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ANALYSIS

Predictable Prices, Higher Margins?
Early Evidence on Germany's 12 o'clock Fuel Regulation

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1 Introduction

Following the 2026 energy crisis triggered by the Iran War, Germany implemented a regulatory reform in the retail fuel market that fundamentally altered the timing of price adjustments. Effective 1 April 2026, the *Kraftstoffanpassungsgesetz* (KPAnG) permits petrol stations to increase prices only once per day, at noon, while allowing unrestricted price decreases. This paper provides the first empirical evaluation of the reform. The results indicate an increase in average gasoline retail margins of 5–6 cents per liter (c/l) and no significant effect on diesel margins. We define retail margins as the difference between retail prices net of taxes and fees and Amsterdam–Rotterdam–Antwerp (ARA) wholesale prices. The policy reduces intraday pricing cycles from eight to one, thereby simplifying consumer search. Additionally, the analysis reveals heterogeneous effects across regions, brand size, and time of day. We conclude that the reform was successful in increasing price transparency but failed to reduce price levels; if anything, it had the opposite effect.

Fuel pricing in Germany and internationally has been subject to sustained regulatory scrutiny and policy debates (Bundeskartellamt, 2022; Bundeswettbewerbsbehörde, 2022; Competition and Markets Authority, 2023). The global industry is dominated by few multinational and fully vertically integrated companies. The market in Germany is highly concentrated, with six companies accounting for 84% of sales (Assad et al., 2024). Additionally, retail prices exhibit pronounced *Edgeworth Cycles*, characterized by sharp increases followed by gradual declines (Maskin and Tirole, 1988). While the 2013 introduction of the *Markttransparenzstelle für Kraftstoffe* (MTS-K) improved transparency by mandating near real-time price reporting, pricing dynamics continued to intensify over time: intraday cycles rose from one to seven or eight, with stations adjusting prices more than 20 times per day prior to the 2026 reform (Bundeskartellamt, 2026). This high-frequency volatility complicated consumers' refueling decisions.

The German reform closely resembles the Austrian *Spritpreisverordnung* introduced in 2011, but omits a key feature: in Austria, only the lower-priced half of stations is publicly reported, creating additional competitive pressure for inclusion, whereas in Germany all prices are disclosed (Martin, 2024). The reform aims "to provide more transparency and reduce short-term price spikes at the fuel pump." (Deutscher Bundestag, 2026). Its theoretical effects are, however, ambiguous. Restricting price increases may curb opportunistic hikes, but could also facilitate tacit coordination by making pricing more predictable. Conversely, simplified price patterns may enhance consumers' ability to time purchases, strengthening demand-side discipline. Denter (2026) theoretically shows that the regulation may weakly raise expected average prices. Empirical evidence from Austria is inconclusive, with no clear impact on average prices (Becker et al., 2021; Fasoula and Schweikert, 2020). In fact, there is evidence that the regulation can even backfire for consumers (Obradovits, 2014). The effect of the most recent German reform thus remains an open empirical question.

This paper provides the first descriptive and econometric evidence on the short-run effects of the reform. Using station-level data from the *Markttransparenzstelle für Kraftstoffe* (MTS-K), covering virtually all price changes at approximately 15,000 German petrol stations, we combine retail prices with ARA wholesale benchmarks to construct station-level margins. An interrupted time series design over a symmetric 28-day window around 1 April 2026 indicates an increase in gasoline margins of 5–6 cents per liter, but no significant effect for diesel. Event-study estimates show that the effect is strongest immediately after implementation and attenuates over time. We further compare hourly intraday price effects and find that margins are lower during the morning hours, particularly between 4 a.m. and noon, and significantly higher from noon to midnight. This pattern is largely driven by the design of the policy, which causes one large price increase at noon everyday.

We also show that the effect of the policy is more pronounced for smaller and independent stations, while stations affiliated with major brands exhibit effects roughly 1 c/l lower. Regionally, the effects of the policy are strongest in Southern Germany and weaker or absent in Eastern Germany. Intraday patterns align with the policy design, with higher prices emerging after noon and lower prices in the morning hours. Overall, the reform simplifies price search but raises average margins during a period of elevated energy costs.

The remainder of the paper is structured as follows. Section 2 describes the data and methodology. Section 3 presents descriptive and econometric results. Section 4 concludes.

2 Data & Methods

Data

To examine the effect of the regulation on retail margins, we combine high-frequency retail fuel price data with wholesale cost benchmarks and station-level characteristics. We consider a symmetric 14-day window around the regulatory change, covering the period from 18 March to 15 April 2026.

The core dataset consists of station-level fuel prices obtained from the German market transparency unit for fuels (MTS-K) via the *Tankerkönig* platform. These data provide sub-daily price information covering all stations across Germany. The dataset includes prices for diesel and gasoline products (E5 and E10). For the present analysis, we focus on E5 gasoline and diesel. The results are qualitatively identical for E10. In addition, we use detailed station-level metadata containing information on geographic location, brand affiliation, and other structural characteristics, which allow us to control for time-invariant heterogeneity across stations.

To account for input cost fluctuations, we incorporate wholesale fuel price data from the Amsterdam-Rotterdam-Antwerp (ARA) region, a central trading hub for refined petroleum products in Europe. Specifically, we use daily ARA benchmark prices for gasoline (PU-10PP-ARA) and diesel (ULSD10-B-ARA), both expressed in EUR per litre. These series capture wholesale market conditions relevant for downstream retail pricing.

Since ARA prices are quoted on trading days only, observations for weekends and public holidays are missing by construction. We impute public holidays using an OLS regression of the ARA price on the concurrent Brent crude price (LCOc1, converted in EUR/l), estimated over the full sample period and forward-fill all missing observations on weekends.

Net-of-tax retail prices are constructed from observed gross prices by subtracting all applicable taxes and fees, including the energy tax, CO_2 tax, value-added tax (VAT), and the stockholding fee. We construct retail margins as the difference between net-of-tax retail prices and ARA-based input costs for E5 gasoline and diesel. To account for the short lag in the pass-through from wholesale to retail prices, we smooth ARA prices using a three-day moving average. This approach captures short-run cost dynamics while reducing high-frequency volatility and potentially asynchronous price adjustments across stations.

Finally, since the observation period includes the Easter holiday period in 2026, including Good Friday (3 April) and Easter Monday (6 April), as well as school holidays that vary across federal states, we include controls for public holidays and school holiday periods, allowing us to separate holiday-related demand effects from the impact of the regulation.

Methods

We identify the effect of the reform using within-station changes of retail margins. By accounting for input costs through the margin transformation and including time-varying controls, we aim to isolate the effect of the policy on pricing behavior. Specifically, we test whether the introduction of the regulation induces a structural break in the level and the trend of margins.

