

**Faculté de droit et de criminologie**

# **The rise of pricing software : does algorithmic collusion fall under the scope of European competition law?**

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## **INTRODUCTION**

Businesses have always looked out for new technological tools which could enable them to increase their efficiency and competitiveness. In recent years, algorithms have become increasingly popular in the digital economy, as two-thirds of online retailers in the European Union use software programmes which autonomously modify prices based on market fluctuations such as competitors' prices.<sup>1</sup> This increasingly widespread use of price algorithms can lead to a new kind of anticompetitive behavior that departs from the traditional conduct that European case law has covered : algorithmic collusion. When describing collusion, legal scholars have often used the metaphor of a meeting of CEOs in a room full of cigar smoke where they secretly shared confidential commercial information and cooperated by fixing prices or allocating markets. With the advent of algorithms, such secret meetings are not required, as cooperation and collusion now occur in digital environments.

While some scholars are already pushing for an ambitious reform of the legal framework, it might be helpful to analyse the established case law and existing doctrinal scope of European Competition law, and confront its application to algorithmic collusion. This is what this thesis aims to accomplish. The thesis will provide extensive review of case law when analysing the scope of terms such as 'agreement' or 'concerted' practice. This is necessary as the conditions required to establish conduct under those notions is not found in article 101 TFEU, but was developed by the Court in what is now considered established case law.

This thesis will start with the chapter 'Algorithms in the Digital Market' which provides the information that is necessary to understand algorithmic collusion. The chapter will provide technical definitions; it will present an overview of dynamic and algorithmic pricing; it will compare the concepts of algorithmic collusion with the notion of collusion through algorithms; it will state the market conditions which make algorithmic collusion possible; and finally it will provide a taxonomy of algorithms and explain how they can be implemented for algorithmic collusion.

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<sup>1</sup> POSCIC Ana, and MARTINOVIC Adrijana, '*EU Competition Law in the Digital Era : Algorithmic Collusion as a Regulatory Challenge*' (2020), EU and Comparative Law Issues and Challenges, p. 1018

The next chapter covers the scope of agreement within the meaning of article 101(1) TFEU. It first provides a quick overview of cartels as they are considered to be the classic example of anticompetitive agreements. The section then covers the *Bayers AG* case and its definition of agreements since such definition is not provided by article 101(1) TFEU, to then confront how this definition restricts the possibility of considering algorithmic collusion as an agreement.

The third chapter covers the scope of concerted practice within the meaning of article 101(1) TFEU. It provides an extensive presentation of case law. This is necessary as the notion of concerted practice has been developed through case law.

The fourth chapter covers the two types of horizontal restraints as understood within the meaning of article 101(1) TFEU. It reviews the case law for restrictions by object and explains how the requirements provided by the court in order to establish a ‘by object’ restriction might restrain its application to algorithmic collusion.

The fifth chapter tackles the notion of ‘association of undertakings’ within the meaning of article 101(1) TFEU. It reviews the *MasterCard* case law and the Court’s criterias of composition and criteria of mandate. It then analyses the possibility of considering online platforms as ‘association of undertakings’ and algorithms as their decision, in light of the notions developed in the *MasterCard* case.

The sixth chapter departs from analysing collusion between competitors, and instead focuses on the possible notion of ‘intra-platform’ algorithmic collusion. It first analyses what the notion of ‘undertaking’ entails within the meaning of article 101(1) TFEU. It then focuses on the case of the platform Uber, and how its use of pricing algorithm could be considered to amount to algorithmic collusion.

The seventh chapter covers the exemption procedure that is found at article 101(3) TFEU. After reviewing the conditions that need to be met in order to be granted an exemption, it considers the possibility that the process has become obsolete over the years, to finally analyze the pro-competitive effects of algorithms which might enable it to be exempted from being considered a competition law infringement under article 101(1) TFEU.

The eighth chapter covers the notion of abuse of collective dominance within the meaning of article 102 TFEU. The chapter will cover case law to analyse the different notions to be applied to algorithm collusion. The *Hoffman-La Roche* case is analysed to develop the notion of dominant position, and through the *Italian Flat Glass* case we review the Court's conditions for collective dominance to be established. After defining the concept of abusive conduct, we analyse the possibility of

The ninth chapter provides a detailed analysis of liability for algorithmic collusion. It first tackles the notion of liability, and reviews case law regarding an undertaking's liability for the conduct of its employees or of its service providers. It then gives an overview of the single economic entity doctrine and how it applies to the notion of liability. It then analyses both the arguments in favour of establishing an undertaking's liability for the conduct of its self-learning algorithms, and the arguments against.

The tenth chapter covers the subject of European competition law remedies for algorithmic collusion. It analyses the Regulation (EC) 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, and the remedies that it develops. Mainly fines, structural remedies, and behavioral remedies; and how those remedies would be applied in the context of algorithmic collusion.

Finally the paper will provide a conclusion. This conclusion will be the opportunity to summarise and reflect on the application of European competition law to algorithmic collusion, in light of the work developed in the thesis.



## **A. ALGORITHMS IN THE DIGITAL MARKET**

### **1) Technical definitions**

One of the complexities of regulating applications of recent technological advancements is that it requires to understand to a certain extent what that technology is. This becomes increasingly difficult for legal professionals as the technology that is being developed becomes more and more complex. The following section aims to give short but clear explanations of the technical terms that will be used throughout the paper.

#### **1.1) Algorithms**

The most important term when it comes to algorithmic collusion is ‘algorithm’. Paradoxically, while being in the name ‘algorithmic collusion’ and therefore crucial to the concept, the notion of algorithm does not have a universally accepted definition.<sup>2</sup> The intuitive perception that most people share is that algorithms are a sequence of rules that needs to be performed in order to perform a certain task<sup>3</sup>, it’s a list of instructions that can generate a desired output from inputs. A scientific definition of algorithm is the following:

*“An algorithm is an unambiguous, precise list of simple operations applied mechanically and systematically to a set of tokens or objects (e.g. configurations of chess pieces, numbers, cake ingredients, etc.). The initial state of the tokens is the input; the final state is the output.”<sup>4</sup>*

#### **1.2) Self-learning algorithms**

However, this definition does not apply for a category of algorithms that will be extensively discussed in this paper, which is the ‘self-learning algorithms’. These complex algorithms are no longer lists of instructions that are designed by programmers, but are instead applications of machine learning and deep learning technology<sup>5</sup>.

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<sup>2</sup> GAL Avigdor, ‘It’s a Feature, not a Bug: On Learning Algorithms and what they teach us’ (2017)

<[https://one.oecd.org/document/DAF/COMP/WD\(2017\)50/en/pdf](https://one.oecd.org/document/DAF/COMP/WD(2017)50/en/pdf)> last accessed 12 August 2021 para 1,5

<sup>3</sup> BEKISZ Hubert, ‘When does algorithmic pricing result in an intra-platform anticompetitive agreement or concerted practice? The case of Uber in the framework of EU Competition Law’ (2021), Journal of European Competition Law & Practice, vol. 12 pp. 218

<sup>4</sup> Background Note by the Secretariat, *Algorithms and Collusion*, OECD Doc. DAF/COMP(2017)4, p. 8

<sup>5</sup> OECD, p. 31

Machine learning is a subfield of artificial intelligence. The algorithms that are developed through machine learning are designed by the computer itself rather than a programmer. This can be achieved through supervised learning, where the system is fed labelled data with desired outputs in order to learn and develop rules to map the two together. It can also be achieved through unsupervised learning where the system is fed unlabelled data and has to identify patterns and develop an algorithm to map the data to those patterns. The system can also learn through reinforcement learning, where it learns through trial and error how to perform a certain task in a dynamic environment where it is rewarded when it performs the desired task, and punished when it doesn't.<sup>6</sup>

## **2) Pricing Algorithms**

### **2.1) Dynamic Pricing**

Pricing algorithms have become increasingly popular, with around 67% of online retailers using automatic pricing algorithms<sup>7</sup>. These algorithms are simply the newest technological implementation of dynamic pricing, which is a method of pricing where a seller continuously adapts their prices to market fluctuations with regards to demand, supply, competitors' prices, etc...<sup>8</sup> The purpose of dynamic pricing was either to provide personalized pricing which was optimized to the consumers' willingness to consume, or to maximize profits through market wide prices which were optimized to market conditions. Although the issue of personalized algorithmic pricing is of raising concerns<sup>9</sup>, this paper will not cover it but rather focus on market wide algorithmic pricing which can lead to algorithmic collusion.

### **2.2) Algorithmic pricing**

Pricing algorithms are, in general, sequences of programme codes which optimize prices in order to perform a certain task like profit maximization, based on the data that it is being fed. That input data is firm-specific data such as stock levels, costs, distribution channels, and

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<sup>6</sup> *ibid*, p.9

<sup>7</sup> Bekisz, p. 219

<sup>8</sup> MEHRA Salik K., '*Antitrust and the Robo-Seller: Competition in the Time of Algorithms*' (2016), Minnesota Law Review 204.

<sup>9</sup> RAB Suzanne, '*Artificial Intelligence, algorithms, and antitrust*' (2019), Competition Law Journal 2019, vol. 18, p. 105

other relevant data about the company which uses the algorithm. It's also market data such as the number of competitors in the relevant market, their sales channels, the prices that they implement and changes that are made to those prices.<sup>10</sup>

The rise of those algorithms has skyrocketed in recent years. With an ever-growing availability of data to be used by the algorithms, and an economy that is continuously shifting to digital markets, businesses that do not use such pricing algorithms put themselves at risk to be at a disadvantage compared to their competitors who do. These algorithms have become essential to the many companies that now use the algorithms to change their prices multiple times a day in order to be optimized to the newest development on their market and attempt to engage in prediction of future price movements.<sup>11</sup> These companies do not need to develop those complex algorithms themselves as they can purchase them from many software providers who have developed an expertise in that area. All they need to do is feed their own data to the algorithm in order to implement it.<sup>12</sup>

### 2.3) Simple vs Complex Algorithms

Although there has existed a large variety of pricing algorithms over the years, we can divide their development in two parts. The first generation of pricing algorithms was hard coded by their developers which designed a sequence of instructions for the algorithm to automatically perform.<sup>13</sup> It is the implementation of one of these simple algorithms which led to the infamous Amazon textbook case. In this example, a biology textbook was sold on Amazon by two different third party sellers who both used pricing algorithms. These two algorithms used the price of competitors as an input and adjusted the price of the textbook based on price changes from other sellers. The first seller's algorithm set the price for the book about 1.271 times higher than the second book offered, the second seller's algorithm set the price 0.998 times the price of the first book. This led the algorithms in a spiralling price war which saw the price of the book climbing to 23.7 million dollars.<sup>14</sup>

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<sup>10</sup> BERNHARDT Lea and DEWENTER Ralf, 'Collusion by code or algorithmic collusion? When pricing algorithms take over' European Competition Journal, p. 315

<sup>11</sup> Bernhardt and Dewenter. P. 316

<sup>12</sup> GAL Michal, 'Algorithms as illegal agreements' (2019), Berkeley Technology Law Journal vol. 34, p. 80

<sup>13</sup> POPESCU Dana, 'Repricing algorithms in E-Commerce' (2015), INSEAD Working Papers No.

2015/75/TOM

<sup>14</sup> PEREIRA Virgilio, 'Algorithm-driven collusion : pouring old wine into new bottles or new wine into fresh wineskins?' (2018), European Competition Law Review, 2018, 39(5), pp.212

The second generation of algorithms is more complex as it is based on machine learning technology. These self-learning algorithms do not require programmers to provide them with a sequence of instructions but rather learn from the data that they are fed how to develop their own rules in order to constantly adjust prices to market fluctuations in order to maximize profits.<sup>15</sup> These algorithms have powerful predictive capacity, and are constantly learning and readapting to changing market conditions. The issue with these algorithms is that they can be so complex in the way they have developed their own functioning, that they can be effectively considered to be a “black box” that even programming experts cannot make sense of.<sup>16</sup> It becomes impossible to understand why the algorithm functions the way it does and why it makes specific price changes. This can lead to a problematic form of algorithmic collusion as we will later see.

### **3) Collusion through algorithms vs algorithmic collusion**

#### **3.1) Collusion through algorithms**

Algorithmic collusion is an established notion in legal literature which will be covered next, however there is no specific term for a different kind of collusion. The term that will be used in this paper and which it proposes is ‘collusion through algorithms’. This notion can be defined as collusion between competitors that is either created or implemented through the use of pricing algorithms. Traditional competition law can be applied to collusion through algorithms in the same manner that it has been applied over the years in traditional markets. The difference with traditional collusion is simply the means of creating or stabilizing the collusion between parties. Instead of phone calls or emails in order to coordinate between competitors, the coordination is implemented through different types of algorithms that we will cover.

#### **3.2) Algorithmic collusion**

The notion of algorithmic collusion however refers to a different type of competition law infringement. In this scenario, price setting algorithms autonomously realize tacit conditions when certain market conditions are present. Unlike collusion through algorithms, there is no

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<sup>15</sup> SONDEREGGER Giulia, ‘*Algorithms and Collusion*’ (2021), *European Competition Law Review*, 42(4), p.9

<sup>16</sup> OECD, p. 32

need for humans to design the algorithms to specifically cooperate, and humans do not need to intervene and coordinate in order to stabilise the algorithmic collusion. Pricing algorithms are most often designed to maximize an undertaking's profits. Algorithmic collusion is simply the result of algorithms realizing that they can jointly maximize their profits by coordinating their prices,<sup>17</sup> the same way humans realized this before.

