DECIPHERING ALGORITHMIC COLLUSION

THE ROLE OF BANDIT ALGORITHMS IN ANTITRUST ENFORCEMENT

Algorithmic Collusion Problems And Counter Measures

Ulrich Schwalbe

Algorithmic Collusion Problems And Counter Measures:

   Research Handbook on the Law of Artificial Intelligence Woodrow Barfield,Ugo Pagallo,2025-06-09 This second edition provides a broad range of perspectives on the legal implications of artificial intelligence AI across different global jurisdictions Contributors identify the potential threats that AI poses to the protection of rights and human wellbeing anticipating future developments in technological and legal infrastructures   Algorithms and Law Martin Ebers,Susana Navas,2020-07-23 Exploring issues from big data to robotics this volume is the first to comprehensively examine the regulatory implications of AI technology   *The Collaborative Economy and EU Law* Vassilis Hatzopoulos,2018-02-22 Disruptive innovation the fourth industrial revolution one of the ten ideas that will change the world the collaborative sharing economy is shaking existing norms It poses unprecedented challenges in terms of both material policies and governance in almost all aspects of EU law This book explores the application or indeed inadequacy of existing EU rules in the context of the collaborative economy It analyses the novelties introduced by the collaborative economy and discusses the specific regulatory needs and instruments employed therein most notably self regulation Further it aims to elucidate the legal status of the parties involved traders consumers prosumers in these multi sided economies and their respective roles in the provision of services especially with regard to liability issues Moreover it delves into a sector specific examination of the relevant EU rules especially on data protection competition consumer protection and labour law and comments on the uncertainties and lacunae produced therein It concludes with the acute question of whether fresh EU regulation would be necessary to avoid fragmentation or on the contrary if such regulation would create unnecessary burdens and stifle innovation Taking a broad perspective and pragmatic view the book provides a comprehensive overview of the collaborative economy in the context of the EU legal landscape   *Research Handbook on Cartels* Peter Whelan,2023-03-02 Drawing together a variety of perspectives this accessible yet comprehensive Research Handbook provides an in depth analysis of the most significant issues pertaining to the legal regulation of cartels An interdisciplinary team of respected experts explores the theoretical legal economic political and comparative discourse surrounding cartel regulation   **Jones and Sufrin's EU Competition Law** Alison Jones,B. E. Sufrin,Niamh Dunne,2019 The most comprehensive resource for students on EU competition law extracts from key cases academic works and legislation are paired with incisive critique and commentary from an expert author team   Algorithmic Tacit Collusion Valeria Caforio,2022 In light of the ongoing debate on algorithmic collusion this paper intends to answer the following question should algorithmic tacit collusion be prohibited under EU competition law By algorithmic tacit collusion it is meant the capability of algorithmic pricing agents to unilaterally engage into tacitly collusive strategies without human intervention we also call it machine to machine cooperation or algorithmic interdependent pricing Essentially this practice raises the very same issues as the well known oligopoly problem Therefore to make it prohibited one could envisage the traditional proposed solution of disentangling the categories of article

