ALGORITHM-FUELLED CONSCIOUS PARALLELISM: POSING MULTIFACETED CHALLENGES TO THE COMPETITION REGIME

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ABSTRACT

In recent times the algorithm has emerged as a new emerging technology that enable computer to take over the task, which were earlier reserved for human beings. Algorithm particularly pricing algorithm have potential to enhance competition landscape in a given market. But, nonetheless algorithm-fuelled conscious parallelism poses multidimensional challenges to the competition regime in form of difficulty in proving plus factors, attributing liability for act of conscious parallelism, distinguishing algorithm fuelled conscious parallelism from oligopolistic interdependence, increased market transparency, over enforcement problems, replacement of explicit collusion with conscious parallelism, *etc.* To tackle such challenges there is a need for proper market study, changes in competition regime, reviewing *ex*-ante merger control regulations, ensuring competition compliance by design, auditing pricing algorithm *etc.* But at the same time it must also be kept in mind that pricing algorithm is still an area of high complexity and uncertainty, so any intervention should be subject to deep assessment and maintain a

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fine balance between consumer protection, promotion of competition and innovation.

1. INTRODUCTION

Thomas Watson who was the president of IBM, in 1943 said, "I think there is a world market for maybe five computers." The same is evident in the present era where the way consumers engage with suppliers has changed rapidly over the past few decades, with an increase in the number of transactions being conducted online. The digital revolution has also enabled the companies' ability to capture, store and analyse the big data[1] about their customers and competitors and also help them price their products and services using algorithms.

The algorithm is a new emerging technology that enable computer to take over the task, which were earlier reserved for human beings. Algorithms are used for calculation, data processing and automated reasoning. There is not one precise definition of an algorithm[2] that has been universally adopted.[3] But it is generally defined as "A well-defined

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[1] Information technology research company Gartner defines big data as: "high-volume, high-velocity and high-variety information ('3V') assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making". *See also*, James Manyika et al., *Big Data: The next frontier for Innovation, Competition and Productivity*, MCKINSEY (Nov. 2, 2018), https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/big-data-the-next-frontier-for-innovation.

[2] YIANNIS MOSCHOVAKIS, WHAT IS AN ALGORITHM? 919 (Björn Engquist & Wilfried Schmid, 2001). The author state that elucidating what an algorithm is has proved to be a challenging problem.

[3] Competition & Market Authority, *Pricing Algorithms: Economic working paper on use of Algorithms to facilitate collusion and personalised pricing,* UKGOV (Nov. 12, 2018, 03:23   PM), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/746353/Algorithms_econ_report.pdf

computational procedure that takes some value or set of values as input and produces some value or set of values as output."[4]

There are various types of algorithms, depending on their purpose, the question or the problem they are supposed to provide the answer to. The OECD Roundtable on "Algorithms and Collusion"[5] outline certain types of algorithms, which may be used by businesses in the process of setting prices, these are as follows: (a) Monitoring algorithms[6] that are used for collection, screening and analysis of data; (b) Parallel algorithms or dynamic pricing algorithms[7] that automatically react to any changes in market conditions and adjust prices accordingly; (c) Signalling algorithms[8] that disclose and disseminate information; (d) Self-learning algorithms that use machine learning and deep learning technologies.[9]

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[4] THOMAS H. CORMEN et. al., INTRODUCTION TO ALGORITHMS 6 (3rd ed., MIT Press 2009). See also, Michal Gal & Niva Elkin-Koren, *Algorithmic Consumers*, 30 HARVARD JOU. OF L. & T. 45, 47 (2017).

[5] OECD, *Algorithms and collusion*, OECD (Nov. 09, 2018, 12:33 PM), http://www.oecd.org/competition/algorithms-and-collusion.htm

[6] This role may include the collection of information concerning competitor's business decisions, data screening to look for any potential deviations and eventually the programming of immediate retaliations. See, OECD, *Algorithms and Collusion: Competition policy in the Digital Age*, OECD (Nov. 15, 2018, 04:33 PM), http://www.oecd.org/daf/competition/Algorithms-and-colllusion-competition-policy-in-the-digital-age.pdf

[7] Dynamic pricing algorithms have been implemented, for instance, by airlines, hotel booking services and transportation network companies to efficiently adjust supply to periods of lower or higher demand.

[8] *In Re* High Fructose Corn Syrup Antitrust Litigation Appeal of A & W Bottling Inc. et al., United States Court of Appeals, Seventh Circuit, 295 F3d 651, 2 (2002). The Court defined the same in context of Competition Law as: If a firm raises price in the expectation that its competitors will do likewise and they do, the firm's behaviour can be conceptualized as the offer of a unilateral contract that the offerees accept by raising their prices.

[9] These are the most complex and subtle way in which algorithms can change price outcomes. OECD, *supra* note 6.

Here, the pricing algorithm is defined as a code describing how prices are assigned to market conditions.[10] Thus, in general terms it implies algorithms used by businesses in the process of setting prices, whether it is one of the abovementioned categories, a combination of them or even a type of algorithm not mentioned above.[11]

2. ALGORITHMS INDUCED BENEFITS

It is also to be noted that the introduction of algorithm has brought many benefits to consumers and has potential to enhance competition landscape[12] in a given market. For example, algorithms can reduce transaction costs for firms, reduce frictions in markets and give consumers greater information[13] on which to base their decisions.[14] Algorithms can also substantially reduce the costs of setting and changing prices and facilitate entry of new suppliers as they can quickly learn how a market

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[10] Joseph E. Harrington Jr., *Developing Competition Law for Collusion by Autonomous Price-Setting Agents*, SSRN (Nov. 15, 2018, 07:43 PM), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3037818

[11] Agnieszka Bartłomiejczyk, *Algorithmic pricing under EU Competition Law*, SCRIPTIESONLINE (Nov. 22, 2018, 04:43 AM), http://www.scriptiesonline.uba.uva.nl/document/660502

[12] Elvinger et al., *Luxembourg: Competition Law Exemption For Webtaxi Pricing Algorithm,* MONDAQ (Nov. 23, 2018, 03:23 AM), http://www.mondaq.com/x/720718/Antitrust+Competition/Newsletter+July+2018. The Competition council of Luxembourg, in its decision on 7th June 2018 on Webtaxi Pricing Algorithm, took into account the efficiency gains generated by the it in form of fewer empty journeys and shorter waiting times and the benefit for the clients in form of lower prices and quality gains.

[13] Michal Gal, *supra* note 4. The author states that pricing algorithm provides consumer with the decision-making muscles to make good decisions. Also see, Peter Georg Picht & Benedikt Freund, *Competition (Law) in the Era of Algorithms*, SSRN (Nov. 17, 2018, 04:54 AM), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3180550

[14] Competition & Market Authority, *supra* note 3.

works.[15] Moreover, even the competition authorities have started using the algorithm to detect bidding anomalies and suspicious bidding patterns. For instance, The Korea Fair Trade Commission (KFTC), which has in several occasions succeeded in detecting bid rigging conspiracies by screening procurement bidding data using algorithms.[16]

3.   COLLUSION IN ERA OF PRICING ALGORITHM

Despite their numerous advantages, pricing algorithms may raise competition concerns,[17] if they facilitate and sustain collusion particularly behaving in a coordinated way[18] and charge inflated prices like a monopolist.

In this regard it is pertinent to mention here that "collusion" is usually understood as a form of coordination among competitors that aims at raising profits to a higher level than attained through competition on

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[15] David Jevons, *When algorithms set prices: winners and losers*, OXERA (NOV. 25 , 2018, 03:47 AM), https://www.oxera.com/agenda/when-algorithms-set-prices-winners-and-losers/

[16] OECD, *Country case: Korea's Bid Rigging Indicator Analysis System (BRIAS)*, OECD (Nov. 27, 2018, 03:46 PM), https://www.oecd.org/governance/procurement/toolbox/search/korea-bid-rigging-indicator-analysis-system-brias.pdf

[17] Isabelle de Silva, President of the French Competition Authority, has said that the digital economy is the "no. 1 problem in competition policy". Whereas Andreas Mundt, President of Germany's cartel office, the *Bundeskartellamt*, has said that the impact of digital technology companies on the economy is "new land" for competition agencies.

