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Three Clocks on a Tax Date: Cost, Posting, and the Measurement of Tax Pass-Through

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Abstract

Temporary fuel-tax cuts are judged by how much of them reaches the pump, and the judge is the change in price around the date in the statute. We show that this date is one of three clocks. The tax is fixed when fuel leaves the warehouse, so a station's paid cost changes with its next delivery; its price changes when it posts. We read the three clocks in every price change at German fuel stations around two cuts and their reversals, in 2022 and 2026. Net of the usual overnight change, more than half of the statutory amount is posted within four hours of midnight in three events, although at midnight no station holds fuel taxed at the new rate: the price follows the next liter, not the liter in the tank. Where a rule confines increases to noon, the restoration was posted the afternoon before. Prices had moved before every event, by a quarter to a half of the statutory amount, after a German announcement and under German posting rules, and no control country removes that movement, so it enters any estimate through the reference period. Against a window of earlier days the measured response to the 2026 cut is 47 percent; against the previous day it is 87 percent, and whether a restoration is passed through more than its cut changes sign in both years. A statute-dated estimate should report its reference period and, where timestamps exist, the share posted at the legal instant.

Keywords: tax pass-through, treatment timing, inventory timing, pricing calendars, retail gasoline

JEL: H22, L13, L81, Q41

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1. Introduction

When fuel prices spike, governments cut fuel taxes for a few months and then restore them. Germany did so in 2022 and again in 2026, when the cut cost about 1.6 billion euros (Monopolkommission, 2026). Whether such a cut reaches drivers is the question on which its justification rests, and the answer is read off the pump around the date in the statute. Research reads it with designs that date the treatment by that statute: a difference-in-differences against France (Fuest et al., 2022; Kahl, 2024b) or Austria (Schmerer and Hansen, 2023), a synthetic control (Dovern et al., 2023), a regression discontinuity at the legal dates (von Waldow and Link, 2026), and the assessments of the ifo tracker and the Monopolies Commission (Gréus et al., 2026; Monopolkommission, 2026). The public reads it on the day: at midnight on June 1, 2022, reporters watched prices fall by the statutory amount (Abrahamczyk, 2022); on September 1, 2022, the afternoon price was set against the previous day's (dpa, 2022); on May 1, 2026, the competition authority reported the fall from April 30 (Bundeskartellamt, 2026b); and the end of the 2026 cut was announced as an increase of 16.7 cents from July 1 (Finanz-Echo, 2026). This paper asks what a price change dated by the statute measures. Our answer is that the date in the statute is only one of three clocks on which a tax change runs.

The first clock is legal: the date in the statute. The second is the cost clock. The German energy tax arises when fuel leaves the tax warehouse, the refinery or tank farm in which it is held untaxed, not when it is sold. Fuel released from the refinery for delivery to stations on the legal date is taxed at the new rate; the fuel already in a station's tank keeps the rate at which it left (Presse- und Informationsamt der Bundesregierung, 2022; Generalzolldirektion, 2026). A station's paid cost therefore changes with its next delivery, on a date that price data do not show. The third is the posting clock, the moment at which a station changes the price on its pump. It follows the routines of the firm and, since April 2026, a statute that allows price increases only at noon. Pass-through is a statement about cost and price (Weyl and Fabinger, 2013). For a seller who prices the next liter, the legal instant is the cost clock; what the statute does not change is the paid cost of the liter in the tank. A regression of prices on the legal date observes the first clock and the third.

None of this is particular to Germany. In 2022 temporary fuel-price measures were enacted across the large economies, in different forms, and where they were evaluated, the yardstick was the

pump price around the date. The United States debated a federal gasoline-tax holiday and several states enacted one; Maryland suspended its motor-fuel tax for a month from March 18 (The White House, 2022; Comptroller of Maryland, 2022). The United Kingdom cut fuel duty by 5 pence per litre from 6 p.m. on March 23 (HM Treasury, 2022). France paid a discount of 15 cents per litre to the firms that release fuel for consumption, from April 1 (Ministère de l'Économie, 2022); Spain required stations to give 20 cents per litre, refunded by the state, from April through December (Comisión Nacional de los Mercados y la Competencia, 2022); Italy set reduced excise rates by decree-law for thirty days from late March (Repubblica Italiana, 2022); Alberta suspended its fuel tax from April 1 (Tombe and Winter, 2022); Japan paid a subsidy to wholesalers from January 27 (Asahi Shimbun, 2022).

The evaluations read the pump price around the date: averages over the holiday in the American states (He and Sun, 2022) and over the spring across East Coast states (Tsvetanov, 2024), the duty cut at six o'clock and the supermarkets' immediate reductions in Britain (Competition and Markets Authority, 2022), the first months in Spain (Comisión Nacional de los Mercados y la Competencia, 2022). The clocks show through. The British authority recorded that duty is charged when fuel leaves the refinery and that stations still held fuel bought at the old rate when the cut took effect (Competition and Markets Authority, 2022). France let the firms sell discounted fuel from March 27 so that stations could hold it on April 1, moving the cost clock ahead of the legal one for the stations resupplied in time (Ministère de l'Économie, 2022). Posting rules exist elsewhere too: Austria has allowed price increases only at noon since 2011 (Republik Österreich, 2010), Western Australia fixes each day's prices for twenty-four hours (Government of Western Australia, 2026), and China adjusts its retail fuel prices every ten working days (China.org.cn, 2013).

We read the three clocks in four events: the cuts of June 2022 and May 2026 and the restorations of September 2022 and July 2026. The four share one statutory amount, 16.71 cents per liter of diesel with value-added tax. The data are the price reports of all German fuel stations, between 14,867 and 14,970 stations per event, each with the second at which the pump price changed. Two features of 2026 let us read the posting clock apart from the legal one: a rule that allows price increases only at noon, and a public holiday on which one retailer, the textile firm Trigema, does not post prices.

The three clocks give three questions, and the paper answers each in turn. First, do pump prices

move at the legal instant, when no station’s paid cost has changed? If they do, the price follows the next liter, not the liter in the tank (sections 4.1 and 4.2). The answer is yes. The response to a tax date is not one movement (Figure 1, Table 1, Figure 2). Net of the usual overnight change, 57, 54, and 72 percent of the statutory amount are posted in the four hours around midnight at the June 2022 cut, the September 2022 restoration, and the May 2026 cut, although at midnight no station holds fuel taxed at the new rate. By 00:15, 20, 19, and 49 percent of all stations have moved by at least half the statutory amount, and the stations of the largest chain move in one common second, about two minutes after midnight. Fuel taxed at the new rate leaves the warehouses only from midnight, so for these moves to rest on it the stations would have had to be resupplied within minutes of midnight.

Second, when a rule or a calendar fixes the hour at which a station may post, does the response move with it, in both directions (section 4.3)? Yes, and which clock a station follows depends on the firm: Aral, the retail brand of BP in Germany (bp, 2026), moves about two thousand stations in one second, while Trigema moves on its next opening day. At the July 2026 restoration almost nothing is posted around midnight. The increase, 88 percent of the statutory amount, is posted on the afternoon of June 30, in the last hours in which the noon rule allowed it, so the pump price rose by most of the tax half a day before the tax did. On the holiday of May 1, 2026, the displacement runs the other way at one firm (Figure 3). Inland stations in Baden-Württemberg change diesel by -14.2 cents, Trigema’s stations post nothing, and at 09:13 the next morning its first station posts a change of -9.0 cents.

Third, when pass-through is measured as the price change around the legal date, what does the measured number contain, and how much does it depend on the reference level that is subtracted (section 4.4)? It contains two things: what stations posted around the date, and where the price already stood before it. Prices had moved before every event: on the day before each legal date the national price stood between a quarter and a half of the statutory amount above its pre-window level (Table 1), which works against a measured cut and for a measured restoration. That movement followed a German announcement under German posting rules, so a control country does not difference it out; it enters any design through the reference period the researcher chooses. Measured against the pre-window, the response to the May 2026 cut is 47 percent of the statutory amount; measured against the previous day, it is 87 percent. For the restorations the ordering

reverses, so whether a restoration appears to be passed through more than its cut changes sign in both years, with the same prices (Figure 4).

This matters because the difference between a tax cut and its reversal is read as evidence on incidence, and the readings disagree. Benzarti et al. (2020) show that prices respond twice as much to increases in value-added tax as to decreases, an asymmetry that persists for years after the change. For fuel, Doyle and Samphantharak (2008) find that 70 percent of a suspended gasoline tax and 80 to 100 percent of its reinstatement were passed through. For the German rebate of 2022, Schmerer and Hansen (2023) find the opposite ordering against Austria, slightly more than full pass-through at the introduction and 66.8 percent for gasoline at the withdrawal, and call the asymmetry surprising, while they regard their diesel estimate at the withdrawal as distorted by other factors. Frondel et al. (2026) find that pass-through of that rebate fell from 96 percent on average to 46 percent in its final month for diesel.

Outside Germany the same designs serve the 2022 measures: Tsvetanov (2024) estimates an average pass-through of 79 percent across East Coast states from daily city prices, Drolsbach et al. (2023) find full shifting in the aggregate for France, Italy, and Germany from daily chain prices, and Jiménez et al. (2025) find that 73.65 percent of Spain’s diesel discount reached the pump, from weekly prices against EU countries without a measure. Montag et al. (2020) use every price change at German and French stations around Germany’s 2020 value-added-tax cut and find pass-through that is fast and incomplete. The Monopolies Commission judged the 2026 rebate largely but not fully passed on, and called its own estimate an upper bound, because surcharges and price reactions that followed the announcement receded when the cut took effect (Monopolkommission, 2026). We do not re-estimate these studies, and we do not resolve the disagreement. We locate it: both orderings are obtained from the same prices by the choice of reference period alone, and we measure, in event time, the movement that a reference period has to absorb. Before it is a disagreement about incidence, it is one about reference periods.

We join work on fuel-tax incidence, which stresses supply conditions and inventories upstream (Marion and Muehlegger, 2011) and the point at which the tax is collected (Kopczuk et al., 2016), with work on price setting, in which posted prices follow the rules of firms rather than a continuous reading of cost (Nakamura and Steinsson, 2008; Eichenbaum et al., 2011; DellaVigna and Gentzkow, 2019); we do not test whether prices rise faster than they fall (Bacon, 1991; Peltzman, 2000).

Three implications follow, for the measurement of pass-through, for the design of a tax change, and for rules on the timing of price changes; section 5 draws them.

2. Setting, data, and measurement

The tax rule is the same in both years. Under section 8 of the Energy Tax Act the tax arises when fuel leaves the tax warehouse (Steuerlager), a refinery or tank farm under tax suspension, not at the retail sale (EnergieStG, 2026; Presse- und Informationsamt der Bundesregierung, 2022), so fuel reaches a station already taxed. For 2022 the federal government stated this in answer to a parliamentary question,¹ and for 2026 the customs administration drew the consequence: the time of sale at the station is not the governing moment, fuel sold in the first days after the cut may still have been taxed at the original rate, and fuel sold after July 1, 2026, may still carry the reduced rate.² Station stocks were not revalued in 2026. What differs between the years is not the tax but a rule on posting, in force since April 1, 2026, which the next paragraph describes.

Four events share one diesel base of 14.04 cents per liter, 16.71 cents with value-added tax. The June 2022 and May 2026 cuts lower it, and the September 2022 and July 2026 restorations put it back. May 1, 2026, is a Friday and a public holiday in Baden-Württemberg. From April 1, 2026, the rule allows a posted increase only at noon, and the last noon before July 1 is noon on June 30; the same rule has applied in Austria since 2011 (Republik Österreich, 2010). The 2026 cut was announced on April 23, 2026, the last day of the May pre-window, and the 2022 cut was passed about ten days before June 1 (Monopolkommission, 2026; Frondel et al., 2026). We give an overview of the four events in Appendix Table B.6.

A report is a change in the posted pump price. The firms that operate stations or set their prices must report each change in real time to the Market Transparency Unit for Fuels at the Bundeskartellamt, which releases the data through licensed consumer-information services (Bundeskartellamt, 2026a).³ The reports cover January 2022 through September 11, 2022, and January 2025 through August 27, 2026. We take the last valid report at or before a clock as the clock price, and we drop

¹“Der Kraftstoff wird nicht erst mit dem Verkauf an der Tankstelle versteuert, sondern bereits mit der Entnahme aus Raffinerie oder Tanklager.” Fuel is taxed when it leaves the refinery or tank farm, not at the sale. Presse- und Informationsamt der Bundesregierung (2022).

²The tax arises when fuel leaves the warehouse, not at the sale. Station stocks are not revalued, and fuel sold after July 1, 2026, may still carry the reduced rate. Generalzolldirektion (2026).

³The archive used here is the one distributed by Tankerkönig, one of those services (Tankerkönig, 2026).

a report whose diesel price lies below half a euro or above three euros per liter, the screen used by Kahl (2024b).⁴

Trigema operates three public stations beside its factory stores, in Burladingen, Rangendingen, and Altshausen (Appendix Figure E.7). In interviews the firm has said that the pump price is the purchase price plus a fixed amount and that the price changes with deliveries (Reutlinger General-Anzeiger, 2026; Business Insider Deutschland, 2022). The firm declined to share delivery records, so the rule cannot be checked; on three legal dates its first post falls on the date itself, which a historical-cost pricer does only if a delivery arrives that day. What the holiday identifies is the posting calendar, whichever rule the firm follows. Across 883 posted-price events from January 3, 2025, through August 27, 2026, none falls on a Sunday and none falls on a public holiday. The data do not show who enters a price, the station or the firm’s office. Since April 2026, 32 percent of Burladingen’s posts have another Trigema site posting within one second, which indicates a common system or instruction. Burladingen and Rangendingen move together on large steps (Appendix Table E.20).

The legal instant is midnight at the start of the legal date, and the statutory amount in every percent below is 16.71 cents per liter of diesel. The pre-window baseline is the mean daily price on the earlier days named in the note to Figure 1. The eve baseline is the price two days before the legal date, so a noon-rule afternoon is not inside it, and the day-before baseline is the price on the calendar day before.

To count how many stations have adapted to the new rate by a given hour, we say that a station has arrived at that hour if its price, relative to the same clock on the eve, has moved by at least half the statutory amount in the direction of the statute and stays there for the next three hours. A price counts only if the report is at most seven days old, and the three Trigema stations (Appendix Table E.14) are exempt, because a held price produces no report and Burladingen held one diesel price from August 24 to September 1, 2022. The national sample is every German station with a counted price at the hours used, 14,968 stations on the June 2022 cut and 14,970 on the September 2022 restoration. The two 2026 events have 14,877 and 14,867 stations.

⁴Every report carries a diesel price, whichever fuel changed. In the days the four event panels read, 7,122 of 35,801,451 reports, 0.02 percent, carry a diesel price outside the screen.

The balanced panel omits at most 1.2 percent of the stations with a counted price at 02:00, and the shares by 02:00 without the balance requirement are within 0.2 points of the balanced ones (Table 3). The inland comparison is in Baden-Württemberg, the federal state in the south of Germany on the borders with France and Switzerland: stations more than fifty kilometers of driving from every Trigema site and outside districts on an international border, 1,099 stations on April 30, 2026. Border districts are dropped because retailing infrastructure differs near an international border, as documented for another German border: at the German–Polish border, station density falls and the share of premium brands rises as the border approaches (Kahl, 2024a).