#### **4) Market Conditions for algorithmic collusion**

In this section I will first review the “Oligopoly Problem”<sup>18</sup> which consists in the market conditions which allow for collusion to occur. I will then provide an analysis which develops how algorithms can enhance these market characteristics that enable collusion and which thus makes algorithmic collusion more possible.

##### **4.1) Conditions for collusion**

###### **4.1.1) Oligopolies**

Collusions are much more likely to occur in an oligopoly market, to the extent that collusion has often been referred to as the ‘Oligopoly Problem’. The following conditions that allow for collusion to occur are all found in oligopolies due to their market structure, which can be summarized as a market which is dominated by a small number of firms and where each firm's decisions have an impact on the market and competitors.<sup>19</sup>

###### **4.1.1.1) Low number of competitors**

The first condition is that the number of competitors in the market must be relatively low.<sup>20</sup> As the number of competitors in a market increases, both the likelihood of collusion and the possible degree of collusion decrease.<sup>21</sup> According to some researchers, the possibility of

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<sup>17</sup> Bernhardt and Dewenter, p. 319

<sup>18</sup> ONG Burton, ‘*The Applicability of Art. 101 TFEU to Horizontal Algorithmic Pricing Practices: Two Conceptual Frontiers*’ (2021), *International Review of Intellectual Property and Competition Law*, vol. 52, p. 205

<sup>19</sup> Gal, p.75

<sup>20</sup> Bernhardt and Dewenter, p. 324

<sup>21</sup> *idem*; DAN ROMAN Vlad, ‘*Digital markets and pricing algorithms - a dynamic approach towards horizontal competition*’ 2018, *European Competition Law Review* 39(1) p. 41

collusion could seriously decrease once the number of competitors pass the low threshold of four companies.<sup>22</sup> Additionally, a large number of firms in a market reduces incentive to collude as it means that the colluding companies would receive a smaller share of the supra-competitive gains than in a market with few competitors.<sup>23</sup> The low benefits of colluding combined with the high cost of fines from competition authorities if the collusion was detected means that sellers would most likely decide not to collude.

A market should therefore have a high barrier of entry in order to be conducive to collusion.<sup>24</sup> This allows not only for the number of competitors to remain low, but it also prevents the structure of the market to be volatile with a high turnover of companies which would render the stability and coordination of the collusion more difficult.<sup>25</sup>

#### 4.1.1.2) High degree of market transparency

The second condition for collusion is a high degree of market transparency<sup>26</sup>. This means that the companies need to have access to a rather large amount of data about fluctuating market conditions such as the competitors' real time price changes. Without this kind of price transparency in the market, it becomes much more difficult for collusion to be possible and be stabilized over time. One of the reasons is that in order to be effective, collusion requires the parties to implement quick retaliations to deviations from the price agreement from one of the parties.<sup>27</sup> Without a credible threat of retaliation, sellers are more likely to divert from the prices in order to momentarily gain an advantage over their competitors, attract consumers, and make significant additional sales.

#### 4.1.1.3) Homogenous products

The third condition is that the competitors in the market should be selling relatively homogenous products. This is especially true in a market with a large number of consumers and a low number of sellers, as such a market structure greatly reduces consumers' power

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<sup>22</sup> Bernhardt and Dewenter, p. 324

<sup>23</sup> Gal, p. 75

<sup>24</sup> FZRACHI Ariel and STUCKE Maurice, '*Sustainable and Unchallenged Algorithmic Tacit Collusion*' (2020), Northwestern Journal of Technology and Intellectual Property, vol. 17 no.2 pp. 228

<sup>25</sup> Bernhardt and Dewenter p. 325

<sup>26</sup> *ibid*, p.. 323

<sup>27</sup> Gal, p. 73

which allows for the sellers a greater possibility to take advantage of the situation and set supra-market prices. A weaker consumers' power is also necessary as it prevents buyers from enticing one of the colluding sellers to defect from the price it shares with its competitors in order to make additional sales, which in turn means that the collusion is more stable.<sup>28</sup> Additionally elements which favour collusion are a market with relatively little innovation, mergers, and market entries or exits.<sup>29</sup>

#### 4.2) Algorithms' impact on the possibility of collusion

The nature of pricing algorithms is such that we are witnessing what could be called an "Oligopolisation"<sup>30</sup> of digital markets, meaning that the strategic use of algorithmic pricing in these markets has amplified and magnified the oligopoly problem to new markets which were not subject to it before.

##### 4.2.1) Market transparency

###### 4.2.1.1) Data availability

According to the OECD, pricing algorithms are fundamentally affecting market conditions in a way that allows tacit collusion to be sustainable in markets where it would have been impossible to implement.<sup>31</sup> Pricing algorithms possess computer power that enables them to process amounts of raw data that are impossible for humans to take into account when manually implementing dynamic pricing. The fact that a much larger amount of data is used as an input for dynamic pricing means that the market transparency has effectively increased and that the likelihood and stability of collusion has consequently increased too.

###### 4.2.1.2) Higher frequency of price modifications

Furthermore, pricing algorithms are able to automatically change prices at a much higher frequency that is manually possible, meaning that the amount of price interaction between competitors is significantly higher than when the prices were set manually by humans. This

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<sup>28</sup> Ezrachi and Stucke, p. 228

<sup>29</sup> Bernhardt and Dewente, p. 325

<sup>30</sup> ONG, p. 205

<sup>31</sup> OECD at 49-50

in turn facilitates collusion and parallel behavior.<sup>32</sup> Indeed, by modifying prices much more frequently, pricing algorithms are providing a lot more information to competitors' own algorithms about their own pricing methods. This means that because of algorithms, over time the pricing strategies of competitors become more transparent and more predictable. The higher number of interactions between competitors' algorithms through price modifications enable them to better make predictions and reduce strategic uncertainty.<sup>33</sup>

#### 4.2.2) Punishment of deviations

As seen earlier, one of the conditions for a successful collusion is that the parties need to be able to quickly punish deviations. Algorithms enable companies to be much more efficient at implementing such punishment due to the speed of retaliation that an algorithm allows.<sup>34</sup> Once a deviation has been detected, an algorithm can react extremely quickly in modifying its own prices in order to prevent the deviating company from enjoying any benefits from its price modification. It effectively deprives the deviating company from any significant sales that would result from momentarily offering their product at a lower price than the colluding competitors.

The threat of such quick retaliation which would virtually prevent any benefits from diverting from the colluding prices means that the coordination is much more sustainable. This was not the case when humans were in charge of both monitoring for deviating prices and implementing punishment in response. Pricing algorithms have therefore in effect made collusion a lot more sustainable than it used to be.

### **5) Algorithms as tools of anticompetitive conduct**

In this section we will cover how algorithms can be effectively used as tools that facilitate anticompetitive conduct. We will be analysing different types of algorithms and how they can be used to that end. There is no specific type of algorithm that is perfectly fit to facilitate collusion between competitors, instead there exists different possible algorithms that can perform different tasks which can enable competitors to both create and enforce collusion in a

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<sup>32</sup> Ezrachi and Stucke, p. 226

<sup>33</sup> OECD at 20

<sup>34</sup> Ezrachi and Stucke, p. 227



manner that would not be possible in a non-digital market. In this section, I will provide an overview of the four different types of algorithms that companies can use as tools that facilitate collusion.

### 5.1) Signalling algorithms

The first type of algorithms can be used by companies in order to signal to their competitors that they intend to collude and coordinate prices with them. If the competitors decide to match the price raise that the company implements, they would in effect be considered to be parties to a unilateral contract offered by the company that raised its prices with the expectation of being followed.<sup>35</sup>

The risk of such signalling is that if the competitors don't accept to collude by matching the price, the company could lose sales and profits due to the price raise<sup>36</sup>. Signalling algorithms would allow companies to mitigate such risk by setting rapid and iterative price raises that consumers could not take advantage of but which competitors could detect through their own algorithms.<sup>37</sup> Such algorithms would allow opportunities for companies to collude that were not possible before.

### 5.2) Monitoring algorithms

Once competitors have entered into an agreement, in order to ensure that it is successfully maintained and enforced, they have to monitor each others' behavior. Monitoring algorithms are designed and used to that end.<sup>38</sup> These algorithms become a tool for the parties to ensure that their competitors are not deviating from the agreed behavior in order to gain an advantage over them. Depending on different types of scenarios the algorithms would be designed differently to fit the specific context, but at its core it would be engineered to monitor and collect relevant information such as competitors' prices in order to successfully detect any deviation.

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<sup>35</sup> High Fructose Corn Syrup Antitrust Litigation Appeal of A & W Bottling Inc. et al., United States Court of Appeals, Seventh Circuit, 295 F3d 651, 2002, p. 2.

<sup>36</sup> HARRINGTON Joseph and ZHAO Wei, '*Signaling and tacit collusion in an infinitely repeated Prisoners' Dilemma*' (2012), Mathematical Social Sciences, p. 4

<sup>37</sup> OECD, p.30

<sup>38</sup> Parziale p. 105; OECD, p. 26

There already exist companies and websites which offer price comparison services where they use web scraping in order to collect the prices of specific platforms and companies and present in easy to use format for their clients.<sup>39</sup> These services are meant to provide important information for businesses about the market that they are a part of in order to make better informed decisions regarding their own prices, but they could easily be used by competitors who have entered an agreement as monitoring algorithms.

### 5.3) Retaliation algorithms

After the monitoring algorithms collect and analyse data in order to detect any deviation by a party from an agreement between competitors, these retaliation algorithms can be used in combination in order to automatically specifically retaliate to the observed deviation.<sup>40</sup> These algorithms would be designed to maintain the prices as agreed with the other parties as long as the agreement was upheld by all concerned, but as soon a deviation would be detected it would execute a trigger strategy that would have the parties effectively enter in a price war<sup>41</sup>.

### 5.4) Parallel algorithms

The two previous algorithms were designed for the parties to the agreement to protect themselves from the other parties and ensure that they do not suffer from a competitor deviating. The parallel algorithms on the other hand are meant to be parallelly used by the different parties to the agreement in order to more efficiently maintain it.

Markets are dynamic and there are constant changes to both supply and demand which require businesses to adapt and therefore adjust their prices, output, and other aspects of their business. Once an agreement has been reached between competitors, it cannot remain static but instead also has to adapt to market conditions in order to remain profitable. This used to mean that the parties would be required to communicate through meetings or phone calls as to discuss how to adapt the agreement.

Parallel algorithms would be designed to avoid this additional communication which puts the colluding businesses at risk of detection. Once the agreement has been made amongst the parties, they can automate their decision process by designing a parallel algorithm that they

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<sup>39</sup>

<sup>40</sup> OECD p. 27

<sup>41</sup> *Idem*

would all use and which will enable the parties to react simultaneously as agreed to the market changes<sup>42</sup>. In effect, the algorithm would allow the companies to replicate conscious parallelism while actually implementing a pricing strategy agreed upon. These types of dynamic pricing algorithms have already been in use in many industries such as the airline or hotel industries.<sup>43</sup>

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<sup>42</sup> *ibid* p. 27

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## **B. ARTICLE 101(1) TFEU : AGREEMENTS**

The chapter covers the scope of agreement within the meaning of article 101(1) TFEU. The first section provides a quick overview of cartels as they are considered to be the classic example of anticompetitive agreements. The second section then covers the notion of agreement as understood through a review of the *Bayers AG* case and its definition of agreements since such definition is not provided by article 101(1) TFEU. The third section then analyses the applicability of the definition to both collusion through algorithms and algorithmic collusion.

### **1) Cartels**

Cartels are the classic example of anti-competitive agreements that are prohibited under article 101 TFEU<sup>44</sup>. They are agreements and/or concerted practices between two or more competitors in a market that aim to coordinate their competitive behavior with practices such as price fixing, sales quotas, or market allocations.<sup>45</sup> We focus on cartels which cooperate with their competitive behavior through algorithmic price fixing.

In many Member States, cartels were actually an accepted business practice. However, the EEC Treaty of Rome forced those countries to change their business culture with regards to that practice as it now prohibited cartels throughout the European Union. The DG COMP is responsible for enforcing cartel prohibition, and it is actually considered to be one of its top priorities.<sup>46</sup> Cartel fines are often quite severe. For example, the Commission imposed fines totaling almost 1 billion euros to members of a cartel in the elevator market.<sup>47</sup>

Cartels are considered to be agreements that restrict competition by object. The very nature of a cartel is such that the likelihood that they have negative effects on the market where it occurs is so high that it would be redundant to have to provide actual evidence of those

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<sup>44</sup> Ong, p. 193

<sup>45</sup> Commission Notice on immunity from fines and reduction of fines in cartel cases [2006] *O.J C* 298/11, para 1

<sup>46</sup> GERARD Damien and FOX Eleanor M., *EU Competition Law : Cases, texts and context*, Edward Elgar Publishing, 2017, p. 33

<sup>47</sup> *ibid*, p. 34

specific negative effects for each cartel implemented.<sup>48</sup> Cartels are by nature secretive, sometimes carried out through trade associations and implemented through mechanisms which leave clues for the competition authorities to discover the existence of such a cartel. As we have seen, the use of pricing algorithms make it much harder for competition authorities to detect such clues compared to more traditional mechanisms of cartel implementation.

However, the majority of cartels have not been discovered through detection of their implementation but rather due to the leniency programs that the competition authorities have put in place. The European Commission grants total immunity to cartel members that first provide sufficient information to launch an inspection against a cartel that has not been yet detected, and the following members that come forward with additional information which can help establish the existence of the cartel are granted reductions for their fines.<sup>49</sup>

## **2) Notion of agreement**

Although cartels are the classic example of anti-competitive agreements, they are not the only type of agreements that are prohibited under article 101 TFEU. However, the article does not provide a definition for what constitutes the notion. The notion of agreement has therefore been developed by case law.

