Regulating Gasoline (Retail) Prices: Experimental Evidence

NEW ZEALAND INSTITUTE FOR THE STUDY OF COMPETITION AND REGULATION

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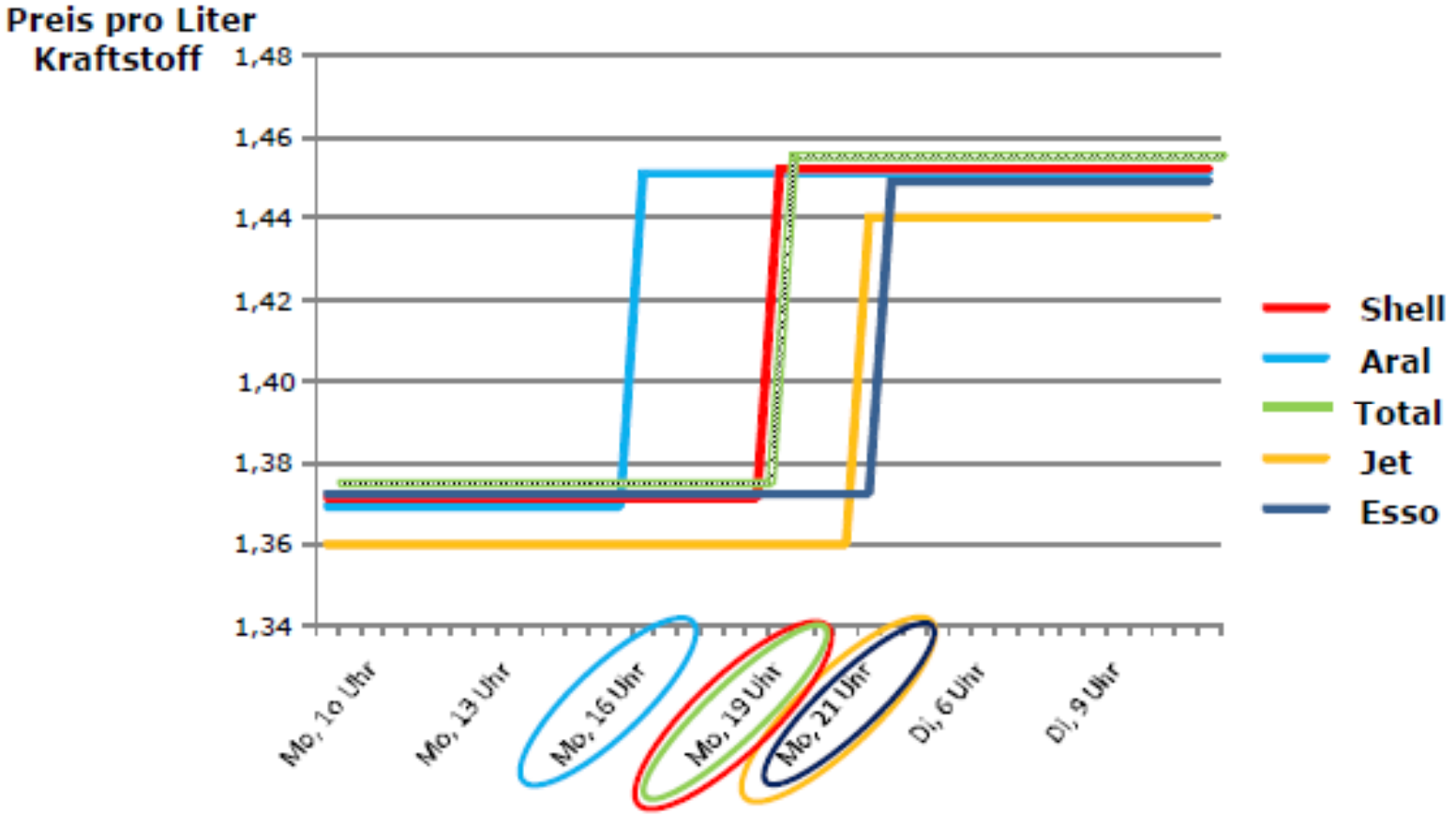
What's it all About?

- Report by German Competition Auhority *Bundeskartellamt* on „Sector Inquiry into Competition between Gas Stations in Germany" (May 2011).
- Legal basis ist §32 of the German Competition Law according to which the German Competition Auhority can conduct an in-depth investigation of any sector in whích competition appears to be restrained.
- Collection of all price changes of 407 gas stations in Hamburg, Leipzig, Cologne and Munich from 01/01/2007 to 30/06/2010
- Focus on:
  - retail gasoline markets, not wholesale (refineries).
  - „normal" road-side gas stations (as *Autobahn* gas stations operate under special licensing regime), covers 95% of the market volume.

