



Energy consumption, political regime and economic growth in sub-Saharan Africa



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HIGHLIGHTS

- Feedback exists between energy consumption and economic growth.
- Democracy moderates the energy consumption and growth nexus.
- positive feedback between energy prices and economic growth.
- Uni-directional relationship from openness to energy consumption.

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ABSTRACT

In this paper, we examine the relationship between energy consumption and economic growth, and how democracy moderates this relationship using panel data of 16 sub-Saharan African (SSA) countries for the period 1971–2013. Employing a panel vector autoregressive model (PVAR) in a generalized method of moments (GMM) framework, the findings support the feedback hypothesis for energy consumption and growth. Second, the interaction variable (energy consumption and democracy) is positively and significantly related to economic growth, supporting the view that democracy moderates the energy consumption and growth nexus. Further, the results provide strong evidence of a uni-directional relationship from trade openness to energy consumption. Additionally, impulse responses and variance decompositions also confirm positive feedback relationships between energy consumption and economic growth, energy prices and economic growth.

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1. Introduction

The issue of how energy use and conservation policies affect economic activity has attracted much attention in the global debate on sustainable development and particularly on climate change and the reduction of the emissions of greenhouse gases. In light of this, many studies have been conducted since the pioneering work of Kraft and Kraft (1978) on the energy-growth

nexus. However, no consensus has yet been reached, even though there is a general perception that the two variables are causally linked (Belke et al., 2010). Wolde-Rufael (2006) has argued that no country in the world has succeeded in shaking loose from a subsistence economy without access to the services that come with modern energy. Similarly, Toman and Jemelkova (2003) claim that the quality of energy services is one of the most important drivers of economic productivity. The International Energy Agency (IEA), 2014 report notes that energy could do much more to act as an engine of inclusive economic and social growth.

It is now widely accepted that if sub-Saharan African (SSA) countries are to pursue sustained economic growth to reduce poverty, the provision of reliable and efficient supply of energy

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would be crucial (Turkson and Wohlgenuth, 2001). It is important to observe that though SSA is rich in energy resources, it is very poor in energy supply. Making reliable and affordable energy widely available therefore becomes critical to the development of a region that accounts for 13% of the world's population, but only 4% of its energy demand (IEA, 2014). Over 620 million people representing about two-thirds of the entire population do not have access to electricity. Even in this period of modernity, over 60% of the population use biomass (the use of firewood, charcoal and crop residue) as the main source of energy. The picture is even more gloomy when we consider that in the early 2000s, the energy consumption of the average African was less than what an average British used in England more than a hundred years ago (Davidson and Sokona, 2002).

Sub-Saharan Africa's energy woes have been necessitated by the poor energy infrastructure, which has led the IEA to describe the region as the epicenter to deal with regarding global challenge of energy poverty (IEA, 2014). However, it is worth mentioning that things are changing for the better. For example, in the last decade (since 2000), energy consumption has increased over 45%, with about 145 million people gaining access to electricity. Overall, the electricity access rate for the SSA improved from 23% in 2000–32% in 2012. The question is whether the dramatic increase in energy infrastructure is helping to improve the growth of the economies in the region? This is a key question that the paper seeks to address. Many studies have been conducted in this light but there is no consensus as to the relationship on the energy-growth nexus (see for example, Soytaş and Sari, 2007; Menyah and Wolde-Rufael, 2010; Eggoh et al., 2011; Shahbaz et al., 2013; Omri and Kahouli, 2014).

What accounts for the diverse results has been attributed to the varying political, economic, and socio-cultural factors that exist in the different countries and regions of the world (Squalli, 2007; Ozturk, 2010; Karanfil and Li, 2015). Accordingly, many recent studies have examined some of these factors, including, the price of energy (Asafu-Adjaye, 2000; Odhiambo, 2010), net energy exports and imports (Eggoh et al., 2011), level of financial development (Shahbaz et al., 2013; Tang and Tan, 2014), national and international developments (Belke et al., 2010), tourism (Tang and Abosedra, 2014), urbanization (Karanfil and Li, 2015) and ICT (Shahbaz et al., 2015). However, none of these has considered the political environment in which decisions on energy policies are formulated. In other words, no study to date to our knowledge has considered how the governance, regulatory regime, regime type or factors impact or moderate the energy-growth relationship. This is the gap this study seeks to fill. We do this empirically by examining how democratization of the political system in SSA countries with similar socioeconomic and cultural condition is affecting the energy-growth relationship. The similar characteristics help to reduce bias in the regression estimates.