### **2.1) Bayer AG case**

#### **2.1.1) Facts of the case**

Bayer AG was the parent company of manufacturer Adalat, one of the largest pharmaceutical groups in Europe. The price of medication is fixed by national health authorities, and medication prices in France and Spain were forty percent lower than in the United Kingdom. Wholesalers were buying medication manufactured by Adalat in France and Spain and were importing to the UK to take advantage of the lower prices. Bayer AG therefore restricted the size of orders in order to reduce the importation practice which it suffered from. The European Commission found that the subsidiaries Bayer France and Bayer Spain had made

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<sup>48</sup> Case C-67/13 P, *Groupeement des cartes bancaires (CB) v. Commission*, EU:C:2014:2204, para 51

<sup>49</sup> Gerard, p. 35

an agreement to implement this trade restriction, which was an infringement of article 101 TFEU. However, Bayer AG denied that the trade restriction resulted from an agreement.<sup>50</sup>

### 2.1.2) Question asked to the Court

The Court was asked whether the trade restriction resulted from what should be considered agreement within the meaning of article 101 TFEU.

### 2.1.3) Court's decision

The European Court of Justice annulled the Commission's decision and ruled that the trade restriction resulted from a mere unilateral decision by Bayer AG. The Court focused its legal reasoning on the notion of an agreement within the meaning of article 101 TFEU, and the conditions that need to be met in order to establish the existence of an agreement. A unilateral policy of one undertaking which can be put into effect without the need of any assistance from other undertakings cannot be considered as an agreement. Indeed, the notion of argument centres around the existence of a concurrence of wills or meeting of minds, the form of which is irrelevant as long as it effectively conveys the parties' intentions. The undertaking's manifestation of the wish to achieve an anti-competitive goal necessarily must constitute an invitation to the other party to achieve said goal jointly, whether that is express or implied.<sup>51</sup>

## **3) Notion of agreement and algorithms**

### 3.1) Collusion through algorithms

Legal scholars agree that if a pricing algorithm is ancillary to an autonomous illicit agreement within the meaning of article 101 TFEU, then their application is not problematic and does not alter the illegality of the agreement.<sup>52</sup> In such a scenario, the parties enter into an agreement through traditional means, they then use algorithms such as monitoring and signalling algorithms in order to implement the collusion.<sup>53</sup> The algorithms are therefore mere extensions of the traditional anti-competitive agreement, and are no different than traditional

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<sup>50</sup> Cases C-2/01 and C-3/01 *Bundesverband der Arzneimittel-Importeure eV and Commission of the European Communities v Bayer AG*, EU:C:2004:2

<sup>51</sup> *Bayer AG*, para 97-102

<sup>52</sup> Parziale, p. 108; Colombo p. 12

<sup>53</sup> Ong, p. 197

tools. This scenario has been named the ‘Messenger scenario’ by Ezrachi and Stucke. The name was chosen because they considered that the algorithms acted as messengers between the parties of the agreement. They enabled parties to send each other ‘messages’ through the algorithms’ conduct regarding planned price increases, supply reductions, or special offers.<sup>54</sup>

An example that illustrates such a scenario is the *Trod Ltd* case in a national court of the United Kingdom. In this case, a small toy retailer from Birmingham and one of its competitors was found guilty of price fixing posters and frames on Amazon UK.<sup>55</sup> The competitors had entered into an agreement that aimed to fix their prices at supra-competitive levels in order to jointly maximize their profits. However *Trod Ltd*’s counterpart came forward to UK’s national competition authority (CMA) in order to apply for its leniency program.<sup>56</sup> As a reminder, as was developed earlier, a leniency program allows a cartel member to receive full immunity if they come forward and provide the evidence necessary to establish the existence of the cartel they are a part of. The important aspect of the case is of course that the parties implemented their humanly agreed cartel through a pricing algorithm. This did not cause any difficulty for the UK national authority to establish an infringement of article 101(1) TFEU by the parties, and *Trod Ltd* was fined for its participation in a price-fixing cartel.

There is, to some extent, some ambiguity when the ‘meeting of mind’ has not been established through a traditional form of communication, but instead completely through algorithms. As has been developed earlier, the use of signalling algorithms and monitoring algorithms can lead to situations of collusion that would not have been possible in different circumstances, due to the rapidity of the algorithms in monitoring each other and reacting to each other’s conduct. However, when the algorithmic collusion in question was intended by the parties, we are still in a situation which can be defined as collusion through algorithms. Indeed, if it is the intention of the parties to collude and the algorithms are designed and implemented to this end, then once again they just simply become means of collusion and an

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<sup>54</sup> EZRACHI Ariel and STUCKE Maurice, ‘*Artificial Intelligence & Collusion: When Computers Inhibit Competition*’ (2015), University of Illinois Law Review, p. 25

<sup>55</sup> GAUTIER Axel and ITOO Ashwin and VAN CLEYNENBREUGEL Pieter, ‘*AI Algorithms, price discrimination and collusion : a technological, economic, and legal perspective*’ (2020), European Journal of Law and Economics

<sup>56</sup> Bernhardt and Dewenter and Dewenter, p. 327

agreement is established despite the lack of prior contacts through traditional means between the competitors.

### 3.2) Algorithmic collusion

However, issues further arise when trying to apply the concept of agreement to autonomous self-learning algorithms. As we saw, the case law, the concept of agreement in competition law is developed through a human prism<sup>57</sup>, as the Court requires a ‘meeting of minds’ or ‘concurrence of wills’. Can a ‘meeting of algorithms’ fit the requirement developed by case law? The Court will most likely have to clarify at some point its use of human-centered words such as ‘mind’ or ‘will’. The questions regarding whether a deep learning algorithm can be considered to possess a will or mind are philosophical questions that seem to fall outside the scope of competition law, but with a notion of agreement centered around words like ‘mind’, competition authorities might have to find answers to some fundamental question regarding artificial intelligence. Furthermore, the notion of agreement requires a form of contact between competitors in order to be established. Qualifying the interactions between algorithms as contacts in the same manner as contacts between humans seems to be stretching the definition. The algorithms are not contacting each other, they are not communicating, they are simply reacting to each other’s price modifications in order to optimize profits.

In conclusion, collusion through algorithms is relatively easily established to fall under the scope of article 101 TFEU, whether the algorithms are used to implement a pre-existing agreement or as a new form of communication to establish such agreement. However, algorithmic collusion between autonomous pricing softwares seems to fall outside the scope of the notion of ‘agreement’ due to the case law requiring a ‘meeting of minds’. The notion of concerted practice, which is another infringement of competition law under article 101 TFEU, could apply instead to algorithmic collusion.

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<sup>57</sup> Ezrachi and Stucke, p. 31



## **C. ARTICLE 101(1) TFEU : CONCERTED PRACTICE**

In this chapter, the paper covers the scope of concerted practice within the meaning of article 101(1) TFEU. The first section provides an extensive presentation of case law which is necessary as the notion of concerted practice has been developed through case law. It will cover the *Sugar Cartel* cases which is an important case law covering the definition of the term ‘concert’. We will then cover the *Dyestuffs* case, where the Court provides a legal reasoning for the differentiation of concerted practice and conscious parallelism. The *Wood Pulp* case is then covered as the Court provided a further definition of ‘concerted practice’ and strengthened the threshold of evidence necessary to establish that undertakings’ conduct is not conscious parallelism. The second section covers the application of the notion of ‘concerted practice’ to algorithmic collusion in light of the case law covered earlier. The *Eturas* case is then reviewed to illustrate the possibility of establishing an infringement of competition law in a Hub-and-spoke scenario.

### **1) Notion of concerted practice**

In this section we will analyse European case law in order to gain a better understanding of the notion of concerted practice and the conditions that need to be met in order to establish its existence.

#### **1.1) *Sugar Cartel* cases**

In these cases, the Court offers a definition for the word ‘concert’ in order to clarify the notion of ‘concerted practice’ which article 101 TFEU prohibits.<sup>58</sup>

##### **1.1.1) Facts of the case**

Multiple sugar producers from three different European countries were found to be allegedly coordinating their competitive behavior in order to moderate the impact of overproduction of sugar in Belgium. The sugar industry was very regulated by European countries through national quotas and intervention purchase prices.<sup>59</sup> The sugar producers argued that it was

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<sup>58</sup> Cases 40-48, 50, 54-56, 111, 113-114/73, *Suiker Unie v. Commission* [1975] ECR 1663, EU:C:1975:174

<sup>59</sup> DE BRANDT Pierre and PROBST Julie, ‘Proving concentration in the text of online platforms: a comment on the *Eturas* case’, (2017), European Competition and Regulatory Law Review, vol. 1 p. 75

consequently impossible for them to coordinate any type of anticompetitive behavior when their industry was so heavily regulated.<sup>60</sup>

According to the producers, the concept of ‘concerted practices’ presupposes a plan that the competitors developed and agreed upon, and which had the aim of removing any doubt of future conducts from the other parties. Additionally, they argued that having reciprocal knowledge of the parallel or complementary nature of their respective decisions should not be sufficient to establish concerted practice.<sup>61</sup> Indeed, if that was the case then any attempt to independently and intelligently adapt to competitors’ behavior would be regarded as concerted practice and therefore prohibited by article 101 TFEU.

#### 1.1.2) Question asked to the Court

The court was asked whether the conduct of the sugar producers amounted to a concerted practice within the meaning of article 101(1) TFEU.

#### 1.1.3) Court’s decision

In its decision, the Court acknowledged that it is indeed legal for companies to intelligently adapt their business decisions with regard to the conduct of their competitors, and that it does not constitute concerted practice as understood under article 101 TFEU. However, the Court denies the producers’ claim that concerted practice requires the working of an actual plan. The article strictly prohibits any direct or indirect contact between competitors, when the object or effect of these contacts is to either influence the competitor’s behavior or share with the competitor one’s own future conduct in order for them to adapt to it.<sup>62</sup> The notion of ‘concert’ is therefore established by such contacts, and it does not require the working of a plan by competitors or an agreement to be concluded.

#### 1.2) Dyestuffs case

This case is extremely important as it is one of the first where the Court provides a legal reasoning which differentiates parallel behavior with concerted practice<sup>63</sup>. Although the Court

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<sup>60</sup> Gerard p. 47

<sup>61</sup> Cases 40-48, 50, 54-56, 111, 113-114/73, *Suiker Unie v. Commission* [1975] ECR 1663, EU:C:1975:174, para 170

<sup>62</sup> *ibid*, para 174

<sup>63</sup> Case 48/69 *Imperial Chemical Industries Ltd. v. Commission* EU:C:1972:70

later became more demanding regarding the standard of proof of agreement, the Court's argument that parallel behavior can constitute strong evidence of concerted practice remains relevant and needs to be studied in the context of algorithmic collusion.

#### 1.2.1) Facts of the case

The case arose when nine European manufacturers of dyestuffs in five different European countries all increased their price almost simultaneously and uniformly in 1964, 1965, and 1967. It was a situation that is described as 'price leadership'. One firm would announce its intention to increase prices by a specific percentage at a later date, and the competitors would do the same soon after this announcement.<sup>64</sup> The Commission took the view that these price increases were the result of concerted practices between the manufacturers, which have as object or effect to negatively impact competition within the market, and which therefore are contrary to article 85 of the Treaty of Rome (now article 101 TFEU).<sup>65</sup>

The manufacturers however argued that they were merely engaging in oligopoly behavior. This meant that they were all acting independently and simply responding to their competitors' price changes as simple market fluctuations which they needed to adapt their prices to.<sup>66</sup>

#### 1.2.2) Questions asked to the Court

The relevant questions that were asked to the Court were the following : What is meant by the notion of concerted practices? What is the standard of proof required to establish the existence of such practices?

#### 1.2.3) Court's decision

In its decision, the Court affirmed that producers were free to change their prices, and that parallel behavior with regard to prices was legal and should not be identified as a concerted practice. However, the Court stated that parallel behavior can be strong evidence of concerted practice if such behavior led to market conditions that do not correspond to what would be

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<sup>64</sup> MANN F.A, *'The Dyestuffs case in the Court of Justice of the European Communities'* (1973), The International and Comparative Law Quarterly, vol. 22, p. 38

<sup>65</sup> *Journal Officiel des Communautés Européennes*, August 7 1969 L 195/11.

<sup>66</sup> Gerard p. 45

considered normal market conditions considering its characteristics such as the nature of the products or the size and number of competitors.<sup>67</sup>

With respect to the present case, the Court affirmed that it considered that it was hardly conceivable that the competitors could spontaneously increase their prices at the same time, on the same national markets, and for the same range of products.<sup>68</sup> The Court thus concluded that the parallel behavior was evidence of cooperation constituting a concerted practice which was prohibited by article 85 of the Treaty of Rome (now article 101 TFEU).

### 1.3) Wood Pulp case

This is an important decision as the Court set a threshold which needs to be met in order to establish concerted practice without providing evidence of prior contacts between the competitors..<sup>69</sup>

#### 1.3.1) Facts of the case

In this case, the Commission brought proceedings against 40 wood pulp producers and their trade associations for allegedly concerting on prices. The companies would all make quarterly price announcements, at times that would often coincide, to the point that these announcements were sometimes simultaneous. The price modifications would often be uniform, and they were all made in dollars in order to increase transparency. The Commission deemed that this amounted to a concerted practice as prohibited under article 101 TFEU.<sup>70</sup>

#### 1.3.2) Questions asked to the court

There were two questions that were asked to the court. The first was whether there was sufficient evidence to establish that the competitors engage in a concerted practice. The second was if the Commission lacked jurisdiction by reason of extraterritoriality.<sup>71</sup> We will focus on the Court's answer to the first question, as the question regarding jurisdiction falls outside the scope of this paper.

