

Fonseca, Miguel A.; Normann, Hans-Theo

Working Paper

Endogenous cartel formation: Experimental evidence

DICE Discussion Paper, No. 159

Provided in Cooperation with:

Düsseldorf Institute for Competition Economics (DICE), Heinrich Heine University Düsseldorf

Suggested Citation: Fonseca, Miguel A.; Normann, Hans-Theo (2014) : Endogenous cartel formation: Experimental evidence, DICE Discussion Paper, No. 159, ISBN 978-3-86304-158-8, Heinrich Heine University Düsseldorf, Düsseldorf Institute for Competition Economics (DICE), Düsseldorf

This Version is available at:

<https://hdl.handle.net/10419/101325>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

DISCUSSION PAPER

No 159

Endogenous Cartel Formation: Experimental Evidence

Miguel A. Fonseca,
Hans-Theo Normann

August 2014

IMPRINT

DICE DISCUSSION PAPER

Published by

düsseldorf university press (dup) on behalf of
Heinrich-Heine-Universität Düsseldorf, Faculty of Economics,
Düsseldorf Institute for Competition Economics (DICE), Universitätsstraße 1,
40225 Düsseldorf, Germany
www.dice.hhu.de

Editor:

Prof. Dr. Hans-Theo Normann
Düsseldorf Institute for Competition Economics (DICE)
Phone: +49(0) 211-81-15125, e-mail: normann@dice.hhu.de

DICE DISCUSSION PAPER

All rights reserved. Düsseldorf, Germany, 2014

ISSN 2190-9938 (online) – ISBN 978-3-86304-158-8

The working papers published in the Series constitute work in progress circulated to stimulate discussion and critical comments. Views expressed represent exclusively the authors' own opinions and do not necessarily reflect those of the editor.

Endogenous Cartel Formation: Experimental Evidence*

Miguel A. Fonseca and Hans-Theo Normann

August 2014

Abstract: In a Bertrand-oligopoly experiment, firms choose whether or not to engage in cartel-like communication and, if so, they may get fined by a cartel authority. We find that four-firm industries form cartels more often than duopolies because they gain less from a hysteresis effect after cartel disruption.

Keywords: cartels, collusion, communication, experiments, repeated games.

JEL Codes: C7, C9, L41

*Fonseca: University of Exeter, email: m.a.fonseca@exeter.ac.uk; Normann: normann@dice.hhu.de. Financial support from Deutsche Forschungsgemeinschaft (DFG NO 429/3) is gratefully acknowledged.

1. Introduction

Conventional wisdom in industrial economics has it that collusion is easier the fewer the firms. This tenet is intuitive enough: fewer firms will find it easier to coordinate on a collusive outcome or on some punishment mechanism. The conventional wisdom can also be rigorously derived in a repeated game where cooperation is an equilibrium of the supergame, but, the more firms there are in the market, the more patient they must be to sustain a collusive equilibrium.¹

Despite its popularity on “lists of factors facilitating collusion,” it turns out the conventional wisdom is not useful for cartel detection. Empirical studies about factors that predict the frequency of detected cartels do not report favorable results. Among others, Levenstein and Suslow (2006) cannot establish a simple correlation between cartel frequency and concentration or the number of firms.

Why are there not more cartels the fewer the firms in the industry? The decision to establish a cartel should foremost depend on the gains and costs from cartelization. The costs include fines if caught by an authority and, importantly, the opportunity cost in terms of the foregone profits when firms do *not* talk. If collusion is easier with fewer firms, this will also be true under (legal) tacit collusion (Ivaldi et al. 2003), suggesting relatively high profits already without explicit cartel talk. However, if firms do well without talking, why should they risk fines and prison sentences for a little extra profit from price fixing?²

This paper illustrates in a simple laboratory experiment how the incentives to form cartels depend on the number of firms. We study industries with two and four firms. The firms can choose to set up a cartel, but a cartel authority randomly audits markets and imposes fines on cartels. In previous research (Fonseca and Normann 2012), we exogenously imposed whether or not firms could talk. There was neither a choice to communicate nor a cartel authority that

¹ See Kühn (2012) for a model where, exceptionally, market fragmentation facilitates collusion.

² Levenstein and Suslow (2006) mention this and other possible reasons why there are not more cartels with fewer firms. Davis and De (2013) find many larger number and asymmetric industries in their dataset of EU cartels and argue that ringleaders stabilize these cartels.

would penalize such behavior. Comparing profits with and without the opportunity to talk, we found that medium-sized firms gain the most from communication. We extend this research by endogenizing cartel formation.

Our data indicate that the duopolies form fewer cartels than the four-firm oligopolies, in an apparent violation of the conventional wisdom. This is because of a hysteresis effect: after talking once, industries maintain prices that are higher than before the first cartel was set up. This hysteresis effect is more pronounced for duopolies. Therefore, two-firm markets are under less pressure to set up a cartel anew.

2. Experimental Design and Procedures

Our computerized experiment implemented Bertrand oligopolies with inelastic demand and zero marginal costs of production (Dufwenberg and Gneezy 2000). There were $m=300$ simulated consumers whose reservation price for a homogeneous good was 100. Subjects simultaneously selected a price p between 0 and 100, and whoever set the lowest price captured the entire market and earned profits of $300p$; if more than one subject set the lowest price, profits were split equally among those subjects; all other subjects made zero profits. Our treatment variable was the number of firms: $N=2$ or $N=4$.