[18] Pricing algorithm has been described often as the digital equivalent of the smoke-filled room agreement. See, Freshfields Bruckhaus Deringer LLP, *Pricing algorithms: the digital collusion scenarios*, FRESHFIELDS (Oct. 22, 2018, 02:33 PM), https://www.freshfields.com/globalassets/our-thinking/campaigns/digital/mediainternet/pdf/freshfields-digital---pricing-algorithms---the-digital-collusion-scenarios.pdf

merit.[19] The collusion may manifest itself into two forms, one being the "explicit collusion", which is based on an agreement or some other form of concertation between the involved market players like joint setting of prices, market sharing *etc.* and the other being the "tacit collusion or conscious parallelism or coordinated efforts"[20] that requires no such concertation and can, in particular, spring from players in oligopoly market[21] monitoring and reacting to each other's independent business decisions.[22] A classical model for describing conscious parallelism type of behaviour is the "Cournot duopoly".[23] In this model,[24] two firms act independently but they are aware of each other's actions. Hence, they do not explicitly agree on prices and make their choices independently, but they are aware of each other's production functions and calculate their economic response accordingly. In consequence, each firm will price at a

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[19] OECD, *supra* note 6. See also, Joseph E. Harrington Jr., *supra* note 10. Sherman Act, 15 U.S.C., § 1 defines collusion as "joint action to divide markets or fix prices, (...). Such collusive action is the substance of the conspiracy in restraint of trade which § 1 of the Act makes a crime". In EU, Article 101 Treaty on the Functioning of the European Union ('TFEU') define collusion as "actively conspiratorial behaviour of the kind captured by the expressions of agreement and concerted practices".

[20] In conscious parallelism the competitors create an atmosphere of mutual certainty that when one party raises its price, the other competitor will follow. Due to this, the competitors can maintain a unilateral profit maximization scheme, with a greater amount of certainty that the competition will not undercut them.

[21] An oligopoly is a market where few firms compete and the actions of each are considered by each other. See, ALAN DEVLIN, FUNDAMENTAL PRINCIPLES OF LAW AND ECONOMICS 338 (Routledge 2015).

[22] RICHARD WHISH & DAVID BAILEY, COMPETITION LAW 594 (8th ed. Oxford University Press 2015).

[23] Salil K. Mehra, *Antitrust and the Robo-Seller: Competition in the Time of Algorithms*, 100 MINNESOTA L. R. 1323, 1323 (2016).

[24] Christian Fischer & Hans-Theo Normann, *Collusion and Bargaining in Asymmetric Cournot Duopoly: An Experiment*, DICE (NOV. 17, 2018, 09:37 AM), http://www.dice.hhu.de/fileadmin/redaktion/Fakultaeten/Wirtschaftswissenschaftliche_Fakultaet/DICE/Discussion_Paper/283_Fischer_Normann.pdf

supra competitive level rather than competing away as in a market with perfect competition.[25]

As mentioned above, the pricing algorithms may be used intentionally to implement, monitor and police already made cartels (explicit collusion), in such scenario, human agree to collude and machines execute the collusion, acting as mere intermediaries.[26] The U.S. Department of Justice (DoJ) and US Federal Trade Commission (FTC) Paper specifically identified the scenarios in which algorithmic pricing could be used to implement explicit coordinated anti-competitive price changes.[27] For example, in 1994, the DoJ found that the use of a jointly owned computerized online booking system (algorithm), the Airline Tariff Publishing Company, provided the airlines, not only with the means to disseminate fare information to the public, but also to engage in private dialogues on fares and certain features of the system enabled the airlines to reach overt price-fixing agreements. Similarly, in July 2018 the European Union (EU) Commission imposed a total fine of €111 million on the four consumer electronics groups for restricting their online retailer's ability to set their own retail prices for widely-used electronics

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[25] Salil K. Mehra, *supra* note 23 at 1345.

[26] Freshfields Bruckhaus, *supra* note 18.

[27] Bertold Bär-Bouyssière et al., *Risky IT Programs - The Use of Algorithms and Risk of Collusion under Antitrust Laws*, DLAPIPER (Nov. 19, 2018, 04:56 PM), https://www.dlapiper.com/en/us/insights/publications/2017/06/risky-it-programs/. An example is also the United States v. David Topkins, No CR 15-00201 (Poster Cartel case), in this case David Topkins, the founder of Poster Revolution was prosecuted under antitrust law by the US Department of Justice. David Topkins and his co-conspirators adopted specific pricing algorithms that collected competitor's pricing information, with the goal of coordinating changes to their pricing strategies for the sale of posters on amazon marketplace.

products.[28] The Commission specifically pointed to the fact that the companies used sophisticated algorithms to monitor the prices set by distributors, thereby allowing them to intervene quickly in case of price decreases.[29] From a legal perspective, the use of algorithms to help execute the cartel's task has the same effect as a cartel executed by humans and is deemed as violation of competition law.[30]

4. PRICING ALGORITHM-FUELLED CONSCIOUS PARALLELISM & CHALLENGES TO THE COMPETITION REGIME

The existing competition law is sufficiently equipped to cater to the challenges where pricing algorithm merely act as an intermediary for the implementation of the already existing cartel. But the algorithms facilitating the conscious parallelism by acting as parallel and signalling algorithms is of particularly concern to the current competition law regime. In these type of cases, each undertaking has an independently

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[28] European Commission, *Antitrust: Commission fines four consumer electronics manufacturers for fixing online resale prices*, EUROPA (Nov. 26, 2018, 06:03 AM), http://europa.eu/rapid/press-release_IP-18-4601_en.htm

[29] Jacquelyn MacLennan, *RPM comes back from the dead: EU Commission tackles pricing in e-commerce*, WHITECASE (NOV. 26, 2018, 06:32 AM), https://www.whitecase.com/publications/alert/rpm-comes-back-dead-eu-commission-tackles-pricing-e-commerce

[30] Margrethe Vestager, *Bundeskartellamt 18th Conference on Competition, Berlin*, *16 March 2017*, EUROPA (Nov. 17, 2018, 03:23AM), https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/bundeskartellamt-18th-conference-competition-berlin-16-march-2017_en. Here the European Commissioner for Competition pointed out that "the companies can't escape responsibility by hiding behind a computer program". See also, Eturas and others v. Lietuvos Respublikos konkurencijos taryba [2016] OJ C 98/3 ECLI:EU:C:2016:42; CMA decided Trod/GB eye Case (online sales of posters and frames case).

selected algorithm that continually monitors and adjusts the price based on the data obtained from the market.[31] Each of these algorithms persistently and very quickly (using trial and error method) sends to and receives signals from the market as long as it finds the temporary optimum, usually setting the price higher than the real competition would have kept it.[32] For example, in the e-commerce sector this is evident from the EU Commission's E-Commerce Sector Inquiry Staff Working Document, where it noted that:

> *53% of the respondent retailers track the online prices of competitors, out of which 67% use automatic software programmes for that purpose. Larger companies have a tendency to track online prices of competitor's more than smaller ones. The majority of those retailers that use software to track prices subsequently adjust their own prices to those of their competitors (78%).*[33]

This is a scenario of a collective elimination of price competition without committing a cartel.[34]

Further, it is observed that incidences of price algorithm induced conscious parallelism will be more evident in oligopolistic market

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[31] Michal s. gal, *Algorithmic-facilitated Coordination: Market and Legal solutions*, CPI (Nov. 13, 2018, 01:43 PM), https://www.competitionpolicyinternational.com/wp-content/uploads/2017/05/CPI-Gal.pdf