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<sup>67</sup> Mann, p. 41

<sup>68</sup> Gerard, p. 346

<sup>69</sup> Cases C-89, 104, 114, 116-117, 125-129/85 *Ahlström Osakeyhtiö v. Commission* EU:C:1993:120

<sup>70</sup> LANGE Dieter and SANDAGE Byron, 'The Wood Pulp decision and its implications for the scope of EC competition law' (1989), Common Market Law Review vol. 26 pp. 139-140

<sup>71</sup> Gerard, p. 49

### 1.3.3) Court's decision

The Court gave reason to the producers and annulled the Commission's decision. It based its reasoning on the *Sugar Cartel* case that we reviewed earlier, by referring to the definition of concerted practice that it developed in the judgment. As said earlier, article 101 prohibits any direct or indirect contact between competitors, when the object or effect of these contacts is to either influence the competitor's behavior or share with the competitor one's own future conduct in order for them to adapt to it. In the case of the wood pulp producers, the communications in question were the quarterly price announcements.

The Commission's first hypothesis was that such a system constituted an infringement of article 101. The Court annulled this decision, on the grounds that such quarterly announcements do not lessen each undertaking's uncertainty as to its competitors' future conduct. At the time of each producer's price announcements, they do not have any certainty that ensures what their competitors' behavior will be. The Court therefore concluded that the system of price announcements did not constitute a concerted practice that was prohibited under article 101 TFEU.<sup>72</sup>

The second hypothesis from the Commission relied on the parallel conduct of the wood pulp producers through their quarterly price announcements, which the Commission regarded as evidence of concerted practice at an earlier stage. The Court provided further legal reasoning on how to distinguish mere parallel behavior and concerted practice. According to the Court, parallel conduct could only be regarded as evidence of concerted practice if concertation is the only plausible explanation for the competitors' parallel conduct, an assessment which is made *in concreto*.<sup>73</sup> The Court also reasserted that article 101 does not deprive companies from intelligently and independently adapting their own conduct based on their competitors' conduct.

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<sup>72</sup> Cases C-89, 104, 114, 116-117, 125-129/85 *Ahlström Osakeyhtiö v. Commission* EU:C:1993:120, para 63-65

<sup>73</sup> *ibid*, para 71

## **2) Algorithmic collusion as a concerted practice**

### **2.1) Applying existing case law to algorithmic collusion**

As we saw, the notion of concerted practice is applied when the anticompetitive behavior is the result of contacts that fall short of constituting an agreement. This should not really be an issue to apply when applying the notion of concerted practice to collusion through algorithms, as this notion also requires prior human contacts to the anticompetitive conduct, whether these contacts themselves are through algorithms or not.

In the *Sugar Cartel* case, the Court emphasises that it is the contacts between competitors which is prohibited, when the object or effect of these contacts is to either influence the competitor's behavior or share with the competitor one's own future conduct in order for them to adapt to it. This raises issues in the possibility of applying the notion of concerted practice to autonomous pricing algorithms. There is uncertainty regarding the notion of contacts, and whether it can apply to self-learning algorithms. We developed the nature of that ambiguity while discussing the application of the notion of agreement to algorithmic collusion.

However, as we saw in the *Dyestuffs* and *Wood Pulp* case, there is a possibility for competition authorities to establish that there is 'concerted practice' without the need to provide evidence of contacts between the competitors, if concertation is the only possible explanation for the parallel conduct between competitors, based on the market conditions. This opens the door for competition authorities to apply the concept of concerted practice to algorithmic collusion. However, as algorithms are highly disruptive to what are considered to be traditional market conditions, which means that competition authorities might face issues when attempting to apply this threshold which was developed with traditional market conditions in mind at the time.

### **2.2) The Hub-and-spoke scenario**

As we saw in the review of case law, concerted behavior needs to be distinguished from parallel behavior, which does not infringe on competition law. A question that arises is whether the parallel use of the same pricing algorithm by competitors is parallel behavior or concerted practice. This scenario is qualified as the Hub-and-spoke scenario by Ezrachi and Stucke. Pricing algorithms are indeed complex to develop and companies often purchase their

algorithms from software providers. If multiple competitors from the same relevant market all use the same central algorithm that they all bought from the same software provider, this could potentially lead to horizontal concertation from the algorithm.<sup>74</sup>

Some legal scholars have argued that in order to establish a concerted practice in the case of the Hub-and-spoke scenario, competition authorities have to provide evidence that the competitors willingly entered the collusion or that the potential anticompetitive effects are known to them.<sup>75</sup> This would mean that the authorities would be faced with a considerable challenge as it is complex to export to digital markets subjective concepts such as intent. Therefore, some scholars have proposed to rely on consumer harm in order to establish concerted practice instead of intent, as consumer harm is an objective notion that can be established through a methodological assessment.<sup>76</sup>

### 2.2.1) Eturas case

This case is of utmost importance as it is the first one in which the CJEU examined the implementation of pricing algorithms in the context of competition law.<sup>77</sup>

#### 2.2.1.1) Facts of the case

The Lithuanian Competition Authority fined 30 travel agencies and the online booking system Eturas in 2012 for the infringement of article 101 TFEU. The travel agencies all used this same online booking system owned by Eturas, and Eturas used the system's personal emails to inform the travel agencies that the discounts applicable to clients would be limited to a uniform maximum rate. This was with the intention of normalizing the competition conditions of the market.<sup>78</sup>

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<sup>74</sup> Pereira, p. 5

<sup>75</sup> Posic, p. 1025

<sup>76</sup> THOMAS Stefan, 'Harmful Signals : Cartel Prohibition and Oligopoly Theory in the Age of Machine Learning' (2019), Journal of Competition Law & Economics, vol. 15, p. 22

<sup>77</sup> COLOMBO Niccolo, 'Virtual Competition : Human Liability Vis-à-Vis Artificial Intelligence's Anticompetitive Behaviours' (2018), European Competition and Regulatory Law Review no. 1, p. 13

<sup>78</sup> Case C-74/14 Eturas, EU:C:2015:493

### 2.2.1.2) Questions asked to the Court

The Lithuanian Court asked the CJEU to clarify whether the mere sending of a message concerning the harmonisation of discounts through restrictions could constitute sufficient evidence to establish a presumption that the travel agencies knew or should have known about the restriction. Furthermore, the Court asked if the fact that the travel agencies failed to oppose the restrictions entailed that they expressed their tacit approval of the discount, therefore resulting in an infringement of the article 101(1) TFEU.<sup>79</sup>

### 2.2.1.3) Court's decision

The Court once again reaffirms the fact that undertakings need to independently develop their own conduct on the market, without engaging in either direct or indirect contacts with their competitors. The contacts can be anticompetitive by effect or object, and passive participation characterized by a lack of clear opposition entails an undertaking's tacit approval of the anticompetitive collusion. Furthermore, according to established case law, the coordination of the concerted practice needs to be followed by a market conduct and a causal link between the two in order to establish a concerted practice that infringes article 101 TFEU.<sup>80</sup> However, there exists a presumption of causation when the undertakings maintain their conduct on the market after the information was exchanged.<sup>81</sup> The Court also asserts that domestic rules apply to the assessment of evidence that the undertakings were aware of the messages they received. If that is established, there is a presumption that the undertakings tacitly approved the anticompetitive practice and infringed article 101 TFEU. Undertakings have the possibility to rebut the presumption through actions such as publicly distancing itself from the anticompetitive practice.<sup>82</sup>

The *Eturas* case can be a great source of case law as the relation between the travel agencies and the Eturas can effectively be described as a Hub-and-spoke scenario. Indeed, in the decision the CJEU determined that a concertation was established between the travel agencies through the booking system and without any contact between them. That is especially important as it means that competition authorities will be able to establish concerted practice

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<sup>79</sup> RUSU Catalin S., '*Eturas: of concerted practices, tacit approval, and the presumption of innocence*' (2016), *Journal of European Competition Law & Practice*, vol. 7, p. 396

<sup>80</sup> Case C-74/14 *Eturas*, EU:C:2015:493

<sup>81</sup> Case C-8/08 *T-Mobile Netherlands and others v. Commission*, EU:C:2009:343

<sup>82</sup> Case C-74/14 *Eturas*, EU:C:2015:493; Rusu p. 397



without having to provide evidence of direct contact between the different undertakings using the same pricing algorithm. However, some legal scholars argue that it is not enough, and that the *Eturas* case highlights the Court's argument that technology by itself cannot infringe competition. Indeed, a certain degree of communication and consent has to be established, even if the consent in question can be tacit and established through a presumption.<sup>83</sup>

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<sup>83</sup> Poscic, p. 1027

## **D. ARTICLE 101(1) TFEU : HORIZONTAL RESTRAINTS**

We have first reviewed the case law for hardcore cartels, as they are the classic example of anti-competitive agreements which are prohibited by article 101 TFEU. But many other kinds of prohibited collusion are prohibited between competitors, some that are even designed for legitimate purposes. In order to fall within the scope of article 101 TFEU, an agreement must either have the object of distorting or restricting competition or the effect of affecting market conditions such as prices or output. The first section of this chapter covers the notion of ‘by object’ restrictions and reviews the settled case law which develops the characteristics of said notion. The second section provides an overview of ‘by effect’ restrictions. And the last section confronts how the case law regarding ‘by object’ restriction might prevent its application to algorithmic collusion.

### **1) ‘By object’ restrictions**

Cartels are an example of ‘by object’ restrictions as they aim to ham competition. However, cartels are not the only type of agreements which are automatically caught under article 101 TFEU as ‘by object’ restrictions. What exactly those agreements are is a question that has come up time and time again in CJEU case law.

#### **1.1) *T-Mobile Netherlands* case**

##### **1.1.1) Facts of the case**

The five Dutch mobile network operators held one isolated meeting where they discussed in particular the reduction of standard remuneration for a specific kind of subscription, and exchanged confidential information although it was unclear what exactly was its content. The companies were fined by the Dutch national competition authority.<sup>84</sup>

##### **1.1.2) Question asked to the Court**

The court was asked whether the agreement between the operators amounted in an horizontal constraint of competition and an infringement of article 101(1) TFEU.

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<sup>84</sup> MEYRING Bernd, ‘*T-Mobile : Further confusion on information exchanges between competitors*’ (2010), Journal of European Competition Law & Practice pp. 30

### 1.1.3) Court's decision

The Court re-asserted the distinction between restrictions ‘by object’ and restrictions ‘by effect’, and the fact that once it has been established that the object to restrict competition is established there is no need to assess its effects. It also stated that in order to be regarded as having an anti-competitive object, it is sufficient that the concerted practice has the potential to have a negative impact on competition with regard to the specific legal and economic context of the relevant market.<sup>85</sup>

Regarding the fact that the parties only had one meeting where they exchanged confidential information, the court asserts that an exchange of information that is capable of removing uncertainties between competitors as to each other's future conduct and which details the modifications to be adopted by the competitor concerned, must be regarded as a concerted practice which is anti-competitive by object.<sup>86</sup>

### 1.2) *Cartes Bancaires* case

The *T-Mobile Netherlands* judgment led to further confusion regarding the definition of ‘by object’ restrictions and competition law analysis of information exchanges. The link between ‘by object’ restriction and the mere potential to have a negative impact on competition seemed overreaching by many<sup>87</sup>. This was somewhat alleviated in the CJEU's decision in the *Cartes Bancaires* case.

#### 1.2.1) Facts of the case

The Cartes Bancaires Group (‘CB’) is an association of French banks, its purpose is to manage the system of card payments and withdrawals of the banks and allow the clients of one bank to use their card at ATMs belonging to any other bank that is a member of the association.<sup>88</sup>

Banks issue cards to consumers and provide acquiring rights to merchants which enables them to accept cards. Issuing cards to consumers is the activity that is a lot more profitable

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<sup>85</sup> Case C-8/08 *T-Mobile Netherlands and others v. Commission*, EU:C:2009:343, para 31

<sup>86</sup> *ibid*, para 41

<sup>87</sup> Meyring, p.32

<sup>88</sup> Case C-67/13 *Groupeement des Cartes Bancaires (CB) v. Commission* EU:C:1014:2204

for banks, and CB thought that banks would concentrate too much on issuing cards while neglecting acquiring services in order to chase short-term profits, effectively free riding. CB therefore required members to pay fees and submit to rules that in effect equalized the revenues from both activities.<sup>89</sup> The Commission affirmed that the intent of the practice was to keep prices artificially high and deter entry, and therefore constituted a restriction by object prohibited by article 101 TFEU.

#### 1.2.2) Question asked to the court

The Court was asked whether the Cartes Bancaires Group's conduct amounted to a restriction by object.

#### 1.2.3) Court's decision

The Court annulled the Commission's decision. The Court stated that according to its case law, the types of coordination which can be considered to be restrictions by object are restrictions which experience shows that the agreements are so likely to have a sufficient degree of harm on competition that it would be redundant to prove that they have the actual effects.<sup>90</sup> The assessment of a 'sufficient degree of harm' is done *in concreto* with regards to the agreements' content, objectives, and the legal and economic context of the market.<sup>91</sup>

### **2) 'By effect' restrictions**

When an agreement is not established to be a restriction by object, its anti-competitive effects must be considered in order to assess whether it is a restriction by effect which falls under the scope of article 101 TFEU.