Static Interrupted Time Series: Our baseline specification follows a standard interrupted time series (ITS) framework applied to station-level data:

$$\begin{aligned} m_{it,f} = {} & \alpha_i + \alpha_{\text{wd}(t)} + \beta_1\, Post_t + \beta_2\, Trend_t + \beta_3\, (Post_t \times Trend_t) \\ & + \delta_1\, Hol_t + \delta_2\, SchoolHol_{s(i),t} + \varepsilon_{it}. \end{aligned} \tag{1}$$

Here, $m_{it,f}$ denotes the retail margin for fuel type $f \in \{\text{E5, diesel}\}$ at station i on day t. Station fixed effects α_i absorb time-invariant differences in pricing levels (e.g., location or brand-specific strategies), while day-of-week fixed effects $\alpha_{\text{wd}(t)}$ capture systematic intra-week variation in demand and pricing behavior.

$Post_t$ is an indicator for the post-reform period, and $Trend_t$ is a linear time trend. Their interaction term allows the slope of the outcome to change following the reform. The vector of controls includes holiday indicators, with Hol_t capturing public holidays and $SchoolHol_{s(i),t}$ capturing school holidays in the federal state of station i.

The coefficient β_1 measures the immediate level shift in margins at the time of the reform, while β_3 captures any change in the underlying trajectory. The error term ϵ_{it} captures unobserved, time-varying influences. Standard errors are clustered at the station level to account for serial correlation within stations and at the daily level to account for serial correlation within days around the regulation.

Since the regulation was introduced simultaneously for all retail gasoline stations in Germany and we have no untreated control group in our sample, identification relies on the assumption that, absent the reform, prices would have continued along both the level and trend observed in the pre-intervention period. The results should be therefore interpreted as evidence of a structural break at the time of the reform, in either the level or the trajectory of prices, or both.

Dynamic ITS: To relax the linear trend assumption imposed by the static specification and to capture short-run adjustment dynamics around the reform, we estimate a dynamic interrupted time series model. Instead of a single post-treatment indicator and a linear trend break, we include a full set of event-time dummies, allowing the treatment effect to vary flexibly over time.

Specifically, we estimate the following model on a daily panel of stations over a symmetric ±14-day window around the reform date:

$$m_{it,f} = \alpha_i + \sum_{k \neq -1} \beta_k \cdot \mathbf{1}[t - T_0 = k] + \delta \cdot SchoolHol_{s(i),t} + \varepsilon_{it}. \tag{2}$$

Here, $\mathbf{1}[t - T_0 = k]$ is an indicator that equals one if day t is k periods relative to the reform date T_0, with the day immediately preceding the reform ($k = -1$) serving as the reference category. Each coefficient β_k therefore measures the deviation in margins relative to this baseline.

This specification traces the full adjustment path of margins before and after the reform. It allows to test pre-trends and to assess whether the effects are immediate or gradual, whether they persist over time.

Again, school holidays ($SchoolHol_t$) are included to capture regional demand variation. Day-of-week fixed effects ($\alpha_{\text{wd}(t)}$) and holidays (Hol_t) are omitted, as they are perfectly collinear with the event-time dummies at the daily frequency.

Heterogeneity by Brand Size: We examine whether the policy impact varies systematically with brand size since brand size may reflect differences in pricing strategies. Therefore we extend the static ITS specification by interacting the treatment indicator with brand size categories.

Following Assad et al. (2024), we classify brands based on the number of stations they operate in our sample into three groups: large chains (400 or more stations), medium chains (50 to 399 stations), and small or independent brands (fewer than 50 stations). The latter serve as the reference category. The specification follows:

$$\begin{aligned} m_{it,f} = \alpha_i + \alpha_{\text{wd}(t)} + \beta_1\, Post_t + \beta_2\, Trend_t + \beta_3\, (Post_t \times Trend_t) + \theta_M\, (Post_t \times \mathbf{1}[Medium_i]) \\ + \theta_L\, (Post_t \times \mathbf{1}[Large_i]) + \delta_1\, Hol_t + \delta_2\, SchoolHol_{s(i),t} + \varepsilon_{it} \end{aligned} \tag{3}$$

where β_1 now captures the level shift for small and independent stations (the reference group), while θ_M and θ_L measure the differential response of medium and large chains relative to that baseline.

Heterogeneity by Regions Further, we examine whether the policy impact varies geographically, which may reflect differences in market structure, competitive intensity, or proximity to wholesale supply.

We group Germany's 16 federal states into four macro-regions: North, East, South and West following standard geographic classification. The West region serves as the reference group. The static specification is extended by interacting the treatment indicator with the region indicators:

$$\begin{aligned} m_{it,f} = \alpha_i + \alpha_{\text{wd}(t)} + \beta_1\, Post_t + \beta_2\, Trend_t + \beta_3\, (Post_t \times Trend_t) \\ + \sum_{r \neq West} \theta_r\, (Post_t \times \mathbf{1}[Region_i = r]) + \delta_1\, Hol_t + \delta_2\, SchoolHol_{s(i),t} + \varepsilon_{it} \end{aligned} \tag{4}$$

Analogously, β_1 captures the level shift in margins for the West region, while the coefficients θ_r measure the differential response of other regions relative to this baseline. This allows us to assess whether the reform effect varies systematically across geographic market environments.

Intraday Patterns To examine whether the policy impact varies systematically over the course of the day, we extend the static specification by allowing the treatment effect to differ across hours. This is particularly relevant in retail fuel markets, where prices exhibit pronounced intraday cycles. Specifically, we estimate the following model:

$$\begin{aligned} m_{ith,f} = \alpha_i + \alpha_{\text{wd}(t)} + \alpha_h + \beta_1 Post_t + \beta_2 Trend_t + \beta_3 (Post_t \times Trend_t) \\ + \sum_{h \neq h_0} \theta_h (Post_t \times Hour_h) + \delta_1 Hol_t + \delta_2 SchoolHol_{s(i),t} + \varepsilon_{ith} \end{aligned} \tag{5}$$

where $\alpha_{\text{hour}(t)}$ captures the baseline intraday pricing pattern, while the interaction terms allow the post-reform effect to vary flexibly by hour of the day. The reference category is hour h_0 (midnight), such that β_1

