RETAIL FUEL, HONG KONG

Lockstep at the pump

Six years of parallel petrol pricing in Hong Kong, with Los Angeles and Perth as benchmarks

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Code, data and every number in this paper: `https://github.com/lyhjeremy/fuel-lockstep`. Each figure in the text is generated from the analysis outputs by `scripts/export_numbers.py`.

Executive summary

Hong Kong's five petrol retailers (Caltex, Esso, PetroChina, Shell and Sinopec) almost always post the same pump price. This paper asks whether that pattern is what a small market with common costs would produce, or whether it shows features that costs do not explain. It uses 2,373 days of brand-level posted prices from the Consumer Council (30 April 2020 to October 2026), Hong Kong's monthly import price of petrol, and two comparison markets with many independent sellers: Los Angeles (weekly EIA retail and spot prices) and Perth (the price at every metropolitan station, every day, from FuelWatch).

- **Alignment is near total but not instantaneous.** The five brands posted the same Standard price on 87.6% of days. Of 143 price changes, all five brands matched within a week in 90% of cases, usually within 2 days, and by an identical amount in 83% of those. All five moved on the same day in only 1.4% of cases. One brand moves, the others follow.
- **Shell leads most often.** Of the 67 changes started by a single brand, Shell started 37, Esso 17 and Caltex 12.
- **Prices rise far more often than they fall.** 110 changes were increases and 33 were cuts. In 2023 and 2024 there were 17 increases and no cuts.
- **The margin over import cost and duty roughly doubled, before and after discounts.** On the posted price it averaged HK$8.76 a litre in the first twelve months of the sample and HK$19.03 in the last twelve. On the average price after walk-in discounts it went from HK$6.74 to HK$13.11. From January 2023 to December 2025 the posted price rose from HK$23.09 to HK$28.89 while the import cost fell from HK$5.23 to HK$4.29.
- **Hong Kong passes cost rises through faster than cost falls.** In the week of a change, 30% of a rise in world gasoline prices reaches the posted price and 7% of a fall does ($p = 0.009$). Los Angeles shows the same asymmetry, smaller (53% against 23%, $p = 0.028$). Perth does not show a significant one ($p = 0.280$).
- **Perth looks nothing like Hong Kong.** On a typical day the cheapest and dearest of Perth's 419 metropolitan stations are 38 cents a litre apart, and no single price is posted by more than 23% of stations. Prices follow a weekly cycle, from a Tuesday low of 155.9 cents to a Wednesday high of 187.1 cents.

None of this proves an agreement, and the paper does not claim one. Identical posted prices are what a concentrated market of sellers with the same costs would produce without any agreement; Hong Kong's Competition Commission made the same point in 2017. And because of walk-in discounts, the posted price is not what most buyers pay. What the screens show is narrower: posted prices move in a fixed leader-follower pattern, rise in small steps more often than they fall, and have drifted away from the cost of the product. Those are the patterns that, under competition law in Hong Kong and the United States, justify asking for more evidence (Section 6).

1 The question

Most drivers in Hong Kong never see two different pump prices for the same grade. The five brands that run nearly all of the city's petrol stations post identical prices for days or weeks at a time, then change them within a day or two of each other. In Los Angeles or Perth, stations a few hundred meters apart often post prices tens of cents a litre apart.

Uniform prices can come from two very different places. In a market with a few sellers, a homogeneous product, the same import costs and fully public prices, each seller can see that undercutting the others would be matched at once, so none of them does; prices settle at a common level with no agreement at all. The same outcome can also come from coordination, explicit or tacit. Competition law treats the two differently, and the first is lawful. The economic tools for telling them apart are screens: statistical tests that ask whether prices behave the way costs and independent decisions would make them behave (Harrington 2008).

This paper runs those screens on six years of Hong Kong's posted prices and puts two markets beside it. Los Angeles has many sellers, frequent price changes and a large literature on asymmetric pass-through. Perth has a legal regime that makes every station's price public a day in advance and a well-studied weekly price cycle (Wang 2009; Byrne and de Roos 2019). The comparison is the point: a screen that Hong Kong fails and Perth passes says more than either result alone.

