

The Impact of Energy Market Uncertainty Shocks on Energy Transition in Europe

*Mehmet Balcilar*¹, *David Roubaud*² and *Muhammad Shahbaz*³

Executive summary

In recent years, there has been a growing concern in Europe, and other countries at large, over increasingly deteriorating impacts of climate change. The European Union has introduced a number of initiatives to reduce carbon dioxide (CO₂) in the member states by increasing the share of renewable energy (RE) in the total energy consumption. The initiatives target both increasing percent of capacity that utilizes RE sources and reducing energy intensities. Although penetration rates of low-carbon generation in Europe have increased, the transition has been much slower than the policy targets and significant differences exists across countries. Previous studies considered many factors that account for the differentiated transition across countries, including economic, social, technical and environmental policy related factors. However, almost all these studies are not based on rigorous statistical evidence and they have been inconclusive.

This paper contributes to the literature by examining the impact of energy market uncertainty shocks on the energy transition in Europe using panel data on 28 European countries from 1990 to 2014 at annual frequency. As Kilian (2008) [The Economic Effects of Energy Price Shocks, *Journal of Economic Literature*, 46, 871-909] pointed out that energy market volatility has been the distinguishing characteristics of the world economies since 1970s and it is significantly linked to the economic performance.

Energy market uncertainties have far reaching impacts from energy transition policy adaptation to household decision making. We consider uncertainty shocks relating to the oil price, domestic energy supply and demand conditions and residual of energy price in a panel stochastic volatility model.

Our study reveals valuable information on the importance of energy market uncertainty shocks. Uncertainty shocks enter into the decision making of all market participants and policy makers, as such they may be a significant factor accelerating or holding back to transition to a sustainable energy system.

The empirical results show that all uncertainty types considered in the study show strong time varying effect on the energy transition. The effect of the oil price on energy transition shows large time variation, but it is always positive. The effect of supply uncertainty has been always significantly negative, except a short period at the end of 2004. The effect of energy demand uncertainty on the energy transition is strongly time-varying and generally positive. The residual price uncertainty captures the effect of other forces on the energy price other than oil price, energy supply, and energy demand. Like the supply and

1

□ Department of Economics, Eastern Mediterranean University, Famagusta, via Mersin 10, Northern Cyprus, Turkey.

2

□ Montpellier Business School, 2300 avenue des Moulins, 34000 Montpellier, France. E-mail: xphe@xmu.edu.cn

3

□ Montpellier Business School, 2300 avenue des Moulins, 34000 Montpellier, France.

demand uncertainties, the price uncertainty has a strongly time varying effect on energy transition. The estimates show that the effect of renewable uncertainty is negative before 2007 and also after 2009. The effect was positive, but small although significant during the 2007-2009 period. However, the effect of the uncertainty relating to the share of renewables has become negative but mostly insignificant in recent years. The findings of the study will help policy makers on making more informed decisions that form the underpinnings of the energy transition policies. The paper discusses energy policy implications of the findings and designing policies that would reduce the impact uncertainty shocks.

Keywords: Energy transition; Uncertainty; Europe; Stochastic volatility.

**J
E
L**

**C
o
d
e
s
:**

**C
2
3
,**

**Q
4
1
,**

Q