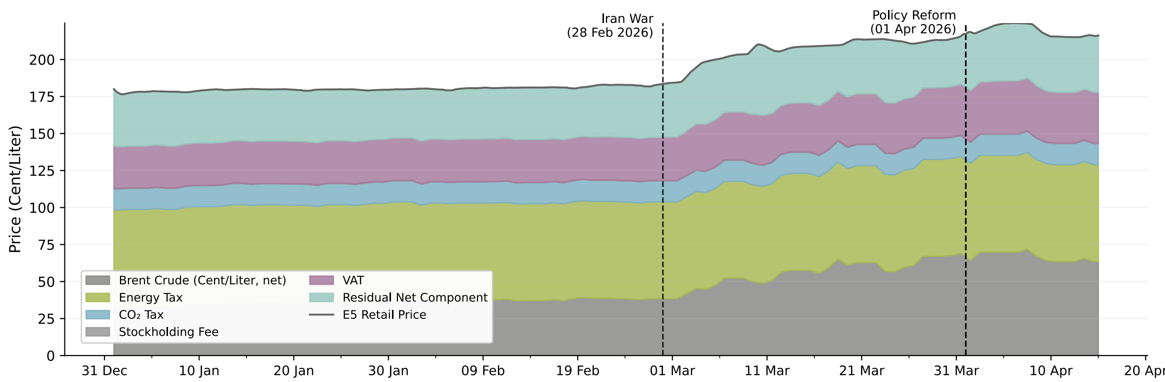
represents the level shift in this reference hour, and the coefficients θ_h measure deviations from this baseline for other hours.

We focus on the estimated interaction coefficients θ_h, which capture the relative strength of the treatment effect across hours. These coefficients are normalized to zero in the reference hour and can therefore be interpreted as deviations from the baseline effect at midnight.

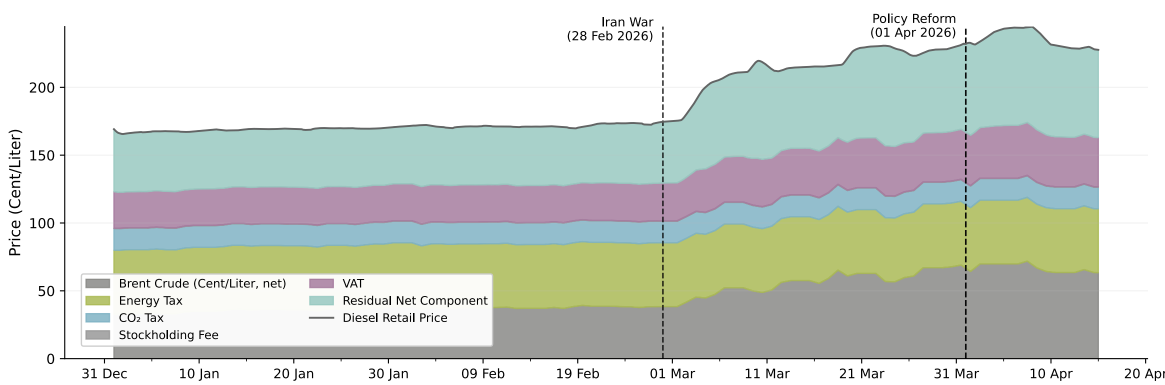
3 Results: The Effect of the 12 o'clock Regulation on German Petrol Station Prices

Prior to estimating the impact of the 12 o'clock regulation on petrol station prices in Germany, we provide a detailed discussion of the underlying data.

Descriptive Statistics



(a) E5



(b) Diesel

Figure 1: Decomposition of E5 and diesel retail prices into tax and cost components, January–April 2026. Dashed lines mark the Iran War (28 February) and the KPAnG reform (1 April). Source: MTS-K, ICE Brent; authors' calculations.

Figure 1 presents stacked decompositions of retail E5 gasoline and diesel prices in 2026, situating the estimation window within the broader cost structure. Prices consist of crude oil costs, energy taxes[1], the CO_2 tax[2], a 19% value-added tax, and a stockholding fee[3], with the residual net component capturing transportation, storage, refinery, and retail margins.

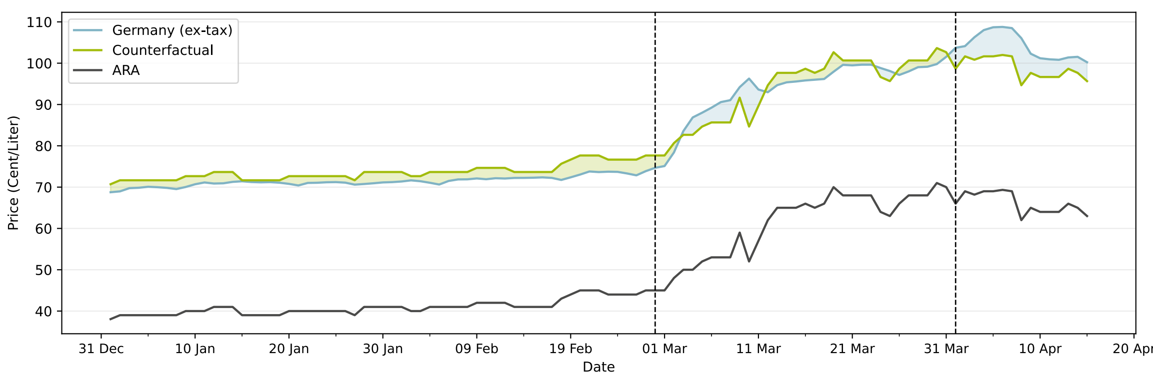
[1]The energy tax in Germany amounts to 65.45 c/l for gasoline and 47.04 c/l for diesel.

[2]We calculate 2.37 (2.65) kg CO_2 per liter of gasoline (diesel) at a price of 0.06 ct per kg CO_2, or 60 EUR per metric ton. This amounts to 14.22 c/l for gasoline and 15.9 c/l for diesel.

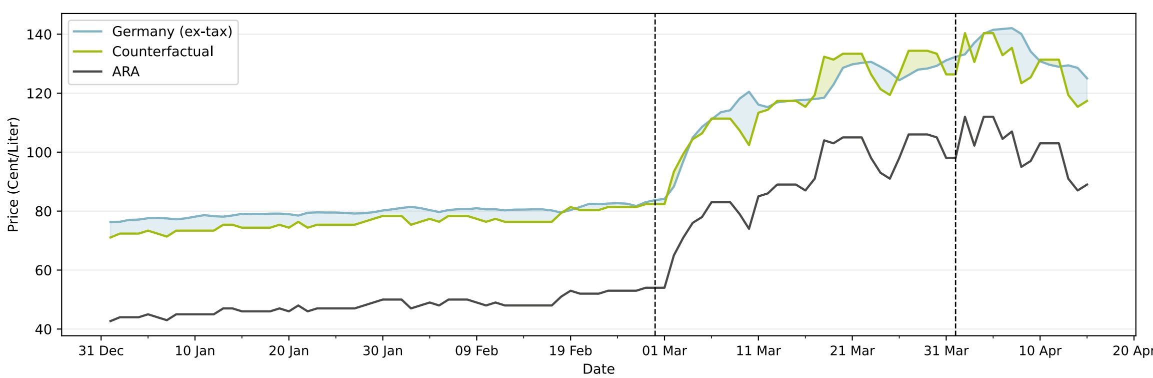
[3]The "Erdölbevorratungsverband" fee amounts to 0.27 c/l for gasoline and 0.3 c/l for diesel.