The European Commission provided an explanation of the notion of anti-competitive effects in its 2011 Horizontal Guidelines. According to the document, the determinative factor is whether or not the agreement enables its parties to maintain or increase its market power and the thereof likelihood of negative market effects with respect to market conditions such as prices, output, product quality, etc...<sup>92</sup>

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<sup>89</sup> Gerard p. 73

<sup>90</sup> Case C-67/13 *Groupement des Cartes Bancaires (CB) v. Commission* EU:C:1014:2204, para 51

<sup>91</sup> *ibid*, para 53

<sup>92</sup> 2011 Horizontal Guidelines, para 3

The first step of the assessment is therefore to determine the parties' market power. The notion of market power is defined as an undertaking's ability to profitably maintain prices above what would normally be competitive levels, for a period of time, due to a lack of sufficient competitive constraints.<sup>93</sup> Although a certain degree of market power needs to be established, the threshold is not as high as for the market power that is required to fall under the scope of article 102 TFEU. Although the notion of 'market' and how to define a relevant market is necessary for application of article 101 TFEU, it will not be covered in this paper.

Restrictions by effect need to be 'appreciable' in order to fall under the scope of article 101 TFEU. The Commission's Notice on agreements of minor importance that do not appreciably restrict competition under article 101 TFEU develops how to assess whether a restraint is insignificant enough to fall under the article 101 TFEU.

### **3) Algorithmic collusion as horizontal restraints**

What type of horizontal restraint can algorithmic collusion be considered? According to legal scholars, it can be considered to most likely fall under the notion of 'by object' restriction.<sup>94</sup> When faced with algorithmic pricing, competition authorities will first have to prove that experience shows that the pricing algorithms are so likely to have a sufficient degree of harm on competition that it would be redundant to prove that they have the actual effects. This would most likely prove difficult for the authorities as pricing algorithms remain a very recent technology. What a court considers to qualify as 'experience' will be of interest as to see whether the evidence of harm caused by algorithmic collusion can meet that threshold. Technology is evolving at a very fast pace, and businesses are constantly looking for a way to gain further competitive advantage by implementing the newest and more powerful technological tools. In this context, competition law should be able to adapt as quickly, and a threshold of 'experience' that is too stringent would prevent competition authorities from effectively protecting consumers from anticompetitive conduct implemented through the latest technology.

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<sup>93</sup> Gerard, p. 78

<sup>94</sup> Colombo, p. 18

## **E. ARTICLE 101(1) TFEU : ASSOCIATION OF UNDERTAKINGS**

Due to the difficulties that exist when applying article 101 TFEU and its ‘agreement’ or ‘concerted practice’ notions to algorithmic collusion, some legal scholars have offered legal alternatives. One of these alternatives is to catch autonomously colluding platforms under the scope of ‘associations of undertakings’ under article 101 TFEU. Although this possibility only applies to a limited scope of algorithmic collusion, it remains interesting to analyse how algorithmic collusion could fall under the notion. The first section of the chapter analyses the notion of ‘association of undertakings’ by reviewing the *MasterCard* case where the Court developed a definition of the notion. The second section analyses how platforms could be considered an association of undertakings in light of the *MasterCard* case and its criterias of composition and mandate. Finally, the third and last section analyses whether algorithms can constitute decisions of associations of undertakings which can constitute an infringement of competition law under article 101(1) TFEU.

### **1) The notion of associations of undertakings**

The notion of associations of undertakings has been defined through case law throughout the years. The notion has acted as an anti-circumvention measure which aimed to avoid the risk that companies would delegate their power to their trade association, or other bodies, so that they would engage in anticompetitive behavior in lieu of them. A trade associate is not considered as an undertaking under article 101 TFEU and its anticompetitive conduct implemented for its members would fall outside the scope of the article<sup>95</sup>

We already covered an application of that notion in the *Groupeement des Cartes Bancaires* case, where the Court stated that the notion of association of undertakings under article 101 TFEU encompasses any common structure or body that represents undertakings’ interest, regardless of the national legal qualification of the structure.<sup>96</sup>

#### **1.1) MasterCard case**

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<sup>95</sup> VAN CLEYNENBREUGEL Pieter, ‘Article 101 TFEU’s association of undertakings notion and its surprising potential to help distinguish acceptable from unacceptable algorithmic collusion’ (2020), The Antitrust Bulletin, vol. 65 p. 434

<sup>96</sup> Case C-67/13 *Groupeement des Cartes Bancaires (CB) v. Commission* EU:C:1014:2204, para 20

In its judgment of the MasterCard case, the Court uses the two criterias established by case law which allow competition authorities to assess whether or not a structure qualifies as an association of undertakings.

#### 1.1.1) Facts of the case

MasterCard provides a payment card scheme for financial institutions to be a part of. An aspect of MasterCard's business model is to charge an 'interchange fee' between those institutions when a transaction is completed within the Mastercard system. However, this system was deemed to be anticompetitive by the European Commission. The relevant aspect of the case was not the nature of the anticompetitive conduct, but the fact that MasterCard was a cooperative scheme between the participating financial institutions.<sup>97</sup>

#### 1.1.2) Questions asked to the Court

The Court was asked to determine whether MasterCard constituted an association of undertakings under article 101 TFEU.<sup>98</sup>

#### 1.1.3) Court's decision

##### Criteria of composition

The Court first applied the criteria of composition. In order to assess whether or not a structure is an association of undertakings, we need to look at the composition of its body and at its governance structures' capacity to take into account the interest of the undertakings. In the case of MasterCard, the financial institutions were no longer shareholders but remained as stakeholders during specific decision-making procedures and as participants of specific boards. Due to these different involvements of the financial institutions, the Court considered that the criteria of composition was fulfilled.<sup>99</sup> As we can see, the Court placed more importance on the governance structures than the composition of the body.

##### Criteria of mandate

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<sup>97</sup> Case T-111/08 *MasterCard v. Commission*, EU:T:2012:260

<sup>98</sup> VAN CLEYNENBREUGEL Pieter, p. 435

<sup>99</sup> Case T-111/08 *MasterCard v. Commission*, EU:T:2012:260, para 42

The Court then applied the criteria of mandate. It stated that because of the joint interest of the financial institutions in MasterCard's processes and decisions, there is established a sufficiently certain indication that MasterCard holds a mandate from the institutions to continue developing its system of interchange fees to their benefits.<sup>100</sup> The criteria holds that if undertakings hold this degree of joint interest in a structure's process and decision, a presumption of implicit mandate is established. Once that is established, the decisions taken by the structure are legally considered to be the decisions of an association of undertakings.

## **2) Platforms as associations of undertakings**

The possibility to adapt this notion is quite restricted. Theoretically, a platform that uses algorithms could be regarded as an association of undertakings due to its functioning as an intermediary between undertakings and their clients.<sup>101</sup> As we can see, the scope is rather limited and does not work for many scenarios of algorithmic collusion.

The legal reasoning behind this classification of platforms is the application of the criterias of the *MasterCard* case. With respect to the criteria of mandate, the undertakings that rely on the platform in order to sell their products online can be considered to have a joint interest in the processes and decisions of the platform. This is due to the fact that platforms use algorithms in order to tailor prices or search results for customers browsing the platform. The undertakings therefore rely on the platform, and have vested interests that the platform makes certain decisions that would generate favorable prices or search results. The undertakings could therefore be considered to have granted the platform a mandate, as understood from the Court's decision in the *MasterCard* case.<sup>102</sup>

Regarding the criteria of composition, as stated in the *MasterCard* case, the undertakings do not need to be shareholders or representatives in the structure in order for that structure to be considered an association of undertakings. What matters is that the governance features are such that the structure takes into account the interests of the undertakings.<sup>103</sup> With platforms, the governance features are the algorithms that are implemented in order to connect supply

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<sup>100</sup> *ibid*, para. 76; Van Cleynenbreugel, p. 435

<sup>101</sup> Van Cleynenbreugel p. 436

<sup>102</sup> *idem*

<sup>103</sup> Case T-111/08 *MasterCard v. Commission*, EU:T:2012:260



and demand through price fixing and search results ranking.<sup>104</sup> We could therefore conclude that both *MaterCard* criterias are met, and that platforms can indeed be considered to be associations of undertakings.

### **3) Algorithms as decisions of associations of undertakings**

We have now established that based on the *MaterCard* criterias of composition and mandate, platforms can be regarded as associations of undertakings under article 101 TFEU. However, that does not automatically entail that any decision adopted by a platform falls under the scope of the article 101 TFEU.

According to established case law, a decision is considered to be a decision adopted by an association of undertakings if it relates to any of the association's activity, and that is developed to produce the results which it aims to suppress.<sup>105</sup> This means that it encompasses decisions that the association makes so that its undertakings' market behavior is streamlined. This notion increases the reach of article 101 TFEU that is covered by the notion of agreements and concerted practices.

In the case of the use of self-learning algorithms by platforms, such decisions could therefore be considered to be a decision of an association of undertakings as the purpose of such decision is to balance supply and demand on the platform between the consumers and the undertakings.<sup>106</sup> When the platform makes the decision to use a specific algorithm, or decides to modify its functioning, that decision is made with the intent of modifying the market conditions and influencing market behavior.

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<sup>104</sup> PASCALE Frank, "The Black Box Society : The Secret Algorithms That Control Money and Information" (2015), p. 59

<sup>105</sup> Case C-71-74, *Frubo v. Commission*, EU:C:1975:61 para 30

<sup>106</sup> Van Cleynenbreugel p. 437

## **F. ARTICLE 101(1) : INTRA-PLATFORM ALGORITHMIC COLLUSION**

So far we have studied algorithmic collusion between clear competitors in a market, but the popularity of platforms such as Uber that also use price fixing algorithms raises the question of a possible application of algorithmic collusion as an intra-platform phenomenon. This is an important question to answer as economists have talked in recent years of the “Uberization” of the labour market where platforms attempt to avoid providing social rights to their service providers who they deem to be independent contractors. In this context, it is important to know whether the current competition law legal framework applies to this new collaborative economy instead of labour rights. If that is the case, then the price setting algorithms used by Uber could be considered to be anticompetitive<sup>107</sup>.

Although the case of intra-platform algorithms has not been tackled at the European level, it has been done at the national level. Indeed, in the 2018 *Webtaxi* case, the Luxembourg Competition Authority rendered a decision regarding a platform which used algorithmic pricing. This platform acted as an intermediary between taxi drivers and consumers, and used a pricing algorithm to set prices. The competition authority ruled that the use of the algorithm consisted in a price-fixing agreement which amounted to a horizontal cartel among competitors.<sup>108</sup>

In this chapter I will first provide an analysis of the notion of ‘undertaking’ in the context of the article 101 TFEU. The second section then considers the relationship between Uber and its drivers to assess whether they are employees or independent contractors who should be considered as ‘undertakings’ in the sense of article 101 TFEU. And finally I will compare the two possible types of concerted practice that could apply to Uber’s algorithmic pricing system, namely the Hub-and-spoke scenario or a series of vertical agreements.

### **1) The notion of undertakings**

In order for algorithmic collusion to apply in an intra-platform context, it requires the users of the platform to be considered ‘undertakings’. Indeed, the scope *rationae personae* of both

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<sup>107</sup> Bekisz, p.217

<sup>108</sup> Parziale p. 110

article 101 and 102 TFEU is limited to undertakings only. Settled case law of the Court of Justice defines undertakings as “every entity engaged in an economic activity, regardless of the legal status of the entity and the way in which it is financed”.<sup>109</sup>

The notion of ‘economic activity’ has been further defined by the Court as any activity that concerns the offering of goods and services.<sup>110</sup> Activities that fall within the exercise of public powers however are not considered to be economic activities -air traffic control for example<sup>111</sup>- and the entities operating them are not considered undertakings.

Although the term used to define an undertaking is ‘entity’, individual entrepreneurs have been regarded as undertakings in case law. For example, the CJEU has considered individual farms as undertakings in a case where it had to assess an anticompetitive agreement.<sup>112</sup> The notion of undertakings is therefore not limited to companies but can also apply to natural persons such as Uber drivers.

However, as was developed by the CJEU in its case law, there is a possibility to be exempted from being subject to article 101 TFEU even if one should be considered an entity. That is when individual entrepreneurs or entities are economically connected and unilaterally pursue the same economic goal, they should then be considered as one undertaking under competition law. The CJEU made such a conclusion in the *Viho* case for example, where both a company and its subsidiaries were considered to be one entity under competition law due to the subsidiaries’ lack of autonomy. Consequently, the agreements between the company and its subsidiaries were considered to be within the same undertaking and therefore the article 101 (1) TFEU did not apply to them.<sup>113</sup>

## **2) The case of Uber**

The analysis should therefore aim to decide whether Uber drivers should be considered individual entrepreneurs who fall under the scope of article 101 TFEU, or if the single

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<sup>109</sup> Case C-41/90 *Höfner*, EU:C:1991:161, para 21

<sup>110</sup> Case 118/85 *Commission v Italy*, EU:C:1987:283 para 7.

<sup>111</sup> Case C-364/92, *Eurocontrol*, EU:C:1994:7 para 30

<sup>112</sup> Case T-245/03, *Others v Commission*, EU:T:2006:391, para 53

<sup>113</sup> Case C-73/95 *Viho*, EU:C:1996:405

economic entity exception applies and in that case there is algorithmic collusion as the price setting by Uber falls outside the scope of the article 101 TFEU.

