

POLICING PRICE BOTS: ALGORITHMS AND COLLUSION

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Jan Blockx¹

Online markets are transparent in ways which would have been unimaginable only a few years ago. If a vendor raises the price of an item on an online marketplace, other vendors can find out instantly, thanks to all sorts of cookies and monitoring mechanisms incorporated in online technologies. According to the Staff Working Document accompanying the European Commission's Final Report on the E-commerce Sector Inquiry, about half of the retailers which responded to the Commission's questionnaire track online prices of competitors and about two-thirds of them do so using automatic software programmes.² This software, often referred to as 'spiders', 'scrapers' or 'crawlers', can be created either by third party software specialists or by the companies themselves.

Furthermore, using pricing robots, some vendors will automatically adapt prices based on the prices they track online. These pricing robots determine prices using algorithms based on factors which are meant to reflect supply and demand, including the perceived prices of competitors. Advances in artificial intelligence (AI) may mean that these robots, through self-learning, may in the future even develop new strategies to set prices.

The increased transparency that comes with price monitoring and the speed with which pricing robots can adapt prices are factors commonly identified with perfect competition. However, other aspects of digital markets put into question this qualification. These include concentration levels in some digital markets but also the disparity between price transparency on the supplier's side of the market and price transparency on the buyer's side: retailers may be better at monitoring each other's prices than their customers are. In those circumstances, the increased transparency and flexibility may not lead to increased competition, but instead, because of the repeated Prisoner's Dilemmas the vendors face, to price increases and reduced offerings.

It is important not to underestimate what customers of online retailers can do to counter-act any restrictions of competition that may result from these characteristics. Indeed, any supra-competitive margins that online retailers make may create opportunities for third parties to offer products and services to help consumers get the best deal: there are numerous price trackers and price comparison websites which can benefit consumers.

Nevertheless, anecdotal evidence shows that the use of pricing robots can lead to prices which are clearly not established by free competition: there are, for example, several reported incidents of book prices on Amazon spiralling out of control because of pricing algorithms, the most

¹ University of Antwerp. An earlier version of this paper was presented at the 2nd Radboud Economic Law Conference on 9 June 2017. I would like to thank Anne-Marie Van den Bossche, Massimiliano Kadar and Johan van de Gronden for comments on an earlier draft. All views expressed and any remaining errors are of course mine.

² Commission, 'Staff Working Document accompanying the Final Report on the E-commerce Sector Inquiry of 10 May 2017', SWD (2017) 154 final, <http://ec.europa.eu/competition/antitrust/sector_inquiry_sw_d_en.pdf> accessed 31 August 2017, para 149.

famous one resulting in a copy of Peter Lawrence's *The Making of a Fly* being advertised for USD 23,698,655.93.³

A number of authors have in recent years stated that current antitrust rules may not be able to police supra-competitive price levels (or indeed other undesirable market outcomes) which may result from the use of price robots.⁴ The focus of most of these authors has been on the antitrust rules in the United States, although some also discuss the rules in Europe. Most influential have been Ezrachi and Stucke who have argued that “*when computer algorithms and machines take over the role of market players, the spectrum of possible infringements may go beyond traditional collusion*”⁵ and that in some cases this “*may result in AI self learning escaping legal scrutiny*.”⁶ Ezrachi and Stucke's paper on AI and collusion has been very influential and won one of the Antitrust Writing Awards of the Institute of Competition Law in 2016. Also their book *Virtual Competition*, which partially covers the same topic, has been the subject of much debate since its publication at the end of 2016.⁷ The interest in the topic from enforcers has also become apparent.⁸

These warnings about the risks of collusion in virtual markets are not to be taken lightly. If algorithms determine prices, it may be much more difficult to know that prices have reached a supra-competitive level: tacit collusion will be much more efficient if conducted by computers. Detection of anticompetitive practices may also be more difficult if there are no humans involved who may act unpredictably or even ‘irrationally’ (e.g. by experiencing anger when losing customers to competitors or guilt about ripping off their customers).

Another question is whether, even if detected, current antitrust rules allow for sufficient intervention to stop price bots from tacitly colluding contrary to the interest of consumers. Antitrust enforcers have normally considered it permissible for companies to react intelligently to the market behaviour of their competitors, even if in oligopolistic markets this implies that pricing is at a supra-competitive level.⁹ Some authors have argued that tacit collusion is just as harmful as explicit collusion and should therefore be banned,¹⁰ but in practice it is difficult to determine when unilateral behaviour that is driven by the rational self-interest which is the basis

³ As described on <<http://www.michaeleisen.org/blog/?p=358>> accessed 31 August 2017.

⁴ Some of the literature is referenced below.