Prices remained relatively stable until the onset of the Iran War on 28 February 2026, after which they increased sharply. This rise was primarily driven by higher crude oil costs and further amplified by the ad valorem VAT structure. During this period, diesel prices temporarily exceeded gasoline prices despite their lower tax burden. In addition to rising crude oil costs, the residual net component, particularly for diesel, also increased, suggesting an expansion in margins.

Following the introduction of the regulation on 1 April, no discrete price adjustment is observable: the upward trend in both fuels persists briefly before stabilizing and declining modestly toward mid-April. To put this into perspective, Figure 2 compares observed German prices to a counterfactual that holds the pre-regulation, post-war spread between ARA wholesale prices and German retail prices constant. For gasoline, German prices subsequently exceed the counterfactual, suggesting that retail prices rose more strongly than international benchmarks would suggest. For diesel, the pattern is less distinct: ARA diesel prices were comparatively high, as the Iran War additionally caused a global diesel shortage (Puls, 2026). In the aftermath of the regulation it remains unclear whether ARA or German prices are higher. The descriptive evidence indicates a relative upward shift in retail gasoline prices compared to ARA benchmark prices following the reform, whereas no comparable effect is observed for diesel.



(a) E5



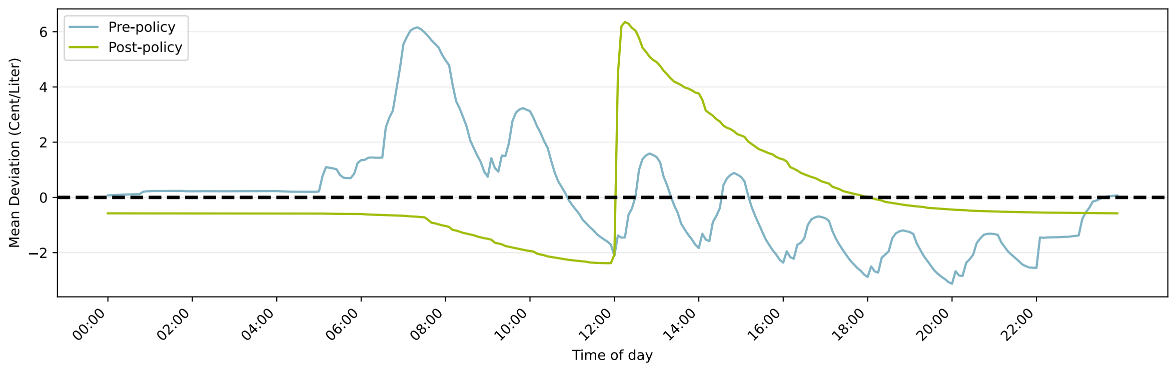
(b) Diesel

Figure 2: Observed German ex-tax retail prices versus a counterfactual holding the pre-reform ARA–Germany spread constant, for E5 (top) and diesel (bottom). Shaded areas indicate deviations from the counterfactual after 1 April 2026. Source: MTS-K, ARA; authors' calculations.

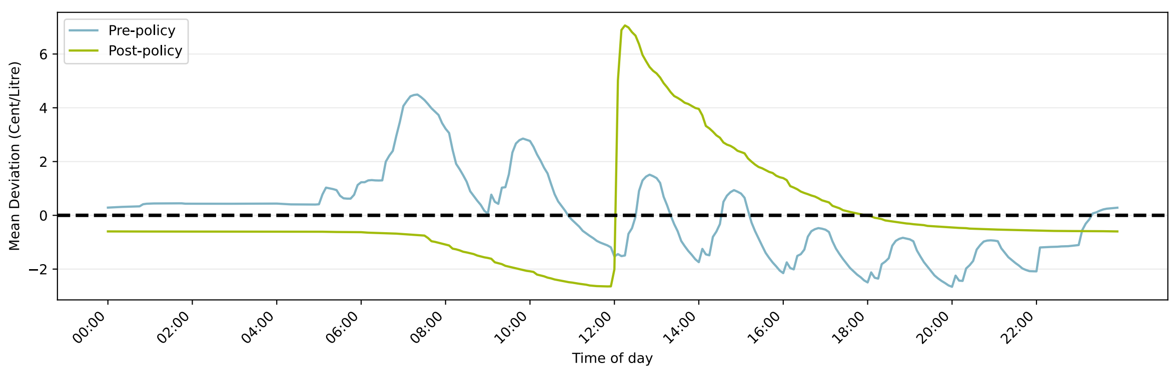
The regulation was, however, also intended to enhance transparency and mitigate short-term price fluctuations at petrol stations (Deutscher Bundestag, 2026). Figure 3 shows the average deviation of prices from the daily mean over the course of the day, both before and after the policy's implementation. The figure shows that, whereas prices previously exhibited seven to eight peaks per day, the regulation effectively reduces this pattern to a single daily peak by design, thereby reducing intraday price volatility. Before the regulation, consumers could minimize expenditure by timing purchases to coincide with troughs in the price cycle; however, identifying these optimal times is nontrivial.

Following the introduction of the regulation, the timing of low prices becomes more predictable: prices are lowest in the late morning, beginning around 7 a.m. until noon, and reach their peak between noon and 4 p.m., while remaining slightly below the daily mean during the rest of the day. This shift has two main implications. First, it simplifies consumers' ability to refuel at favorable times. Second, for consumers who are unable to shift consumption inter-temporally, the cost of refueling at suboptimal times has increased substantially.[4] Finally, it is noteworthy that intraday pricing patterns for gasoline and diesel are highly similar, despite differences in their overall price levels. This was true both before and after the new policy came into effect.

Descriptive evidence suggests that the reform improved price transparency and reduced search frictions by limiting the frequency of price cycles. However, it may have increased refueling costs when intertemporal substitution is constrained, with potential upward effects on gasoline prices likely and effects on diesel prices to be examined in the following section.



(a) E5



(b) Diesel

Figure 3: Average intraday deviation from the daily mean price, before (blue) and after (green) the KPAnG reform, for E5 (top) and diesel (bottom). Source: MTS-K; authors' calculations.

