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Did the Harmonization of the Four German Control Areas Lead to More Efficiency? An Econometric Analysis

by

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Outline

1. Motivation
2. The German Market for MRP and SRP
3. Econometric Analysis
4. Results and Conclusion

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1. Motivation

- Markets for reserve power were subject to many reforms in the recent past
 - e.g. common web based platform for minute reserve power (MRP) and secondary control (SC) since 01 December 2006 and 01 December 2007, respectively
 - **Goal:** more competitive and efficient markets
- A current reform by the German Federal Network Agency (BNetzA) was resolved in 16 March 2010: gradual **market harmonization** SC and MRP in order to improve coordination between the four transmission system operators (TSOs)
- The **aim** of this paper is to evaluate the achievements of this reform by using panel data analysis
- The focus will be on prices for both incremental and decremental MRP

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2. German Markets for MRP and SC

In order to maintain the balance between demand and supply (system stability) at each point in time the TSOs are obliged to procure electricity reserves. There are three types...

1. **Primary Control (PC)**

2. **Secondary Control (SC)**

- Replaces PC if equilibrium state is not restored
- Procured monthly via a common web based platform since 01 Dec 2007
- Start of market harmonization in Dec 2008 (initially without Amprion)
- 4 steps/modules

3. **Minute Reserve Power (MRP)**

- Is traded daily since 01 Dec 2006 on a common web based platform
- Replaces SC if targeted frequency is not achieved
- Market harmonization achieved 01 July 2010

Market harmonization reform focuses on SC and MRP!

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3. Econometric Analysis

Data set:

- Panel data set from 01 Jan 2006 to 30 Sep 2010 (1734 obs)
- Dependent variable(s): Daily price data for both incremental and decremental MRP
- Independent / control variables: EEX spot price (base), WTI oil price, coal and gas prices, dummies to control for seasonal effects, feed in from wind power, german weather data

Econometric strategy:

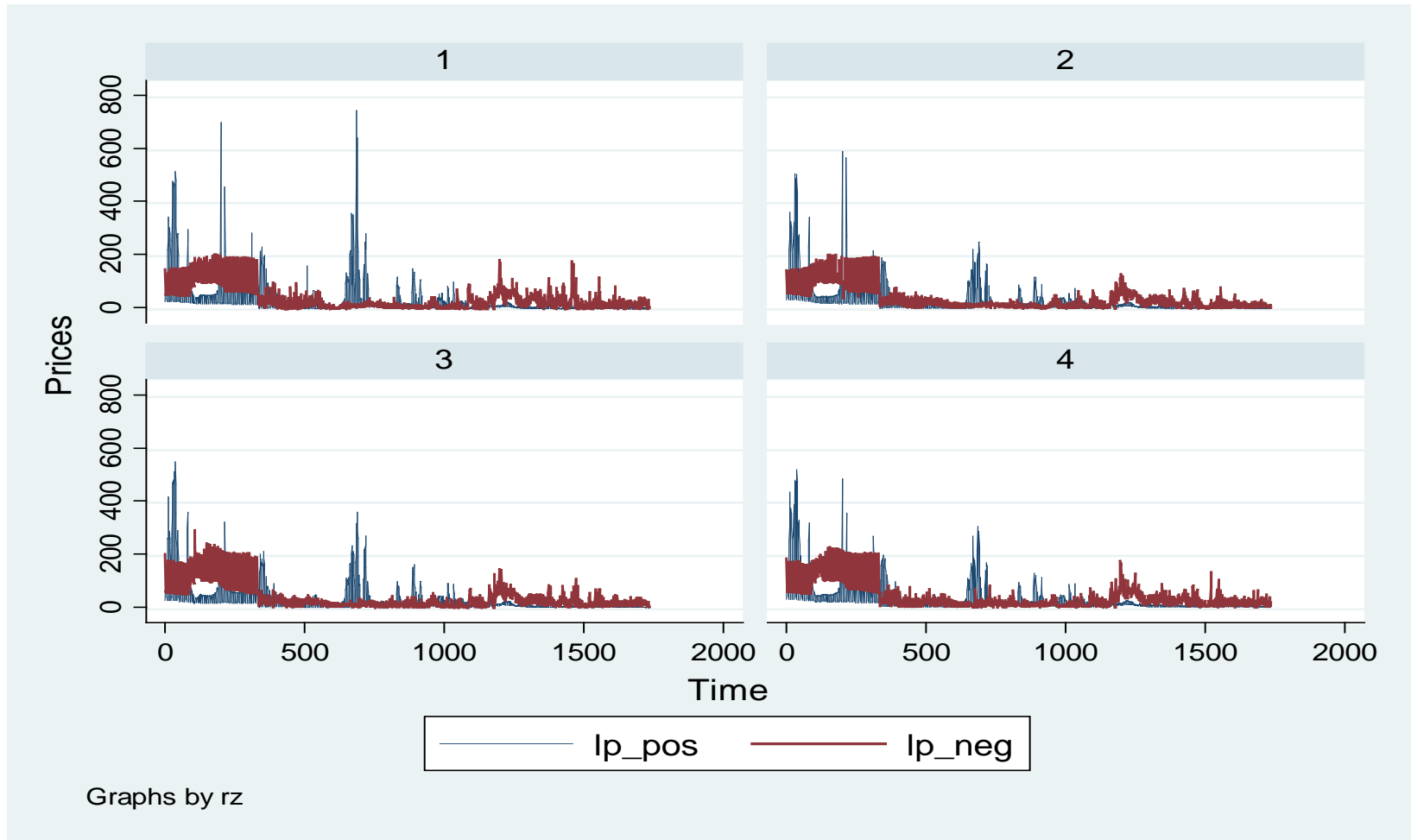
- Dynamic panel data analysis using fixed effects