[32] Václav Šmejkal, *Cartels by Robots: Current Antitrust law in search of an answer,* HRCAK (Nov. 4, 2018, 01:23 PM), https://hrcak.srce.hr/file/284431

[33] European Commission, *Final report on the E-commerce Sector Inquiry*, EUROPA (Nov. 23, 2018, 03:45 PM), http://ec.europa.eu/competition/antitrust/sector_inquiry_swd_en.pdf

[34] A. EZRACHI & M.E. STUCKE, VIRTUAL COMPETITION: THE PROMISE AND PERILS OF THE ALGORITHM-DRIVEN ECONOMY 56-81 (Harvard University Press 2016). The authors in their book mentioned four different types of *modus operandi* to execute explicit collusion or conscious parallelism *i.e.* the Messenger scenario, the Hub and Spoke scenario, the Predictable Agent & Digital eye scenario respectively.

characterized by concentration involving homogeneous products,[35] cross ownership,[36] high entry barriers, high market transparency,[37] high frequency of interaction between market players,[38] presence of credible deterrent mechanism to deviation *etc.[39]*

Thus, taking into consideration the recent evolution of the digital economy, change in *modus operandi* of collusion from smoke filled hotel rooms to a world where pricing algorithms continuously monitor and adjust to each other's price in form of conscious parallelism poses multifaceted challenges to the competition regime.[40] Some of these challenges before the competition authorities are as follows:

4.1   LEGAL LACUNA IN THE EXISTING COMPETITION REGIME

Algorithm fuelled conscious parallelism raises challenging questions with respect to liability under competition law.[41] Under most jurisdictions' antitrust laws, the unilateral use of pricing algorithms (free

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[35] WHISH, R. & D. BAILEY, COMPETITION LAW 598 (8th ed., Oxford University Press 2015).

[36] Marc Ivaldi et al., *The Economics of Tacit Collusion,* EUROPA (10 Nov. 2018, 01:34 PM), http://ec.europa.eu/competition/mergers/studies_reports/the_economics_of_tacit_collusio n_en.pdf

[37] OECD, *Roundtable on information exchange between competitors under competition law,* OECD (Nov. 22, 2018, 03:37 AM), http://www.oecd.org/competition/cartels/48379006.pdf

[38] David H. Evans, *Alarmist Algorithms: Why Pricing Bots Won't Be the End of Society,* ONCOMPETITIONPOLICY (Nov. 5, 2018, 02:17 PM), https://www.oncompetitionpolicy.com/2017/06/alarmist-algorithms-why-pricing-bots-wont-be-the-end-of-society/. See also, Competition & Market Authority, *supra* note 3.

[39] FLORIAN WAGNER-VON PAPP, HANDBOOK ON EUROPEAN COMPETITION LAW SUBSTANTIVE ASPECTS 138 (Elgar 2013). See also, David Jevons, *supra* note 15.

[40] A. Ezrachi, *supra* note 34. The authors in their book have described theses challenges as the "end of competition as we know it".

[41] § 1 of the Sherman Act or Article 101 TFEU or § 3 of the Indian Competition Act, 2002, prohibits anti-competitive agreements.

from agreements or communications) to monitor and adjust pricing to that of the competitor's price is legal,[42] even if it leads to parallel price increase,[43] to the detriment of consumer.[44] As, one cannot condemn a firm for behaving rationally and interdependently on the market.[45] For this reason many judges, lawyers observes it as the end of the story for the competition law[46] as interdependent parallel conduct, without more, has not been held to satisfy "agreement" language.[47]

Further, even under the existing law, challenges of the pricing algorithms is that it expand the grey area between unlawful explicit

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[42] Monopolkommission, *Algorithms and collusion*, MONOPOLKOMMISSION (Nov. 26, 2018, 12:21 PM), https://www.monopolkommission.de/images/HG22/Main_Report_XXII_Algorithms_and_Collusion.pdf

[43] Shearman & Sterling, *Artificial intelligence and Algorithms in cartel cases: Risks in potential broad theories of harm*, SHEARMAN (Nov. 16, 2018, 04:43 PM), https://www.shearman.com/perspectives/2018/04/2018-antitrust-report/artificial-intelligence-and-algorithms-in-cartel-cases. For example, Article 101, TFEU does not prevent companies from using information available in the market to adapt to existing and anticipated conduct of their competitors. Companies, foreseeing their rival's conduct are free to change their prices.

[44] Ariel Ezrachi & Maurice Stucke, *From Smoke-Filled Rooms to Computer Algorithms: The Evolution of Collusion*, CLSBLUESKY (Nov. 23, 2018, 03:06 AM), http://clsbluesky.law.columbia.edu/2015/05/14/from-smoke-filled-rooms-to-computer-algorithms-the-evolution-of-collusion/. This is a situation where competitors do not explicitly collude with each other, but engage in conscious parallel behaviour that the result is as if they had colluded. Thus, economically, the result is the same, but legally they can be qualified differently.

[45] A. Ezrachi *supra* note 34 at 61.

[46] Salil K. Mehra, *supra* note 23.

[47] Case C-199/92, P Hüls AG v. Commission, (1999) 5 CMLR 1016; Joined Cases C-89, 104, 114, 116, 117, 125, 129/85, Ahlström Osakeyhtiö and others v. Commission (Wood Pulp II), (1993) 4 CMLR 407; Cases T-442/08, CISAC v. Commission, (2013) 5 CMLR 15 (General Court); Clamp-all Corporation v. Cast Iron Soil Pipe Institute & others, 851 F.2d 478, 484 (1st Cir. 1988). See also, PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION ¶ 1428 (2d ed. 2001) (stating that "mere interdependent parallelism has not been held to constitute agreement" but continuing on to discuss the arguments for doing so).

collusion and lawful conscious parallelism[48] allowing firms to sustain profits above the competitive level more easily without necessarily having to enter into an agreement.[49] For instance, in situations where collusion could only be implemented using explicit communication, algorithms may create new automatic mechanisms that facilitate the implementing of a common policy and the monitoring of the behaviour of other firms without the need for any human interaction. In other words, algorithms may enable firms to replace explicit collusion with conscious parallelism.[50]

4.2   CHALLENGE OF PROVING VIOLATION USING "PLUS FACTOR" IN CASES OF ALGORITHM INDUCED CONSCIOUS PARALLELISM

The analysis of the available case laws allows for a conclusion that price parallelism in itself does not amount to a concerted practice, there is also a need of showing "plus factors"[51] to impose liability for an anti-competitive agreement.[52] Traditionally, such plus factors have included evidence of clandestine meetings and secret exchanges of information

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[48] Joseph E. Harrington Jr, *A Theory of Tacit Collusion*, TSE (Nov. 25, 2018, 09:12 PM), https://www.tse-fr.eu/sites/default/files/medias/stories/SEMIN_11_12/ECONOMIC_THEORY/harrington.pdf

[49] Tacit collusion may serve to establish collective dominance under Article 102 TFEU, but absent a separate abuse, it will also escape scrutiny under this provision.

[50] OECD, *supra* note 6.

[51] The plus factors doctrine is used in the competition regime for the prosecution of certain types of parallel conduct and can be defined as "the body of economic circumstantial evidence of collusion and beyond parallel movement of prices by firm in an industry." See, ROBERT C MARSHALL & LESLIE M MARX, THE ECONOMICS OF COLLUSION: CARTELS AND BIDDING RINGS 213 (MIT Press 2012).

[52] Imperial Chemical Industries Limited v. Commission, ECLI:EU:C:1972:70 (1972) ¶ 66. See also Rajasthan Cylinders and Containers Limited v. Union of India and Another, Civil Appeal No. 3546 of 2014 (India), here also the Court held that mere price parallelism does not amount to concerted practice. MASSIMO MOTTA, COMPETITION POLICY: THEORY AND PRACTICE 25 (Cambridge University Press 2004).

etc.[53] However, conventional plus factors are unlikely to be very helpful with pricing algorithms as the delegation of competitive intelligence and pricing activities previously done by marketing and sales people to pricing algorithm will likely render such plus factors irrelevant.[54] Further, algorithms crunching massive data collections cannot "meet" nor will they necessarily exchange information[55] as their ability to gather and process huge amounts of data obviates the need to do so.