The European Commission conducted a research on Uber for its agenda on the collaborative economy. It showed that Uber drivers enjoyed a degree of autonomy as they are not obligated to drive according to a specific schedule, that there is no minimum number of hours that they have to drive, or that they can drive as a complementary activity from their work.<sup>114</sup> It is this very degree of autonomy that Uber has promoted to both attract drivers, and use as an argument in court in order to have their drivers be considered independent contractors rather than employees and therefore not have to abide by labour rights which employers have to respect.<sup>115</sup>

CJEU case law has shown that this notion of autonomy is the main criteria to assess whether the notion of undertaking applies. If one cannot independently determine its own conduct, depends on its principal, and does not bear any financial or commercial risks, then one cannot be considered to be an undertaking under article 101 TFEU.<sup>116</sup> As said earlier, Uber drivers enjoy a certain degree of autonomy as they decide when and where they work, and for how long. They also bear some financial burden as they use their private cars to provide the rides.

### **3) Algorithmic collusion in the context of Uber**

Based on the notion of ‘undertakings’ and the nature of Uber drivers’ work, this paper considers that Uber drivers should indeed be considered as undertakings and that the article 101 TFEU applies. This means that the pricing algorithm provided by Uber for all their drivers to set their fares for the rides should be under scrutiny by competition authorities as to assess its compliance with the article 101 TFEU.

#### **3.1) Hub-and-spoke scenario**

The pricing algorithm implemented by Uber can be considered to fit the Hub-and-spoke scenario that we developed earlier. Indeed, by providing the same pricing algorithm to all its drivers who are considered to be undertakings, Uber is acting as a cartel facilitator between

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<sup>114</sup> COM (2016) 356

<sup>115</sup> UK Employment Tribunal *Aslam, Farrar and Others v Uber*, case no 2202551/2015 [2016]

<sup>116</sup> Case C-413 *FNV Kunsten*, EU:C:2014:2411

the drivers who are not communicating between each other.<sup>117</sup> This behavior is anti-competitive because the Uber drivers should in theory be competing against each other as they are individual contractors rather than employees. But instead of engaging in price competition, they are using the same pricing algorithm provided by Uber. This amounts to a concerted practice under article 101 TFEU and qualifies as algorithmic collusion. Furthermore, as we saw earlier in the *AC-Treuhand* case, Uber would also be held liable for the anti-competitive behavior due to its role as a price-fixing cartel facilitator.

### 3.2) A series of vertical agreements

Additionally, instead of considering Uber's pricing algorithm system as a hub-and-spoke scenario, it could instead be analysed as a series of vertical agreements between Uber and each of its drivers.<sup>118</sup> In the *Eturas* case that we reviewed earlier, advocate general Szpunar provided a line of thinking which would help identify the situation as either a case of horizontal or vertical agreements.

As a reminder, the *Eturas* case concerned travel agencies which all used the same online booking company. The company was deemed to be a cartel facilitator as it informed the agencies that discounts applicable to clients were limited to a uniform maximum rate as to normalise the conditions of competition.<sup>119</sup> In the Court's decision, AG Szpunar affirmed that if a cartel facilitator implemented a pricing algorithm which was intended to work in its own interest and which the other parties were restricted from refusing to use, then such a situation should not be considered to be a horizontal collusion but rather a series of vertical agreements.<sup>120</sup>

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<sup>117</sup> Bekisz, p. 231

<sup>118</sup> Bekisz p. 232

<sup>119</sup> Rusu p. 396

<sup>120</sup> Case C-74/14 *Eturas*, EU:C:2015:493 para 73

## **G. ARTICLE 101 (3) TFEU : EXEMPTION PROCESS**

This chapter covers the exemption procedure that is found at article 101(3) TFEU. After reviewing the conditions that need to be met in order to be granted an exemption, it considers whether or not the process has become obsolete over the years, to finally analyze the pro-competitive effects of algorithms which might enable it to be exempted from being considered a competition law infringement under article 101(1) TFEU.

### **1) Conditions**

If an agreement or concerted practice falls under the article 101(1) TFEU, the undertaking has a possibility to invoke the exemption found at article 101(3). The following conditions must be met<sup>121</sup> :

- 1) The restriction on competition contributes to efficiency gains in the market. This means that the restriction improves the production or distribution of goods, or promotes technical or economic progress in the relevant market.
- 2) The restriction allows consumers a fair share of benefits.
- 3) A restriction indispensable to the attainment of the above objectives is not imposed in the relevant market
- 4) The restriction does not afford the undertakings the possibility to eliminate competition with regards to a substantial part of the goods concerned in the relevant market.

The Commission issued Guidelines in 2004 on the application of the article 101(3) TFEU. It clarified some points regarding the application of the article in order to assist national competition authorities and national courts, as it would be the first time they would apply the provision at the time.

The Guidelines reasserted the fact that the purpose of article 101 TFEU is to protect competition in the internal market of the European Union, in order to ensure an efficient

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<sup>121</sup> Article 101 (3) TFEU

allocation of resources and enhance consumer welfare.<sup>122</sup> For these reasons, a conduct that constituted a restriction under article 101 TFEU should be granted an exemption if it did not have any negative impacts on those aspects of the internal market. The Guidelines restated that the four conditions were cumulative and exhaustive, and that the burden of proof lies on the undertaking that is invoking the exemption.<sup>123</sup> The conduct's benefits should also be objectively valuable for the EU, rather than simply constituting a private advantage for the parties. And the benefits in question should also outweigh the negative effects that the conduct causes.<sup>124</sup>

## **2) An obsolete process?**

Although it is important to review the existence and functioning of the exemption process that article 101(3) offers, the process has actually experienced what some legal scholars call a slow death. Firstly, the notion of 'by object' restriction has been expanding over the years to behavior that is not *prima facie* anticompetitive.<sup>125</sup> Secondly, the preclusion of national competition authorities from adopting negative decisions has made the exemption process unpopular. And thirdly, different standards for review of the efficiency argument have been adopted throughout the European Union.<sup>126</sup> Furthermore, in practice, competition authorities use the substantive assessment and balancing exercise of article 101(3) TFEU while evaluating whether or not a conduct is anticompetitive, therefore during the process of article 101(1) TFEU. It could therefore be affirmed that the exemption process has been made redundant.

## **3) Algorithmic pricing pro-competitive effects**

Regardless, it is still a useful exercise to review the pro-competitive effects of pricing algorithms which might make them eligible for the exemption process, or even deemed by competition authorities to fall outside the scope of article 101 TFEU altogether.<sup>127</sup>

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<sup>122</sup> 2004 Guidelines, para 13

<sup>123</sup> *ibid*, para 42

<sup>124</sup> Colombo p. 19

<sup>125</sup> Case C-8/08 *T-Mobile Netherlands and others v. Commission*, EU:C:2009:343

<sup>126</sup> Colombo, p. 18

<sup>127</sup> *ibid*, p. 19; Parziale p. 101; Ong p. 191

As said earlier, pricing algorithms are simply the latest implementation of dynamic pricing. The reality is that firms have always monitored their competitors' price fluctuations and modified their own in return. However, algorithms are able to monitor and react to competitors' price changes at a much lower marginal cost than other tools. They allow both consumers and suppliers to make fast decisions, and implement constant price modifications in order to always be optimised to the latest market fluctuations with regard to variables such as stock or anticipated demand. Those effects of pricing algorithms are considered to improve market efficiency.<sup>128</sup>

Furthermore, firms can use algorithms to further enhance their competition with their competitors. For example they can decide to implement an algorithm that reprices their products in reaction to other online sellers in order to beat their live prices and attract customers. This is not only pro-competitive, it in turn improves market efficiency by reducing issues related to excess demand or supply.<sup>129</sup>

An example of national case law is the *Webtaxi* case from the Luxembourg Competition Authority that we reviewed earlier. The pricing algorithms that the platform used when connecting taxi drivers and users was ruled as constituting a horizontal cartel among competitors. However, the national competition authority ruled that the efficiency gains derived from the implementation of the algorithms benefited consumers, namely by reducing empty runs and waiting time. Due to the fact that these benefits were enjoyed by the consumers, and that they could not have been obtained without the implementation of the pricing algorithm, the competition authority granted an exemption to the platform. The platform could therefore use its algorithm despite the fact that it constituted a horizontal cartel amongst competitors.<sup>130</sup>

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<sup>128</sup> OECD p. 17

<sup>129</sup> Colombo p. 19

<sup>130</sup> Parziale p. 110



## **H. ARTICLE 102 TFEU : COLLECTIVE ABUSE OF DOMINANCE**

According to article 102 TFEU, any abuse by one or more undertakings of a dominant position is prohibited, as it is incompatible with the internal market and may negatively affect trade between Member States. In this section, we will review the case law of article 102 TFEU in order to define what constitutes a dominant position, what is the notion of collective dominance, and finally what defines the abusive conduct of excessive price fixing. We will then analyse how algorithmic tacit collusion can be framed as a collective abuse of a dominant position, how the assessment of market share differs in digital markets compared to traditional markets, and why framing algorithmic tacit collusion under article 102 TFEU rather than article 101 TFEU has benefits.

### **1) The notion of dominant position**

#### **1.1) *Hoffman-La Roche* case**

This case is famous for its long lasting importance of the Court of Justice's definition of what constitutes a dominant position in a relevant market.

##### **1.1.1) Facts of the case**

Hoffman-La Roche was a multinational group and was the world's leading vitamin manufacturer and one of the largest pharmaceutical groups. The company was found to allegedly abuse its dominant position through a pricing abuse where it offered fidelity rebates in some vitamins' markets which in effect cause discrimination between customers.<sup>131</sup>

##### **1.1.2) Question asked to the court**

The court was asked whether Hoffman-La Roche enjoyed a dominant position, and if it abused its dominant position.

##### **1.1.3) Court's decision**

The Court asserted that the notion of dominant position which article 102 TFEU refers to is a position of economic strength which allows an undertaking to prevent effective competition being maintained on the relevant market. The dominant position affords the undertaking such

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<sup>131</sup> Case 85/76, *Hoffman-La Roche v. Commission*, EU:C:1979:36

market power that it can behave to an appreciable extent independently of its competitors and its customers.<sup>132</sup> Although a substantial market share is not alone evidence of a dominant position, a very large share is in itself, except in exceptional circumstances, evidence of the existence of a dominant position.<sup>133</sup>

## **2) The notion of collective dominance**

Article 102 prohibits abuse of dominance by one or more undertakings, which means that it is possible for the behavior of multiple undertakings to be considered as a collective abuse of a dominant position.

### **2.1) Italian Flat Glass case**

#### **2.1.1) Facts of the case**

The Commission fined three Italian flat-glass producers for abuse of dominant position that was prohibited under article 102 TFEU.

#### **2.1.2) Question asked to the Court**

The Court was asked how to determine whether the market share of multiple undertakings constituted a collective dominant position.

#### **2.1.3) Court's decision**

The Court reasserted that under article 102 TFEU, two or more independent economic entities which are part of a specific market can be considered to hold a dominant position vis-à-vis the other competitors of that market, when they are united by such economic links as agreements or licenses which grant them a technological lead.<sup>134</sup> The Court provided three cumulative conditions that need to be met.

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<sup>132</sup> *ibid*, para 38

<sup>133</sup> *ibid*, para 40 and 41

<sup>134</sup> Cases T-68/89, T-77/89 and T-78/89, *Società Italiana Vetro SpA and others v. Commission* EU:T:1992:38

The competing undertakings need to be independent economic and legal entities. They share market power. And finally, the undertakings are united by economic links enabling strategic alignment.<sup>135</sup>

### **3) Abusive conduct**

Article 102 lists four practices which may be abusive. However, as this paper is about algorithmic collusion through algorithmic pricing, we will only focus on the abusive conduct of excessive pricing. In *British Leylands Plc v. Commission*, the company British Leylands was granted exclusive right by the British government to determine the conformity of imported British Leyland cars to national standards. Upon inspection, they would be issued certificates of conformity. However, British Leylands set much higher fees for left-hand-drive cars than for right-hand-drive cars. The Court assessed the nature of the examinations of imported vehicles conducted by the company and compared them with the fees they set. Upon assessment, the Court found that the fees charged by British Leylands were disproportionate to the economic value of the service that it provided.<sup>136</sup>

### **4) Algorithmic collusion**

#### **4.1) Dominant Position**

The first step for the competition authorities that aim to apply article 102 TFEU is to establish that the undertakings in question that use algorithmic pricing algorithms enjoy a dominant position in their relevant market. This entails that the undertakings can act independently from competitors and consumers as the latter do not offer any competitive constraints.

#### **4.2) Collective dominance**

Secondly, the competition authority needs to establish that the undertakings are independent economic and legal entities, share market power, and are united by economic links enabling strategic alignment. The notion of economic links which grant strategic alignment is of particular importance when it comes to algorithmic tacit collusion. The Court talked of agreements or licences which granted the undertakings a technological lead. Can pricing algorithms be considered as one of those economic links? Although there is no certainty since

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<sup>135</sup> Parziale, p. 112

<sup>136</sup> Case 226/84, *British Leyland Public Limited Company v Commission*, EU:C:1986:421

Courts would have to answer that question, the *Italian Flat Glass* case seems to make it a possibility, especially in a Hub-and-spoke scenario that we saw earlier where multiple undertakings use the same pricing algorithm.