2 Markets and data

Exhibit 1: Data sources

Series	Source and detail	Span
Hong Kong posted prices	Consumer Council pump-price file, every archived version on data.gov.hk (1,210 snapshots), five brands, three grades	Apr 2020 to Oct 2026
Hong Kong walk-in discounts	Consumer Council Oil Price Watch page, Internet Archive captures (119 days)	23 November 2020 to 20 July 2026
Hong Kong import cost	Census and Statistics Department table 915-91104, monthly unit value of unleaded petrol imports, HK$ per litre	Jan 2013 to Aug 2026
Los Angeles	EIA weekly retail price, regular gasoline, all formulations; EIA daily Los Angeles RBOB spot price	2020 to 2026
Perth	FuelWatch daily price at every metropolitan station, unleaded petrol (ULP)	Jan 2020 to Sep 2026
World gasoline cost	EIA daily US Gulf Coast conventional gasoline spot; FRED exchange rates	2020 to 2026

Hong Kong. The Consumer Council publishes each brand's posted pump price as a small file on the government's open-data portal. The portal keeps a copy whenever the file changes, which gives a record of every change since 30 April 2020. A day's price is the last snapshot taken that day; snapshots are usually harvested between 09:00 and 11:00, so a one-day gap between two brands can be an artifact of harvest timing. Both of Hong Kong's petrol grades are 98 RON (Competition Commission 2017a), the duty on petrol

has been HK$6.06 a litre since 1998 (Consumer Council 2026), and the analysis uses the Standard grade throughout. Walk-in discounts are not in the open-data file; they come from the Internet Archive's captures of the Council's comparison page. On those days the page's pump prices match the open-data file for 97.5% of brand-days, which checks both sources.

Costs. Hong Kong has no refinery and imports all its petrol. The monthly import unit value from the Census and Statistics Department is the closest public measure of what the retailers pay for the product. For weekly analysis, the US Gulf Coast spot price of gasoline, converted to local currency per litre, stands in for movements in world gasoline prices. It is a regular grade and not Hong Kong's 98 RON, so its level is not Hong Kong's cost; only its changes are used.

Perth. Western Australia's FuelWatch scheme requires Perth retailers to notify the next day's price by 2pm and hold it for 24 hours from 6am (Consumer Protection, Western Australia 2026). Every station's price is therefore public and fixed for a day, which makes Perth the cleanest comparison for a market where transparency is complete but sellers are many.

3 How Hong Kong's prices move

3.1 Alignment

On 87.6% of days from 30 April 2020 to October 2026, all five brands posted the same Standard price. On the remaining days the gap was small (a median of 20 cents) and closed within days. Exhibit 2 shows four busy months in 2026: the lines sit on top of each other except for short stretches after one brand has moved.