Therefore, it can be said that the ease of online conscious price parallelism goes hand in hand with the difficulty of their detection. The fact that customer usually learn about overcharge only when it amounts to blatant price aberration, make life difficult for the competition authorities.[56] Thus, unlike humans the pricing algorithm will not leave evidence of plus factors[57] and will make it difficult to prove conscious

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[53] See, United States v. Andreas, 216 F.3d 645, 650 (7th Cir. 2000) (pointing to aliases, front organizations, and the use of prostitutes to clandestinely gather information from competitors as examples of particularly egregious behavior demonstrating "an inexplicable lack of business ethics and an atmosphere of general lawlessness"); C-O-Two Fire Equipment Co. v. United States, 197 F.2d 489, 497 (9th Cir. 1952) (citing price hike during a time of surplus). See also, William E. Kovacic et al., *Plus Factors and Agreement in Antitrust Law*, 110 MICH. L. REV. 393, 405-407 (2011).

[54] Salil K. Mehra, *supra* note 23.

[55] NICOLAS PETIT, THE OLIGOPOLY PROBLEM IN EU COMPETITION LAW- HANDBOOK ON EUROPEAN COMPETITION LAW SUBSTANTIVE ASPECTS 2-10 (Edward Elgar 2013).

[56] Václav Šmejkal, *supra* note 32. Under the circumstances of the rapidly changing price levels, which in the markets with predominantly online trading (securities, software, music *etc.*) do not have a clear and palpable benchmark, a gradual but inconsistent upward trend in prices may be difficult to detect and prove. Further, in a pricing algorithm driven market a "price snake" is perfectly imaginable that would twist around a slightly but inconsistently rising axis. This would resemble a perfect adaptation to market's ups and downs and it would be very difficult to tell if the price at a specific moment were really above its competitive level.

[57] William Kovacic et. al., *Plus Factors and Agreement in Antitrust Law* 110 MICH. L. REV. 393, 395 (2011).

parallelism as violation of competition law.[58] Moreover, it will also create challenge in form of investigation of infringement by pricing algorithm as auditing the algorithms requires not only a high level of expertise in computer science that competition authorities might be lacking, but also significant time and costs to carry out such an investigation.[59]

4.3   CHALLENGE OF ATTRIBUTING LIABILITY FOR ACT OF CONSCIOUS PARALLELISM

Travis Kalanick, founder of Uber, in reaction to a severe price increase on what should have been a normal Uber fare said, "We are not setting the price. The market is setting the price. We have algorithms to determine what that market is."[60] This may lead to a worrying trend in the future as algorithm setting the prices with decreasing level of human involvement[61] and person attempting to hide behind their algorithms to claim that they are not responsible for pricing decisions.[62] In dealing with a pricing algorithm that takes conscious parallel actions there are three choices in attributing responsibility: to the algorithm itself, to the humans who deploy it or to no one.[63] This debate has highlighted the challenges of attributing antitrust liability to individuals when commercial strategies are

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[58] Joseph E. Harrington Jr., *supra* note 10.

[59] Agnieszka, *supra* note 11.

[60] Jill Priluck, *When Bots Collude*, NEWYORKER (Nov. 1, 2018, 05:46 AM), https://www.newyorker.com/business/currency/when-bots-collude. The Uber co-founder argued that their algorithms, not the people working for the company, were responsible.

[61] Kellie Lerner & David Rochelson, *How Do You Solve a Problem Like Algorithmic Price Fixing?*, ROBINSKAPLAN (Nov. 23, 2018, 03:45 PM), https://www.robinskaplan.com/~/media/pdfs/how%20do%20you%20solve%20a%20problem%20like%20algorithmic%20price%20fixing.pdf?la=en

[62] Mandrescu Daniel, A*pplying EU Competition Law to online platforms: the road ahead (Part 1)* 38 EUR. COM. L. R. 348, 357 (2017).

[63] Salil K. Mehra, *supra* note 23

delegated to an algorithm and humans have no ability to influence the way in which such decisions are taken or are even unaware of conscious parallelism by pricing algorithms.[64] In such a scenario question arises whether existing competition law can be applied at all to autonomous pricing algorithm systems, which no longer require interaction with natural persons.[65]

Further, it can be challenging to effectively fight pricing algorithms, which implement conscious parallel behaviour, if such algorithms are being run on servers located abroad as competition authorities investigational power is limited to national borders.[66]

4.4 CHALLENGE OF DISTINGUISHING ALGORITHM FUELLED CONSCIOUS PARALLELISM FROM OLIGOPOLISTIC INTERDEPENDENCE

Under certain market conditions (*i.e.* transparent markets with few sellers and homogeneous products) conscious parallel behaviour may be the normal outcome[67] of rational economic behaviour[68] of each firm in the market.[69] As noted by Ezrachi and Stucke, one of the main difficulties when it comes to algorithm induced conscious parallelism is to identify the counterfactual *i.e.* to assess what would be the market situation if not

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[64] *Id.*

[65] Andreas Heinemann & Aleksandra Gebicka, *Can Computers form Cartels? About the Need for European Institutions to Revise the Concertation Doctrine in the Information Age*, 7 JOU. OF EURO. COMP. L. & P. 423, 431 (2016).

[66] Peter Georg Picht, *supra* note 13.

[67] ICI v. Commission, Case C-48/69, 655 ¶ 66 (1972).

[68] Nicolas Petit, *supra* note 55 at 284.

[69] OECD, *supra* note 6.

for the use of algorithmic pricing.[70] Thus, it will be difficult for competition authorities to determine whether the conscious parallel behaviour is the one of tacit collusion *i.e.* artificially enhanced or created or whether there is an alternative plausible explanation for it like oligopolistic interdependence[71] *i.e.* a "natural" outcome.[72] Consequently, it will be challenging to identify a clear, enforceable triggering event for intervention, which would prevent the change of market dynamics that foster conscious parallelism.[73]

The situation is further aggravated by the fact that pricing algorithm may amplify the so-called oligopoly problem[74] by giving individual firms the incentive to raise the price above the competitive level as pricing algorithm ensure greater accuracy in detection of price changes[75] and the minimal level of human collaboration can remove the

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[70] OECD, *Algorithmic Collusion: Problems and Counter-Measures- Note by A. Ezrachi & M. E. Stucke*, OECD (Nov. 27, 2018, 10:07 AM), https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WD%282017%2925&docLanguage=En

[71] Donald Turner, *The Definition of Agreement under the Sherman Act: Conscious Parallelism and Refusals to Deal,* 75 HARVARD L. REV. 655, 666 (1962).

[72] Patrick Andreoli-Versbach & Franck Jens-Uwe, *Econometric Evidence to Target Tacit Collusion in Oligopolistic Markets*, 11 JOU. OF COM. L. & ECO. 452, 470 (2015).

[73] Ariel Ezrachi, *supra* note 44.

[74] R.A. POSNER, ANTITRUST LAW (University of Chicago press 2001). The book says that the expression "oligopoly problem" refers to the concern that high interdependence and mutual self-awareness in oligopolistic markets might result in conscious parallelism, an outcome, which is socially undesirable but that falls out of the reach of competition law. Competition authorities in some jurisdictions have attempted to extend antitrust tools to address the oligopoly problem, using in particular two distinct solutions: (a) *Ex*-ante merger control rules to prevent structural changes, which favour coordinate effects. (b) *Ex*-post rules to prevent unilateral conducts that promote oligopolistic interdependence, such as facilitating practices under the notion of joint dominance.

