing empirical literature for Pakistan. However, our methodology allows us to go beyond previous research and describe what drives this overall result. We find evidence that high energy price decreases real interest rate, investment and stock prices. It also decreases the real value of local currency. High energy price puts pressure on government expenditures and increases unemployment in the country. The results reveal that energy price positively affects output growth through its impact on real interest rate and government consumption, while it negatively affects output growth through investment, stock prices, real exchange rate and unemployment. The results show that most of the effect of energy price on economic growth is captured by stock prices, real exchange rate, government consumption and unemployment. In turn, real interest rate and investment captures a small effect of energy price on economic growth. The study highlights that to improve economic growth policy makers in Pakistan should design appropriate policies to control energy prices and to plan energy conservative policies that will motivate to explore alternative energy sources to meet high energy demand in Pakistan.

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1. Introduction

Energy sector plays an important role for economic development of a country. Stable energy prices boost economic growth while hiked energy prices adversely affect economic growth. In energy import countries, like Pakistan, increase in energy prices increases domestic inflation and decreases domestic foreign exchange reserves [1]. It adversely affects value of domestic currency by depreciating it, which makes energy imports more expensive. It increases cost of production, which badly affects productivity of a country [2]. This increase in energy prices may also lessens the accessibility of fundamental inputs to production, which declines potential output [3]. Decrease in productivity will lessen the real wage rate and will increase unemployment. Decrease in real wage rate and increase in unemployment will accelerate inflation [4] that would reduce real wealth and consumption spending [5]. It adversely affects purchasing power of the people and even government. This cuts down both private and public expenditures which puts negative effect on the economy of a country. Further, increase in energy prices increases nominal interest rates through inflation [6]. It deteriorates investment, stock prices, current account balance, foreign debt, and fiscal balance, among others. Moreover, increase in energy prices results in reallocation of resources that will put negative pressure on output growth [7]. However, high energy prices may also increase output as it would stimulate energy-efficient sectors relative to energy-intensive sectors [8] and [9].

Empirics have shown positive effect of increase in energy prices on economic growth of energy exporting countries and negative impact on energy importing countries [6,10,11,12] and [13].[1] Empirical studies have also shown negative effect of high energy prices on economic growth of Pakistan as Pakistan is an energy importing country [15] and [16]. According to Malik [1] and Akhtar et al. [17] in Pakistan high energy prices have created cost push inflation which has slowed down the productivity. Similarly, in a recent study Khan and Ahmed [18] have shown that oil price shocks positively affect inflation and interest rate and negatively affect industrial production. Moreover, increase in oil prices lead to a negative impact on real GDP, foreign exchange reserves and foreign debt [19]. These studies have examined the direct effect of energy prices on economic growth using simple econometric techniques like least square, etc. However, the recent theory has shown that the effect of energy prices on economic growth is indirect [20] as energy price first affects determinants of economic growth (like investment, consumption, etc.) and then through these channel variables it affects economic growth. The contribution of the present study is that it will construct a macro-econometric model to gauge the indirect effect of energy prices on economic growth in Pakistan. Here more attention will be paid to explore the channel variables through which energy price is contemplated to affect economic growth. Energy price is expected to affect output growth via its effects on inflation, interest rate, exchange rate, investment, urbanization, consumption, employment, stock prices, etc. In essence, this study is expected to be an important attempt to address this issue in a technical, systematic and rigorous way for Pakistan (a developing country) by taking into account an appropriate energy price index. The empirical analysis will be conducted in a time-series framework for the period 1991–2011 using quarterly frequencies.

The rest of the paper is organized as follows. Section 2 describes energy trends in Pakistan. Section 3 provides theoretical framework. Section 4 provides data overview, estimation and interpretation of the results. Final section concludes the paper.

2. Energy trends in Pakistan

Due to high population and fast economic growth energy consumption in Pakistan is increasing rapidly. Historically, until eighties Pakistan was using local resources to fulfill most of its energy needs. In nineties Pakistan coped up its high energy demand by new discoveries of oil and gas. However, in 2000s, Pakistan's energy requirement was fulfilled mainly through imports, especially through oil imports. Pakistan's energy mix includes gas (43.5%), oil (29%), electricity (15.5%), coal (10.5%) and LPG (1.5%) sources. The price of all energy resources is increasing, which is putting negative impact on the economy by increasing trade deficit [1]. It is estimated that in the next few years, energy requirement will become double [21]. According to Pakistan Economic Survey (2011/12) for the last ten years on average gas consumption has increased by 5.1%, electricity consumption by 4.8% and coal consumption by 7.7% annually. According to the government's statistics, by 2030, the demand for energy in Pakistan will be almost 64% greater than projected supply. Despite of increase in energy demand, no necessary steps have been taken to establish new energy resources. By 2011/12, energy shortage is considered to be the major reason of less production in different industries. In fact, there are mainly three reasons for the energy crisis in Pakistan. First, Pakistan has faced high economic growth rates for many years that have generated high energy demand in the country. Second, government has failed to implement new energy projects. Third, security conditions get worst, which discouraged and stopped foreign investments in energy sector.

To meet its energy needs government has started focusing on renewable energy resources i.e. solar energy, wind energy, biomass energy, and hydropower energy as Pakistan is rich in renewable energy resources [22]. Despite the favorable conditions, the use of renewable energy for generating electricity or heating is still in its beginnings. Government of Pakistan is coordinating, facilitating and promoting renewable energy technologies that will help to accomplish a reasonable share of power generation through renewable energies by year 2030. For use of these technologies, the government is encouraging local industry to produce equipments related to renewable energies in the country.

3. Theoretical framework

Theoretical literature has highlighted various transmission channels through which energy prices affect economic growth. Based on literature this study has identified six channel variables i.e.

[1] For previous empirical literature reader is referred to Gounder and Bartleet [14].