Insider trading on continuous intraday electricity markets? Some empirical evidence from Germany

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Overview

- The role of information on price building and trading is especially important in financial economics (Madhavan, 2000).
- An example of asymmetric information between participants in electricity markets is knowledge of an unplanned power plant outage (von der Fehr, 2013).
- Non-disclosure, or disclosure with a time lag, of missing capacities may save costs, since market participants cannot use this information to adapt their biddings strategically.
- This paper investigates empirically how private and public information about unplanned power plant outages impact intraday electricity prices in Germany.

Overview

- The Regulation on Wholesale Energy Market Integrity and Transparency (REMIT) requires all market participants to disclose insider information.
- Lazarczyk (2016) shows that the arrival of market-specific news about unexpected outages positively affects the Nordic intraday price.
- Since missing production leads to a shortage of supply, the price of affected contracts increases, ceteris paribus.
- We follow Lazarczyk (2016) and introduce a method to measure the impact of private information about unexpected outages.

Overview

- Electricity spot markets in Germany are organized by the European Power Exchange (EPEX):
  - Day-ahead auction:
    Bids and offers can be submitted latest 12.00 p.m.
  - Continuous intraday:
    Pay as you bid until 45/30 minutes before delivery.
- We use market messages about unplanned power plant outages that arrive in time to influence the intraday price.
- We segregate the content of these messages into private and public information about the outages and test whether they explain the average intraday price besides market fundamentals.

Publication of power plant non-usabilities

- The opportunity to trade with private information arises if the time lag between the actual outage and its publication exceeds at least one tradable contract:

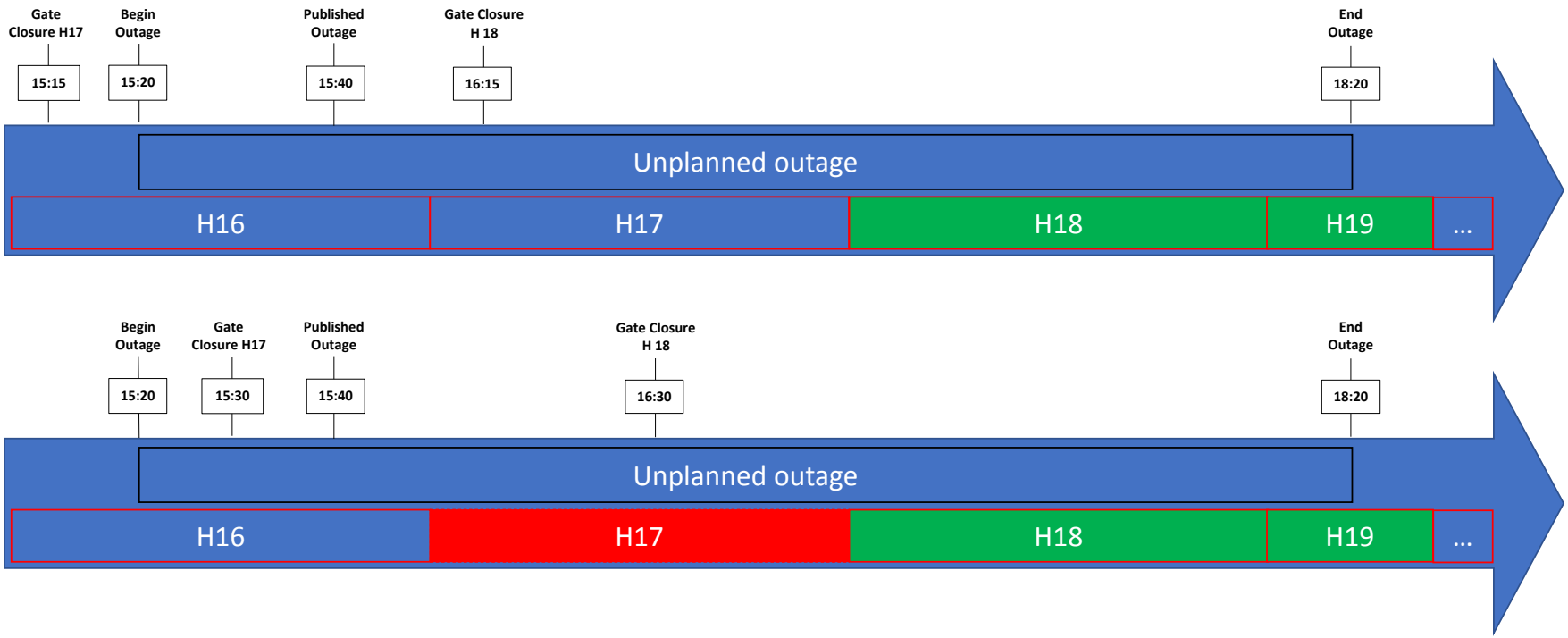
[Source]	[StartDate]	[EndDate]	[Capacity]	[Reason]	[PublicationTimeStamp]
coal	2016-02-04T12:15	2016-02-18T18:30	345,0	Failure	2016-02-04T14:21

- Possible hourly trading products for publication time stamps: 2016-02-04 15-16, [...] , 2016-02-05 23-24.
- Possible hourly trading products for physical time stamps: 2016-02-04 13-14, 14-15, 15-16, [...] , 2016-02-05 23-24.