Findings of the Sector Inquiry

- "Proof of a dominant oligopoly" of five petrol companies: BP (Aral), ConocoPhilipps (Jet), ExxonMobil (Esso), Shell and Total who serve 65% of the market.
- Regarding the so-called Airtours/FirstChoice criteria, the *Bundekartellamt* holds the view that there is no effective competition between these five firms nor is there sufficient external pressure to discipline their price setting.
- There are barriers to entry, product is homogeneous, retaliation devices are available (access to refineries).
- And: Every gas station operator has the task of observing another 3.4 gas stations on average, but this is true for both vertically-integrated gas stations as well as for independent ones….

Findings of the Sector Inquiry



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Findings of the Sector Inquiry

- Number of price changes has increased from 12235 to 18726 price increases and 30458 to 45653 price cuts per year.
- Quite a vivid debate on how to interpret these results….
- Is this a form of (a) competition, (b) unilateral consumer obfuscation or (c) sophisticated collusion?

- Theory?
- Evidence?

Related Literature (1)

Theory and Evidence: Michael Noel – Edgeworth Cycles

Professor Noel shows that, in Canada, the price cycles tend to occur in cities where competition is the strongest, not the weakest. The research study examines 19 Canadian cities over 11 years using weekly data on average prices in each city. There is variation in competition levels (measured by industry concentration ratios) across cities and over time and similarly, there is variation in the prevalence of cycling across cities and over time. Noel estimates a Markov switching regression model to estimate how concentration ratios, population, and station density affect the prevalence of cycling activity, and also how these competitive factors affect the shape of the cycle, including the cycle's period, amplitude, and asymmetry.

The results show that where small price aggressive independents have a larger presence, cycles are more prevalent. Therefore, the presence of cycles is associated with stronger competition, not weaker. Moreover, Noel finds that the level of competition affects the shape of the cycles themselves. A stronger presence of price aggressive firms results in faster and taller cycles. This is consistent with the idea that when there are more price aggressive firms, undercutting proceeds more quickly, and firms need to relent to higher prices more often to attain an average margin. Noel further finds that more densely populated areas are more likely to experience retail price cycles. The findings of the paper support the argument that the cycles are generated by an Edgeworth Cycles process and that Edgeworth Cycles are associated with more competitive markets.

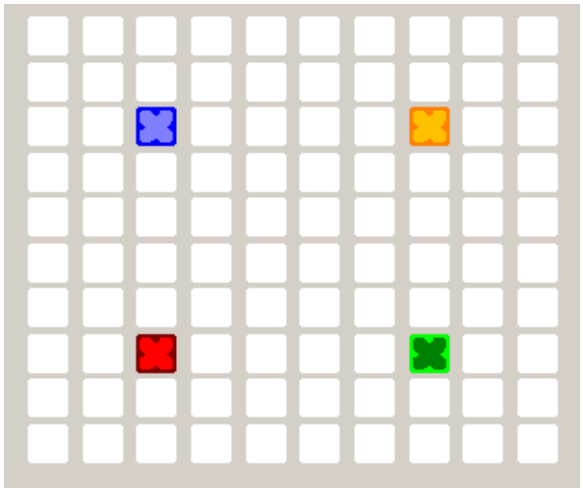
http://www.econ.ucsd.edu/~mdnoel/index-media.html

Related Literature (2)

- Empirical Work: Andreoli-Versbach (2011), Blanckenburg, Geist and Kholodilin (German Econ Rev, 2012)
- Somewhat suspicious though:
  - In 90% of all cases Aral (BP) or Shell initiate the price increase.
  - The other three firms are following almost always exactly 3 hours later
- What to do now? – Debate about pricing rules.
- Experimental Work:
  - Wilson and Deck (2006, JEBO): Focus on pricing rules concerning gas station chains with monopoly (captured customers) in one region and competition in another region
  - Berninghaus/Hesch/Hildenbrand (2012): Focus on the so-called Austrian pricing rule in a stylised game

Experimental Setting (1)

- 4 Sellers of a fictional good, equally distributed in a 10 x 10 block square
- Sellers set prices for their good
- Robot buyers (100 per block) minimise sum of price and transport cost
- Total demand: 10000 per day



- Experiment has two phases which consist of 8 „days“ each,
- Each day has 4 daytimes (morning, noon, afternoon, night),
- Demand: morning 3500, noon: 2000, afternoon: 3500, night: 1000,
- Sellers purchase good at input prices that change every day.

Experimental Setting (2)

- Buyers purchase good if $p + t_i \leq 40$,
- Travel costs are 1 Taler per block line, consumers can travel horizontally and vertically,
- Maximum travel costs are 14, e.g. if consumer @ (10,10) travels to shop @ (3,3),
- Wholesale price fluctuates between 15 and 25,
- Fixed-matching with same four rivals over the entire course of the game,
- Price regulation may change after 8 „days“.

Price Regulations

- Austrian Rule (A): Price increase is only allowed in the morning, but price cuts are always possible.
- Western Australia (W): Only one price change per day (morning).
- Luxemburg rule (L): Maximum mark-up of 8 Taler.

