CHOOSING WHETHER TO COMPETE: PRICE AND FORMAT COMPETITION WITH CONSUMER CONFUSION

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INTRODUCTION

CHOICE OF STANDARD BY FIRMS

- Market experiment where firms can choose not only their price but also whether to adopt a common standard.
  - Use of standard model of competition with differentiated products (Perloff and Salop, 1985).
- Adopting a common standard makes it easier for consumers to compare products
- Analogy:
  - Choosing level of differentiation vs. competition.
  - Choosing location in a spatial model of competition

CONSUMER CHOICE

- Two types of consumers, naive and savvy (Salop and Stiglitz, 1977).
  - Equal portions of naïve favor each one of the firms (bonus ε)
  - Savvy choose lower priced of firms with comparable offers (those that share a common standard)
    - Unless non-standard offer is much cheaper.

MAIN IDEAS

- We test the belief in the self-regulating nature of competitive markets.
  - Will firms choose to compete head-on through standardization or employ obfuscatory tactics by avoiding the use of common standards? (Gaudeul and Sugden, 2012)
- We focus on comparability between products, not complexity of offers per-se.
  - Other experiments: Kalayci (2011); Kalayci and Potters (2011); Shchepetova (2012); Sluijs et al. (2011).
  - Empirical work: Célérier and Vallée (2013); Ellison and Ellison (2009); Hossain and Morgan (2007); Wenzel (2013).

KEYWORDS

- Consumer side: spurious complexity, obfuscation, transparency, shrouding, confusion, consumer protection, (soft) paternalism.
  - References: Carlin (2009); Chioveanu and Zhou (2013); Ellison and Wolitzky (2012); Gabaix and Laibson (2006); Gaudeul and Sugden (2012); Piccione and Spiegler (2012); Sitzia and Zizzo (2009); Wenzel (2014).
- Firms side: collusion, industrial organization, competition, oligopoly, standardization and compatibility.
  - References: Aoyagi and Fréchette (2009); Boone et al. (2012); Bruttel (2009); Davis (2011); Dufwenberg and Gneezy (2000); Dugar and Mitra (2009); Huck et al. (2000, 2004); Keser (1993, 2000); Wenzel (2014); Wright (2013).

SUMMARY FINDINGS

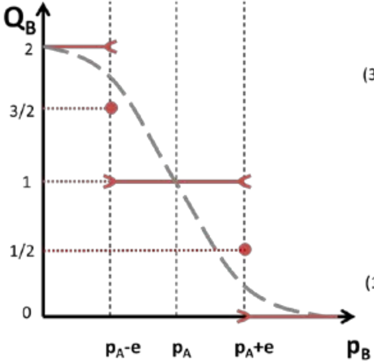
- In treatments with full information:
  - Early phases with strong competition and comparable offers are followed by later phases with higher prices and less comparability.
  - Welfare decreases as the portion of savvy consumers increases.
- In treatments with no information:
  - Firms adopt the common standard more often as the portion of savvy consumers increases.
  - This leads to an improvement in welfare for all consumers.

MODELING

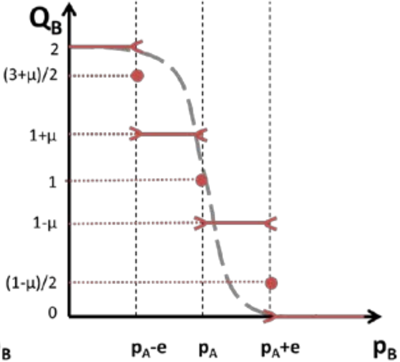
A MODEL OF COMPETITION WITH SHROUDING

- Experiment with three firms, but let us start with the simpler duopoly case
  - Two firms, A and B selling homogeneous good.
  - Firm B choose between its own standard and standard A.
  - Firms set their own prices, independently and without knowing the choice of others.
- Consumers have a (spurious) preference for different firms.
- μ % of consumers are “savvy”: They give a preference to cheapest common standard offer if there is a common standard.