3. Framework

A station sells from a tank, and two cost concepts can govern its price. Under historical-cost pricing, the price is the tax-inclusive cost paid for the liter in the tank plus a margin, and it changes when the tank is refilled with fuel taxed at the new rate. Under replacement-cost pricing, the price is the cost of the next liter plus a margin, and it changes at the legal instant, because from midnight the next liter leaves the warehouse at the new rate. The second rule is pricing at opportunity cost, which electricity generators applied to emission permits they had received free of charge (Fabra and Reguant, 2014) and which the German fuel industry says it applies (en2x — Wirtschaftsverband Fuels und Energie, 2026). The two rules predict the same direction and different clocks: at the legal instant a replacement-cost pricer moves by the statutory amount and a historical-cost pricer does not move until delivery. Figure 1, Panel A, draws the two rules and the posting calendar on one time axis.

Both rules act through posting. A station posts on its own calendar, and since April 2026 an increase may be posted only at noon. A seller who expects a cost increase at midnight and may raise prices only at noon chooses between the last noon before midnight and the first after it; the first choice sells twelve hours at the new price on old-tax stock, the second forgoes them. A retailer that does not post on a holiday moves at its next opening, whichever cost rule it follows (Figure 1, Panel A).

We write the mean price change dated by the statute as

$$\begin{aligned}\mathbb{E}[\Delta P] &= \Pr(S = 1, O = 1) \mathbb{E}[\Delta A + \Delta m \mid S = 1, O = 1] \\ &\quad + \Pr(S = 0, O = 1) \mathbb{E}[\Delta m \mid S = 0, O = 1].\end{aligned}\tag{1}$$

where $S = 1$ if the pricing-relevant liter carries the new rate, $O = 1$ if the station posts, and $m = P - A$ is the accounting margin over the paid cost A of the liter in the tank. At the legal instant $\Pr(S = 1) = 0$: stock was not revalued, and a liter taxed at the new rate has not left the warehouse. What remains is the share of stations that post, times their movement relative to paid cost. Under replacement-cost pricing, that movement is the pass-through of the change in the cost of the next liter; under historical-cost pricing, it is zero.

The daily price cycle, an Edgeworth cycle of a few large increases and many small cuts (Noel, 2007; Kahl and Wein, 2025), moves prices at every clock, which is why the decomposition below measures each clock against the same clock on earlier days. The baseline a study subtracts is not in the equation; what it absorbs is the empirical question of section 4.4.

4. Results

4.1. *The response is not one movement*

The first question is whether prices move at the legal instant, and the first step is to see where in time the response sits. The response to a tax date is not one movement, because the price had already left its earlier level before the legal date. On the day before, the national diesel mean stood 4.9, 7.5, 6.6, and 11.6 cents per liter above its pre-window level, and the July day already contains the afternoon of June 30 (Figure 1; the series is in Appendix Table F.24). We do not attribute the earlier movement to cost, anticipation, or conduct. Anticipation is familiar from the literature on tax changes (Coglianese et al., 2017), and the Monopolies Commission reads part of the 2026 movement that way (Monopolkommission, 2026).

Net of the usual overnight change, stations post 57, 54, and 72 percent of the statutory amount in the four hours around midnight at the June 2022 cut, the September 2022 restoration, and the May 2026 cut (Table 1; inland rows in Table 2, May 2026 at other clocks in Appendix Table F.25). At the July 2026 restoration that part is 3 percent, because stations had posted the increase, 88

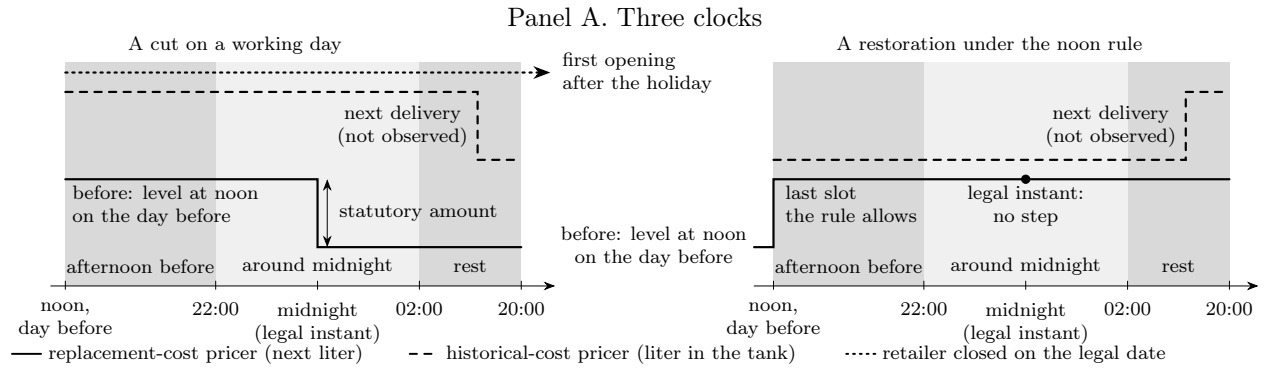


Figure 1: Three clocks, and diesel prices around four tax dates.

Notes: Panel A: calendar time runs to the right; the legal instant is midnight at the start of the legal date. The three paths are the two cost rules of section 3 and a retailer closed on the legal date. The shaded bands are the windows of Table 1. Panel B: National mean of the duration-weighted diesel price from 08:00 to 20:00, minus the mean of that series on the pre-window days, in cents per liter. The pre-window is May 23–27, 2022, August 22–26, 2022, April 17–23, 2026, and June 22–26, 2026. The dashed line is the statutory amount, 16.71 cents per liter, signed with the direction of the statute. The dotted line marks the legal date.

Table 1: Where in time the response sits, in percent of the statutory amount of 16.71 cents per liter.

Event	Before	Afternoon before	Around midnight	Rest of the legal day	Total by 20:00	Stations
June 2022 cut	-28.9	-11.3	57.2	13.5	30.5	14,930
September 2022 restoration	46.5	4.0	54.5	-9.8	95.2	14,949
May 2026 cut	-27.1	-19.1	71.7	17.5	43.0	14,863
July 2026 restoration	30.2	88.4	2.8	14.9	136.4	14,855

Notes: National diesel panel. Each position is the price at a clock minus the mean price at the same clock on the pre-window days, so each part is net of the usual change between its two clocks. Entries are signed in the direction of the statute. Before is the position at noon on the previous day. Afternoon before is 12:00 to 22:00 that day. Around midnight is 22:00 to 02:00. The rest of the legal day is 02:00 to 20:00. Total by 20:00 is the position at 20:00 on the legal date. Parts may not add to the total because of rounding. Counts are 14,930, 14,949, 14,863, and 14,855 stations.

Table 2: Where in time the response sits, inland Baden-Württemberg.

Event	Before	Afternoon before	Around midnight	Rest of the legal day	Total by 20:00	Stations
June 2022 cut	-32.8	-15.5	65.2	6.4	23.3	1,046
September 2022 restoration	46.0	6.4	53.4	-5.1	100.8	1,032
May 2026 cut	-4.9	-19.5	73.3	12.4	61.3	1,088
July 2026 restoration	28.2	97.1	2.8	7.9	135.9	1,079

Notes: Inland diesel panel, stations more than fifty kilometers of driving from every Trigema site, outside districts on an international border. Columns match Table 1. Entries are percent of 16.71 cents per liter, signed in the direction of the statute. Parts may not add to the total because of rounding. Counts are 1,046, 1,032, 1,088, and 1,079 stations.

percent of the statutory amount, on the afternoon of June 30.⁵ The before column, the position at noon on the previous day, is -29 and -27 percent before the two cuts and 46 and 30 percent before the two restorations. The total by 20:00, which is what a coefficient dated by the statute reports against a pre-window, is 31 and 43 percent for the two cuts and 95 and 136 percent for the two restorations. We do not read those totals as pass-through: the before column lowers each cut and raises each restoration. Read on the three clocks, the columns say this. Stations post the around-midnight parts at the legal instant, when no station's paid cost has changed, which is the first question. The afternoon-before part of July 2026 is the posting clock under the noon rule, the second. The before column is the movement that any reference period has to absorb, the third.

⁵The around-midnight part is the change from 22:00 to 02:00 net of the same-clock change on the pre-window nights, so a night on which prices are held rather than cut as usual shows a positive part without any increase. Not every station waited for noon, either. Of the balanced panel, 12 stations, 11 of them being one regional chain posting at two shared seconds, raised diesel by 17.0 cents between 00:07 and 01:44 on July 1, when the rule allows no increase; none reversed an earlier cut. They are the July 2026 entries of Table 3.

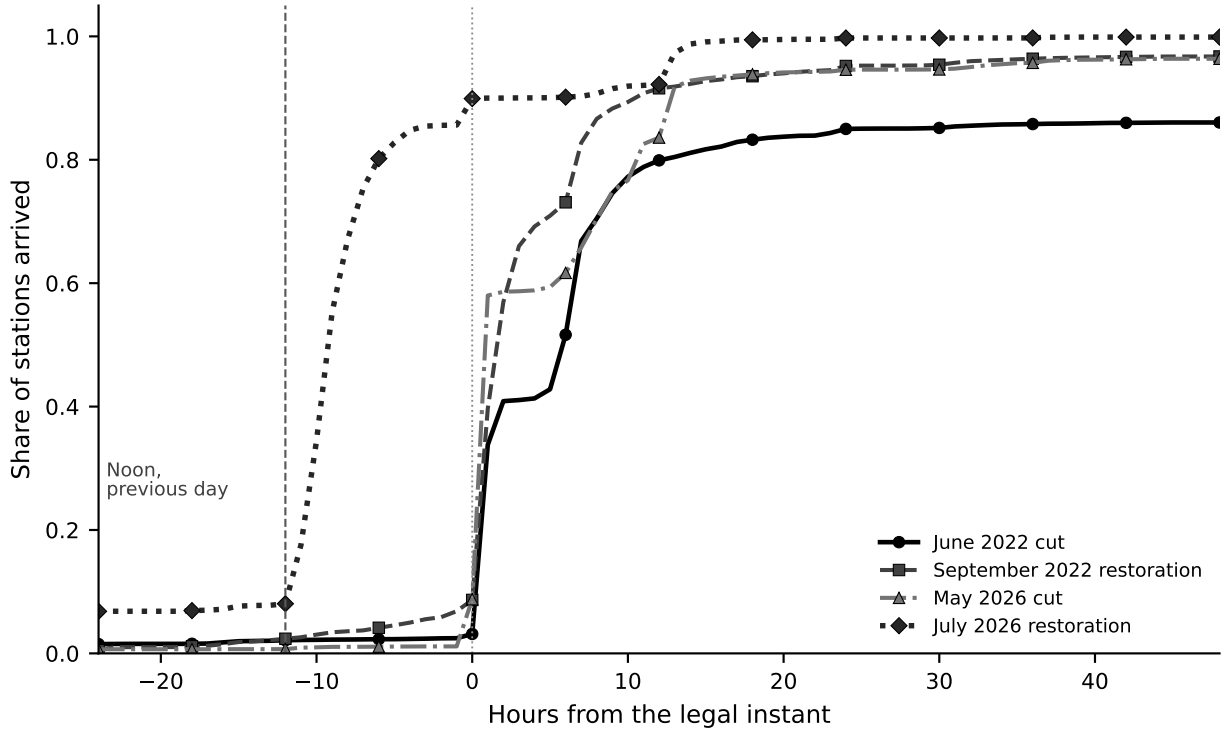


Figure 2: Stations arrived, by hour from the legal instant.

Notes: Cumulative share of stations in the national balanced panel that have arrived, as defined in section 2. Time zero is midnight at the start of the legal date. The dashed line is noon on the previous day. Sample sizes are 14,968, 14,970, 14,877, and 14,867 stations.

4.2. The legal instant

Arrival rises after midnight in the three midnight events and is already high before midnight at the July 2026 restoration (Figure 2). By 00:15, 20, 19, and 49 percent of stations have moved by at least half the statutory amount on the June 2022 cut, the September 2022 restoration, and the May 2026 cut. For the moves by 00:15 to rest on fuel taxed at the new rate, those stations would have had to be resupplied within fifteen minutes of midnight. By 02:00 the shares are 47, 53, and 67 percent. No placebo night has a share at 00:15 as large; the placebo nights are the same weekday in the other weeks of the data span, 28, 27, and 73 of them for the three events. By 23:55, 0.4, 1.8, and 7.7 percent of stations have already moved. In May 2026 the brand with the most first posts in the 23:00 hour is ESSO, 1,058 stations at 23:48:52, eleven minutes before the legal instant.

Aral's stations post at one second in all three events: 1,991 of 2,247 at 00:02:09 on the June 2022 cut, 2,222 of 2,239 at 00:02:11 on the September 2022 restoration, and 2,149 of 2,165 at 00:02:02

Table 3: Share of stations moved, by minutes after the legal instant.

Event	23:55	00:05	00:15	00:30	01:00	02:00
June 2022 cut	0.4	16.9	19.5	22.2	32.5	47.4
September 2022 restoration	1.8	17.8	19.5	21.7	34.6	52.8
May 2026 cut	7.7	38.5	49.0	63.9	66.4	67.1
July 2026 restoration	0.0	0.0	0.1	0.0	0.0	0.1

Notes: Percent of the balanced national panel. A station counts if its diesel price differs from its 22:00 price on the previous day by at least half the statutory amount, in the direction of the statute. The price at a minute is the last report at or before that minute, and it counts only if the report is at most seven days old. The sample is the stations with a counted price at every full hour from three days before the legal date through three days after. Parts of a row are cumulative shares, not increments. Without the balance requirement, the shares by 02:00 are 47.2, 52.8, 66.9, and 0.1 percent.

on the May 2026 cut.⁶ Shell’s do the same, about an hour after midnight in 2022 and in the same second as Aral in 2026: 1,573 of 1,738 at 01:01:12, 1,683 of 1,733 at 01:01:16, and 1,628 of 1,665 at 00:02:02 (Appendix Table C.11). Other chains post at seconds of their own, some of them hours later (Appendix Table C.12 and Appendix Figure C.6). A delivery is an event at one station. For a post at a common second to rest on fuel taxed at the new rate, every station that posts at that second would have had to be resupplied between midnight and that second. Between 89 and 99 percent of Aral’s stations and between 92 and 99 percent of Shell’s post at their chain’s common second. Within an hour of midnight, those stations behave as replacement-cost pricers.

For a station that moves between 00:15 and 02:00 at no such common second, a delivery after midnight cannot be excluded. From 22:00 to 02:00 the national diesel mean changes by -6.4, 9.8, and -11.3 cents per liter on the three midnight events, outside the range of the same-weekday placebo nights. None of the 28, 27, and 73 placebo nights matches that overnight change, and none of the 74 matches the July 2026 one (Appendix Table C.9). Appendix Table C.8 reports the 08:00 counts, and Appendix Table G.26 their robustness and that of arrival (Appendix Table C.10). Stations closed at night cannot post. Among stations that reported price changes at night in the two weeks before the event, the shares by 02:00 are 45 and 66 percent in 2022, above the shares for all stations; in 2026 that group has only 604 and 584 stations, because night-time reports became rare after the noon rule took effect, and its composition differs, so we do not read its shares (Appendix Table C.7 and Appendix Figure C.5). By 08:00 on the legal date, 70 and 70 percent of stations have moved

⁶The chain counts differ across events because each event has its own balanced panel (section 2) and because brand strings change between 2022 and 2026 as stations open, close, or change brand. Appendix Table C.12 lists the counts by brand.

by at least half the statutory amount at the two cuts, and 87 and 91 percent at the two restorations (Appendix Table C.7). This answers the first question: prices move at the legal instant, and within the first hour the price follows the replacement cost of the next liter, not the paid cost of the liter in the tank.

