Tacitly Negotiating Collusion: A Study in Retail Gasoline

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Disclaimers: The interpretations of all results are those of the authors and do not necessarily represent those of the Australian Competition and Consumer Commission, Australian Government. Any references to collusion in the slides to talk are strictly in the economic and not legal sense.

On the need for smoked-filled rooms

How do firms figure out how to collude?

Standard models of collusion assume firms mutually understand (Harrington, 2017)

- when and how to raise prices
- who initiates price increases and how quickly rivals must follow
- how colluding firms respond to demand and cost fluctuations
- how cheating is detected and verified
- what to do if cheating occurs

Given their complexity, it is natural to assume firms explicitly communicate to construct and implement collusive arrangements (Green and Porter, 1984; Marshall and Marx 2014)

Prices as a medium of communication

Historically, human language is the assumed medium of communication among cartel members in forming collusive agreements

This presumption in our models of collusion motivates the use of, e.g., wiretaps to detect collusion and uncovering explicit agreements to prosecute it

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However, the rise of digitization, and in particular price information sharing platforms, raises the concern that prices can serve as medium of communication to construct and implement collusive agreements

- i.e., digital platforms can potentially provide a modern “smoked filled room”

These concerns suggest the scope for (tacit) collusion increases with digitally-enabled information sharing and may create challenges for antitrust enforcement, particularly in establishing the existence of anticompetitive agreements between firms

A metaphor

Australia has an organism – its retail gasoline industry – which uses price information sharing platforms to construct and implement collusive pricing arrangements

It is a useful organism because we can obtain long panels of high-frequency station-level price data from it to forensically study how oligopolists can exploit platforms to collude

In previous work, we show these platform-enabled firms use price leadership and experiments to construct, strictly through price-setting, stable collusive pricing structures (Byrne and de Roos 2019)

This paper

This paper continues this line of inquiry to further our understanding of how prices can serve as a medium of communication in facilitating collusion

We show collusion among firms, strictly through their prices, can entail:

1. Negotiations over the form collusive pricing structures take
2. Recurrent cheating without punishment

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1. Negotiations over the form collusive pricing structures take
2. Recurrent cheating without punishment

These findings shed new light on the limitations of implementing such (tacitly) collusive pricing structures in terms of

1. Punishing cheaters
2. Managing strategic uncertainty (Brandenburger 1996)

Related work

Empirical studies of tacit collusion and coordinated effects

Borenstein and Shepard (1996), Cramton and Schwartz (2000), Busse (2000), Knittel and Stango (2003), Wang (2009), Lewis (2012), Ciliberto and Williams (2014), Miller and Weinberg (2017), Byrne and de Roos (2019), Miller, Weinberg, and Sheu (2021)

Algorithmic and data-enabled collusion

Calvano et. al (2022), Assad et. al (2023), Musoff (2023), Leisten (2023), Asker et al. (2023), Byrne et al. (2023)

Roadmap

1. Context and data
2. An equilibrium transition
3. Negotiating tacit collusion
4. Margin impacts [incomplete]
5. Discussion

Context and data

Context

Retail gasoline market of Melbourne, Australia

- $\approx$ 4 million people
- 5 major retailers: BP, Caltex, Coles, Woolworths, 7-Eleven
- prices centrally set by the retailers
- Coles and Woolworths operate national supermarket chains

No major changes in market structure between 2006 and 2014

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Platform-enabled information sharing via Informed Sources

- subscribers upload station-level prices to a platform every 15 or 30 minutes
- observe prices for all other subscribers
- all 5 major retailers subscribe to the platform

Data

Daily station-level retail prices for 7-years (Informed Sources)

- 1 January 2007 - 1 January 2014
- focus on the 5 major brands
- $\approx$ 3 million station-date observations

Daily wholesale terminal gate prices (TGP) (Australian Institute of Petroleum)

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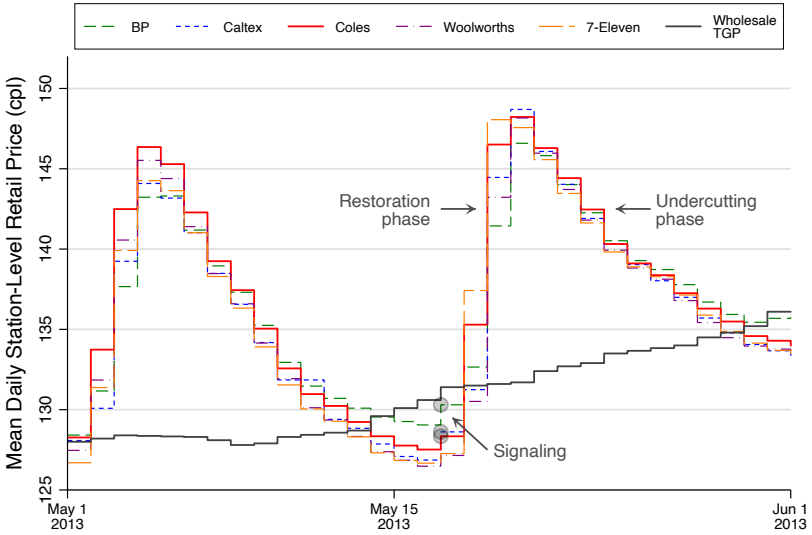
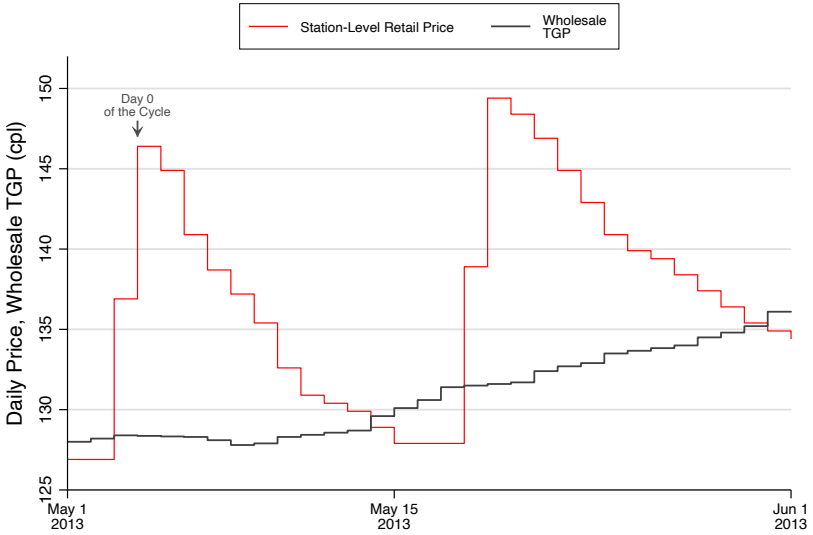
In sum, the context and data are characterized by

- unrestrained price setting
- perfect monitoring of rivals' current and past actions (no secret price-cutting)
- observable common daily cost shocks

Retail price cycles



Retail price cycles



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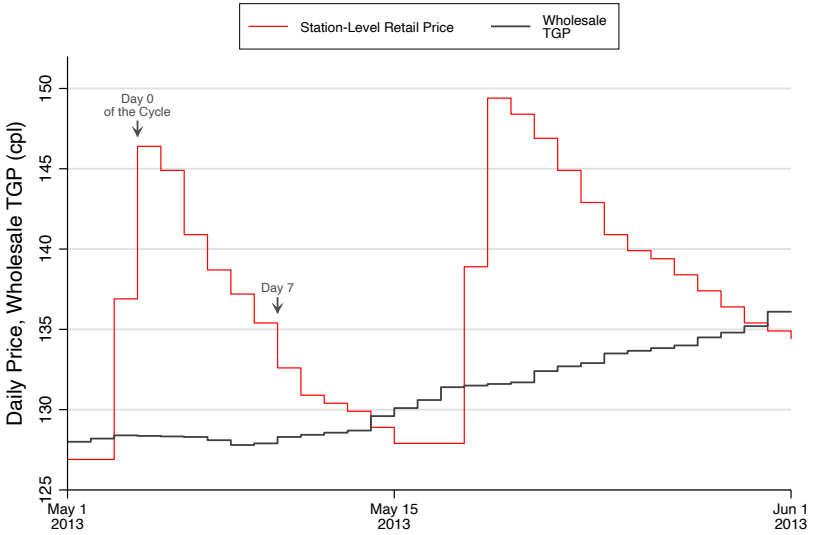

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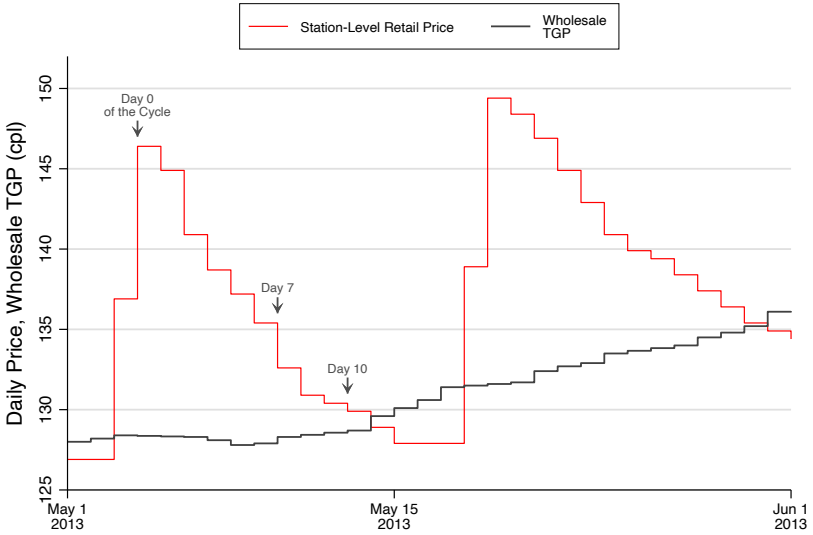

