THE EFFECTS OF MARKET COUPLING ON DAY-AHEAD ELECTRICITY PRICES IN CENTRAL-WESTERN EUROPE

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Overview

Market coupling is a major pillar of the EU's energy policy. The completion of market coupling across Europe was planned for 2014. Trilateral market coupling consisting of the day-ahead markets of Belgium, France and the Netherlands as well as Central-Western Europe market coupling that incorporated also the German market, are two multiannual periods of market coupling that have always been referred to as an exemplary cases. With several studies about the success of market coupling already in existence, this study fills a remaining gap by answering the question of whether or not price drivers diminish the measurable effects of market coupling. Hence, answering the question of whether national structural differences or common regulatory framework are driving electricity prices is a main motivation of this thesis.

Methods

This thesis' methodology consists of a two-step approach. First, the effects of market coupling are assessed. Correlation and convergence analyses are conducted to estimate the relationships between the different markets. The first step of the analysis offers a comprehensive analysis of the measurable effects of market coupling. The second part offers valuable insights into the complex interplay between the different drivers of electricity prices. It estimates which price drivers diminish the theoretical effects of market coupling. Fuel prices, generation assets and interconnector capacity are included in the analysis. Overall, a comprehensive examination of the implications of market coupling on day-ahead electricity prices is carried out.

Results

The analysis showed that price convergence can be a result of market coupling, however, only with a certain relationship between coal, gas and CO_2 prices and a certain amount of RES feed-in. This was seen in CWE in 2011, with converging prices above 60% of the time, and throughout the entire TLC phase. Changing market conditions did not allow for price convergence across CWE after 2012. The analysis of fuel prices revealed that fuel price changes resulted in changed generation profiles. As the coal price decreased and the gas price increased, gas was crowded out of the supply mix in Germany. Whereas in the Dutch market gas still plays an important role in the supply mix and influences the electricity price. Further, the analysis showed that decreasing coal prices result in a further widening of the price spread across CWE markets. Particularly, Germany benefited from the low coal prices and together with increasing solar generation during peak hours, the influence of gas vanished. Supplementary, evidence was found that the increasing share of RES in Germany also contributes to diverging prices in CWE. Yet, the correlation was not as extensive as seen by coal prices. Additionally, low priced electricity is exported to neighbouring countries which benefit to a large extent. Market coupling is profitable for further expansion of RES and this potential should be used as RES are an important pillar of the EU's goal to implement a lowcarbon, competitive and reliable electricity system. The examples of Belgium and France showed that short term undersupply and extreme import needs can be balanced out, however, the structural dissimilarity between the Dutch and the other market results in essential differences.

Conclusions

The analysis revealed that a further re-fragmentation of energy policy should be avoided. Recently, several uncoordinated regional and national initiatives concerning market design were observable e.g. the implementation of a capacity market and the subsidies to Hinkley Point in the UK. The EU's regulatory scheme should be further optimised and the full potential of regional cooperation needs to be exploited. The analysis of the French and German network situation in February 2012 showed that the coupling of intraday and balancing markets should be further developed. If it's achieved to vertically interlink the day-ahead, intraday and balancing market, there is no need for a capacity market. As a faster and larger energy-only market will be able to deliver the shortterm flexibility

needed. Measures interact with each other in important ways as for example a wider balancing area allows for decreased amount of flexibility options. Resource adequacy should be tackled on a regional level. Member state wide examination of resource adequacy will generate over-investment and raise costs. A regional approach will allow lower costs for reliability and mitigate the demand for flexible resources. The integration of RES is an essential pillar of the transition towards a low-carbon and competitive European electricity system. Efforts for cross border cooperation in design and implementation of RES support schemes should be made. However, in the long-term more market exposure and balancing responsibilities for RES should be incorporated. This study also showed that neighbouring countries benefit from low German wholesale prices (high consumer surplus) while the German customers pay high subsidies and only producers benefit (high producer surplus). This imbalance should be tackled, especially, as cross border sales and the balancing effect of a European electricity market are an important pillar of the German energy transition. The cross-border opening of support schemes seems to be a valuable measure in order to distribute costs evenly between beneficiaries. The study showed that the complex flow-based market coupling mechanism is experienced as extended interconnector capacity and thus, results in higher levels of price convergence, i.e. increased efficiency. After successful implementation in the CWE region an extension to the NWE region should be conducted in order to increase the integration of European electricity markets.

Thus, one can see that the underlying production portfolio and demand structures are main driving forces for the electricity price and that market coupling effects are only verifiable with a certain interplay between the interdependent driving forces of electricity prices. Since 2012 the underlying physical conditions do not allow for full price convergence.