There was a minimum of 25 periods in our experiment. After the 25th period, the computer stopped the experiment with a one-in-six chance (which was common knowledge, as per the instructions). Subjects remained fixed in groups of two or four, for the whole experiment.

Firms could choose to initiate a chat box that got activated only if all firms chose to do so. If so, all firms in the market could communicate for 30 seconds before the price-setting stage and the chat box continued to be available in the following periods until the cartel was detected or until the end of the supergame.

Following several leniency experiments (Apesteguia et al. 2007, Hinloopen and Soetevent 2008, Bigoni et al. 2009), the computer audited each market every

period with probability 0.15. If a market was audited and firms were caught communicating in period t , $100p_t/N$ is the per-firm, per-period fine. Firms were fined for the past periods in which they were talking, up to a maximum of five periods. Formally, the total fine per firm is $F_t = \frac{100}{N} \sum_{\tau=\theta}^t p_\tau$, where p_τ is the price in period τ , $\theta = \max \{t - 5, t_0\}$, and t_0 is the cartel's initial communication period. Since the fine for the entire industry was evenly distributed among firms, for any cartel price the (expected) fine was the same for $N=2$ and $N=4$.

We have 16 independent markets for each treatment. The experiments were conducted in July 2012 and July 2013 at the DICE-Lab of the University of Duesseldorf. Participants were students from all over campus. Sessions lasted less than an hour. The experimental currency was the "Taler," whose exchange rate to euro was 1:15,000 and 1:30,000 in the four-firm markets and the duopolies, respectively. The average payment of the 96 participants was €13.34.

3. Results

We first analyze cartel formation. The $N=4$ markets successfully formed nearly twice as many cartels: we find 2.19 (std. dev. = 1.22) cartels for the $N=4$ industries on average versus 1.13 (0.62) for $N=2$, a highly significant difference (Mann-Whitney (MW) test, $p=0.003$, two tailed). The result is surprising since getting a consensus to chat is harder with bigger groups. When we count each instance in which at least one firm chooses to initiate the chat (possibly unsuccessfully so), the $N=4$ markets exhibit significantly more attempts to form a cartel (8.25) than the duopolies (2.94) (MW test, $p = 0.001$). Thus, despite a lower proportion of successful attempts, more cartels are established with $N=4$.

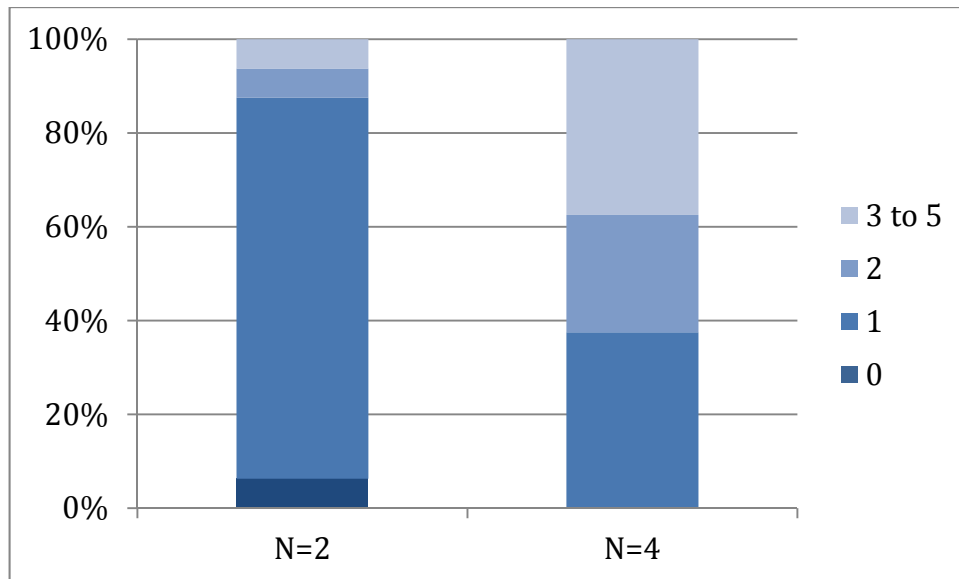


Figure 1. The distribution of the number of cartels formed per market.

Figure 1 shows the distribution of the number of cartels per market by treatment. The vast majority of duopolies talked exactly once (there was even one N=2 market where players never talked and nevertheless performed well), one duopoly started two cartels and another one three. By contrast, 10 of the 16 N=4 markets started more than one cartel.

	Average selling price		
	all periods	when talking	when not talking
N=2	83.95 (19.36)	88.65 (15.03)	80.80 (21.09)
N=4	78.63 (14.82)	91.10 (12.37)	68.59 (25.61)

Table 1: Average selling prices by treatment, standard deviations in parentheses, calculated from group moments.

Looking for an explanation for this result, we look at selling prices (that is, the lowest of two or four prices, respectively) in Table 1. Duopolies have higher average prices, but the gap is particularly pronounced when the firms do not

talk. Under communication, the duopolies even do slightly worse than the N=4 markets.⁴

Since selling prices are equivalent to profits in our experiment, the gain from talking can be measured by taking the difference of the selling prices with and without communication.⁵ We calculate this difference for each market (except for the one duopoly that never talked) and obtain that it is significantly larger for N=4 (Wilcoxon signed-ranked test, $p=0.016$). In short, duopolies have a smaller incentive to form a cartel.