DEMAND FUNCTION

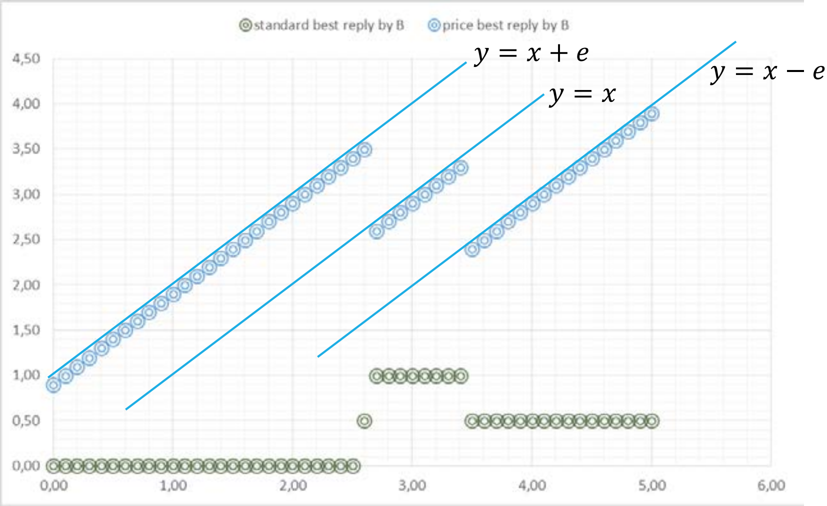


Firm B adopted standard B



Firm B adopted standard A

REACTION FUNCTION $(\mu = 40\%)$



THE TRIOPOLY

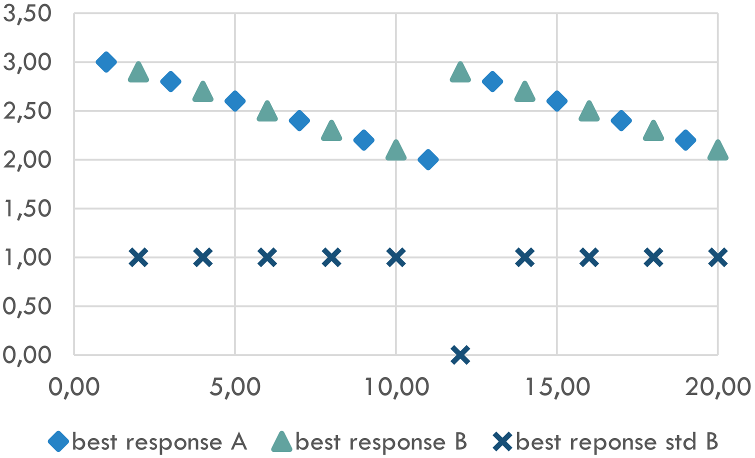
- If two firms adopt same standard but one firm does not
  - Then savvy consumers follow the asymmetric dominance heuristic (decoy or attraction) effect (Huber et al., 1982; Huber and Puto, 1983).
  - Translated as penalty λ on the price of the non-standard firm.

TREATMENTS

Two main dimensions:

- Transparency on the firms' side
  - Firms either see price, sales and profit of other firms, or only their own.
- Transparency on the consumer side
  - Higher μ → potentially more transparent
  - Choice of μ and λ based on own previous work.

BEST RESPONSE DYNAMICS



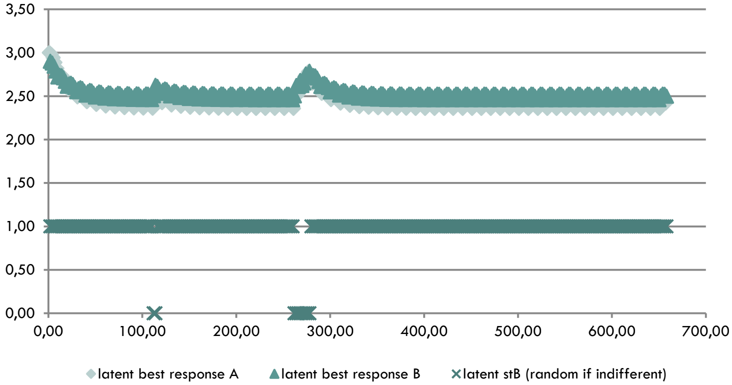
BEST RESPONSE DYNAMICS WITH LATENCY

If we introduce latency, then range of prices is smaller, but mean is the same.