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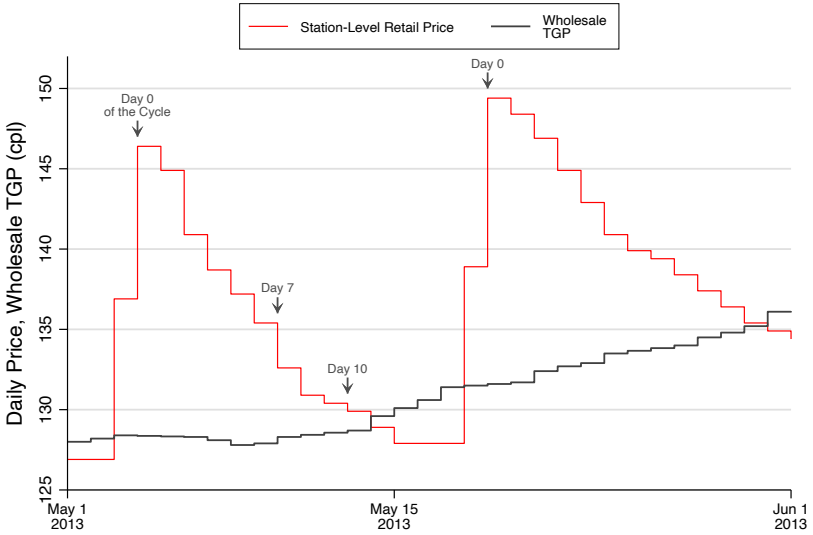
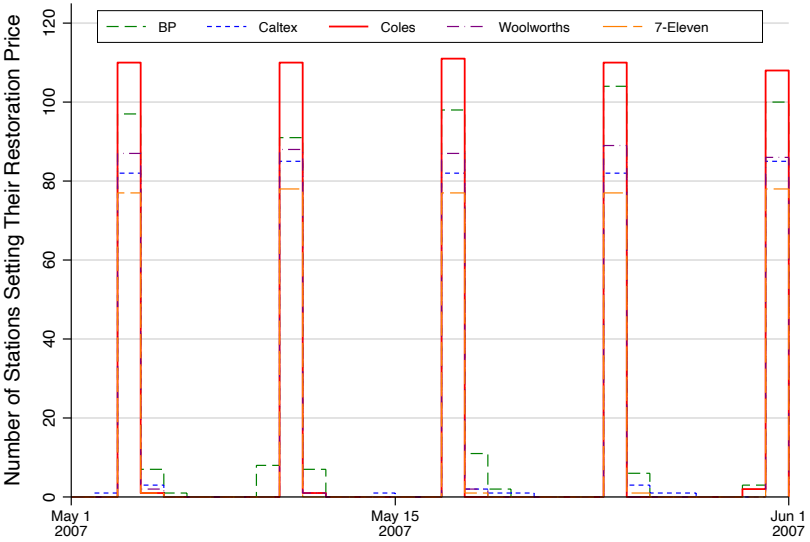
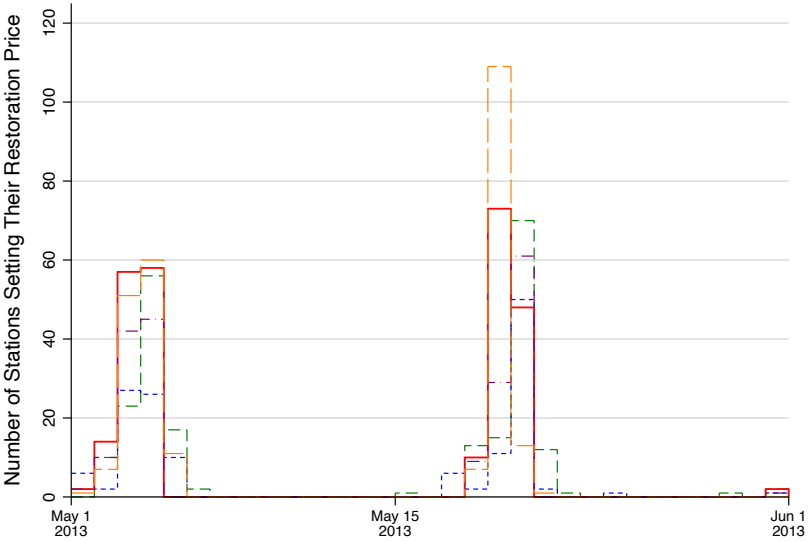


An equilibrium transition

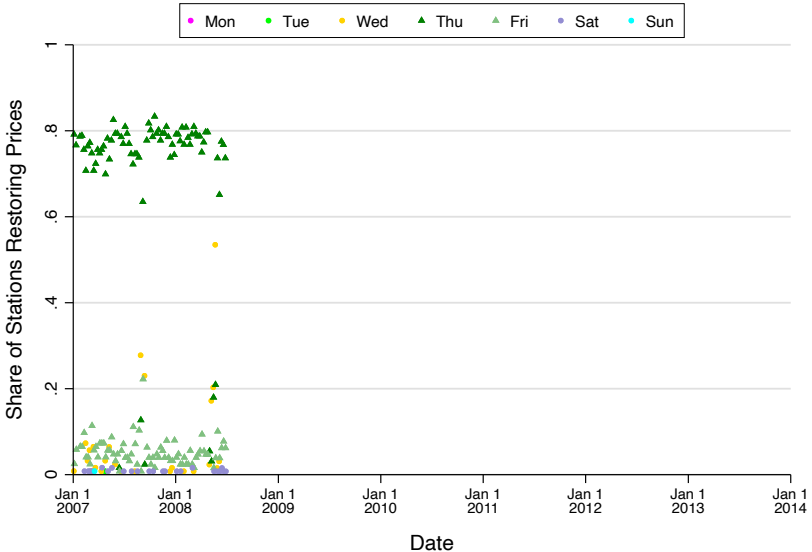
Price restorations: start of sample (2007)



Price restorations: end of sample (2013)



Price restorations by day of the week: BP



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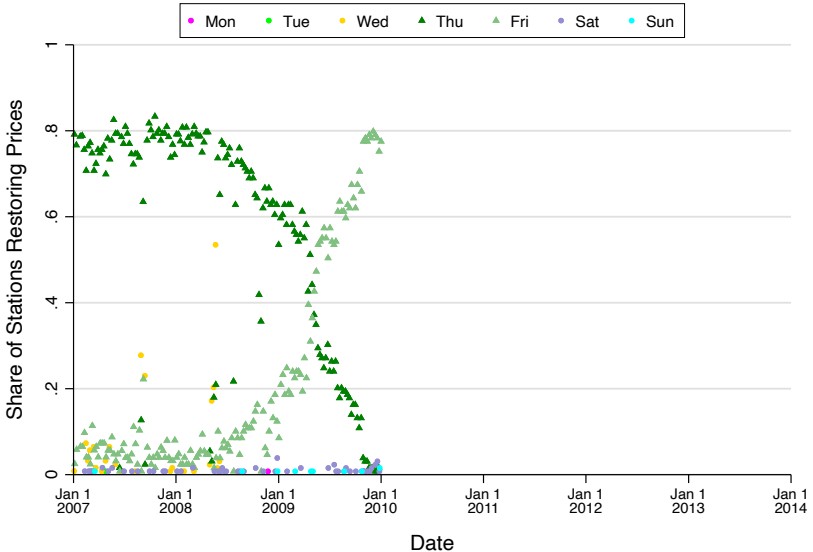

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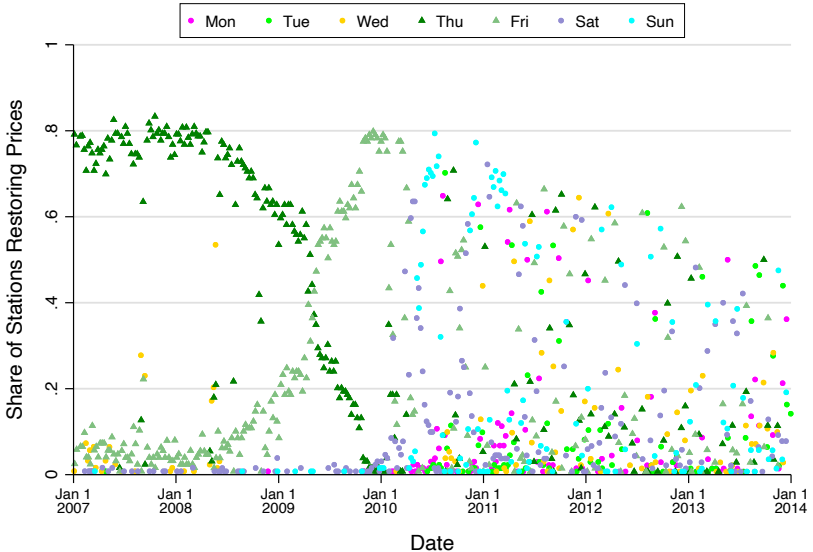
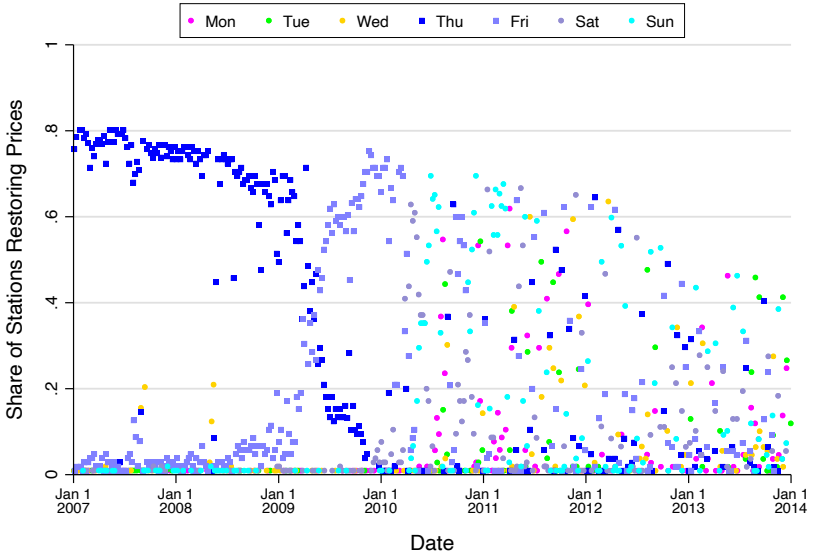
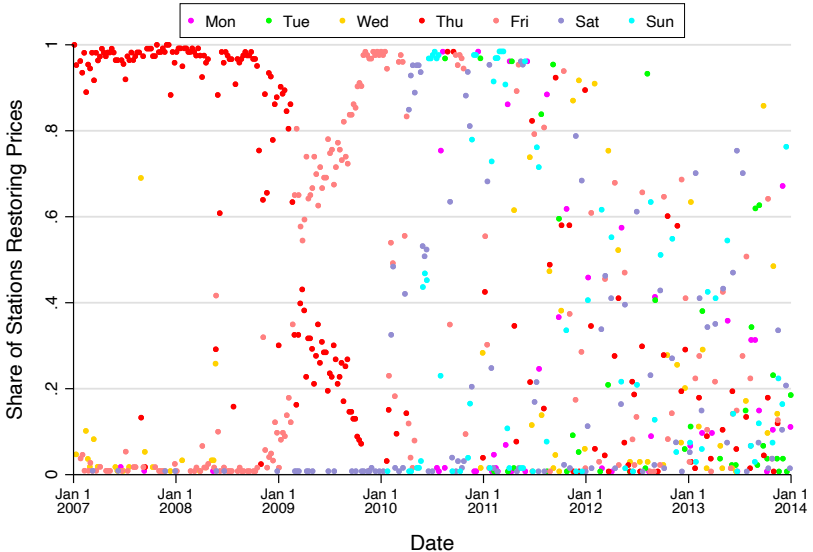


