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The Impact of the Market Transparency Unit for Fuels on Gasoline Prices in Germany[1]

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May 2016

Abstract

Increasing horizontal as well as vertical transparency in oligopolistic markets can be advantageous for consumers, due to reduced search costs. However, market transparency can also affect incentives to deviate from collusive agreements and the punishment by rival firms in the market. Using a panel of 27 European countries, we analyze the impact of increased market transparency via the introduction of a market transparency unit for fuels in Germany. Applying a difference-in-differences approach, we find evidence that both gasoline and diesel prices have increased. While consumers may be better off using a retail price app for fuels, gas stations are also able to compare prices at almost no cost.

Keywords: market transparency unit, regulation, fuel prices, difference-in-differences

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1 Introduction

As of December 2013 the German market transparency unit for fuels (Markttransparenzstelle für Kraftstoffe) went into operation. Since then German gas stations have been committed to report price changes for gasoline or diesel fuel in ``real time´´ to the unit, which is hosted by the German competition authority (Bundeskartellamt). The aim of this regulation is to strengthen vertical market transparency by enabling consumers to gain information on current fuel prices easily.[2] Furthermore, the data collected should help to disclose abuse of market power or cartelization. However, the amount of information available to firms in the market increases as well, which could have negative effects.

Information is vital for decision making in firms and consumers purchasing decisions.[3] While vertical market transparency is meant to accelerate consumer reaction, and therefore increase competition, the introduction of the transparency unit is also suitable for increasing horizontal market transparency, so gas stations can also base their decisions on richer information. As a result, there are two effects which might work in opposite directions. More information for consumers might lead to better decisions. Stiglitz (1989) shows that prices may fall substantially in a competitive market, if consumer search costs can be reduced significantly. On the other hand, firms may also gain additional information. The welfare effects of what the literature calls information sharing in oligopolistic markets depend on several factors, but most important are the "output adjustment" and "preferences for variety" effects.

According to Kühn and Vives (1995) there are two effects when firms face uncertain demand and share information. The first is the so-called output adjustment effect, which is caused by firms' increased information, which reduces the adjustment of output to the state of demand. The size of output adjustment depends on the kind of competition in markets: price setting leads to more output adjustment, if more information is available, but if firms use prices as strategic variables, information sharing leads to less output adjustment and a tendency towards increased deadweight loss (see Vives, 1990).

The second effect is the so called "preference for variety" effect. When common shocks to demand information that is received by firms are assumed, sharing demand information makes firms' outputs more uniform. On the other hand, if demand shocks are firm-specific, sharing information makes output across firms less uniform. If customers have certain preferences for variety in choices, they would prefer also a more uniform distribution of firms' outputs. As a result, if shocks are common, effects of information sharing on consumer surplus could be positive (see Kühn and Vives, 1995).

Under Bertrand competition, the total welfare effects of information sharing can be positive if products are close substitutes (see Vives, 1984; 2000: 251). However, one generalizable result from the literature on the welfare effects of information sharing is that information sharing under Bertrand competition is almost always bad for consumers (see Vives, 2000: 252). We utilize the introduction of the German market transparency unit for Diesel and gasoline fuels as

[2] Up to January 2016, 49 so-called consumer information service providers running websites and smart phone apps were available.
[3] For the importance of information sharing in competition policy see Kühn (2001).

a natural experiment to test the effects of increased information available to customers, as well as firms, on retail fuel prices.

2 Empirical Analysis

2.1 Identification

In order to test whether the market transparency unit for fuels (MTU) has any positive or negative impact on fuel prices, we use a difference-in-differences approach (see Wooldridge, 2010). By these means we are able to compare fuel prices before and after the introduction of the unit and additionally to compare German prices with average prices from a control group.

The only country in our sample that has introduced a market transparency unit is Germany. Our control group consists of 27 other European countries.[4] As of January 2011, fuel prices in Austria are regulated, hence Austria is not in our panel.[5] Fuel markets are highly regional and, as a result, we can assume that our control group is independent of our treatment group. The likelihood that there are any major interrelationships between these markets is quite low.

By using fixed effects techniques we account for unobserved time-invariant country heterogeneity, which yields the following regression equation

$$price_{it} = c_i + \boldsymbol{x}_{it}'\beta + \phi_1 \, reg_t + \phi_2 \, regcountry_i + \phi_3 \, treat_{it} + u_{it},$$

where price is either the gas or the diesel price of country *i* at time *t*, c_i is a country specific fixed effect, **x** is a vector of controls, *reg* is a dummy variable indicating the regulation period, *regcountry* is a dummy variable indicating whether a certain country belongs to the treatment or control group, *treat* is an interaction effect constructed as the product of regulation and a dummy variable for Germany, to identify the effects of the introduction of regulation in Germany, and u_{it} is an error term. To avoid biases in standard errors we report p-values that are based on clustered standard errors in our results (see Bertrand et al., 2004).

2.2 The Data

Our data consists of an unbalanced panel of weekly observations spanning 28 member states of the European Union from the 2nd week of 2005 to the 42nd week of 2015 (see Table 1 for descriptive statistics). The start of the treatment period is the first week of December 2013 when the market transparency unit went live.

