

The Relationships between Carbon Dioxide (CO₂) Emissions, Energy Consumption and GDP for UAE, 1980-2012

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Abstract— The relationships between environmental quality, energy use and economic output have created growing attention over the past decades among researchers and policy makers. Focusing on the empirical aspects of the role of carbon dioxide (CO₂) emissions and energy use in affecting the economic output, this paper is an effort to fulfill the gap in a comprehensive case study at a country level using modern econometric techniques. To achieve the goal, this country-specific study examines the short-run and long-run relationships among energy consumption (using disaggregated energy sources: petroleum products and the direct combustion of crude oil, natural gas, and electricity), CO₂ emissions and gross domestic product (GDP) for the United Arab Emirates (UAE) using time series analysis from the year 1980-2012. To investigate the relationships between the variables, this paper employs the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) unit root tests for stationarity, Johansen maximum likelihood method for cointegration and a Vector Error Correction Model (VECM) for both short- and long-run causality among the research variables for the sample. All the independent variables in this study show very strong significant effects on the GDP in the country for the long term. The long-run equilibrium in the VECM suggests negative long-run causalities from the CO₂ emissions and the natural gas use to the GDP. Conversely, positive impacts of the consumption of petroleum products and the direct combustion of crude oil and the electricity consumption on the GDP found to be significant in Iraq during the period. In the short run, there also exists a negative unidirectional causality running from the GDP to the electricity consumption. All the variables in this study show no significant effects on GDP in the country for the short term. The VECM suggests no short-run causalities from the consumption of any energy sources to GDP and there does not exist any short-run relationship between the variables. The results partly support and also partly deny the conventional arguments that there is a short-run positive effect from environmental quality and energy use on economic output but they eventually reduce economic output in the long run. Overall, this study found that the associations could be differed by the sources of energy in the case of the UAE over of period 1980-2012.

Keywords— CO₂ emissions, energy consumption, GDP, UAE, time series analysis

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