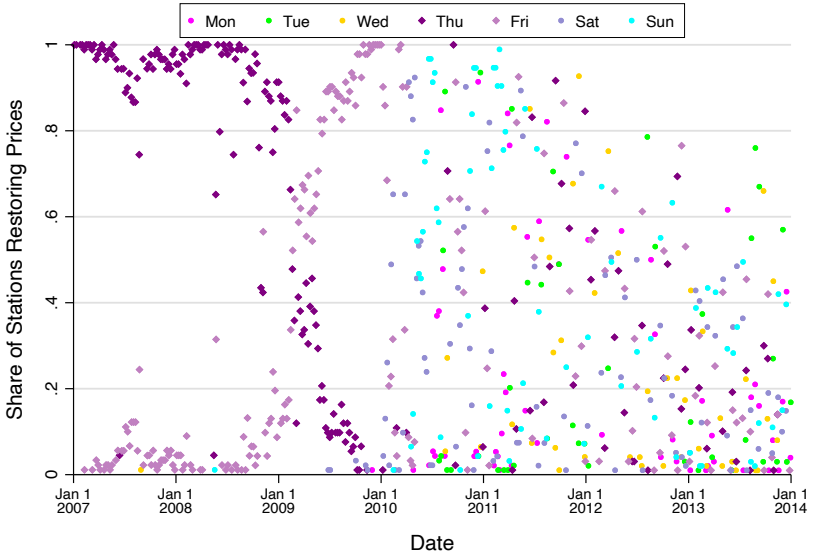
Price restorations by day of the week: Caltex



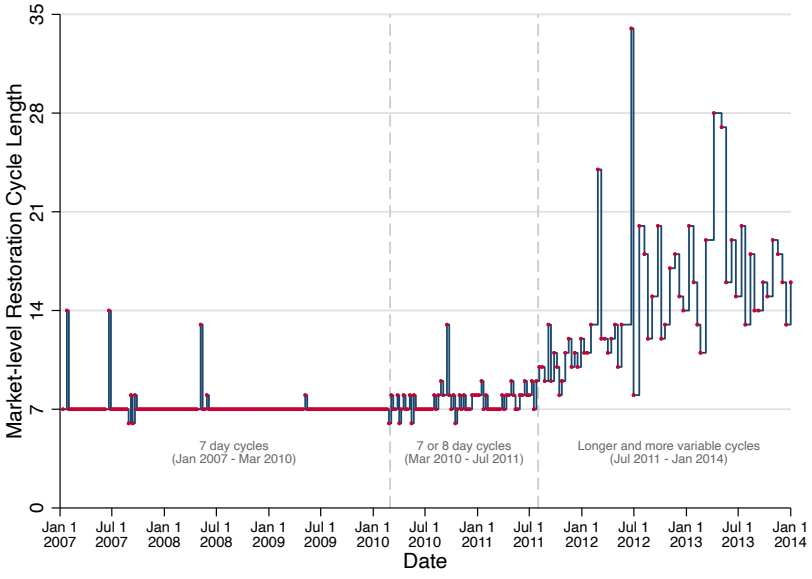
Price restorations by day of the week: Coles



Price restorations by day of the week: Woolworths



Market cycle length



Tacitly negotiating collusion

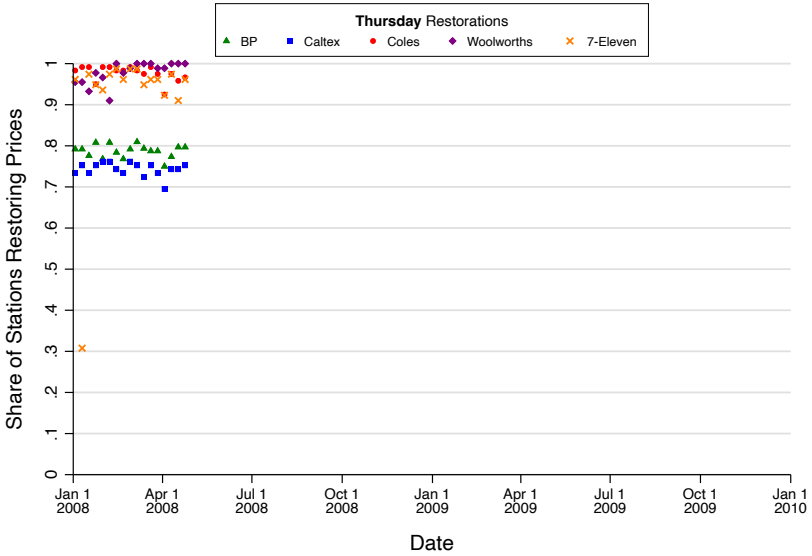
Forensics

"Zoom in" to dissect the evolution of tacit collusion between July 2008 and Jan 2014

Four phases emerge

- Jul 08 - Jan 10: Thursday $\rightarrow$ Friday focal day transition
- Jan 10 - Mar 10: Coordination breakdown and negotiation
- Mar 10 - Jul 11: Recurrent cheating and focal rule unravelling
- Jul 11 - Jan 14: Focal days abandoned for signaling

Phase 1: Thursday → Friday focal day transition



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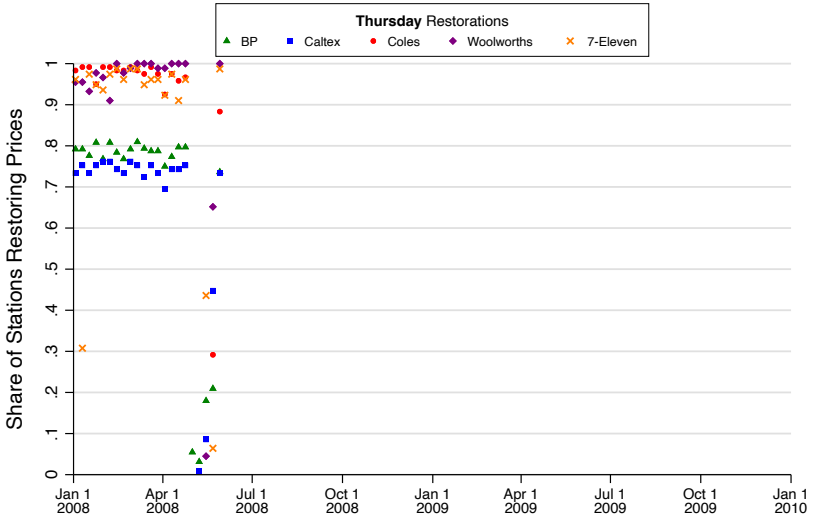

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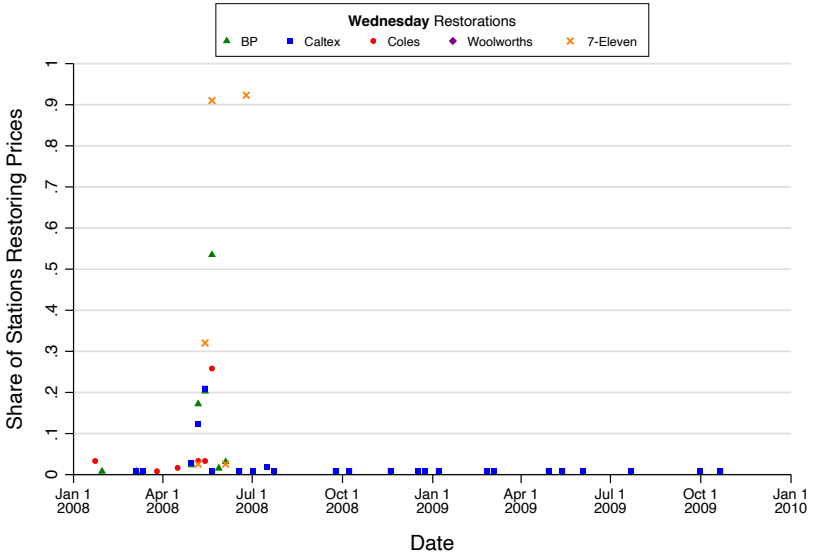

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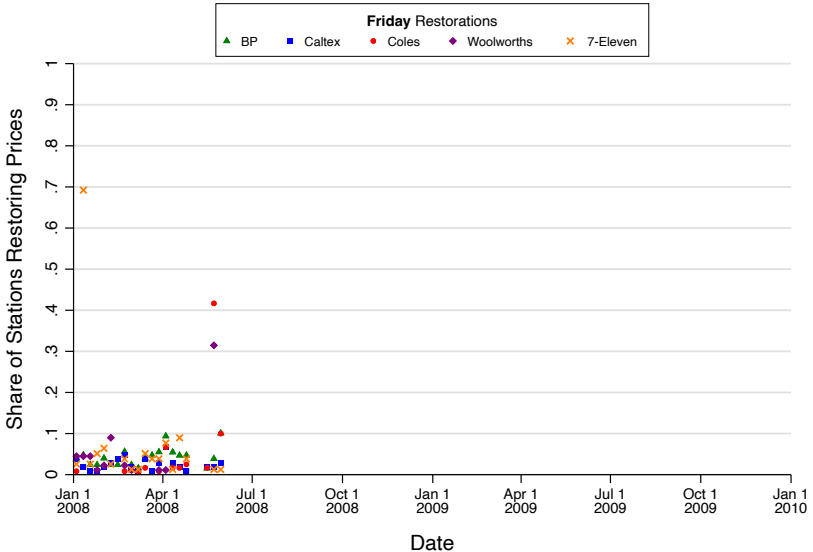