Selling prices without communication are affected by hysteresis effects.⁶ In both treatments, prices after cartel disruption do not decline to the levels prior to the first cartel being founded. For those industries that did not immediately found a cartel, the average selling prices in period one were 34.33 (N=2) and 32.21 (N=4) and are therefore substantially lower than the prices in the right column of Table 1. Also, the price in the period preceding the first cartel formation was 31.50 and 18.43 for N=2 and N=4 respectively, while the price in the period immediately after the first cartel's detection was 83.75 and 77.64 (N=2: $p=0.068$; N=4: $p=0.001$, Wilcoxon signed-rank test). The vast majority of markets formed their first cartel in the first three periods of the experiment; therefore most pricing decisions without communication occurred after a cartel was detected. When we distinguish the two cases, we obtain practically the same result, so we report the mixed measure here for simplicity. We reiterate, however, that the high level of prices "when not talking" is due to a hysteresis effect.

The hysteresis effect can also be demonstrated when considering selling prices and whether a cartel existed before as explanatory variables for cartel foundation. We estimate a random-effects Probit regression using as the regressor a dummy variable taking a value of one if market j formed a cartel in

⁴ There are no significant time trends of the selling prices, with or without communication.

⁵ We do not subtract actual fines here (which would yield the cartels' ex-post profitability) because actual fines vary due to randomness of the detection mechanism.

⁶ See Harrington (2004) for a model rationalizing hysteresis effects.

period t , conditional on a cartel not being active in period $t-1$. The equation we estimate is:

$$\text{Chat}_{j,t} = I\{\beta_0 + \beta_1 \text{Quad} + \beta_2 \text{Sellp}_{j,t-1} + \beta_3 \text{Sellp}_{j,t-1} \times \text{Quad} + \beta_4 \text{CartelB4} + \beta_5 \text{CartelB4} \times \text{Quad} + u_j + v_{jt} > 0\} \quad (1)$$

	(1)	(2)	(3)
Quad	0.348** (0.142)	0.006 (0.352)	0.550*** (0.468)
Sellp _{j,t-1}			-0.008* (0.005)
Sellp _{j,t-1} x Quad			-0.007 (0.006)
CartelB4		-2.125*** (0.392)	-1.543*** (0.491)
CartelB4 x Quad		0.873** (0.437)	0.638 (0.554)
Constant	-1.630*** (0.109)	-0.407 (0.268)	-0.306 (0.391)
Groups, N	32, 720	32, 720	32, 688
Rho	0.000	0.222 [†]	0.539 [†]
Log likelihood	-188.747	-153.608	-120.622

[†]: significant at the 1% level using LR test.

***, **, *: significant at the 1%, 5% and 10% level.

Table 2: Probit estimates of the likelihood of starting a cartel.

The regression results are as follows. Specification (1) is a restricted version of our econometric model in order to avoid dropping the first period from the data (nine duopolies and two four-firm markets began cartels in period 1). Consistent with the above results, we find that $N=4$ markets are more inclined to form cartels. In specification (2), we consider the effect of having had a cartel in existence before the decision to start a new cartel (*CartelB4*). The history of collusion in a market matters differently for different market structures: duopolists are significantly less likely than their four-firm market counterparts to start a cartel if they had colluded explicitly before. Interestingly, the coefficient on *Quad* is now non-significant. In specification (3), we also consider the effect of the selling price in the previous period (*Sellp_{j,t-1}*). The effect of past prices is negative. The higher prices were in the previous period, the lower the odds of forming a cartel. Four-firm markets are more likely to engage in cartels than duopolies and *CartelB4* continues to be highly significant.

4. Discussion

We find more endogenously founded cartels in experimental Bertrand markets with four firms than with two. Markets with four firms have a bigger incentive to cartelize, as a comparison of selling prices suggests. Whereas enabling cartel-like communication leads to significant increases in prices, breaking a cartel does not lead to the opposite result – hysteresis. This is particularly pronounced for duopolies, which consequently are less likely to re-start a cartel after being caught by the cartel authority.

Our result is at odds with the conventional wisdom, if interpreted as “there are more cartels the fewer the firms.” In our data, duopolies have higher prices throughout, so the conventional wisdom that “fewer firms find it easier to maintain high prices” does hold both when firms talk and when they do not talk. But we also saw that the gain from talking is larger for the less concentrated industry, and, as a result, “there are fewer cartels the fewer the firms.”

References

- Apestequia, J., Dufwenberg, M., and Selten, R., 2007. Blowing the whistle. *Economic Theory* 31, 143–166.
- Bigoni, M., Fridolfsson, S., Le Coq, C., and Spagnolo, G., 2009. Fines, leniency and rewards in antitrust, *Rand Journal of Economics* 43(2) 2012, 368-390.
- Davies, S. and De, O., 2013. Ringleaders in larger number asymmetric cartels, *The Economic Journal* 123(572), F524–F544.
- Dufwenberg, M., and Gneezy, U., 2000. Price competition and market concentration: an experimental study. *International Journal of Industrial Organization* 18, 7–22.
- Fonseca, M.A., and Normann, H.-T. ,2012. Explicit vs. tacit collusion – The impact of communication in oligopoly experiments. *European Economic Review* 56, 1759-1772.
- Harrington, J. E. ,2004. Post-cartel pricing during litigation. *The Journal of Industrial Economics* LII (4), 517–533.
- Hinlopen, J., and Soetevent, A.R., 2008. Laboratory evidence on the effectiveness of corporate leniency programs. *RAND Journal of Economics* 39, 607–616.

Ivaldi, M., Jullien, B., Rey, P., Seabright, P., and Tirole, J., 2003. The Economics of Tacit Collusion. *Report for DG Competition, European Commission*.