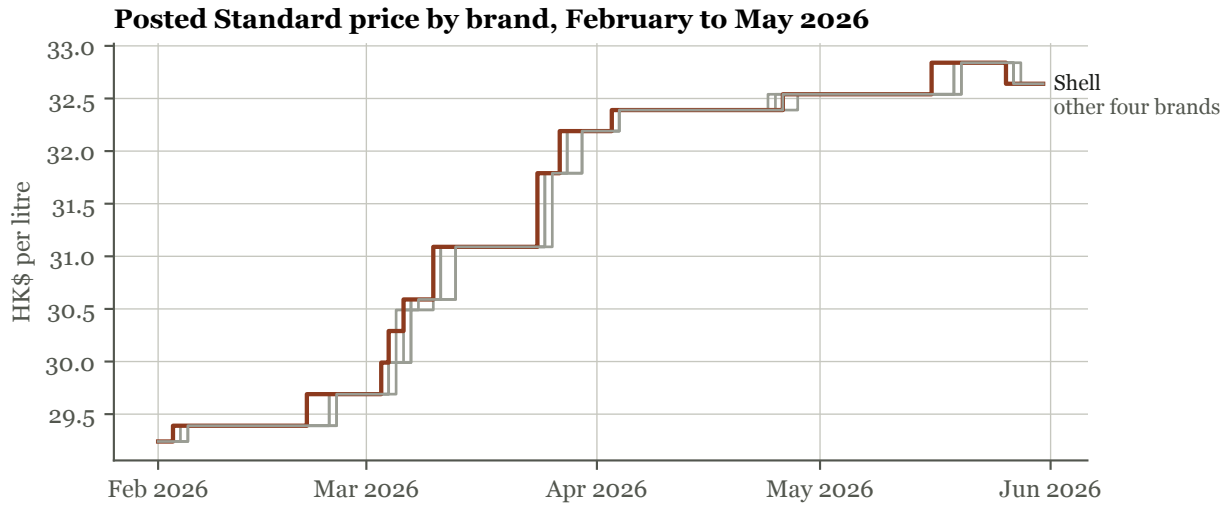


Exhibit 2: Shell moves first, the others follow within days. Posted Standard price by brand, daily.

Alignment was loosest in 2026 (78% of days), the year world gasoline prices swung most, and tightest in 2023 (96%). The gaps are the days it takes the followers to catch up.

3.2 Leaders and followers

A change episode starts with the first brand to change price and collects each other brand's first change in the same direction within seven days. There were 143 episodes for Standard petrol. All five brands moved within the week in 90% of them and by exactly the same amount in 83% of those. All five moved on the same day in 1.4%. Of the 15 episodes that not every brand joined, 8 were a single brand moving alone; in 2 of those the brand went back to its old price within two weeks.

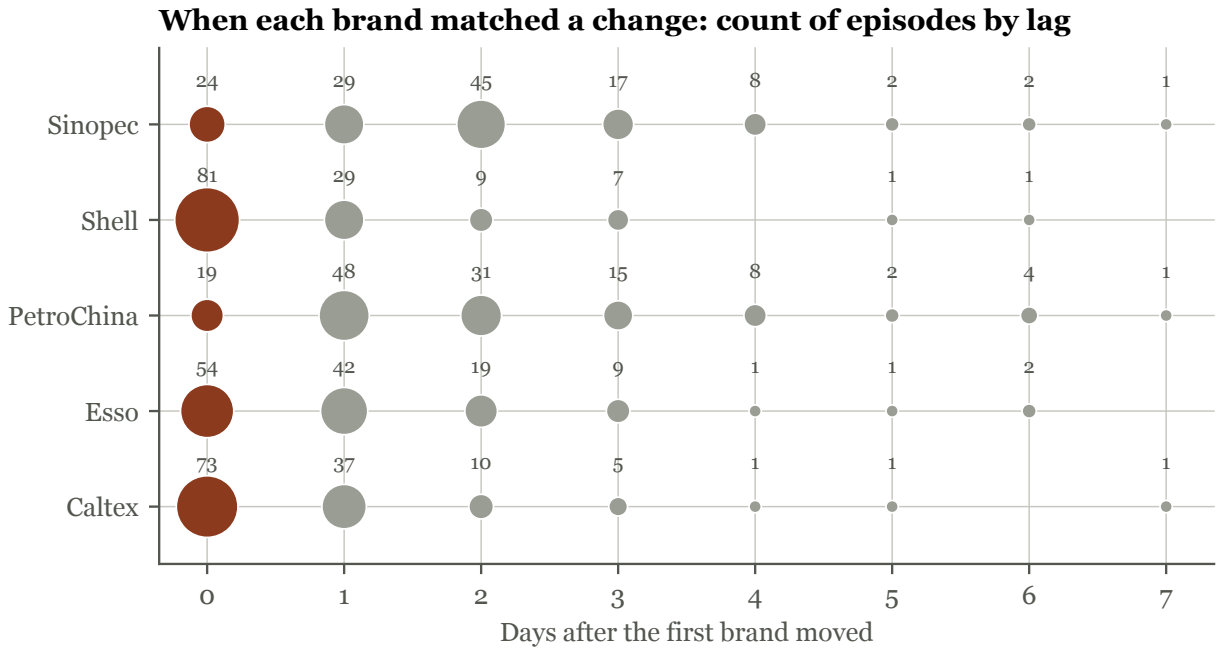


Exhibit 3: Caltex, Shell and Esso are usually first; PetroChina and Sinopec usually follow a day or two later. Number of complete episodes by brand and by days after the first move.