101 TFEU from the notions of an act of reciprocal communication between firms or meeting of minds The paper sets out to discuss this option and its implications It argues that from a competition law standpoint although algorithmic tacit collusion remains undesirable the notions of agreement and concerted practices should not be changed to encompass it Rather it embraces a regulatory perspective referred to as algorithms by design which relies on introducing a legal obligation for firms to program algorithms in such a way as to prevent them from setting oligopolistic prices In particular while exploring this regulatory proposal the paper discusses the peculiar case of algorithms that though designed not to violate antitrust law end up charging collusive prices In this regard the paper develops a second proposal it introduces the idea of outcome visibility to nail firms to their responsibility This concept implies the idea that even if firms are not aware that their pricing algorithms are implementing a collusive strategy they cannot ignore their visible market outcome **Collusion Via Algorithms** Mohsin Rahim,2022 The technological advancement at an unprecedented pace has resulted in legislation and regulation failing to keep up with new challenges faced by the consumers The legislators and regulators are consequently struggling to amend provisions In the traditional sense collusion is amongst humans or actions caused by humans New technological advances have resulted in such collusions being taken by or in active connivance of algorithms The major issues across jurisdictions are 1 What constitutes collusion in the digital age and 2 What is the method to collect such evidence that they can rely on to enforce Competition law without disclosing the proprietary commercially sensitive information and scuttling innovation The aim and objective of this paper is to analyze the functioning of algorithms under the lens of competition law to draw a comparative analysis of the draft regulations from the jurisdictions of the European Union the United Kingdom and the United States and provide suggestive regulatory reforms in India by analyzing the regulations being implemented with regard to algorithmic collusions in the abovementioned jurisdictions The paper shall also attempt to put forward other measures which are not a part of any regulation yet that can be implemented to counter collusion by algorithms **Two Artificial Neural Networks Meet in an Online Hub and Change the Future (Of Competition, Market Dynamics and Society).** Ariel Ezrachi,2019 In the future one may imagine a new breed of antitrust humor Jokes might start along the following lines Two Artificial Neural Network and one Nash equilibrium meet in an online pub hub After a few milliseconds a unique silent friendship is formed Back to the present we are not sure how this joke might end Nor can we estimate how funny future consumers would find it We can however explain at present how technological advancements have changed and will continue to change the dynamics of competition and subsequently the distribution of wealth in society How algorithms may be used in stealth mode to stabilize and dampen market competition while retaining the fa ade of a competitive environment That tale is at the heart of this paper We first raised algorithmic tacit collusion in 2015 Our recent book Virtual Competition The Promise and Perils of the Algorithm Driven Economy provides further context and analysis We illustrate how online tacit collusion may emerge when products are generally homogeneous sellers do not benefit from brand recognition or

loyalty and markets are transparent and concentrated Since our book elaborates on the four collusion scenarios we begin here by outlining one model of tacit collusion and its manifestation online Taking note of advancements in technology and emerging policies we move the debate forward in reviewing the possible harm and means to address it We illustrate with several case studies how the move to an online pricing environment under certain market conditions may harm the buyers welfare We note how new technologies may undermine enforcers attempts to intervene as stealth becomes a feature of future strategies That tale of course is not immune from disruptive strategies We consider the testing of counter measures in an algorithmic collusion incubator to better understand what effectively destabilizes algorithmic tacit collusion Further we consider the effects and likelihood of secret dealings We note how somewhat counter intuitively secret deals in an online environment could reduce at times our welfare **Controlling Algorithmic Collusion** Joao E. Gata,2019 Algorithms have played an increasingly important role in economic activity as they becoming faster and smarter Together with the increasing use of ever larger data sets they may lead to significant changes in the way markets work These developments have been raising concerns not only over the rights to privacy and consumers autonomy but also on competition Infringements of antitrust laws involving the use of algorithms have occurred in the past However current concerns are of a different nature as they relate to the role algorithms can play as facilitators of collusive behavior in repeated games and the role increasingly sophisticated algorithms can play as autonomous implementers of pricing strategies learning to collude without any explicit instructions provided by human agents In particular it is recognized that the use of learning algorithms can facilitate tacit collusion and lead to an increased blurring of borders between tacit and explicit collusion Several authors who have addressed the possibilities for achieving tacit collusion equilibrium outcomes by algorithms interacting autonomously have also considered some form of ex ante assessment and regulation over the type of algorithms used by firms By using well known results in the theory of computation I show that such option faces serious challenges to its effectiveness due to undecidability results Ex post assessment may be constrained as well Notwithstanding several challenges face by current software testing methodologies competition law enforcement and policy have much to gain from an interdisciplinary collaboration with computer science and mathematics **Algorithms, Machine Learning, and Collusion** Ulrich Schwalbe,2018 This paper discusses the question whether self learning price setting algorithms are able to coordinate their pricing behaviour to achieve a collusive outcome that maximizes the joint profits of the firms using these algorithms While the legal literature generally assumes that algorithmic collusion is indeed possible and in fact very easy the computer science literature on cooperation between algorithms as well as the economics literature on collusion in experimental oligopolies indicate that a coordinated and in particular tacitly collusive behaviour is in general rather difficult to achieve Many studies have shown that some form of communication is of vital importance for collusion if there are more than two firms in a market Communication between algorithms is also a topic in artificial intelligence research and some recent contributions indicate

