

Germany's Market Transparency Unit for Fuels: Fostering Collusion or Competition?

Marco Horvath

RWI – Leibniz Institute for Economic Research

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Motivation

- Gasoline demand is highly inelastic and represents a significant share in many consumers' budgets
- In 2011 the Federal Cartel Office released a report concerning market power in the Retail Gasoline Market in Germany exercise market-dominating influence as oligopolists
- As a result a publicly accessible on-line price portal (Market Transparency Unit for Fuels (MTU)) was established, at which gasoline retailers are legally obligated to post fuel prices in real time

Main Research Questions

- What is the effect of the MTU on price margins of gas stations?
- Was the aim of more competition and hence welfare gains for consumers achieved?

Theoretical Considerations

- The primary aim of the establishment of the MTU was to increase competition on the gasoline market
- According to theory (Schultz, 2005), there might be two opposing effects from increased transparency:
 - 1 Benefits of undercutting the competitors prices increase with more market transparency and therefore more people comparing prices
 - 2 Deviating from the optimal outcome can also be observed more easily by other oligopolists and therefore be punished more quickly and harshly

Empirical Literature on information disclosure

- Gasoline markets
 - Frondel et al. (2018): The effect of the MTU on the “Rockets and Feathers” pattern
 - Dewenter et al. (2017): The overall price effect of the MTU
 - Luco (2019): The effect of information disclosure on gasoline prices and margins in Chile
- Information disclosure in other markets
 - Albaek et al. (1997): Effects of the information disclosure in the concrete market in Denmark

Data: Stationlevel Gasoline Data

- Data on daily retail fuel prices for E10 gasoline, the wholesale price of refined fuel and gas station characteristics (location, brand, opening hours)
- Two data sources:
 - 1 Market Transparency Unit for Fuels (MTU)
 - Legally mandated on-line portal
 - More than 14,000 stations in Germany (including station characteristics)
 - From September 2013 through March 2014
 - 2 Clevertanken-Data
 - Prior to the MTU, the Clevertanken.de site relied on price postings voluntarily provided by customers of the stations via mobile apps
 - Covers 13,701 stations (about 95% of the market)
 - From May 2013 through November 2013

Data: Stationlevel Gasoline Data

- It was possible to match 9,834 stations in the two data sets using addresses and coordinates provided for the stations
- 3,450 stations from Clevertanken-Data were dropped because of spotty temporal coverage
- The final panel data set consists of 1,620,637 observations from 6,384 stations
- The two data sets briefly overlap during the beta test of the MTU between September and November 2013
⇒ In this period the correspondence between Clevertanken and MTU is tight, with a correlation of over 99%

Data: EU Weekly Oil Bulletin Data

- Data from European Commission Weekly Oil Bulletin
 - Weekly average retail gasoline price for 19 EU countries
 - Time period: 2012 until 2014
 - Additionally: Information on country characteristics (GDP, unemployment,...)

Descriptives (Station Level Data)

Table: Summary statistics for the variables employed in the empirical analysis (German daily data)

Variable	Description	Mean	Std. Dev.
<i>Price</i>	Daily average price of gasoline (in EUR/l)	0.625	0.038
<i>Refined Gasoline</i>	Daily average of wholesale price of refined fuel (in EUR/l)	0.537	0.024
<i>Margin</i>	Price margin (in EUR/l)	0.087	0.026
<i>Brent</i>	Daily average of Brent oil price (in EUR/l)	0.469	0.015

Note: Number of observations for all variables: 1,620,637. Data sources: MTU, clever-tanken.de, EID

Descriptives EU Weekly Data

Methodology: Station Level data

Baseline Equation:

$$\text{Margin}_{it} = \alpha_i + \beta_1 \text{Brent}_t + \beta_2 \text{MTU}_t + \epsilon_{it} \quad (1)$$

MTU-Effects split for each day:

$$\text{Margin}_{it} = \alpha_i + \beta_1 \text{Brent}_t + \sum_{\tau} \beta_{\tau} \text{MTUdate}_{\tau t} + \epsilon_{it}, \quad (2)$$

with $\tau \in [25 \text{ Sep } 2013, 26 \text{ Sep } 2013, \dots, 24 \text{ Mar } 2014, 25 \text{ Mar } 2014]$,

Methodology: EU Weekly Oil Bulletin Data

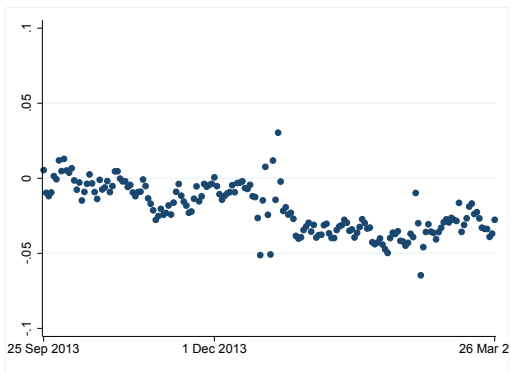
Difference-in-Difference Approach

$$\begin{aligned} \text{Margin}_{cw} = & \beta_c + \beta_1 \text{Brent}_w + \beta_2 X_{cw} + \\ & + \beta_3 \text{postMTU}_{cw} + \beta_4 \text{postMTU} * \text{Germany}_{cw} + \epsilon_{cw} \end{aligned} \quad (3)$$

- X: Further Controls (GDP, Unemployment, Population Density)

Empirical Results (MTU Data)

Figure: Plot of MTU date coefficients



The coefficient for Brent is -0.237 with the standard error at 0.003 . The number of observations is $1,620,637$.