The order is stable (Exhibit 3). When one brand moved alone, it was Shell 37 times, Esso 17 times and Caltex 12 times; PetroChina and Sinopec almost never move first on their own. The premium grade shows the same pattern over a longer span. In January 2024 Shell raised its premium surcharge over Standard from HK$1.19 to HK$1.60. The other four held at HK$1.19 for a year, then moved to HK$1.60 between 7 and 11 January 2025. Three days later Shell raised its surcharge to HK$1.80, and all four matched within a week.

3.3 Rises and cuts

Of the 143 episodes, 110 were increases and 33 were cuts. The median increase was HK$0.20 a litre and the median cut HK$0.10. In 2023 and 2024 together there were 17 increases and no cuts. Small, frequent increases and rarer, smaller cuts are a pattern that cost movements alone would not produce: costs fell in those years.

4 Prices and costs

4.1 The margin over cost

Exhibit 4 splits the monthly posted Standard price into the import cost of the petrol, the fixed duty, and what is left: the margin that pays for storage, distribution, stations, land and profit. In the first twelve months of the sample the posted price averaged HK$17.55 and the margin HK$8.76. In the twelve months to 2026-08 the posted price averaged HK$30.49 and the margin HK$19.03. The import cost rose from HK$2.73 to HK$5.40 over the same span. Of the HK$12.94 rise in the posted price, HK$10.27 (79%) is margin and HK$2.67 is the cost of the petrol.

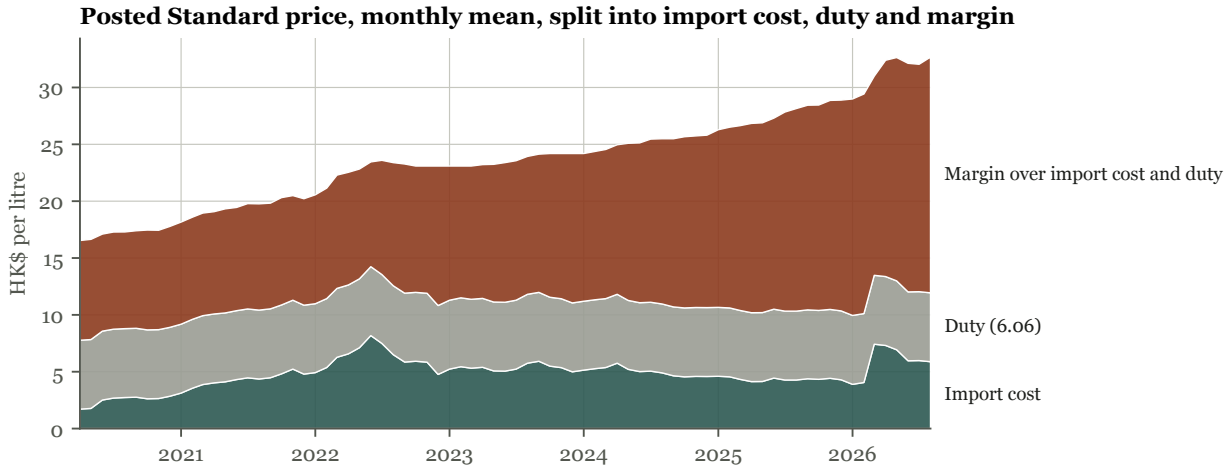


Exhibit 4: Most of the rise in the posted price since 2020 is margin. Monthly mean posted Standard price split into import unit value, duty and the remainder.

The clearest stretch is January 2023 to December 2025. The posted price rose from HK$23.09 to HK$28.89 while the import cost fell from HK$5.23 to HK$4.29. Some of the margin pays for costs that rose in those years, rents and wages among them, and this paper has no data on those. It is hard, though, for station operating costs to account for a margin that more than doubled in six years.