[75] Maureen K. Ohlhausen, *Should We Fear The Things That Go Beep In the Night? Some Initial Thoughts on the Intersection of Antitrust Law and Algorithmic Pricing*, FTC (Nov. 16, 2018, 02:34 PM),

element of irrationality and reduce the chance that the collusive scheme is undermined by mistake.[76]

4.5 CHALLENGE OF ALGORITHM INDUCED MARKET TRANSPARENCY VIS-À-VIS CONSCIOUS PARALLELISM (END OF PRISONER'S DILEMMA)

Transparency of prices is a "double edged sword"[77] as the greater transparency in the market is generally efficiency enhancing and as such, welcome by competition agencies. But it can also produce anti-competitive effects by facilitating conscious parallelism[78] or providing firms with focal points around which to align their behaviour, thereby benefiting only the suppliers. The increase of market transparency is not only a result of more data being available, but also of the ability of pricing algorithms to make predictions and to reduce strategic uncertainty.[79] Thus,

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https://www.ftc.gov/system/files/documents/public_statements/1220893/ohlhausen_-_concurrences_5-23-17.pdf

[76] Michaela Ross, *Artificial Intelligence Pushes the Antitrust Envelope*, BNA (Nov. 27, 2018, 12:47 AM), https://www.bna.com/artificial-intelligence-pushes-n57982087335/. See also, Margrethe Vestager, *supra* note 30. Margrethe Vestager, the European Commissioner for Competition, recently remarked on the potential for algorithms to sustain cartel behavior: "Every cartel faces the risk that its members will start cheating each other as well as the public. If everyone else's price is high, you can gain a lot of customers by quietly undercutting them. So whether cartels survive depends on how quickly others spot those lower prices and cut their own price in retaliation. By doing that quickly, cartelists can make sure that others will be less likely to try cutting prices in the future. And the trouble is, automated systems help to do exactly that."

[77] Mario Monti, *Speech by Mr. Mario Monti- Defining the Boundries Competition Policy in High Tech Sectors*, EUROPA (Nov. 24, 2018, 03:44 PM), http://europa.eu/rapid/press-release_SPEECH-01-375_en.pdf

[78] Jay Modrall, *OECD Workshop Addresses Algorithms and Collusion Issues*, KLUWERCOMPETITIONLAW (Nov. 19, 2018, 06:47 AM), http://competitionlawblog.kluwercompetitionlaw.com/2017/07/17/oecd-workshop-addresses-algorithms-collusion-issues/

[79] OECD, *supra* note 6.

with pricing algorithms firms have more information about market trends and this may render conscious parallelism more feasible, due to the enhanced capacity of firms to rapidly adjust to the price changes of competitors.[80]

Moreover, challenge due to the algorithm fuelled market transparency is accentuated in situation where a firm reduces its prices, the other competitors could be able to match such price reduction much faster if they use algorithms, reducing the firm's incentive to undertake a price reduction strategy.[81] The empirical experience with transparency provided by online tools shows that the perfect information for market participants does not necessarily lead to greater but, on the contrary, to a less intense price competition. The authorities in Chile, Australia and Germany have witnessed such effect when they tried to display and update online the information about current fuel prices at petrol stations in the country. The well-intentioned effort to release motorists from the grip of overcharging local micro-monopolies by informing them about an alternative price available at acceptable distance ended up with an overall (albeit non-nationwide) increase in the price level by 10% on average.[82]

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[80] David J. Lynch, *Policing the digital cartels*, FINANCIALTIMES (Nov. 28, 2018, 11:22 AM), https://www.ft.com/content/9de9fb80-cd23-11e6-864f-20dcb35cede2

[81] A. Ezrachi, *supra* note 34 at 62-64. The damaging influence conscious parallelism could have on a market is that it becomes less attractive for competitors to lower their prices and engage in price wars. In order for such decisions to attract customers, time is needed. Algorithms, by making decisions in less than a second, essentially take away this element, leading to prices being kept high artificially and resulting in distorted market conditions.

[82] OECD, *supra* note 70.

Further, the rivalry based on a competitive uncertainty has been underpinned in theory by the well-known model of prisoner's dilemma.[83] Doubts about whether one can rely on an opponent with whom it is not possible to communicate directly have dictated to "every prisoner" to prefer an aggressive strategy that disregarded the opponent's interests and fought him ruthlessly. Such a strategy, applied to prices, usually led to the downward movement of prices or occasionally event to price wars that were beneficial for consumers. But as soon as price algorithms that are capable to monitor online each change in price and consciously follow it quickly and precisely before the price war initiator were able to profit from it,[84] the competition through the lowering of prices is quickly assessed as ineffective.[85] Thus, widespread use of price algorithm marks the end of so-called prisoner's dilemma and the conscious parallelism becomes the norm of the market, thereby further aggravates the challenge to the competition regime.

4.6   PRICE ALGORITHM ENSURING, SUSTAINING AND PROMOTING CONSCIOUS PARALLELISM

The advent of digital economy has revolutionized the speed at which firms can make business decisions by increasing frequency of interaction. If automation through pricing algorithms is added to

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[83] Two accomplices locked in separate cells. Each is offered three choices by the police: (1) if both confess to the charges, both will be jailed for five years, (2) if only one confesses, he will be freed but the non-confessor will be jailed for ten years or (3) if neither confesses, both will be tried for a minor offense and will be jailed for one year.

[84] Kai-Uwe Kühn et al., *Fighting Collusion by Regulating Communication between Firms*, 16 ECO. POLICY 167, 183 (2001).

[85] Václav Šmejkal, *supra* note 32.

digitalization, prices may be updated in real-time, allowing for an immediate retaliation to deviations from conscious parallel conduct.[86] To illustrate the same, it suffices to remind that by using price algorithm, the well-known internet business trader Amazon performed in November 2012 as many as 2.5 million changes in charged prices within one day, while the Walmart retail chain changed at the same time around 50,000 prices per month.[87]

Further, as noted by Ezrachi and Stucke, pricing algorithms could create a so-called "tacit collusion on steroids" scenario.[88] The reason to assert this is that the extensive use of pricing algorithms could clearly make coordination easier, cheaper and faster and thus lead to more cases of conscious parallelism[89] and make it more common in the already oligopolistic markets and even extend the oligopoly problem[90] to non-oligopolistic markets structures.[91] In fact, the combination of machine

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[86] Monopolkommission, *supra* note 42.

[87] Václav Šmejkal, *supra* note 32. Similarly, in 2011, a developmental biology textbook on fruit flies available on Amazon for the astonishing price of $23.7 million. That particular market price was set through the interaction of two different seller's programmed algorithms. The first algorithm automatically set the price of the first book for 1.27059 times the price of the second book, which belonged to the other seller in the marketplace. The second algorithm automatically set the price of the second book at 0.9983 times the price of the first book. The result was an upward spiral in which each algorithm's price hike was subsequently responded to by a price hike from the other and *vice versa*. From April 8 to 18, 2011, the offer prices of the two books rose in tandem into the millions of dollars. See, John D. Sutter, *Amazon Seller Lists Book at $23,698,655.93—Plus Shipping*, CNN (Nov. 25, 2018, 02:24 PM), http://edition.cnn.com/2011/TECH/web/04/25/amazon.price.algorithm/index.html.

[88] A. Ezrachi, *supra* note 34 at 56.

[89] Margrethe Vestager, *supra* note 30.

[90] R.A. Posner, *supra* note 74.