that algorithms may learn to communicate albeit in a rather limited way This leads to the conclusion that algorithmic collusion is currently much more difficult to achieve than often assumed in the legal literature and is therefore currently not a particularly important competitive concern In addition there are also several legal problems associated with algorithmic collusion for example questions of liability of auditing and monitoring algorithms as well as enforcement The limited resources of competition authorities should rather be devoted to more pressing problems as for example the abuse of dominant positions by large online platforms

What Do We Know About Algorithmic Collusion Now? New Insights from the Latest Academic Research Ai Deng,2023 Algorithmic collusion has captured the attention of the global antitrust community for the past several years Deng 2020 provided a comprehensive survey of the pertinent literature in economics and computer science and a critical discussion Over the past three years new insights have emerged from academic research These new insights have not only deepened our understanding of the intricate relationship between algorithms and competition but also begun challenging some previous findings once considered compelling evidence supporting the plausibility of autonomous algorithmic tacit collusion In this article I discuss these new insights with a focus on four topics 1 the nuanced ways algorithms affect prices 2 the crucial role of algorithmic design 3 the consequences of third party pricing algorithms and 4 some considerations when assessing algorithmic impact in litigation

Price Discrimination-Driven Algorithmic Collusion Salil K. Mehra,2020 Algorithmic competition has arrived With it has come the specter of algorithmic collusion rapid detection of co conspirators defection via technologically enhanced price monitoring and setting capability can encourage anticompetitive collusion Strikingly the ability to track consumers willingness to pay and price discriminate among them may synergize with algorithmic collusion into something antitrust scholars had previously thought impossible stable cartels In particular consumer facing digital platforms increasingly can determine consumers individual willingness to pay Doing this allows them to deploy sophisticated forms of price discrimination and thereby effect large welfare transfers from consumers to producers This Article is the first to describe and analyze the potential interaction between price discrimination and algorithmic collusion Algorithm driven platforms now knit together large numbers of previously independent firms and agents some platforms set the price these participating firms and agents will charge Crucially if the gains to producers from collusive price discrimination are big enough a qualitative change may take place participants may find that they are no longer are in a Prisoner s Dilemma tempting them to undercut each other on price but rather in a coordination game with a single rational choice keep their collusion going This Article sets forth how this dynamic can produce agreements by competitors facilitated by price discriminating price setting platforms that transfer wealth from consumers to producers arguably a violation of Section 1 of the Sherman Act Indeed in contrast to the traditional view that firms need to first obtain Section 2 monopoly power and only then can implement price discrimination the model presented here shows the causation can run the other way The ability to price discriminate effectively can drive the joint maintenance of monopoly power by

colluding competitors This dynamic takes on new urgency as more and more commerce shifts to the Internet and smartphone apps a trend that has been accelerated by the COVID 19 pandemic and its associated acceleration of the shift to e commerce Potential solutions to this problem will be complicated by antitrust law s current relegation of price discrimination to the dead letter office no Federal Trade Commission complaint under the Robinson Patman Act the main relevant statute has been brought this century Indeed during the past decade the most recent edition of the leading antitrust casebook in the U S deleted its section on price discrimination and the Act This Article proposes three actions i revive some enforcement against price discrimination ii prioritize action against price discriminating platforms that inhibit switching by participants including scrutinizing mergers between firms whose Big Data based ability to gauge willingness to pay may if combined have negative ramifications for consumers and iii factor price discrimination driven algorithmic collusion into the current reevaluation of vertical restraints   *Tacit Algorithmic Collusion* Lucie Ronchewski,2022   *Autonomous Algorithmic Collusion: Economic Research and Policy Implications* Stephanie Assad,Emilio Calvano,Giacomo Calzolari,Robert Clark,Vincenzo Denicolò,Daniel Ershov,Justin P. Johnson,Sergio Pastorello,Andrew Rhodes,Lei Xu,Matthijs R. Wildenbeest,2021

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