Kühn, K.U., (2012) How market fragmentation can facilitate collusion. *Journal of the European Economic Association* 10, 1116–1140.

Levenstein, M.C., and Suslow, V.Y., 2006. What determines cartel success? *Journal of Economic Literature* 44, 43–95.

Instructions

Hello, and welcome to our experiment. Please read these instructions very carefully. The experiment will be conducted anonymously, meaning that you will not know with which persons you are interacting. We will not save any data in connection with your name.

Through your decisions and the decisions of the other participants, you may stand to earn Taler. At the end of the experiment, we will immediately exchange your Taler at a rate of

30,000 Taler = 1 Euro

which you will receive cash in hand. We ask you to remain in your booth until we call you to collect your payment. When you collect your payment, please have to hand all the documents you have received from us.

We kindly request that you remain silent during the entire experiment; if at any point you require assistance, please raise your hand and we will come to you.

Firms and markets

In this experiment you will be in the role of a firm which is in a market with another firm. During the entire experiment, it will always be the same firms (or participants) serving a market. That is, you will always be together with the same firm in the market.

The firms produce a good and there are no costs of producing this good.

This market is made up of 300 identical consumers, each of whom wants to purchase one unit of the good at the lowest price. The consumers will pay as much as 100 Taler for a unit of the good.

The firms' profits depend on the prices set by the two firms. In particular, the firm who sets the lowest price will sell to all 300 buyers. The other firm will not have any customers left to supply and will therefore make zero profit. If both firms set the lowest price, they will then equally divide the available consumers.

Let us go over a couple of illustrative examples:

1. Firm A sets a price of 85 and firm B chooses a price of 75. Firm B has set the lowest price and therefore sells its 300 units first at a price of 75, making a profit of 22,500 Taler. Firm A will therefore not supply any customers, thus making 0 Taler.
2. Firm A and firm B both set a price of 70. Given that firms A and B have set the same price, they will have to share the available customers equally. Hence, both firms will sell 150 units at a price of 70 each per unit, therefore making a profit of 10,500 Taler.

Communication

At the beginning of the first period, all firms will be asked whether they wish to communicate with each other before setting the price.

If both firms agree to communicate, a text box will appear on the screen for 30 seconds before firms can set their prices. Firms can communicate about anything they wish, so long as they do not identify who they are in the room. (Abusive language will not be tolerated.)

Payment for communication

If firms decide to communicate, they will have to make a payment with a **15%** probability. A random computer draw will decide whether a payment has to be made. If not all firms decide to communicate with each other, no payment will have to be made.

The payment is determined by the lowest price charged up to five periods back. If the communication started less than five periods back, then only the periods where you communicated will be charged. To summarize:

Payment = 50 x the sum of the lowest prices since the start of communication, but not more than for the last 5 rounds, with a 15% probability.

Consider again our examples. If in Example 1 firms decided to communicate before setting the prices and if the payment has to be made according to the random draw, the payment will be equal to $50 \cdot 75 = 3,750$ for each firm. Firm A would make a loss of $-3,750$ and firm B's payoff would be $22,500 - 3,750 = 18,750$ Taler. If the communication was enabled for more periods, the payment would accordingly be larger.

In Example 2, both firms had a price of 70. If the firms decided in favor of communication, the payment to be made after the random draw is $70 \cdot 50 = 3,500$ for both companies. Both would earn $10,500 - 3,500 = 7,000$ Taler. If communication has been enabled at this price for three periods already, the payment is $3 \cdot 3,500 = 10,500$ Taler. Note once again that it is not necessary to make a payment in every period. It occurs with a 15% probability.

Once firms agree to communicate, they will not need to agree again to communicate. Communication will stay enabled up to the point where you have to make a payment. Firms will then have the possibility again to agree on whether they wish to communicate.

Feedback

At the end of each period, you will find out the prices of all the firms. You will also learn how much profit you have made.

Duration

There will be at least 25 periods in this experiment.

After that, the computer will throw a virtual die which will determine the end of the experiment. If a 6 is thrown, the experiment will end; otherwise, another period will take place.

You will be matched with the same participant in every period.

