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Estimating higher education induced energy consumption: The case of Northern Cyprus

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ABSTRACT

This study estimates higher education-induced energy consumption in the case of the TRNC (Turkish Republic of Northern Cyprus). Although the TRNC is a non-recognized state and a small island; it attracts many international students each year and has shown tremendous development in higher education since the 1990s. The results of the present study reveal that higher education development has an ongoing relationship with electricity consumption; electricity consumption reacts to its long-term equilibrium level by 80.95% as a result of higher education development. Finally, the results of the present study reveal that higher education development in Northern Cyprus exerts a positive and significant growth impact not only on electricity consumption but also on overall oil consumption, both in the short- and long-term; therefore, it can be inferred that higher education development in this small and non-recognized island state is a catalyst for the growth of energy consumption.

1. Introduction

In addition to investigating the relationship between international trade expansion and economic growth, which has become a popular topic in development economics, the relationship between international tourism and economic growth has started to attract attention. Studies on the topic have been conducted by Katircioglu [1–4], Cortés-Jiménez and Pulina [5], Gunduz and Hatemi-J [6], Oh [7], Ongan and Demiroz [8], Dristakis [9], and Balaguer and Cantavella-Jordá [10]. International trade (including services and tourism) expansion can contribute to economic growth through various channels [11]. However, to the best of the author's knowledge, the contribution of international tourism to economic growth and particular segments of the economy has received little interest from researchers to date. Therefore, an investigation of these channels in the case of international tourism is warranted.

Higher education is an important global phenomenon. In fact, millions of people pursue their higher education at overseas institutions each year. Thus, higher education can be considered as a type of student tourism that contributes to national income, employment, and the wealth of local citizens [1]. Davies & Lea [12] and Carr [13] suggest that university students are actually a distinct population, differing in age and socio-cultural, educational, and economic characteristics despite the fact that the majority of them might be chronologically defined as belonging to the youth population. Furthermore, Smeaton et al. [14] show that the university environment encourages students to travel and take holidays. The contribution of student tourism to the economy is of particular importance to developing countries. Stevens and Weale [15] mention that living standards in most countries, and especially those in Europe, have risen over the last millennium due to developments in education. It is obvious that one of the most important factors affecting the demand for private secondary or higher education is the household income level and the costs incurred by a family when it takes the decision to invest in education [16]. However, there are generally accepted social and economic factors that affect a household's demand for education such as the parents' education, the geographical location of the place of residence, the size and composition of the family, the occupation of the primary earner, and the family's own consideration of its social

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status [16]. On the other hand, there are some external factors that might also affect the decision to study abroad such as the political and economic conditions of the targeted country or region, geographical location of the targeted institution, student fees, scholarship opportunities, medium of instruction, and the accreditation of the diploma that is received from these institutions.

From an economic viewpoint, an important reason for education is its impact on reducing inequalities of income [17] and the relationship between education and the labor market [16]. Some studies have focused on the estimation of the rate of return from education [18–20]. On the other hand, there are few studies in the field of higher education. Katircioglu [1] concludes that higher education acts as a catalyst for real income growth in a non-recognized state, namely, the TRNC (the Turkish Republic of Northern Cyprus) in the Mediterranean.

As previously mentioned, since millions of students pursue their higher education at overseas institutions, student tourism can be considered as a part of traditional (international) tourism [1]. The contribution of higher education development is not only important for the overall income of a nation but also for particular segments of the economy. The energy sector is an example of one of the various channels through which higher education contributes to expansion in the economy. A growth in international (student) tourism results in an increased demand for energy, for example through accommodation and transportation [21–23]. If higher education institutions progress considerably and are successful in attracting overseas students as well as local citizens, this development in higher education institutions will lead to increase in the number of buildings utilized, and therefore in energy demand. Increases in the number of higher education institutions and the number of overseas students will also lead to an increase in the number of businesses in the economy including restaurants, dormitories, travel agencies, and dry cleaners, among others. All of these will raise the energy (including electricity) demand in the economy; therefore, while higher education development contributes to the overall economy through different sectors, it also leads to a long-term expansion in energy consumption. This highlights the importance of adapting successful energy management policies in order to achieve energy conservation and environmental protection. Increased energy consumption will result in increases in energy expenditures by households and firms, which in turn will lead to an increase in aggregate income in the economy. In this respect, research on the nature of the relationship between higher education development and energy consumption deserves attention. Many studies in the existing literature focus on the relationship between real income growth and particular segments of the energy sector, including an early study by Kraft and Kraft [24]; and among the latest studies, Ouédraogo [25],[1] Wolde-Rafael [26], Odhiambo [27], Apergis and Payne [28], and Lee [29]. However, little research has studied the interaction between the energy sector and particular segments of the economy. For example, there are few studies on energy consumption or the patterns of energy use in the case of international tourism. Of those in existence are Tabatchnaia [30], Gössling [31], Ceron and Dubois [32], Becken and Simmons [33], Becken et al. [22], Trung and Kumar [34], Warnken et al. [35], Becken et al. [21], and Nepal [36].

