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Augmented energy-growth nexus: economic, political and social globalization impacts

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Abstract

The augmented energy-growth nexus with globalization is analyzed for a panel of 43 countries between 1971 to 2013, by using an autoregressive distributed lag (ARDL) approach. The impacts of economic, political and social globalization on energy-growth nexus are explored. The results are consistent with the presence of cointegration. Evidences of the traditional feedback hypothesis on the energy-growth nexus was found. Economic, political and social globalization have heterogenous impacts on the nexus. In general, globalization is a long-run driver of both energy consumption and economic growth. Accordingly, globalization should be promoted. In addition, restrictive energy policies should be avoided or carefully designed to no hamper economic growth.

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1. Introduction

For decades, the energy-growth nexus has received considerable attention (Wolde-Rufael, 2005; Marques et al., 2015; Akarca and Long, 1980). The literature identified four types of relationships: (i) the “neutrality hypothesis” that asserts that no causality between energy consumption and economic growth is observed; (ii) the “conservation hypothesis” that states that there is uni-directional causality from economic growth to energy consumption; (iii) the “growth hypothesis” stating that uni-directional causality from energy consumption to economic growth; and (iv) the “feedback hypothesis” noting that there is bi-directional causality between energy consumption and economic growth.

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The literature evolved from the traditionally bi-variate models to study of augmented energy-growth nexus by the inclusion of additional variables such as the financial development, population, urbanization or industrialization (Islam et al., 2013; Shahbaz and Lean, 2012). Recently, new concerns arise, leading to the inclusion of more variables to the energy-growth nexus research, for instance carbon dioxide emissions and trade openness (Apergis and Ozturk, 2015; Farhani and Ozturk, 2015). The study of trade openness impacts on energy consumption, started when Cole (2006) by using the Antweiler et al. (2001) theoretical principles, observed that trade liberalization can increase per capita energy use, for a sample of 32 developed and developing countries. Thenceforth, vast literature aimed to investigate the relationship between energy consumption, economic growth and trade openness, by using individual countries (Kyophilavong et al., 2015; Shahbaz et al., 2016) or panel of countries (Nasreen and Anwar, 2014; Sadorsky, 2012) studies. To do so, various proxies of globalization have been used, for instance imports, exports, trade liberalization, among others. The existent literature supports that on long-run, trade openness conducts to different impacts on energy consumption across the globe. For instance, Sadorsky (2012) found bidirectional causality between energy consumption and exports and between energy consumption and imports for seven South American countries. While, Shahbaz et al. (2016) found that globalization lead to a decline in energy demand for Indian economy.

Over the next few decades, global energy consumption is expected to continue changing. Energy consumption will most likely increase over the next two decades, at least, driven by emerging economies (BP, 2016). It will lead to energy policies that face the new concerns. Taking this into consideration, the augmented energy-growth nexus including globalization should be examined allowing to find the balance between energy consumption, economic growth and globalization. This fact leads to the central question of this paper: Which are the impacts of economic, social and political globalization on energy-growth nexus?

To analyze the augmented energy-growth nexus, a panel data with 43 countries that encompasses yearly data from 1971 to 2013 is used. By following an autoregressive distributed lag (ARDL) approach, the short- and long-run behaviors are examined. The results found evidence of feedback hypothesis on energy-growth nexus both on short- and long-run. In addition, the results support that economic, political and social globalization have long-run impacts on energy-growth nexus.

The paper evolves as follows: Section 2 describes data and methodology. Section 3 presents and discuss the results. Section 4 concludes.

2. Data and methodology

The paper uses annual data, from 1971 to 2013, for 43 countries around the world. It should be said that the used sample was limited by their availability for the different variables. The econometric analysis was performed by using Stata 13.0. The used variables are the following:

- (i) Gross Domestic Product *per capita* (YPC) – Corresponds to GDP *per capita* (constant 2010 US\$) obtained from World Bank.
- (ii) Primary Energy Consumption *per capita* (EPC) – computed by dividing primary energy consumption by total population. The sources of the variables are BP statistical review of world energy 2016 workbook and World Bank, respectively.
- (iii) Globalization (G) – To measure globalization the KOF index of globalization (<http://globalization.kof.ethz.ch/>) was used. The KOF overall index is based on economic globalization, social globalization and political globalization. It includes components such as, trades, foreign direct investment, import barriers, number of embassies in a country, international treaties, among others.
- (iv) Economic Globalization (EG) – To measure economic globalization the Economic Globalization index from KOF Index of Globalization was used (<http://globalization.kof.ethz.ch/>).
- (v) Political Globalization (PG) – Is the Political Globalization index from KOF Index of Globalization (<http://globalization.kof.ethz.ch/>).
- (vi) Social Globalization (SG) – Corresponds to the Social Globalization index from KOF Index of Globalization (<http://globalization.kof.ethz.ch/>).

The prefix “L” denote natural logarithm and “D” denote first difference of the variable. Summary statistics are presented in Table 1.

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