Regulators' thoughts on evaluation methodology

According to the FCA regulation Art 30

NordREG
Nordic Energy Regulators

Introduction

- Art 30.4 of the FCA GL stipulates that NRAs shall make an evaluation of the functioning of wholesale electricity markets and to analyse the <u>hedging opportunities offered to market participants through the forward market.</u>

- Evaluation to be performed on <u>bidding zone level</u>

- The evaluation shall be followed by a <u>consultation</u> of stakeholders

Art 30.4

The evaluation referred to in paragraph 3(b) shall investigate the functioning of wholesale electricity markets and shall be based on transparent criteria which <u>include at least</u>:

- an analysis of whether the **products or combination of products** offered on forward markets **represent a hedge against the volatility of the day-ahead price of the concerned bidding zone**. Such product or combination of products shall be considered as an appropriate hedge against the risk of change of the day-ahead price of the concerned bidding zone where there is a **sufficient correlation** between the day-ahead price of the concerned bidding zone and the underlying price against which the product or combination of products are settled;

Art 30.4 continued

- an analysis of whether the products or combination of products offered on forward markets are efficient. For this purpose, <u>at least</u> the following indicators shall be assessed:

  (i)   trading horizon;

  (ii)   bid-ask spread;

  (iii)   traded volumes in relation to physical consumption;

  (iv)   open interest in relation to physical consumption.

Criteria 1 – Hedge effectiveness

- Objective – assess whether there are instruments (or combinations of instruments) available that ensure that cash flows from a position in the market can be <u>effectively hedged</u>.

- Taking into account different risk management practices among market participants in the Nordic countries
  - System price forwards might be sufficient in some price areas
  - EPAD's might be preferred in others (either EPAD of specific price area or another EPAD providing sufficient hedge)

Criteria 1 – Hedge effectiveness

- Proposal to use the framework of IAS39 (International Accounting Standard)
  - A **hedged item** is an asset, liability, firm commitment, highly probable forecast transaction or net investment in a foreign operation that (a) exposes the entity to risk of changes in fair value or future cash flows and (b) is designated as being hedged.
  - A **hedging instrument** is a designated derivative or (for a hedge of the risk of changes in foreign currency exchange rates only) a designated non-derivate financial asset or non-derivative financial liability whose fair value or cash flows are expected to offset changes in the fair value or cash flows of a designated hedge item.
  - **Hedge effectiveness** is the degree to which changes in fair value or cash flows of the hedged item that are attributable to a hedged risk are offset by changes in the fair value or cash flows of the hedging instrument.

Criteria 2 – Efficiency/liquidity of products offered in forward markets

- Objective – test the liquidity of the financial markets in which the instruments are traded

- We suggest to use a set of different indicators, among them (but not limited to) the ones mentioned in the GL:

i. trading horizon

ii. bid-ask spread

iii. traded volumes in relation to physical consumption

iv. open interest in relation to physical consumption

Criteria 2 - Liquidity

- Objective – test the liquidity of the financial markets in which the instruments are traded

- We suggest to use a set of different indicators, among them (but not limited to) the ones mentioned in the GL:

i.   trading horizon

ii.   bid-ask spread

iii.   traded volumes in relation to physical consumption

iv.   open interest in relation to physical consumption

Liquidity will primarily affect transaction cost

- Transaction cost is the costs associated with executing a transaction in the capital markets

  → Decreasing function of liquidity

- Transaction cost affects the investor's:

  - entry/exit decision and

  - the frequency of which she trades

- An illiquid asset must offer a higher expected return (and thus a lower price)

NordREG
Nordic Energy Regulators

How to measure transaction cost?

- Transaction cost can be measured by indicators such as

  - Bid-ask spread (mentioned in the GL)
    - Difference between the best standing bid and ask quote
  - Price impact costs (market impact cost)
    - The cost incurred because the transaction itself changed the price of the asset
  - Delay and search costs
  - Direct transaction cost
    - Brokerage commission, exchange fees, and transaction taxes

NordREG
Nordic Energy Regulators

How to measure transaction cost?

