“Re-coupling” the GB market: the cost of uncoupling

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Outline

• Single Day Ahead Coupling (SDAC) vs uncoupled
• **Hedging** within and between countries
  – Before and after Brexit
• **Modelling** traders’ behaviour post-Brexit
  – Forecasting and loss of value
• Cost of uncoupling GB-Continent
• GB-SEM early experience
  – Intraday remains coupled with SEM

=> *why not recouple GB-SEM at Day-ahead?*
Before coupling flows *against* price differences - FAPDs

**GB imports vs GB-FR prices 2013**

FAPD GB imports when GB price lower than French price

FAPD GB exports when GB price higher than French price

**GB-FR prices Euros/MWh**

**GB imports MW per hour**
After 2014 EUPHEMIA efficiently clears Day-ahead market
Hedging under SDAC

- Physical Transmission Rights (PTRs): options entitle holder to nominate flows over ICs or sell (UIOSI)
  - Sold forward (year, quarter, month ahead) for $p_{GB} - p_{FR}$ or v.v. (per MW)
  - Day-ahead become FTR options under SDAC
  - Total volume limited to IC capacity
- Financial – FTRs: usually obligations, entitled to congestion revenue
  - Can be sold forward. Cannot offer PTRs and FTRs for same border
  - Obligations can be netted (as in the IDAs between GB & SEM)
- Contracts for difference (CfDs) allow hedging within a country
  - Pay $(s - p_{GB})/MW$ for an agreed strike price, $s$
- Arbitrage makes local CfD = FTR + foreign CfD
Forward markets converge on DAM spot price

### IFA 28-day lagged DAM price, front and current month FTR

- **28 day lagged DAM**
- **Current FTR**
- **Current quarter FTR**

**Graph Details:**
- **Y-axis:** £0 to £40 in increments of £5
- **X-axis:** Dates from 2/2/15 to 2/12/17

**Legend:**
- Blue line: 28 day lagged DAM
- Green line: Current FTR
- Orange line: Current quarter FTR
GB Day-ahead auction times

IC *before* DAM then nominate

- BritNed Day Ahead Auction (08:50 – 09:10)
- Nordpool N2EC Day Ahead Gate Closure (10:50)
- SDAC Gate Closure (12:00)
- IFA/IFA2 Day Ahead Auction (09:40 – 10:00)
- Nemo Link Day Ahead Auction (09:40 – 10:10)*
- BritNed Nom. Gate (10:30 – 13:30)
- IFA/IFA2 Nom. Gate (12:05 – 14:00)
- Nemo Link Nom. Gate (12:05 – 14:00)*

All times in CET

*The Nemo Link times are currently being consulted upon and may change*
Post-Brexit import to GB

• Sequence of transactions
  1. At D-1 buy PTR FR=>GB
  2. Buy FR DAM, sell in GB DAM
  3. Nominate for profitable hours over IFA
• Risks: expected value of IFA may differ from DAM price differences
  => Exposure to imbalance charge for un-nominated flows or may flow in wrong direction

Question: what is the loss of efficiency from separating the SDAC into three separate transactions?
Forecasting price differences: using autoregressive exog. variables

• Scenario 1 IC auction before DAM auctions
  – As with GB - Continent
  – 1A directly forecast price difference
  – 1B forecast each DAM price and take difference

• Scenario 2 IC auction after DAM auctions
  – As with Intra-day auctions with SEM

Error Measures for IFA forecasts

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>MAE   (€/MWh)</th>
<th>MSE (€/(MWh)^2)</th>
<th>FAPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>€5.49</td>
<td>66.45</td>
<td>9.8%</td>
</tr>
<tr>
<td>1B</td>
<td>€5.5</td>
<td>66.55</td>
<td>9.9%</td>
</tr>
<tr>
<td>2</td>
<td>€3.89</td>
<td>33.81</td>
<td>11.9%</td>
</tr>
</tbody>
</table>
Actual vs Forecast GB-FR price differences (IC after DAM)
Modelling bidding strategy

- Bids discounted to forecast price difference
  - To avoid imbalance charges or FAPD
- Competitive traders bid least discount for non-negative cumulative profits over e.g. 91 days

*Table: Zero-profit discount for marginal traders on IFA*

<table>
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<tr>
<th>Scenario</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1A</td>
<td>1B</td>
</tr>
<tr>
<td>Risk discount (€/MWh)</td>
<td>€2.35</td>
<td>€2.39</td>
</tr>
<tr>
<td>Annual Profit (€ mill.) (driven to just-above zero)</td>
<td>0.10</td>
<td>0.06</td>
</tr>
</tbody>
</table>
IFA trade: inflexible nuclear, temperature-sensitive demand

91-day Risk Premia on IFA

Better to know DAM prices before buying IC
Costs of uncoupling to Continent

- Reduced liquidity in markets increases risk
- A €2/MWh risk discount = lost IC revenue of €8 million/yr over 3 GB-Continent IC’s (to FR, BE, NL)
  - Social loss (saving in generation cost or extra export value) slightly more (infra-marginal surpluses)
- Under-used capacity and FAPDs = inefficient use of valuable and costly infrastructure

=> accelerate move to multi-region loose volume coupling
• **Single Electricity Market (SEM)** adopted SDAC in 2018
  – After 5 years transition from a regulated bid Pool model to the EU’s Target Electricity Model, transition cost > €100 million
  – Improvement on IC’s worth €25+ million/yr
• **Remains within single market, retains SEM, but not SDAC**
  – Intraday coupling auctions IDA1, IDA2
  – Two GB DAM auctions: EPEX announces at 9:30; N2EX at 9:50; SEM at 11:00
  – Two Intra-day auctions, IDA1 close 17:30 D-1, IDA2 at 8:00 on Day for half-hour period 25-48
IDA1 is main coupled market, much smaller than DAM
There are two GB DAMs!
DAMs poor forecast of IDA price difference

IDA1 SEM-GB against average of DAM SEM-GB price differences

$R^2 = 64\%$
Efficiency of trading

• Trade much impacted by ramping constraints
  – They appear either underutilised or have FAPDs
  – Losses are important: Moyle’s losses are 2.36%, EWIC’s 4.68%
  => Moyle had non-zero flows 91% of time, EWIC only 43%.
  – Flows can only change by 150 MW/half hour on each (Moyle, EWIC)
  – This explains almost all the apparent inefficiency

• Simulate IDA1 efficient flow from 1 Jan – 11 Feb 2021:
  – Moyle congestion revenue: simulated €4.671 million vs actual €4.319 million; efficiency 92.5%
  – EWIC’s congestion revenue: simulated and actual €4.861 million, 100% efficient (as only trades when clearly profitable)
Conclusions

• Uncoupling reduces congestion revenue by €8+ million/yr (social cost slightly more)

• Links to Continent most affected
  – But why not move quickly to intra-day coupling?

• Links to SEM still couple intra-day
  – Appears reasonably efficient but liquidity down
  => recouple at day-ahead stage – does not impact SDAC

Clear CBA case for reinstating efficient volume coupling

D Newbery
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References