⁵ A Ezrachi and ME Stucke, ‘Artificial intelligence & collusion: when computers inhibit competition’ (2015) <<https://www.law.ox.ac.uk/sites/files/oxlaw/cclpl40.pdf>> accessed 31 August 2017, 7.

⁶ *Idem*, 25.

⁷ A Ezrachi and ME Stucke, *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy* (Harvard University Press 2016).

⁸ In addition to other references in this paper, see the Background Note of the Secretariat prepared for the OECD Competition Committee's round table on ‘Algorithms and collusion’ on 21-23 June 2017: <[https://one.oecd.org/document/DAF/COMP\(2017\)4/en/pdf](https://one.oecd.org/document/DAF/COMP(2017)4/en/pdf)> accessed 31 August 2017.

⁹ The Court of Justice of the European Union (CJEU) has held that Article 101 TFEU “*does not deprive economic operators of the right to adapt themselves intelligently to the existing and anticipated conduct of their competitors*” (see cases C-40/73 *Suiker Unie and Others v Commission* ECLI:EU:C:1975:174, para 174 and C-89/85 *Ahlström Osakeyhtiö and Others v Commission* ECLI:EU:C:1993:120, para 71).

¹⁰ One of the most vocal advocates used to be Richard Posner. See R Posner, *Antitrust Law* (The University of Chicago Press 2001), in particular its chapter 3 “Price fixing and the oligopoly problem”, 51-100. Posner also argued that tacit collusion could be covered by section 1 of the Sherman Act (see in particular R Posner, ‘Oligopoly and the antitrust laws: a suggested approach’ (1968) 21 *Stanford Law Review* 1562) although the vast majority of scholars (and it seems Posner himself today) disagree. For a discussion of the situation under EU law, see N Petit, ‘The oligopoly problem in EU competition law’ in I Liannos and D Geradin (eds), *Research Handbook in European Competition Law* (Edward Elgar 2013) 259, also available at <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1999829> accessed 31 August 2017.

of our economic model would become unacceptable because it implies tacit collusion. However, tacit collusion may become a much more pressing issue in the time of pricing by (self-learning) algorithms: because of their all-seeing eye, processing power and lack of human biases, price bots could make tacit collusion the norm rather than the exception.

It is certainly true that the current antitrust rules do not prohibit all behaviour which leads to harm to consumer. It is even more true that the current rules cannot foresee every possible technological (r)evolution and its impact on competition. There are and will be gaps in enforcement. To determine how serious the problem is, we should nevertheless first analyse the size and depth of the gap.

Indeed it has been argued that some of the gaps in enforcement that have been identified in European competition law in the past were smaller than perceived. In the early 2000s there was a perceived gap in the first EU Merger Regulation's ability to stop the creation of non-collusive oligopolies, which resulted in a reform of the substantive test for mergers in the EU in 2004.¹¹ But, although the Commission has claimed that the closing of the gap in the first EU Merger Regulation has allowed it to assess "numerous" gap cases,¹² it has been argued by others that at least some of these cases could also have been dealt with under the first EU Merger Regulation.¹³ More recently, a discussion has taken place in Europe on the need to require notification of minority shareholdings because of a perceived gap in enforcement there,¹⁴ but the European Commission seems in the meantime to have abandoned the idea of reforming the EU Merger Regulation to cover possible anticompetitive minority shareholdings.¹⁵

¹¹ See Commission, 'Green Paper on the review of Council Regulation No. 4064/89', <http://ec.europa.eu/competition/consultations/2002_council_regulation/index.html> accessed 31 August 2017.

¹² Commission, 'Staff Working Document Accompanying the White Paper Towards more effective EU merger control of 9 July 2014', <http://ec.europa.eu/competition/consultations/2014_merger_control/staff_working_document_en.pdf> accessed 31 August 2017, para 13.

¹³ The German Federal Cartel Office, for example, was of the view that the first "gap" case the Commission claims it dealt with, case M.3916 *T-Mobile/Tele.ring* in 2006, might just as well have been addressed under the previous substantive test. See OECD Competition Committee Working Party No. 3 on Cooperation and Enforcement, Roundtable on the standard for merger review, with a particular emphasis on country experience with the change of merger review standard from the dominance test to the SLC/SIEC test, 9 June 2009, <http://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Diskussions_Hintergrundpapiere/OECD_2009.05.28Standard_Merger_Review.pdf?__blob=publicationFile&v=4> accessed 31 August 2017, para 11. MB Coate, 'Did the European Union's market dominance policy have a gap? Evidence from enforcement in the United States' (<https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1410246> accessed 31 August 2017) also argues that when applying the previous EU substantive review test to US enforcement action, the gap in EU enforcement appeared relatively small.

