

Pass-through of Temporary Fuel Tax Reductions: Evidence from Europe

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- Several European countries introduced temporary fuel tax reductions in 2022
 - Part of government subsidy programs to tackle high inflation rates of up to 10%.
 - e.g., France, Spain, Italy and Germany
- Open question whether the tax reductions have been passed to consumers by the petroleum companies
- Estimation of the pass-through rate and the effect on retail margins of the temporary fuel tax reductions in France, Germany and Italy using a staggered Difference-in-Differences approach

The Retail Fuel Market

- Upstream market:
 - Petroleum refineries process crude oil into several petroleum products
 - Number of refineries varies across our treatment countries (e.g., Germany: 12, Italy: 10, France: 6).
- Intermediate Market: Wholesale
- Downstream market:
 - Dominated by oligopolies that are operating nationwide and regionally operating companies (e.g., in Germany five oligopolists have a 2/3 market share)
 - Italy (21,700) has the largest number of service stations, followed by Germany (14,458) and France (11,151)
- Crude oil is most important share of price fluctuations.
- Fuel taxes constitute the largest share of fuel prices.

- Edgeworth price cycles as the leading theory to very specific cyclical pricing pattern in gasoline markets (Maskin and Tirole, 1988; Noel et al., 2011).
- Evidence for tacit collusion (e.g., Maskin and Tirole, 1988; Noel et al., 2011).
- Evidence for oil-gasoline relationship (e.g., Grasso and Manera, 2007; Noel, 2009; Noel, 2015).
- Evidence on pass-through of taxes and excise duties (e.g., Montag et al., 2021; Genakos and Pagliero, 2022; Harju et al., 2022).
- Evidence for the 2022 fuel tax reduction in Germany (e.g., Fuest et al., 2022; Dovern et al., 2022; Kahl, 2023).

Theoretical Background (Weyl and Fabinger, 2013)

- Theoretically, pass-through depends on
 - elasticity of demand (ϵ_D) and supply (ϵ_S),
 - the degree of competition in a market (θ).
- The conduct parameter θ is equal to 0 in perfect and Bertrand competition, equal to 1 in a monopolistic market, and equal to $1/n$ in Cournot competition.
- Following Weyl and Fabinger (2013), the pass-through rate then can be determined independently of the specific model by

$$\rho = \frac{1}{1 + \frac{\theta}{\epsilon_\theta} + \frac{\epsilon_D - \theta}{\epsilon_S} + \frac{\theta}{\epsilon_{ms}}}. \quad (1)$$

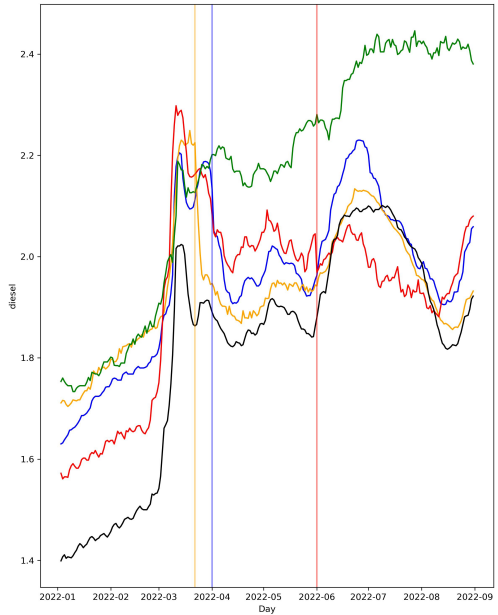
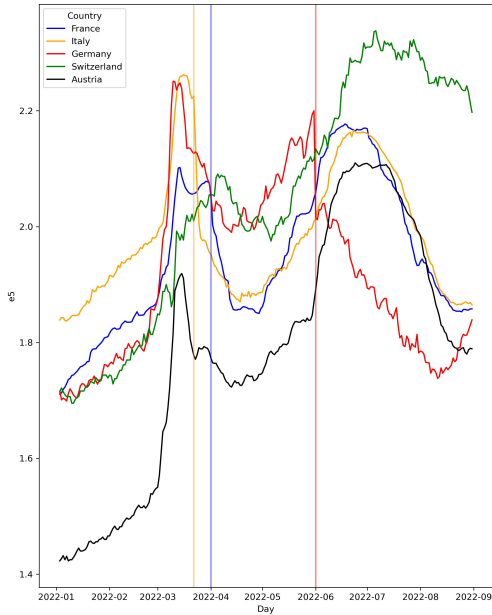
- Formula (1) implies that the sign and magnitude of an increase in θ is ambiguous, especially for oligopolistic markets
 - Effect can be either positive or negative
 - Under certain assumptions also pass-through rates larger than one are possible.
- Impact of the intensity of competition on the pass-through rate in an oligopolistic market remains an empirical problem (Genakos and Pagliero, 2022).