4.3. The posting clock

The second question is whether the response follows the posting clock when a rule or a calendar fixes it. The noon rule moved the July 2026 increase off the legal date and onto the afternoon of June 30. Figure 3, Panel A, shows that afternoon against the three earlier Tuesdays; the placebo range is in Appendix Table C.9. By 18:00 on June 30, 80 percent of stations had moved by at least half the statutory amount (Appendix Table C.7). At 08:00 the Super E5 price has moved by 80 and 56 percent of its own statutory amount on the two cuts and by 80 and 92 percent on the two restorations, so the timing is not special to diesel (Appendix Table G.27).

Trigema does not post on a Sunday or a public holiday (Appendix Table E.15), so on May 1, 2026, it cannot move when the inland stations can. This is a test of the posting clock within one firm. On the three working-day events Burladingen's first post in the direction of the statute falls on the legal date: 14:13 on June 1, 2022, 09:26 on September 1, 2022, and 12:05 on July 1, 2026 (Appendix Figure E.8 and Appendix Table E.18). If the calendar did not bind, May 1 would look the same, and the gap between Trigema and the inland stations would not close on that day. It closes. The gap between Burladingen and the inland mean is -18.6 cents per liter on April 30, -4.4 cents on May 1, and -14.4 cents on May 2, after the first post at 09:13 (Figure 3, Panel B; Appendix Table E.17). In the window from April 9 to June 30, 2026, 83 days, the May 1 closing is the largest one-day increase of that gap and the May 2 reopening is the largest decrease (Appendix Table E.19). The test identifies the calendar, not the cost rule. It also narrows the rule: on the three working-day dates Trigema posted on the legal date itself, so either it was resupplied with fuel taxed at the new rate on each of those days or its price does not follow its paid cost. In both directions, then, the response moved with the posting clock: forward by half a day under the rule, back by a day under the calendar.

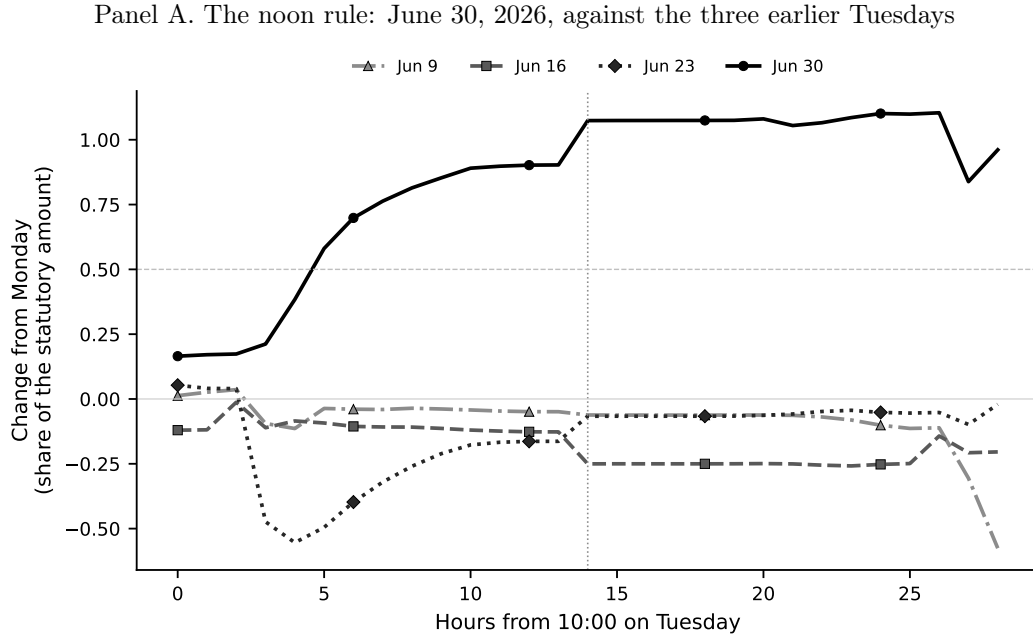
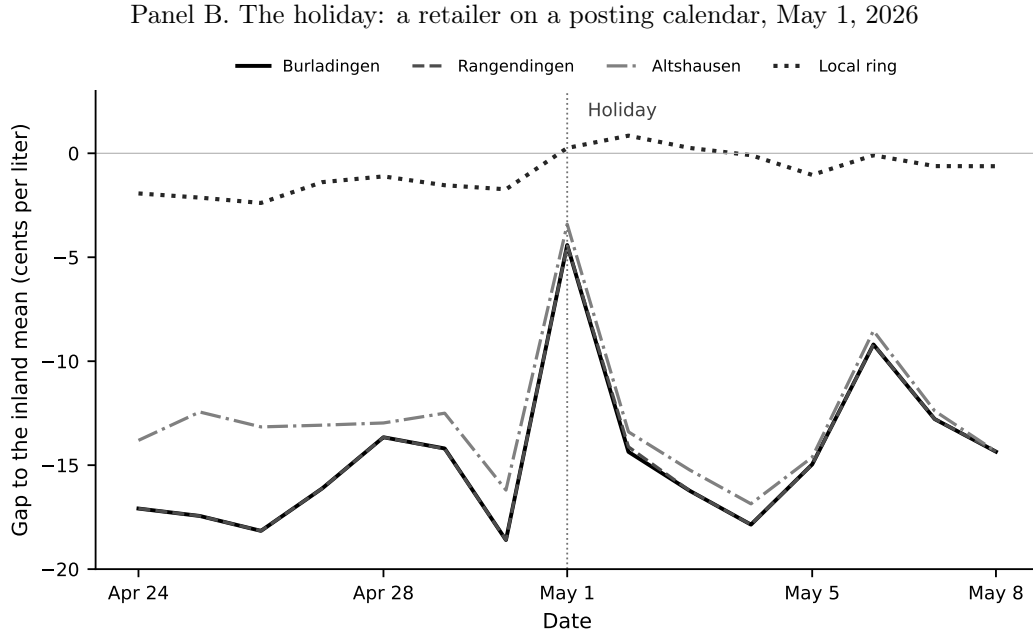


Figure 3: The posting clock moves the response, in both directions.

Notes: Panel A: National diesel path on June 30, 2026, against the three earlier Tuesdays. The share of stations holding the 13:00 price to 20:00 on each of the four days is in Appendix Table D.13, and the change from 12:00 to 22:00 on June 30 against the Tuesday placebos is in Appendix Table C.9. Panel B: Gap between each Trigema station, and the local ring, and the inland Baden-Württemberg mean of the duration-weighted diesel price from 08:00 to 20:00, in cents per liter. The local ring is five to twenty kilometers away. The dotted line marks May 1, 2026, a public holiday. The Burladingen and Rangendingen lines coincide on most days (Appendix Table E.16).

4.4. What a statute-dated coefficient picks up

The third question is what a coefficient dated by the statute measures. Any estimate dated by the statute subtracts a reference level: a pre-window mean, the price on the day before, or the pre-period of a difference-in-differences, an event study, or a synthetic control. A control country removes what the two countries share, the price of crude, refining margins, and the calendar. It does not remove what is German: the announcement of April 23, 2026, the posting rules, and the move at noon on June 30. That is the before column of Table 1, and it is why the reference period matters here with or without a control.

Figure 4 traces the response to each event against every reference day from one to ten days before it. Against the day before, the response to the May 2026 cut is 87 percent of the statutory amount; against the pre-window it is 47 percent. For the July 2026 restoration the two figures are 59 and 128 percent, because the day before already contains the afternoon of June 30. The literature reads the difference between a restoration and its cut as evidence on incidence (section 1), so we compute that difference under each reference day. It is -16 and -28 percentage points in 2022 and 2026 against the day before, and 59 and 81 against the pre-window (Appendix Tables F.21, F.22, and F.23; the inland rows show the same pattern). Read as the literature reads it, a positive difference says that a restoration is passed through more than its cut and a negative one says the reverse; here the sign turns on the reference day alone, with the events, the stations, and the prices held fixed. In 2022 the difference is within half a point of zero against the second and third day before and positive from the fourth; in 2026 it is positive from the second. The reversal is a consequence of the reference day, not of sampling: station bootstrap standard errors in Table 1 and Appendix Table F.22 are at most 0.4 percentage points; clustered by brand, 1,337 to 1,421 clusters, they are 8.4 to 12.0 points on the around-midnight pieces, because the large chains post together, and at most 3.9 points on the differences (Tables 4 and 5).

The reference period alone can produce both orderings in the literature from these prices. A difference-in-differences with a week of pre-period, as in Schmerer and Hansen (2023), carries that week's movement into its estimate unless the control country moved the same way, and the Monopolies Commission calls its own 2026 estimate an upper bound for this reason (Monopolkommission, 2026). We do not claim to explain any one of those estimates. What the decomposition adds is the size of the movement, in event time, that a reference period has to absorb: a quarter to a half of

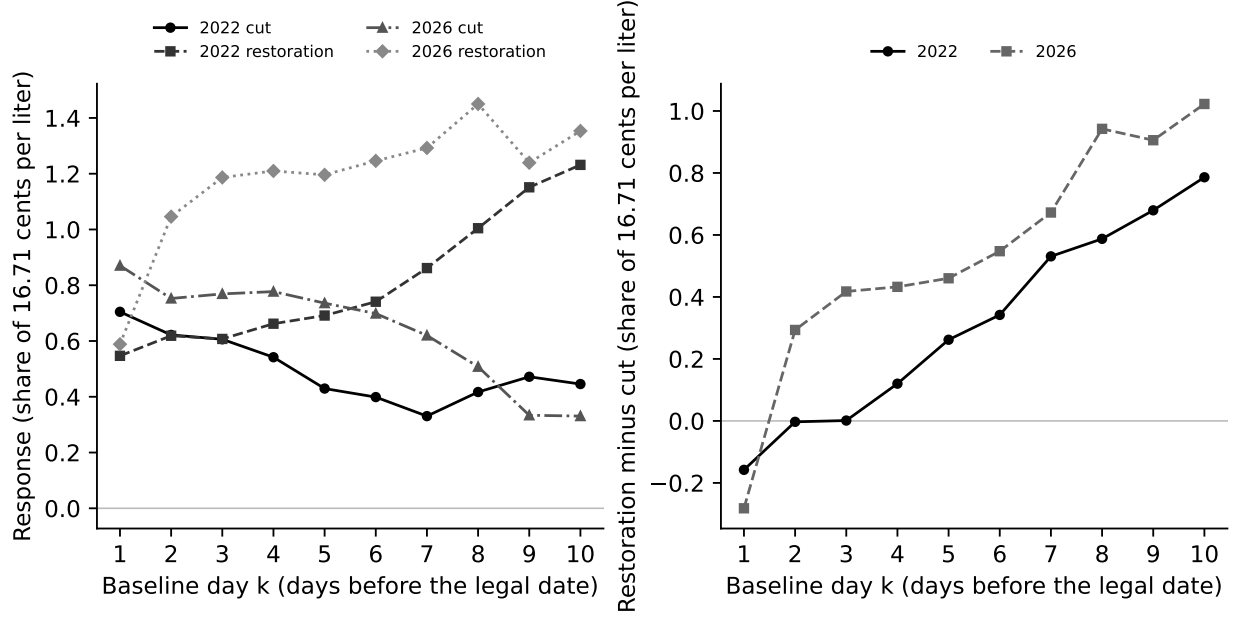


Figure 4: The response against each earlier reference day.

Notes: For each event and each reference day k , the response is the sign of the statute times the national duration-weighted diesel mean from 08:00 to 20:00 on the legal date, minus the same mean k days earlier, divided by 16.71 cents per liter. The left panel is the four events. The right panel is the restoration minus the cut of the same year.

the statutory amount in these four events. That answers the third question: the coefficient reads the posting clock, and what remains of it is the reference period.

5. Implications and limits

Three things follow for the measurement of pass-through. An estimate dated by a statute should state its reference period, because a control country removes shared cost shocks and not the treated country's own movement before the date; here that movement is a quarter to a half of the statutory amount. Where timestamps exist, the share of the response that stations post at the legal instant is a statistic that a daily series cannot deliver, and it separates what follows the statute from what can have followed a delivery. And any rule on when prices may change belongs in the design, because a discontinuity at the legal date estimates what stations post at the legal instant, which under a noon rule can be almost nothing, stations having posted the response the afternoon before.

The findings also bear on the design of a tax change. Because Germany levies the tax upstream and does not revalue station stocks, a station that posts the new price at midnight sells old-tax fuel at the new price: it gives up the tax difference on its stock at a cut and collects it at a restoration.

Table 4: Bootstrap standard errors for the timing decomposition.

Event	Component	Estimate	Station SE	Station 2.5–97.5	Brand SE	Brand 2.5–97.5
E1	Before	-0.2894	0.0021	[-0.2933, -0.2852]	0.0100	[-0.3077, -0.2694]
E1	Afternoon before	-0.1129	0.0027	[-0.1181, -0.1074]	0.0717	[-0.2640, -0.0172]
E1	Around midnight	0.5722	0.0044	[0.5632, 0.5805]	0.1195	[0.3116, 0.7761]
E1	Rest of the legal day	0.1352	0.0040	[0.1271, 0.1434]	0.0876	[-0.0143, 0.3171]
E1	Total by 20:00	0.3052	0.0019	[0.3012, 0.3091]	0.0081	[0.2904, 0.3217]
E2	Before	0.4645	0.0016	[0.4614, 0.4676]	0.0106	[0.4462, 0.4876]
E2	Afternoon before	0.0396	0.0019	[0.0358, 0.0433]	0.0154	[0.0145, 0.0714]
E2	Around midnight	0.5450	0.0037	[0.5382, 0.5528]	0.0852	[0.3642, 0.6804]
E2	Rest of the legal day	-0.0975	0.0043	[-0.1065, -0.0892]	0.0895	[-0.2405, 0.1041]
E2	Total by 20:00	0.9516	0.0022	[0.9473, 0.9560]	0.0103	[0.9339, 0.9742]
E3	Before	-0.2710	0.0026	[-0.2762, -0.2659]	0.0246	[-0.3127, -0.2168]
E3	Afternoon before	-0.1911	0.0018	[-0.1946, -0.1873]	0.0101	[-0.2124, -0.1739]
E3	Around midnight	0.7174	0.0038	[0.7100, 0.7244]	0.0844	[0.5303, 0.8412]
E3	Rest of the legal day	0.1751	0.0039	[0.1678, 0.1827]	0.0738	[0.0636, 0.3423]
E3	Total by 20:00	0.4304	0.0025	[0.4251, 0.4351]	0.0197	[0.3906, 0.4666]
E4	Before	0.3024	0.0017	[0.2990, 0.3058]	0.0135	[0.2771, 0.3294]
E4	Afternoon before	0.8839	0.0034	[0.8775, 0.8905]	0.0542	[0.7977, 1.0051]
E4	Around midnight	0.0282	0.0006	[0.0271, 0.0294]	0.0024	[0.0232, 0.0322]
E4	Rest of the legal day	0.1492	0.0033	[0.1420, 0.1552]	0.0568	[0.0154, 0.2324]
E4	Total by 20:00	1.3636	0.0022	[1.3591, 1.3678]	0.0176	[1.3322, 1.3980]

Notes: National diesel. Each entry is a share of 16.71 cents per liter, signed in the direction of the statute. Columns match Table 1. The station standard error resamples stations with replacement. The brand standard error resamples the brand string as stored, and a station with a blank brand string is its own cluster. Each standard error is the standard deviation across 1,000 draws. The interval is the 2.5 and 97.5 percentiles of the same draws. Brand clusters number 1,403, 1,421, 1,343, and 1,337.

