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Pricing algorithms and competition law: the anti-competitive effects of the pricing technology Overview of European union law

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Price fixing between a company and its competitors is not a recent phenomenon. What is recent is the use of pricing algorithms to implement and, above all, to maintain such agreements. Thus in 2015, the founder of *Posters Revolution* was prosecuted for having participated in a cartel between competitors aimed at stabilizing the resale price of posters on the *Amazon* website[1]. This agreement was based on the use of pricing algorithms. Thus, the use of pricing algorithms for collusive purposes has challenged certain competition authorities. Companies seeking to practice the best prices, platforms wishing to adapt their behavior in order to be as responsive as possible, the use of these price stabilization techniques has a considerable impact on the behavior of companies in the market.[2]

Competition law is obviously concerned by the use of new technologies because algorithms are a well-known to be innovation and production's tools. Competition authorities are now faced with the question of whether competition law is adequate or whether it needs to be revised. That is why we will try to understand why this technology of pricing algorithms concerns competition law (I), the breaches their use can cause (II), and the powers of investigation of the competition authorities to denounce infringements to competition law (III).

I – *Pricing algorithms apprehended by competition law*

Pricing algorithms represent a new challenge for companies. But their definition faces a legal vagueness: the law tries to apprehend them and there have been attempts to define them (A). Some, including pricing algorithms, play an important role in business strategies (B).

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1) *United States of America v. David Topkins,* United States District Court, Northern District of California, April 30 2015.

2) Jean-Christophe Roda, « L'entente algorithmique », *La semaine juridique edition générale* n° 28, (July 2019) doctr. 785 : 1373.

A – What is a pricing algorithm?

The aim of this study is not to address a full review of the notion of algorithms, it will restrain the point of view on the subject of algorithms which involve economic consequences on competition. There is no legal definition of the algorithms. The notion is old and even prior to the development of computers[3]. It is a set of rules that, once applied, solve a problem through the implementation of several operations. It is translated through a programming language into an executable program.

The French competition authority tried to define it in an Notice of 6 March 2018 on the use of data in the internet advertising sector by explaining that "*an algorithm designates a series of rules to be applied in an order precise to accomplish a particular task: it is a logical sequence to obtain a certain result from a given input. Algorithms can be represented by means of a language, code or a program that can be read and executed by a machine: thanks to advances in computer science, they are now used for the automatic execution of repetitive tasks involving data processing and complex calculations*"[4]. It is possible to represent an algorithm in different ways: it can be "common" language, it can be computer code, they can perform tasks automatically even if it involves complex calculations that cannot be performed by humans[5].

Pricing algorithms are called numerical algorithms because they have an impact on the economic system. They make prices to be dynamically fixed, according to the capacity of businesses or consumers demands[6]. They can be used to set prices based on other available offers. This is the example of the dynamic pricing algorithms which are used to adapt prices to the firm's capacities, or to adapt them to competitor's prices. Therefore, they allow a variation of prices according to supply and demand. Thanks to the big data, they manage to collect various information allowing this adaptation.

The notion of machine learning is very important, because some of these

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3) OECD, (2017), Algorithmes et ententes, Note information du secrétariat, DAF/COMP(2017) 4, cons. 8 : 6-7 "*Although the notion of "algorithm" is quite old, and much earlier at the creation of the first computers, there is still no definition of them universally accepted*". (personal translation)

4) French Competition authority, Avis n° 18-A-03, 6 mars 2018 *portant sur l'exploitation des données dans le secteur de la publicité sur internet*. (personal translation)

5) OECD, *supra* note 3 : 6-7.

6) Frédéric Marty, « Algorithmes de prix, intelligence artificielle et équilibres collusifs », *Revue internationale de droit économique*, vol. t.xxxi (2017) : 4.

algorithms can infer their parameters with a high degree of automation and from learning datas. This is called machine learning: their driving parameters are automatically determined using a set of datas without any human intervention.

The consequence of the use of these pricing algorithms is a price differentiation. Indeed, the price will be adapted to the payment capacities of each consumer. The pricing algorithm will also organize the pricing strategy. Yes, they may improve the companies' innovation abilities: new business ideas, less research costs, suggestions accorded with consumer's needs. But such technologies involve risks. Indeed, there are two categories of algorithms: descriptive algorithms or " estimation-optimization algorithms" which will monitor the prices charged by competitors, it is programmed to automatically adapt prices, and "black box" algorithms which, thanks to an artificial intelligence system, use learning machines and are able to act autonomously. Because, here is the problem: there is no precise legal classification of the algorithm.

B – Their role in business strategies

Algorithms are now part of our legal landscape and have been for a long time. The recent phenomenon concerns their role in economic life since their use in combination with other technologies is now impacting the markets. Indeed, thanks to the increase in the computing power of computers, they can perform more complex tasks. Computer networks have made it possible to develop better communication. In addition, thanks to big data, it is now easier to collect large volumes of data[7)]. Finally, the development of machine learning has allowed machines to learn on their own: some algorithms have a great deal of autonomy allowing them to evolve their parameters without human intervention[8)].

These technologies are of interest to companies who have recourse to their use to perform different tasks: for example, airlines or rail companies use them for seat allocation when the customer books a ticket. They also allow banks to detect fraud[9)]. But these digital innovations do not present great risks from the old point of competition law. They make it possible to better understand the market and therefore to adapt the practices carried out by companies. Conversely pricing algorithms which are of greater concern in that they can undermine markets and

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7) Olivier Sautel, « Personalisation tarifaire à l'heure des big data : quel éclairage de la théorie économique ? », *Concurrences*, n° 4 (November 2017) : 21-24.