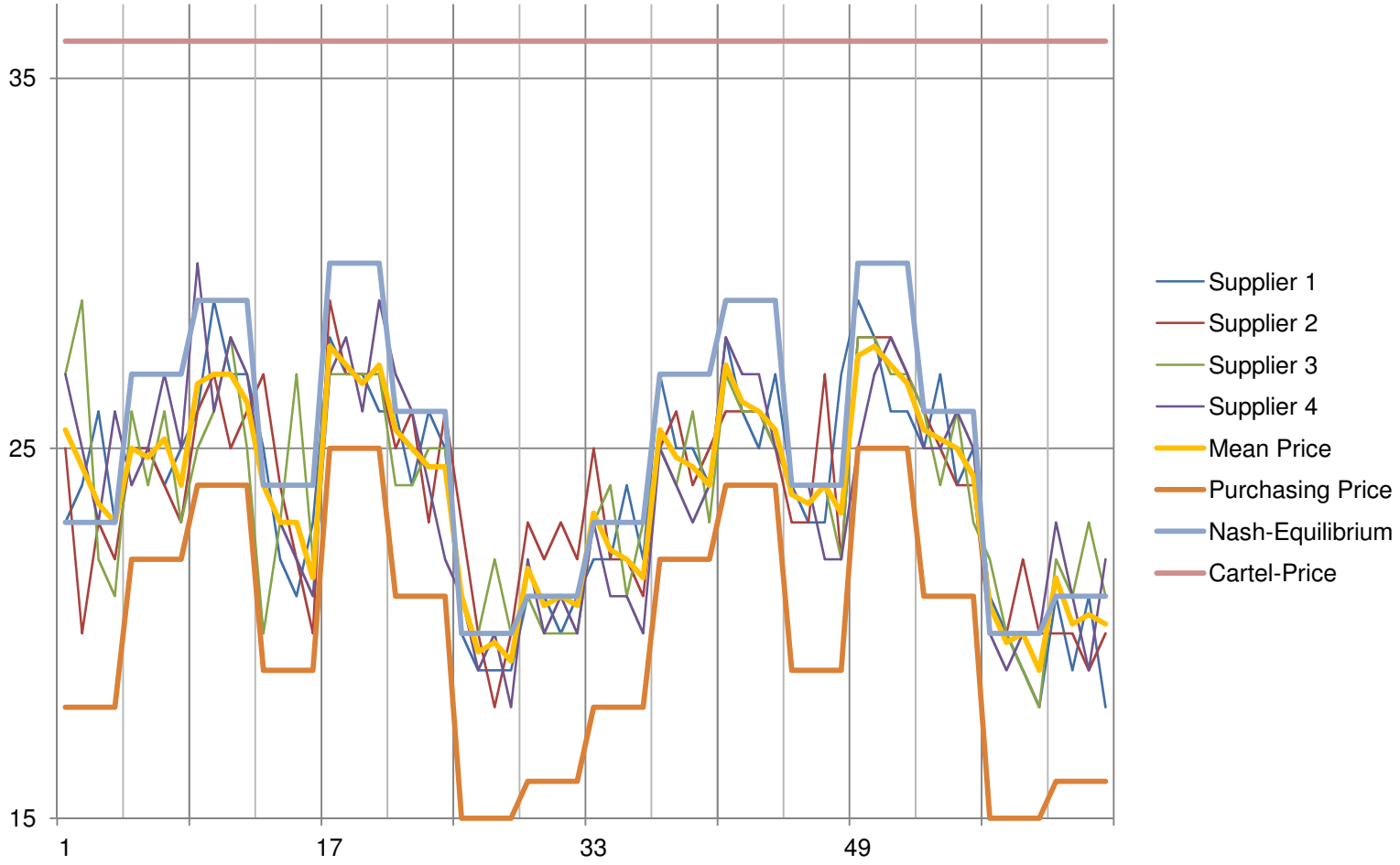
Hypotheses

- Cartel price = 36.
- Nash equilibria: (input price + 5) and (input price + 6).

Treatments

Treatment	Abbr.	First phase	Second phase	# Groups
1	B-B	Baseline	Baseline	10
2	A-B	Austria	Baseline	12
3	W-B	Westaustralia	Baseline	9
4	L-B	Luxemburg	Baseline	13
5	B-A	Baseline	Austria	11
6	B-W	Baseline	Westaustralia	10
7	B-L	Baseline	Luxemburg	9

Results (1)



