Integrating European Electricity Markets – what effect for consumers and producers?

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Overview

Electricity market design is evolving with the increase in electricity generated from renewable sources. The market system was originally designed for dispatchable fossil fuel electricity generation with high marginal costs rather than renewable electricity generation with nearly zero marginal costs and high upfront capital costs. When short term prices no longer cover long term investment costs, new market design is needed. An alternative is to increase interconnection to facilitate increased trade between markets (Pollitt and Chyong, 2018). Economic theory would suggest that eliminating barriers to trade across a regional market will decrease consumer costs and producer profits in areas that increase imports, while increasing producer profits and consumer costs in areas that increase exports (Dahlke, 2018). Trade through interconnectors can exploit differences in wind and sun conditions across regions and so reduce supply variability; higher shares of renewable electricity raises the value of market integration even further (Newbery *et al.,* 2018).

In this context, the EU has been progressively harmonizing national and regional electricity markets, to form a single market that includes more than 500 million people. The Multi-Regional Coupling organized through European power exchanges coordinates the clearing of day-ahead markets and determines day-ahead prices across the countries involved (Politico, 2018). In the 1996, 2003 and 2009 EU electricity directives, the development of integrated wholesale power markets across the continent was encouraged in order to incentivise market-driven investment in generation across Europe. The Internal Energy Market (IEM) in Europe provides for free trade across border and non-discrimination between internal and cross-border transactions. On October 1st 2018, Ireland was one of the final countries to integrate with this market due to the small isolated nature of this synchronous system which required additional precautions to put in place new market arrangements.

The Irish electricity market has been a wholesale all-island market (including Northern Ireland, called the SEM) since 2007. The integration of the all-island electricity market with European electricity markets was expected to increase the use of the interconnector with Great Britain which should “deliver increased levels of competition which should help put a downward pressure on prices as well as encouraging greater levels of security of supply and transparency” (EirGrid, 2016). In addition to integration with Europe, other features were included in the new I-SEM market, such as changes to how energy is bought and sold; how generators are remunerated for availability; forward trading arrangements and market liquidity; market power controls; and the systems, policies and procedures that are required to operate the market (EirGrid, 2016). This has led to new balancing, capacity, and intraday markets that did not previously exist in the Irish market. With the integration of the Irish market, the IEM now comprises 20 countries, with 38 interconnectors and a total generating capacity of over 3,000 TW (EirGrid, 2016).

The European Target model sets out the common rules and arrangements for market coupling in Europe. It includes a common price coupling algorithm for scheduling day-ahead markets and determining flows between geographic regions. The energy transactions involving sellers and buyers from different bidding zones are centrally collected to maximise the most efficient and effective trades. In theory, unless the network is congested, markets should converge to a single price. When the network is congested, prices diverge.

The integration of the Irish electricity market with the IEM provides a natural experiment with which to test economic theory relating to the benefits of interconnection, regional electricity trade, and market rule changes for consumers,producers and markets. While there is an extensive literature on electricity market design and theory, it is rare to find empirical data such as this with which to test the theory. This integration is relatively recent, yet it provides an ideal opportunity to examine in detail several features over the period directly before and after the change. Ireland, as an isolated market. Ireland has been identified as a country at the forefront of market change due to the high share of renewable electricity and its isolated market (Polllitt and Chyong, 2018). It also serves as a good case study, as there are less confounding factors in an analysis of market design, compared with more geographically integrated countries.

Methods

We have created a novel dataset combining data from the old electricity market (SEM), new electricity market (I-SEM), and ENTSO-E Transparency platform websites. Considerable time has been spent understanding the specifics of the variables collected on old and new market sites and to identify continuous variables across the sites. We have focussed on three areas: wholesale day ahead prices, where the majority of trades happen in European and Irish markets; interconnector flows; and fuel mix.

In order to evaluate the effect of integrating the Irish market with the European electricity market we set up a synthetic cotrol model using data from Texas, Portugal and Spain.

Results

Early results show that the average prices have not changed significantly since the integration with the European market (see Figure 1), however the volatility and interconnector flows have both increased. In particular, where the value of imports or exports on the East West interconnector to Britain (EWIC) previously never rose abouve 300 MW, they are now regularly close to the rated capacity of 500MW in both directions. Further analysis is needed of the portfolio of plant employed since the market change and the current fuel mix, however it is notable that the record for shares of wind on the Irish system has been broken three times since November 2018.

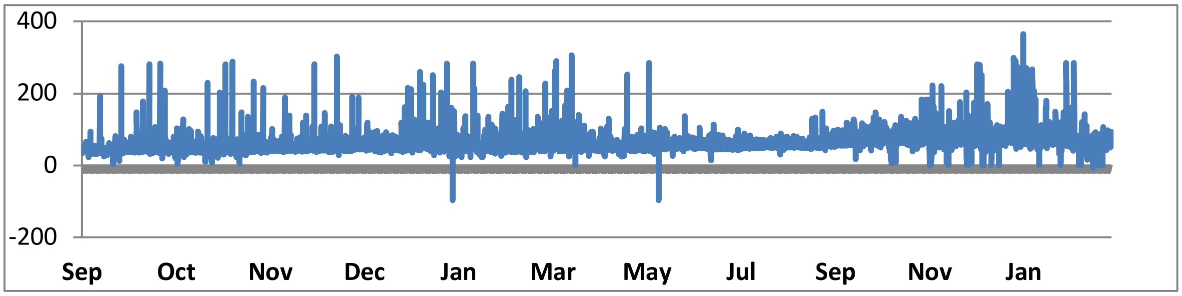

Figure 1: SMP /Day Ahead Prices (01.09.2017-28.02.2019)

Conclusions

Pollitt and Chyong (2018) suggests that more interconnections should stabilise wholesale prices through convergence between key markets in Europe both in terms of price level and variations are reduced significantly. This may have consequences for financial markets and the risks associated with financing variable renewable and conventional technologies. Our results seem to differ from this in terms of the volatility of prices in the new integrated markets. However, interconnector trades have increased substantially since the integration and this has facilitated the integration of higher shares of wind energy on the grid. Future work will have a longer time series to examine the different effects. It ccan be expected that the results should become less volatile in time even with out bread-making skills.

References

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