¹⁴ See Commission, 'Staff Working Document Accompanying the White Paper Towards more effective EU merger control of 9 July 2014', <http://ec.europa.eu/competition/consultations/2014_merger_control/staff_working_document_en.pdf> accessed 31 August 2017.

¹⁵ While the jurisdiction over acquisitions of minority shareholdings was the main topic in the Commission's 2014 White Paper 'Towards more effective EU merger control' (<<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1406814408042&uri=CELEX:52014DC0449>> accessed 31 August 2017), Commissioner Vestager at the 2016 ABA Spring Meeting questioned the administrative burden created by this. The Commission's 2016 consultation 'Evaluation of procedural and jurisdictional aspects of EU merger control' (<http://ec.europa.eu/competition/consultations/2016_merger_control/index_en.html> accessed 31 August 2017) did not cover this topic anymore.

This paper will discuss what tools are available in EU antitrust law to tackle collusion by price bots, based on the existing legislation, the case law of the European courts and the practice of the European Commission. My aim is to assess how deep and wide the gap in enforcement is so that virtual competition, rather than causing us vertigo, can be ensured by the optimisation of the existing antitrust enforcement tool box.

In their paper on AI and collusion, Ezrachi and Stucke consider two important legal issues which would raise enforcement challenges: (i) evidence of intent and a horizontal agreement and (ii) potential liability.¹⁶ These two issues will be the basis for my analysis below.

I will argue that the case law of the CJEU on the substance of Article 101 TFEU does not absolutely require evidence of intent and that the standard to find horizontal collusion in the sense of Article 101 TFEU is fairly low. As to the question of potential liability, I will argue that undertakings can be held liable for the actions of the price bots which they design or use and that the toolbox of the European Commission is large enough to even stop practices for which no undertaking is to blame. As a consequence, while tacit collusion will continue to present a gap or “*crack*” in enforcement, there are a number of tools already available to avoid this turning into a chasm.¹⁷

1. Evidence of intent and a horizontal agreement

Ezrachi and Stucke’s first contention is that in some scenarios of collusion by pricing bots there is insufficient evidence of a horizontal agreement (an agreement between competitors) or of an intent to change market dynamics in order to find an infringement. Below I will set out how the case law of the CJEU is sufficiently flexible to allow for a finding of a horizontal agreement or a concerted practice even by pricing bots, and why evidence of intent is less vital in the EU than Ezrachi and Stucke suggest.

a. Communication of sensitive commercial information can result in a concerted practice

The language of European antitrust law is undoubtedly anthropocentric.¹⁸ The European Courts have defined the notion of agreement in the sense of Article 101 TFEU as centring “*around the existence of a concurrence of wills between at least two parties, the form in which it is manifested being unimportant so long as it constitutes the faithful expression of the parties’ intention.*”¹⁹ This wording seems to be entirely inapplicable in the world of robots and AI.

However, in practice, the European Courts have focused their analysis of the notion of agreement on the “*expressions*” of the parties, rather than on any presumed or postulated “*wills*”

¹⁶ See A Ezrachi and ME Stucke, ‘Artificial intelligence & collusion: when computers inhibit competition’ (2015) <<https://www.law.ox.ac.uk/sites/files/oxlaw/cclp140.pdf>> accessed 31 August 2017, 7-8.

¹⁷ Which is a fear expressed by SK Mehra, ‘Antitrust and the robo-seller: competition in the time of algorithms’ (2016) 100 *University of Minnesota Law Review* 1323, 1340.

¹⁸ The same is of course true of US antitrust law: see SK Mehra, ‘Antitrust and the robo-seller: competition in the time of algorithms’ (2016) 100 *University of Minnesota Law Review* 1323, 1329. A Ezrachi and ME Stucke, *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy* (Harvard University Press 2016), 42 and A Ezrachi and ME Stucke, ‘Artificial intelligence & collusion: when computers inhibit competition’ (2015) <<https://www.law.ox.ac.uk/sites/files/oxlaw/cclp140.pdf>> accessed 31 August 2017, 7 also refer to a “*human’ prism*”.

¹⁹ Case T-41/96 *Bayer v Commission* ECLI:EU:T:2000:242, para 69.

or “*intentions*” which would exist behind those expressions. What is more, any thoughts or intentions which a party would privately entail are not determinative for the existence of an agreement; what matters is what the party expressed to the other party.²⁰ Rather than “*wills*” and “*intentions*”, the focus of EU antitrust is therefore on “*expressions*” and “*communications*”, clearly things which robots and AI are capable of.

