

Special Issue “Energy Challenges in an Uncertain World”

Editorial

Anna Creti, Duc Khuong Nguyen, and Lutz Kilian

<https://doi.org/10.5547/01956574.39.SI2.acre>

In the aftermath of the 2009 crisis, the energy sector has been characterized by high uncertainty about prices and volumes. Three phenomena have further added to this uncertainty: the shale oil revolution, the financialization of energy futures markets, and the likelihood of a transition towards a low carbon economy, especially in the aftermath of the Paris Agreement, which was intended to make the use of renewables more attractive than that of fossil fuels. The papers in this special issue reexamine our understanding of how the energy sector works in light of these new developments. A common theme in many of these papers is the interdependence of markets. For example, fossil fuel markets are integrated with the broader economy, the growth of renewables depends on features of the electricity market, and anti-pollution policies interact with the pre-existing structures of the electricity market. The resulting spillovers and side effects have stimulated research on a wide range of topics.

For example, the paper “Renewable generation and network congestion: an empirical analysis of the Italian Power Market” by F. Ardian, S. Concettini and A. Creti assesses both the frequency and the cost of congestion in the Italian electricity market due to the production of electricity by renewables. It employs a unique database with hourly observations spanning the 2010–15 period that captures the organization of the Italian electricity market by zones. A multinomial logit and a two-stage least squares model shows that increasing the supply of electricity from solar and wind sources in electricity-importing regions decreases the probability of congestion, while the opposite effect occurs when renewable production is located in an electricity-exporting region. Hydroelectric production also decreases the probability of congestion, whereas higher electricity demand increases it. The likelihood and cost of the congestion is sensitive to the historically efficient location of electricity producers, mainly hydroelectric power, and to the geographical configuration of the transmission network. Given this locational heterogeneity, the development of new renewable capacity in electricity-importing regions would seem important.

In “Integration of European Electricity Markets: Evidence from Spot Prices” K. Gugler, A. Haxhimusa and M. Liebensteiner employ error correction models to study the extent of market integration in European electricity markets, allowing for the possibility of a single integrated electricity market as well several efficient trading zones at the wholesale level. Their study uses a novel dataset combining hourly spot price series from 25 European electricity market areas for the period 2010–15 and includes several control variables such as the interconnection capacity, congestion and its direction, market coupling, input prices for other technologies, forecasted electricity feed-in from intermittent renewables, and national holidays. They find that market integration increased from 2010 to mid-2012 but then declined until 2015. The strength of the error correction in the European data is rather low. As in the Ardian, Concettini and Creti paper, this result may reflect

the increasing penetration of renewables into the electricity market, which is likely to cause rising network congestion.

A similar question is investigated by O. Massol and A. Banal-Estanol in “Market power and spatial arbitrage between interconnected gas hubs”. In the natural gas market price spreads may reflect oligopolistic pricing by the arbitrageurs. To overcome this problem, the authors define integration using the equilibrium notion that all spatial arbitrage opportunities between the two markets are being exploited. In other words, price spreads must be consistent with the traders’ profit maximization behavior. Using the spatial arbitrage trades conducted during the period 2003–06 in the “Interconnector” pipeline, which connects Europe’s two oldest spot markets for natural gas, the UK’s National Balancing Point and the Zeebrugge market in Belgium, high degrees of wholesale natural gas market integration are found. While the price co-movement can be interpreted as a measure of market integration, the data also reveal the existence of some market power.

The contribution “Oil Price Risk and Financial Contagion” by K. Guesmi, I. Abid, A. Creti, and J. Chevallier seeks to understand the determinants of contagion, defined as an excess correlation that is not explained by fundamental factors. The authors define oil price risk as the exposure to contagion stemming from trades in physical goods incorporating oil or from financial trades seeking high returns. Their analysis is based on monthly OECD stock market data for the period from January 1991 to April 2015. A three-factor model with time-varying loadings (the U.S. market return, the WTI oil price and the regional equity portfolio return) shows that the oil price risk measured in this manner is an important determinant of contagion. The oil price risk in the U.S market is an important determinant for excess returns in all regions (North America, European Union, Non-European Union, and Asia-Pacific) or the world.

The paper “Is the Discretionary Income Effect of Oil Price Shocks a Hoax?” by C. Baumeister, L. Kilian and X. Zhou also focuses on fossil fuel markets. The authors review the theoretical basis of the standard explanation of how a change in the real price of oil affects private consumer spending in oil-importing economies, which has been called into question recently by some observers. It is shown that this so-called discretionary income effect is closely related to the terms-of-trade effect of a change in the real price of oil on real domestic income and has a sound theoretical basis. State-of-the-art regression methods for quantifying this effect are consistent with the implications of New Keynesian dynamic stochastic general equilibrium models. Alternative estimates sometimes discussed in policy circles are shown to involve strong simplifying assumptions. The authors also discuss how estimates of the discretionary income effect can be made robust to changes in the dependence on oil and gasoline imports over time, generalizing earlier estimates in the literature.

One of the key drivers of the changing nature of electricity trading is pollution control. In the paper “Counterpart choice in emission markets: beyond pollution abatement motives”, M.E. Sanin studies the determinants of buying and selling allowances in the US Acid Rain Market. He considers the important role of professional traders in linking local markets, in reducing trading costs, risks and processing information. Using data on all transactions in the Acid Rain Market between 1995 and 2005, Sanin finds that agents seeking to trade large quantities usually prefer to trade in a centralized market. Electricity producers buy allowances from market makers, which operate nationwide and serve as a link between local markets, increasing the efficiency of the environmental regulation.

To summarize, the papers in this special issue shed light on how the energy sector has evolved in recent years from a variety of different angles and using a range of different techniques.