Elecxit: The Impact of Barriers to Electricity Trade after Brexit

Joachim Geske, Richard Green and Iain Staffell

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Introduction

- The United Kingdom is in the process of leaving the EU.
- The UK government has given itself a red line of not coming under the jurisdiction of the European Court of Justice, which has oversight of the Single Electricity Market.
- It is conceivable that the United Kingdom will leave the Single Electricity Market.
- We ask two questions:
  1. What does leaving the Single Electricity Market mean and imply for the electricity system (Elecxit)?
  2. What are the midterm (2030) costs of this Elecxit?
- Answers: Elecxit scenario, model framework and simulation
Elecit scenario: Brexit Impact channels

- Tariffs on
  - electricity exchange
  - (oil and) gas (55% non UK)

- Infrastructure development - Interconnection
  - electricity 4GW → 12GW 2020 financing, at risk?

- European institutions
  - market rules (market coupling; cross-border balancing; capacity market trading)
  - carbon pricing (EU-ETS)
  - renewable energy directive
  - euratom

- Nuclear research (incl. fusion)

→ Elecit scenario:
  1. limited interconnector capacity expansion
  2. market uncoupling
Simplified model of electricity trading in coupled markets…

Day ahead UK&F auction
Round 1 price proposal:
60 €/MWh
80 €/MWh

Market closure

Generators & Demand
Trader

Auctioneer
.... And in uncoupled markets

Day ahead auction UK Round 1 price proposal: 60 €/MWh

Day ahead auction F Round 1 price proposal: 80 €/MWh

Auctioneer

Poor boy!

Genius!

God saved the queen!

Disrupter!

Generators & Demand

Auctionateur
Uncoupled Markets

- European electricity markets uncoupled until 2014.
- Traders complained about the necessity to anticipate UK prices.
- Impact: trading vs. price difference:
  - Interpretation: Anticipation errors cause trading ‘errors’ and efficiency losses (in a world of increasing marginal cost).
  - Since 2014 markets are coupled via ‘Euphemia’.
Elecxit costs

- **Brexit scenario**: market uncoupling = - market coupling; with Elecxit the same conditions of uncoupled markets (before 2014) apply.
- **Model**: bilateral equilibrium of distorted trade under capacity constraints → distortion depends on 1. supply curvature, 2. variance of the anticipation error (coupling = 0!) and transmission capacity.
- **Calibration** of variance by welfare gains of market coupling (0.5% of market value).
- **Simulation Elecxit 2030**: ENTSOE Vision 3, generation structure, load profiles generated with DESSTINEE (Green&Staffell, open source), variance extrapolated from 2010, x2
Results / Conclusion

- **Elecxit** in the dynamic future of electricity markets can be expected to be **5 times as costly as market coupling** reduced generation costs in the past.

- The **‘loss‘ of trading infrastructure** could be **twice as expensive as market uncoupling**.

- Perspective: Switch to **trade data** and estimate the (censored) distorted trade model directly → contribution to the literature of benefits from market coupling (avoid calibration step)

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<td>5 GW</td>
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<td><strong>Market Design Scenario</strong></td>
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<td>Uncoupled ($\sigma &gt; 0$)</td>
<td>Hard Elecxit 1.026</td>
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