PREVIOUS DISCUSSION PAPERS

- 159 Fonseca, Miguel A. and Normann, Hans-Theo, Endogenous Cartel Formation: Experimental Evidence, August 2014.
Forthcoming in: Economics Letters.
- 158 Stiebale, Joel, Cross-Border M&As and Innovative Activity of Acquiring and Target Firms, August 2014.
- 157 Haucap, Justus and Heimeshoff, Ulrich, The Happiness of Economists: Estimating the Causal Effect of Studying Economics on Subjective Well-Being, August 2014.
Forthcoming in: International Review of Economics Education.
- 156 Haucap, Justus, Heimeshoff, Ulrich and Lange, Mirjam R. J., The Impact of Tariff Diversity on Broadband Diffusion – An Empirical Analysis, August 2014.
- 155 Baumann, Florian and Friehe, Tim, On Discovery, Restricting Lawyers, and the Settlement Rate, August 2014.
- 154 Hottenrott, Hanna and Lopes-Bento, Cindy, R&D Partnerships and Innovation Performance: Can There be too Much of a Good Thing?, July 2014.
- 153 Hottenrott, Hanna and Lawson, Cornelia, Flying the Nest: How the Home Department Shapes Researchers' Career Paths, July 2014.
- 152 Hottenrott, Hanna, Lopes-Bento, Cindy and Veugelers, Reinhilde, Direct and Cross-Scheme Effects in a Research and Development Subsidy Program, July 2014.
- 151 Dewenter, Ralf and Heimeshoff, Ulrich, Do Expert Reviews Really Drive Demand? Evidence from a German Car Magazine, July 2014.
- 150 Bataille, Marc, Steinmetz, Alexander and Thorwarth, Susanne, Screening Instruments for Monitoring Market Power in Wholesale Electricity Markets – Lessons from Applications in Germany, July 2014.
- 149 Kholodilin, Konstantin A., Thomas, Tobias and Ulbricht, Dirk, Do Media Data Help to Predict German Industrial Production?, July 2014.
- 148 Hogrefe, Jan and Wrona, Jens, Trade, Tasks, and Trading: The Effect of Offshoring on Individual Skill Upgrading, June 2014.
- 147 Gaudin, Germain and White, Alexander, On the Antitrust Economics of the Electronic Books Industry, May 2014.
- 146 Alipranti, Maria, Milliou, Chrysovalantou and Petrakis, Emmanuel, Price vs. Quantity Competition in a Vertically Related Market, May 2014.
Published in: Economics Letters, 124 (2014), pp.122-126.
- 145 Blanco, Mariana, Engelmann, Dirk, Koch, Alexander K., and Normann, Hans-Theo, Preferences and Beliefs in a Sequential Social Dilemma: A Within-Subjects Analysis, May 2014.
Published in: Games and Economic Behavior, 87 (2014), pp.122-135.
- 144 Jeitschko, Thomas D., Jung, Yeonjei and Kim, Jaesoo, Bundling and Joint Marketing by Rival Firms, May 2014.
- 143 Benndorf, Volker and Normann, Hans-Theo, The Willingness to Sell Personal Data, April 2014.

- 142 Dauth, Wolfgang and Suedekum, Jens, Globalization and Local Profiles of Economic Growth and Industrial Change, April 2014.
- 141 Nowak, Verena, Schwarz, Christian and Suedekum, Jens, Asymmetric Spiders: Supplier Heterogeneity and the Organization of Firms, April 2014.
- 140 Hasnas, Irina, A Note on Consumer Flexibility, Data Quality and Collusion, April 2014.
- 139 Baye, Irina and Hasnas, Irina, Consumer Flexibility, Data Quality and Location Choice, April 2014.
- 138 Aghadadashli, Hamid and Wey, Christian, Multi-Union Bargaining: Tariff Plurality and Tariff Competition, April 2014.
- 137 Duso, Tomaso, Herr, Annika and Suppliet, Moritz, The Welfare Impact of Parallel Imports: A Structural Approach Applied to the German Market for Oral Anti-diabetics, April 2014.
Published in: *Health Economics*, 23 (2014), pp. 1036-1057.
- 136 Haucap, Justus and Müller, Andrea, Why are Economists so Different? Nature, Nurture and Gender Effects in a Simple Trust Game, March 2014.
- 135 Normann, Hans-Theo and Rau, Holger A., Simultaneous and Sequential Contributions to Step-Level Public Goods: One vs. Two Provision Levels, March 2014.
Forthcoming in: *Journal of Conflict Resolution*.
- 134 Bucher, Monika, Hauck, Achim and Neyer, Ulrike, Frictions in the Interbank Market and Uncertain Liquidity Needs: Implications for Monetary Policy Implementation, July 2014 (First Version March 2014).
- 133 Czarnitzki, Dirk, Hall, Bronwyn, H. and Hottenrott, Hanna, Patents as Quality Signals? The Implications for Financing Constraints on R&D?, February 2014.
- 132 Dewenter, Ralf and Heimeshoff, Ulrich, Media Bias and Advertising: Evidence from a German Car Magazine, February 2014.
Published in: *Review of Economics*, 65 (2014), pp. 77-94.
- 131 Baye, Irina and Sapi, Geza, Targeted Pricing, Consumer Myopia and Investment in Customer-Tracking Technology, February 2014.
- 130 Clemens, Georg and Rau, Holger A., Do Leniency Policies Facilitate Collusion? Experimental Evidence, January 2014.
- 129 Hottenrott, Hanna and Lawson, Cornelia, Fishing for Complementarities: Competitive Research Funding and Research Productivity, December 2013.
- 128 Hottenrott, Hanna and Rexhäuser, Sascha, Policy-Induced Environmental Technology and Inventive Efforts: Is There a Crowding Out?, December 2013.
- 127 Dauth, Wolfgang, Findeisen, Sebastian and Suedekum, Jens, The Rise of the East and the Far East: German Labor Markets and Trade Integration, December 2013.
Forthcoming in: *Journal of European Economic Association*.
- 126 Wenzel, Tobias, Consumer Myopia, Competition and the Incentives to Unshroud Add-on Information, December 2013.
Published in: *Journal of Economic Behavior and Organization*, 98 (2014), pp. 89-96.