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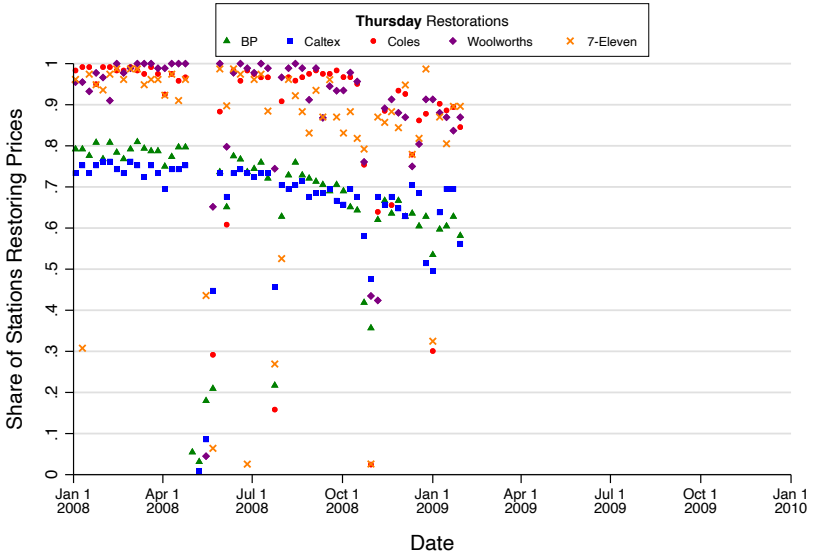

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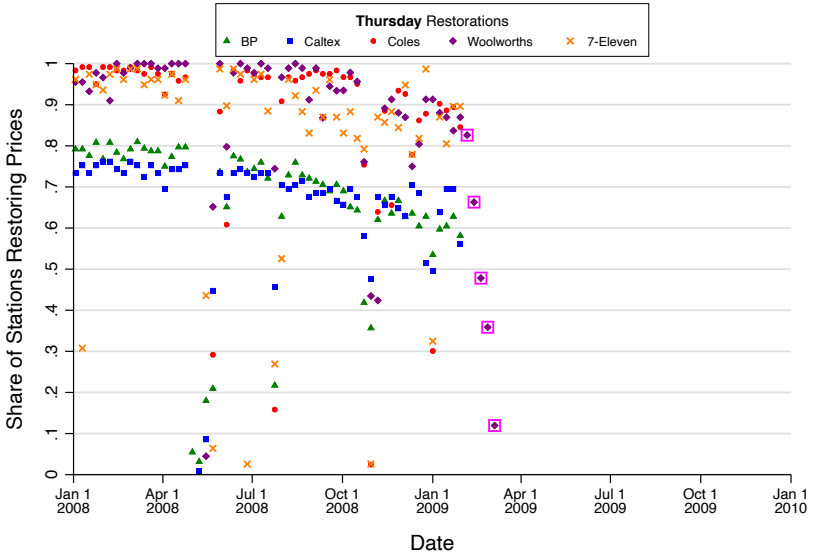

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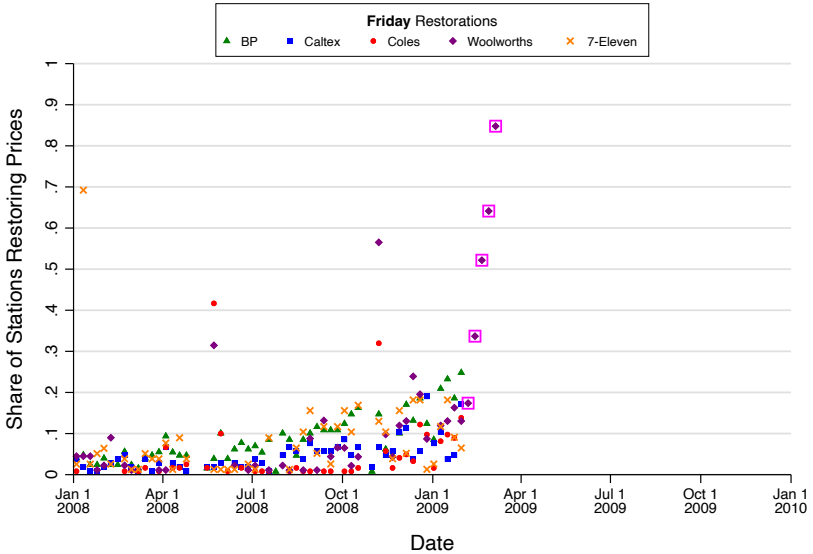

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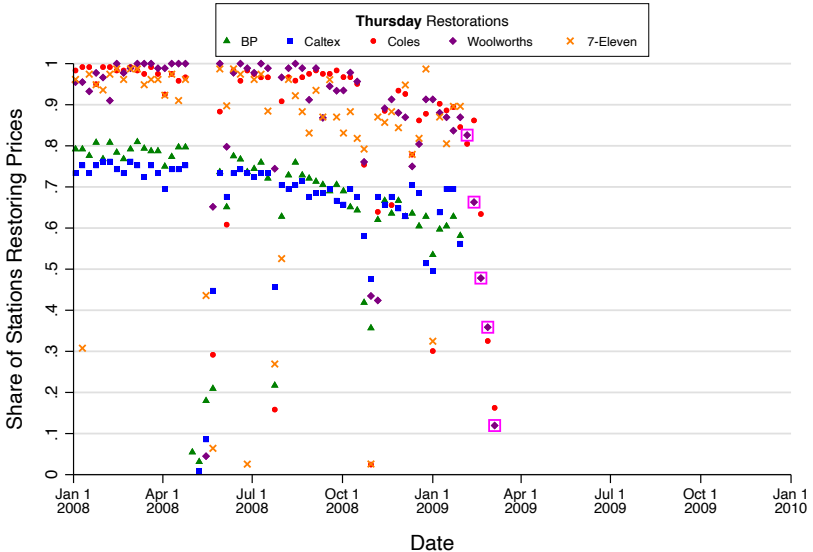

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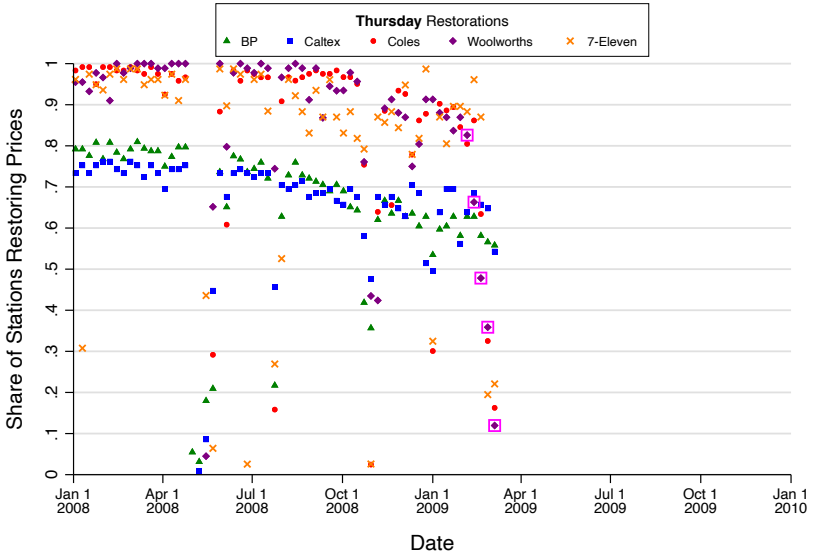

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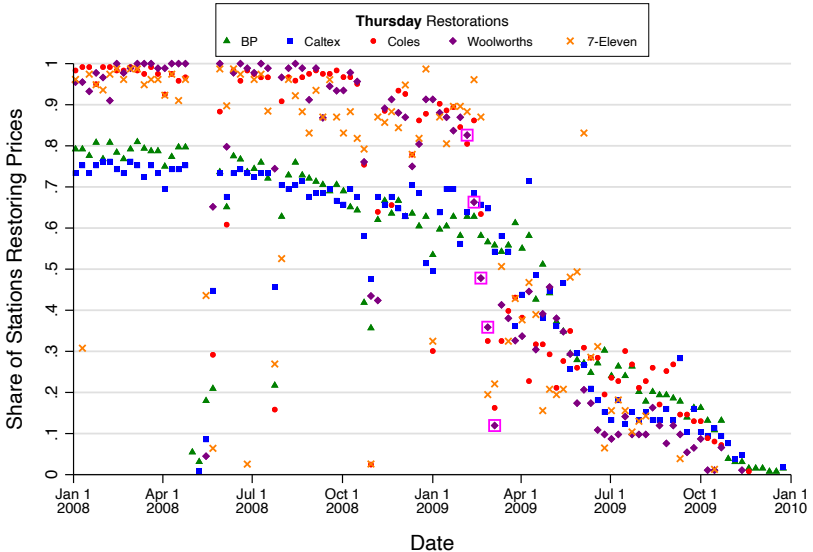

