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Is it possible to improve environmental quality without reducing economic growth: Evidence from the Qatar economy

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ABSTRACT

In line with the priorities of the Qatar national vision (QNV) 2030 and its principal pillars, we examine in this paper the energy use – economic growth nexus for Qatar during the period 1970–2014. Using recent development in both unit roots and ARDL bounds testing approach with structural breaks, we found strong evidence for the growth hypothesis. This result indicates that the Qatari policymakers should recognize that energy conservation policies will have adverse effects on economic growth, and therefore alternative means must be undertaken to preserve the environment. This paper presents and discusses a detailed economic, energy and environmental policies that can help Qatari policymakers in achieving the objective of balance between economic growth and environment quality.

1. Introduction

Environmental degradation has become a major concern for all countries [1–7]. As stated at several international environmental and energies meetings, all governments are requested to be involved in a process that favors the reduction of CO_2 emissions (COPs conferences). For instance, a target of keeping the rise in temperature below the level of 2 °C was supported by many governments at the last COP conference, which was held in Paris from November to December 2015 (COP21 conference). Consequently, an agreement of reducing CO_2 emissions has been signed by several countries. This agreement was entered into force on November 4th, 2016, once the total CO_2 emissions of countries signing the agreement exceed the threshold of 55% of the world's CO_2 emissions. All these efforts highlight the level of importance of reducing air pollution. Moreover, it is commonly recognized that CO_2 emissions have important negative impacts on the inhabitant standard of living, their health, as well as economic growth and energy security [8–10]. Thus, proposing and implementing policies that can help in reducing CO_2 emissions are of particular interest, especially for countries that are characterized by a high level of CO_2 emissions per capita such as Qatar.[1] However, in the attempt to reduce CO_2 emissions by decreasing energy use and/or imposing more environmental regulations, the level of country competitiveness can deteriorate, inducing a decrease of economic growth. Therefore, it is very important to determine the causal relationship between energy use and economic growth as the type of this causality relationship direction strongly determines the adequate policies to be implemented to improve the environmental quality without reducing economic growth.

In the last few decades, a large body of the economic-environment literature has emphasized the growing importance of the energy consumption–economic growth relationship in determining the adequate policies required to improve the environment quality [11–16]. For instance, on the one hand, it is well recognized that the negative effects of environmental degradation exceed its instantaneous and direct effects on human health and quality of life to also cover its threatening effects on the future generation [17–22]; on the other hand, it is also well recognized that excessive environmental laws and regulations can reduce the level of employment, destroy competitiveness, slow down economic development, and harm society [23–25].

However, and despite the countless research investigating the causal relationship between energy consumption and economic growth, there has been no clear-cut agreement until now between scholars regarding this type of relationship [26–29]. The results seem to depend on the econometric approach employed, the period considered, the country under study [16,29,30], the variables used, as well as many other factors [31]. In particular, four hypotheses have been largely examined when exploring the energy consumption–economic growth nexus,

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[1] Qatar is ranked second in the word in term of CO_2 emissions per capita [16,29].

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namely the growth, energy conservation, feedback, and neutrality hypotheses.[2] The importance of uncovering which of these hypotheses apply in the situation of a country is that each hypothesis significantly impacts the effects of the implemented policies. In other words, policymakers should set policies bearing in mind which of the hypotheses are proven to apply. Therefore, the goal of any country is to implement the adequate economic, energy, and environmental policies that balance both/all in a way that maximizes the well-being of its population. Therefore, the study of the causal relationship between energy consumption and economic growth provides important insights into the impact of energy conservation policies on the level of economic performance. It extends beyond detecting the relationship between the consumption of energy and economic growth to shedding light on the policies that a country should implement to achieve the utmost level of balanced environmental conditions and economic growth [16,26,32–35].

In developing countries such as Qatar, this question of the effectiveness of energy conservation policies designed to reduce environmental degradation is of particular interest for policymakers and local government. In fact, by being a part of the Kyoto protocol and having ratified the COP21 agreement on April 22, 2016, Qatar is inclined to follow a strategy that reduces Green House Gases (GHG) emissions. Moreover, preserving the environment for future generations was considered one of the most important country objectives for many years. This commitment toward improving environmental quality was reflected in many official documents such as the Qatar permanent constitution, which clearly stated that: "*The State (Qatar) shall preserve the environment and its natural balance in order to achieve comprehensive and sustainable development for all generations*" (Article 33, Part 2 [36]). In addition, in its National Vision 2030 a whole pillar, the fourth pillar of QNV 2030, was devoted to environmental development [37].