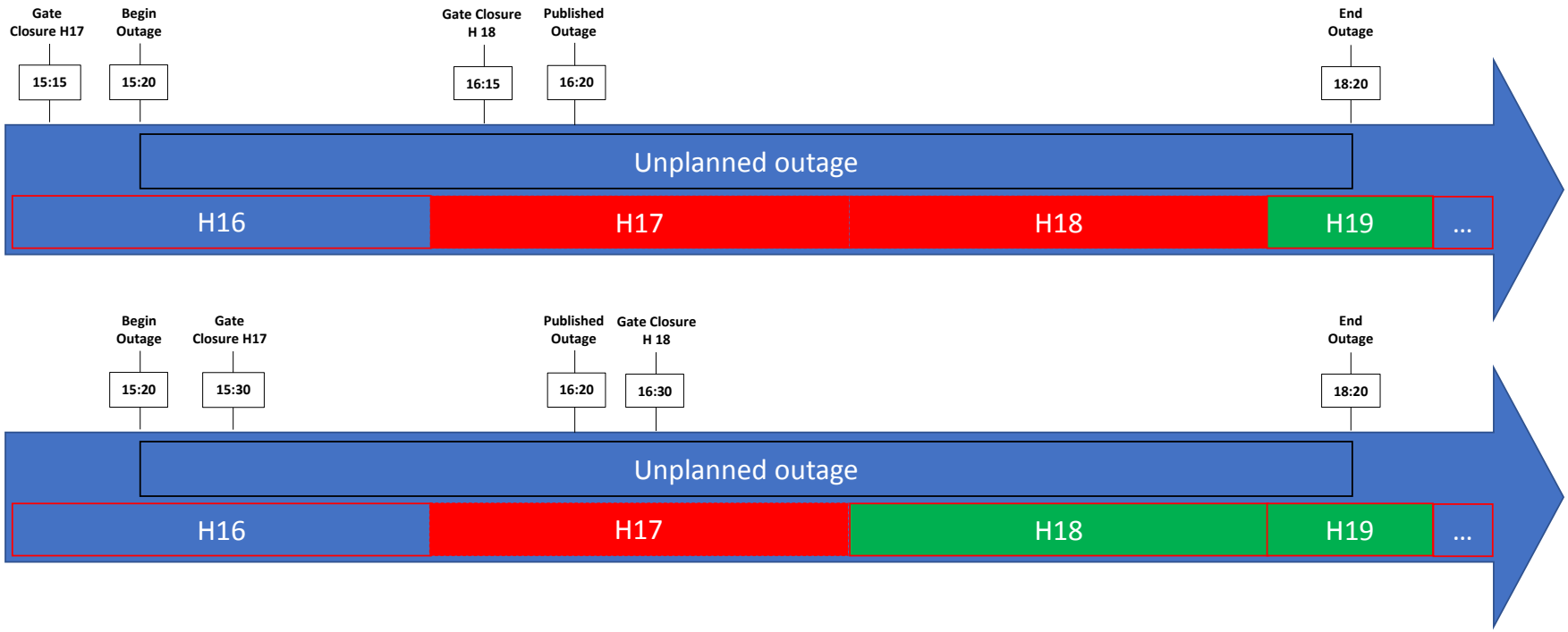
Institutional change on the intraday market

- In July 16, 2015, the lead time on the intraday market was reduced from 45 to 30 minutes till delivery.
- This change was introduced to manage emerging flexibility challenges of power markets more efficiently.
- The time gap between the actual outage event and its publication creates constellations that open or limit the insider opportunity under the new regime.

Institutional change on the intraday market



Institutional change on the intraday market



Data

- Hourly prices of the EPEX day-ahead and intraday continuous market from January 1, 2014 to December 31, 2016.
- 3,500 unique messages about unplanned power plant outages of 100 MW or more.
- Actual and forecasted feed-in from renewable energy sources.
- Actual and forecasted load.
- Net exports from Germany to France.

