PhD Course: Advanced Industrial Economics and Competition Policy

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Objectives

Competition policy typically rests on three pillars: the prosecution of *cartels and other illegal agreements*, law enforcement against *abusive conduct of powerful firms*, and *merger control.* Under the influence of modern industrial economics, competition policy institutions and legal provisions have been substantially revised throughout the last decade(s) – consider for instance the introduction of leniency and whistle-blowing programs against cartels, the re-thinking of law enforcement against vertical restraints, or the assessment of market power on the basis of econometric test techniques in revised merger guidelines. Notwithstanding these reforms of competition policy, recent economic developments such as the *privatization and liberalization* of public utilities in the 1990th, the *internet* revolution around the millennium, or the growing awareness of *financial market imperfections* in the last couple of years resemble new challenges to competition policy that will be the topic of this course.

A common feature of all these challenges for competition policy is the prevalence of networks – in most of the privatized industries (e.g. telecommunication, transportation, or natural resources) the good or service is *access to a network*, the internet has changed our live mostly via services *mediated through a network*, and financial market imperfections (as well as certain features of the most recent crisis) are best described as a particular *formation of (economic) networks.* To address these topics, the first week of the course will cover models of network formation and competition between service providers on networks. The main theoretical toolkit will be the theory of learning in games. The second week will apply these concepts to recent competition policy cases.

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Evaluation

Take-home exam Throughout the first week of the course, students will receive little problem sets that have to be submitted before the beginning of the second week of the course and are subject to grading.

Research paper After the course, students have to prepare a short paper (6 to 10 pages) of a competition policy case of their own choice. In principle, any case is admissible (except cases involving Google or eBay as these firms will be discussed in class to a large extend). For further inspiration, a list of potentially fruitful cases will be provided in the first week of the course. The paper can focus on theoretical aspects that are relevant to the particular case or discuss empirical methods that are or should be considered or emphasize the institutional/policy aspect of the case at hand.

The paper should be typed (handwriting is not accepted). Joined work of up to two students is encouraged, but in that case the paper should be 10-14 pages (and the grade will not discriminate between the two students). The final grade will be one third the grade of the take-home exam and two thirds the grade for the research paper.

Core texts

The course assumes a pre-knowledge in basics of industrial organization (in particular oligopoly theory and theories of cartelization) and game theory (in particular normal form games and basics in auction theory) at an undergraduate level. A successful participation in the PhD courses on microeconomics and game theory is appreciated but not a indispensable prerequisite. A good refresher in industrial economics, a reference throughout the course, and a source for inspiration regarding the world of competition policy cases are

Belleflamme, P. and M. Peitz (2010), Industrial Organization: Markets and Strategies, Cambridge.

Motta, M. (2009), Competition Policy: Theory and Practice, Cambridge.

A classic reference for the theory of learning in games is

Young, P. (1998), Individual Strategy and Social Structure: An evolutionary theory of institutions, Princeton.

From the rapidly growing literature on networks, the following two books are particularly helpful.

Goyal, S. (2009), Connections, Princeton.

Easley, D. and J. Kleinberg (2010), Networks, crowds, and markets, Cambridge.

Except for the textbooks by Belleflamme and Peitz (2010) and Goyal (2009) which are available at IBK library, all references can be found in the ecampus.

Research and survey papers

Alos-Ferrer, C., G. Kirchsteiger, and M. Walzl (2010), On the Evolution of Market Institutions - The Platform Design Paradox, Economic Journal, 120 (543), 215-243.

Ariely, D., A. Ockenfels, and A. E. Roth (2005), An Experimental Analysis of Ending Rules in Internet Auctions, The RAND Journal of Economics, 36(4), 890-907.

Boeheim, M. (2010), Wettbewerbspolitik nach der Wirtschaftskrise, WiFo Monatsberichte 10/2010.

Edelman, B., M. Ostrovsky, and M. Schwarz (2007). Internet advertising and the generalized second price auction: Selling billions of dollars worth of keywords. American Economic Review, 97(1), 242-259.

Goyal, S. and S. Joshi (2003), Networks of collaboration in oligopoly, Games and Economic Behavior, 43, 57-85.

Jackson, M.O. and A. Watts (2002), The evolution of social and economic networks, Journal of Economic Theory 106, 265-295.

Jackson, M.O. and A. Wolinsky (1996), A Strategic Model of Social and Economic Networks, Journal of Economic Theory 71, 44-74.

Klaus, B., F. Klijn, and M. Walzl (2010), Stochastic Stability for Roommate Markets, Journal of Economic Theory 145, 2218-2240.

Kosfeld, M. (2004), Economic Networks in the Laboratory: A Survey, Review of Network Economics, 3(1).

Roth, A.E. and A. Ockenfels (2002), Last-Minute Bidding and the Rules for Ending Second-Price Auctions: Evidence from eBay and Amazon Auctions on the Internet, American Economic Review, 92(4), 1093-1103.

Varian, H. (2007), Position auctions. International Journal of Industrial Organization, 25, 1163-1178.

Young, H. P. (1993), The Evolution of Conventions, Econometrica 61, 57-84.

Schedule

Week 1: Theory

- Session 1: 07-06-2011, 09.00 - 10.45:[1] Opening and introductory examples

  For a review of competition policy institutions see Appendix B in Belleflamme and Peitz (2010) or Ch. 1 in Motta (2009), for an assessment of the status-quo in Austria see Boeheim (2010 – in German).