Impact of the New Policy on Retail Prices

As outlined in Section 2, we estimate an interrupted time series (ITS) model to compare retail margins before and after the policy intervention. Margins are defined as the difference between retail prices net of taxes and fees and a three-day rolling average of ARA gasoline and diesel spot prices. This construction isolates retail-level pricing behavior by controlling for the most important input cost component, wholesale prices on the ARA market, which already reflect global supply and demand conditions on both the crude oil, as well as the gasoline and diesel markets.

[4]For example, when undertaking long-distance travel.

Table 1: Impact of the Fuel Policy on Retail Margins Relative to 3-Day Rolling ARA Wholesale Prices

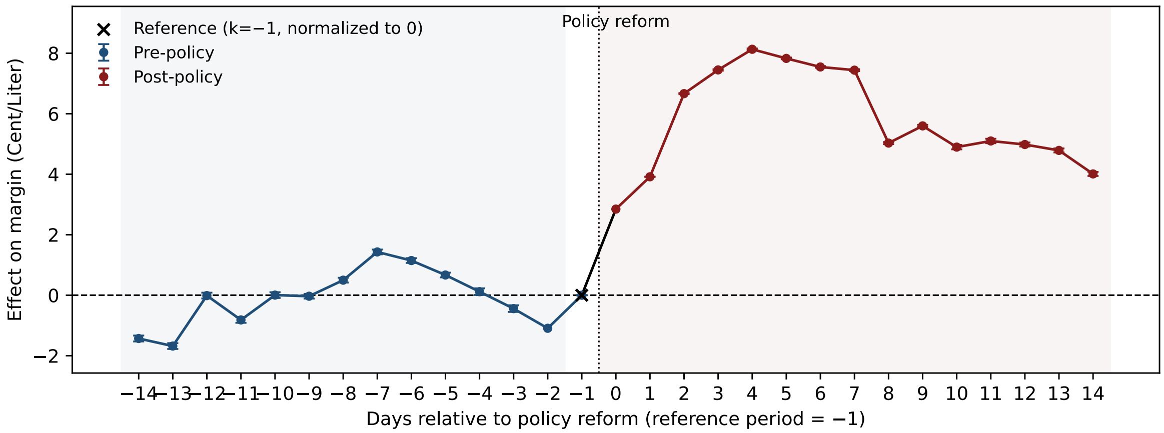
	E5 Margin (c/l)			Diesel Margin (c/l)		
	(1)	(2)	(3)	(1)	(2)	(3)
Post_t	5.943^{***}	6.442^{***}	5.742^{***}	3.061	2.683	2.339
	(1.214)	(1.147)	(1.315)	(2.454)	(2.415)	(2.533)
Trend_t	0.090^{*}	0.048	0.044	0.483	0.526	0.524
	(0.053)	(0.058)	(0.061)	(0.299)	(0.320)	(0.323)
$\text{Post}_t \times \text{Trend}_t$	−0.177	−0.157	−0.099	−0.448	−0.500	−0.471
	(0.125)	(0.120)	(0.125)	(0.339)	(0.326)	(0.342)
Station FE	Yes	Yes	Yes	Yes	Yes	Yes
Weekday FE	No	Yes	Yes	No	Yes	Yes
Holiday Controls	No	No	Yes	No	No	Yes
Clustering	Station & Time (Two-way)			Station & Time (Two-way)		
Observations	423,823	423,823	423,823	433,886	433,886	433,886
Stations	14,681	14,681	14,681	15,034	15,034	15,034
Within R^2	0.646	0.659	0.669	0.439	0.522	0.523

Notes: Standard errors in parentheses. The dependent variable is the retail margin in cents per liter, defined as the net-of-tax retail price minus the corresponding 3-day rolling average of ARA wholesale prices. Specification (1) includes station fixed effects only. Specification (2) additionally includes weekday fixed effects. Specification (3) further includes public holiday and school holiday controls. Standard errors are clustered two-way at the station and date level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

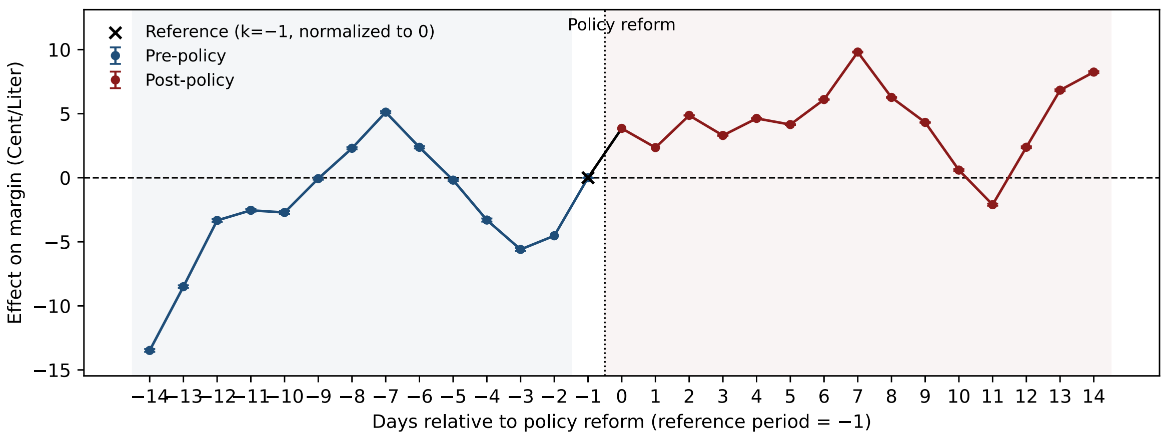
Table 1 reports the estimation results based on Equation (1). The coefficient of primary interest, $Post_t$, captures the average shift in margins following the introduction of the policy. For E5, the estimates indicate a statistically significant increase in margins of approximately 6 c/l. By contrast, the corresponding coefficient for diesel is positive but not statistically significant, providing no clear evidence of a comparable policy effect on diesel margins. These results are consistent with the descriptive evidence presented in Figure 2, where gasoline margins increase markedly after policy implementation, while diesel margins remain largely unchanged.

These findings are robust across alternative specifications. Starting from a baseline model, the analysis progressively incorporates additional controls. First, weekday fixed effects are included to account for systematic intra-week variation, which leads to a modest increase in the estimated treatment effect. Next, controls for public and school holidays are added to capture demand fluctuations; while generally small, the corresponding coefficients are occasionally positive and statistically significant, particularly for gasoline, consistent with higher demand and elevated margins during holiday periods.

All specifications include station fixed effects to control for time-invariant heterogeneity across stations, as well as a linear time trend ($Trend_t$) and its interaction with the post-policy indicator ($Post_t \times Trend_t$), allowing for differential pre- and post-policy trends. The estimated coefficients on these trend terms are small and statistically insignificant across fuel types, indicating no meaningful changes in underlying trends beyond the level shift captured by $Post_t$. Standard errors are computed using two-way clustering at the station and date levels, thereby accounting for potential correlation both across stations and over time.