$$y_{it} = \alpha_{it} + \sum \beta_k \cdot x_{it,k} + \varepsilon_{it}$$

- Instrument variable techniques (endogeneity EEX spot price)
- Structural break analysis (policy evaluation)
- F-test for joint significance of the structural break dummies
- We account for stationarity (oil; first-diff), multicollinearity (coal, gas) and heteroscedasticity (robust standard errors)

3. Econometric Analysis

Prices for inc and dec MRP from 01 Jan 2006 to 30 Sep 2010 by control area



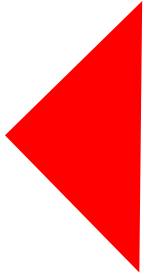
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4. Results and Conclusion

Inc MRP:

Variable	Coefficient	Std. Errors
EEX spot price	1.144368***	.2241438
WTI oil price	1.80954***	.5598348
winter	29.96587***	1.832768
summer	-4.121241***	1.157243
weekend	-29.58194***	1.224434
MRP_1	-36.59997***	4.10467
SC_1	-47.12123***	6.644417
SC_M1	2.324295	5.127132
SC_M2	35.03688***	3.171876
SC_M3	-10.38947***	1.647026
SC_M4	-24.93337**	1.870894
SC_amprion	17.07704***	1.786284
MRP_2	-2.40578*	1.244016
Obs		6932
Weak Identif		153.935
R ²		0.4317




4. Results and Conclusion

Dec MRP:

Variable	Coefficient	Std. Errors
EEX spot price	-1.052493***	.1299164
WTI oil price	-.0762932	.2652941
winter	-3.3836***	.8379587
summer	.92388	.8310129
weekend	16.72076***	.8459687
MRP_1	-95.05005***	2.33721
SC_1	23.96789 ***	3.769496
SC_M1	2.060684	3.102502
SC_M2	.2989895	2.263363
SC_M3	-18.56289***	1.497024
SC_M4	1.365807	1.100285
SC_amprion	-7.987966**	1.059788
MRP_2	1.963812**	.820833
Obs		6932
Weak Identif		153.935
R ²		0.6034

4. Results and Conclusion

Chow test statistics:



Variable	Inc MRP	Dec MRP
MRP_1	199.419***	2327.862
SC_1	166.3825907***	79.17047581***
SC_M1	30.52947877***	976.0376566***
SC_M2	-34.01644526	-79.47876556
SC_M3	18.08225584***	-78.48470974
SC_M4	13.59325679***	-4.056000296
SC_amprion	14.62651328***	3.384013481*
MRP_2	12.50119389***	-26.69940645
F-Test (pooled dummy)	328.98***	734.26***

4. Results and Conclusion

- Our analysis indicates that the reform had a significant impact on MRP prices whereas the effect on Inc MRP is slightly stronger
- At the same time it is not clear whether the reform as a whole led to price reductions (increased efficiency) or not
- Other factors such as number of SC suppliers and strategic pricing must be taken into account
- Observation period should be extended