$$p_{i,t+1} = wp_{i,t} + (1-w)BR(p_{j,t}, s_{j,t})$$

$$s_{i,t+1} = s_{i,t} \text{ with probability } w$$
$$= BR(p_{j,t}, s_{j,t})\ else$$

BEST RESPONSE DYNAMICS WITH LATENCY



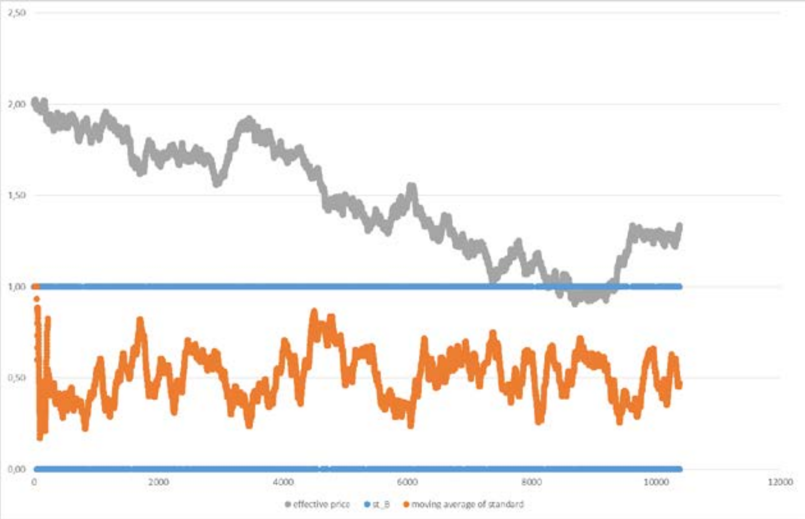
IMITATION (WITH VANISHING NOISE)

- Two cases:
  - If no common standard → higher priced makes more profit → prices go up to maximum willingness to pay.
  - If common standard → lower priced makes more profit → prices go down to 0.

  Choice of standard:
  - If prices low, then better off with no common standard
  - If prices high, then at least as well off adopting common standard

→ Starting from no common standard, prices go up → one firm adopts CS → prices go down → switch to no CS → …

IMITATION DYNAMICS



MIXED STRATEGIES

- More use of common standard as μ and λ increase.
- Distribution of prices shifts towards 0

→ Lower profits

! No dependence of prices on previous decisions.

COLLUSION

- Collusion would display periods of increasing prices, followed by abrupt decreases in price ($\neq$ from imitation where prices decrease gradually)
- Collusion is easier to sustain the higher is μ
  - Punishment is to drive down others' profit to $(1 - \mu) * \varepsilon$ by setting price $= 0$ and adopting common standard. (yes, not individually rational)

THE EXPERIMENT

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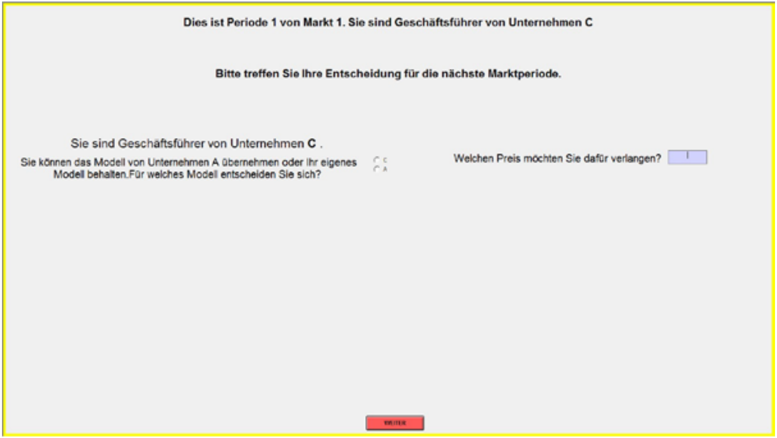
Run in November and December 2013 at the laboratory of the Max Planck Institute of Economics in Jena.