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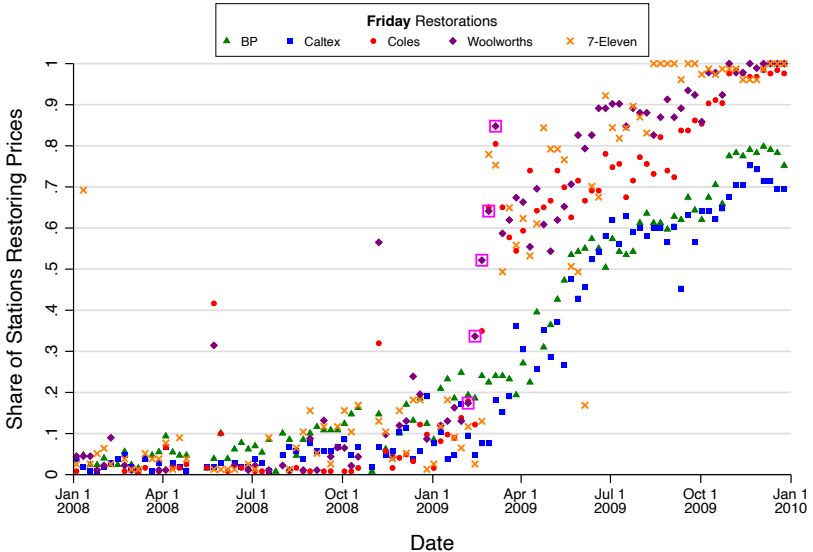

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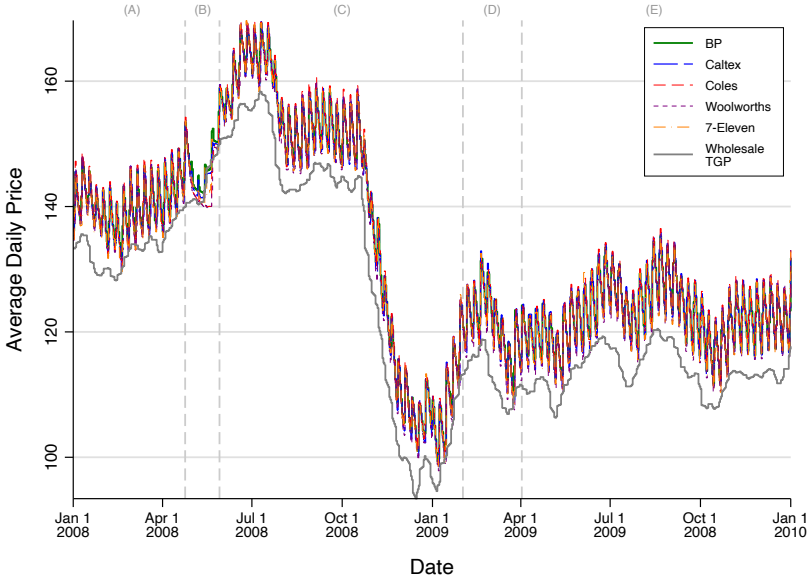

Phase 1: takeaways

Why Woolworths?

- Asymmetric retailers: Woolworths (and Coles) disproportionately benefit from (consistently) charging lower prices
- Woolworths (and Coles) are “efficient types” in negotiating collusive relationships (Clark and Houde 2013)

Phase 1: takeaways

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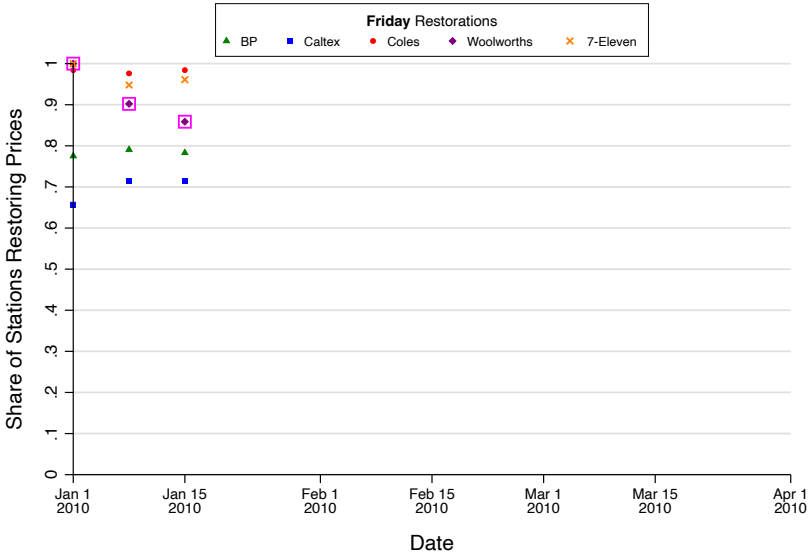
Why one year?

- Limited ability to communicate and implement punishment rules
- Strategic uncertainty

Phase 2: coordination breakdown and negotiation



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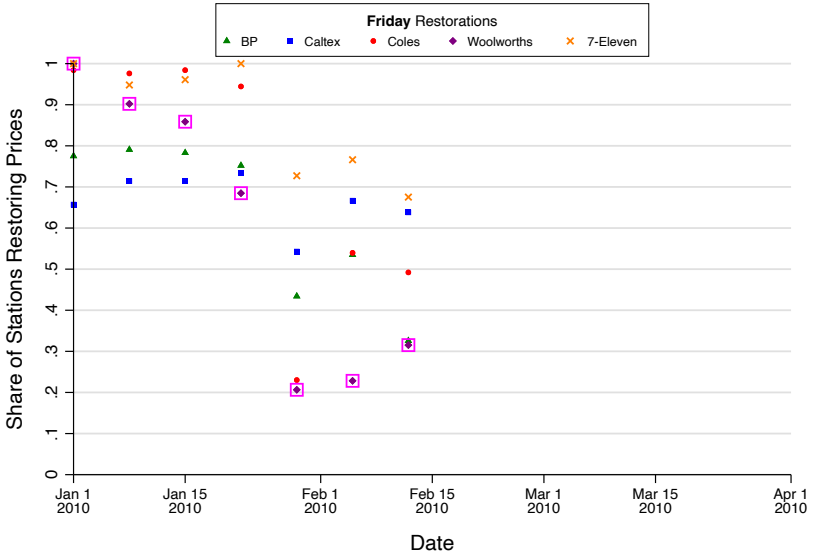

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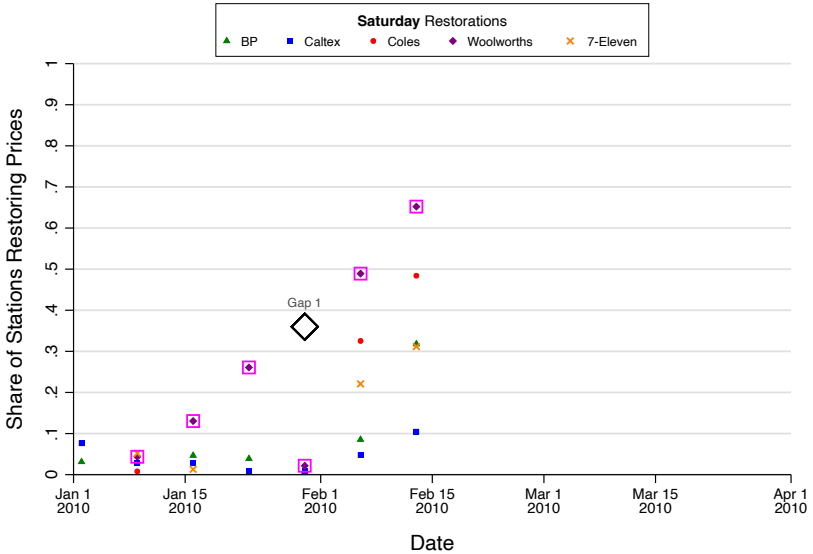

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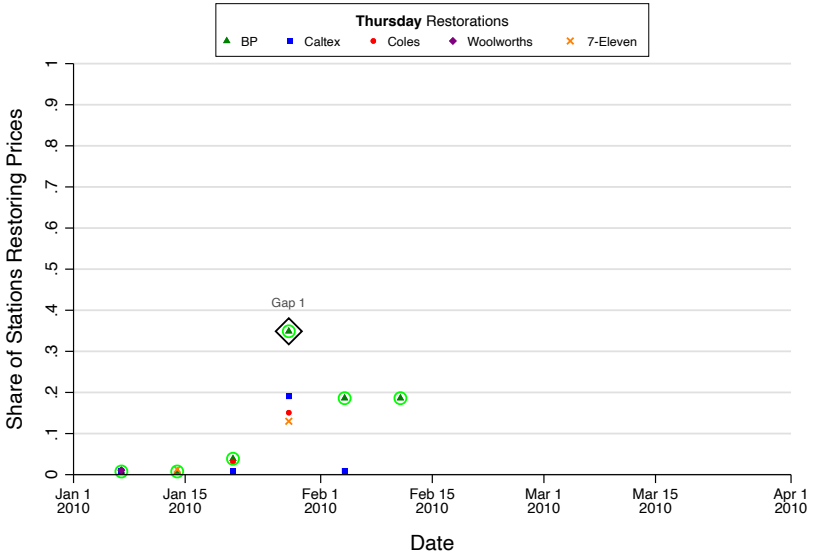

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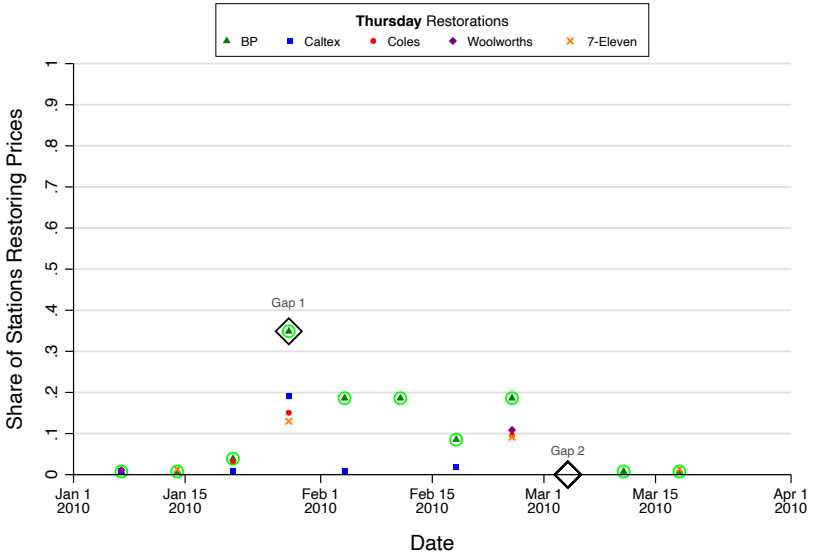