(a) E5



(b) Diesel

Figure 4: Dynamic ITS estimates of the reform's effect on retail margins (E5 panel a, diesel panel b). Coefficients measure daily deviations relative to t = -1; bars show 95% confidence intervals, two-way clustered by station and date.

Dynamic ITS Figure 4 presents the estimates from the dynamic interrupted time series model specified in Equation (2). The event time is indexed relative to the policy implementation date (Day 0, 1 April 2026). The coefficients β_k capture the deviation in margins relative to the omitted reference period, defined as the day immediately preceding the reform (Day -1).

Figure 4a shows E5 margins, which in the pre-policy period exhibits relatively modest variation, with coefficients fluctuating in a narrow band of approximately ± 2 c/l. This stability in E5 pre-trends supports the identifying assumption of parallel pre-trends. Following the policy implementation, a significant and immediate increase in margins is observed. The effect peaks at roughly 8 c/l within the first week and subsequently stabilizes at a level slightly below 6 c/l. This dynamic adjustment is consistent with the magnitude estimated in the baseline ITS specification reported in Table 1. Notably, the initial post-treatment window coincides with the Easter holiday period, which may introduce short-term demand and pricing biases. The slight attenuation of the effect after approximately one week is consistent with a normalization of market conditions following this temporary holiday shock.

In contrast, Figure 4b shows the results for diesel margins, which reveals substantial volatility both before and after the policy intervention. In the pre-policy period, coefficients range widely between approximately -15 and +5 c/l, indicating a clear deviation from a flat pre-trend. This instability weakens the credibility of a causal interpretation, as it suggests the presence of confounding factors or underlying structural fluctuations unrelated to the policy.

Post-policy, while there is an initial upward movement in margins, reaching values of around 6–7 c/l, the trajectory remains highly irregular, with subsequent reversals and no clear stabilization. The absence of a consistent post-treatment pattern, combined with the pronounced pre-policy variability, explains why the corresponding estimates are statistically insignificant in Table 1.

In Summary this means that the evidence suggests that while the policy effect on E5 margins is both economically and empirically well-identified, the diesel margin dynamics are dominated by noise and external shocks, rendering any apparent post-policy changes indistinguishable from underlying market volatility.

3.1 Heterogeneity Analysis

Table 2: Heterogeneous Policy Effects by Brand Size (Margin Specification)

	E5 Margin (c/l)			Diesel Margin (c/l)		
	(1)	(2)	(3)	(1)	(2)	(3)
$Post_t$	6.467^{***}	6.965^{***}	6.663^{***}	3.729	3.353	3.467^{*}
	(1.241)	(1.170)	(0.988)	(2.490)	(2.437)	(2.090)
$Trend_t$	0.090^{*}	0.048	0.206^{***}	0.483	0.526	0.768^{**}
	(0.053)	(0.058)	(0.064)	(0.299)	(0.320)	(0.364)
$Post_t \times Trend_t$	-0.177	-0.157	-0.395^{***}	-0.448	-0.499	-0.915^{**}
	(0.125)	(0.120)	(0.112)	(0.339)	(0.326)	(0.444)
$Post_t \times \mathbf{1}[\text{Medium}]$	-0.278^{**}	-0.278^{**}	-0.278^{**}	-0.646^{***}	-0.648^{***}	-0.648^{***}
	(0.129)	(0.129)	(0.129)	(0.164)	(0.165)	(0.166)
$Post_t \times \mathbf{1}[\text{Large}]$	-0.809^{***}	-0.808^{***}	-0.809^{***}	-0.931^{***}	-0.935^{***}	-0.935^{***}
	(0.189)	(0.189)	(0.190)	(0.293)	(0.294)	(0.295)
Station FE	Yes	Yes	Yes	Yes	Yes	Yes
Weekday FE	No	Yes	Yes	No	Yes	Yes
Holiday Controls	No	No	Yes	No	No	Yes
R^2 (within)	0.648	0.661	0.702	0.440	0.523	0.564
Observations	423,823	423,823	423,823	433,886	433,886	433,886
Stations	14,681	14,681	14,681	15,034	15,034	15,034

Notes: Dependent variable: net-of-tax margin in cents per liter. Brand-size classification follows Assad et al. (2024): Large $\geq$ 400 stations (ARAL, Shell, ESSO, TotalEnergies, JET, Avia, Star, Agip Eni, Raiffeisen); Medium = 50–399 stations; Small $<$ 50 stations (reference group). $Post_t \times \mathbf{1}[\cdot]$ denotes the differential post-reform effect relative to Small brands. Standard errors are two-way clustered by station and time. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Heterogeneity by Brand Size To examine whether the policy effect varies with brand size, Equation (3) augments the baseline specification by interacting the post-treatment indicator with indicators for brand size categories. Following Assad et al., 2024, brands are classified as large ($\geq$ 400 stations), medium (50 – 399 stations), and small ($<$ 50 stations), with small brands serving as the omitted reference category. Accordingly, the coefficient on $Post_t$ captures the average post-policy level shift in margins for small and independent stations, while the interaction terms reflect the difference in effects for medium and large brands.

The results in Table 2 reveal a clear pattern of decreasing treatment effects with increasing brand size. For E5, the baseline coefficient $Post_t$ is positive and statistically significant across all specifications, with point estimates ranging from 6.47 to 6.97 c/l. For diesel, the corresponding estimates are smaller, between 3.35 and 3.73 c/l, and only weakly significant in the last specification.

The interaction terms are consistently negative and statistically significant, indicating that stations affiliated with larger brands experienced smaller margin increases. For medium-sized brands, the differential effect amounts to -0.28 c/l for E5 and around -0.65 c/l for diesel. For large brands, the reductions are more pronounced, at roughly -0.81 c/l for E5 and -0.93 c/l for diesel.

Overall, the evidence indicates that the policy-induced increase in margins is stronger among small and independent stations, while stations affiliated with larger brands exhibit weaker responses. The effect is consistent across fuel types.