Table 5: Bootstrap standard errors for a cut against its restoration.

Year	Baseline	Component	Estimate	Station SE	Brand SE
2022	pre	cut	0.4097	0.0019	0.0098
2022	pre	rest	0.9976	0.0019	0.0102
2022	pre	diff	0.5879	0.0027	0.0142
2022	eve	cut	0.6218	0.0022	0.0127
2022	eve	rest	0.6191	0.0018	0.0077
2022	eve	diff	-0.0027	0.0028	0.0149
2022	day	cut	0.7048	0.0021	0.0124
2022	day	rest	0.5470	0.0018	0.0072
2022	day	diff	-0.1578	0.0028	0.0143
2026	pre	cut	0.4735	0.0024	0.0260
2026	pre	rest	1.2832	0.0021	0.0197
2026	pre	diff	0.8097	0.0032	0.0326
2026	eve	cut	0.7533	0.0021	0.0276
2026	eve	rest	1.0466	0.0019	0.0198
2026	eve	diff	0.2933	0.0028	0.0340
2026	day	cut	0.8706	0.0020	0.0340
2026	day	rest	0.5887	0.0016	0.0195
2026	day	diff	-0.2819	0.0026	0.0392

The standard error on each difference is the square root of the sum of the squared cut and restoration standard errors from the same bootstrap scheme. *Notes:* National diesel means, as shares of 16.71 cents per liter. Columns match Appendix Table F.22. The two bootstraps are defined in the note to Table 4.

Floor-stocks provisions exist to remove exactly this difference, by charging or refunding the tax change on goods held on the date (Internal Revenue Service, 2001); the United States does so for fuel held by dealers but not for retail stocks at the place of sale (United States Code, 2026), and Germany did not adjust station stocks in either year (Generalzolldirektion, 2026). Two countries met the same problem in 2022 from opposite sides: the British competition authority recorded stations still holding fuel bought at the old duty when the cut took effect (Competition and Markets Authority, 2022), and France paid its discount to the firms that release fuel for consumption and let them sell discounted fuel five days early, so that stations could hold it on the date (Ministère de l'Économie, 2022).⁷ Two designs would remove the difference at the pump: revaluing station stocks at the legal instant or dating the tax at the sale. Each has a cost, a stock count at every station on the date or a tax point at the stations instead of the warehouses, and Table 1 says what either would buy. It is the around-midnight column: the fuel sold at the new price in the first hours would carry the new tax, and the difference that a station now gives up at a cut and collects at a restoration would disappear.

⁷The two retail markets also differ in how often prices change: German stations run through about four price cycles a day between 8 a.m. and 10 p.m. (Kahl and Wein, 2025), while French stations changed their prices on average about once a week over 2007 to 2009 (Gautier and Le Saout, 2017).

A rule on when prices may change is also a rule on when a tax change reaches drivers. The noon rule left noon on June 30, 2026, as the last slot at which an increase could be posted before the restoration; stations held that afternoon’s price into the evening at a rate above any of the three earlier Tuesdays, and drivers paid most of the restored tax half a day before it applied. The rule did not stop the increase; it chose its hour. Austria has had the same rule since 2011, and an evaluation over 2005 to 2018 finds that the price reduction associated with it is offset once the accompanying transparency rule is included (Bernhardt et al., 2025); Western Australia fixes each day’s prices for twenty-four hours (Government of Western Australia, 2026). Tax dates are watched by the press and the competition authority, and the data cannot separate that scrutiny from ordinary pricing.

The limits are those of the data. We do not observe deliveries, so we read the cost clock only where it is known, at midnight; we do not say whether or when the part of the statutory amount not posted around midnight is posted later, and for stations that move after the first minutes we cannot exclude a delivery after midnight. The posting-calendar evidence is one retailer and one holiday; it identifies the mechanism, not its frequency. We measure the movement before each event and do not attribute it: four events cannot separate anticipation from cost, and Figure 4 varies the reference day, not the length of a pre-period. What travels is the method, three clocks read from timestamped prices, and the question it puts to any statute-dated estimate: which clock it reads, and against which reference period.

6. Conclusion

Pass-through estimates dated by a statute are read as measures of how much of a tax change reached consumers. In four German fuel-tax events they measure something else first: when stations post. At midnight no station holds fuel taxed at the new rate, yet more than half of the statutory amount is on the pumps within four hours, one chain reprices about two thousand stations in one second, and a rule that confines increases to noon moved a restoration to the previous afternoon, as a holiday moved one retailer’s cut to the next morning. What these prices follow is the statute, which is the cost of the next liter, not the cost of the liter in the tank. The remainder of a statute-dated estimate is the position of the price before the event, which no control country removes and which enters every design through its reference period. That position decides whether a cut appears to be passed through less than its reversal: against a pre-window it does, against the previous day

it does not, in both years.

Three things follow for policy. First, a government that cuts a fuel tax and reads the result off the pump on the legal date is reading the posting clock; whether the cut reached drivers in the weeks that followed is a different question, and the reference period decides its answer. That holds for the holidays, discounts, and duty cuts of 2022 in the United States, the United Kingdom, France, Spain, Italy, Canada, and Japan as much as for Germany. Second, a tax fixed upstream without a revaluation of stocks leaves the tax difference with whoever holds the stock when the price moves, at a cut and again at a restoration; France reduced the difference by releasing discounted fuel before its date, and floor-stocks provisions remove it by charging or refunding the tax on goods held on the date. Third, a rule on when prices may change is a rule on when a tax change reaches drivers: Germany's noon rule brought a restoration forward by half a day, and the rules in Austria and Western Australia fix the hour as well.

Three things would carry the method further. Delivery records would close the one clock we cannot read. Timestamped price reports now exist beyond Germany and Austria; the United Kingdom's Fuel Finder has required a report within thirty minutes of each price change since February 2026 (Department for Energy Security and Net Zero, 2026), so the next tax date there can be read on the legal and the posting clock. And the noon rule is a natural experiment in waiting: it fixes the hour of every increase at every station, and what stations do with a cost shock they can see coming, as on June 30, 2026, is a question about pricing under a common clock that four events cannot settle but that the next ones can.

Data availability

The station-level price reports are collected by the Market Transparency Unit for Fuels at the Bundeskartellamt and released through licensed consumer-information services; the archive used here is Tankerkönig's. The code and derived data that reproduce every exhibit are archived at Zenodo, <https://doi.org/10.5281/zenodo.23474819>.

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Declaration of competing interest

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CRedit authorship contribution statement

Mats Petter Kahl: Conceptualization, Methodology, Software, Validation, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Thomas Wein:** Conceptualization, Methodology, Writing – review & editing.

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Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work, the authors used artificial intelligence tools (Claude (Anthropic), Codex (OpenAI), Grammarly, and Cursor (Anysphere)) to draft and edit the manuscript text, to write, run, and check the analysis code under the authors' specifications, and to check numbers and citations against their sources. After using these tools, the authors reviewed, verified, and edited all text, code, and results as needed, and take full responsibility for the content and integrity of the published article.

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Appendix A. Data construction

This appendix supports section 2 of the main text. A price at a clock is the last report at or before that clock whose diesel price lies inside the screen, half a euro to three euros per liter. The report counts only if it is at most seven days old. A daily mean uses only the part of the window in which the station has such a price. The three Trigema stations are exempt from the seven-day rule in every sample, including the national panels, because a held price produces no new report and Burladingen held one diesel price from August 24 to September 1, 2022. The counts use this exemption. In the September 2022 national panel it keeps two stations that the seven-day screen would otherwise drop. The national arrival sample has a counted price at every full hour from three days before the legal date through three days after: 14,968 stations on the June 2022 cut, 14,970 on the September 2022 restoration, 14,877 on the May 2026 cut, and 14,867 on the July 2026 restoration. The inland comparison drops districts on an international border and stations within fifty kilometers of driving from any Trigema site. On April 30, 2026, that cell has 1,099 stations.

Appendix B. The four events and the tax point

This appendix supports section 2 of the main text. Appendix Table B.6 records the statutory change, the weekday, and the posting rule in force. The customs guidance states that the moment the tax arises governs the rate, for example when fuel is removed from the warehouse, and that the moment of sale at the station does not.⁸ The cut does not apply to fuel already taxed and still in station tanks on the legal date.⁹

Table B.6: The four events.

Legal date	Weekday	Direction	Energy tax (ct/L)	With VAT (ct/L)	Posting rule
1 June 2022	Wednesday	Cut	14.04 diesel; 29.55 gasoline	16.71 diesel; 35.16 gasoline	No rule on the hour of an increase
1 September 2022	Thursday	Restoration	14.04 diesel; 29.55 gasoline	16.71 diesel; 35.16 gasoline	No rule on the hour of an increase
1 May 2026	Friday, public holiday	Cut	14.04, all road fuels	16.71	Cuts any hour; increases only at 12:00
1 July 2026	Wednesday	Restoration	14.04, all road fuels	16.71	Cuts any hour; increases only at 12:00

Notes: Statutory energy-tax change and the same change with the 19 percent value-added tax, in cents per liter. The noon rule, in force from April 1, 2026, allows a posted increase only at 12:00. Cuts are unrestricted.

The close-and-reopen prediction is drawn in Figure 1, Panel A, of the main text: the benchmark posts at the legal instant and a retailer closed on that date posts at its first opening, so in a cut the gap between them narrows at the legal instant and widens at that opening, and in a restoration it moves the other way and then reverses. Under the noon rule the benchmark’s increase can be posted at noon on the previous day.

⁸“Maßgebend für den Zeitpunkt der Anwendung der reduzierten Steuersätze ist der Zeitpunkt der Steuerentstehung [zum Beispiel durch Entfernung aus dem Steuerlager, ohne dass sich ein weiteres Steueraussetzungsverfahren anschließt (§ 8 Abs. 1 Satz 1 EnergieStG)]. Nicht maßgebend hingegen ist der Zeitpunkt des Verkaufs bereits versteuerter Kraftstoffe an den Tankstellen. Dies kann dazu führen, dass Kraftstoff, der in den ersten Tagen nach der Steuersenkung verkauft wird, noch mit dem originären Steuersatz versteuert worden ist. Die Steuersenkung ist somit auf die Restbestände von Kraftstoffen, die sich bereits versteuert noch zum 1. Mai 2026 in den Tanks der Tankstellen befinden, nicht anwendbar. Aus diesem Grund ist eine zollamtliche Bewertung von Restbeständen in den Tanks der Tankstellen auch nicht erforderlich. Umgekehrt kann es auch dazu führen, dass Kraftstoff, der nach dem 1. Juli 2026 an den Tankstellen verkauft wird, noch mit den abgesenkten Steuersätzen versteuert ist.” The tax arises when fuel leaves the warehouse, not at the sale. Station stocks are not revalued, and fuel sold after July 1, 2026, may still carry the reduced rate. Generalzolldirektion (2026).

⁹“Die Steuersenkung ist somit auf die Restbestände von Kraftstoffen, die sich bereits versteuert noch zum 1. Mai 2026 in den Tanks der Tankstellen befinden, nicht anwendbar.” The cut does not apply to remaining stocks of fuel that have already been taxed and are still in station tanks on May 1, 2026. Generalzolldirektion (2026). For 2022 the federal government stated that fuel is taxed when it leaves the refinery or tank farm, not at the sale: “Der Kraftstoff wird nicht erst mit dem Verkauf an der Tankstelle versteuert, sondern bereits mit der Entnahme aus Raffinerie oder Tanklager.” Presse- und Informationsamt der Bundesregierung (2022).

Appendix C. The legal instant

This appendix supports section 4.2 of the main text. The inland panel of the timing decomposition has the same shape as the national panel (Table 2 in the main text). Around midnight is the large column in the three midnight events. The afternoon before the July 2026 restoration is where that increase sits.

Appendix Table C.7 reports the cumulative arrival share at selected hours, for all stations and for night-active stations, and Appendix Figure C.5 plots the night-active series. Stations closed at night cannot post. In 2026 the night-active group is small. Night-time reports became rare after the noon rule took effect on April 1, 2026: in the fourteen-day window before the May 2026 cut, 604 of 15,005 reporting stations reported a price change at night on at least five of its days, against 10,491 of 14,754 in the same days of 2025; before the July 2026 restoration, 584 of 15,050 against 10,435 of 15,002. The group is also differently composed: Aral and Shell, which post at a common second on the event nights, are 0 percent of it against 26 percent of the panel in May 2026, and 0 against 26 percent in July. The 2026 shares are therefore not comparable with 2022.

Table C.7: Arrival shares at selected hours.

Event	Group	$t^* - 6h$	t^*	+2h	+8h	+24h	N
June 2022 cut	All stations	0.023	0.031	0.409	0.705	0.850	14968
June 2022 cut	Night-active	0.022	0.030	0.449	0.754	0.889	10097
September 2022 restoration	All stations	0.041	0.087	0.570	0.866	0.952	14970
September 2022 restoration	Night-active	0.048	0.097	0.661	0.922	0.973	10135
May 2026 cut	All stations	0.011	0.088	0.586	0.704	0.946	14877
May 2026 cut	Night-active	0.003	0.079	0.548	0.647	0.932	604
July 2026 restoration	All stations	0.802	0.899	0.900	0.907	0.997	14867
July 2026 restoration	Night-active	0.846	0.945	0.949	0.964	0.998	584

Event	Site	First post	Change (ct/L)	National share arrived	N
June 2022 cut	Burladingen	2022-06-01 14:13:10	-8.0	0.811	14968
September 2022 restoration	Burladingen	2022-09-01 09:26:12	10.0	0.883	14970
May 2026 cut	Burladingen	2026-05-02 09:13:59	-9.0	0.953	14877
July 2026 restoration	Burladingen	2026-07-01 12:05:10	14.0	0.922	14867

Notes: Share of stations whose diesel price, relative to the same clock two days earlier, has moved by at least half the statutory amount in the direction of the statute and remains there for three hours. A price counts only if it was reported within the previous seven days. Time zero is midnight at the start of the legal date. The second panel is Burladingen's first post in the direction of the statute, the national share arrived at that hour, and the station count. A station is night-active if it reported a price change between 22:00 and 05:00 on at least five of the fourteen days that end three days before the legal date. Night-active counts are 10,097, 10,135, 604, and 584 stations.

Appendix Table C.8 compares the price change at a clock with same-weekday placebo nights. At 08:00 the June 2022 cut is larger than all but 1 of 28 placebo nights. The larger date is March 9, 2022, in the oil-price shock, and that placebo is a rise while the event is a fall. The September 2022 restoration at 08:00 is larger than all but 1 of 27. The larger date is March 10, 2022, in the same shock. The May 2026 cut at 08:00 is larger than all but 1 of 73. The larger date is March 20, 2026, and that placebo is a rise while the event is a fall. The July 2026 restoration at 08:00 is larger than all but 1 of 74. The larger date is March 4, 2026, in the oil-price shock of that month. Appendix Table C.10 lists every exceeding date.