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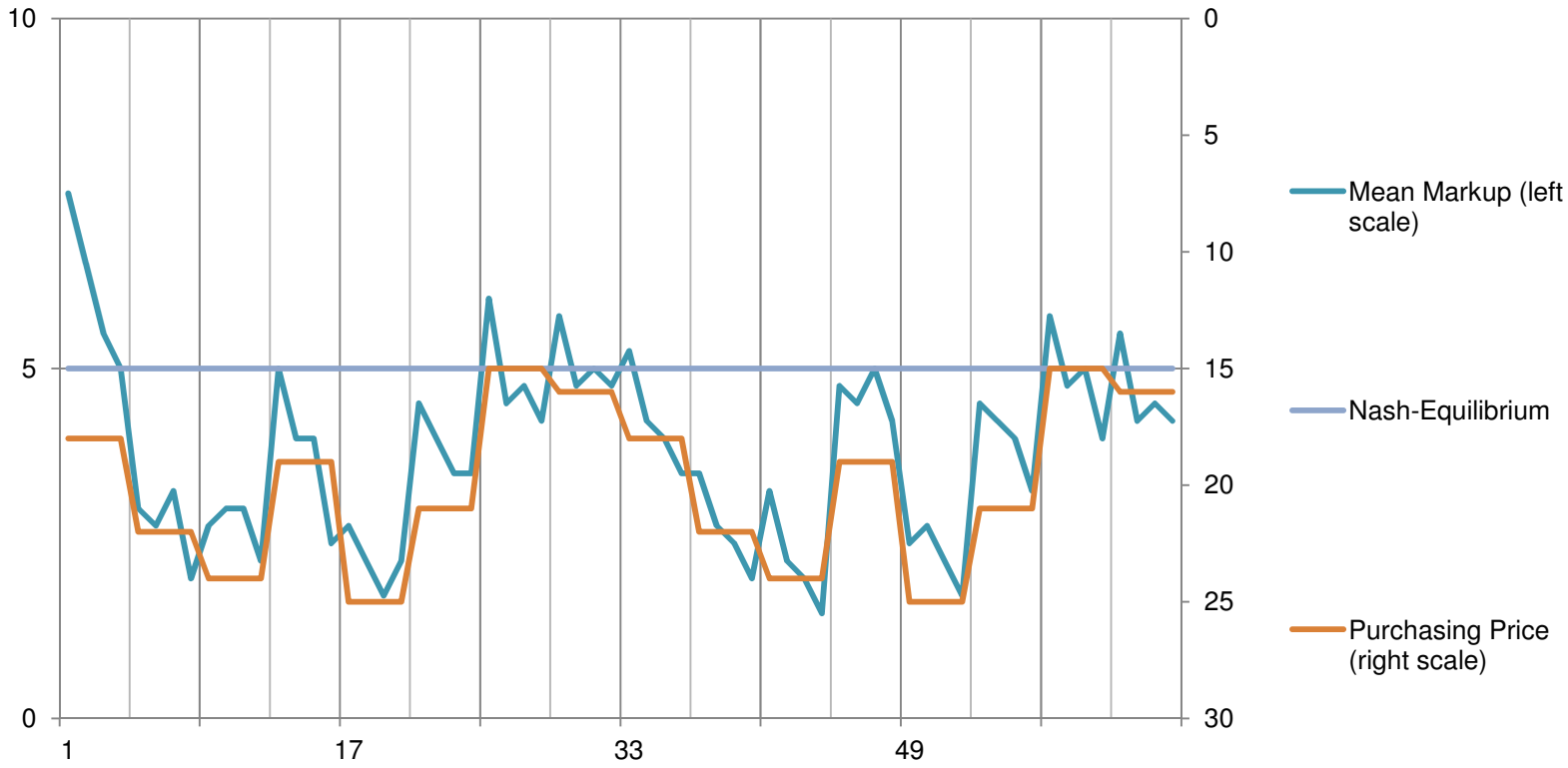