Table 3: Heterogeneous Policy Effects by Region (Margin Specification)

	E5 Margin (c/l)			Diesel Margin (c/l)		
	(1)	(2)	(3)	(1)	(2)	(3)
$Post_t$	5.474***	5.973***	5.145***	2.177	1.798	1.470
	(1.224)	(1.169)	(1.362)	(2.487)	(2.428)	(2.570)
$Trend_t$	0.090*	0.048	0.044	0.483	0.526	0.527
	(0.053)	(0.058)	(0.060)	(0.299)	(0.320)	(0.322)
$Post_t \times Trend_t$	−0.177	−0.157	−0.099	−0.448	−0.499	−0.478
	(0.125)	(0.120)	(0.126)	(0.339)	(0.326)	(0.341)
$Post_t \times \mathbf{1}$[East]	0.664***	0.664***	0.879***	0.143	0.143	0.187
	(0.142)	(0.142)	(0.179)	(0.187)	(0.188)	(0.253)
$Post_t \times \mathbf{1}$[North]	−0.054	−0.054	0.568*	0.661**	0.661**	0.790
	(0.160)	(0.160)	(0.335)	(0.279)	(0.280)	(0.617)
$Post_t \times \mathbf{1}$[South]	1.276***	1.276***	1.219***	2.426***	2.429***	2.418***
	(0.262)	(0.262)	(0.205)	(0.340)	(0.341)	(0.331)
Station FE	Yes	Yes	Yes	Yes	Yes	Yes
Weekday FE	No	Yes	Yes	No	Yes	Yes
Holiday Controls	No	No	Yes	No	No	Yes
R^2 (within)	0.652	0.665	0.674	0.448	0.530	0.531
Observations	423,798	423,798	423,798	433,861	433,861	433,861
Stations	14,672	14,672	14,672	15,025	15,025	15,025

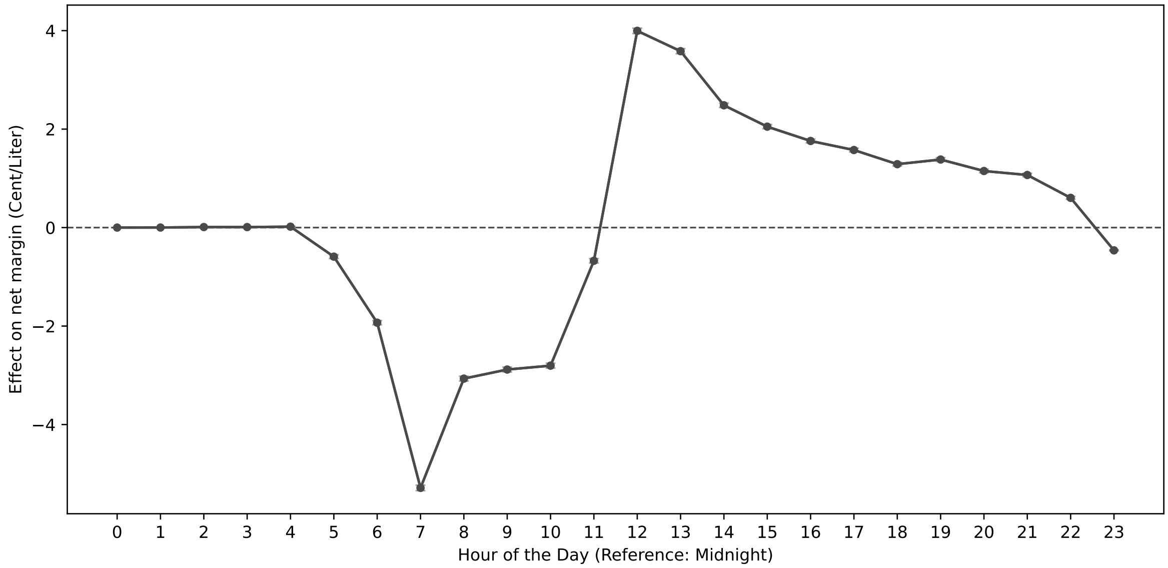
Notes: Dependent variable: net-of-tax margin in cents per liter. Regions are defined as follows: North = Schleswig-Holstein, Hamburg, Bremen, Lower Saxony, Mecklenburg-Vorpommern; East = Berlin, Brandenburg, Saxony, Saxony-Anhalt, Thuringia; South = Baden-Württemberg, Bavaria; West = North Rhine-Westphalia, Hesse, Rhineland-Palatinate, Saarland (reference group). $Post_t \times \mathbf{1}[\cdot]$ denotes the differential post-reform effect relative to the West region. Standard errors are two-way clustered by station and time. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Heterogeneity by Region To assess whether the policy effect varies across geographic areas, Equation (4) augments the baseline specification with interactions between the post-treatment indicator and regional dummies. We partition Germany into the four cardinal regions, where the West serves as the omitted reference category. The coefficient on $Post_t$ therefore captures the average post-policy level shift in margins for stations located in Western Germany, while the interaction terms reflect differential effects in the remaining regions.

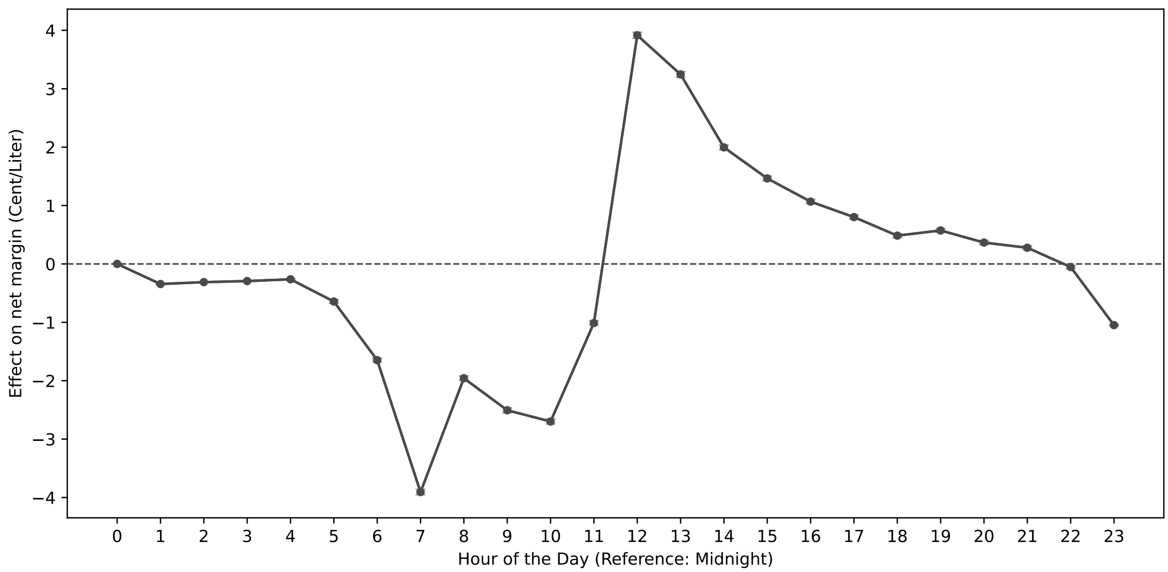
The results in Table 3 indicate that margins in the reference region (West) increase by approximately 5.1 to 6.0 c/l for E5 across specifications, with all estimates statistically significant. For diesel, the corresponding coefficients range from 1.47 to 2.18 c/l but remain statistically insignificant throughout. Regional heterogeneity is pronounced and varies by fuel type. For E5, the interaction terms for the South and East are consistently positive and statistically significant. In the South, the differential effect amounts to approximately 1.2 c/l. In the East, the additional effect ranges from about 0.66 to 0.88 c/l. By contrast, the estimated differences for the North are smaller, less stable across specifications and only weakly significant.

