KHAYATI Marouane   *Under the supervision of Professor EDDELANI Oumhani*

Economic growth and renewable energy consumption: modelling approach

Abstract:

The aim of this work is to study the nature of the relationship between economic growth indicators (including gross domestic product, gross fixed capital formation with other economic variable) and environmental indicators that have an impact on the environment, taking into account the consumption of renewable energy and the level of carbon emissions (CO2), not forgetting other variables that could be included in our research, such as gross domestic product (GDP) per capita and per sector of activity (by agricultural, industrial or even digital sector) . In this respect, we will opt for the econometric approach of multiple linear regression and more precisely on the techniques of ordinary least squares (Régis BOURBONNAIS, 2015, p50), based on the data of the World Bank (international sites) to treat the economic and environmental indicators of Morocco over the period between 2000 and 2020. Our aim in this paper will be based on the recent literature review that focuses on the energy economy as a key factor of sustainability and its relationship with economic growth (Saidi and Omri, 2020, p1), trying to study this possible relationship to know the cleanest and most likely to be green economic activity sector in renewable energy (Saidi and Omri, 2020, p 1)

Background to the research and literature review :

The last few decades have been characterised by a growing awareness of environmental issues, reflecting the scale of the debates generated by this problem. One of the central questions raised by these debates is whether growth can be achieved in a more environmentally friendly way (Domguia and Ndieupa, 2017, p 615). It is therefore necessary to use new sources of energy to grow the economy without creating negative effects on the environment. This is why most countries are committed to developing renewable energy

sources (Saidi and Omri, 2020, p 1). However, there are several studies that examine the relationship between renewable energy consumption, economic growth and CO2 emissions. Some of these studies have been carried out in the United States (Sari et al, 2008), These authors have found that there is a positive link between economic growth and renewable energy. In the Portuguese economy, for example, some researchers (Leitao, 2014) have tested the relationship between economic growth, renewable energy consumption and CO2 carbon emissions (using a Gaussian mixture model) and have subsequently shown that there is a positive link between these three variables. The same goes for the work of the Club of Rome, which in 1972 published a report entitled 'The Limits to Growth', which drew global attention to environmental issues and the challenges of sustainable economic growth in a resource-poor world (Domguia and Ndieupa, 2017, p 615). The report used technical models to examine the relationship between economic growth and the environment. Their researchers warned that if current trends in economic growth and resource consumption continued unchanged, environmental limits could be reached in the foreseeable future, leading to negative consequences such as pollution and environmental deterioration.

It is for this reason that we want to study this model in our Moroccan context, and find out whether there really is a relationship between environmental degradation, economic growth and the consumption of renewable energy. To address this issue, we will highlight the following questions :

What sector of Morocco's economy could consume more renewable energy with a low impact on CO2 emissions ? In other words, what sector of activity (in the agricultural, industrial, service or digital sectors) should be developed sustainably and emit less pollution than another area of activity ?

Research methodology :

In this sense, we will choose the quantitative method to do the econometric modelling of our variables based on GDP, GFCF (gross fixed capital formation), CO2 emissions, renewable energy consumption and other variables, between the period 2000 and 2021 in Morocco. To do this, we will try to apply our model using the R statistical software, based on World Bank data. We will check whether there is any correlation between the variables studied.

Provisional result :

The results of the research will show us the distinction between the sector of activity that preserves the environment through the consumption of renewable energies and the other that emits pollution. On the basis of this study, we will be able to make a recommendation to the effect that the State should invest in the sector that relies on renewable energies in order to create sustainable growth that respects the environment.

Future work :

In the future work, we will associate the time variable with the other model variables to test this time the causality relationship between these variables by the Granger method. Subsequently, we will study the energy projects that have been implemented by the Moroccan state in order to evaluate the indicators of an economic, environmental and human nature. We will test the hypothesis of the Kuznets curve according to which CO_2 emissions will decrease after a long increase in the latter, by integrating the other variables, of course, which could serve us in the validation of the model.

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