4.2 Discounts

The posted price is not what most buyers pay. Each brand advertises a walk-in discount for anyone who fills up, and deeper discounts for card and loyalty holders. The Consumer Council's comparison page, archived on 119 days between 23 November 2020 and 20 July 2026, shows the walk-in discounts widening as posted prices rose (Exhibit 5). The largest walk-in discount on Standard was HK$3.50 on the first archived day and HK$7.00 on the last; the cheapest net price went from HK$13.99 to HK$25.04, against posted prices of HK$17.49 and HK$32.04.

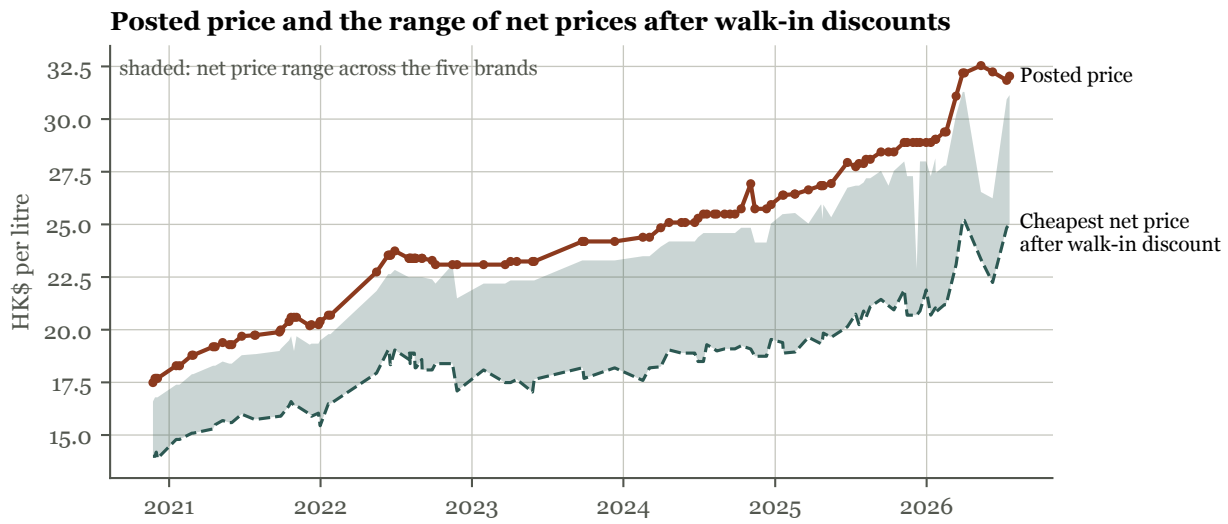


Exhibit 5: Discounts widened as posted prices rose, but net prices rose too. Posted Standard price and the range of net prices after each brand's walk-in discount, on days the Consumer Council page was archived.

Discounts do not explain the rising margin away. The average walk-in discount across the five brands was HK$2.44 a litre in the first year of archived pages and HK$5.52 in the last. Taking the average net price instead of the posted one, the margin over import cost and duty went from HK$6.74 to HK$13.11, close to the same doubling. Card and loyalty discounts are deeper still and are not observed, so the margin on an average sale is lower than this, and how it changed is unknown.

The discounts do show that brands compete on net price: on any given day they differ widely across brands. But they sit on top of a posted price that does not differ, and the Competition Commission found the discount system "complex and opaque" and "not a perfect substitute for price competition" (Competition Commission 2017a).

4.3 Pass-through

The standard test for asymmetric pass-through is an error-correction model in which retail price changes respond separately to rises and falls in cost (Borenstein et al. 1997). Each market is estimated on weekly data with four lags of cost changes and one lag of the retail change; Hong Kong's long-run relation includes a time trend because its margin drifts upward (about HK$2.08 a litre a year). Exhibit 6 shows the simulated response to a permanent one-unit change in cost.