- Transaction cost can be measured by indicators such as

  - Bid-ask spread (mentioned in the GL)
    - Difference between the best standing bid and ask quote
  - Price impact cost (market impact cost)
    - The cost incurred because the transaction itself changed the price of the asset
  - Delay and search costs
  - Direct transaction cost
    - Brokerage commission, exchange fees, and transaction taxes

NordREG
Nordic Energy Regulators

Transaction cost: bid-ask spread

- A variety of (high-frequency) benchmark indicators on **bid-ask spread**

<div align="right">(Goyenko, Holden, and Trzcinka, 2009)</div>

- Effective $\text{spread}(TAC)_k = 2[\ln(P_k) - \ln(M_k)]$

$$\text{where } P \text{ is the price and } M \text{ is the midpoint}$$
$$\text{of the best standing bid and ask quote}$$

- Realized $\text{spread}(TAC)_k = \begin{cases} 2 \times (\ln(P_k) - \ln(P_{k+5})) \text{ when the } k\text{:th trade is a buy} \\ 2 \times (\ln(P_{k+5}) - \ln(P_k)) \text{ when the } k\text{:th trade is a sell} \end{cases}$

- \$Effective $\text{spread}(605)_k = \begin{cases} 2 \times (P_k - M_k) \text{ for marketable buys} \\ 2 \times (M_k - P_k) \text{ for marketable sells} \end{cases}$

NordREG
Nordic Energy Regulators

Transaction cost: low frequency proxies

Bid-ask spread proxy	Description	Pros and cons
Roll (1984)	Estimator based on the serial covariance of the change in price	+ Commonly used - Inconsistent (context dependent) - Unintuitive
LOT Y-split Lesmond, Ogden, and Trzcinka (1999)	Estimator of the effective spread based on the assumption of informed trading on non-zero-return days and the absence of informed trading on zero-return days	+ Dominates Roll and Zeros + Intuitive
Zeros	Uses the proportion of days with zero returns as a proxy for liquidity	+ Simple to use - Over simplistic

NordREG
Nordic Energy Regulators

Transaction cost: price impact cost

- A variety of benchmark (high-frequency) indicators on **price impact**

(Goyenko, Holden, and Trzcinka, 2009)

- $\textbf{\textit{Static Price Impact}}(\textbf{605})_i =$

$$\left[\left(\frac{\$Effective\ Spread(605)_{Big\ orders}}{\bar{P}_i}\right) - \left(\frac{\$Effective\ Spread(605)_{Small\ orders}}{\bar{P}_i}\right)\right]$$
$$/\left[\left(Avg\ Trade\ Size(605)_{Big\ orders}\right) - \left(Avg\ Trade\ Size(605)_{Small\ orders}\right)\right]$$

- $\boldsymbol{r_n} = \lambda(TAQ) \times Volume_n + u_n$

- **5-minute price impact** $(\boldsymbol{TAC})_{\boldsymbol{k}} =$
$$\begin{cases} 2 \times (\ln(M_{k+5}) - \ln(M_k))\ för\ köptransaktioner \\ 2 \times (\ln(M_k) - \ln(M_{k+5}))\ för\ säljtransaktioner \end{cases}$$

Transaction cost: low frequency proxies

Price impact proxy	Description	Pros and cons
Amihud (2002)	Indicator that captures the "daily price response associated with one dollar of trading volume" $$Illiquidity = Avg(\frac{|r_t|}{Volume_t})$$	+ Reasonable good proxy + Intuitive + Simple - There are several extensions

NordREG
Nordic Energy Regulators

Data requirements

1. **High frequency data**

   - The best bid and offer, i.e. the highest bid and lowest ask available at every trade

2. **Low frequency data – bid-ask spread**

   - Opening and closing price each day

3. **Low frequency data – price impact**

   - Opening and closing price each day

   - Euro volume traded each day

Issues regarding OTC-traded products

- Can we somehow assess the existence of bilateral/OTC contracts providing hedging opportunities outside of the exchange?
  - It is likely that tailor-made EPAD contracts (profiled) for specific consumers/producers are offered bilaterally and thus not traded or cleared at all at exchanges
  - => Liquidity will be underestimated if only exchange data is considered

Thank you for listening

If you have further input or questions, do not hesitate to contact us

kaj.forsberg@ei.se

elon.stromback@ei.se

NordREG
Nordic Energy Regulators