The overnight window is a different object (Appendix Table C.9). It is the change from 22:00 to 02:00, and for the July 2026 restoration also the change from 12:00 to 22:00 on the previous day. The event means for the three midnight events lie outside the min-to-max range of the placebo-night means. The share column is the share of stations that moved by at least half the statutory amount. That share's placebo maximum is not negligible on the September 2022 restoration.

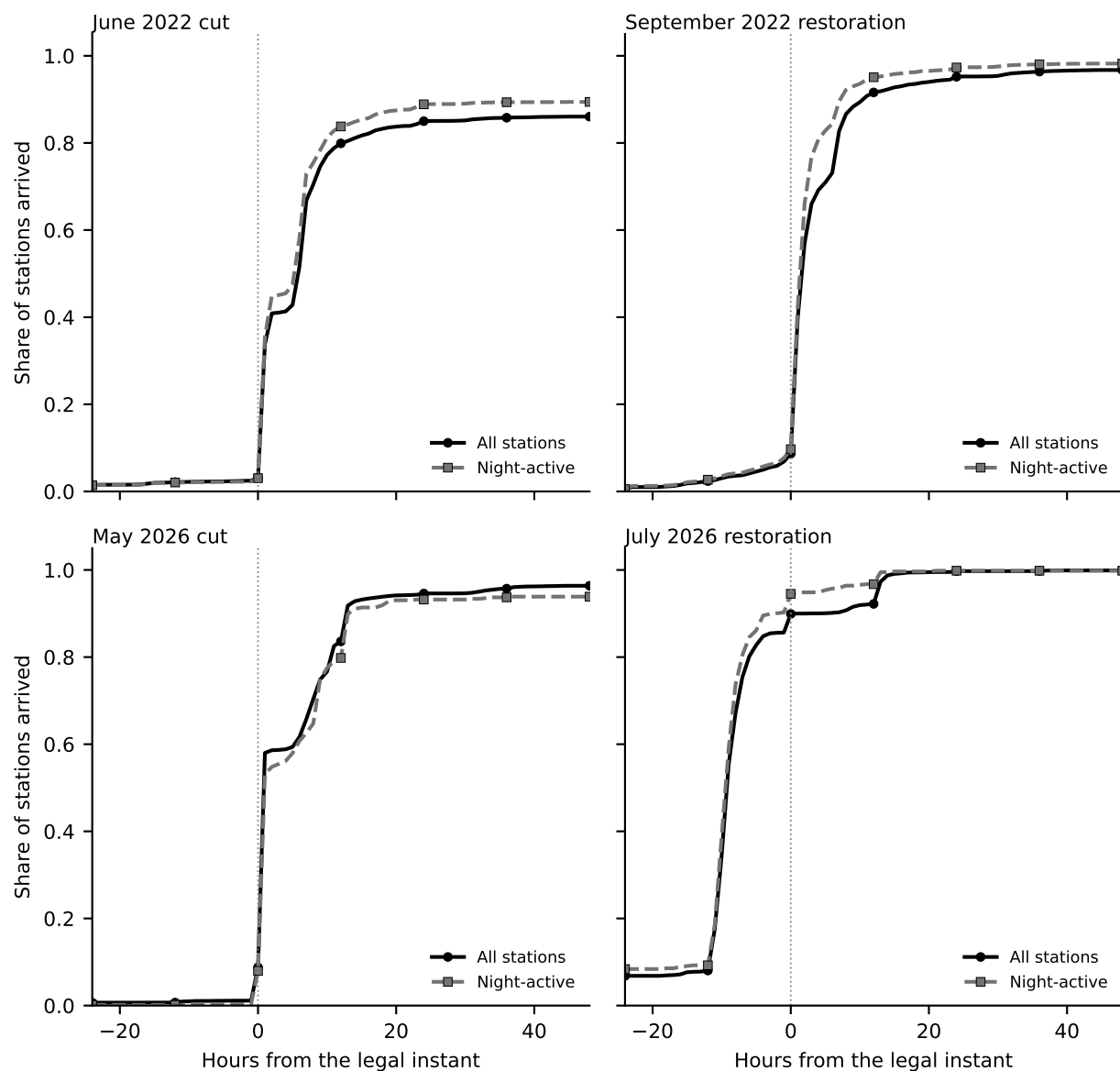


Figure C.5: Arrival among night-active stations.

Notes: A station is night-active if it reported a price change between 22:00 and 05:00 on at least five of the fourteen days that end three days before the legal date. Same arrival definition as Figure 2. Night-active station counts are 10,097 on the June 2022 cut, 10,135 on the September 2022 restoration, 604 on the May 2026 cut, and 584 on the July 2026 restoration.

Table C.8: Price changes by clock, against same-weekday placebos.

Event	Clock	Jump	N	Change (ct/L)	Placebo $\geq$	N placebo	Largest direction (ct/L)	same- direction placebo
June 2022 cut	02:00	0.327	14968	-5.47	1	28	-4.76	
June 2022 cut	08:00	0.970	14968	-16.21	1	28	-6.47	
June 2022 cut	13:00	0.649	14968	-10.85	1	28	-5.70	
June 2022 cut	18:00	0.528	14968	-8.82	1	28	-6.31	
June 2022 cut	Daily mean	0.624	14968	-10.43	1	28	-5.95	
September 2022 restoration	02:00	0.604	14970	10.10	1	27	22.96	
September 2022 restoration	08:00	0.751	14970	12.55	1	27	19.96	
September 2022 restoration	13:00	0.623	14970	10.41	2	27	19.15	
September 2022 restoration	18:00	0.560	14970	9.36	3	27	14.93	
September 2022 restoration	Daily mean	0.619	14970	10.34	2	27	17.57	
May 2026 cut	02:00	0.452	14877	-7.55	2	73	-6.14	
May 2026 cut	08:00	0.588	14877	-9.82	1	73	-6.09	
May 2026 cut	13:00	0.974	14877	-16.27	0	73	-3.45	
May 2026 cut	18:00	0.714	14877	-11.94	1	73	-3.25	
May 2026 cut	Daily mean	0.755	14877	-12.62	1	73	-3.66	
July 2026 restoration	02:00	1.074	14867	17.95	1	74	21.32	
July 2026 restoration	08:00	1.073	14867	17.93	1	74	21.13	
July 2026 restoration	13:00	0.840	14867	14.03	1	74	19.61	
July 2026 restoration	18:00	1.073	14867	17.93	1	74	17.97	
July 2026 restoration	Daily mean	1.052	14867	17.57	1	74	19.26	

Notes: Jump is the mean price change from the same clock on the eve, as a fraction of the statutory amount, signed in the direction of the statute. Event change is cents per liter. Placebo $\geq$ counts placebo nights whose absolute change is at least as large as the event's. The last column is the largest placebo change of the same sign, in cents per liter. The placebo nights are the same weekday, under the seven-day rule, without the balance restriction used for the event column.

Table C.9: Overnight changes and Tuesday-afternoon placebos.

Event	Window	Event ct	Event share	Event N	N placebo	Mean min	Mean med	Mean max	Share min	Share med	Share max
June 2022 cut	22:00 to 02:00	-6.40	0.474	14968	28	-0.11	3.25	4.03	0.000	0.000	0.015
September 2022 restoration	22:00 to 02:00	9.84	0.528	14970	27	1.93	3.28	3.97	0.009	0.022	0.128
May 2026 cut	22:00 to 02:00	-11.31	0.671	14877	73	-0.08	2.89	3.01	0.000	0.000	0.001
July 2026 restoration	22:00 to 02:00	-0.07	0.001	14867	74	-0.06	2.87	3.26	0.000	0.016	0.088
July 2026 restoration	12:00 to 22:00, day before	16.83	0.877	14867	74	-3.31	-1.56	6.52	0.001	0.002	0.389

Notes: Event change in cents per liter, and the share of stations moving by at least half the statutory amount in the direction of the statute. The event uses the balanced national panel. The placebo columns are the minimum, median, and maximum across same-weekday nights, on every station with a counted price at both ends of the window, without the balance restriction. A price counts only if it was reported within the previous seven days.

Table C.10: Placebo dates whose absolute change is at least as large as the event.

Event	Hour	Placebo date	Change (ct/L)	Event change (ct/L)
June 2022 cut	Daily mean	2022-03-09	24.714	-10.426
June 2022 cut	02:00	2022-03-09	21.719	-5.469
June 2022 cut	08:00	2022-03-09	23.144	-16.213
June 2022 cut	13:00	2022-03-09	25.106	-10.846
June 2022 cut	18:00	2022-03-09	24.288	-8.823
September 2022 restoration	Daily mean	2022-03-03	12.324	10.344
September 2022 restoration	Daily mean	2022-03-10	17.568	10.344
September 2022 restoration	02:00	2022-03-10	22.958	10.096
September 2022 restoration	08:00	2022-03-10	19.965	12.551
September 2022 restoration	13:00	2022-03-03	12.664	10.406
September 2022 restoration	13:00	2022-03-10	19.151	10.406
September 2022 restoration	18:00	2022-03-03	13.486	9.361
September 2022 restoration	18:00	2022-03-10	14.927	9.361
September 2022 restoration	18:00	2022-03-17	-9.827	9.361
May 2026 cut	Daily mean	2026-03-20	12.929	-12.622
May 2026 cut	02:00	2026-03-06	8.494	-7.549
May 2026 cut	02:00	2026-03-20	10.741	-7.549
May 2026 cut	08:00	2026-03-20	10.998	-9.819
May 2026 cut	18:00	2026-03-20	13.388	-11.935
July 2026 restoration	Daily mean	2026-03-04	19.263	17.571
July 2026 restoration	02:00	2026-03-04	21.315	17.952
July 2026 restoration	08:00	2026-03-04	21.127	17.933
July 2026 restoration	13:00	2026-03-04	19.609	14.03
July 2026 restoration	18:00	2026-03-04	17.973	17.932

Notes: Cents per liter. A row is a same-weekday placebo night on which the absolute change at that clock is at least as large as the event change. Several of these dates fall in March 2022 or March 2026. The sign of the placebo need not match the event.

Aral's modal post is about two minutes after midnight in all three midnight events (Appendix Table C.11). Shell's modal post is 00:02:02 on the May 2026 cut and about one hour after midnight in the two 2022 events. Appendix Table C.12 reports the modal second for the ten most common brand strings on the three midnight events. Appendix Figure C.6 shows the distribution of first posts. Table 3 in the main text gives the share of the balanced national panel that has moved by at least half the statutory amount at each minute after the legal instant.

Table C.11: Modal posting second, Aral and Shell.

Event	Sample	Brand	Stations	Modal clock	Posts at that second	Posts at 00:02:02
June 2022 cut	National	ARAL	2247	00:02:09	1991	0
June 2022 cut	Inland	ARAL	170	00:02:09	149	0
June 2022 cut	National	Shell	1738	01:01:12	1573	0
June 2022 cut	Inland	Shell	141	01:01:12	139	0
September 2022 restoration	National	ARAL	2239	00:02:11	2222	0
September 2022 restoration	Inland	ARAL	169	00:02:11	169	0
September 2022 restoration	National	Shell	1733	01:01:16	1683	0
September 2022 restoration	Inland	Shell	140	01:01:16	137	0
May 2026 cut	National	ARAL	2165	00:02:02	2149	2149
May 2026 cut	Inland	ARAL	158	00:02:02	158	158
May 2026 cut	National	Shell	1665	00:02:02	1628	1628
May 2026 cut	Inland	Shell	140	00:02:02	140	140

Notes: National and inland samples. The modal clock is the second with the most posts in the direction of the statute on the legal date. The last column counts posts at 00:02:02. A station is Aral when the uppercased brand string is ARAL, and Shell when the lowercased brand string is shell. Appendix Table C.12 matches the brand string as stored, which is why its Shell counts differ from the counts here.

Table C.12: Modal second by brand, three midnight events.

Event	Brand	Stations	Modal second	Share at that second	Share within 30 minutes	Median clock	Median change (cents)
June 2022 cut	ARAL	2247	00:02:09	0.886	0.888	00:02:09	-14.0
June 2022 cut	Shell	1705	01:01:12	0.922	0.923	01:01:12	-8.0
June 2022 cut	ESSO	939	00:48:16	0.455	0.889	00:48:16	-11.0
June 2022 cut	TotalEnergies	844	06:09:09	0.207	0.214	05:38:09	-10.0
June 2022 cut	JET	679	05:13:10	0.209	0.390	06:05:07	-9.0
June 2022 cut	AVIA	624	00:12:07	0.067	0.096	06:22:08	-9.0
June 2022 cut	STAR	559	00:28:21	0.404	0.603	00:28:21	-12.0
June 2022 cut	unknown	515	05:54:07	0.021	0.151	07:03:09	-9.0
June 2022 cut	AGIP ENI	424	08:58:11	0.434	0.854	08:58:11	-10.0
June 2022 cut	HEM	398	03:12:06	0.098	0.342	05:23:09	-10.0
September 2022 restoration	ARAL	2239	00:02:11	0.992	0.995	00:02:11	15.0
September 2022 restoration	Shell	1700	01:01:16	0.989	0.991	01:01:16	15.0
September 2022 restoration	ESSO	916	00:36:12	0.329	0.976	00:36:12	17.0
September 2022 restoration	TotalEnergies	844	06:04:10	0.532	0.891	06:04:10	16.0
September 2022 restoration	JET	684	02:51:07	0.867	0.991	02:51:07	17.0
September 2022 restoration	AVIA	683	01:50:14	0.078	0.110	03:04:10	15.0
September 2022 restoration	STAR	560	00:32:55	0.789	0.989	00:32:55	18.0
September 2022 restoration	unknown	535	03:04:10	0.019	0.127	05:50:09	14.0
September 2022 restoration	AGIP ENI	435	03:01:15	0.828	0.867	03:01:15	16.0
September 2022 restoration	HEM	397	02:27:13	0.705	0.987	02:27:13	18.0
May 2026 cut	ARAL	2165	00:02:02	0.993	1.000	00:02:02	-17.0
May 2026 cut	Shell	1664	00:02:02	0.978	0.994	00:02:02	-17.0
May 2026 cut	ESSO	1074	23:48:52	0.749	0.993	23:48:52	-17.0
May 2026 cut	TotalEnergies	745	06:51:36	0.611	0.905	06:51:36	-8.0
May 2026 cut	JET	685	00:18:18	0.955	0.994	00:18:18	-17.0
May 2026 cut	AVIA	632	07:01:03	0.079	0.187	06:03:23	-15.0
May 2026 cut	STAR	480	00:18:18	0.654	0.985	00:18:18	-17.0
May 2026 cut	AGIP ENI	474	00:22:20	0.150	0.768	00:19:18	-17.0
May 2026 cut	Raiffeisen	417	00:31:27	0.187	0.408	00:51:43	-10.0
May 2026 cut	unknown	410	00:05:06	0.029	0.161	07:29:48	-15.0

Notes: A first post is the earliest diesel report at or after 20:00 on the day before the legal date whose change from the last valid report before that hour is at least five cents per liter in the direction of the statute. The reference price is looked up over the previous seven days, and a report outside the range from half a euro to three euros per liter is dropped. The sample is every station with such a post, not the balanced panel. The table keeps the ten most common brand strings and matches the string as stored. Stations is that count. The modal second is the clock with the most of those posts. Share at that second is the fraction of the brand's stations at that clock. Share within 30 minutes is the fraction whose post falls within 30 minutes of the brand's median timestamp. The median clock is that timestamp. The median change is the median diesel change, in cents per liter. Appendix Table C.11 counts Shell with a case-insensitive match, so its Shell counts are 1738, 1733, and 1665. This table's Shell counts are 1705, 1700, and 1664. The Aral counts agree.