For diesel, the pattern differs somewhat. The interaction terms for the South are again large, positive, and highly statistically significant, with estimates around 2.42 c/l. In contrast, the coefficients for the East remain small and statistically insignificant, suggesting no meaningful regional deviation from the baseline effect. The North exhibits moderate positive differentials (around 0.66 c/l), which are also only weakly significant.

Overall, the results point to substantial geographic variation in the policy impact. The strongest margin increases are observed in Southern Germany, followed by the East for gasoline, while the North largely resembles the West.



(a) E5



(b) Diesel

Figure 5: Estimated hourly policy effects on retail margins relative to midnight, for E5 (panel a) and diesel (panel b). Bars show 95% confidence intervals.

Intraday Patterns Lastly, we estimate the effect of the policy on price levels at different times of the day. Equation (5) shows that we interact the treatment effect estimator $Post_t$ with every hour of the day $Hour_h$ and leave one hour out to serve as the benchmark.

Figure 5 displays the effects θ_h for diesel and E5 across the day with Midnight as reference hour. From midnight until the early morning (1-4 a.m.), the coefficients remain close to zero, mirroring the baseline at midnight. From 5 until 7 a.m. we see a sharp decline with the most negative deviation from the midnight baseline at 7 a.m., resulting in -5ct/L for E5 and -4 ct/L for diesel. Afterward, the coefficients recover rapidly, cross zero at 11 a.m. and rise until the peak at 12 p.m. reaching approximately +4 c/l for E5 and diesel. After noon, the coefficients decline gradually and monotonically, returning toward zero by the late evening hours. All hourly estimates are highly significant, confirming a stable and consistent intraday pattern for both E5 and diesel.

4 Discussion & Conclusion

This paper provides the first empirical evidence on the short-run effects of the *Kraftstoffanpassungsgesetz* (KPAnG) in Germany, enacted in response to the global oil crisis of 2026 following the Iran War. The policy restricts petrol stations to at most one daily price increase at noon, thereby closely resembling the regulatory framework introduced in Austria in 2011. Using comprehensive station-level pricing data covering approximately 15,000 stations over a four-week window around the reform, the analysis identifies both average treatment effects and systematic heterogeneity across firms and regions.

The primary finding is a substantial and statistically significant increase in gasoline margins following the policy intervention. Margins, defined as the difference between retail prices net of taxes and wholesale prices on the Amsterdam-Rotterdam-Antwerp (ARA) market, increase by approximately 6 c/l for E5 and E10. This effect is robust across a wide range of specifications and cannot be explained by changes in wholesale costs, demand fluctuations due to holidays, or underlying time trends. We find no significant level effect for diesel margins.

The divergence between fuel types allows several interpretations. Existing evidence, such as Montag et al. (2023), suggests that diesel demand is more price-elastic, potentially reflecting the higher mileage intensity of diesel users. In addition, Figure 1 shows that diesel prices increased disproportionately during the crisis, at times exceeding gasoline prices despite lower taxation, which may have constrained further retail price adjustments. Furthermore, diesel prices approached the salient threshold of 2.50 EUR per liter, which might have limited firms' willingness to raise prices, due to concerns about demand responses and further regulatory interventions.

Beyond average price effects, the policy achieved its intended objective of increasing price transparency. The intraday pricing cycle, previously characterized by seven to eight peaks, collapses into a single, predictable adjustment shortly after noon. As a result, low-price windows become more salient and easier to anticipate. However, this simplification comes at a cost: prices are systematically elevated during the midday period. Positive deviations from the daily average persist between noon and late afternoon, whereas prices tend to fall below the daily average during the morning hours. While the pre-reform regime offered multiple opportunities to refuel at relatively low prices throughout the day, the post-reform structure compresses these opportunities into a narrower and more predictable time window.

The heterogeneity analysis indicates that the policy effect differs systematically across both brand size and geographic regions. Regarding brand size, the increase in margins is primarily concentrated among small and independent stations. Medium-sized brands display more moderate increases (-0.27 c/l for gasoline and -0.65 c/l for diesel), while the effects for large brands amount to -0.81 c/l for gasoline and -0.65 c/l for diesel. This pattern suggests that larger firms adjust their margins less aggressively, likely due to greater sensitivity to regulatory scrutiny and reputational concerns. Because they have a stronger influence on aggregate price levels, they internalize the effect of their pricing on market averages and thus exercise more restraint. In contrast, smaller and independent stations, whose individual impact on overall prices is negligible, face weaker constraints and are therefore more likely to test higher prices.

Secondly, we show that the treatment effect varies strongly by region. Stations in Southern Germany increase their gasoline margins by 1.2 c/l and their diesel margins by 2.4 c/l. Higher per capita income levels in the South, as documented by Gregor and Haucap (2026), may support higher willingness to pay and thus larger margin adjustments. In addition, differences in competitive intensity may contribute to weaker competitive constraints, as the competitive intensity in states in Eastern Germany is lower compared to the intensity in states in Southern or Western Germany. Finally, regional disparities in supply chains and crude oil sourcing, as discussed in Gregor and Haucap (2025), may generate cost heterogeneity that further amplifies regional differences in pricing responses. We further compare hourly intraday price effects and find that margins are lower during the morning hours, particularly between 4 a.m. and noon, and significantly higher from noon to midnight. This finding is consistent with the descriptive evidence and aligns with the institutional design of the reform, which permits only a single daily price increase at noon while allowing unrestricted price decreases.

These findings mirror the mixed international record of Austrian-style fuel price regulations and underscore the importance of the statutory one-year evaluation mandated by the KPAnG. Given the short observation window, our results should be interpreted as preliminary. The mechanical compression of the intraday cycle has been achieved, shifting optimal refuelling to the morning hours. While price patterns become more transparent, we find no indication of price relief for consumers due to the regulation. Instead, retail margins increase, pointing to unintended effects that may leave consumers worse off on average. The heterogeneous response across brand sizes and regions further indicates that any review should also examine distributional effects besides average treatment effects, including the behavior of possible price setting brands. Whether the margin increase persists, erodes as competitive dynamics adjust, or evolves in response to further cost shocks remains an open question for subsequent evaluation.

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