[91] Kone AG and others v. ÖBB-Infrastruktur AG, Case C-557/12 (2014), the European Court of Justice (ECJ) has endorsed the validity of a causal relationship between a cartel and "umbrella pricing", *i.e.* inflated prices charged by non-cartelists whose prices are benchmarked against market-wide prices which are artificially inflated as a result of a

learning with market data may allow algorithms to accurately predict rival's actions[92] and to anticipate any deviations before they actually take place.[93] Therefore, after a period of repeated interactions, firms become conscious that their respective strategic choices are interdependent[94] and that by matching each other's conduct, they can set prices at a *supra* competitive level, without actually communicating. In other words, the challenge to the competition regime is the structure of some markets is such that through conscious interdependence and mutual self-awareness, prices may rise towards the monopoly level.[95]

4.7 CHALLENGE OF OVER-ENFORCEMENT AND CONSEQUENT NEGATIVE EXTERNALITIES

In first place, it is highly complex to distinguish coordinated from non-coordinated outcomes, so attempts to intervene against such conscious parallel conduct carry a clear risk of false convictions.[96] Secondly, for dealing with such situation the policy makers might come up with policies to change the structural characteristics of digital markets that

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cartel. The ECJ held in this context that: "even if the determination of an offer price is a purely autonomous decision, taken by the undertaking not party to a cartel, it must none the less be stated that such decision has been able to be taken by reference to a market price distorted by that cartel and as a result, contrary to the competition rules." See also, A. Ezrachi, *supra* note 34 at 60.

[92] For maintaining conscious parallelism, the information has to be complete and perfect and this is where pricing algorithms aid in the completeness and perfection of the information.

[93] A. Ezrachi, *supra* note 34 at 60.

[94] SIGRID STROUX, US AND EC OLIGOPOLY CONTROL 15 (Kluwer Law International 2004).

[95] R. WHISH & D. BAILEY, COMPETITION LAW 139 (Oxford University Press 2012).

[96] RBB Economics, *Automatic Harm to Competition? Pricing algorithms and coordination*, RBBECON (Nov. 4, 2018, 04:55 AM), https://www.rbbecon.com/downloads/2018/02/RBB_Brief-55-Online1.pdf

most facilitate conscious parallelism. For instance, in order to make markets less transparent, policy makers impose restrictions on the information that can be published online; likewise, in order to reduce the high frequency of interaction in digital markets, they could enforce lags on price adjustments.[97] Unfortunately, such policies will also likely to result in severe restrictions to competition,[98] by reducing the amount of information available to consumers and by preventing fast price adjustments by efficiently matching demand and supply.[99]

Further, policy makers could eventually consider the creation of rules that restrict the way pricing algorithms are designed, for example-pricing algorithms could be programed not to react to most recent changes in prices or instead to ignore price variations of individual companies. This solution might constrain the ability of firms to develop innovative algorithms[100] and may have chilling effect on the economic activity.[101] On the other hand, regulating pricing algorithm design could also pose on competition agencies the additional burden of supervising *i.e.* whether companies are effectively complying with the rules or not.[102]

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[97] A. Ezrachi, *supra* note 34 at 43.

[98]OECD, *Competition Assessment toolkit*, OECD (Nov. 18, 2018, 02:33 AM), http://www.oecd.org/competition/assessment-toolkit.htm

[99] OECD, *supra* note 6.

[100] Jonathan Galloway, *Driving Innovation: A Case for Targeted Competition Policy in Dynamic Markets*, SSRN (Nov. 26, 2018, 08:23 PM), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1763676

[101] Louis Kaplow, *On the Meaning of Horizontal Agreements in Competition Law*, SSRN (Nov. 13, 2018, 04:56 AM), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1873430

[102] *Id.*

5. SOLUTIONS TO THE CHALLENGES POSED BY ALGORITHM FUELLED CONSCIOUS PARALLELISM

Thus, be it an *ex*-post or *ex*-ante regime, competition authorities still has to confront the challenge of identifying the adequate level of intervention, if such exists, when dealing with the creation of market conditions for conscious parallelism. Some may argue that these challenges should tilt the balance in favour of non-intervention.[103] But a non-interventionist approach, however, risks creating a lacuna, which market players can exploit, again to consumer's detriment.[104] Therefore, some of the proposed solutions to the challenges posed by algorithm fuelled conscious parallelism are as follows:

5.1 MARKET STUDY

When there are signs that the market is not functioning well, but there are no indications of any coordination among the market players, competition agencies may decide to engage in market studies[105] or sector inquires in order to understand why the market is failing and to identify possible solutions.[106] Hence, the use of market studies typically precedes

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[103] OECD, *Algorithms and Collusion - Note from the European Union*, OECD (Nov. 28, 2018, 02:56 AM), https://one.oecd.org/document/DAF/COMP/WD(2017)12/en/pdf

[104] Ariel Ezrachi, *supra* note 44.

[105] The French and German competition authorities, Autorité de la concurrence and Bundeskartellamt, have started a joint project on algorithms and their effects on competition. See, Thomas Oster & Dr. Jörg Witting, *Algorithms and Competition Law*, LEXOLOGY (Nov. 27, 2018, 03:23 AM), https://www.lexology.com/library/detail.aspx?g=87d6373f-07f5-402b-9f61-1b23882ecf6f

[106] According to OECD, market studies and sector inquiries are useful tools to understand the dynamic of the market and to promote competition. Market studies are used primarily for the assessment of markets and their competitive conditions. They are mainly

other enforcement actions[107] on the implications of pricing algorithms on various markets.[108] In this sense, market studies/sector inquiries may support competition agencies' efforts to understand the market characteristics that can lead to conscious parallelism,[109] such as high transparency, predictability and frequent interaction or any other structural characteristics that have not been identified yet.[110] For example, in United States, the FTC's Bureau of Consumer Protection established the "Office of Technology Research and Investigation", which is responsible for conducting independent studies and providing guidance in several topics, including algorithmic transparency.[111]

Further, the use of market studies can lead to recommendations for the government to engage in regulatory interventions to address legal or

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considered as an advocacy tool to issue recommendations to change laws and regulations or as a pre-enforcement tool in case they reveal constraints to competition of a behavioural nature.

[107] According to the EU Commissioner for Competition, Margrethe Vestager: "we certainly shouldn't panic about the way algorithms are affecting markets. But we do need to keep a close eye on how algorithms are developing."

[108] Agnieszka Bartłomiejczyk, *supra* note 11.

[109] A. Ezrachi *supra* note 34 at 74. Ezrachi and Stucke suggest that "such approach may prove useful in helping agencies understand the new dynamics in algorithm-driven markets and the magnitude of any competitive problems."

[110] OECD, *supra* note 6.

[111] In addition, the US Public Policy Council of the Association for Computing Machinery (USACM) published a statement proposing a set of principles for algorithmic transparency and accountability, which are intended to minimise harm while at the same time realizing the benefits of algorithmic decision-making. See, USACM, *Statement on Algorithmic Transparency and Accountability*, ACM (Nov. 29, 2018, 05:07 AM), http://www.acm.org/binaries/content/assets/public-policy/2017_joint_statement_algorithms.pdf. Further, Competition & Market Authority recently appointed a new data unit to better understand the impact that data, machine learning and other algorithms have on markets and people. See, Competition and Markets Authority, *CMA appoints Stefan Hunt to top digital role*, GOVUK (Nov. 23, 2018, 03:55 AM), https://www.gov.uk/government/news/cma-appoints-stefan-hunt-to-top-digital-role

structural restrictions to competition, as well as to the opening of investigations[112] when the cause of the concern is behavioural.[113] Market studies could also lead to advocacy efforts and recommendations to the business community itself with the objective of fostering stronger compliance with competition principles.[114] This could result, for instance, in the adoption of self-regulation in the form of codes of conduct, which companies would agree to comply with when designing and using pricing algorithms.[115]

5.2   CHANGES IN THE COMPETITION REGIME

The first option for enforcing conscious parallelism enhanced by use of pricing algorithm is to revisit the concept of "agreement" and "concerted practices".[116] The conscious parallelism needs to be reclassified and recategorized by making a clear-cut distinction between

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[112] Recently, the Competition Commission of India decided to study/probe the issue of use of algorithms by airlines to determine fares, as part of a detailed probe into alleged fixing of air ticket prices. See, Meetu Jain, *Competition Commission of India to look into hike in airfares during peak season*, INDIATODAY (Nov. 30, 2018, 03:18 AM), https://www.indiatoday.in/india/story/why-airlines-charge-so-much-for-a-ticket-during-rush-time-competition-commission-of-india-to-look-at-algorithms-1231781-2018-05-11

[113] For this, the competition authorities also need sufficient in house or third party expertise in computer science and in particular in artificial intelligence to properly assess the impact of pricing algorithm on market as such. See, Ulrich Schwalbe, *Algorithms, Machine Learning, and Collusion*, SSRN (Nov. 27, 2018, 04:06 AM), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3232631

[114] The advantage of market study is that they offer the agency a degree of flexibility in restoring competition in the market that would not be possible through other means.