- 125 Schwarz, Christian and Suedekum, Jens, Global Sourcing of Complex Production Processes, December 2013.
Published in: Journal of International Economics, 93 (2014), pp. 123-139.
- 124 Defever, Fabrice and Suedekum, Jens, Financial Liberalization and the Relationship-Specificity of Exports, December 2013.
Published in: Economics Letters, 122 (2014), pp. 375-379.
- 123 Bauernschuster, Stefan, Falck, Oliver, Heblich, Stephan and Suedekum, Jens, Why Are Educated and Risk-Loving Persons More Mobile Across Regions?, December 2013.
Published in: Journal of Economic Behavior and Organization, 98 (2014), pp. 56-69.
- 122 Hottenrott, Hanna and Lopes-Bento, Cindy, Quantity or Quality? Knowledge Alliances and their Effects on Patenting, December 2013.
Forthcoming in: Industrial and Corporate Change.
- 121 Hottenrott, Hanna and Lopes-Bento, Cindy, (International) R&D Collaboration and SMEs: The Effectiveness of Targeted Public R&D Support Schemes, December 2013.
Published in: Research Policy, 43 (2014), pp.1055-1066.
- 120 Giesen, Kristian and Suedekum, Jens, City Age and City Size, November 2013.
Forthcoming in: European Economic Review.
- 119 Trax, Michaela, Brunow, Stephan and Suedekum, Jens, Cultural Diversity and Plant-Level Productivity, November 2013.
- 118 Manasakis, Constantine and Vlassis, Minas, Downstream Mode of Competition With Upstream Market Power, November 2013.
Published in: Research in Economics, 68 (2014), pp. 84-93.
- 117 Sapi, Geza and Suleymanova, Irina, Consumer Flexibility, Data Quality and Targeted Pricing, November 2013.
- 116 Hinloopen, Jeroen, Müller, Wieland and Normann, Hans-Theo, Output Commitment Through Product Bundling: Experimental Evidence, November 2013.
Published in: European Economic Review, 65 (2014), pp. 164-180.
- 115 Baumann, Florian, Denter, Philipp and Friehe Tim, Hide or Show? Endogenous Observability of Private Precautions Against Crime When Property Value is Private Information, November 2013.
- 114 Fan, Ying, Kühn, Kai-Uwe and Lafontaine, Francine, Financial Constraints and Moral Hazard: The Case of Franchising, November 2013.
- 113 Aguzzoni, Luca, Argentesi, Elena, Buccirossi, Paolo, Ciari, Lorenzo, Duso, Tomaso, Tognoni, Massimo and Vitale, Cristiana, They Played the Merger Game: A Retrospective Analysis in the UK Videogames Market, October 2013.
Forthcoming in: Journal of Competition Law and Economics under the title: "A Retrospective Merger Analysis in the UK Videogame Market".
- 112 Myrseth, Kristian Ove R., Riener, Gerhard and Wollbrant, Conny, Tangible Temptation in the Social Dilemma: Cash, Cooperation, and Self-Control, October 2013.
- 111 Hasnas, Irina, Lambertini, Luca and Palestini, Arsen, Open Innovation in a Dynamic Cournot Duopoly, October 2013.
Published in: Economic Modelling, 36 (2014), pp. 79-87.

- 110 Baumann, Florian and Friehe, Tim, Competitive Pressure and Corporate Crime, September 2013.
- 109 Böckers, Veit, Haucap, Justus and Heimeshoff, Ulrich, Benefits of an Integrated European Electricity Market, September 2013.
- 108 Normann, Hans-Theo and Tan, Elaine S., Effects of Different Cartel Policies: Evidence from the German Power-Cable Industry, September 2013.
Published in: *Industrial and Corporate Change*, 23 (2014), pp.1037-1057.
- 107 Haucap, Justus, Heimeshoff, Ulrich, Klein, Gordon J., Rickert, Dennis and Wey, Christian, Bargaining Power in Manufacturer-Retailer Relationships, September 2013.
- 106 Baumann, Florian and Friehe, Tim, Design Standards and Technology Adoption: Welfare Effects of Increasing Environmental Fines when the Number of Firms is Endogenous, September 2013.
- 105 Jeitschko, Thomas D., NYSE Changing Hands: Antitrust and Attempted Acquisitions of an Erstwhile Monopoly, August 2013.
Published in: *Journal of Stock and Forex Trading*, 2 (2) (2013), pp. 1-6.
- 104 Böckers, Veit, Giessing, Leonie and Rösch, Jürgen, The Green Game Changer: An Empirical Assessment of the Effects of Wind and Solar Power on the Merit Order, August 2013.
- 103 Haucap, Justus and Muck, Johannes, What Drives the Relevance and Reputation of Economics Journals? An Update from a Survey among Economists, August 2013.
- 102 Jovanovic, Dragan and Wey, Christian, Passive Partial Ownership, Sneaky Takeovers, and Merger Control, August 2013.
Published in: *Economics Letters*, 125 (2014), pp. 32-35.
- 101 Haucap, Justus, Heimeshoff, Ulrich, Klein, Gordon J., Rickert, Dennis and Wey, Christian, Inter-Format Competition Among Retailers – The Role of Private Label Products in Market Delineation, August 2013.
- 100 Normann, Hans-Theo, Requate, Till and Waichman, Israel, Do Short-Term Laboratory Experiments Provide Valid Descriptions of Long-Term Economic Interactions? A Study of Cournot Markets, July 2013.
Published in: *Experimental Economics*, 17 (2014), pp. 371-390.
- 99 Dertwinkel-Kalt, Markus, Haucap, Justus and Wey, Christian, Input Price Discrimination (Bans), Entry and Welfare, June 2013.
- 98 Aguzzoni, Luca, Argentesi, Elena, Ciari, Lorenzo, Duso, Tomaso and Tognoni, Massimo, Ex-post Merger Evaluation in the UK Retail Market for Books, June 2013.
- 97 Caprice, Stéphane and von Schlippenbach, Vanessa, One-Stop Shopping as a Cause of Slotting Fees: A Rent-Shifting Mechanism, May 2012.
Published in: *Journal of Economics and Management Strategy*, 22 (2013), pp. 468-487.
- 96 Wenzel, Tobias, Independent Service Operators in ATM Markets, June 2013.
Published in: *Scottish Journal of Political Economy*, 61 (2014), pp. 26-47.
- 95 Coublucq, Daniel, Econometric Analysis of Productivity with Measurement Error: Empirical Application to the US Railroad Industry, June 2013.
- 94 Coublucq, Daniel, Demand Estimation with Selection Bias: A Dynamic Game Approach with an Application to the US Railroad Industry, June 2013.