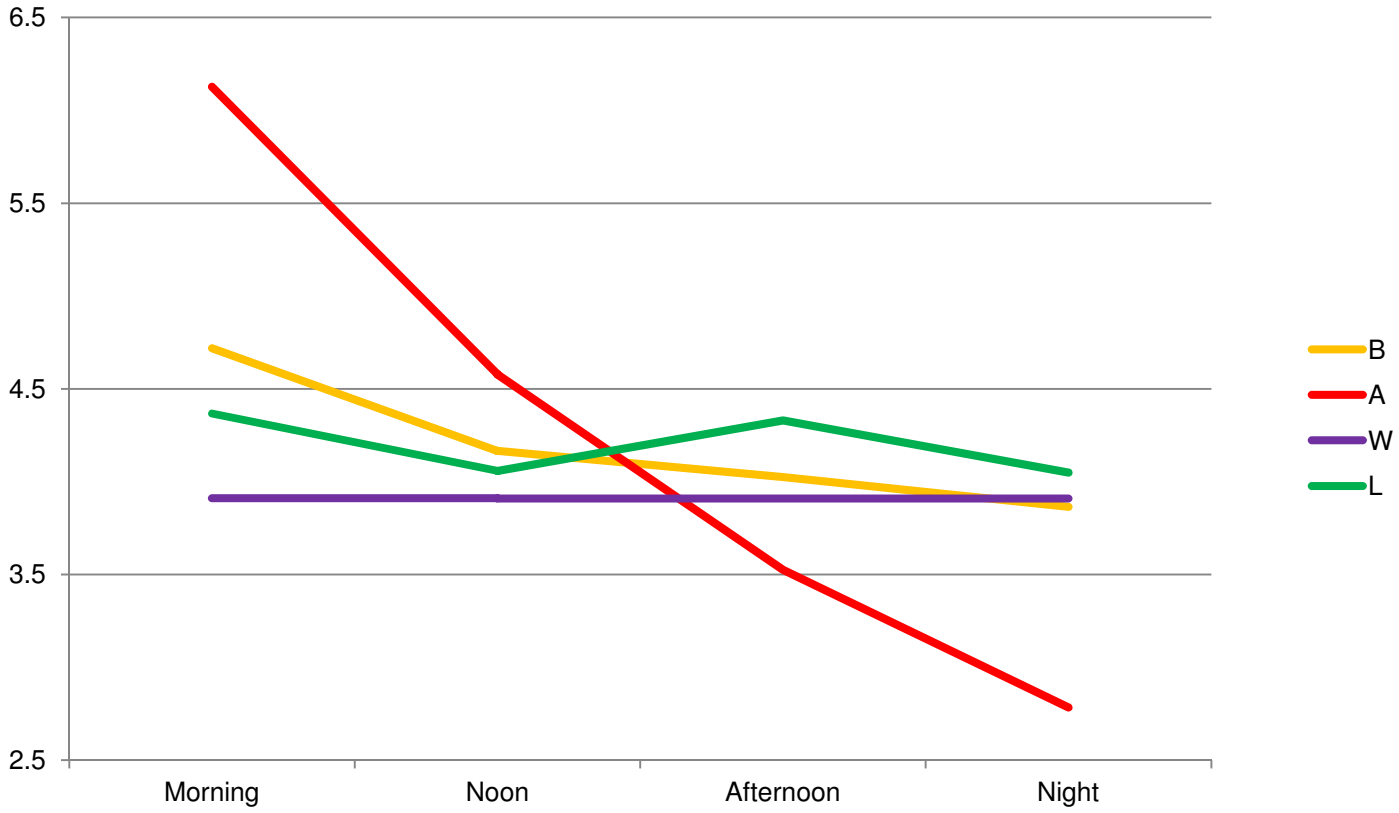
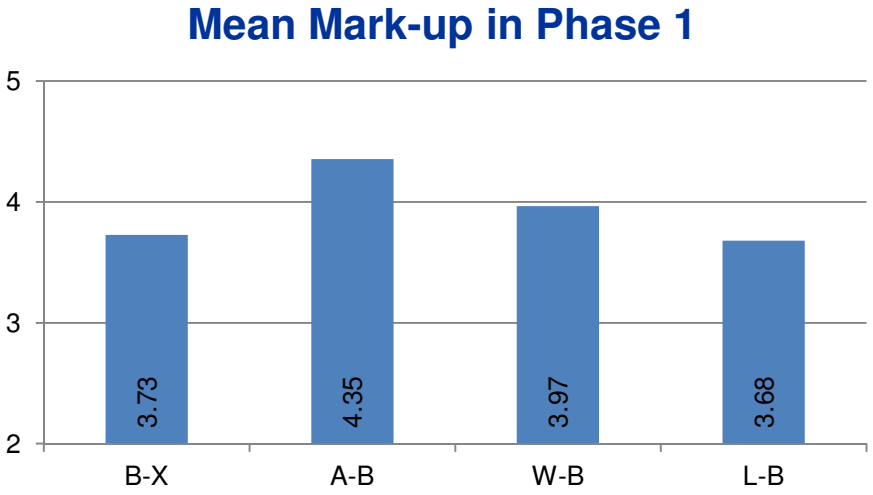
Results (2)