[115] OECD, *supra* note 6.

[116] Catalina González Verdugo, *Horizontal restraint regulations in the EU and the US in the Era of Algorithmic Tacit Collusion*, UCL (Nov. 29, 2018, 05:14 AM), http://discovery.ucl.ac.uk/10049901/1/Verdugo%20-%20Algorithms.pdf

independent behaviour,[117] interdependent behaviour[118] and express agreement. By doing so, the concept of plain interdependence can be brought within the purview of "agreement"[119] and be made subject to enforcement action[120] under competition act.[121] The rationale being that the pricing algorithms theoretically increase the risk of conscious parallelism as it may occur more frequently and therefore, amending the current regulation on horizontal restraints may be an option. Moreover, the term "concerted practice" should be interpreted widely in order to include into it the repeated information exchanges between competitor's pricing algorithms *i.e.* to treat communications *via* algorithms as information exchanges evidencing an illegal concerted practice.[122] For example, Section 46 of the Australian Competition and Consumer Act, 2010 requires no proof of the "meeting of minds" to make companies liable, who are benefiting from collusion.[123] Thus, under the Australian competition law, the companies that have deployed pricing algorithm can be held responsible, whether or not there was an agreement or the

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[117] Independent behaviour can be defined as "behavior by two or more parties that has no relationship whatsoever as well as behavior that has similarities yet is motivated by considerations that do not depend on other's reactions."

[118] Interdependent behaviour can be defined as "behaviour that involves coordination with others."

[119] *In Re* High Fructose Corn Syrup, *supra* note 8.

[120] R.A. Posner, *supra* note 74. The author argues that conscious parallelism should be analyzed as a conscious meeting of minds to which the competition act will be applicable.

[121] Louis Kaplow, *supra* note 101.

[122] Jay Modrall, *supra* note 78.

[123] There is a consensus among the experts that there is a need to shift the focus away from requirement to establish a "meeting of mind" to consider whether there has been cooperation between the competing businesses that substantially lessens the competition.

intention to collude.[124] But at the same time the benefits and risks should be carefully analysed to avoid undesired effects, such as deterring competitive conduct.[125]

Further, as suggested by the German Monopolies Commission's (*Monopolkommission*) proposal,[126] in markets where there are concrete indication that pricing algorithm are highly likely to lead to conscious parallelism, the burden of proof with regard to damage caused by an infringement of competition law be reversed.[127] Thus, in such cases any liability for the adverse consequences arising should be assigned to the user of such pricing algorithm.[128]

5.3   AN AGENCY LAW SOLUTION

Most pricing algorithms today still operate based on instructions designed by human beings[129] and there is no doubt that humans will be in most cases responsible for the decisions made by algorithms. Based on the current stand of the law, computer programs and pricing algorithms are to be considered simply as tools, implying that their decision can be directly

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[124] James Panichi et al., *Australia reckons it's ready to fight algorithmic collusion as world scrambles to review laws*, MLEXMARKETINSIGHT (Nov. 29, 2018, 02:03 AM), https://mlexmarketinsight.com/insights-center/editors-picks/antitrust/cross-jurisdiction/australia-reckons-its-ready-to-fight-algorithmic-collusion-as-world-scrambles-to-review-laws

[125] Catalina González Verdugo, *supra* note 116.

[126] Monopolkommission, *supra* note 42.

[127] Miranda Cole et al., *The German Monopolies Commission's Proposals Regarding Pricing Algorithms*, COVCOMPETITION (Nov. 29, 2018, 02:41 AM), https://www.covcompetition.com/2018/09/the-german-monopolies-commissions-proposals-regarding-pricing-algorithms/

[128] OECD, *supra* note 70.

[129] SAMIR CHOPRA & LAURENCE F. WHITE, A LEGAL THEORY FOR AUTONOMOUS ARTIFICIAL AGENTS 171–72 (University of Michigan Press 2011).

attributed to their human operators.[130] As the European Commissioner Vestager stated in a recent speech:

> *The challenges that automated systems create are very real. If they help companies to fix prices, they really could make our economy work less well for everyone else. (…) So as competition enforcers, I think we need to make it very clear that companies can't escape responsibility for collusion by hiding behind a computer program.*[131]

Thus, like an employee or an outside consultant working under a firm's direction or control, a pricing algorithm remains under the firm's control and therefore the firm is liable for its actions.[132] This stands true no matter how intelligent pricing algorithm becomes or how independently they can make decisions.[133]

5.4   *EX-ANTE* MERGER CONTROL MEASURES

The possible *ex-ante* approach consists in establishing a system capable of preventing conscious parallelism, through the enforcement of merger control rules in markets with algorithmic activities.[134] Such an approach would allow agencies to assess the risk of future coordination,

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[130] OECD, *supra* note 6.

[131] Margrethe Vestager, *supra* note 30.

[132] Stephen Wisking & Molly Herron, *Algorithmic Pricing - The new Competition Law frontier?*, HERBERTSMITHFREEHILLS (Nov. 28, 2018, 10:07 AM), https://www.herbertsmithfreehills.com/file/22201/download?token=0vOY3W7j

[133] Nicolas Petit, *Antitrust and Artificial Intelligence: A Research Agenda*, SSRN (Nov. 21, 2018, 04:37 AM), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2993855

[134] It is a central object of merger policy to obstruct the creation or reinforcement by merger of such oligopolistic market structures in which conscious parallelism can occur. See, F.T.C. v. H.J. Heinz Co., 246 F.3d 708, 725 (D.C. Cir. 2001). See also, PHILLIP E. AREEDA ET AL., ANTITRUST LAW 9 (Little, Brown & Comp. 1998).

going beyond the traditional duopolies where conscious parallelism is more easily sustainable; to include also cases where the use of pricing algorithms may facilitate conscious parallelism even in less concentrated industries.[135] In order to effectively prevent algorithm fuelled conscious parallelism, competition agencies should focus their analysis particularly on the impact of the transactions on market characteristics such as transparency and velocity of interaction, which are the factors that are mostly affected by the use of pricing algorithms.[136]

5.5   COMPETITION COMPLIANCE BY DESIGN

An additional possibility can be the enactment of statutory requirement for companies to develop pricing algorithm that rule out anti-competitive behaviour and make price decision understandable to the competition authorities, which can be denominated as compliance by design.[137] For example- in a recent speech at the Bundeskartellamt, the EU Commissioner Vestager (2017) stated that businesses have the obligation of programming algorithms to deliberately comply with data protection and antitrust laws.[138] Similarly, the German Chancellor Angela Merkel made also a public statement calling for companies like Facebook and

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[135] A. Ezrachi *supra* note 34 at 77. The authors says that the "one factor is of conscious parallelism, because of algorithms, spreads beyond duopolies to markets with as many as five to six significant players. The agencies can be more sensitive to whether the elimination of a particular player would increase significantly the risk of algorithmic-fuelled conscious parallelism. It may be preserving a market of diverse sellers with different horizons for profits and different capacity constraints.

[136] OECD, *supra* note 6.

[137] Dr. Sebastian Janka, *Antitrust authorities turn their attention to algorithms in 2018*, NOERR (Nov. 30, 2018, 04:18 AM), https://www.noerr.com/en/newsroom/News/antitrust-authorities-turn-their-attention-to-algorithms-in-2018.aspx

[138] Margrethe Vestager, *supra* note 30.