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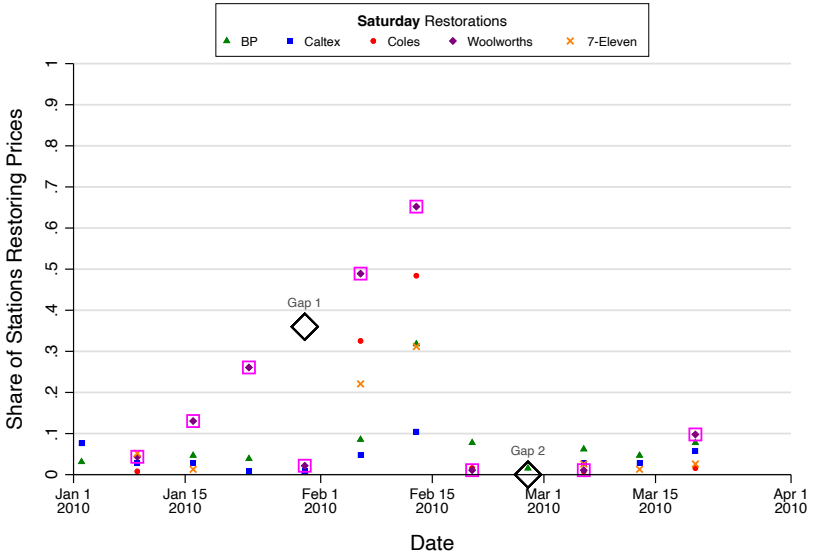

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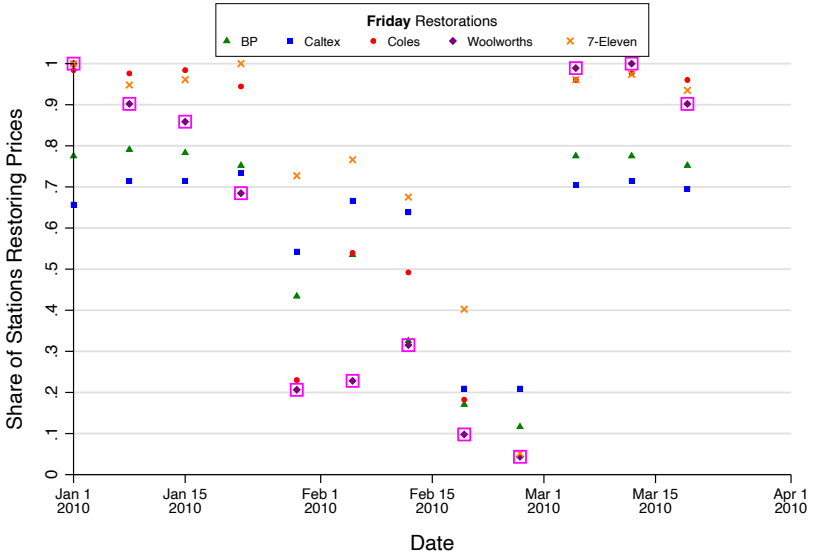

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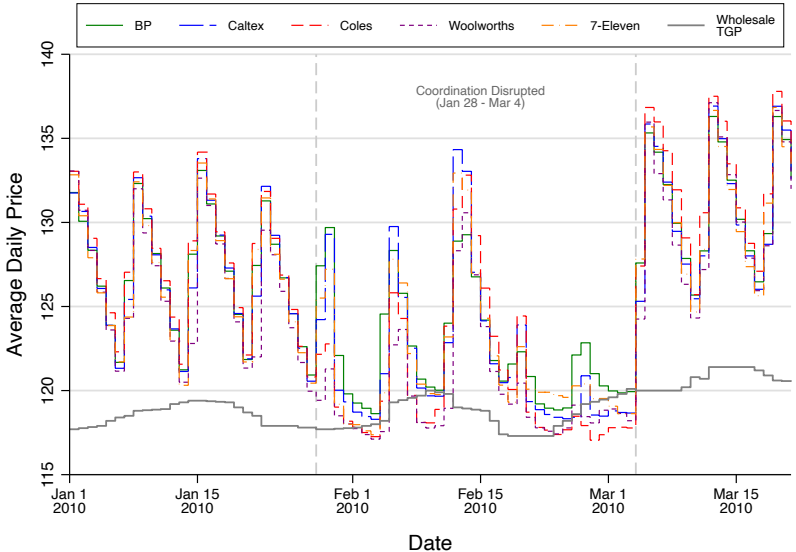

Phase 2: takeaways

Through their prices, platform-enabled firms can negotiate over the form of collusive pricing structures

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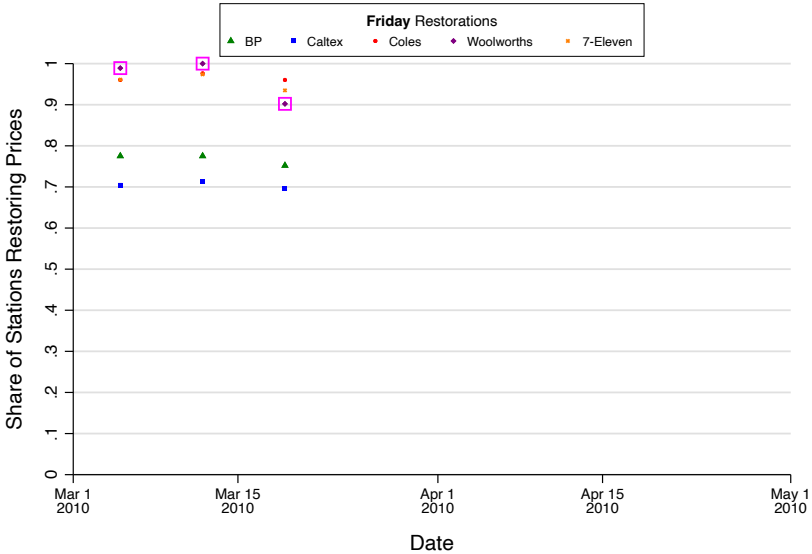
Through their prices, platform-enabled firms can negotiate over the form of collusive pricing structures

Negotiations end in a standstill with Friday re-established as the focal restoration day

- . . . but this would not last long

Phase 3: recurrent cheating and focal rule unravelling



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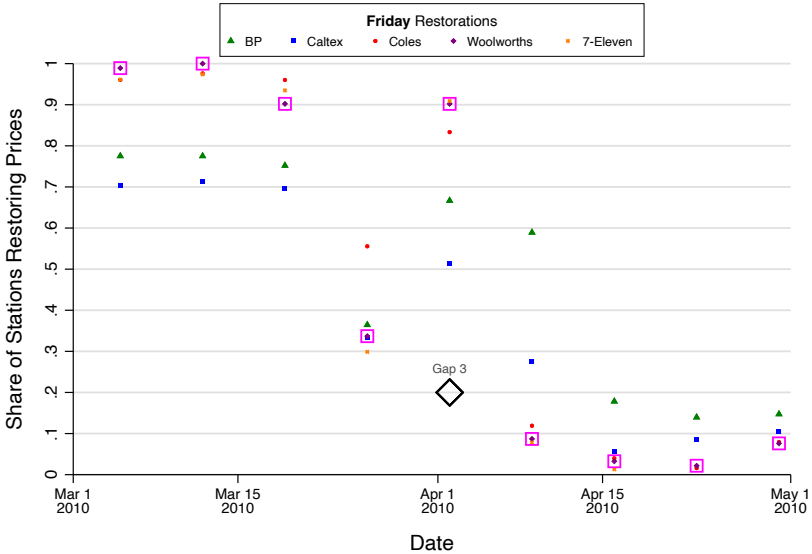

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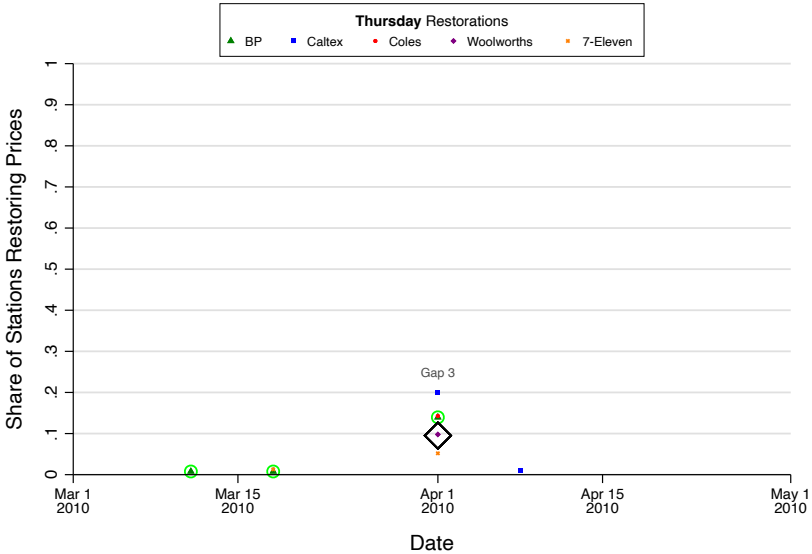

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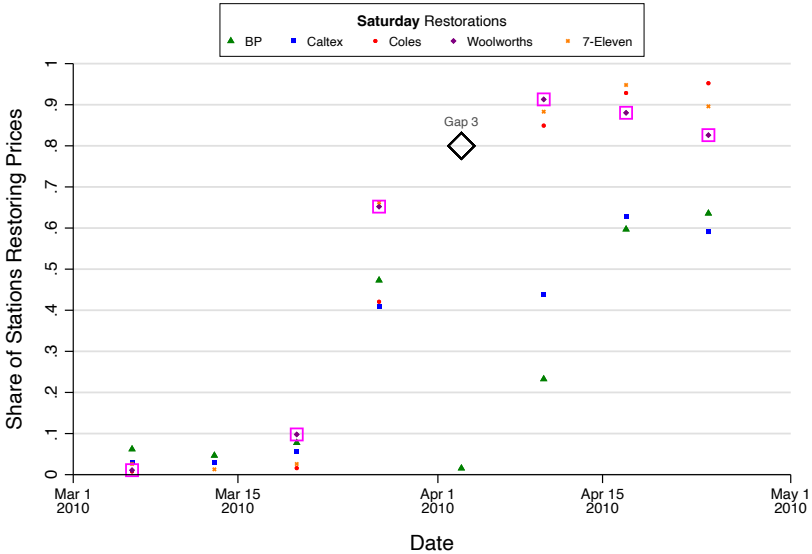