Information on fuel prices is taken from the *Weekly Oil Bulletin* provided by the European Commission. Pump prices are given with and without taxes for 1,000 liters gasoline (Eurosuper) and diesel oil (automotive gas oil). For reasons of comparability we use prices without taxes, because they vary greatly between countries and typically include different types, such

[4] Belgium, Bulgaria, Cyprus, Czech Republic, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, The Netherlands, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia, Spain, and the United Kingdom.

[5] Since 2011 Austrian gas stations are allowed to raise prices only once a day. Additionally, Austria has introduced a transparency unit. Dewenter & Heimeshoff (2015) found that regulations (not the introduction of the transparency unit) led to a significant decrease in prices.

as value added taxes and various indirect taxes. Furthermore, there are differences in the methods used by EU member countries to average prices reported to the European Commission, which makes comparison more difficult (see European Commission, 2009). Exemplarily Germany reports unweighted arithmetic averages while the Netherlands weight fuel prices based on volumes sold. However, these methodological differences are usually constant over time and we use fixed-effects regressions to account for unobserved heterogeneity between countries. As a result, differences in methodology should not bias our general results.

A main impact factor of fuel prices is the crude oil price. We use weekly information on Brent Oil spot prices (brent) as a control variable. Furthermore, we include monthly information on macroeconomic factors such as the consumer price index (CPI) and the industrial production index (IPI), and weekly observations of taxes for diesel (Dtax)/gasoline (Gtax) fuels as explanatory variables. While macroeconomic factors are taken from Eurostat, information on taxes is calculated as the difference of fuel prices with and without taxes.

2.3 Results

The following table 1 reports the results of our regressions for gasoline as well as Diesel fuel.

Table 2: Regression Results – Difference in differences

	Gas I	**Gas II**	**Gas III**	**Diesel I**	**Diesel II**	**Diesel III**
Regulation	46.50 (0.00)	12.20 (0.05)	18.67 (0.05)	37.51 (0.00)	2.28 (0.76)	12.78 (0.07)
Treatment	15.87 (0.00)	12.20 (0.00)	34.15 (0.00)	-6.08 (0.18)	20.34 (0.00)	19.1 (0.00)
Brent	-	269.55 (0.00)	254.92 (0.00)	-	284.79 (0.00)	286.66 (0.00)
CPI	-	2.41 (0.00)	2.15 (0.00)	-	1.38 (0.03)	1.27 (0.00)
IPI	-	-.0227 (0.91)	-	-	.5862 (0.03)	-
Taxes	-	.1907 (0.42)	.1986 (0.00)	-	.3385 (0.00)	.3381 (0.00)
Constant	556.20 (0.00)	-1044.08 (0.00)	-967.06 (0.00)	601.85 (0.00)	-1070.03 (0.00)	-993.50 (0.00)
Country fixed effects	YES	YES	YES	YES	YES	YES
Time dummies	NO	NO	YES	NO	NO	YES
R^2	0.02	0.85	0.85	0.01	0.86	0.85
F-Test (controls)	93.19 (0.00)	10320.93 (0.00)	1423.46 (0.00)	172.88 (0.00)	11064.00 (0.00)	1371.00 (0.00)
Obs	13,644	10,413	13,590	13,644	10,413	13,590

Note: p-values given in parenthesis are based on clustered standard errors.

At first we analyze gas and diesel prices using regulation and treatment dummies as well as country fixed effects. Our results suggest an increase of gasoline prices by about 1.5 euro cents per liter (see Gas I) in comparison with the control group, despite the introduction of the market transparency unit. However, referring to regression Diesel I, no significant price change can be found with respect to diesel oil.

As the explanatory power of the regressions is rather weak, we ran further regressions, including some explanatory variables discussed above (in regressions Gas II and Diesel II), as well as

time dummies (Gas III & Diesel III). In regressions III we also skipped the industrial production index, which is not available for some countries and does not have a significant impact on our results. While regressions of gasoline prices do not change, results for diesel regressions turn out to support a positive effect on prices when using a richer model.

Without time controls, gas prices increase by about 1.2 euro cents when including further control variables. Generally controls have the expected signs and the explanatory power of the regressions increases sharply. Adding time dummies and skipping IPI, the treatment effect increases to about 3.4 euro cents. Independently of using only controls or adding time dummies, prices for diesel oil increase in both regressions by about 2 euro cents.

3 Conclusions

This paper utilizes a unique opportunity to test whether more information within a Bertrand-style oligopoly harms consumers. Our results support the hypothesis derived by Vives (1984) that information sharing between competitors in oligopolies under Bertrand competition is usually harmful. While gasoline prices increased by about 1.2 to 3.3 euro cents due to an increased horizontal market transparency, prices for diesel increased by about 2 euro cents.

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Appendix

Table A1: Descriptive Statistics

	Obs	Mean	Standard Deviation	Min	Max
Gas	14,175	563.77	116.90	226.38	860.51
Diesel	14,175	607.73	124.12	335.92	933.00
Brent	14,176	84.32	24.87	40.02	142.43
CPI	14,120	115.65	12.60	96.05	157.42
IPI	10,934	102.53	10.46	67.40	149.00
Gtax	14,175	723.20	160.58	384.73	1110.51
Dtax	14,175	589.64	127.10	339.80	1114.46

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