A second anthropocentric aspect of the above notion of agreement lies in the “*concurrence*” of wills which the notion of agreement entails. The meaning of this notion goes to the heart of what should be viewed as “*collusion*” in antitrust law. While it is clear that purely unilateral conduct is not caught by Article 101 TFEU,²¹ it is much harder to define which conduct is purely unilateral and which is not. The European Courts have struggled with this question a lot but what comes out of the case law is that the requirement of reciprocity is at least very limited. In order for there to be an “*agreement*” in the sense of Article 101 TFEU, it is sufficient that one party send an invitation to collude to the other party²² and that the other party tacitly acquiesces to that invitation. Tacit acquiescence of the recipient of the invitation arises if its business conduct is influenced by that invitation.²³

In order to establish a “*concerted practice*” in the sense of Article 101 TFEU, the communication from the first party does not even need to be an invitation to collude: the mere communication of commercially sensitive information from one party to another suffices. Article 101 TFEU strictly precludes any direct or indirect contact between actual or potential competitors which may influence their conduct on the market.²⁴ If the recipient of such commercially sensitive information becomes aware of its content, it will be regarded as having tacitly assented to a common anticompetitive practice.²⁵ The recipient can only escape liability by publicly distancing itself from the content of the communication or reporting it to the authorities.²⁶

Applied to the digital world this means that a concerted practice in the sense of Article 101 TFEU can arise if one trader communicates to another trader commercially sensitive

²⁰ In case C-29/83 *CRAM v Commission* ECLI:EU:C:1984:130, at [1984] ECR 01695 and ECR 01703-4, para 26, the CJEU therefore held that the fact that Schiltz “*never intended to observe the agreement*” was irrelevant to the question of whether it concluded an agreement or not. In case T-41/96, *Bayer v Commission* ECLI:EU:T:2000:242, para 156, the General Court analysed whether Bayer’s dealers “*wished to pursue Bayer’s objectives or wished to make Bayer believe that they did*”: if they had done the latter that could have made them party to an agreement, even if they had private reservations about it. Admittedly, the position of the CJEU on appeal was more ambiguous: compare paras 121 and 122 of joined cases C-2/01 P and C-3/01 *BAI v Bayer and Commission* ECLI:EU:C:2004:2.

²¹ Case C-107/82 *AEG v Commission* ECLI:EU:C:1983:293, para 38; joined cases C-25/84 and C-26/84 *Ford and Ford Europe v Commission* ECLI:EU:C:1985:340, para 21; case T-43/92 *Dunlop Slazenger v Commission* ECLI:EU:T:1994:79, para 56; case T-41/96 *Bayer v Commission* ECLI:EU:T:2000:242, para 66.

²² On the need for an invitation, see joined cases C-2/01 P and C-3/01 *BAI v Bayer and Commission* ECLI:EU:C:2004:2, para 102.

²³ Cases C-338/00 P *Volkswagen v Commission* ECLI:EU:C:2003:473, para 67 and C-74/04 P *Commission v Volkswagen* ECLI:EU:C:2006:460, para 39.

²⁴ Cases C-8/08 *T-Mobile Netherlands and Others* ECLI:EU:C:2009:343, para 33 and C-74/14 *Eturas and Others* ECLI:EU:C:2016:42, para 27.

²⁵ Case C-74/14 *Eturas and Others* ECLI:EU:C:2016:42, para 44.

²⁶ Established case law since case T-6/89 *Enichem Anic v Commission* ECLI:EU:T:1991:74, confirmed by case C-49/92 P *Commission v Anic Partecipazioni* ECLI:EU:C:1999:356. Most recently, see case C-74/14 *Eturas and Others* ECLI:EU:C:2016:42, para 28.

information which may influence the conduct of the recipient, such as pricing information. There are different ways in which this can happen.

In case multiple competing traders use the same supplier for the pricing software and this software improves its performance (“learns”) using the data obtained from the traders, this can clearly lead to hub-and-spoke collusion.²⁷ Price trackers embedded in the website of the trader which contractually allow the software to optimise prices of multiple traders can also be problematic.^{28 29}

A gap in enforcement may therefore only exist if a website is crawled without the consent of its owner and the owner has merely made the pricing information which is crawled public. But the European Commission’s view is that it cannot be excluded that public communications could lead to a concerted practice³⁰ and even in those circumstances enforcement may therefore be possible. In any event, that the recipient of the information has given its consent to receiving the information is beyond doubt, since, by using price trackers, the recipient specifically requested it.

b. Collusion can be found in the absence of an intention to restrict competition

Another element in antitrust law that is said to be an obstacle to enforcement in respect of AI is the widespread reliance on intentions to assess the object of collusion. It is indeed quite common for the Commission and the European Courts to assess the conduct of undertakings in light of their intentions and the strategies they pursue, in particular if the conduct is ambiguous.³¹ However, at least in the EU,³² an anticompetitive intention is not necessary³³ (nor sufficient)³⁴

²⁷ See, however, on the relevance of intent in hub-and-spoke collusion, further below.