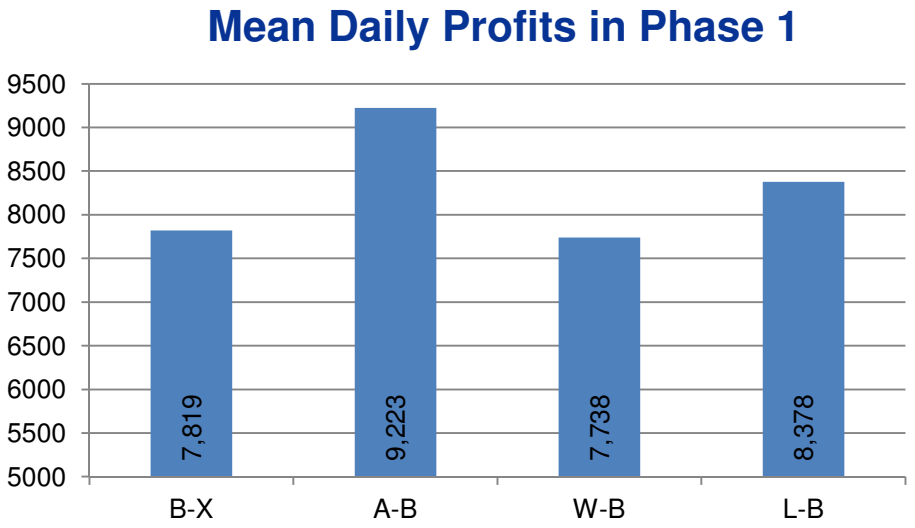

10
5
0
0
5
10
15
20
25
30
1
17
33
49
Mean Markup (left scale)
Nash-Equilibrium
Purchasing Price (right scale)