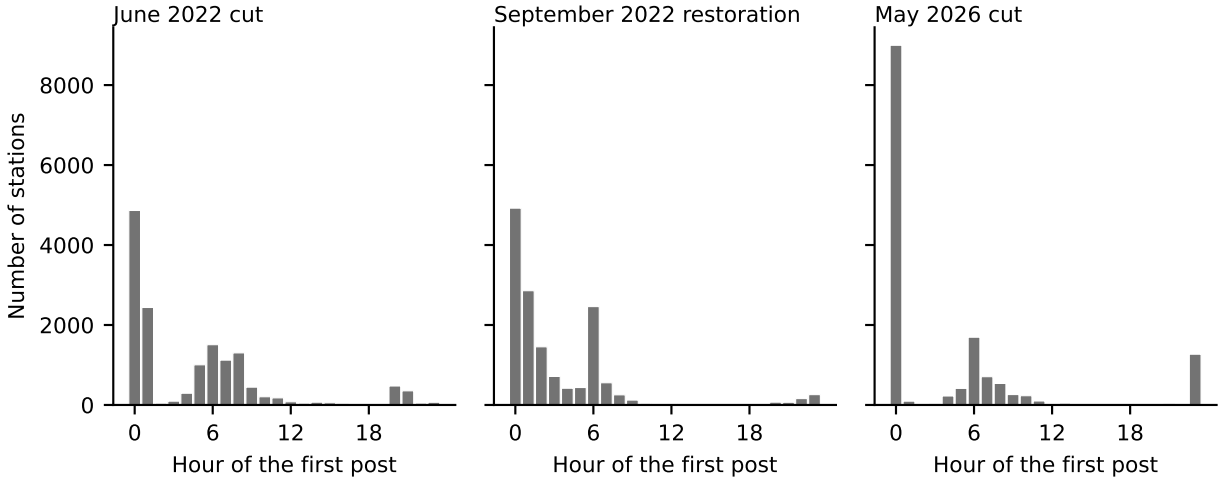


Figure C.6: Clock time of the first post in the direction of the statute.

Notes: Share of stations by the clock time of the first diesel post in the direction of the statute. The sample is the national panel.

Appendix D. The noon rule

This appendix supports section 4.3 of the main text. On June 30, 2026, stations did not make the usual Tuesday-evening cuts (Figure 3, Panel A, of the main text, and Appendix Table D.13). The national change from 12:00 to 22:00 that day is the last row of Appendix Table C.9.

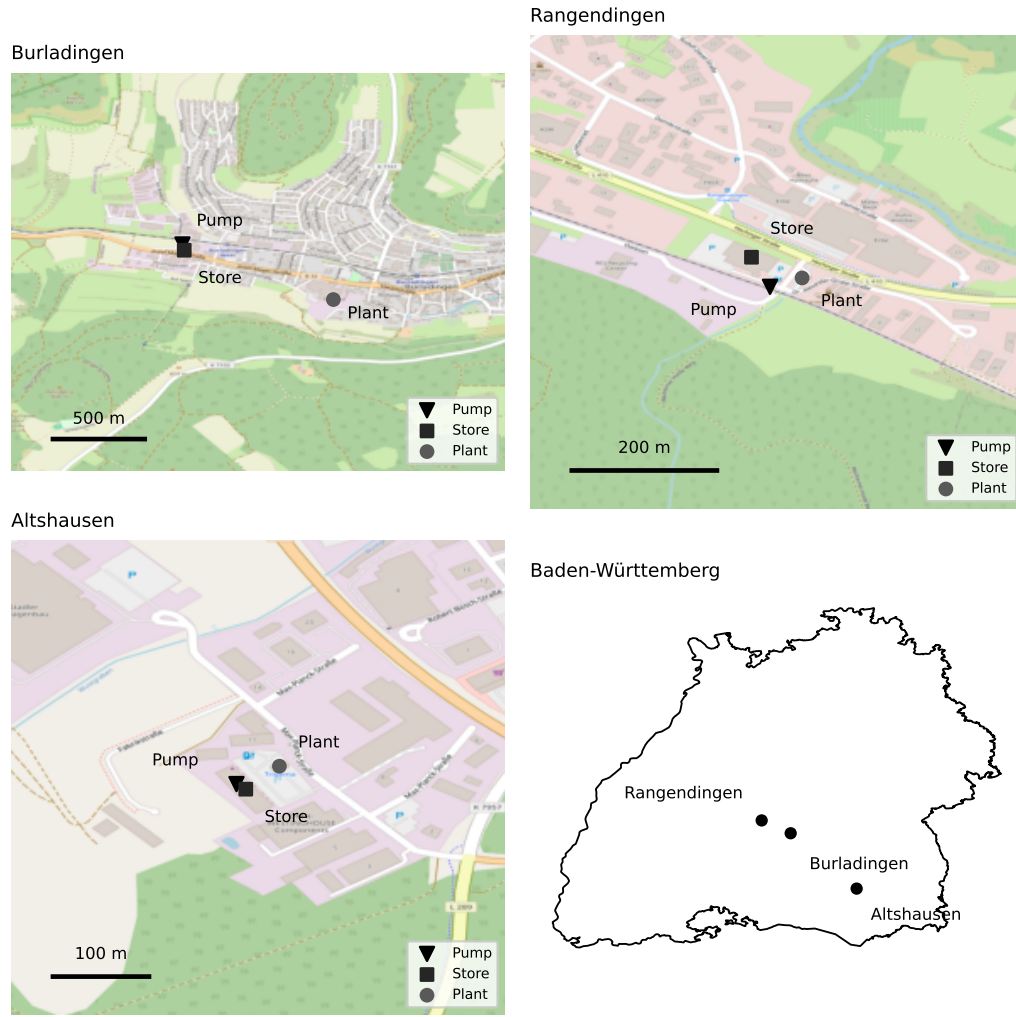
Table D.13: Stations holding the 13:00 price until 20:00.

Tuesday	Share within 3 ct	<i>N</i>
2026-06-30	0.454	15040
2026-06-23	0.306	14960
2026-06-16	0.084	15044
2026-06-09	0.078	15033

Notes: Share of stations whose 20:00 diesel price is within three cents per liter of the 13:00 price, and the station count. A price counts only if it was reported within the previous seven days.

Appendix E. Trigema

This appendix supports section 4.3 of the main text. The three stations sit beside the factory stores (Appendix Figure E.7 and Appendix Table E.14). Appendix Table E.15 counts posts by hour before and after the noon rule. None of the 883 posted-price events from January 3, 2025, through August 27, 2026, falls on a Sunday or a public holiday. Appendix Table E.16 reports how often a post at one site is matched by a post at another. The data do not show who enters a price, the station or the firm's office.



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Figure E.7: Trigma stations and the inland comparison.

Notes: The three public stations and the inland Baden-Württemberg cell used as the comparison.

Table E.14: The three Trigma stations.

Site	Pump address	Store address	Meters	Store hours	Plant
Burladingen	Josef-Mayer-Str. 72393 Burladingen	94, Josef-Mayer-Straße 72393 Burladingen	94, 45.5	Mo–Fr 09:00–18:30; Yes Sa 09:00–18:00; closed Sun/holidays	
Rangendingen	Hechingerstr. 56, 72414 Rangendingen	Hechinger Straße 56, 72414 Rangendingen	56, 64.3	Mo–Fr 09:30–18:00; Yes Sa 09:30–17:00; closed Sun/holidays	
Altshausen	Max-Planck-Str. 9, 88361 Altshausen	Max-Planck-Straße 9, 88361 Altshausen	9, 12	Mo–Fr 09:30–18:30; Yes Sa 09:30–17:00; closed Sun/holidays	

Notes: Station identifier, street address of the pump and of the store, straight-line distance in meters, store opening hours, and whether the site is a production plant. The stores are closed on Sundays and public holidays.

Table E.15: Trigema posting hours before and after the noon rule.

period	direction	hour	n
After April 1, 2026	down	9	4
After April 1, 2026	down	11	7
After April 1, 2026	down	12	94
After April 1, 2026	down	13	1
After April 1, 2026	down	14	1
After April 1, 2026	down	16	6
After April 1, 2026	down	17	1
After April 1, 2026	up	12	97
After April 1, 2026	up	13	1
Before April 1, 2026	down	8	31
Before April 1, 2026	down	9	116
Before April 1, 2026	down	10	30
Before April 1, 2026	down	11	18
Before April 1, 2026	down	12	12
Before April 1, 2026	down	13	11
Before April 1, 2026	down	14	11
Before April 1, 2026	down	15	6
Before April 1, 2026	down	16	5
Before April 1, 2026	down	17	6
Before April 1, 2026	down	18	4
Before April 1, 2026	up	8	35
Before April 1, 2026	up	9	124
Before April 1, 2026	up	10	40
Before April 1, 2026	up	11	15
Before April 1, 2026	up	12	12
Before April 1, 2026	up	13	13
Before April 1, 2026	up	14	4
Before April 1, 2026	up	15	6
Before April 1, 2026	up	16	6
Before April 1, 2026	up	17	9
Before April 1, 2026	up	18	7

Notes: Count of posted-price events by direction and by hour of the day. After April 1, 2026, increases are allowed only at 12:00. The table is the hour distribution, not the Sunday and holiday count, which is zero in the full record of 883 events.

Table E.16: Posts at one Trigema site matched by another.

Period	Slice	From	To	Posts	1 second	60 seconds	30 minutes	Same day
Jan 3, 2025–Aug 27, 2026	All days	Burladingen	Rangendingen	269	0.048	0.067	0.472	0.929
Jan 3, 2025–Aug 27, 2026	All days	Burladingen	Altshausen	269	0.067	0.078	0.416	0.773
Jan 3, 2025–Aug 27, 2026	All days	Rangendingen	Altshausen	280	0.05	0.054	0.332	0.761
Jan 3, 2025–Aug 27, 2026	All days	Burladingen	Any other site	269	0.097	0.123	0.602	0.981
Jan 3, 2025–Aug 27, 2026	All days	Rangendingen	Any other site	280	0.079	0.096	0.518	0.964
Jan 3, 2025–Aug 27, 2026	All days	Altshausen	Any other site	334	0.081	0.09	0.41	0.71
Jan 3, 2025–Aug 27, 2026	MonFri	Burladingen	Rangendingen	257	0.047	0.066	0.486	0.949
Jan 3, 2025–Aug 27, 2026	MonFri	Burladingen	Altshausen	257	0.066	0.078	0.412	0.774
Jan 3, 2025–Aug 27, 2026	MonFri	Rangendingen	Altshausen	269	0.045	0.048	0.335	0.766
Jan 3, 2025–Aug 27, 2026	MonFri	Burladingen	Any other site	257	0.097	0.124	0.607	0.988
Jan 3, 2025–Aug 27, 2026	MonFri	Rangendingen	Any other site	269	0.074	0.093	0.528	0.974

Period	Slice	From	To	Posts	1 second	60 seconds	30 minutes	Same day
Jan 3, 2025–Aug 27, 2026	MonFri	Altshausen	Any other site	296	0.085	0.095	0.439	0.767
Jan 3, 2025–Aug 27, 2026	Saturday	Burladingen	Rangendingen	12	0.083	0.083	0.167	0.5
Jan 3, 2025–Aug 27, 2026	Saturday	Burladingen	Altshausen	12	0.083	0.083	0.5	0.75
Jan 3, 2025–Aug 27, 2026	Saturday	Rangendingen	Altshausen	11	0.182	0.182	0.273	0.636
Jan 3, 2025–Aug 27, 2026	Saturday	Burladingen	Any other site	12	0.083	0.083	0.5	0.833
Jan 3, 2025–Aug 27, 2026	Saturday	Rangendingen	Any other site	11	0.182	0.182	0.273	0.727
Jan 3, 2025–Aug 27, 2026	Saturday	Altshausen	Any other site	38	0.053	0.053	0.184	0.263
Before April 1, 2026	All days	Burladingen	Rangendingen	194	0	0.01	0.304	0.907
Before April 1, 2026	All days	Burladingen	Altshausen	194	0.01	0.015	0.247	0.696
Before April 1, 2026	All days	Rangendingen	Altshausen	203	0.005	0.005	0.128	0.685
Before April 1, 2026	All days	Burladingen	Any other site	194	0.01	0.026	0.474	0.974
Before April 1, 2026	All days	Rangendingen	Any other site	203	0.005	0.015	0.35	0.951
Before April 1, 2026	All days	Altshausen	Any other site	239	0.013	0.017	0.259	0.653
Before April 1, 2026	MonFri	Burladingen	Rangendingen	184	0	0.011	0.321	0.935
Before April 1, 2026	MonFri	Burladingen	Altshausen	184	0.011	0.016	0.239	0.696
Before April 1, 2026	MonFri	Rangendingen	Altshausen	194	0	0	0.129	0.691
Before April 1, 2026	MonFri	Burladingen	Any other site	184	0.011	0.027	0.478	0.984
Before April 1, 2026	MonFri	Rangendingen	Any other site	194	0	0.01	0.361	0.964
Before April 1, 2026	MonFri	Altshausen	Any other site	207	0.01	0.015	0.275	0.715
Before April 1, 2026	Saturday	Burladingen	Rangendingen	10	0	0	0	0.4
Before April 1, 2026	Saturday	Burladingen	Altshausen	10	0	0	0.4	0.7
Before April 1, 2026	Saturday	Rangendingen	Altshausen	9	0.111	0.111	0.111	0.556
Before April 1, 2026	Saturday	Burladingen	Any other site	10	0	0	0.4	0.8
Before April 1, 2026	Saturday	Rangendingen	Any other site	9	0.111	0.111	0.111	0.667
Before April 1, 2026	Saturday	Altshausen	Any other site	32	0.031	0.031	0.156	0.25
From April 1, 2026	All days	Burladingen	Rangendingen	75	0.173	0.213	0.907	0.987
From April 1, 2026	All days	Burladingen	Altshausen	75	0.213	0.24	0.853	0.973
From April 1, 2026	All days	Rangendingen	Altshausen	77	0.169	0.182	0.87	0.961
From April 1, 2026	All days	Burladingen	Any other site	75	0.32	0.373	0.933	1
From April 1, 2026	All days	Rangendingen	Any other site	77	0.273	0.312	0.961	1
From April 1, 2026	All days	Altshausen	Any other site	95	0.253	0.274	0.789	0.853
From April 1, 2026	MonFri	Burladingen	Rangendingen	73	0.164	0.205	0.904	0.986
From April 1, 2026	MonFri	Burladingen	Altshausen	73	0.205	0.233	0.849	0.973
From April 1, 2026	MonFri	Rangendingen	Altshausen	75	0.16	0.173	0.867	0.96
From April 1, 2026	MonFri	Burladingen	Any other site	73	0.315	0.37	0.931	1
From April 1, 2026	MonFri	Rangendingen	Any other site	75	0.267	0.307	0.96	1
From April 1, 2026	MonFri	Altshausen	Any other site	89	0.258	0.281	0.82	0.888
From April 1, 2026	Saturday	Burladingen	Rangendingen	2	0.5	0.5	1	1
From April 1, 2026	Saturday	Burladingen	Altshausen	2	0.5	0.5	1	1
From April 1, 2026	Saturday	Rangendingen	Altshausen	2	0.5	0.5	1	1
From April 1, 2026	Saturday	Burladingen	Any other site	2	0.5	0.5	1	1
From April 1, 2026	Saturday	Rangendingen	Any other site	2	0.5	0.5	1	1
From April 1, 2026	Saturday	Altshausen	Any other site	6	0.167	0.167	0.333	0.333

Notes: Share of posts at the first site that have a post at the second site within one second, within sixty seconds, within thirty minutes, and on the same day. From April 1, 2026, 32 percent of Burladingen’s posts have another Trigema site within one second. The data do not show who enters a price, the station or the firm’s office.