Google to publicly disclose their proprietary algorithms, she remarked that:

> *The algorithms must be made public, so that one can inform oneself as an interested citizen on questions like: what influences my behaviour on the internet and that of others? (...) These algorithms, when they are not transparent, can lead to a distortion of our perception, they narrow our breadth of information.*[139]

Thus, the pricing algorithm should be designed in such a way to ignore information about certain market conditions.[140] Further, there can also be *per se* prohibition of certain algorithms, e.g. prohibition of "price matching" algorithms.[141]

Moreover, it will be prudent for algorithm developers and users to maintain a clear audit trail of all the steps taken during the development of the algorithm and in particular the decision making process of the pricing algorithm and any changes that are made to the algorithm during its use. It will also be prudent to ensure that the input parameters (source data) used by the pricing algorithm are set by the user and the default settings are not used. Consideration should also be given to whether the same algorithm is being used by other competitors.[142]

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[139] BBC News, *Angela Merkel wants Facebook and Google's secrets revealed*, BBC (Nov. 28, 2018, 04:37 AM), https://www.bbc.com/news/technology-37798762

[140] The other ways to prevent conscious parallelism is to have regulators reverse engineering pricing algorithms in order to understand how their decision-making process functions.

[141] Joseph E. Harrington Jr., *supra* note 10.

[142] Bertold Bär-Bouyssière, *supra* note 27.

5.6   AUDITING PRICING ALGORITHM

Ezrachi and Stucke propose that algorithms could be audited in a "sandbox" or a "collusion incubator", where their effects on the market could be observed. This could guarantee that pricing algorithms are programmed in a way to steer clear of any competition concerns.[143] Moreover, from an enforcement and regulatory perspective, auditing pricing algorithm will be beneficial to understand whether and if a firm could know that its pricing algorithm is implementing a conscious parallel outcome. For instance, if a firm observes that its profits have risen since it implemented algorithmic pricing, would it be able to determine whether this is because the algorithm has attracted new customers, increased sales to existing customers, raised prices to loyal customers or engaged in conscious parallel conduct?[144]

However, as noted by Ezrachi and Stucke, this can fail in leading to a meaningful tool, since pricing algorithms do not necessarily include instructions to collude, but rather to maximize profit. Moreover, auditing is not likely to keep pace with the development of the industry, especially given the self-learning nature of algorithms and it may be hard to prevent pricing algorithms from ignoring information that is publicly available ("cheap talk" problem).[145]

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[143] OECD, *supra* note 70.
[144] Competition & Market Authority, *supra* note 3.
[145] OECD, *supra* note 70.

5.7   OTHER INTERVENTIONS

The other intervention proposing big or small legal changes includes regulating the frequency with which the companies may adjust prices, requirement for companies to monitor the effects of their pricing algorithms on a regular basis and correcting *supra*-competitive prices,[146] introduction of consumer's algorithm or digital butler,[147] treating use of pricing algorithm with certain characteristics itself as "plus factors" in cases of conscious parallelism,[148] use of prohibition against abuse of collective dominant position[149] when faced with cases of conscious parallel conduct by pricing algorithm of two or more dominant market

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[146] Competition policy in Digital age, *Cartels and Pricing Algorithms – The Next frontier of Competition Law?,* HENGELER (Nov. 26, 2018, 06:03 AM) https://www.hengeler.com/fileadmin/news/BF_Letter/BF-CompNewsletterMay2017.pdf

[147] Digital butlers are algorithms that are employed by consumers, which make and execute decisions for the consumer by directly communicating with other systems through the Internet. The algorithm automatically identifies a need, searches for an optimal purchase and executes the transaction on behalf of the consumer. These offer many benefits to consumers as they can significantly reduce search and transaction costs and help consumers overcome biases and enable more rational and sophisticated choices. Digital butler can also create buyer power, if such algorithms have a sufficiently large number of users or if it coordinates its conduct with other digital butlers. This in turn, may allow consumers to counteract supplier's buyer power. Indeed, such algorithm can be coded not to buy a certain good if price is above a certain level. The aggregation of buyers can also make transactions less frequent and small, thereby increasing incentives of suppliers to deviate from the *status quo.* Or it might always buy some portion of its goods from at least one new source to strengthen incentives for new suppliers to enter the market. Indeed, once consumers are aggregated into sufficiently large consumer groups, suppliers will lose the ability to collect information on consumer's individual preferences with regard to products bought through the group. See, Michal s. Gal, *supra* note 31.

[148] Joseph E Harrington Jr., *Posted Pricing as a plus Factor*, UPENN (Nov. 26, 2018, 06:03 AM), https://repository.upenn.edu/cgi/viewcontent.cgi?article=1130&context=bepp_papers

[149] Under the theory of collective or joint dominance, several firms can share and abuse a dominant position. See, Massimiliano Vatiero, *Power in the Market: on the Dominant Position*, EUROPA (Nov. 30, 2018, 04:20 PM), http://ec.europa.eu/competition/antitrust/art82/005.pdf

players,[150] expanding the traditional duo of major antitrust offences (cartels and abuse of dominant position) of a new offence that could be the abuse of excessive market transparency or simply the anti-competitive algorithmic parallelism as a type of behaviour different from the permissible "normal" conscious parallelism (market adaptation) *etc.* [151]

6.   CONCLUSION

The interaction between pricing algorithms and concisions parallelism is a developing area, and in future policy makers may need to reconsider the current antitrust toolkit in order to adequately tackle such misconduct. But at the same time pricing algorithms have a major influence on the way firms compete in today's economy and have undoubtedly led to pro-competitive influence in many markets. Thus, there should be no disagreement about maintaining a fine balance between consumer protection, promotion of competition and innovation. Moreover, the policy approaches to tackle algorithm-induced conscious parallelism should be developed in cooperation with competition law enforcers, consumer protection authorities, data protection agencies, relevant sectorial regulators and organisations of computer science with expertise in algorithms. In conclusion, despite the clear risks that pricing algorithms may pose on competition, this is still an area of high complexity and

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[150] Manon van Roozendaal, *Algorithms: Teenage troublemakers of EU Competition Law*, EUROPEANLAWINSTITUTE (Nov. 20, 2018, 05:15 AM), https://www.europeanlawinstitute.eu/fileadmin/user_upload/p_eli/Award/Winner_2018_ELI_Young_Lawyers_Award_Manon_van__Roozendaal_FINAL.pdf

[151] Dylan i. Ballard & Amar s. Naik, *Algorithms, Artificial Intelligence and Joint Conduct*, COMPETITIONPOLICYINTERNATIONAL (Nov. 25. 2018, 05:45 AM), https://www.competitionpolicyinternational.com/wp-content/uploads/2017/05/CPI-Ballard-Naik.pdf

uncertainty, where lack of intervention and over regulation could both pose serious costs on society. Whatever actions are taken in the future, they should be subject to deep assessment and a cautious approach.

ONE HOUSE, MULTIPLE FAMILIES: SHOULD ENFORCEMENT OF CONSUMER PROTECTION AND COMPETITION LAWS BE HOUSED TOGETHER?

Saravanan Rathakrishnan[*]

ABSTRACT

With the increasing integration of India's economy with the rest of the world, growth of Indian companies has surpassed expectations. As a result, Indian companies have grown phenomenally and have established dominant positions within India. At the same time, companies based outside of India have entered into India's burgeoning and profitable consumer market. Thus, Indian regulators must grapple with two concerns: first, ensuring that there is competition in the markets and second, protecting consumers. It is trite that both concerns are essentially about enhancing consumer welfare, albeit via different pathways. Ensuring competition in the markets is a macro-based, supply-side approach to enhancing consumer welfare: an indirect approach. Consumer protection is a micro-based, transaction-focused, demand side approach to enhancing consumer welfare: a direct approach. This paper posits that despite this differential, there are advantages to housing enforcement of competition and consumer protection under the same house. Overall, benefits of such an amalgamation far outweigh the costs. To conclude, this paper submits

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