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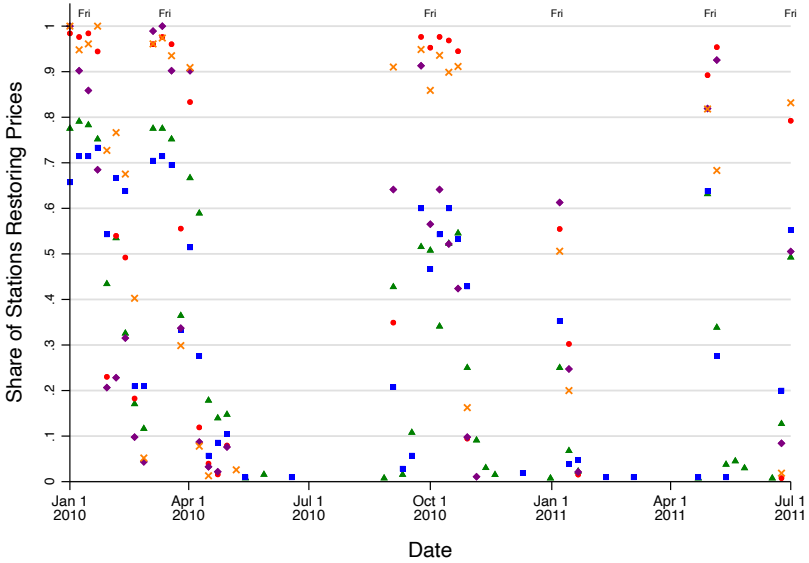

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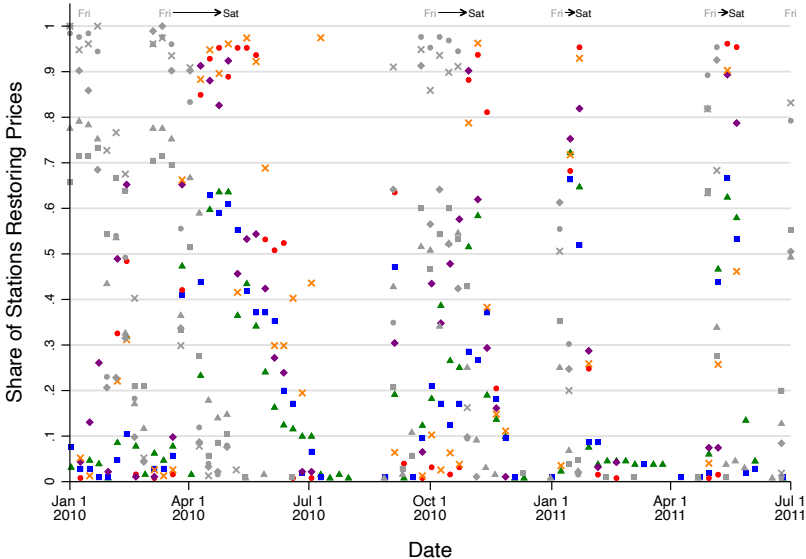

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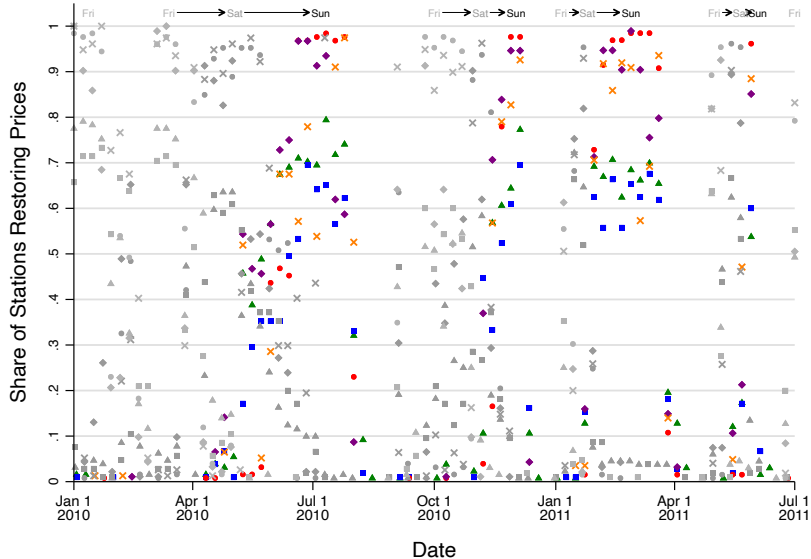

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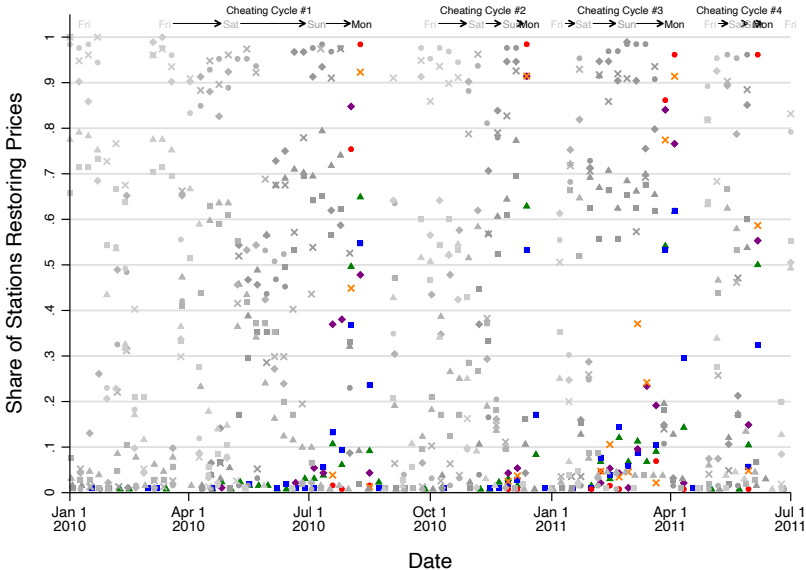

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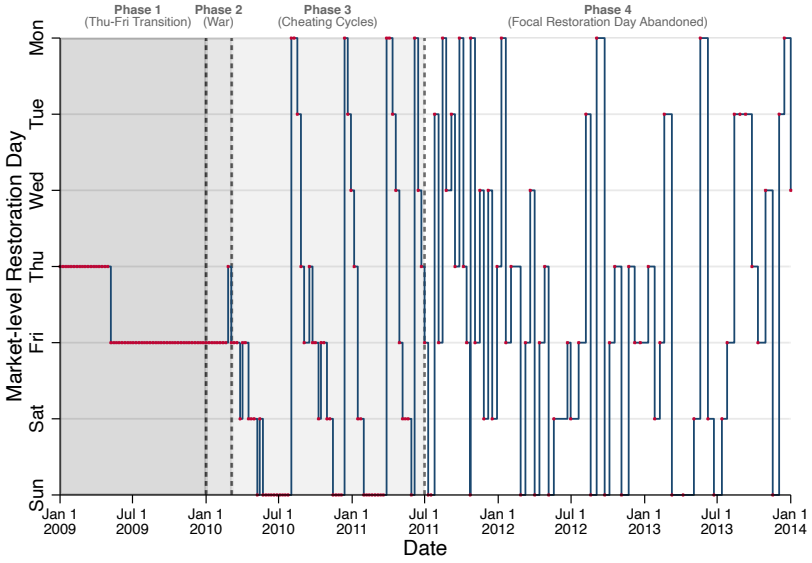

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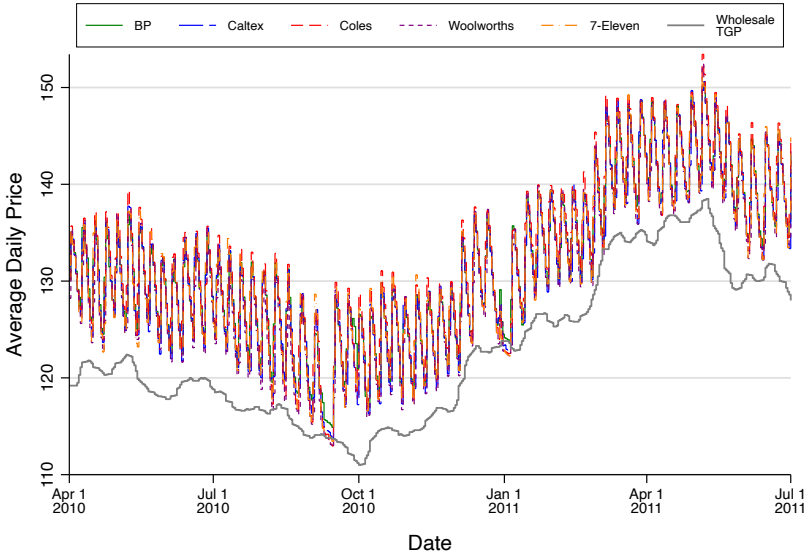

Phase 3: takeaways

Recurrent cheating for 18-months again underlines a challenge with tacit collusion: absent explicit communication, how do you punish cheating while (simultaneously) managing strategic uncertainty?