#### 4.3) Excessive pricing

Finally, the competition authority would have to establish that the undertakings are indeed abusing their dominant position, as simply holding a dominant position is not itself prohibited by article 102 TFEU. This means that the competition authority should conduct an assessment which compares the economic value of the services or goods provided by the undertakings, and compare it with the prices that are set by the pricing algorithms. If the pricing algorithms set prices that are disproportionate to the economic value of the goods or services provided, excessive pricing prohibited under article 102 TFEU would be established<sup>137</sup>.

#### 4.4) Market share in digital markets

As we saw, undertakings hold a dominant position when they have a market power which enables them to behave independently of competitors and consumers. The assessment of whether or not undertakings enjoy a dominant position is based on market conditions such as market shares, profit margins, or concentration ratios.<sup>138</sup> Performing such an assessment on digital markets with companies that use algorithmic pricing is a lot more complicated than for traditional markets. While traditional market conditions take time to be modified, digital markets on the other hand are continuously change nature by constantly being created or reshaped by undertakings. The assessment of market share is especially problematic as newcomers often challenge the incumbent undertakings.

Competition authorities therefore need to adapt the way they assess the notion of dominant position. As we saw, according to case law, an undertaking enjoys dominance when it can act independently from competitors and consumers as the latter do not offer any competitive constraints. The assessment should therefore focus on variables such as buying and selling power, the degree of vertical integration, and barriers of entry to the relevant market.

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<sup>137</sup> Rab, p. 145

<sup>138</sup> Parziale, p. 111

Algorithms could also be considered as a new source of market power in digital markets, and competition authorities could take into account their analytical power and the data that they process as a source of market power.<sup>139</sup> By involving these new aspects of competition in their assessment, competition authorities would be able to get a better understanding of the market conditions and consequently of the market shares that each undertaking enjoys.

### **5) Responsibility of dominant firms**

In its judgment for the *Michelin* case, the European Court of Justice introduced the notion of a special responsibility for dominant undertakings. According to the Court, undertakings that hold a dominant position have the responsibility to ensure that their conduct does not impair undistorted competition in their relevant market.<sup>140</sup> This notion has been used both by competition authorities and courts throughout the years in order to catch under article 102 TFEU a wider variety of conducts.

Legal scholars have in turn proposed that the concept of special responsibility of dominant firms could also catch algorithmic tacit collusion under article 102 TFEU, and some have even named it “algorithmic special responsibility doctrine”.<sup>141</sup> The application of this doctrine would be especially relevant to cases of algorithmic tacit collusion reached by self-learning pricing algorithms. Even if the undertakings that used such pricing algorithms claimed that they either did not intend, or were not aware, that their algorithms were colluding. The algorithmic special responsibility doctrine would entail that it was still their responsibility to ensure that their self-learning algorithms did not collude, due to their dominant position in their relevant market.

### **6) Collective dominance vs. concerted practice**

There are benefits to framing algorithmic tacit collusion as a collective abuse of dominant position rather than a concerted practice. Indeed, a collective dominant position is a purely

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<sup>139</sup>LAROCHE Pierre, ‘*Disruptive Innovation and Competition Law Enforcement*’ (2015), Competition Policy and Innovation

<sup>140</sup> Case 322/81 *NV Nederlandsche Banden Industrie Michelin v Commission*, para 57

<sup>141</sup> Pereira, p. 14

objective notion<sup>142</sup>. It is established through an objective assessment, and the competition authorities do not need to provide evidence of intention nor consciousness. In contrast, in order to fall under the scope of article 101 TFEU, the competition authorities need to provide evidence of a meeting of minds or of a conscious co-operation between undertakings.<sup>143</sup>

However, despite the benefits, applying article 102 TFEU to algorithmic tacit collusion has some downfalls. It is generally agreed upon that competition authorities should not be acting as price regulators. The Court's assessment in the *British Leylands* of comparing the economic value of the good or service with its price is not without faults. The true nature of what constitutes an unfair or excessive price is very complex to assess.<sup>144</sup> The existence of personalized pricing is the proof of that. Different consumers have different willingness to consume and therefore different prices which they are willing to pay. A price deemed unfair by one consumer might be reasonable for another. For these reasons, competition authorities have applied article 102 TFEU most frequently to exclusionary conduct, which is another abuse of dominance.

Furthermore, article 102 TFEU in the context of algorithmic tacit collusion can only be applied when the undertakings are part of an oligopolistic market, even though algorithmic tacit collusion can occur in digital markets which are not characterized as oligopolies. Regardless, competition authorities can still apply article 102 TFEU when they are faced with the inherent difficulties of applying the concepts of agreements and concerted practices. Furthermore, oligopolistic markets are the ones which are the most prone to suffer anti-competitive effects from algorithmic tacit collusion.

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<sup>142</sup> Case 85/76, *Hoffman-La Roche v. Commission*, EU:C:1979:36

<sup>143</sup> Parziale, p. 113

<sup>144</sup> Pereira, p. 14

## **I. LIABILITY**

In this chapter we will review the issue of liability and how it applies to self-learning algorithms. We will first provide an introduction on the subject of liability and its link to European competition law. We will then analyse the case law regarding undertakings' liability for their employees and their service providers, by reviewing the *Suiker Unie* case and the *VM Remonts* case. Next, we will discuss how the single economic entity doctrine justifies the concept of liability for undertakings. And finally, we will compare the arguments in favour and against the notion of undertakings' liability for the anticompetitive conduct of their self-learning algorithms.

### **1) The notion of liability**

In the case of the messenger scenario, where the pricing algorithms are designed and used with the intention of collusion, there is no issue regarding liability. In those cases of collusion through algorithms, the algorithms are used as simple tools and the undertakings using them are liable in the same way that they are liable when using any other tool to cooperate with competitors.

However, the issue of liability is important when the pricing algorithms are self-learning algorithms which are colluding although they were not designed to, and possibly without the algorithm's owner being aware of the ongoing collusion. We previously reviewed the possibility of catching such scenarios under the scope of the 'algorithmic special responsibility doctrine', developed in case law to fall under article 102 TFEU. However, liability for a self-learning algorithm can also be possibly established under article 101 TFEU.

When considering the liability of self-learning algorithms, three outcomes are possible: the algorithm is liable, the human who deployed it is liable, or no one is liable.<sup>145</sup> Like the Commission warned during a speech by Margrethe Vestager, companies will not be able to escape liability by hiding behind their self-learning algorithms.<sup>146</sup> The third option is

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<sup>145</sup> MEHRA Salik K., 'Antitrust and the Robo-Seller: Competition in the Time of Algorithms' (2016), Minnesota Law Review 204.

<sup>146</sup>Colombo p. 14

therefore out of the question. Which means that the question remains whether the algorithm itself or the human deploying it should be held liable.

The concept of holding an algorithm liable however clashes with existing notions of law that have been established. A self-learning algorithm should be regarded as a mere tool for the persons that deploy them. And if a self-learning algorithm malfunctions the same way any other tool or even simple algorithm could malfunction, even despite the person's intent or awareness, the legal consequences that that person faces are no different than they would usually be. A self-learning algorithm that malfunctions does not suddenly gain agency or capacity.<sup>147</sup> Furthermore, as Ezrachi and Stucke correctly affirm, algorithms do not fear detection, fines, or incarceration. The component of deterrence which results from being held liable does not have any effect on algorithms.<sup>148</sup> Therefore one can question the objective of holding an algorithm liable. Consequently, it is the persons and entities deploying self-learning algorithms which should be held liable.

## **2) Case Law**

Liability in competition law has been developed to be based on the persons' relation with the entity that is regulated. A person can be an employee, service provider, or independent contractor for a company; and the degree of the company's liability for that person's actions depends on that qualification.

It is also possible for an entity to be liable for another entity's action. As stated in the Commission's guidelines on the applicability of article 101 TFEU to horizontal agreements, different companies can be considered as being part of the same undertaking, which entails that each company is liable for the actions of the others.<sup>149</sup>

### **2.1) Liability for employees**

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<sup>147</sup> Mehra, p. 47

<sup>148</sup> EZRACHI Ariel and STUCKE Maurice, 'Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy' (2016), Harvard University Press, p.4

<sup>149</sup> European Commission, 'Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements', 2011, Document 52011XC0114(04) (n 80)



The European Court of Justice first held an undertaking liable for the conduct of one of its employees in the *Suiker Unie* case. In its judgment, the Court affirmed that undertakings are liable for their employees when the latter acts within their employment relationship with the undertaking, as they then form a single economic entity under competition law.<sup>150</sup>

## 2.2) Liability for service providers - *VM Remonts* case

### 2.2.1) Facts of the case

The case was regarding a tender procedure organised in a Latvian town, where the company PK engaged expert advisors for assistance. The company sent draft tender submissions to the advisors, who then used those drafts as a point of reference for tender submissions which they prepared for other tenderers. The national competition authority held that the three tenderers prepared their tenders in cooperation in order to create the impression of competition, and therefore infringed competition law.<sup>151</sup>

### 2.2.2) Question asked to the Court

The court was asked whether the company PK was answerable for participation in a concerted practice prohibited under article 101 TFEU, for the conduct of the expert advisors it engaged, considering it did not authorize or was aware of their behavior.

### 2.2.3) Court's decision

The Court's judgment focuses on the conditions that need to be met in order for an entity to be liable for a concerted practice that its service provider is involved in. The Court made reference to the *Anic* case which we reviewed earlier. The Court reaffirmed that an undertaking's relationship with its service provider is, in principle, not comparable with its relationship with its employees as elaborated in the *Suiker Unie* case. However, it is possible that the service provider which presents itself as independent is in fact under the control of the undertaking that uses its services. In that case, the relationship between the undertaking and its service provider would effectively be a disguised employment relationship.<sup>152</sup>

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<sup>150</sup> Cases 40-48, 50, 54-56, 111, 113-114/73, *Suiker Unie v. Commission*, EU:C:1975:174, para 80

<sup>151</sup> TALBOT Conor, 'The ECJ's decision in *VM Remonts* and the extension of liability for the anticompetitive conduct of service providers under article 101(1) TFEU' (2016), *Commercial Law Practitioner* vol 23, pp. 233

<sup>152</sup> Case C-542/14 *VM Remonts and others* EU:C:2016:578

The Court establishes that in order for an undertaking to be held liable under article 101 TFEU for a concerted practice which its independent service provider participated in, one of the following conditions must be met:

- 1) The service provider must in fact be under the control of the undertaking. This can be inferred from the existence of specific organisational or legal links between the undertaking and its service provider.
- 2) The undertaking was in fact aware of the concerted practice between its service provider and its competitors, and intended to contribute through its own behavior.
- 3) The undertaking could have reasonably foreseen the anticompetitive acts of its service provider and of its competitors, and was prepared to accept the risk and bear the consequences that these acts entailed.<sup>153</sup>

### **3) Single economic entity doctrine**

The reason that undertakings can be held liable for the anticompetitive conduct of its employees, service providers, or self-learning algorithms, is that article 101 TFEU does not apply to agreements which are made between entities forming a single undertaking.<sup>154</sup> It only applies to agreements made between undertakings. Therefore, if one entity within an undertaking infringes competition law under article 101 TFEU, it does so as an undertaking rather than a subset entity, and consequently the other entities which are part of the same undertaking are also held liable for the conduct.<sup>155</sup>

Furthermore, an employee or any legal or natural person which is part of an undertaking cannot be considered to exert a competitive force on the market which is distinct from the competitive force of its employer undertaking. Therefore any conduct of an employee is

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<sup>153</sup> *ibid*; Colombo p. 17

<sup>154</sup> BHADURI Anik ‘*Tackling collusion in the digital marketplace : is the Competition Act enough?*’ (2020), European Competition Law Review, pp. 103

<sup>155</sup> VAN CLEYNENBREUGEL Pieter, ‘*Single entity tests in U.S antitrust and EU competition law*’ (2011), <<https://orbi.uliege.be/bitstream/2268/201655/1/SSRN-id1889232.pdf>> last accessed 16 August 2021

automatically assimilated to its employer, such as in the cases of the purchase of goods and services for the undertaking.<sup>156</sup>

As stated in the *VM Remonts* case, what defines an employee relationship is the lack of autonomy towards the company. It is the company that exerts direction and control over its employees' conduct in the market.<sup>157</sup> The undertaking is regarded as being the source of the orders that direct the employees' behavior, and there is a presumption that the undertaking has a system in place which prevents its employees from taking decisions which can harm or go against the interests of its employer.<sup>158</sup>

Lastly, when an employee infringes competition law, that infringement - in principle - benefits the undertaking rather than bears individual benefits for the employee. Consequently, the liability should fall on the undertaking.<sup>159</sup>

#### **4) Liability for algorithmic anti-competitive conduct**

##### **4.1) Arguments in favor**

###### **4.1.1) *VM Remonts* case**

The *VM Remonts* case is a very important case law for algorithmic collusion as it lays the legal foundations for the Commission's most likely approach to undertaking's liability for the anti-competitive conduct of their self-learning algorithms.<sup>160</sup> Indeed, the third condition elaborated by the Court to establish an undertaking's liability for its service provider can be solidly established as well for algorithmic anti-competitive conduct. If an undertaking could have reasonably foreseen the anticompetitive acts of its self-learning algorithm and was prepared to accept the risks, then it is liable for its anticompetitive conduct. The judgment also confirms case law that was elaborated in such judgments as the *Anic Partecipazioni* case which it referenced.

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<sup>156</sup> BAILEY David and OKEOGHENE Odudu, 'The single economic entity doctrine in EU competition law' (2014), Common Market Law Review vol. 51, p. 1735

<sup>157</sup> Case C-73/95 *Viho*, EU:C:1996:405

<sup>158</sup> Bailey and Okeoghene, p.1744-1745

<sup>159</sup> *Ibid*, p. 1753, Van Cleynenbreugel p.

