Revising the Empirical Linkage between Renewable Energy Consumption and Economic Growth in Tunisia: Evidence from ARDL Model

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ABSTRACT

This paper investigates the interactive relationships between renewable energy and economic growth based on a Cobb-Douglas production function for Tunisia over the period of 1980-2011. Using an ARDL model, results show confirm the validity of the feedback hypothesis while in the short term the conservation hypothesis is supported. Based on the author’s results, the Tunisian government is appealed to revise its policy toward the use of renewable energy by (i) the enforcement of the production and consumption of renewable energy to be substituted to the fossil and fuel energy and (ii) encouraging private sectors to deal with this energy subsector.

Keywords: ARDL Model, Cobb-Douglas Production Function, Economic Growth, Renewable Energy, Tunisia

1. INTRODUCTION

The rarity of fossil fuel energy, the important fluctuation that affect their price, the geographical disparity of their localization that can increase costs of their supplying as well as the environment impact of their use due to the emissions and climate changes have generated a great deal of interest in renewable energy sources by both policymakers and the general public (Apergis and Payne, 2014). Even fossil fuels are still the primary energy source worldwide, renewable energy sources have emerged as an important component of world energy consumption.

It has generally been realized that the consumption of renewable energy manifests a vital role for economy and environment. In this vein, (Fang, 2011) reports that renewable energy consumption should contribute to economic growth and should not cause damage to the environment.

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Most important features of renewable energy sources are reducing carbon dioxide emissions and assisting to protect the environment.

The relationship between energy consumption and GDP growth has been intensely examined in multiple frameworks set by various methods and countries. However even the important number of studies realized in this topic, a much smaller body of work has emerged examining a possible relationship between renewable energy and economic growth. Empirical evidence on the relationship is mixed. Several studies find a bidirectional relationship between renewable energy consumption and economic growth (Apergis and Payne, 2010 a,b; Sadorsky, 2009a; Silva, Soares and Pinho, 2011).

In the literature, the connection between renewable energy consumption and economic growth has been investigated in a number of studies. However, even the importance of empirical findings, there is no consensus on empirical results of these studies, which show different causality directions. These differences in nexus can be attributed to the fact that these studies have been conducted for different countries, and focused on different periods, variables and used different econometric methodologies (Ozturk, 2010; Apergis and Payne, 2011). The commonly employed methodologies include the forecast error variance decomposition analysis model, the bivariate error correction model, the Toda-Yamamoto procedure within a framework of production function, and the multivariate error correction model within a framework of production. Some empirical findings show that energy consumption contributed to economic growth both directly and/or indirectly, others that economic growth determined energy consumption, others supports the bidirectional causality between energy consumption and real gross domestic (Silva, Soares and Pinho, 2011).

This paper seeks to contribute to the literature on the nexus between renewable energy and GDP growth based on a Cobb-Douglass functions model. Using annual data for Tunisia over the period 1980-2011, we implement an ARDL model to analyze the dynamic relationship between real GDP and renewable energy consumption based on a Cobb-Douglas type production function.

The remainder of this paper is organized as follows. In section 2 we present an overview of literature studies on the renewable energy consumption and economic growth. Section 3 presents the data, the modeling approach and results. And finally, section 4 concludes.

2. LITERATURE REVIEW

In the end of the 20th and the beginning of the 21st century, the relationship between energy consumption and economic growth has attracted significant research interest. Empirical studies of the relationship between energy consumption and economic growth have been conducted for different economic regions or countries (Apergis and Payne, 2009); Acaravci and Ozturk, 2010). More extensive analyses show more specifically, in recent years, that increasing attention being paid to renewable energy, as a result research on the relationship between renewable energy consumption and economic growth has emerged in the literature.

Ozturk (2010) reviews the literature about specificity of the connection between energy consumption and economic growth. He reported that several studies in the literature have focused on the relationship between renewable energy consumption and economic growth. Even the importance of the empirical evidence the causal nexus between energy consumption and real GDP are still mixed (Yildirim et al., 2012). The absence of consensus in the results is due to the use of different data, period, and methodological approach. Some studies have found unidirectional causality running from renewable energy consumption to economic growth, and running from economic growth to renewable energy consumption. Others failed to confirm the
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