- Session 2: 08-06-2011,15.00 - 18.45: Coordination, learning, and the evolution of standards and conventions

  The session will focus on Young (1993), a more detailed description of the relevant concepts can be found in Ch. 1-4 in Young (1998). A more applied perspective on standard setting can be found in Ch. 21 in Belleflamme and Peitz (2010).

- Session 3: 09-06-2011, 15.00 - 18.45: Formation of social and economic networks

  The session will focus on Jackson and Watts (2002). Other references on network formation touched upon throughout the lecture will be Jackson and Wolinsky (1996) and Klaus et al. (2010). The experimental literature on networks is surveyed in Kosfeld (2004). A nice introduction to network economics is Goyal (2009).

- Session 4: 10-06-2011, 08.00 - 10.45: Trade intermediation and platform competition

  The session will focus on Alos-Ferrer et al. (2010), as an example of the corresponding empirical literature consider Roth and Ockenfels (2002) or Ariely et al. (2002). A comprehensive introduction into the economics of intermediation can be found in Belleflamme and Peitz (2010, Ch. 22).

[1] All sessions are in Seminarraum 4 (SOWI), IBK

Week 2: Applications

- Session 5: 20-06-2011, 08.00 - 09.45: Competition and Innovation(networks)

  This session will focus on Goyal and Joshi (2003) – for a textbook description of the model see Ch. 10 in Goyal (2009). A comprehensive introduction into the economics of innovation can be found in Belleflamme and Peitz (2010, Ch. 18).

- Session 6: 21-06-2011, 08.00 - 10.45: Abuse of a dominant position (Google Case)

  Most of the material covered in this session is discussed in Part IV of Easley and Kleinberg (2010) – the original papers on Add-auctions are Varian (2007) and Edelman et al. (2007)

- Session 7: 22-06-2011, 15.00 - 18.45: Case Analysis I (Cartels, collusion and merger control)

  Literature provided by the presenting participants.

- Session 8: 24-06-2011, 08.00 - 10.45: Case Analysis II (Predation and other abusive practices)

  Literature provided by the presenting participants.

1 Markov Process Terminology

- A *Markov process* (X, T) is determined by a discrete state space X and a mapping $T : X \times X \to [0, 1]$ where $T(x, x')$ describes the probability that the state equals $x' \in X$ in period $t+1$ whenever it was in $x \in X$ in period t. Clearly, for all $x \in X$, $\sum_{x' \in X} T(x, x') = 1$. Here we restrict ourselves to *finite*, *time-homogeneous* Markov processes, i.e., X is a finite set and transition probabilities induced (and captured in T) do not depend on time.

- An *absorbing set* $A \subseteq X$ is a minimal set of states that once entered throughout the dynamic process is never abandoned.

- An absorbing set A is *aperiodic* whenever it does not contain any deterministic and non-trivial cycle, i.e., there is no sequence of at least two states $x_1, x_2, \ldots, x_n \in A$ such that for all $i = 1, .., n-1$, $x_i \in A$ and $T(x_i, x_{i+1}) = T(x_n, x_1) = 1$. Note that a sufficient condition for the aperiodicity of an absorbing set A is that for some $x \in A$, $0 < T(x, x) < 1$, i.e., the Markov process exhibits sufficient (but not complete) inertia.

- By the *weak fundamental theorem of Markov processes* every aperiodic absorbing set $A \subseteq X$ corresponds to exactly one *invariant distribution* $p : X \to [0, 1]$ with $p \cdot T = p$ and support A, i.e., $\sum_{x \in A} p(x) = 1$. If all absorbing sets of a Markov process are aperiodic, then its set of invariant distributions is defined as the convex hull of the invariant distributions of its absorbing sets. The support of an invariant distribution p of such a Markov process is therefore a (non-empty) collection of absorbing sets.

- By the *fundamental theorem of Markov processes* the unique invariant distribution p that is induced by an aperiodic absorbing set $A \subseteq X$ describes the probability $p(x)$ that the process will be at state $x \in A$ if it reached a state in A and propagated forever, i.e., for all $x \in A$ and all probability distributions $\tilde{p} : A \to [0, 1]$, $p(x) = (\lim_{k \to \infty} \tilde{p} \cdot T^k)(x)$.

- A Markov process is *ergodic* if it has a unique absorbing set.

- A Markov process is *irreducible* if it is ergodic and the unique absorbing set coincides with the state space X.

- A *perturbed Markov process* (X, T^ϵ) is a Markov process such that for all $x, x' \in X$, $\lim_{\epsilon \to 0} T^\epsilon(x, x') = T(x, x')$, and for all $\epsilon > 0$, $T^\epsilon(x, x') > 0$ implies that there is an $r \geq 0$ with $0 < \lim_{\epsilon \to 0} \epsilon^{-r} T^\epsilon(x, x') < \infty$. Here we restrict ourselves to irreducible and aperiodic perturbed Markov processes. Therefore, the invariant distribution p^ϵ of (X, T^ϵ) is unique.

- The *limit invariant distribution* p^* of a Markov process (X, T) is the invariant distribution p^ϵ of a perturbed process (X, T^ϵ) in the limit of $\epsilon \to 0$. Young (1993, Theorem 4(i)) implies that $p^* := \lim_{\epsilon \to 0} p^\epsilon$ exists and is an invariant distribution of (X, T).

- A state in the support of p^* is *stochastically stable.*