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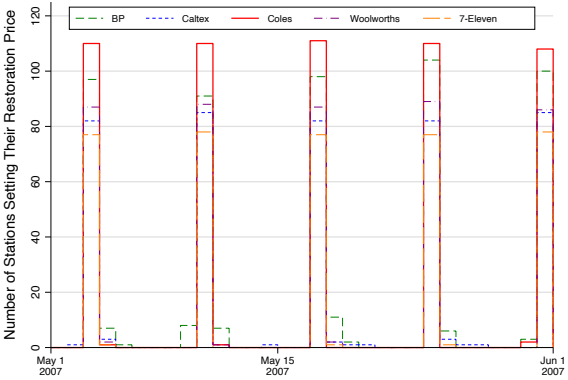
Woolworths flexes its bargaining position by repeatedly cheating and being a low-priced competitor, which is advantageous for their (primary) grocery business

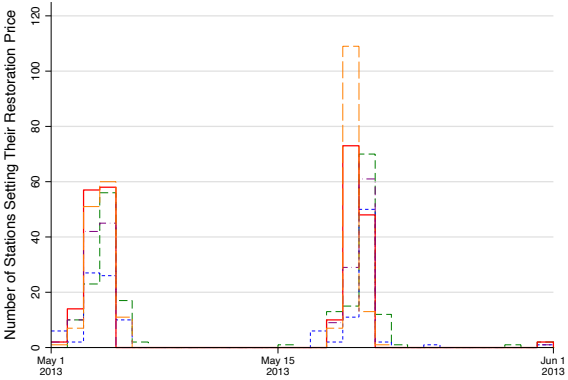
Rivals adapt to Woolworths by more quickly matching the timing of (delayed) price increases over time, thereby reducing the gains to recurrent cheating

Phase 4: focal restoration days abandoned

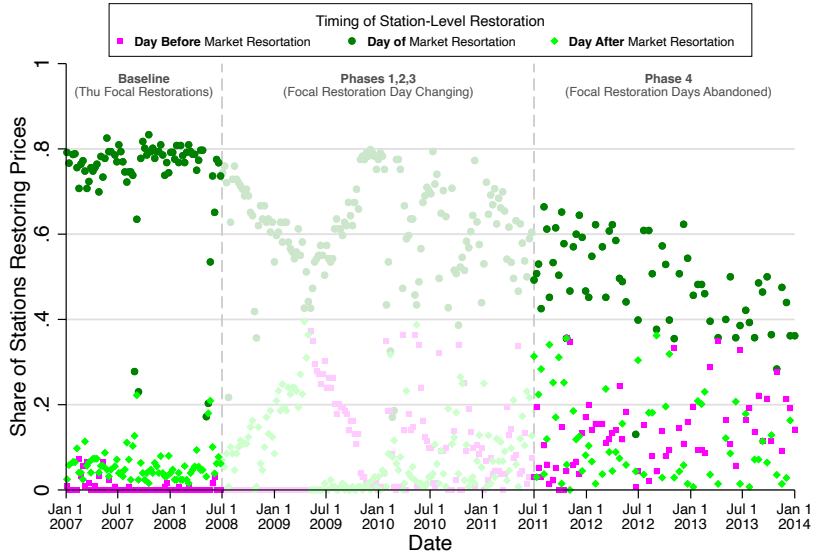
(a) Pre July-2011: Focal Restoration Days



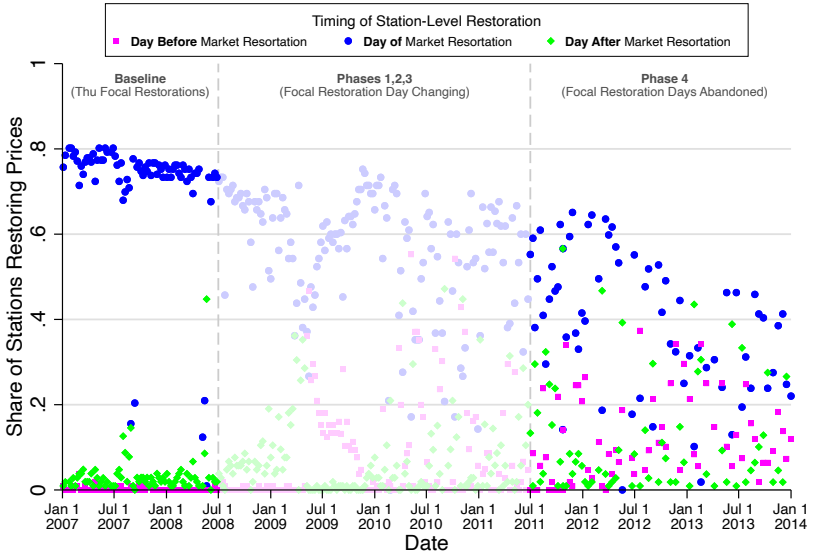
(b) Post July-2011: No Focal Restoration Days



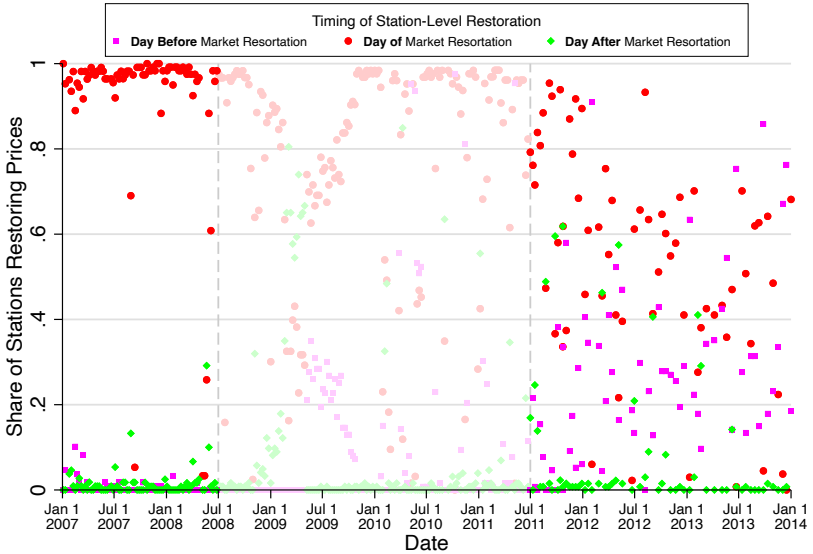
Phase 4: focal restoration days abandoned, BP



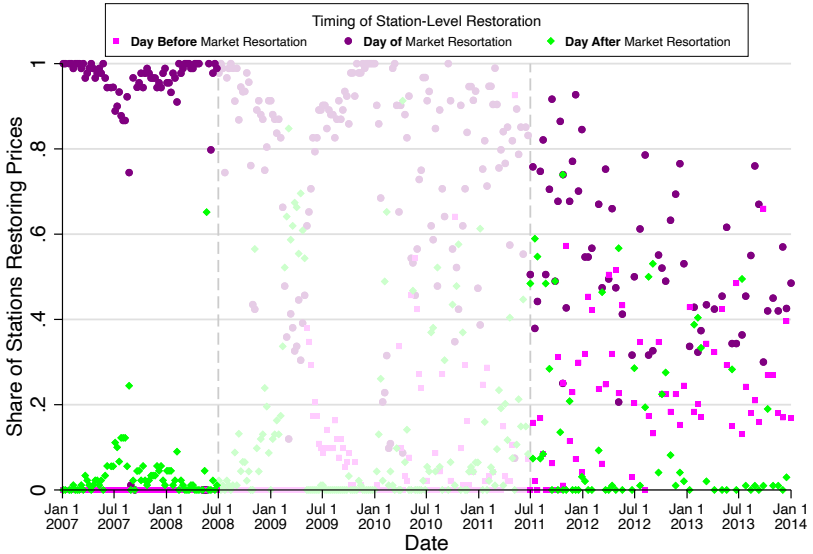
Phase 4: focal restoration days abandoned, Caltex



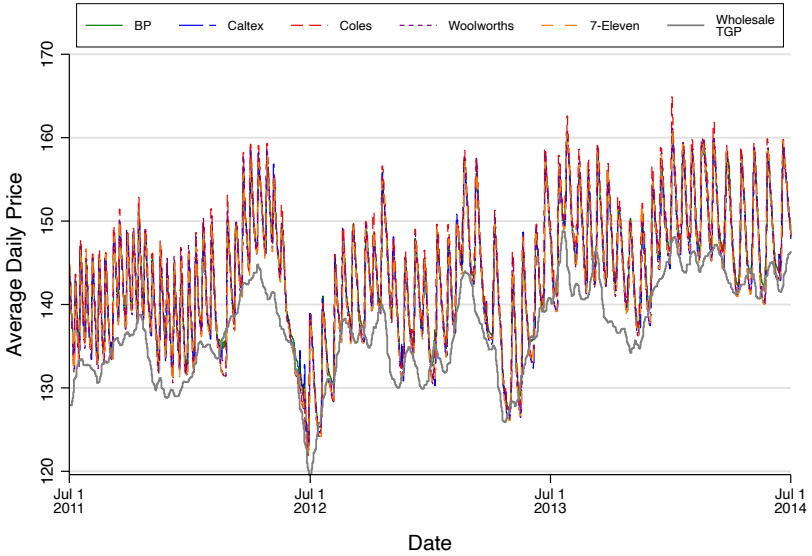
Phase 4: focal restoration days abandoned, Coles



Phase 4: focal restoration days abandoned, Woolworths



Phase 4: focal restoration days abandoned



Phase 4 takeaways

After 3 years of recurrent cheating, the firms abandon focal price restoration days

They evolve to using a signal-then-restore pricing structure to enable coordination while reducing exploitation risk for price leaders

Margins effects

Margins effects (to be completed)

Estimate a demand system accounting for cross-section and inter-temporal consumption choices (Byrne et al. 2023)

Quantify the evolution of each retailer's margins and profits across phases 1-4

Conclusion

Summary

Explicit communication, using human language between cartel members, is typically assumed necessary for collusion

Our findings suggests that, when shared on digital platforms, prices are a sufficiently thick medium of communication that they enable firms to negotiate over collusive pricing structures

Negotiations are, however sluggish and can entail recurrent cheating, shedding new light on challenges tacitly colluding firms face:

1. punishing cheaters
2. managing strategic uncertainty

Discussion

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Detection: if the price data firms use are available, antitrust agencies can screen for the types of behavior that we documented. There are (at least) two issues, however:

1. data availability
2. resources and capacity

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2. resources and capacity

Prosecution: familiar challenges likely will persist

1. per se price fixing offences are hard to find because you need to establish an agreement exists strictly through price-based communication
2. rule of reason is a more likely avenue going forward; in our work, it has been hard to think of offsetting pro-competitive effects from the anticompetitive transitions we have found