Consequently, Qatar has extensively invested in research and technology to accomplish its goal in term of reduction of air pollution. Several initiatives have been proposed and some of them were already implemented. For instance, one of the technologies expected to achieve this goal is CCS (Carbon Capture and Storage), which is expected to allow the use of fossil fuel while reducing CO_2 emissions; however, it is still under study and there are some limitations against its implementation [38]. Moreover, there are some individual company initiatives such as Al-Shaheen oil field associated gas recovery and utilization project implemented by Qatar Petroleum and Maersk Oil Qatar which reduces approximately 2.31 million tons of CO_2e annually, Zero Flaring by Qatar Petroleum development (QPD) which saves about 45,468 tCO_2 equivalent per year, Acid Gas capture and re-injection by Ras Gas, which prevented the emission of 11,000 t of SO_2. There are also some renewable energy and energy efficiency initiatives such as the waste heat recovery project implemented by Maersk Oil which reduces the CO_2 emissions by 250,000 t per year [39].

However, this country's objectives toward reducing the hydrocarbon emissions makes the Qatar economy face different challenges, in particular due to the upcoming important events such as the World Cup 2022 and the approach of the year 2030, which marks the date for QNV 2030. These challenges are mainly associated with the complexity of connecting the different priorities of QNV 2030. For instance, achieving reasonable and sustainable rates of economic growth without damaging the environment constitutes the most challenging objective of the country during the next years. According to Qatar National Vision 2030, "*Economic development and protection of the environment are two demands neither of which should be sacrificed for the sake of the other*". Given this, it cannot be denied that balancing energy consumption and economic growth represents a real challenge for Qatar given its extensive reliance on hydrocarbon resources. Whereas the natural resources of oil and gas provide a massive contribution to the increased financial wealth of the nation, hydrocarbon and its derivatives are considered the major causes of environment degradation [40–44]. Moreover, the rapid increase of the Qatar economic growth combined with the rapid population and urbanization growth have increased the demands for resources including crude oil, electricity, and water use. As a consequence, carbon dioxide emissions have also increased rapidly, creating several environmental problems. In this study, by investigating the relationship between energy consumption and economic growth in Qatar, a clear guide will be developed on what policies should be implemented to ensure a sound economy in Qatar that is economically thriving and preserving the environment.

Previous studies did not investigate the case of Qatar. The only works that have examined the case of a group of countries (non-OCDE or OPEC countries) but that yield a single country result that includes Qatar are the studies of [45,46]. In their article [45], employ energy consumption per capita and [46] uses electricity consumption per capita as proxies of energy use. For both studies, their results show evidence for the feedback hypothesis for the case of Qatar. A shortcoming of these two studies is that the economic and environmental policies are not well discussed and are not country oriented. Other studies in the literature have included Qatar in a group of countries (GCC or MENA countries) [14,15,47]. These studies do not allow for results by country, which means that no policies by country was proposed. Among these studies [47], investigated energy efficiency of the six GCC countries to propose the proper policies that could preserve the environment without slowing down economic growth. The results provide evidence for the conservation hypothesis for all the GCC countries. Recently [15], explored the relationship between natural gas energy consumption and economic growth in GCC countries for the period 1980–2012 and found evidence of the feedback hypothesis for the region. Additionally, a study by [14] investigated the linkages between CO_2 emission, economic growth, and energy consumption for the GCC countries and found evidence for the feedback hypothesis as well. Despite these important studies on the GCC countries, there was no study that focused on the case of Qatar.

To fill this gap in the energy economics literature, we focus our analysis on the Qatar case. As stated above, the case of Qatar is of particular interest due to the high level of air pollution in the country and its effects on the quality of life including health. The choice of this country is also motivated by the multiple efforts that have been made by this country during the last few years to improve the environment quality.

In contrast to previous studies in the literature who provided in general a broad policy implications. In this paper, our main contribution is to provide a very detailed economic, energy and environment policies that can help Qatar in reaching its objective of balance between economic growth and environmental quality. These policies are based on the outcomes of the results of testing of the causality direction between energy use and economic growth. As a robustness of results, we use two proxies of energy consumption namely energy consumption and electricity consumption. Moreover, to control for possible variables

[2] The first hypothesis that governs the energy use–economic growth nexus is the growth hypothesis, which postulates that energy consumption causes economic growth. It suggests that an increase in energy consumption will lead to an increase of economic growth and, in the same way, a reduction in energy consumption will lower economic growth. As a result, conservation policies aimed at reducing energy consumption are inefficient. The second hypothesis is the conservation hypothesis, which is the complete opposite of the growth hypothesis. The conservation hypothesis states that an increase of the economic growth will lead to an increase of the energy consumption. Therefore, policies aimed at reducing energy consumption will not necessarily affect economic growth, as the causality's direction is from growth to energy consumption. The third hypothesis is the feedback hypothesis, which indicates that economic growth and energy consumption simultaneously and interdependently cause each other; the causality effect is also called bidirectional. Consequently, policies directed at reducing energy consumption will have a significant effect on economic growth. Finally, the fourth hypothesis that can be obtained when testing for causality direction between energy use and economic growth is the neutrality hypothesis. This hypothesis states that neither energy consumption nor economic growth causes each other. In this case, policies recommended to reduce energy consumption are inefficient and will have no impact on economic growth.