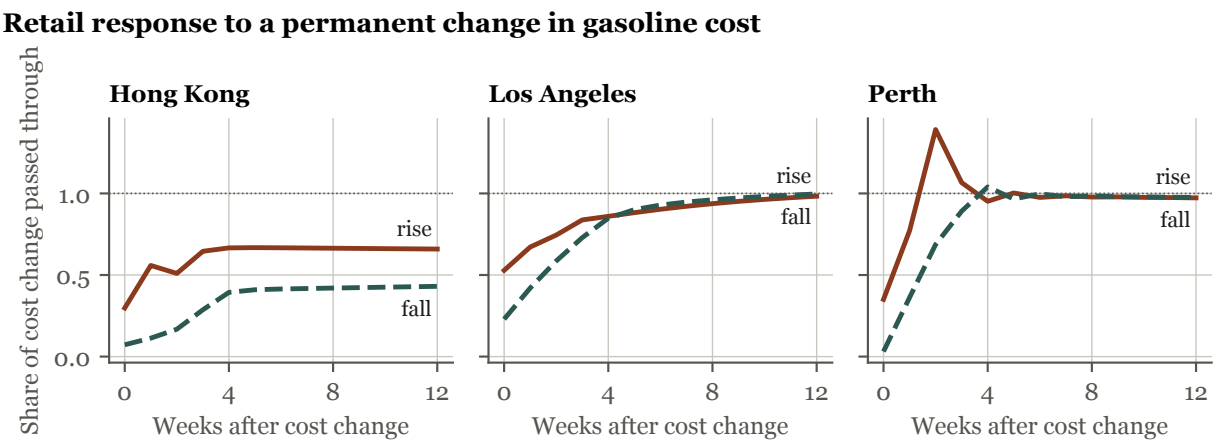


Exhibit 6: Hong Kong and Los Angeles pass cost rises through faster than falls; Perth does not, once its weekly cycle is accounted for. Cumulative share of a permanent cost change passed to the retail price.

Exhibit 7: Share of a cost change passed through, by week

	Week 0		Week 4		Rise = fall,
Market	Rise	Fall	Rise	Fall	weeks 0 to 1 (p)
Hong Kong (posted, Monday)	30%	7%	67%	39%	0.009
Los Angeles (EIA weekly)	53%	23%	86%	85%	0.028
Perth (Tuesday median)	35%	3%	95%	104%	0.280

Cost is the Los Angeles RBOB spot price for Los Angeles and the US Gulf Coast spot price in local currency for Hong Kong and Perth. Newey-West standard errors. Results with six and eight lags, and for Perth at the weekly mean and the Wednesday peak, are in `results/passthrough_robustness.csv`; the Hong Kong and Los Angeles asymmetries are significant at 5% in every specification and Perth's in none.

Hong Kong's asymmetry is the largest of the three. Part of it is mechanical: the posted price changed in only 66% of weeks, against nearly every week in Los Angeles and Perth, so any lag in adjusting shows up as slow pass-through in both directions. The asymmetry is the part that is not mechanical. Rises are passed on faster than falls, and in the long run less than half of a fall is passed on at all.

5 The comparison markets

Los Angeles. Retail prices in Los Angeles track the spot price closely (a correlation in levels above 0.95), change almost every week, and show the familiar "rockets and feathers" asymmetry: 53% of a cost rise reaches the pump within the week against 23% of a fall, though both are almost fully passed through within three months. The asymmetry is consistent with consumer search costs and is not, by itself, evidence of coordination (Borenstein et al. 1997).

Perth. Perth combines complete price transparency with many sellers: about 419 metropolitan stations under dozens of brands. On a typical day the gap between the cheapest and dearest station is 38 cents a litre and the interquartile range 6 cents. Medians by brand differ by about 10.4 cents. Prices follow a weekly cycle in which the major brands restore prices on the same day each week and then undercut each other back down

(Exhibit 8). Byrne and de Roos (2019) show that this cycle is itself a coordination device: over a three-year transition, the dominant firms used price leadership and price experiments to settle the market on a focal weekly pattern. So Perth is no benchmark of pure competition either. What it shows is that full transparency among many sellers ends each week in a synchronized restoration followed by a price war.