²⁸ See on this S Schmidt, ‘Web-Tracker und Kartellrecht’ (2016) *Wirtschaft und Wettbewerb* 572, 574-575.

²⁹ Furthermore, in case traders united by economic links together represent a significant part of the market, they can collectively hold a dominant position (see in particular joined cases T-68/89, T-77/89 and T-78/89 *SIV and Others v Commission* ECLI:EU:T:1992:38, para 358). There is little enforcement practice in this field, but, according to some scholars, the use by multiple competing traders of devices strengthening their interdependence (e.g. by using the same pricing software) could be viewed as an abuse of such a collective dominant position. For a critical discussion of these views, see N Petit, ‘The oligopoly problem in EU competition law’ in I Liannos and D Geradin (eds), *Research Handbook in European Competition Law* (Edward Elgar 2013) 259, 335-336, also available at <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1999829> accessed 31 August 2017.

³⁰ Commission, ‘Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements’, OJ C11, 1, paras 63 and 94. The Commission has raised concerns with public price announcements in case 39.850 *Container Shipping* which resulted in commitments by the undertakings concerned (see the Commission decision of 7 July 2016 in case 39.850 *Container Shipping*, <http://ec.europa.eu/competition/antitrust/cases/dec_docs/39850/39850_3377_3.pdf> accessed 31 August 2017, in particular paras 45-47).

³¹ See, for example, the importance attached to the intentions of the parties in the patent settlement investigations of the Commission: Commission decision of 19 June 2013 in case 39.226 *Lundbeck*, in particular paras 803-816, 858-866, 950-954, 1000-1005, 1075-1079 and 1161-1166, confirmed by the General Court in case T-472/13 *Lundbeck v Commission* ECLI:EU:T:2016:449, in particular paras 517-533; and the Commission decision of 10 December 2013 in case 39.685 *Fentanyl*, in particular paras 334-359.

³² For the situation in the United States, see ME Stucke, ‘Is intent relevant?’ (2012) 8 *Journal of Law, Economics & Policy*, 801.

³³ Cases C-551/03 P *General Motors v Commission* ECLI:EU:C:2006:229, para 77; C-8/08 *T-Mobile Netherlands and Others* ECLI:EU:C:2009:343, para 27; C-501/06 P et al. *GlaxoSmithKline Services Unlimited v Commission* ECLI:EU:C:2009:610, para 58; C-32/11 *Allianz Hungaria Biztosító* ECLI:EU:C:2013:160, para 37; C-67/13 P *Cartes Bancaires v Commission* ECLI:EU:C:2014:2204, para 54 and C-286/13 P *Dole Food and Dole Fresh Fruit Europe v Commission* ECLI:EU:C:2015:184, para 118.

³⁴ Case C-67/13 P *Cartes Bancaires v Commission* ECLI:EU:C:2014:2204, para 88.

to establish a restriction to competition in the sense of Article 101 TFEU. There is no ‘gap’ in EU antitrust law when it comes to unintentional infringements.

As a consequence, the fact that pricing information would originally have been collected through crawlers in order to allow the recipient to be more competitive, does not exclude that that information is used in an unlawful way to increase prices or otherwise make the market less competitive. It is therefore not excluded that algorithms, self-learning or not, which are written with procompetitive intentions can still be found to be restrictive of competition.

Of course, as already indicated above, evidence of intentions can be useful to put conduct into context. If there is evidence that an algorithm has been programmed in a particular way in order to soften competition, this will clearly be useful in assessing whether it can and does restrict competition. Given the complexities of assessing the economic consequences of the conduct of undertakings, it is not surprising that the intentions and strategies of undertakings provide a good insight into the objectives pursued by their conduct.³⁵ In the absence of evidence on the objectives pursued by the algorithm (its intentions), a much more detailed effects analysis will often need to be conducted and this may hinder enforcement in practice.

Evidence of intentions has been considered particularly important if there are suspicions of hub-and-spoke collusion – although this may be less about the intention to restrict competition than the intention as to whom commercially sensitive information should be shared with.³⁶ Although evidence of such intentions can be important to distinguish the (legitimate) direct exchange of information between distributor and supplier from the (illegitimate) indirect exchange of information between two distributors via the supplier, this is only important if there is ambiguity in this respect – and, even then, only as regards the liability of the distributors in question.³⁷

2. Potential liability

This brings us to the second obstacle which Ezrachi and Stucke identify: potential liability. Their question is: if pricing bots collude, who should be held responsible for this? Should it be the developers of the algorithm in question, or their users (and beneficiaries)? On what basis could either of them be held liable?