<sup>160</sup> Pereira p.5

The assessment of the evidence and standard of proof that is required to establish whether a specific case fits the third condition is left for the national courts to decide. Competition authorities will need to show that the undertaking indirectly consented and accepted the risk of anticompetitive conduct from its self-learning algorithm, and provide evidence that the algorithm's conduct is a restriction by object or by effect under article 101 TFEU.<sup>161</sup>

#### 4.1.2) Human employees vs. self-learning algorithms

A common argument against liability for the anticompetitive conduct of self-learning algorithms is that the undertakings that deployed them did not intend or were not aware of their anticompetitive behavior. However, these same things could be said of undertakings' employees. A human employee's anticompetitive conduct can be unintended by its employer which, furthermore, could be completely unaware of it. But as we saw in the established case law, the undertaking is still liable for such a human employee. It therefore makes sense that the same applies for self-learning algorithms.

Another argument is often to hide behind the 'black box problem'. Machine learning and deep learning algorithms are so complex that sometimes, even experts do not understand how they function. Some therefore argue that if even expert programmers cannot understand the algorithms' functioning, then an undertaking cannot be held liable for its conduct. However, once again, the same thing could be said of a human employee. One could even argue that humans are often even more opaque black box than a self-learning algorithm. To go even further, one could even argue that it's more plausible to ensure that a self-learning algorithm does not conduct itself anti-competitively, than it is to ensure that a human employee does the same. Therefore an exemption of liability on those grounds is unfounded.

#### 4.1.3) Single economic entity doctrine

We can now further continue our comparison between human employees and self-learning algorithms, now in the context of the single economic entity doctrine. Indeed, a self-learning algorithm exerts a competitive force on the market that is indistinguishable from the undertaking's own competitive force.<sup>162</sup> A self-learning algorithm cannot decide to conduct

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<sup>161</sup> Colombo, p. 17

<sup>162</sup> Van Cleynenbreugel, p. 25

itself for its own benefits, it simply works for the undertaking, under its control and direction and with the sole aim to perform the task it was programmed to achieve.

In the *VM Remonts* case, we saw how the criteria of control and direction characterized the employee relationship and justified the liability of the undertaking for its human employee's action which it has control over. This criteria is even more fulfilled by self-learning algorithms than it is by human employees. Even the most complex and opaque self-learning black-box algorithm has much more possibilities to be hardcoded against certain anticompetitive conducts than a human employee ever would be. Unlike algorithms, humans can be emotional, irrational, and decide to act for their own interest and against their employers' interest. Furthermore, a failure to control a self-learning algorithm despite attempts to by the undertaking, does not relieve said undertaking from liability. Indeed, an undertaking could not claim that it is not liable for a human employee's anticompetitive conduct because it made them follow a compliance program.

To finish this comparison between human employees and self-learning algorithms, the single economic entity doctrine was used to justify liability due to the fact that the employer would benefit from its employee's anticompetitive conduct. That is even more applicable to self-learning algorithms. One could argue that in certain circumstances, an employee could engage in anticompetitive conduct for their own interest. For example such conduct could lead to a better apparent performance at work, and grant them bonuses or promotions. Self-learning algorithms do not have the notion of self-interest and all its decisions are made to optimize the task it was programmed for by the undertaking.

## 4.2) Arguments against

### 4.2.1) Anti-innovation effects

A possibility of implementing liability for self-learning algorithms is that it could significantly deter companies from implementing them. The reality is that the implementation of the latest technology is a succession of trials, some successful and others not. Machine learning and deep learning are well-known for being extremely complex forms of technology that, when applied, are often even incomprehensible to renowned experts. Machine learning engineers often like to joke that they throw the technology at the wall to see what sticks. It is maybe due to this methodology that machine learning applications have been found to make

racist or sexist decisions unbeknownst to their programmers and users. However, without further implementation, the technology cannot be improved upon. Liability of undertakings could therefore have negative effects on technological innovation of self-learning algorithms.

#### 4.2.2) Black Box problem

As developed earlier, machine learning and deep learning algorithms are often referred to as ‘black boxes’. Some argue that the inability for undertakings and even experts to have a solid understanding of the algorithm's functioning means that undertakings should not be held accountable if the algorithm develops anticompetitive behavior over time. As we saw in the *VM Remonts*, the third criteria developed by the court for establishing liability is that the undertaking could have reasonably foreseen the anticompetitive acts and was prepared to accept the risk that they entailed.<sup>163</sup> Because of the black box problem, the criteria is not fulfilled and liability therefore cannot be established. Of course, the difficulty is to differentiate when a self-learning algorithm is an effective black box that the undertaking couldn't possibly understand, and when the undertaking is hiding behind the black box exemption even though it could have monitored and understood its self-learning algorithm's functioning.

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<sup>163</sup> Case C-542/14 *VM Remonts and others* EU:C:2016:578

## **J. REMEDIES**

This chapter will assume that algorithmic collusion has been established to breach European competition law, which leads to the question of the appropriate and effective remedies in order to more effectively deter algorithmic interdependent pricing. In general, a remedy is considered to be effective and proportionate when it corrects the particular harm caused by the anticompetitive conduct that it aims to deter. In this section we will cover the remedies under article 101 TFEU and articles 7 to 10 of the regulation 1/2003, which consist of fines, structural remedies, and behavioral remedies. In the last section, we will consider the possibility of using algorithms as compliance tools, through the possible use of monitoring or disruptive algorithms by competition authorities.

### **1) Fines**

When deciding whether to collude or not, companies balance the potential benefits with the potential cost. Fines represent an additional cost and therefore have a deterrent effect as the potential benefit of the anticompetitive conduct would need to be higher in order to cover the risk of being potentially fined by the competition authorities.

The effectiveness of a fine depends on its amount. The competition authorities will have to decide whether they impose the same amount of fines for algorithmic tacit collusion which was implemented by artificial intelligence, compared to a collusion through algorithms that was intended by the parties. It could be possible to consider decreasing fines if artificial intelligence is responsible for the collusion, as this would prevent needlessly deterring the application of AI pricing software that would not cause social harm.<sup>164</sup> Additionally, fines could be implemented in the very functioning of the self-learning algorithmic softwares. Artificial intelligence that learns from Reinforcement Learning would be particularly sensitive to the deterrence effect of fines, as this learning method is based on dynamic environments where the algorithm learns through rewards and punishments.<sup>165</sup>

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<sup>164</sup> BENEKE Francisco and MACKENRODT Mark-Oliver, '*Remedies for algorithmic collusion*' (2020), Journal of Antitrust Enforcement pp. 15

<sup>165</sup> GAUTIER Axel and ITOO Ashwin and VAN CLEYNENBREUGEL Pieter, '*AI Algorithms, price discrimination and collusion : a technological, economic, and legal perspective*' (2020), European Journal of Law and Economics

Another consideration to take into account is fines for cartel facilitators. As was developed earlier, many cases of algorithmic collusion would fit in the Hub-and-spoke scenario, as pricing algorithms that are AI-based are very complex to develop and therefore software suppliers with this expertise sell their algorithms to undertakings. As we saw in the Etura and AC-Treuhand case, those software suppliers are considered to be cartel facilitators and are therefore also liable for the infringement of competition law.<sup>166</sup> However, competition authorities should decide on the amount of the fines that such a company would receive as cartel facilitators.

The fines for algorithmic collusion need to be a careful balance between a fine that is high enough to deter collusion, but low enough not to deter algorithmic pricing application altogether and therefore have negative effects on technological innovation. The advantage of fines is that they do not require competition authorities to overreach and have to tackle technical difficulties such as instructing software providers how to develop their AI-based pricing software.<sup>167</sup>

## **2) Structural remedies**

Structural remedies can legally be imposed only in two situations. They can be imposed if an equally effective behavioural remedy cannot be imposed instead, or if such remedy would be more burdensome than a structural remedy.<sup>168</sup> This is due to the fact that structural remedies are considered as a stronger form of intervention.

An example of structural remedy is a divestiture, which aims to rearrange market conditions such as the number of competitors in order to render tacit collusion more difficult to implement and stabilise.<sup>169</sup> Structural remedies can only be applied if there are assets for the competition authorities to divest, and in the case of algorithmic pricing, structural remedies

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<sup>166</sup> Case C-74/14 *Eturas*, EU:C:2015:493

<sup>167</sup> Beneke and Mackenrodt p. 16; GONENC Gurkaynak et al, '*Shady Contours of Cartel Liability*' (2017), Competition Law International vol. 13 p. 86

<sup>168</sup> Article 7(1) Regulation 1/2003

<sup>169</sup> Beneke and Mackenrodt, p. 17



could be applied to markets such as the airline industry. A structural remedy could consist in divesting slots at the airports to airlines not operating the route in question.<sup>170</sup>

Structural remedies hold certain advantages over fines as a remedy. The first advantage is that like fines, they can be implemented without the competition authorities overreaching and enforcing technological measures such as how to develop AI-based pricing algorithms. However, unlike fine, structural remedies address the market conditions which facilitate algorithmic collusion. They also do not require data such as undertakings' marginal cost or likelihood of detection in order to be implemented and successful.<sup>171</sup>

### **3) Behavioural remedies**

Behavioural remedies could be considered to be overreaching and competitions would need to proceed with caution in their implementation. An example of behavioral remedy are injunctions. With regard to self-learning algorithms, competition authorities could order firms to design their algorithms in such a way that they aim to optimize competition, rather than profit maximization which can lead to the algorithm colluding with competitors.

Some authors have proposed to increase transparency of pricing algorithms and allow authorities to ensure that algorithms are developed according to specific standards. They claim that such transparency would “aim at eliminating the black box problem”.<sup>172</sup> Although transparency is indeed desirable, it would not have any effect on the black box problem as Beneke and Mackenrodt assert. As we have developed earlier, the black box problem refers to the sheer complexity of some artificial applications such that even experts do not understand their functioning. The opacity of the black box is not due to a lack of transparency of the source code, but rather due to the complexity of the AI. In order to tackle the issue of the black box, competition authorities could allow firms to only use pricing self-learning algorithms if they can provide an explanation of its functioning. This would also prevent firms from attempting to escape liability for algorithmic collusion by claiming they do not understand how their pricing algorithms function.

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<sup>170</sup> HARRINGTON Joseph, ‘*A proposal for a structural remedy for illegal collusion*’ (2017), Antitrust Law Journal, p. 347-357

<sup>171</sup> Beneke and Mackenrodt, p. 18

<sup>172</sup> *ibid*, p. 19

#### **4) Algorithms as compliance tools**

##### **4.1) Monitoring algorithm**

As was developed earlier, undertakings can use price monitoring algorithms in order to monitor the conduct of the competitors who have entered an anticompetitive agreement with them. The same type of algorithms could be used by competition authorities. Instead of being developed to monitor for behavior that deviates from the agreement, the algorithms would be developed to detect pricing behavior that departs from what is legal parallel behavior.<sup>173</sup> Such an assessment is not new for competition authorities as we saw in case law regarding concerted practice. The Court has often had to provide criterias that distinguish mere conscious parallelism with an anticompetitive conduct. Competition authorities should therefore attempt to design and develop algorithms which can detect these *plus factors* at a rate which matches the rapidity of price fluctuations from pricing algorithms.

##### **4.2) Disruptive algorithms**

This second type of algorithms could be implemented once the monitoring algorithms have been able to identify a case of algorithmic collusion. As we saw in the first chapter, the market conditions need to meet specific requirements in order to be conducive for algorithmic collusion. Competition authorities could develop and implement algorithms which were designed to disturb the collusive equilibria which was fixed by the algorithms. The Commission had made an announcement in 2018 that it would develop such algorithms in order to adapt their enforcement tools to the digital markets.<sup>174</sup> However, disruptive algorithms require a very advanced degree of machine learning of technology and three years later, no such algorithms have been implemented by the Commission.

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<sup>173</sup> Bernhardt and Dewenter p. 332

<sup>174</sup> *Ibid*, p.334; KUPCIK Jan, 'European tacit collusion theory and its applications to price algorithms' (2020), European Competition Law Review, pp. 543

## **K. CONCLUSION**

This thesis aimed to provide an in-depth analysis of the articulation of algorithmic pricing with established concepts of European competition law. The bulk of the analysis covered the article 101(1) TFEU, as it provided numerous notions and therefore more opportunities to qualify algorithms as infringement of competition law.

The review of the settled case law enabled us to clearly define the notions which fall under the scope of competition law, and the conditions which need to be met in order to establish that algorithmic collusion amounts to anticompetitive conduct. The difficulty that the thesis was faced with was the fact that the concepts developed in the case law were developed by the Court at a time where algorithms and autonomous softwares were not a concern for competition authorities, and the notions were therefore under a human prism which clashes with the artificial nature of algorithms. Can interactions between algorithms be defined as contacts within the meaning of competition law? Can the criteria of ‘meeting of minds’ apply to algorithms? The most crucial step forward for European competition law is for the Court to revisit its notions in order to develop new definitions which do not use terms which are human-centered in order to allow the possibility of algorithmic collusion to clearly fall under its scope. If such reform is not achieved, competition authorities will remain forced to attempt to apply human-centered notions to algorithms, and in the process ponder philosophical questions regarding the personhood of autonomous softwares which in effect fall outside the scope of their competence.

## **L. SOURCES**

### **LEGISLATION**

Art. 101, 102 TFEU

Regulation (EC) 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

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