- 93 Baumann, Florian and Friehe, Tim, Status Concerns as a Motive for Crime?, April 2013.
- 92 Jeitschko, Thomas D. and Zhang, Nanyun, Adverse Effects of Patent Pooling on Product Development and Commercialization, April 2013.
Published in: The B. E. Journal of Theoretical Economics, 14 (1) (2014), Art. No. 2013-0038.
- 91 Baumann, Florian and Friehe, Tim, Private Protection Against Crime when Property Value is Private Information, April 2013.
Published in: International Review of Law and Economics, 35 (2013), pp. 73-79.
- 90 Baumann, Florian and Friehe, Tim, Cheap Talk About the Detection Probability, April 2013.
Published in: International Game Theory Review, 15 (2013), Art. No. 1350003.
- 89 Pagel, Beatrice and Wey, Christian, How to Counter Union Power? Equilibrium Mergers in International Oligopoly, April 2013.
- 88 Jovanovic, Dragan, Mergers, Managerial Incentives, and Efficiencies, April 2014 (First Version April 2013).
- 87 Heimeshoff, Ulrich and Klein Gordon J., Bargaining Power and Local Heroes, March 2013.
- 86 Bertschek, Irene, Cerquera, Daniel and Klein, Gordon J., More Bits – More Bucks? Measuring the Impact of Broadband Internet on Firm Performance, February 2013.
Published in: Information Economics and Policy, 25 (2013), pp. 190-203.
- 85 Rasch, Alexander and Wenzel, Tobias, Piracy in a Two-Sided Software Market, February 2013.
Published in: Journal of Economic Behavior & Organization, 88 (2013), pp. 78-89.
- 84 Bataille, Marc and Steinmetz, Alexander, Intermodal Competition on Some Routes in Transportation Networks: The Case of Inter Urban Buses and Railways, January 2013.
- 83 Haucap, Justus and Heimeshoff, Ulrich, Google, Facebook, Amazon, eBay: Is the Internet Driving Competition or Market Monopolization?, January 2013.
Published in: International Economics and Economic Policy, 11 (2014), pp. 49-61.
- 82 Regner, Tobias and Riener, Gerhard, Voluntary Payments, Privacy and Social Pressure on the Internet: A Natural Field Experiment, December 2012.
- 81 Dertwinkel-Kalt, Markus and Wey, Christian, The Effects of Remedies on Merger Activity in Oligopoly, December 2012.
- 80 Baumann, Florian and Friehe, Tim, Optimal Damages Multipliers in Oligopolistic Markets, December 2012.
- 79 Duso, Tomaso, Röller, Lars-Hendrik and Seldeslachts, Jo, Collusion through Joint R&D: An Empirical Assessment, December 2012.
Published in: The Review of Economics and Statistics, 96 (2014), pp.349-370.
- 78 Baumann, Florian and Heine, Klaus, Innovation, Tort Law, and Competition, December 2012.
Published in: Journal of Institutional and Theoretical Economics, 169 (2013), pp. 703-719.
- 77 Coenen, Michael and Jovanovic, Dragan, Investment Behavior in a Constrained Dictator Game, November 2012.

- 76 Gu, Yiquan and Wenzel, Tobias, Strategic Obfuscation and Consumer Protection Policy in Financial Markets: Theory and Experimental Evidence, November 2012. Forthcoming in: Journal of Industrial Economics under the title "Strategic Obfuscation and Consumer Protection Policy".
- 75 Haucap, Justus, Heimeshoff, Ulrich and Jovanovic, Dragan, Competition in Germany's Minute Reserve Power Market: An Econometric Analysis, November 2012. Published in: The Energy Journal, 35 (2014), pp. 139-158.
- 74 Normann, Hans-Theo, Rösch, Jürgen and Schultz, Luis Manuel, Do Buyer Groups Facilitate Collusion?, November 2012.
- 73 Riener, Gerhard and Wiederhold, Simon, Heterogeneous Treatment Effects in Groups, November 2012. Published in: Economics Letters, 120 (2013), pp 408-412.
- 72 Berlemann, Michael and Haucap, Justus, Which Factors Drive the Decision to Boycott and Opt Out of Research Rankings? A Note, November 2012.
- 71 Muck, Johannes and Heimeshoff, Ulrich, First Mover Advantages in Mobile Telecommunications: Evidence from OECD Countries, October 2012.
- 70 Karaçuka, Mehmet, Çatik, A. Nazif and Haucap, Justus, Consumer Choice and Local Network Effects in Mobile Telecommunications in Turkey, October 2012. Published in: Telecommunications Policy, 37 (2013), pp. 334-344.
- 69 Clemens, Georg and Rau, Holger A., Rebels without a Clue? Experimental Evidence on Partial Cartels, April 2013 (First Version October 2012).
- 68 Regner, Tobias and Riener, Gerhard, Motivational Cherry Picking, September 2012.
- 67 Fonseca, Miguel A. and Normann, Hans-Theo, Excess Capacity and Pricing in Bertrand-Edgeworth Markets: Experimental Evidence, September 2012. Published in: Journal of Institutional and Theoretical Economics, 169 (2013), pp. 199-228.
- 66 Riener, Gerhard and Wiederhold, Simon, Team Building and Hidden Costs of Control, September 2012.
- 65 Fonseca, Miguel A. and Normann, Hans-Theo, Explicit vs. Tacit Collusion – The Impact of Communication in Oligopoly Experiments, August 2012. Published in: European Economic Review, 56 (2012), pp. 1759-1772.
- 64 Jovanovic, Dragan and Wey, Christian, An Equilibrium Analysis of Efficiency Gains from Mergers, July 2012.
- 63 Dewenter, Ralf, Jaschinski, Thomas and Kuchinke, Björn A., Hospital Market Concentration and Discrimination of Patients, July 2012 . Published in: Schmollers Jahrbuch, 133 (2013), pp. 345-374.
- 62 Von Schlippenbach, Vanessa and Teichmann, Isabel, The Strategic Use of Private Quality Standards in Food Supply Chains, May 2012. Published in: American Journal of Agricultural Economics, 94 (2012), pp. 1189-1201.
- 61 Sapi, Geza, Bargaining, Vertical Mergers and Entry, July 2012.
- 60 Jentzsch, Nicola, Sapi, Geza and Suleymanova, Irina, Targeted Pricing and Customer Data Sharing Among Rivals, July 2012. Published in: International Journal of Industrial Organization, 31 (2013), pp. 131-144.