I do not think these questions can be answered in the abstract: it all depends. However, I do want to make two observations here in terms of the responsibilities of the undertakings involved and in terms of the tools available to European antitrust enforcers.

³⁵ See footnote 35 to the Federal Trade Commission & US Department of Justice, ‘Antitrust guidelines for collaborations among competitors’ (2000) <https://www.ftc.gov/sites/default/files/documents/public_events/joint-venture-hearings-antitrust-guidelines-collaboration-among-competitors/ftcdojguidelines-2.pdf> accessed 31 August 2017: “... *extrinsic evidence of intent may aid in evaluating market power, the likelihood of anticompetitive harm, and claimed procompetitive justifications where an agreement’s effects are otherwise ambiguous.*”

³⁶ See in particular, the judgment of the Court of Appeal in England and Wales in case *Argos, Littlewoods and JJB v OFT* [2006] EWCA Civ 1318, at paras 91 and 141.

³⁷ The Court of Appeal in the case mentioned in the previous footnote, like the Competition Appeals Tribunal before it, seems to find evidence of intentions mainly relevant to determine who are the “parties to a concerted practice”. Clearly the exchange of pricing information between a supplier and distributor can also be used to enforce illegal resale price maintenance, even if there is no intention to share the information with other distributors.

a. Undertakings have an obligation to actively ensure compliance

First of all, I believe the case law of the CJEU is pretty clear that undertakings cannot take a passive attitude when it comes to antitrust infringements. We have already seen how an undertaking can be liable for participation in a concerted practice if it does not publicly distance itself from commercially sensitive information it receives. Liability for an antitrust infringement can arise not merely as a result of the actions of an undertakings but also from its inactions.

It is well known that in the EU dominant undertakings have a “*special responsibility*” to ensure that their conduct does not restrict competition.³⁸ But there is also a “*special responsibility*” for undertakings to be circumspect in their dealings with competitors and with sensitive information they receive from their competitors. For example, when competitors engage in a lawful joint venture, they must ensure that their lawful cooperation does not have spill-over effects in other markets where their cooperation would not be lawful. To avoid this, undertakings may be under a positive obligation to put in place the necessary safeguards.³⁹ Similarly, while it is accepted that undertakings which envisage to merge need to exchange certain commercially sensitive information in order to assess whether the transaction is worth their while, they need to put in place safeguards to ensure that that exchange of information does not result in an infringement of Article 101 TFEU.⁴⁰ That undertakings should keep their business relations under constant review is also attested by the fact that they may infringe Article 101 TFEU by being party to a vertical agreement in case similar vertical agreements are subsequently concluded by other undertakings: in those circumstances, an agreement may become illegal even though it was not illegal when it was originally concluded.⁴¹

Along the same lines, undertakings which collect commercially sensitive information from their competitors must take the necessary steps to ensure compliance with Article 101 TFEU. If they use pricing bots, they need to ensure that what these bots do is in compliance with the antitrust rules. If a designer or user of a pricing bots fails to take the necessary steps to stop those bots

³⁸ First mentioned in case C- 322/81 *Nederlandsche Banden Industrie Michelin v Commission* ECLI:EU:C:1983:313, para 57.

³⁹ See Commission, ‘Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements’, OJ C11/p. 1, para 215 which requires parties to a joint purchasing arrangement to ensure that sensitive data collated by the joint venture is not passed on to the parties.

⁴⁰ There are no decisions of the European Commission on information exchanges prior to M&A transactions but in the decision of the French Competition Authority of 8 November 2016 fining Altice for exercising influence over SFR prior to the clearance of its acquisition, the Authority stated that although “*the preparation of a concentration usually gives rise to the exchange of a large amount of information between the acquirer and the seller or target*”, nevertheless “*whatever the reasons for which the companies may need to exchange information, it is their duty to put in place measures that eliminate any communication of strategic information between independent undertakings.*” (“*La préparation d’une opération de concentration donne habituellement lieu à l’échange de nombreuses informations entre l’acquéreur et le vendeur ou la cible*” “*Quels que soient les motifs pour lesquels les entreprises pourraient avoir besoin d’échanger des informations, il leur appartient de mettre en place un dispositif qui élimine toute communication entre entreprises indépendantes d’informations stratégiques*”) (paras 259-260).