- Four different data sources
 1. Daily average gasoline and diesel consumer prices from the information platform *Fuelo*
 2. Crude oil price Brent and exchange rates from *Onvista*
 3. Country level-data from the *Google Mobility Reports*.
 4. Data on refinery capacities from *Concawe*
- Panel dataset on daily fuel prices for the period January 3 to August 31, 2022 for five European countries (Germany, France, Italy, Austria and Switzerland)

Descriptive Statistics I

Country	Fuel tax reduction	Treatment	Gasoline				Diesel			
			Pre	Post	Difference	Difference incl. VAT	Pre	Post	Difference	Difference incl. VAT
Austria	NO		0.48				0.40			
France	YES	04/01/2022	0.68	0.53	- 0.15	- 0.18	0.59	0.44	- 0.15	- 0.18
Germany	YES	06/01/2022	0.65	0.36	- 0.29	- 0.352	0.49	0.33	- 0.16	- 0.167
Italy	YES	03/22/2022	0.73	0.48	- 0.25	- 0.305	0.62	0.37	- 0.25	- 0.305
Switzerland	NO		0.77				0.80			

Descriptive Statistics II



- staggered Differences-in-Differences (DiD) design to causally estimate the effect of temporary fuel tax reductions on fuel prices
- ("Standard") canonical DiD suffers from several pitfalls when observing time-varying treatments
 - time-varying treatment effects can create a bias in the static TWFE DiD estimate since earlier-treated units act as effective controls for later-treated units
 - in contrast to the canonical DiD setup, the staggered design allows to estimate treatment effect when there are more than two time periods and variation in timing of the treatment
- In our analysis we follow the approach of Callaway and Sant'Anna (2021) as it allows to estimate time-varying and cohort-specific ATT using not-yet-treated and/or never-treated as clean controls

- Baseline DiD regression model:

$$y_{it} = X'_{it}\beta + \rho_{it} \cdot TAX_{it} + \eta_i + \lambda_t + \epsilon_{it}, \quad (2)$$

- Variables:
 - $y_{i,t}$ - consumer price of gasoline or diesel in country i at date t ,
 - TAX_{it} - dummy variable that equals one when country i implements a temporary fuel tax reduction at date t
 - X' - contains control variables (refinery capacity and Google Mobility)
 - η_i - country fixed effects
 - λ_t - day fixed effects

Results: Pass-through

	(I) Gasoline	(II) Diesel	(III) Gasoline	(IV) Diesel	(V) Gasoline	(VI) Diesel
Results ATT Italy	-0.34*** (0.01)	-0.35*** (0.04)	-0.32*** (0.00)	-0.28*** (0.01)	-0.31*** (0.01)	-0.28*** (0.01)
Results ATT France	-0.20*** (0.00)	-0.22*** (0.03)	-0.20*** (0.00)	-0.18*** (0.01)	-0.20* (0.08)	-0.17* (0.07)
Results ATT Germany	-0.47*** (0.01)	-0.19*** (0.00)	-0.45*** (0.00)	-0.20*** (0.00)	-0.43*** (0.01)	-0.17*** (0.02)
Simple Weighted Average	-0.34*** (0.01)	-0.25*** (0.02)	-0.32*** (0.00)	-0.22*** (0.00)	-0.31*** (0.03)	-0.21*** (0.02)
Pass-Through Rates Italy	137.42%	139.70%	127.05%	111.55%	124.34%	110.87%
Pass-Through Rates France	112.44%	119.69%	111.98%	98.28%	108.57%	95.12%
Pass-Through Rates Germany	157.58%	137.95%	153.31%	140.13%	147.15%	118.91%
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Covariate Included	No	No	Cap	Cap	Cap & Mob	Cap & Mob

- In general, very high pass-through rates which are mostly larger than 100% → highly competitive markets
- Effect is very large in Italy and Germany, slightly smaller in France
 - More inelastic supply in France compared to the other two countries
- Compared to previous tax reductions: higher public awareness and the threat of policymakers to pursue antitrust measures
- Pass-through rates higher for gasoline compared to diesel
 - Counterintuitively as the literature finds a more inelastic demand for diesel than for gasoline
 - Most probably due to the unusually high demand for heating diesel in spring/summer 2022
- Estimated effects on retail margins are in line with findings for pass-through rates

Conclusion and Policy Implications

- Temporary fuel tax reductions in Western Europe are passed on to the consumers disproportionately.
- From a competition policy perspective, our results hardly allow any conclusions on possible competition restrictions. High pass-through rates suggest that alleged restrictions can at least not hinder pass-through of tax reductions.
- Due to distributional- and climate-economical shortcomings as well as the relatively high fiscal burden it is debatable whether it is an efficient intervention.
- Work in progress: event study design, more countries, further robustness checks

Thank You!