Econometric specification

- We use the following estimation equation and perform OLS regressions:

$$ID\_price_t - DA\_price_t = \alpha + \beta Private\_information_t + \gamma Public\_information_t + \delta C_t + \epsilon_t \quad (1)$$

- Sum of missing capacities at time t are divided into:
  - $Private\_information_t$: From beginning until publication.
  - $Public\_information_t$: From publication until expected end.
- C_t: Vector of control variables: RES forecast error, Load forecast error, Net exports, Time dummies.

OLS regression results

VARIABLES	(1) Total sample
Private information	1.212*
	(0.734)
Public information	1.053***
	(0.256)
RES forecast error	-1.471***
	(0.218)
Load forecast error	0.264***
	(0.0530)
Net exports	0.219**
	(0.110)
Dummies	Yes
Constant	-0.0680
	(0.485)
Observations	25,697
Adjusted R-squared	0.185

Newey-West standard errors in parantheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

OLS regression results

VARIABLES	(1) Total sample	(2) 45 min lead time
Private information	1.212*	0.563
	(0.734)	(1.305)
Public information	1.053***	1.188***
	(0.256)	(0.385)
RES forecast error	-1.471***	-2.207***
	(0.218)	(0.107)
Load forecast error	0.264***	0.268***
	(0.0530)	(0.0625)
Net exports	0.219**	-0.141
	(0.110)	(0.181)
Dummies	Yes	Yes
Constant	-0.0680	-0.211
	(0.485)	(0.521)
Observations	25,697	13,097
Adjusted R-squared	0.185	0.278

Newey-West standard errors in parantheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

OLS regression results

VARIABLES	(1) Total sample	(2) 45 min lead time	(3) 30 min lead time
Private information	1.212*	0.563	2.127***
	(0.734)	(1.305)	(0.510)
Public information	1.053***	1.188***	1.222***
	(0.256)	(0.385)	(0.313)
RES forecast error	-1.471***	-2.207***	-1.081***
	(0.218)	(0.107)	(0.259)
Load forecast error	0.264***	0.268***	0.408***
	(0.0530)	(0.0625)	(0.0886)
Net exports	0.219**	-0.141	0.510***
	(0.110)	(0.181)	(0.146)
Dummies	Yes	Yes	Yes
Constant	-0.0680	-0.211	-0.584
	(0.485)	(0.521)	(0.688)
Observations	25,697	13,097	12,600
Adjusted R-squared	0.185	0.278	0.153

Newey-West standard errors in parantheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

OLS regression results

VARIABLES	(1) Total sample	(2) 45 min lead time	(3) 30 min lead time
Private information	1.212*	0.563	2.127***
	(0.734)	(1.305)	(0.510)
Private information: no change			
Private information: increase			
Private information: decrease			
Public information	1.053***	1.188***	1.222***
	(0.256)	(0.385)	(0.313)
Public information: no change			
Public information: increase			
Public information: decrease			
RES forecast error	-1.471***	-2.207***	-1.081***
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OLS regression results

VARIABLES	(1) Total sample	(2) 45 min lead time	(3) 30 min lead time	(4) 30 min lead time
Private information	1.212*	0.563	2.127***	
	(0.734)	(1.305)	(0.510)	
Private information: no change				1.617***
				(0.627)
Private information: increase				3.912***
				(1.041)
Private information: decrease				1.767
				(1.792)
Public information	1.053***	1.188***	1.222***	
	(0.256)	(0.385)	(0.313)	
Public information: no change				1.555***
				(0.405)
Public information: increase				0.145
				(0.542)
Public information: decrease				3.798***
				(1.387)
RES forecast error	-1.471***	-2.207***	-1.081***	-1.078***
	(0.218)	(0.107)	(0.259)	(0.259)
Load forecast error	0.264***	0.268***	0.408***	0.407***
	(0.0530)	(0.0625)	(0.0886)	(0.0887)
Net exports	0.219**	-0.141	0.510***	0.520***
	(0.110)	(0.181)	(0.146)	(0.145)
Dummies	Yes	Yes	Yes	Yes
Constant	-0.0680	-0.211	-0.584	-0.426
	(0.485)	(0.521)	(0.688)	(0.699)
Observations	25,697	13,097	12,600	12,600
Adjusted R-squared	0.185	0.278	0.153	0.155

Newey-West standard errors in parantheses. Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Conclusions

- The results suggest that private information about unplanned outages has a positive significant impact on the intraday price.
- Similarly, public information regarding these missing capacities increase the intraday price.
- The results indicate a higher adoption of the participants after the reduction of the lead time: an increased impact of private information on the electricity price is observed.

Policy implications and limitations

- Consequently, the results for private information indicate that the objectives of REMIT may be violated.
- However, empirical findings do not provide evidence for actual insider trading since prices are determined through anonymous bids and offers.
- Policy makers could increase transpareny among participants by introducing a real-time updated market messages framework.