⁴¹ On the cumulative effect of parallel networks of vertical agreements, see cases C-23/67 *SA Brasserie de Haecht v Consorts Wilkin-Janssen* ECLI:EU:C:1967:54 and C-234/89 *Stergios Delimitis v Henninger Bräu AG* ECLI:EU:C:1991:91. The effect of this doctrine has been toned down by Commission Regulation 330/2010 of 20 April 2010 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of vertical agreements and concerted practices, OJ L102/1 which block exempts vertical agreement if certain thresholds are met, also if parallel vertical agreements exist (although there is a possibility for the Commission to withdraw the benefit of the regulation in that case – see Article 6).

from engaging in collusion, they can be liable for that collusion, regardless of whether the pricing bot is self-learning or not. Self-learning robots are not so different from sales people who, as not-artificial intelligence, also learn and adapt their commercial strategies. And, just like employers will be liable if their employees commit an antitrust infringement when authorized to act for their employer,⁴² undertakings will be liable for the actions of their pricing bots if they use them.⁴³

Commissioner Vestager has also made this clear in a recent speech where she said that “businesses need to know that when they decide to use an automated system, they will be held responsible for what it does.”⁴⁴ Director-General Laitenberger went even a step further in identifying the positive compliance obligations of companies:

“Imagine that a firm lets a piece of software monitor the prices of rivals and set its own. Let us also imagine that the software works all by itself, taking over the kind of coordination, bargaining and mutual commitment that are necessary to run a cartel. Well, even in this case the firm would still be liable for its actions. To stay on the safe side of the law, it should have programmed the software to prevent collusion in the first place.”⁴⁵

As regards the liability of the developer of the algorithm (if that is a different undertaking from the user), the case law that a middleman which facilitates collusion by competitors is itself party to that infringement and can be punished for it, is now fairly well established.^{46 47}

b. In case of doubt, the Commission can regulate without fines

Obviously, the effectiveness of antitrust enforcement is linked to the severity of the sanctions that are imposed for infringements. It is a well-known fact that some cartels have covered the entire world with the exception of the United States because the risk of imprisonment there deterred the cartelists from extending it to American territory.⁴⁸ On the other hand,

⁴² See joined cases C-100-103/08 *Musique Diffusion française v Commission* ECLI:EU:C:1983:158, para 97, and, more recently, case T-588/08 *Dole Food and Dole Germany v Commission* ECLI:EU:T:2013:130, para 581.

⁴³ As Acting Chairman of the US Federal Trade Commission Maureen K Ohlhausen put it in a speech on 23 May 2017: “If it isn’t ok for a guy named Bob to do it, then it probably isn’t ok for an algorithm to do it either.” (<<https://www.ftc.gov/public-statements/2017/05/should-we-fear-things-go-beep-night-some-initial-thoughts-intersection>> accessed 31 August 2017).

⁴⁴ Speech of Commissioner Vestager at the Bundeskartellamt 18th Conference on Competition, Berlin, 16 March 2017 (<https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/bundeskartellamt-18th-conference-competition-berlin-16-march-2017_en> accessed 31 August 2017).

⁴⁵ Speech of Director-General Laitenberger at the Consumer and Competition Day, Malta, 24 April 2017 (<http://ec.europa.eu/competition/speeches/text/sp2017_06_en.pdf> accessed 31 August 2017).

⁴⁶ Cases T-99/04 *AC-Treuhand v Commission* ECLI:EU:T:2008:256; T-27/10 *AC-Treuhand v Commission* ECLI:EU:T:2014:59 and C-194/14 P *AC-Treuhand v Commission* ECLI:EU:C:2015:717.

⁴⁷ Furthermore, if the algorithm becomes a standard in the industry, one can wonder whether the use of that algorithm to facilitate price increases to the detriment of consumers could not be viewed as the abuse of a dominant position. Along the same lines, see <<https://chillingcompetition.com/2016/01/22/ecjs-judgment-in-case-c-7414-eturas-on-the-scope-of-concerted-practices-and-on-technological-collusion/>> accessed 31 August 2017.