- 300 subjects over 10 sessions, each with 30 subjects.
- Each session lasted about 1 hour and 30 minutes overall and participants earned 12 euros on average.
- Each subject matched three times with different market players (perfect stranger matching).
- Each matching lasted several periods, random termination time.

CHOICE OF PRICE AND STANDARD



FEEDBACK

Dies ist Periode 1 von Markt 1. Sie sind Geschäftsführer von Unternehmen A

Ergebnisse des Marktes.

Unternehmen	A	B	C
Modell	A	B	A
Preis	3.60	3.20	4.00
Nachfrage	100	100	100
Gewinn	360.00	320.00	400.00

Ergebnisse der vergangenen Perioden

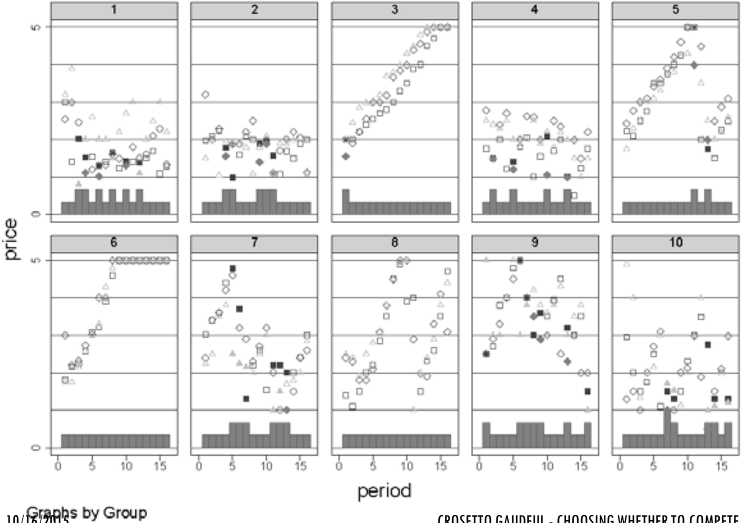
Periode	Unt. A – Modell	Unt. B – Modell	Unt. C – Modell	Unt. A – Preis	Unt. B – Preis	Unt. C – Preis	Unt. A – Nachfrage	Unt. B – Nachfrage	Unt. C – Nachfrage	Unt. A – Gewinn	Unt. B – Gewinn	Unt. C – Gewinn
1	A	B	A	3.60	3.20	4.00	100.00	100.00	100.00	360.00	320.00	400.00

FINDINGS

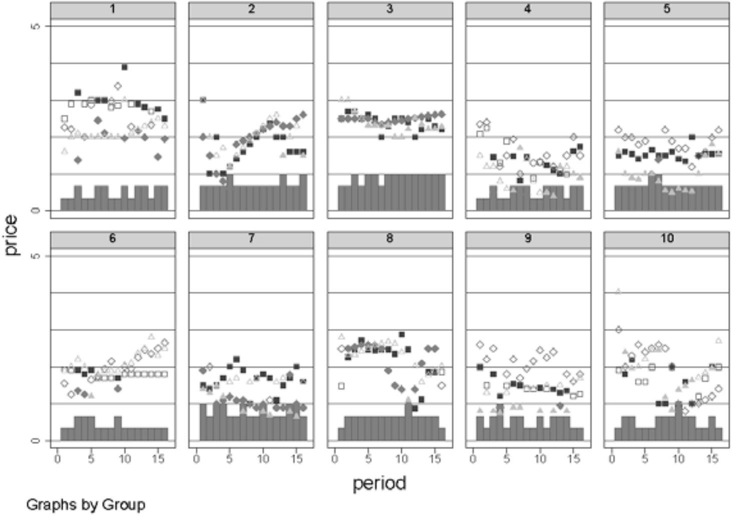
EXPERIMENTAL FINDINGS

- Price patterns: Collusion or imitation?
- Revenues and frequency of adoption of common standards
- Correlation “Low prices” and “adoption of a common standard”.
- Welfare analysis.