Recognizing the importance of this issue, the present study estimates higher education induced electricity consumption and investigates the empirical relationship between higher education and energy consumption, which is proxied by electricity and oil consumptions, in the TRNC. The TRNC is not recognized by countries other than its mainland, Turkey, but attracts many international students from around the world as a result of the successful development of its higher education sector. A study by Katircioglu [1] validates the higher education-led *Growth Hypothesis* in the case of Northern Cyprus. The TRNC, which is located in a strategic location in the Eastern Mediterranean, was established in 1983 in an already divided island and has a population of over 286,973 and a per capita income of 14,421.77 US$ [37]. The TRNC does not have any foreign trade relationships with countries other than Turkey due to its political non-recognition. Therefore, international tourism and the emergence of the higher education sector are two major sources of foreign exchange for this small island state. However, the tourism sector also faces great difficulties in attracting international tourists because of problems such as the lack of direct flights to Northern Cyprus and high transportation costs.

To the best of the author's knowledge, there are currently no empirical studies investigating the relationship between higher education and energy consumption in the literature. Thus, this study is the first of its kind as it investigates the ongoing equilibrium relationship and direction of causality between higher education development and energy consumption in the TRNC.

The services sector in Northern Cyprus was given priority as a result of the political isolation and embargoes faced by the country in every field. The 1980s became a transition period from the manufacturing industry to services with a focus on tourism and higher education. The tourism sector suffered also from political problems, so the island could not attract the amount of tourists needed to stimulate significant growth in the economy. Tourists from abroad were targeted by allowing the opening of casinos on the island. Now, many casinos have opened in Northern Cyprus and attract tourists from Turkey and the south of Cyprus. Legalized gambling is prohibited in both of these countries. In 2008, 808,682 tourists visited Northern Cyprus, of which 80% were from Turkey. Net tourism revenues constituted 10.88% of GDP (gross domestic product) in 2010 [37].

On the other hand, the demand for higher education in Northern Cyprus has increased considerably since the 1990s, mainly due to the number of students from Turkey and overseas advertising especially in Africa and the Middle East. There are eight universities in Northern Cyprus: The EMU (Eastern Mediterranean University), which is the oldest and the largest, was established in 1979, NEU (Near East University), LEU (Lefke European University), GAU (Girne American University), CIA (Cyprus International University), the Northern Cyprus campus of METU (which is a Turkish university) (Middle East Technical University), the northern campus of ITU (which is a Turkish university) (Istanbul Technical University), and the UMK (University of Mediterranean Karpasia). At the beginning of the 2011–2012 academic year, there were almost 53,000 students studying at these eight universities, of which 20.40% were Turkish Cypriots, 72.95% were from mainland Turkey, and 6.65% were from various overseas countries [37]. Overseas students have been coming to Northern Cyprus for higher education since 1982. Since then, there has been a steady increase in the number of overseas students who now come from more than 68 different countries. The presence of internationally recognized and accredited universities in Northern Cyprus contributes to the positive image of the country in the international arena. Furthermore, the expansion of infrastructure and facilities at the universities of Northern Cyprus continues at an unprecedented rate and may now be compared favorably with their international counterparts. Therefore, the higher education sector is now the most important sector in Northern Cyprus and earns considerable foreign exchange. The sector is also contributing to the growth of this small and non-recognized island state. The development of higher education in Northern Cyprus has led to considerable increase in energy demand in the island as well. The overall net electricity consumption in

[1] Ouédraogo [25] also presents a brief review of the literature in this field.