⁴⁸ See GJ Werden, SD Hammond and BA Barnett, ‘Recidivism eliminated: cartel enforcement in the United States since 1999’ (2011), <<https://www.justice.gov/atr/file/518331/download>> accessed 31 August 2017, 8: “On numerous occasions, the Antitrust Division has interviewed members of international cartels who provided first-hand accounts of their participation in cartels that spanned the globe but stopped at the U.S. border because the participants feared going to jail. This eyewitness testimony is compelling evidence that enforcement in the United States is deterring cartel activity.”

criminalisation of cartels also increases the evidentiary burden of the investigative authorities since the standard of proof in criminal law is generally higher than in civil law. Even in the EU, the punishment of cartels through fines has been viewed as quasi-criminal, which implies that the evidentiary burden is relatively high.⁴⁹

However, as a last resort, EU antitrust law allows for the regulation of practices which are considered to be harmful to competition even if it would not be appropriate to impose a fine. The Commission has in particular proceeded in this way when it found a practice to be anticompetitive which had not been qualified as such in the past.⁵⁰ Although the Commission is not prevented from imposing a fine in those circumstances,⁵¹ it can exceptionally not impose a fine on an undertaking even though that undertaking has infringed the EU rules on competition, if there are objective reasons to do so.⁵²

In particular, Article 23(2) Regulation 1/2003⁵³ provides that fines may be imposed by the Commission on undertakings which “*either intentionally or negligently*” infringe Article 101 TFEU. If, in exceptional circumstances, no intention or even negligence could be established in respect of an undertaking, the Commission is therefore estopped from imposing a fine on that undertaking. However, that does not mean that the Commission cannot prohibit the practice which it deems anticompetitive. Indeed, even in the absence of an intention or negligence, the Commission may, pursuant to Article 7 of Regulation 1/2003 order an undertaking to bring an infringement to an end and, if necessary, impose structural or behavioural remedies which are necessary to terminate the infringement. Article 24 of Regulation 1/2003 allows the Commission to make compliance with such a decision subject to periodic penalty payments.

So even if, as a theoretical hypothesis, a practice of a pricing bot would be considered to be so ambiguous that it may not have been possible for its designer or user to foresee its anticompetitive character, the Commission can prohibit the practice without a fine. Similarly and again hypothetically, if an anticompetitive practice is identified which causes parallel behaviour between a number of undertakings but it would be impossible to identify the undertaking which is to blame for the collusion, the Commission can prohibit the practice and impose an obligation on one or more undertakings to ensure that the practice is stopped (possibly subject to the risk of a periodic penalty payment).

3. Conclusion

While the internet may bring us new products and services and markets which are competitive in ways which seemed unthinkable until very recently, it may also create market inefficiencies.

⁴⁹ Although the CJEU has always avoided the qualification of EU antitrust law as criminal and Article 23(5) of Regulation 1/2003 even explicitly denies that characterisation to fining decisions adopted by the Commission, many have argued that fines in cartel cases should be viewed as quasi-criminal, see, for example, the AG Opinion in case C-681/11 *Schenker & Co. and Others* ECLI:EU:C:2013:126, para 59.

⁵⁰ See, for example, the Commission decision of 29 April 2014 in case 39.985 *Motorola – Enforcement of GPRS standard essential patents* (<http://ec.europa.eu/competition/antitrust/cases/dec_docs/39985/39985_928_16.pdf> accessed 31 August 2017, in particular paras 559-561).

⁵¹ Case C-457/10 P *AstraZeneca v Commission* ECLI:EU:C:2012:770, para 164.

⁵² Case C-499/11 P *Dow Chemical and Others v Commission* ECLI:EU:C:2013:482, para 47.

⁵³ Regulation No 1/2003 of 16 December 2002 on the implementation of the rules on competition laid down in Articles 81 and 82 of the Treaty, OJ L1/1.

It is therefore worthwhile to look out for any gaps in antitrust enforcement that may arise from the competitive process in virtual markets.

However, it is also important not to underestimate the flexibility allowed by the CJEU's case law in EU antitrust cases. The CJEU has identified unlawful collusion as a consequence of the disclosure of sensitive information from one undertaking to another and has also allowed for the establishment of infringements in the absence of anticompetitive intent. On this basis, even self-learning pricing algorithms could be caught by the prohibition of Article 101 TFEU.

Furthermore, undertakings can be liable for the actions of the (self-learning) algorithms they create or use. Undertakings have a positive obligation to ensure compliance with the EU antitrust rules and cannot plead ignorance of what their employees or price bots are doing. And even if there would be circumstances where undertakings could not be found to have been negligent in how they supervise their employees and price bots, the Commission could prohibit practices and ensure compliance through periodic penalty payments.

While there will be gaps in enforcement, EU antitrust laws can also stop many restrictions of virtual competition.⁵⁴

⁵⁴ See also the European Commission note for the OECD Competition Committee's round table on 'Algorithms and collusion' on 21-23 June 2017 (<[https://one.oecd.org/document/DAF/COMP/WD\(2017\)12/en/pdf](https://one.oecd.org/document/DAF/COMP/WD(2017)12/en/pdf)> accessed 31 August 2017) which reaches the same conclusion: "*To a large extent, pricing algorithms can be analysed by reference to the traditional reasoning and categories used in EU competition law.*"