Results (3)



Results in Phase 1





Results in Phase 1

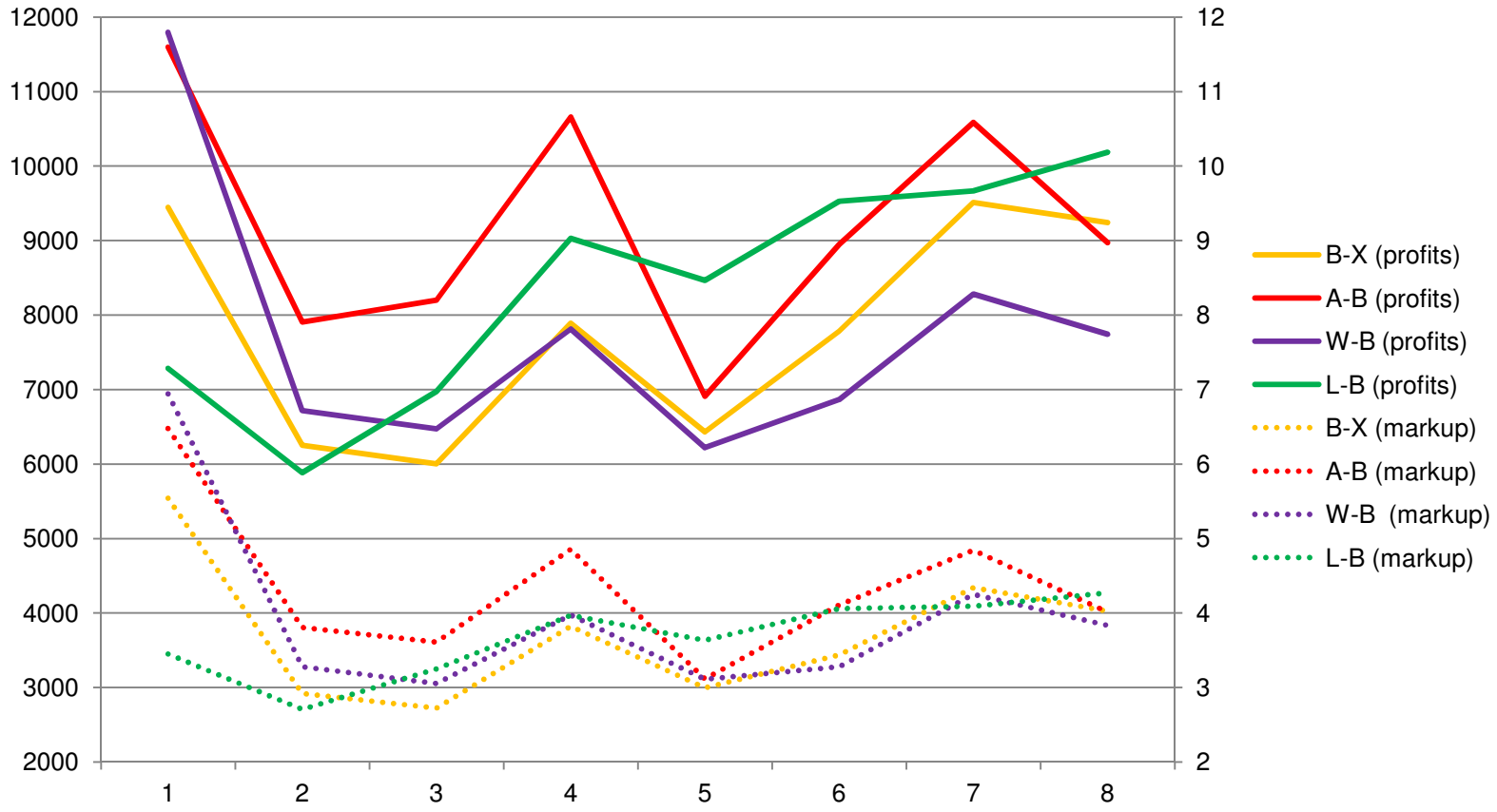


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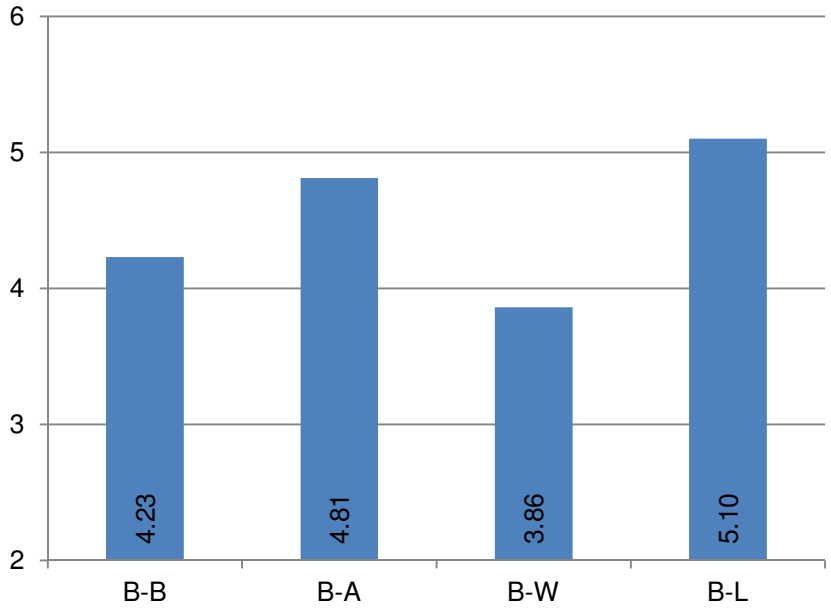
Table 3.2: Random Effects Panel Regressions for Phase 1

Variable	Daily Profits	Daily Averaged Weighted mark-ups
Method	RE	RE
Regimes:		
Baseline	(base)	(base)
Austrian	1403.1561**	0.6281**
	(-0.0414)	(-0.0329)
W.- Australian	-81.3370	0.2394
	(-0.8938)	(-0.5008)
Luxembourg	558.2365	-0.0467
	(-0.4150)	(-0.8659)
Wholesale Price	-345.1227***	-0.2158***
	(<0.0001)	(<0.0001)
Day	-38.8273	-0.1651***
	(-0.6441)	(<0.0001)
Constant	14896.6502***	8.7843***
	(<0.0001)	(<0.0001)
Observations	2368	2368
Subjects	296	296
Groups	74	74
R2 (overall)	0.1129	0.1263
R2 (within)	0.1431	0.1701
R2 (between)	0.0567	0.0415

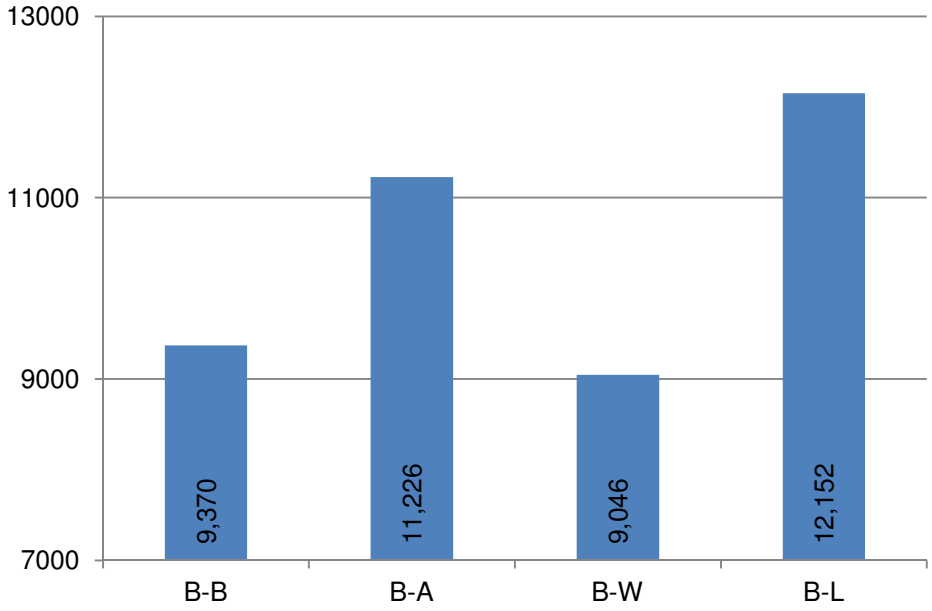
p-values in brackets; *: p <0.1; **: p <0.05; ***: p <0.01