Appendix Table E.17 is the May 2026 holiday in levels and gaps. Altshausen’s May 1 change is a comparison of daily means across a day with no report, not a posted step. Appendix Figure E.8 plots the gap in all four events. Appendix Table E.18 lists the posts. Appendix Table E.19 ranks one-day changes in the Burladingen gap from April 9 to June 30, 2026. Appendix Table E.20 compares large diesel moves across stations.

Table E.17: Diesel around May 1, 2026.

Series	P 30 Apr	Δ May 1	Δ May 2	Gap 30 Apr	Gap May 1	Gap May 2	N 30 Apr	N May 1	N May 2
Trigema Burladingen	1.989	0.0	-8.1	-18.6	-4.4	-14.4	1	1	1
Trigema Rangendingen	1.989	0.0	-7.8	-18.6	-4.4	-14.1	1	1	1
Trigema Altshausen	2.013	-1.4	-8.1	-16.2	-3.4	-13.4	1	1	1
Neighbors 0–5 km	2.042	-4.8	-0.8	-13.3	-3.9	-6.6	4	4	4
Local 5–20 km	2.158	-12.2	2.5	-1.7	0.3	0.8	65	65	64
Inland BW	2.175	-14.2	1.9	0.0	0.0	0.0	1099	1100	1102

Notes: Duration-weighted means from 08:00 to 20:00. Levels in euros per liter. Changes and gaps in cents per liter. Gaps are versus the inland mean. The inland cell on April 30 has 1,099 stations. A price counts only if it was reported within the previous seven days. The three Trigema stations are exempt. Altshausen files no report on May 1.

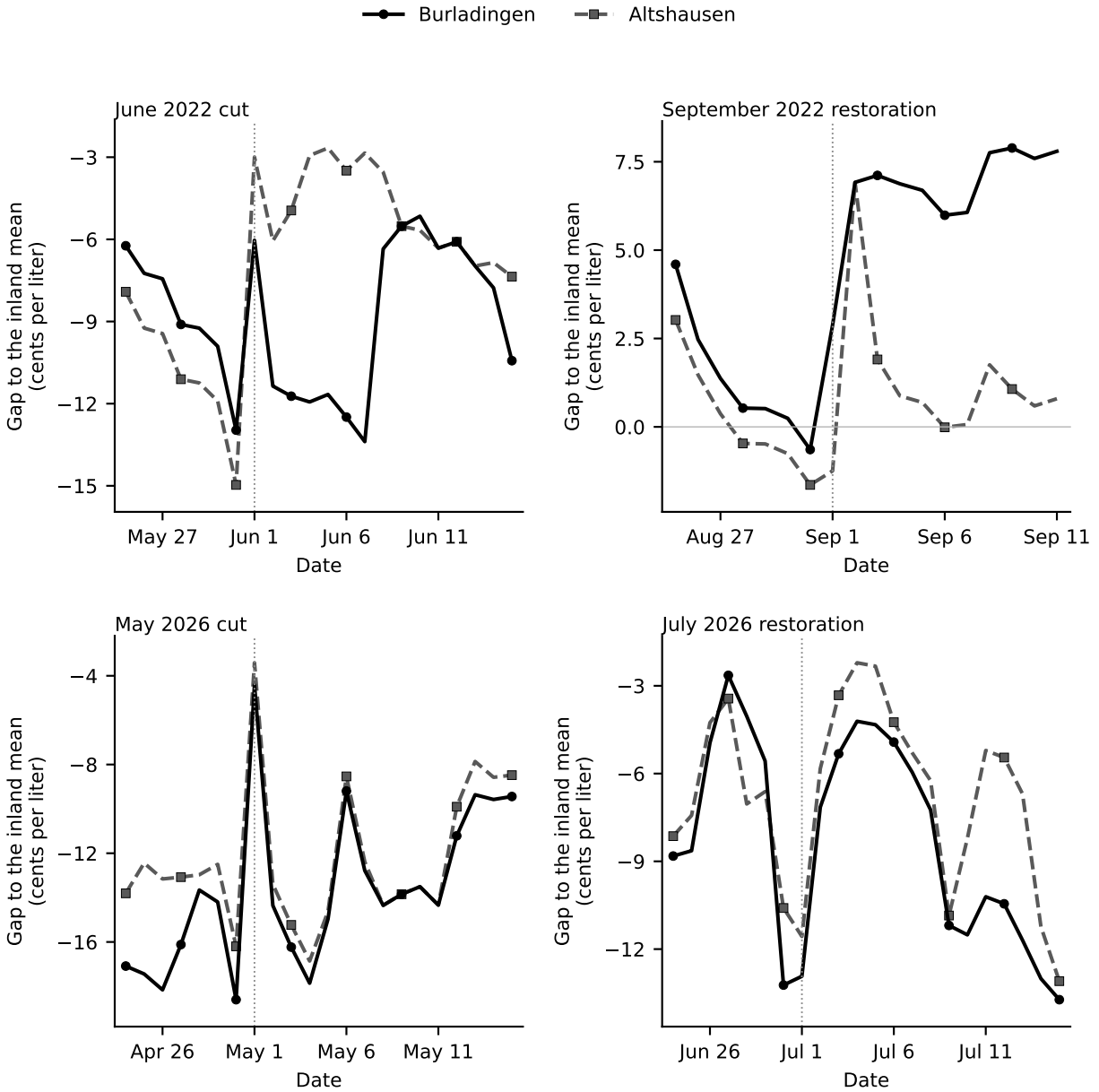


Figure E.8: Trigema gaps around the four legal dates.

Notes: Gap between each Trigema station and the inland mean, in cents per liter, on the days around each legal date.

Table E.18: Trigema posts around the four legal dates.

Event	Site	Time	Diesel	Super E5	E10	Diesel change	Super E5 change	E10 change
June 2022 cut	Altshausen	2022-06-01 09:35:20	1.919	1.909	1.909	NA	NA	NA
June 2022 cut	Altshausen	2022-06-01 09:36:09	1.919	1.859	1.839	0	-5	-7
June 2022 cut	Burladingen	2022-06-01 09:51:30	1.909	1.929	2.009	NA	NA	NA
June 2022 cut	Burladingen	2022-06-01 09:53:17	1.909	1.929	1.909	0	0	-9
June 2022 cut	Burladingen	2022-06-01 09:54:14	1.909	1.919	1.899	0	-1	-1
June 2022 cut	Rangendingen	2022-06-01 10:17:21	1.909	1.959	1.939	0	-6	-6
June 2022 cut	Rangendingen	2022-06-01 10:18:11	1.909	1.919	1.899	0	-4	-4
June 2022 cut	Altshausen	2022-06-01 11:30:08	1.899	1.859	1.839	-2	0	0
June 2022 cut	Burladingen	2022-06-01 14:13:10	1.829	1.849	1.829	-8	-7	-7
June 2022 cut	Rangendingen	2022-06-01 14:28:09	1.849	1.829	1.809	-6	-9	-9
June 2022 cut	Rangendingen	2022-06-01 18:15:09	1.849	1.899	1.809	0	7	0
June 2022 cut	Rangendingen	2022-06-01 18:58:09	1.849	1.899	1.879	0	0	7
June 2022 cut	Rangendingen	2022-06-01 19:01:08	1.919	1.899	1.879	7	0	0
June 2022 cut	Burladingen	2022-06-02 09:49:09	1.849	1.799	1.779	2	-5	-5
June 2022 cut	Rangendingen	2022-06-02 10:09:12	1.919	1.839	1.819	0	-6	-6
June 2022 cut	Burladingen	2022-06-03 12:31:42	1.849	1.779	1.759	0	-2	-2
June 2022 cut	Altshausen	2022-06-03 14:39:09	1.939	1.859	1.839	4	0	0
June 2022 cut	Rangendingen	2022-06-03 14:39:09	1.899	1.839	1.819	-2	0	0
September 2022 restoration	Rangendingen	2022-09-01 09:22:11	2.279	1.859	1.8	NA	NA	NA
September 2022 restoration	Burladingen	2022-09-01 09:26:12	2.229	1.809	1.789	NA	NA	NA
September 2022 restoration	Rangendingen	2022-09-01 09:27:12	2.279	1.999	1.979	0	14	17.9
September 2022 restoration	Burladingen	2022-09-01 09:28:15	2.279	1.909	1.889	4	10	10
September 2022 restoration	Burladingen	2022-09-01 09:30:12	2.279	1.999	1.979	0	9	9
September 2022 restoration	Altshausen	2022-09-01 12:27:12	2.279	1.899	1.899	NA	NA	NA
September 2022 restoration	Altshausen	2022-09-01 12:33:15	2.279	1.999	1.979	0	10	8
September 2022 restoration	Burladingen	2022-09-02 16:25:11	2.279	1.999	1.979	0	0	0
September 2022 restoration	Rangendingen	2022-09-02 16:25:11	2.279	1.999	1.979	0	0	0
September 2022 restoration	Altshausen	2022-09-02 16:25:11	2.279	1.999	1.979	0	0	0
September 2022 restoration	Altshausen	2022-09-03 09:35:09	2.219	1.919	1.899	-6	-8	-8
May 2026 cut	Burladingen	2026-04-28 12:07:04	2.029	2.019	1.999	1	1	1
May 2026 cut	Altshausen	2026-04-28 12:08:05	2.029	2.029	2.009	-1	-2	-2
May 2026 cut	Rangendingen	2026-04-28 12:08:05	2.029	2.019	1.999	1	1	1

Event	Site	Time	Diesel	Super E5	E10	Diesel change	Super E5 change	E10 change
May 2026 cut	Altshausen	2026-04-29 12:05:33	2.039	2.029	2.009	1	0	0
May 2026 cut	Rangendingen	2026-04-29 16:50:08	1.989	1.999	1.979	-3	-2	-2
May 2026 cut	Burladingen	2026-04-29 16:53:13	1.989	1.999	1.979	-3	-2	-2
May 2026 cut	Altshausen	2026-04-30 12:12:40	1.999	2.009	1.989	-4	-2	-2
May 2026 cut	Altshausen	2026-05-02 09:10:47	1.909	1.899	1.879	-9	-10	-11
May 2026 cut	Burladingen	2026-05-02 09:13:59	1.899	1.899	1.879	-9	-10	-10
May 2026 cut	Rangendingen	2026-05-02 09:33:09	1.899	1.899	1.879	-9	-10	-10
July 2026 restora- tion	Burladingen	2026-06-29 06:49:39	1.739	1.829	1.809	0	0	0
July 2026 restora- tion	Rangendingen	2026-06-29 06:49:39	1.739	1.829	1.809	0	0	0
July 2026 restora- tion	Altshausen	2026-06-29 06:49:39	1.709	1.829	1.809	0	0	0
July 2026 restora- tion	Burladingen	2026-06-29 07:45:19	1.739	1.829	1.809	0	0	0
July 2026 restora- tion	Rangendingen	2026-06-29 07:45:19	1.739	1.829	1.809	0	0	0
July 2026 restora- tion	Altshausen	2026-06-29 07:45:19	1.709	1.829	1.809	0	0	0
July 2026 restora- tion	Altshausen	2026-06-29 12:10:57	1.739	1.829	1.809	3	0	0
July 2026 restora- tion	Rangendingen	2026-06-30 12:05:39	1.749	1.849	1.829	1	2	2
July 2026 restora- tion	Burladingen	2026-06-30 12:05:39	1.749	1.849	1.829	1	2	2
July 2026 restora- tion	Altshausen	2026-06-30 12:05:39	1.789	1.879	1.859	4	5	5
July 2026 restora- tion	Burladingen	2026-07-01 12:05:10	1.889	1.969	1.949	13	12	12
July 2026 restora- tion	Altshausen	2026-07-01 12:05:10	1.889	1.969	1.949	10	9	9
July 2026 restora- tion	Rangendingen	2026-07-01 12:07:13	1.889	1.969	1.949	13	12	12
July 2026 restora- tion	Altshausen	2026-07-02 12:04:29	1.889	1.989	1.969	0	2	2
July 2026 restora- tion	Burladingen	2026-07-02 12:04:29	1.899	1.979	1.959	1	1	1
July 2026 restora- tion	Altshausen	2026-07-02 12:05:31	1.919	1.989	1.969	3	0	0
July 2026 restora- tion	Rangendingen	2026-07-02 12:19:44	1.899	1.979	1.959	1	1	1

Notes: Each row is a report. Prices in euros per liter. Changes in cents per liter. A blank change is the first report of the spell. The three stations are exempt from the seven-day rule.

Between April 8 and June 30, 2026, excluding May 1, all 12 of Burladingen's large diesel moves have a same-sign Rangendingen move within thirty minutes. For random inland pairs that share is 58 percent, and for random same-brand pairs it is 71 percent. Since April 2026 most large moves at any station fall at noon, which is why random pairs match often.

Table E.19: Ranks of one-day changes in the Burladingen gap.

Quantity	Value
n_days	83
n_changes	82
n_increases	43
n_decreases	39
n_saturday_decreases	4
gap_apr30_ct	-18.601
gap_may1_ct	-4.413
gap_may2_ct	-14.358
chg_may1_ct	14.188
chg_may2_ct	-9.945
rank_may1_increase	1
rank_may2_decrease	1
rank_may2_saturday_decrease	1
largest_close_date	2026-05-01
largest_close_ct	14.188
second_close_date	2026-05-06
second_close_ct	5.767
largest_reopen_date	2026-05-02
largest_reopen_ct	-9.945
second_reopen_date	2026-06-30
second_reopen_ct	-7.659
close_tie	0
reopen_tie	0

Notes: Window from April 9 to June 30, 2026. The gap is Burladingen’s duration-weighted diesel mean minus the inland mean, in cents per liter. An increase of the gap is a closing. The top rank is the largest move of that sign. The May 1 closing and the May 2 reopening are each the largest move of that sign.

Table E.20: Large diesel moves matched across stations.