- 59 Lambarraa, Fatima and Riener, Gerhard, On the Norms of Charitable Giving in Islam: A Field Experiment, June 2012.
- 58 Duso, Tomaso, Gugler, Klaus and Szücs, Florian, An Empirical Assessment of the 2004 EU Merger Policy Reform, June 2012.
Published in: *Economic Journal*, 123 (2013), F596-F619.
- 57 Dewenter, Ralf and Heimeshoff, Ulrich, More Ads, More Revs? Is there a Media Bias in the Likelihood to be Reviewed?, June 2012.
- 56 Böckers, Veit, Heimeshoff, Ulrich and Müller Andrea, Pull-Forward Effects in the German Car Scrappage Scheme: A Time Series Approach, June 2012.
- 55 Kellner, Christian and Riener, Gerhard, The Effect of Ambiguity Aversion on Reward Scheme Choice, June 2012.
- 54 De Silva, Dakshina G., Kosmopoulou, Georgia, Pagel, Beatrice and Peeters, Ronald, The Impact of Timing on Bidding Behavior in Procurement Auctions of Contracts with Private Costs, June 2012.
Published in: *Review of Industrial Organization*, 41 (2013), pp.321-343.
- 53 Benndorf, Volker and Rau, Holger A., Competition in the Workplace: An Experimental Investigation, May 2012.
- 52 Haucap, Justus and Klein, Gordon J., How Regulation Affects Network and Service Quality in Related Markets, May 2012.
Published in: *Economics Letters*, 117 (2012), pp. 521-524.
- 51 Dewenter, Ralf and Heimeshoff, Ulrich, Less Pain at the Pump? The Effects of Regulatory Interventions in Retail Gasoline Markets, May 2012.
- 50 Böckers, Veit and Heimeshoff, Ulrich, The Extent of European Power Markets, April 2012.
- 49 Barth, Anne-Kathrin and Heimeshoff, Ulrich, How Large is the Magnitude of Fixed-Mobile Call Substitution? - Empirical Evidence from 16 European Countries, April 2012.
Forthcoming in: *Telecommunications Policy*.
- 48 Herr, Annika and Suppliet, Moritz, Pharmaceutical Prices under Regulation: Tiered Co-payments and Reference Pricing in Germany, April 2012.
- 47 Haucap, Justus and Müller, Hans Christian, The Effects of Gasoline Price Regulations: Experimental Evidence, April 2012.
- 46 Stühmeier, Torben, Roaming and Investments in the Mobile Internet Market, March 2012.
Published in: *Telecommunications Policy*, 36 (2012), pp. 595-607.
- 45 Graf, Julia, The Effects of Rebate Contracts on the Health Care System, March 2012,
Published in: *The European Journal of Health Economics*, 15 (2014), pp.477-487.
- 44 Pagel, Beatrice and Wey, Christian, Unionization Structures in International Oligopoly, February 2012.
Published in: *Labour: Review of Labour Economics and Industrial Relations*, 27 (2013), pp. 1-17.
- 43 Gu, Yiquan and Wenzel, Tobias, Price-Dependent Demand in Spatial Models, January 2012.
Published in: *B. E. Journal of Economic Analysis & Policy*, 12 (2012), Article 6.

- 42 Barth, Anne-Kathrin and Heimeshoff, Ulrich, Does the Growth of Mobile Markets Cause the Demise of Fixed Networks? – Evidence from the European Union, January 2012.
Forthcoming in: Telecommunications Policy.
- 41 Stühmeier, Torben and Wenzel, Tobias, Regulating Advertising in the Presence of Public Service Broadcasting, January 2012.
Published in: Review of Network Economics, 11/2 (2012), Article 1.

Older discussion papers can be found online at:
<http://ideas.repec.org/s/zbw/dicedp.html>

Heinrich-Heine-University of Düsseldorf

**Düsseldorf Institute for
Competition Economics (DICE)**

Universitätsstraße 1_ 40225 Düsseldorf
www.dice.hhu.de

ISSN 2190-9938 (online)
ISBN 978-3-86304-158-8