

The Threshold Role of FDI Flows in the Energy-Growth Nexus: An Endogenous Growth Perspective

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FDI flows to sub-Saharan African countries have risen and plunged in recent years, fluctuating precariously. At the same time, a burgeoning literature is hyping on the role of FDI flows in the relationship between energy consumption and economic growth. One aspect of this relationship is the precariousness of FDI flows and their implications for the nexus between energy consumption and economic growth. Technically, studies have emphasized the role of intervening variables between economic growth and energy consumption and authors have used a good number of variables to account for what is highlighted in the causality literature as omitted variable. Empirically, the role of FDI flows in this study is additionally helpful in interpreting the data and the relationship more logically. Therefore, for sub-Saharan African countries that have experienced a bout of spurts and trickles of FDI flows, the implications for the four energy-growth hypotheses – namely, (i) the growth hypothesis, (ii) the conservation hypothesis, (iii) the feedback hypothesis and (iv) the neutrality hypothesis – are worth investigating. In particular, the study seeks to answer to the question of which of these hypotheses holds if the FDI flows rise or fall.

Many aspects of the data on sub-Saharan African countries call for close scrutiny. The phenomenon of cross-sectional dependence, for example, occupies a frontal methodological space in our analysis. For obvious reasons, accounting for and treating cross-sectional dependence is clearly necessary. For example, the questions of policy affinity, geographical proximity and simultaneous response to global shocks as well as the recent trade integration of African countries through the AFCFTA suggest the need to account for cross-sectional dependence. A number of cross-sectional dependency tests show that the data could not reject the cross-sectional dependence. At the same time, we entertain the stationarity testing. It is particularly important to do this because the adopted methods – the lag-augmented VAR and its variant adopted for sensitivity test the lag-variable-augmented VAR – require the inclusion of the highest stationarity order of integration. As part of the methodological novelty of the study, we introduce the bootstrap method to overcome the problem associated with the finite sample. Given its superiority over the finite sample approach to testing, our results are interpreted based on the bootstrap p-values.

Estimating the basic and extended models, we report the following findings. For the basic model, both asymptotic and bootstrap p-values suggest that there is a neutrality between energy use and economic growth, thus highlighting a policy-mix without a recourse to a trade-off between income expansion and energy use. Based on the bootstrap p-values, the obtained results suggest that the extended model accounting for cross-sectional dependence does not change the neutrality between energy use and economic growth, although the asymptotic p-value indicates there is a feedback effect from economic growth to energy use at 10% level. The neutrality suggests that energy and economic policies are not conflicting in those sub-Saharan countries.

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The introduction of FDI flows as a threshold variable into the basic and the cross-sectionally corrected model indicates the neutrality hypothesis cannot be rejected using the bootstrap p-value whereas the asymptotic p-value indicates that both energy use and economic growth are mutually feeding back into the system. This obviously conflicting evidence results from the finite sample bias for which the bootstrap is robust. Thus, based on the bootstrap p-value, the data support the evidence of neutrality whether FDI flows are contracting or expanding. This implies that spurts and bursts in FDI flows do not particularly interfere with neutrality either in the small or large dataset. However, when FDI flows directly drive energy use which in turn drives economic growth, it is found that economic growth impacts energy use in the expanding phase of FDI flows only, thus subscribing to the energy conservation hypothesis.

Overall, our results imply that using energy more efficiently and substituting one type of energy for another, such as substituting natural gas for oil or oil for biomass in light of oil discoveries in some countries, could be a good policy option. Nevertheless, individual countries need to consider the growth in FDI flows. The implication of this result suggests that an energy demand policy, such as an energy conservation policy, would not cause any significant adverse side-effects on economic growth in those sub-Saharan African countries.