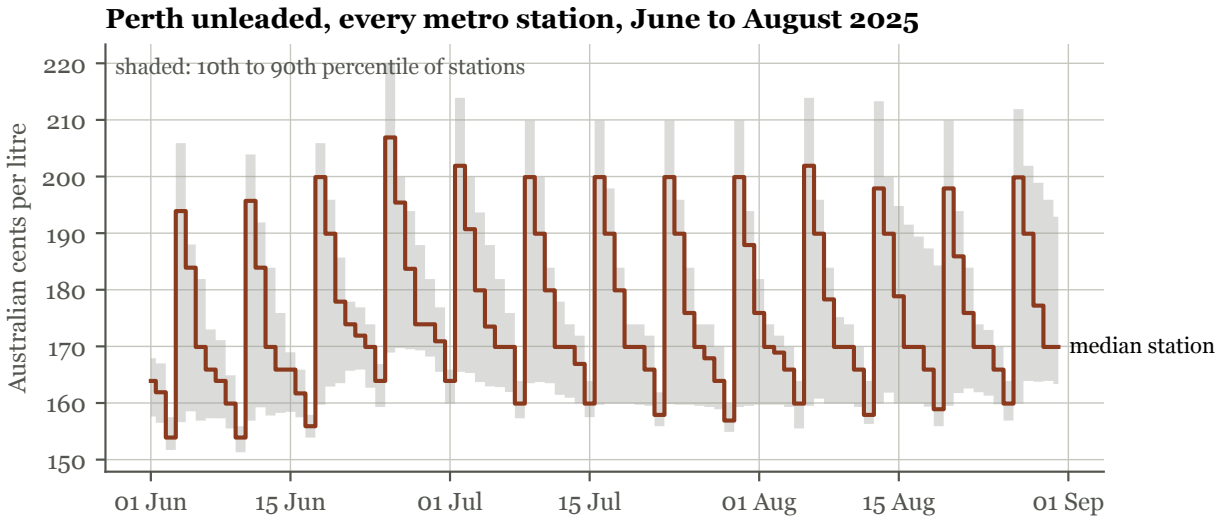


Exhibit 8: Perth's prices cycle every week and spread widely across stations. Daily median and 10th to 90th percentile of metropolitan unleaded prices.

6 What the screens can and cannot show

The legal standard. In the United States, an agreement among competitors to fix prices is unlawful per se.[1] Parallel pricing is not. The Supreme Court has held that "conscious parallelism" has "not yet read conspiracy out of the Sherman Act entirely",[2] but that parallel conduct alone is "just as much in line with a wide swath of rational and competitive business strategy" and must be placed "in a context that raises a suggestion of a preceding agreement".[3] Hong Kong's First Conduct Rule, in force since December 2015, prohibits agreements and concerted practices that harm competition.[4] Both regimes require something beyond identical prices.

What the evidence here supports. Each pattern in this paper has an innocent reading. Identical posted prices follow from identical costs and public prices. A stable leader is what a price-leadership equilibrium looks like with or without an agreement. Asymmetric pass-through appears in competitive markets with search costs. A rising margin can reflect rising land and labor costs. What the screens add is that the patterns occur together, persist for six years, and are strongest exactly where cost explanations are weakest: increases with no cuts through two years of falling import costs. In the language of screening, Hong Kong fails the screens that Perth and Los Angeles pass or fail more mildly, and that is a reason to ask for more evidence.

What would distinguish the explanations. Station-level operating costs and land rents would show how

[1] *United States v. Socony-Vacuum Oil Co.*, 310 U.S. 150 (1940).
[2] *Theatre Enterprises, Inc. v. Paramount Film Distributing Corp.*, 346 U.S. 537, 541 (1954).
[3] *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544 (2007) (Part II).
[4] Competition Ordinance (Cap. 619) s. 6; the conduct rules came into force on 14 December 2015.

much of the margin is cost. The timing of price notices (when each brand tells the Consumer Council of a change, and whether brands learn of each other's changes before the public does) would show whether the leader-follower pattern runs through public information or around it. Walk-in and card discount terms by date, which the Council collects but does not publish as data, would show whether the net prices that customers pay move in lockstep as the posted prices do. The Competition Commission's 2017 study described the follow-within-a-day-or-two pattern documented here and concluded that, on its own, it "reveals very little about whether firms are competing or coordinating" (Competition Commission 2017b). It recommended prominent display of pump prices and walk-in discounts, more station sites, and a review of how sites are tendered (Competition Commission 2017a). The margin in the years since, on posted and on net prices, has roughly doubled.

