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Analysis of Relationship between CO₂ Emissions, Crude Oil Prices, and Nuclear Power Generation Using Nonparametric Quantile Causality Test*

Yeonjeong Lee¹

Abstract

This study analyzes the relationship between CO₂ emissions, crude oil prices, and nuclear power generation using the Granger causality test and nonparametric quantile causality test. The analysis period is from January 1999 to December 2018. In both causality tests, the change in CO₂ concentration significantly caused the change in nuclear power generation proportion at the lag of 1. The Granger causality test showed that international oil prices had no significant effect on domestic CO₂ emissions and nuclear power generation in the lags of 8. In the nonparametric quantile causality test, however, international oil prices have a significant effect on domestic CO₂ emissions and nuclear power generation in the middle quantiles.

Keywords: CO₂ Emissions, Crude Oil Price, Nuclear Energy, Granger Causality, Nonparametric Quantile Causality

1. Introduction

The purpose of this study is to analyze the relationship between CO₂ emissions, nuclear power generation, and international oil prices using the traditional Granger causality test and the nonparametric quantile causality test of Balciyar, Bekiros, and Gupta (2016). The UN intergovernmental panel on climate change (UNPCC) found that the main source of greenhouse gases is the use of fossil fuels for power generation. Also the IEA (2016) report, 'Energy and Air Pollution' found that coal-fired power plants have increased air pollution in Asia. This means that the higher the amount of coal-fired power generation, the greater the emissions of air pollutants, including greenhouse gases. If coal prices are lower and the unit price of coal-fired power becomes relatively inexpensive, it may be preferable to produce energy from coal-fired power plants rather than nuclear power plants. And air pollution is likely to increase due to the increase in coal-fired power generation. Coal-fired power plants and nuclear power plants are the bases of domestic energy production. Therefore, if coal-fired power generation is

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