SOME PATTERNS: FULL INFORMATION



SOME PATTERNS: LIMITED INFORMATION

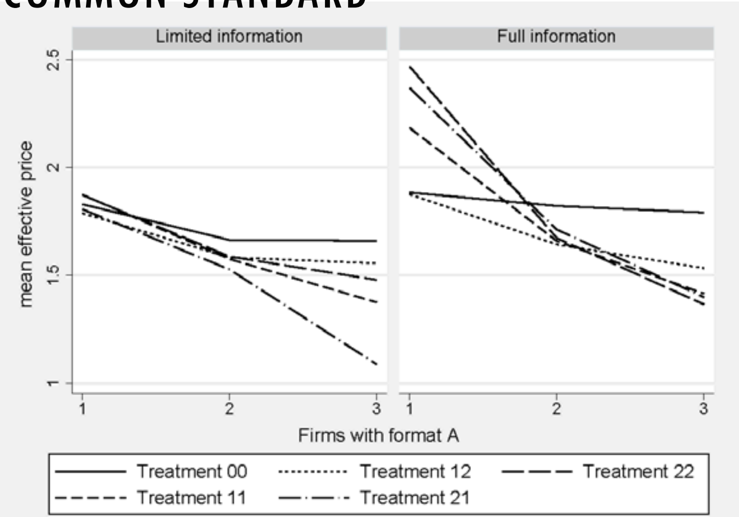


REVENUES AND STANDARDS

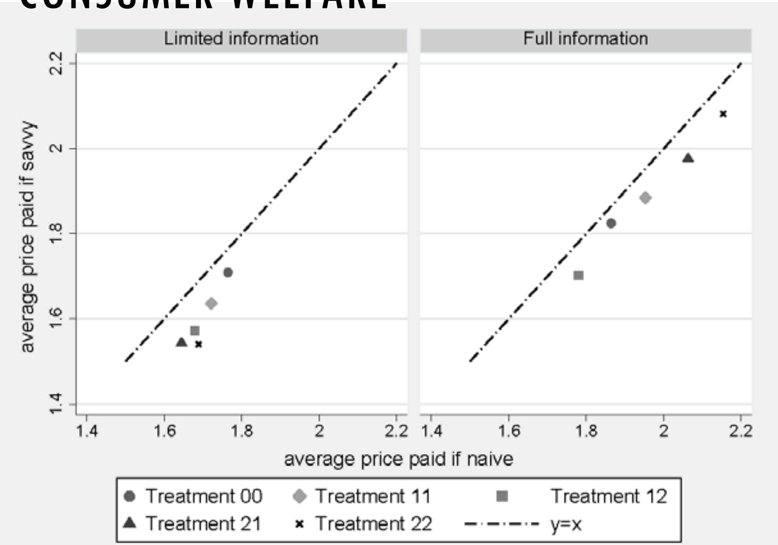
Selling price means (st.dev.)					
			μ		
			0%	10%	20%
Limited information	λ	10%	1.76 (0.62)	1.71 (0.57)	1.62 (0.66)
		20%		1.67 (0.55)	1.66 (0.60)
Full information	λ	10%	1.86 (0.85)	1.95 (0.83)	2.05 (0.90)
		20%		1.77 (0.83)	2.14 (1.06)

Share of periods with comparable offers					
			μ		
			0%	10%	20%
Limited information	λ	10%	40%	48%	54%
		20%		57%	68%
Full information	λ	10%	33%	42%	44%
		20%		40%	37%

COMPETITION AND ADOPTION OF A COMMON STANDARD



CONSUMER WELFARE



CONSUMER WELFARE

- Under limited information
  - Savvy consumers are the ones who derive most benefits from standardization
- Under full information
  - savvy consumers suffer less than naive consumers, but their own existence makes their own situation worse.
  - The more savvy consumers there are and the stronger are their preferences, the worse they fare under full information (Möllgard, 2001).

CONCLUSION

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- Firms understand the benefit of not adopting the common standard and are able to collude in shrouding their offers.
  - This effect plays out when firms can see prices and standards of other firms.
- Being able to choose to make prices transparent to consumers could help collusion.
  - Not choosing a common standard serves as a signal that one wishes to make peace with others.
  - Having more savvy consumers makes the punishment phases harder.