7 Limitations

- The Hong Kong record starts in April 2020, the first version kept by the open-data archive. Earlier years, including the period of the Commission's study, are not covered.
- Day-level timing in Hong Kong depends on when the archive harvested the file. A one-day gap between brands may be a harvesting artifact; the leader-follower order across 143 episodes is not.
- The import unit value is monthly and averages consignments, so it lags spot prices. The weekly pass-through model uses a world gasoline price that is a different grade from Hong Kong's.
- The margin is gross. It includes storage, distribution, station costs and rents, none of which are observed.
- Discounts are observed only on archived days, and card and loyalty discounts are not observed at all.

A Method notes

Episodes. For each grade, a change is any day on which a brand's posted price differs from the day before. Changes are processed in date order; an episode opens with the earliest unassigned change and collects, for each brand, its first unassigned change in the same direction within seven days. Lags are measured in days from the opening change.

Pass-through model. For retail price r_t and cost x_t in the same units, the long-run relation $r_t = c + \theta x_t \ (+ \delta t)$ is estimated in levels, and the short-run model is

$$\Delta r_t = a + \sum_{k=0}^{4} \left(\beta_k^{+} \Delta x_{t-k}^{+} + \beta_k^{-} \Delta x_{t-k}^{-}\right) + \phi \, \Delta r_{t-1} + \gamma \left(r_{t-1} - \hat{c} - \hat{\theta} x_{t-1} - \hat{\delta}(t-1)\right) + \varepsilon_t,$$

where Δx^{+} keeps cost rises and Δx^{-} keeps cost falls. Responses are simulated from the fitted coefficients for a permanent unit step. The asymmetry test is a Wald test that $\beta_0^{+} + \beta_1^{+} = \beta_0^{-} + \beta_1^{-}$, with Newey-West standard errors.

Data decisions are listed in `docs/decisions.md` in the repository, including the treatment of one-snapshot reporting faults in the premium series and the choice of Perth's Tuesday price.

References

Borenstein, Severin, A. Colin Cameron, and Richard Gilbert (1997). "Do Gasoline Prices Respond Asymmetrically to Crude Oil Price Changes?" In: *Quarterly Journal of Economics* 112.1, pp. 305–339.

Byrne, David P. and Nicolas de Roos (2019). "Learning to Coordinate: A Study in Retail Gasoline". In: *American Economic Review* 109.2, pp. 591–619. DOI: 10.1257/aer.20170116.

Competition Commission (May 4, 2017a). *Competition Commission Announces Findings of Its Study into Hong Kong's Auto-fuel Market*. Press release. Hong Kong: Competition Commission. URL: https://www.compcomm.hk/en/media/press/files/20170504_Competition_Commission_announces_findings.pdf.

– (May 2017b). *Study into Hong Kong's Auto-fuel Market: At a Glance*. Hong Kong: Competition Commission. URL: https://www.compcomm.hk/en/media/press/files/At_a_glance_final_Eng.pdf.

Consumer Council (2026). *Auto-fuel Price Trend: Explanatory Note*. URL: https://oil-price.consumer.org.hk/en/trend/explanatory-note (visited on 10/28/2026).

Consumer Protection, Western Australia (2026). *Commissioner's Blog: Use FuelWatch to Find Best Deal*. URL: https://www.wa.gov.au/government/announcements/commissioners-blog-use-fuelwatch-find-best-deal (visited on 10/28/2026).

Harrington Joseph E., Jr. (2008). "Detecting Cartels". In: *Handbook of Antitrust Economics*. Ed. by Paolo Buccirossi. Cambridge, MA: MIT Press.

Wang, Zhongmin (2009). "(Mixed) Strategy in Oligopoly Pricing: Evidence from Gasoline Price Cycles Before and Under a Timing Regulation". In: *Journal of Political Economy* 117.6, pp. 987–1030.