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Signatures of water resources consumption on sustainable economic growth in Sub-Saharan African countries

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Abstract

We adapt the transcendental logarithmic (translog) production model to examine the role of water resources consumption on economic growth in 38 Sub-Saharan African (SSA) countries. Labor, capital and energy are incorporated into the model to provide for omitted variable bias. Several findings have been documented from the investigation. First, the results suggest that economic growth in SSA is driven mainly by water and labor. Capital and energy were found not to significantly drive economic growth. Second, technical change in SSA is scale-biased and factor augmenting; suggesting that efficiency of water withdrawals and labor use would lead to technological progress in SSA. Third, substitution possibilities between water and labor exist indicating that restrictions on water withdrawals would lead to labor intensiveness and vice versa. Finally, a more general insight from the study is that efficient use of water resources promotes technological innovation and hence, critical for sustainable development.

Keywords: Water resources consumption; Sustainable economic growth; Translog; Sub-Saharan Africa

1. Introduction

Geographically, Sub-Saharan Africa (SSA) is the extent of the African continent that falls south of the Sahara Desert. Political wise, it comprises of all African nations that are completely or partly located south of the Sahara (excluding Sudan)[1] (Fig. 1). SSA is endowed with abundant natural resources such as minerals, forests, wildlife and rich biological diversity. Yet, these natural resources are largely unexploited and do not reflect the welfare of the inhabitants in the region (Ngoran et al., 2015a). In this segment of the African continent, we find some of the world's biggest tropical rain forests and highest equatorial mountains. Strategic natural resources are unevenly

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[1] http://unstats.un.org/unsd/methods/m49/m49regin.htm (Retrieved: 20/05/2013).

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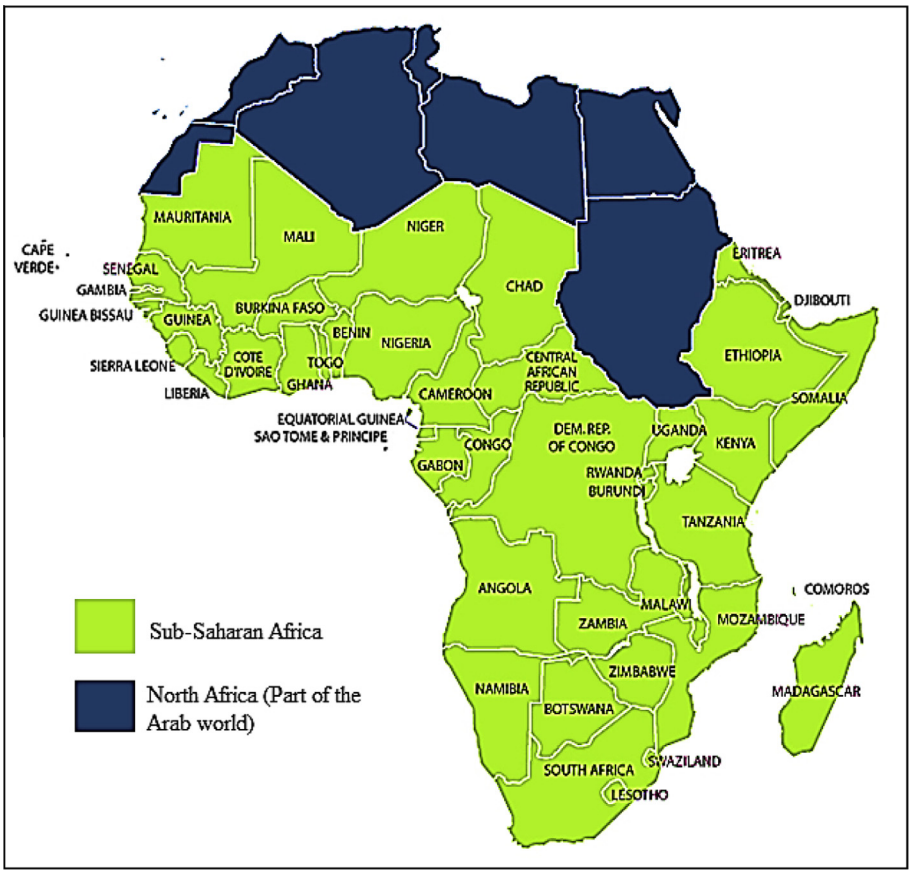

Figure 1. Location of Sub-Saharan Africa. Source: http://blogs.ft.com/material-world/2014/05/11/part-lll-sub-saharan-africa/ (Retrieved: 20/01/2015).

repartitioned. For instance, more than 20% of the remaining tropical forest is in the Democratic Republic of the Congo, while the river Congo, river Niger, the river Nile, river Zambezi and Lake Victoria and Lake Chad detain more than half of SSA's fresh water resources (Urama and Ozor, 2010; Ngoran et al., 2015b).

Given the background that the SSA boasts some of the largest natural resources in the world, including water, it lags behind the wheels of economic growth. From a global perspective, sustainable economic growth in SSA remains a daunting challenge. Within a span of 20 years (1980–2000), economic growth in SSA countries stood low due to macro-economic instability. According to the World Bank data (2012), the average growth rate in Gross Domestic Product (GDP) per capita in SSA was −0.6% from 1980 to 2000. Also, Banya and Zajda (2015) portrayed that economic growth in SSA averaged 4% over the last ten years, but, poverty and inequality have remained persisting problems challenging sustainable development. Hence, growth pathways that provoke strong changes in SSA's production and consumption patterns are necessary. Nowadays, many SSA countries are experiencing a lot challenges linked to water resource consumption. Following the growing importance of mining activities and the overdependence of SSA on agriculture (agriculture accounts for over 75% employment, contributes about 30% GDP and with an estimated 40% of exports) (Reij and Smaling, 2008)), water resources consumption is bound to increase. Again, with SSA burgeoning population, urbanization, adverse effects of climate change and the strive by various SSA governments to eradicate poverty through economic growth, the problem of dwindling water resources will further be compounded. For instance, the Lake Chad, once noted as one of Africa's largest freshwater lakes, has shrunk significantly owing to related anthropogenic actions and the effect of climate change. The surface area of Lake Chad reduced from 45,000 square kilometers to 10,000 square kilometers in 1960 and 1998, respectively (Ngoran et al., 2015a,b). Lake Victoria, the world's largest tropical lake (68,790 square kilometers) and the second-largest freshwater lake in the world, is fast losing its waters for similar reasons (Urama and Ozor, 2010). Based on the fact that more than half of the population in SSA lives in Urban areas coupled with the disproportionate allocation of primary industries, the anthropogenic built-up of urban milieu is affirmatively a game-changer in shaping water resources (Ngoran and Xue, 2015). However, studies tallying only on data from the interchanging factors of the built-up environment would represent a big error margin since data estimates are collected at national levels by international institutes (Wesseh and Lin, 2016a). Therefore, it is imperative to