ELECTRICITY GENERATION AND INVESTMENTS FOR ECONOMIC GROWTH IN SOUTHERN AFRICA COUNTRIES (SADC)

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I. Overview

In Africa it is estimated that 621 million inhabitants do not have access to energy and electricity, according to *Africa Progress report* (2015), to meet this deficit in Africa, there will be a need to increase 10 times more the energy generation in order to ensure access to electricity for all Africans by 2030. Due to this shortage, the potential growth of Africa reduces between 2% to 4% that leads to more unemployment and poverty. Aiming to reduce the poverty and unemployment, many organizations were create in Africa to solve problems that certain groups of African countries have been facing, Southern Africa Development Community (SADC) being one of them. Furthermore SADC has been facing many challenges, particular in the energy sector. According to Oji et al. (2016) and Jones and Thompson (1996) the visible challenges to the energy sector is the lacking of funding and resistance to enter new energy providers in the market. As it was find convenient to study private investment and renewable energy consumption's influence on the indicator that measures the economic growth, where the main goal of research is to found out whether there is positive or negative impact of GDP per capita (economic growth index) in the countries members of SADC. Throughout the research some relevant question about the topic, such as: What other factors besides energy consumption and investment could affect the economic growth? What are the benefits that energy would bring to these countries? What are the biggest challenges at a financial level in the energy sector? According to Dlamini (2017) the SADC has been receiving financial support from Development Bank of Southern Africa in energy sector since 2013, where 60% of investments were applied into energy, from that 88% were to renewable sources. Besides that, SADC has been making efforts so that by 2019 all renewable energy's projects are concluded, reaching more than 800km of transmission and 1200Mw of generation.

II. Methodological approach

There are 16 countries belonging to SADC and due to the lack of data, only 7 countries will be analyzed from the period of 1991 to 2013, and they are as follows: Angola, Democratic Republic of Congo, Mauritius, Mozambique, Tanzania, Zambia and Zimbabwe. The database includes, gross domestic product (constant 2010 U.S Dollars); electricity production from renewable (% of total); electricity production from fossil fuel (% of total) and export volume index, were extracted from World Bank and for the variable of private and general government investments (billions of constant 2011 international dollars) from IMF. The ARDL Approach was used to capture the short and long term effects, introduced by Pesaran et al. (2001) in order to incorporate I (0) and I (1) variables in same estimation and will be used the first generation. Hausman test was conducted to determine which model should be used. Based on the result, additional specification test was applied to verify the existence of contemporaneous correlation, heteroscedasticity and first order autocorrelation. After gaining the results, the estimator Drisk Kraay was used to obtain robust results.

III. Results

Based on the results of the specification tests, the estimator Driscoll Kraay was used. This regression allows to correct the heteroscedasticity, since the estimator presents a robustness in the presence of cross-section dependence. The preliminary results show that total investments have a positive impact on economic growth both in the short-run and long-run, by computing the semi elasticity an increase of one per cent of the total investments, increase of the economic growth by 0.046509 and long-run gives a large contribution to GDP per capita with elasticity value of 0.1410255, as it already was expected to have a large significance on a long-run due to its nature, the investments give better results in long-run because they take a while to generate return on investments. Furthermore to the preliminary results

demonstrate that the renewable energy generation has a negative effect on short-run, the same happens on a long-run to the fossil and renewable energy generation, they not contribute to Gdp per capita with elasticity value of -0.0717401 and -0.6394277 respectively. There's the possibility that these results come from a bad usage of electricity on non-productive activities or politics applied by the government.

IV. Discussion and Conclusions

The paper centers on the relationship between total investments and electricity generation from renewable and fossil fuel with economic growth. The countries chosen belong to a specific group located in Southern Africa, where all of them consume energy from the sources under study. It is to highlight that there are a few studies done on this group of countries due to the lack of data. The panel data was subjected to an exhaustive battery of teste with the objective to analyze and to guarantee the use of appropriate estimators. The estimator Driscoll Kraay was used and the ARDL approach to determine the short and on the long run effects. Economic growth is measured by the GDP per capita variable, such as vast majority of literature focused on the energy-growth nexus. The results are enough to sustain that the electricity generation from fossil fuel and renewable resources has a negative effect on economic growth, but on the renewable electricity generation it manages to have more negative effects on a long-run than on the sort-run on the economic growth, what can also be observed is that, for variable of investment has more contribution for economic growth.

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