

# Chapter 26

## Empirical Analysis of the Relationship Between Energy Consumption, CO<sub>2</sub> Emissions and Economic Growth in Tunisia

**Sana Essaber Jouini**

*University of Carthage, Tunisia & University of Manouba, Tunisia*

**Etidel Labidi**

*University of Carthage, Tunisia & University of Manouba, Tunisia*

### ABSTRACT

*This paper examines the long run and causal relationship issues between economic growth, energy consumption and carbon emissions by using vector error correction model for the case of Tunisia within 1970-2010. Empirical results using time series data suggest an evidence of a long-run relationship between the variables at 5% significance level in Tunisia. A Granger causality analysis is conducted amongst the variables. The overall results indicate bidirectional causality between energy consumption and CO<sub>2</sub> emissions and a unidirectional causality running from pollutant emissions to economic growth. But there is no direct relation between energy consumption and economic growth. Thus, our results reveal that in short term energy conservation policies, such as rationing energy consumption have no effect on the real output growth of Tunisia.*

### 1. INTRODUCTION

The threat of climate change is becoming a serious growing global worry and constitutes a dominant question in economic and political debates. These debates aim at thinking about how to mitigate negative effects of climate change. Thus, the impacts of global warming and climate change on the world economy have been thoroughly assessed by researches and practitioners. Furthermore, worldwide organizations, such as the United Nations, have been attempting to reduce the adverse impacts of global warming and climate changes through intergovernmental and binding agreements, such as the United

DOI: 10.4018/978-1-7998-1207-4.ch026

Nations Framework Convention on Climate Change (UNFCCC) known as Kyoto Protocol. This protocol, aims at combating global warming with objective of reducing, during the period 2008-2012, the greenhouse gas emissions by 5.2% under 1990 level. Carbon dioxide accounts for more than 60% of the greenhouse gases. Global emissions have almost doubled since the beginning of the seventies, and if present policies do not change, these emissions can grow up to 70% higher during 2008-2050 (OECD, 2008). Likewise, Johannesburg meeting in 2002 on sustainable development identified harmful impact of energy on environment despite its fundamental role as engine of economic growth. Thus, economic growth, energy consumption and pollutant emissions seem to be tightly linked. Depending on the nature of long term relationship among carbon emissions, energy consumption and income, different countries may resort different strategies to fight against global warming (Soytas and Sari, 2006).

In line with these arguments, this current study is an attempt to explore the relationship between energy consumption, CO2 emissions and economic growth for a small and open developing country, Tunisia within 1970–2010. Tunisia appears to be an interesting case study given that it is one of the highest growth economies in the Middle East and North Africa during the study period (1970–2010). The share of agricultural sector continuously declines from 24.8% to 12.1% and share of industry sector increases from 20% to 28.3%. The share of services sector also increases relatively slowly from 55.2% to 59.6%, which constitutes on average more than half of the total economic activity (National Statistics Institute, 2004). Environmental policies, such as air pollution management in Tunisia, have become a national priority and a major component of the environmental protection programs, starting with the creation of the Energy Control Agency (ECA) in 1985, then the National Environment Protection Agency (NEPA) in 1988 and the Ministry of Environment and Land Use planning in 1991. During the past three decades, efforts to reduce and control air pollution were directed toward three operations: (1) the identification and the inventory of air pollution sources; the evaluation of emissions by area and type of pollutants, (2) the development of standards and of a monitoring network, and (3) the reduction of pollutant emissions, particularly in industry and transport sectors. The choice of this country is also motivated by the fact that no known substantial study has been conducted to examine the relationship between economic growth and environmental quality in Tunisia. Our investigation is made to assess the nature of the long-run relationship between per capita income, energy consumption and environmental indicator (CO2 emissions) in Tunisia, using time series data and cointegration analysis (Johansen, 1995; Lardic and Mingon, 2002). The objective of our study is to determine whether increases in per capita income are associated with reductions in environmental degradation. Causality tests are also undertaken to assess the direction of relationship between the three variables, per capita income, energy consumption and pollutant emissions. Our aim is to investigate the existence of a relation between energy conservation politic and economic growth politic in Tunisia or in the contrary is the country proving the ‘neutrality hypotheses’ between these two politics?

As different works combining Environmental Kuznets Curve (EKC) literature with studies exploring the links between energy consumption and economic growth (Richmond et Kaufman, 2006; Soytaş et al., 2007; Ang, 2007 et 2008; Soytaş et Sari, 2009; Apergis et Payne, 2010, Chebbi, 2010; Arouri et al., 2011, et Wang et al., 2011) we empirically investigate short run and long run relations between the three variables in an integrated analysis using Tunisian time series data.

The rest of the paper is structured as follows. Section 2 reviews the literature and empirical findings on relationships between per capita income, energy consumption and pollutant emissions. Section 3 describes the data and the methodological approach, and presents empirical findings. Finally, some conclusions are drawn in the last section.

11 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:  
[www.igi-global.com/chapter/empirical-analysis-of-the-relationship-between-energy-consumption-co2-emissions-and-economic-growth-in-tunisia/241080](http://www.igi-global.com/chapter/empirical-analysis-of-the-relationship-between-energy-consumption-co2-emissions-and-economic-growth-in-tunisia/241080)

## Related Content

---

### Transition to the Circular Economy: Implications to Program Management

Ron Schipperand Gilbert Silvius (2021). *International Journal of Circular Economy and Waste Management* (pp. 33-53).

[www.irma-international.org/article/transition-to-the-circular-economy/271259](http://www.irma-international.org/article/transition-to-the-circular-economy/271259)

### Gastronomic Entrepreneurial Profile and Factors Influencing the Potential of Business Internationalization: The Case of Metropizza

José G. Vargas-Hernándezand Mario Guadalupe Zazueta-Félix (2021). *Handbook of Research on the Empirical Aspects of Strategic Trade Negotiations and Management* (pp. 337-351).

[www.irma-international.org/chapter/gastronomic-entrepreneurial-profile-and-factors-influencing-the-potential-of-business-internationalization/280036](http://www.irma-international.org/chapter/gastronomic-entrepreneurial-profile-and-factors-influencing-the-potential-of-business-internationalization/280036)

### Tunisia's Struggle for Democratic Consolidation: Obstacles, Opportunities, and Political Culture Post Arab Spring

Akash Bag, Souvik Royand Ashutosh Pandey (2024). *Democratization of Africa and Its Impact on the Global Economy* (pp. 156-179).

[www.irma-international.org/chapter/tunisias-struggle-for-democratic-consolidation/336974](http://www.irma-international.org/chapter/tunisias-struggle-for-democratic-consolidation/336974)

### An Observational Study on Women Empowerment in Marketing With Reference to Chennai City: Successful Women Entrepreneurs in India in Business

M. Radhikaashreeand Shalini M. (2021). *Women Empowerment and Well-Being for Inclusive Economic Growth* (pp. 128-137).

[www.irma-international.org/chapter/an-observational-study-on-women-empowerment-in-marketing-with-reference-to-chennai-city/265663](http://www.irma-international.org/chapter/an-observational-study-on-women-empowerment-in-marketing-with-reference-to-chennai-city/265663)

### Fuzzy Multicriteria Decision Making Methodologies Used in the Book

(2020). *Monetary Policies and Independence of the Central Banks in E7 Countries* (pp. 92-131).

[www.irma-international.org/chapter/fuzzy-multicriteria-decision-making-methodologies-used-in-the-book/242325](http://www.irma-international.org/chapter/fuzzy-multicriteria-decision-making-methodologies-used-in-the-book/242325)