Results in Phase 2

Mean Mark-up in Phase 2



Mean Daily Profits in Phase 2



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Results in Phase 2

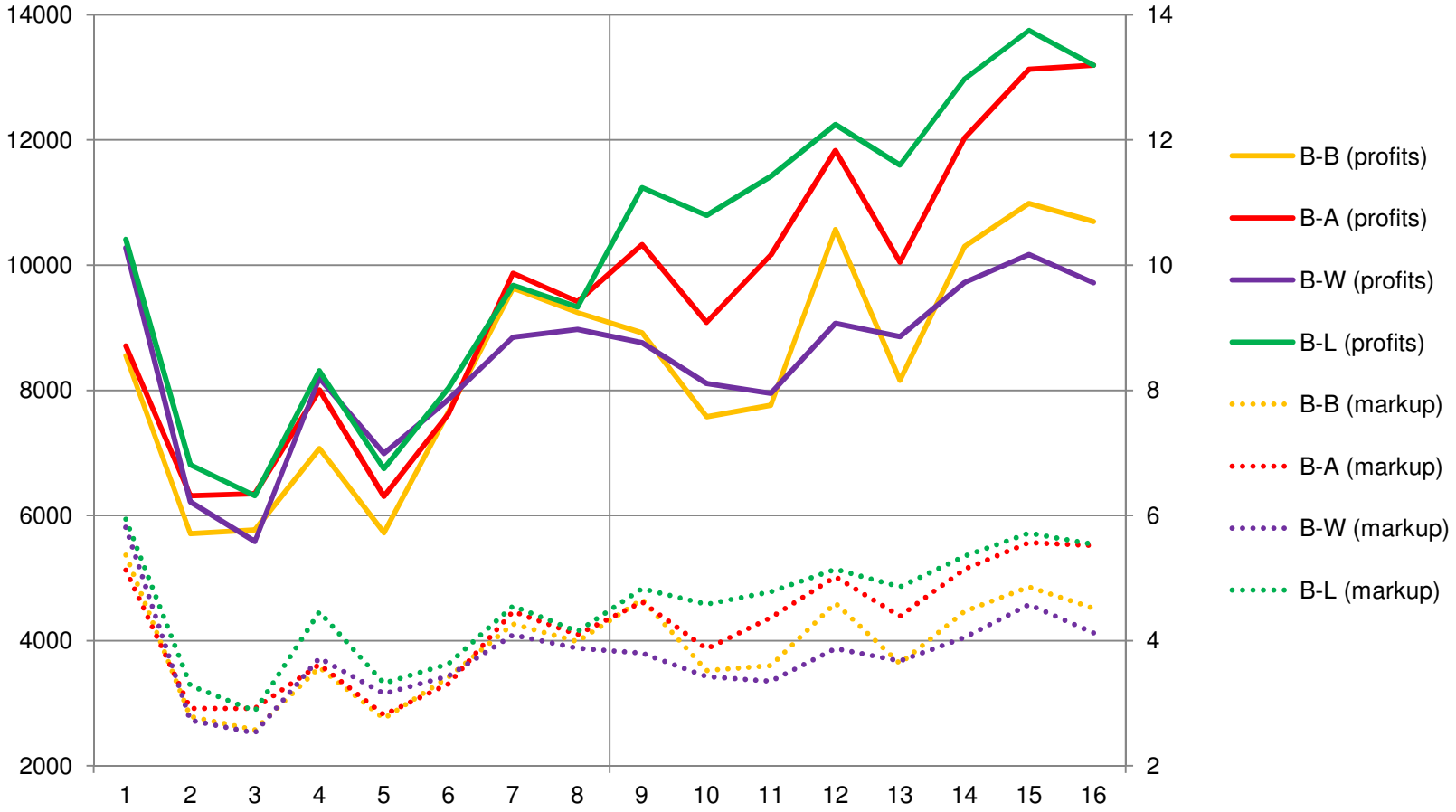

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Table 3.3: Random Effects Panel Regressions for Phase 2

Variable	Daily Profits	Daily Averaged Weighted mark-ups
Method	RE	RE
Regimes:		
Baseline	(base)	(base)
Austrian	1856.2074*	0.5788
	(-0.0945)	(-0.1718)
W.- Australian	-324.2212	-0.3725
	(-0.7409)	(-0.3422)
Luxemb.	2781.8435*	0.8673
	(-0.0519)	(-0.1116)
Purchasing Price	-166.3161***	-0.0856***
	(<0.0001)	(<0.0001)
Day	297.5162***	0.0846**
	(<0.0001)	(-0.0161)
Constant	8977.3734***	4.8856***
	(<0.0001)	(<0.0001)
Observations	1280	1280
Subjects	160	160
Groups	40	40
R2 (overall)	0.2608	0.1362
R2 (within)	0.1916	0.1256
R2 (between)	0.1619	0.1188
p-values in brackets; *: p <0.1; **: p <0.05; ***: p <0.01		

Conclusions

- The Austrian and Luxemburg pricing rules are more likely to increase prices and profits than not,
- The Western Australian rule does not appear to do much harm, but does not lead to lower prices either (not statistically significant),
- If consumers do not like price variations, the Western Australian rule may provide some non-monetary benefits, but no „real“ benefit in terms of money saved.

- Full paper at: http://ideas.repec.org/p/zbw/dicedp/47.html

Thank you for your attention!

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