The IEA (2014) report notes that a key requirement for African countries to realize their development ambitions is the development of effective governance systems. The lack of effective institutions, the report suggests, had led to problems such as corruption, lack of transparency and accountability and inadequate regulatory and legal frameworks. One key factor known to reduce these failures is deepening democratic systems. It is of interest to note that many of the countries in the region have embarked on reforms of their political system over the last four decades with varying degrees of success. This is in sync with the ecological theories that show a relationship between the geographic location, the personalities of the residents and their governments as was discussed in the writings by Aristotle and Montesquieu.

The question then is, how are the political reforms affecting the energy-growth relationship? This is an area where there is a dearth of research. Accordingly, the study contributes to the

literature by examining how democratization is impacting on the energy-growth relationship. This analysis is important because shifting political and socioeconomic conditions in a country do shape both the energy provision and consumption (Moss, 2014). It is our expectation that the political economy approach employed here could provide deeper insight into the energy consumption-growth relationship. In the sections that follow, we present the literature review, after which the methodology and the data are discussed and results analyzed and policy implications given.

2. Literature review

The traditional economic growth theories have followed the Solow model with an underlying assumption of capital and labor as the primary factors of production. However, in the modern era, ecological economists and institutionalists have placed emphasis on energy and institutions as key inputs to national output. While classical economists see capital and labor as key growth determinants and energy as intermediary factors, ecological economists emphasize energy and its availability in the economic production process (Stern and Cleveland, 2004). The Energy Information Administration of the United States (US EIA), for example, reports that the economic growth of a country is linked to its energy consumption (US EIA, 2013). Jumba (2004) asserts that energy consumption particularly electricity is relevant to economic development because it facilitates the efficiency of inputs of production and serves as a signal of a growing economy.

Stern and Cleveland (2004) theorize on the relationship between economic growth and energy using the laws of thermodynamics, in which the first law (the conservation law) suggests that in order to attain a certain physical output greater or equal volumes of matter must be employed as factors of production. This implies less material input requirements for any production activity generating material outputs. The second law (the efficiency law) shows that a certain amount of energy is needed in the conversion of matter. Stern and Cleveland explain that all production requires conversion or changes in matter in one way or the other.

It must be emphasized that a number of parallels can be drawn between ecological economics and institutions. Ecological economics encompasses a complete system phenomenon of understanding economic behavior. In this regard, the economy can be considered as a sub-system of a broad ecosystem (Bergh, 2001) utilizing factors provided by the ecosystem for production and consumption. This creates a connection between human behavior (production and consumption) or social systems and the natural environment. In this line, ecological economics is seen as addressing the relationships between economic and ecosystems (Costanza, 1989).

Institutions are needed to harmonize the relationship between human behavior and the environment. In the ecological sense, an important issue where the role of institutions is emphasized has to do with sustainability (Bergh, 2001), which pertains to meeting the needs of today's generation with the natural factors without inhibiting the ability of the future generation in meeting their own needs. To a very large extent, institutions are regarded as the distinguishing factors explaining differences in output growth or prosperity among countries (Hall and Jones, 1999; Acemoglu et al., 2001; Acemoglu and Robinson, 2008). Acemoglu and Robinson (2008) contend that institutions are the fundamental causes of growth whilst the variations in capital (physical and human), and technology are only proximate causes.

Goes (2015) using data from 119 countries over a 10 year period and the GMM/instrumental variable VAR approach reports that institutions promote economic growth. Gazdar and Cherif (2015)

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