Empirical Results (EU Data)

Table: Difference-in-Difference Estimations for the Price Margins using EU weekly data

	Price Margin	Price Margin
Brent	-0.366** (0.011)	-0.387** (0.011)
postMTU (Sep)	-0.011** (0.001)	– –
post MTU * Germany (Sep)	-0.009* (0.004)	– –
postMTU (Dec)	– –	-0.016** (0.001)
post MTU * Germany (Dec)	– –	-0.011** (0.004)
Constant	0.353** (0.026)	0.343** (0.025)
Further Controls	✓	✓
Number of Observations	2,790	2,790
Adjusted R^2	0.286	0.311

Note: * denotes significance at the 5%-level and ** at the 1%-level, respectively. Standard Errors are in parentheses.

Robustness Checks

- Regressions using the price as dependent variable instead of the margins produce virtually the same results

Regressions with price

- Placebo regressions for other time periods support the findings

Placebo regressions

Conclusion

- Over the different specifications and data sets, this study consistently finds a negative effect of the MTU on price margins, accounting for a reduction for 1 to 2 cent per liter
- While the magnitude of this reduction is large from the perspective of retailers, translating into a roughly 20% reduction of the price margin, it is relatively moderate from the perspective of consumers
- These savings are therefore probably of low economic significance for the average consumer

- Next steps:
 - Check for heterogeneous effects regarding different brands
 - Check for heterogeneous effects regarding different regions

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Empirical Results (German Data)

Table: Baseline Estimation of the Price Margins

	Price Margin	Price Margin
Brent	-0.011** (0.002)	-0.115** (0.002)
MTU (Sep)	-0.017** (0.001)	-
MTU (Dec)	-	-0.024** (0.001)
Constant	0.106** (0.001)	0.153** (0.001)
Number of Observations	1,620,637	1,620,637
Adjusted R^2	0.136	0.228

Note: * denotes significance at the 5%-level and ** at the 1%-level, respectively. Standard Errors are in parentheses.

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Empirical Results (EU Data)

Table: Difference-in-Difference Estimations for the Price Margins using EU weekly data

	Price Margin		Price Margin	
Brent	-0.366**	(0.011)	-0.387**	(0.011)
GDP per capita	-0.011**	(0.003)	-0.008**	(0.002)
Population density	0.271*	(0.106)	0.286**	(0.104)
Unemployment	-0.001*	(0.000)	-0.001*	(0.000)
postMTU (Sep)	-0.011**	(0.001)	–	–
post MTU * Germany (Sep)	-0.009*	(0.004)	–	–
postMTU (Dec)	–	–	-0.016**	(0.001)
post MTU * Germany (Dec)	–	–	-0.011**	(0.004)
Constant	0.353**	(0.026)	0.343**	(0.025)
Number of Observations	2,790		2,790	
Adjusted R^2	0.286		0.311	

Note: * denotes significance at the 5%-level and ** at the 1%-level, respectively. Standard Errors are in parentheses.

Descriptives (Weekly Oil Bulletin – European Commission)

Table: Summary statistics for the variables employed in the empirical analysis (EU averaged weekly data)

Variable	Description	Mean	Std. Dev.
<i>Price</i>	Weekly average price of gasoline (in EUR/l)	0.691	0.055
<i>Margin</i>	Price margin (in EUR/l)	0.128	0.038
<i>Refined Gasoline</i>	Weekly average of wholesale price of refined fuel (in EUR/l)	0.564	0.061
<i>Brent</i>	Weekly average of Brent oil price (in EUR/l)	0.509	0.051
<i>GDP per capita</i>	Quarterly GDP per capita (EUR)	7.222	4.248
<i>Population density</i>	Quarterly country population per km ²	0.200	0.293
<i>Unemployment</i>	Quarterly country unemployment	11.53%	5.90%

Note: Number of observations for all variables: 2,790. Data sources: Weekly Oil Bulletin (EU Commission), Eurostat, EID.

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Empirical Results with Price as dependent variable

Table: Difference-in-Difference Estimations with Prices

	Price		Price	
Brent	0.652**	(0.013)	0.690**	(0.013)
postMTU (Sep)	-0.027**	(0.001)	–	–
post MTU Germany (Sep)	-0.010*	(0.005)	–	–
postMTU (Dec)	–	–	-0.019**	(0.001)
post MTU Germany (Dec)	–	–	-0.011*	(0.005)
Constant	0.336**	(0.029)	0.362**	(0.030)
Further Controls	✓		✓	
Number of Observations	2,826		2,826	
Adjusted R^2	0.702		0.678	

Note: * denotes significance at the 5%-level and ** at the 1%-level, respectively. Standard Errors are in parentheses.

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Placebo Regressions with Price as dependent variable

Table: Placebo Difference-in-Difference Estimations with Prices

	Placebo 2007–2009		Placebo 2009–2011		Placebo 2016–2018	
	Price		Price		Price	
Brent	0.849**	(0.010)	1.016**	(0.010)	0.760**	(0.013)
post Sep2008	-0.016**	(0.002)	–	–	–	–
post Sep2008 * Germany	0.007	(0.006)	–	–	–	–
post Sep2010	–	–	-0.006**	(0.002)	–	–
post Sep2010 * Germany	–	–	-0.006	(0.004)	–	–
post Sep2017	–	–	–	–	-0.017**	(0.002)
post Sep2017 * Germany	–	–	–	–	0.006	(0.004)
Constant	-0.034	(0.071)	0.494**	(0.061)	0.446**	(0.022)
Further Controls	✓		✓		✓	
Number of Observations	2,826		2,808		2,728	
Adjusted R^2	0.853		0.938		0.805	

Note: * denotes significance at the 5%-level and ** at the 1%-level, respectively.
Standard Errors are in parentheses.