Sample	Events	Three-fuel same sign	Within 30 min	Same day
Burladingen	31	0.968	0.742	0.968
Rangendingen	33	0.879	NA	NA
Altshausen	35	0.686	NA	NA
All three sites	99	0.838	NA	NA
Burladingen-Rangendingen spring	12	NA	1.000	1.000
Random inland pairs	1000	NA	0.579	0.834
Random same-brand inland pairs	1000	NA	0.705	0.890

Notes: A large move is a diesel change of at least five cents per liter. The spring row is Burladingen from April 8 to June 30, 2026, excluding May 1, matched to Rangendingen. Random rows draw inland pairs. Since April 2026 most large moves fall at noon, which is why random pairs match often. Shares are fractions.

Appendix F. Baselines

This appendix supports section 4.4 of the main text. Appendix Table F.21 reports the statute-dated response under three baselines, with the change in New York Harbor diesel and in Brent over the same window. Those series are not German acquisition costs. The cut-versus-restoration comparison under three baselines is Appendix Table F.22, and its inland rows are Appendix Table F.23. The sign pattern matches the national table: the pre-window difference is positive and the day-before difference is negative, in both years. Appendix Table F.24 is the series drawn in Figure 1. Appendix Table F.25 is the May 2026 comparison at several clocks, each against its own same-clock baseline.

Table F.21: Statute-dated responses under three baselines.

Event	Sample	Baseline	Raw pass-through	NYH (ct/L)	Brent (ct/L)	N
June 2022 cut	National	Pre-window	0.410	7.27	3.62	15022
June 2022 cut	National	eve	0.622	7.08	-0.06	15022
June 2022 cut	National	Day before	0.705	8.14	-1.64	15023
June 2022 cut	Inland	Pre-window	0.326	7.27	3.62	1053
June 2022 cut	Inland	eve	0.462	7.08	-0.06	1053
June 2022 cut	Inland	Day before	0.646	8.14	-1.64	1053
September 2022 restoration	National	Pre-window	0.998	-10.06	-4.86	15002
September 2022 restoration	National	eve	0.619	-6.35	-4.83	15005
September 2022 restoration	National	Day before	0.547	-2.20	-2.41	15007
September 2022 restoration	Inland	Pre-window	1.020	-10.06	-4.86	1034
September 2022 restoration	Inland	eve	0.631	-6.35	-4.83	1034
September 2022 restoration	Inland	Day before	0.578	-2.20	-2.41	1034
May 2026 cut	National	Pre-window	0.474	8.34	8.75	14947
May 2026 cut	National	eve	0.753	-7.22	-4.16	14942
May 2026 cut	National	Day before	0.871	-5.63	-3.98	14940
May 2026 cut	Inland	Pre-window	0.653	8.34	8.75	1097
May 2026 cut	Inland	eve	0.765	-7.22	-4.16	1098
May 2026 cut	Inland	Day before	0.851	-5.63	-3.98	1097
July 2026 restoration	National	Pre-window	1.283	0.91	-2.86	15038
July 2026 restoration	National	eve	1.047	-2.32	-1.38	15036
July 2026 restoration	National	Day before	0.589	-1.56	-0.67	15042
July 2026 restoration	Inland	Pre-window	1.294	0.91	-2.86	1107
July 2026 restoration	Inland	eve	1.053	-2.32	-1.38	1107
July 2026 restoration	Inland	Day before	0.555	-1.56	-0.67	1107
May 2026 cut	Inland	08:00	0.639	8.34	8.75	1094
May 2026 cut	Inland	h11	0.673	8.34	8.75	1095
May 2026 cut	Inland	13:00	0.631	8.34	8.75	1094
May 2026 cut	Inland	18:00	0.630	8.34	8.75	1095

Notes: Raw response is the price change in the direction of the statute, as a fraction of 16.71 cents per liter. Eve is the daily price two days before the legal date. Day before is the calendar day before. Pre-window is the mean on the pre-window days. New York Harbor diesel and Brent are the change in those series over the same window, in cents per liter, and they are not German acquisition costs. National and inland samples. A price counts only if it was reported within the previous seven days.

Table F.22: A cut against its restoration, under three baselines.

Year	Pre-window			Eve			Day before		
	Cut	Restoration	Difference	Cut	Restoration	Difference	Cut	Restoration	Difference
2022	41.0	99.8	58.8	62.2	61.9	-0.3	70.5	54.7	-15.8
2026	47.4	128.3	81.0	75.3	104.7	29.3	87.1	58.9	-28.2

Notes: National diesel means. Each entry is the price change in the direction of the statute, from the named baseline to the legal date, as a percent of 16.71 cents per liter. The pre-window is the mean daily price on the pre-window days. The eve is the daily price two days before the legal date. The day before is the daily price on the calendar day before. Difference is the restoration minus the cut. Parts may not add to a printed difference because of rounding.

Table F.23: A cut against its restoration, inland rows.

Year	Pre-window			Eve			Day before		
	Cut	Restoration	Difference	Cut	Restoration	Difference	Cut	Restoration	Difference
2022	32.6	102.0	69.4	46.2	63.1	16.9	64.6	57.8	-6.7
2026	65.3	129.4	64.1	76.5	105.3	28.8	85.1	55.5	-29.6

Notes: Inland Baden-Württemberg. Columns match Appendix Table F.22. Entries are percent of 16.71 cents per liter. Difference is the restoration minus the cut. Parts may not add to a printed difference because of rounding.

Table F.24: National diesel path around the four legal dates.

Event	Day	Change vs pre-window (ct/L)	Stations	Statutory (ct/L)
June 2022 cut	-10	0.60	14952	-16.71
June 2022 cut	-9	1.04	14970	-16.71
June 2022 cut	-8	0.13	14965	-16.71
June 2022 cut	-7	-1.32	15026	-16.71
June 2022 cut	-6	-0.18	15026	-16.71
June 2022 cut	-5	0.33	15026	-16.71
June 2022 cut	-4	2.21	15027	-16.71
June 2022 cut	-3	3.29	15025	-16.71
June 2022 cut	-2	3.55	15024	-16.71
June 2022 cut	-1	4.93	15024	-16.71
June 2022 cut	0	-6.84	15029	-16.71
June 2022 cut	1	-3.96	15002	-16.71
June 2022 cut	2	-2.14	15006	-16.71
June 2022 cut	3	-2.10	15007	-16.71
June 2022 cut	4	-1.88	15007	-16.71
June 2022 cut	5	-1.58	15005	-16.71
June 2022 cut	6	0.22	15006	-16.71
June 2022 cut	7	1.67	15005	-16.71
June 2022 cut	8	2.27	14993	-16.71
June 2022 cut	9	2.59	14991	-16.71
June 2022 cut	10	3.78	14981	-16.71
September 2022 restoration	-10	-3.91	14982	16.71
September 2022 restoration	-9	-2.56	14994	16.71
September 2022 restoration	-8	-0.11	14999	16.71
September 2022 restoration	-7	2.28	15001	16.71
September 2022 restoration	-6	4.30	15002	16.71
September 2022 restoration	-5	5.12	15001	16.71
September 2022 restoration	-4	5.61	15001	16.71
September 2022 restoration	-3	6.53	15010	16.71
September 2022 restoration	-2	6.33	15009	16.71
September 2022 restoration	-1	7.54	15008	16.71
September 2022 restoration	0	16.68	15013	16.71
September 2022 restoration	1	15.55	15057	16.71
September 2022 restoration	2	14.59	15055	16.71
September 2022 restoration	3	14.26	15055	16.71
September 2022 restoration	4	14.66	15055	16.71
September 2022 restoration	5	14.84	15055	16.71
September 2022 restoration	6	15.47	15076	16.71
September 2022 restoration	7	13.86	15074	16.71
September 2022 restoration	8	13.20	15074	16.71
September 2022 restoration	9	12.38	14969	16.71
September 2022 restoration	10	11.97	14967	16.71
May 2026 cut	-10	-2.39	14987	-16.71
May 2026 cut	-9	-2.34	14990	-16.71
May 2026 cut	-8	0.57	14990	-16.71
May 2026 cut	-7	2.44	14991	-16.71
May 2026 cut	-6	3.76	14983	-16.71
May 2026 cut	-5	4.38	14979	-16.71
May 2026 cut	-4	5.07	14983	-16.71
May 2026 cut	-3	4.93	14973	-16.71
May 2026 cut	-2	4.66	14960	-16.71
May 2026 cut	-1	6.63	14947	-16.71
May 2026 cut	0	-7.92	14961	-16.71
May 2026 cut	1	-5.57	14970	-16.71
May 2026 cut	2	-4.56	14969	-16.71
May 2026 cut	3	-4.96	14983	-16.71
May 2026 cut	4	-5.38	14989	-16.71
May 2026 cut	5	-10.10	14991	-16.71
May 2026 cut	6	-12.49	14998	-16.71
May 2026 cut	7	-14.92	14997	-16.71
May 2026 cut	8	-16.27	14989	-16.71
May 2026 cut	9	-16.29	14983	-16.71
May 2026 cut	10	-15.75	14990	-16.71
July 2026 restoration	-10	-1.15	15041	16.71

Event	Day	Change vs pre-window (ct/L)	Stations	Statutory (ct/L)
July 2026 restoration	-9	0.76	15037	16.71
July 2026 restoration	-8	-2.76	15039	16.71
July 2026 restoration	-7	-0.13	14968	16.71
July 2026 restoration	-6	0.65	14946	16.71
July 2026 restoration	-5	1.48	14912	16.71
July 2026 restoration	-4	1.25	14883	16.71
July 2026 restoration	-3	1.64	14878	16.71
July 2026 restoration	-2	3.99	15037	16.71
July 2026 restoration	-1	11.63	15043	16.71
July 2026 restoration	0	21.47	15046	16.71
July 2026 restoration	1	21.98	15046	16.71
July 2026 restoration	2	20.81	15047	16.71
July 2026 restoration	3	19.92	15047	16.71
July 2026 restoration	4	19.80	15047	16.71
July 2026 restoration	5	20.10	15001	16.71
July 2026 restoration	6	20.69	15004	16.71
July 2026 restoration	7	22.33	14971	16.71
July 2026 restoration	8	26.88	14958	16.71
July 2026 restoration	9	28.28	14964	16.71
July 2026 restoration	10	27.25	14957	16.71

Notes: Day is the number of calendar days relative to the legal date. Change is the national duration-weighted diesel mean from 08:00 to 20:00, minus the pre-window mean, in cents per liter. The statutory column is 16.71 cents per liter, signed with the statute. A price counts only if it was reported within the previous seven days.

Table F.25: May 2026 at several clocks, same-clock baselines.

Window	Burladingen Δ (ct)	Burladingen ρ (%)	Inland Δ (ct)	Inland ρ (%)	Inland N	Baseline
May 1, 08:00	-4.3	25.6	-10.7	63.9	1094	same-clock mean, 17-23 April 2026 at 08:00
May 1, 11:00	-4.3	25.6	-11.2	67.3	1095	same-clock mean, 17-23 April 2026 at 11:00
May 1, 13:00	-3.3	19.7	-10.5	63.1	1094	same-clock mean, 17-23 April 2026 at 13:00
May 1, 18:00	-3.3	19.7	-10.5	63.0	1095	same-clock mean, 17-23 April 2026 at 18:00
May 1, 08:00-20:00	-3.6	21.5	-10.9	65.3	1097	mean of 08:00-20:00 daily means, 17-23 April 2026
May 1, store hours 09:30-18:00	-3.5	21.2	-11.0	66.0	1097	mean of 09:30-18:00 store-hours means, 17-23 April 2026
May 2, 08:00	-4.3	25.6	-10.8	64.5	1095	same-clock mean, 17-23 April 2026 at 08:00
May 2, 11:00	-13.3	79.5	-10.4	62.3	1098	same-clock mean, 17-23 April 2026 at 11:00
May 3, 08:00-20:00	-12.6	75.3	-8.1	48.6	1099	mean of 08:00-20:00 daily means, 17-23 April 2026
May 1-8	-11.0	65.6	-9.7	58.1	1100	mean of 08:00-20:00 daily means, 17-23 April 2026
May 3-31	-16.3	97.3	-17.0	102.0	1100	mean of 08:00-20:00 daily means, 17-23 April 2026

Notes: Changes in cents per liter and as a percent of 16.71 cents per liter. Each row uses the baseline named in the last column. With a same-clock baseline, the inland percent on May 1 varies little across the clocks shown. Burladingen's May 1 entries are not a posted step at the legal instant.

Appendix G. Robustness

This appendix supports sections 4.1 and 4.2 of the main text. Appendix Table G.26 repeats the 08:00 jump and the arrival share when carried-forward prices are dropped, when the panel is not balanced, when arrival must still hold at 08:00, and for Super E5. The 08:00 jump barely moves. The arrival share is smaller when the move must still be in place at 08:00. Appendix Table G.27 states the Super E5 jump at 08:00 as a percent of the statutory amount.

Table G.26: Robustness of the 08:00 jump and of arrival.

Variant	Event	Jump 08:00	Arrival share	Arrival hour	<i>N</i>
Main	June 2022 cut	0.970	0.409	2	14968
Main	September 2022 restoration	0.751	0.570	2	14970
Main	May 2026 cut	0.588	0.586	2	14877
Main	July 2026 restoration	1.073	0.899	0	14867
No carried-forward prices	June 2022 cut	0.966	0.407	2	15044
No carried-forward prices	September 2022 restoration	0.750	0.568	2	15036
No carried-forward prices	May 2026 cut	0.583	0.582	2	15004
No carried-forward prices	July 2026 restoration	1.065	0.892	0	15052
Unbalanced	June 2022 cut	0.967	0.407	2	15024
Unbalanced	September 2022 restoration	0.751	0.569	2	15007
Unbalanced	May 2026 cut	0.586	0.583	2	14957
Unbalanced	July 2026 restoration	1.066	0.892	0	15037
Arrival held to 08:00	June 2022 cut	0.970	0.187	2	14968
Arrival held to 08:00	September 2022 restoration	0.751	0.453	2	14970
Arrival held to 08:00	May 2026 cut	0.588	0.228	2	14877
Arrival held to 08:00	July 2026 restoration	1.073	0.776	0	14867
Super E5	June 2022 cut	0.798	0.547	2	14664
Super E5	September 2022 restoration	0.803	0.542	2	14668
Super E5	May 2026 cut	0.561	0.585	2	14537
Super E5	July 2026 restoration	0.918	0.895	0	14525

Notes: Jump at 08:00 is a fraction of the statutory amount. Arrival share uses the definition in Figure 2, at the hour in the next column. The main row is the specification in the text. Super E5 uses the gasoline statutory amount of that year.

Table G.27: Super E5 at 08:00, percent of the statutory amount.

Event	June 2022 cut	September 2022 restoration	May 2026 cut	July 2026 restoration
Super E5 at 08:00	79.8	80.3	56.1	91.8

Notes: Mean Super E5 change at 08:00, as a percent of the absolute statutory amount for that fuel and year. The gasoline statutory amount in 2022 is 35.16 cents per liter with value-added tax. In 2026 the statutory amount is 16.71 cents per liter for all road fuels.

Appendix H. Inference

This appendix supports section 4.4 of the main text. Table 4 in the main text reports bootstrap standard errors for the timing decomposition, and Table 5 in the main text reports them for the cut against its restoration. A station standard error resamples stations with replacement. A brand standard error resamples brand strings with replacement, and a station with a blank brand string is its own cluster. Each standard error is the standard deviation across 1,000 draws, and each interval is the 2.5 and 97.5 percentiles of those draws. The standard error of a difference is the square root of the sum of the squared cut and restoration standard errors from the same scheme.

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