8) Sophie Troussard et Frédéric de Bure « La coordination algorithmique : fantasme ou réalité ? », *Revue Lamy de la concurrence*, n° 92 (March 2020).

9) *Ibid.*

competition law when their purpose is to carry out a strategy aimed at eliminating competitors from the market.[10].

The French competition authority and its German equivalent have studied this issue and worked together to draft a report published on November 6, 2019, entitled *Algorithms and competition*[11]. Indeed, algorithms are one of these new digital technologies that make companies more attractive and innovative, and therefore more efficient. But the question arises of the risk of constituting collusive behaviors due to their use.

Indeed, they impact competition by influencing one of the factors of market 'stability (interactions, number of companies, etc). Indeed, these pricing algorithms could make it easier to implement agreements. Worse yet, they could conceal them, or they could implement the agreements without human intervention.

II – *The risk of competition law breaches*

Competition law is therefore directly affected by these new digital technologies, and sanctions algorithmic agreements. Free competition protects the market economy. The various actors undertake to refrain any abuse. The use of pricing algorithms has several consequences and is prohibited since this would distort the game of competition: we will study collusion (A) and abuses of dominant position (B).

A – The first consequence: algorithms and risks of collusion

The French Commercial code establishes the principle of prohibiting all agreements, regardless of the form they may take[12]. The Treaty on the Functioning

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10) Marie Malaurie-Vignal, « Concurrence et numérique : un foisonnement d'idées pour dominer les géants », *communication commerce électronique* n° 10, study 17 (October 2020).

11) Authority of Competition and Bundeskartellamt, *Algorithms and competition*, (November 2016).

12) Indeed, the article L. 420-1 of the French Commercial code provides that "*Concerted actions, agreements, express or tacit understandings or coalitions are prohibited, even though the direct or indirect intermediary of a group company established outside France, when their purpose or effect is or may be to prevent, restrict or distort competition in a market, in particular when they tend to :*

1° Limit access to the market or the free exercise of competition by other undertakings;

2° Obstruct the fixing of prices by the free play of the market by artificially encouraging their rise or fall;

3° Limiting or controlling production, markets, investments or technical progress;

4° To allocate markets or sources of supply;

of the European Union also called the Treaty of Rome, forbids agreements that could affect trade between member States[13)]. These legal texts establish the principle of the prohibition of anti-competitive agreements, but do not define them. They simply give a list of examples of behaviours prohibited because they are too restrictive. The prohibition of such practices results from three cumulative conditions: consultation between autonomous economic operators, which has the effect of restricting competition. The Treaty on the Functioning of the European Union and the French Commercial Code target cartels in their whole sense in order to incorporate all kinds of practices such as agreements, concerted actions, or even complex agreements. In addition, these rules only apply to companies, or individuals where this is likely to affect the market and competition.

The agreement is based on a concerted effort by several companies that will

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↘ *5° To limit or control production, markets, investments or technical progress*" (personal translation).

13) Article 101 of the Treaty on the Functioning of the European Union: "*1. The following shall be prohibited as incompatible with the internal market: all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the internal market, and in particular those which:*
(a) directly or indirectly fix purchase or selling prices or any other trading conditions;
(b) limit or control production, markets, technical development, or investment;
(c) share markets or sources of supply;
(d) apply dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage;
(e) make the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts.
2. Any agreements or decisions prohibited pursuant to this Article shall be automatically void.
3. The provisions of paragraph 1 may, however, be declared inapplicable in the case of:
- any agreement or category of agreements between undertakings,
- any decision or category of decisions by associations of undertakings,
- any concerted practice or category of concerted practices,
which contributes to improving the production or distribution of goods or to promoting technical or economic progress, while allowing consumers a fair share of the resulting benefit, and which does not:
(a) impose on the undertakings concerned restrictions which are not indispensable to the attainment of these objectives;
(b) afford such undertakings the possibility of eliminating competition in respect of a substantial part of the products in question."

cause a market disruption. Article L. 420-1 of the French Commercial Code deals with concerted actions and express or tacit agreements. A cartel is "*an agreement between competitors (horizontal agreement) or between non-competitors (distribution agreement qualified as a vertical agreement)*". The willingness to adhere to this agreement may be tacit and is inferred from the behavior of the actor wishing to participate in the cartel. Article 101 of the Treaty on the Functioning of the European Union specifies that a prohibited agreement is based on two constituent elements: an agreement that restricts competition. Anticompetitive collusion is defined as "*a coordination of conduct on the market*": by using this coordination, competitors will prevent other economic players from benefiting from advantages in terms of price and innovation.
Algorithms can have the consequence of establishing collusion practices on prices[14).

The study carried out by the French and German competition authorities made it possible to detail various collusive scenarios involving the use of pricing algorithms[15). The report defines horizontal collusion as "*a situation in which companies use reward and penalty schemes to reward competitors for engaging in behaviors leading to super competitive results and to sanction them for deviating from them*"[16). Then the pricing algorithm can be used to monitor distributors. Indeed, a supplier will be able to control the prices charged by his reseller thanks to particularly sophisticated price tracking algorithms[17). Here again, this use helps to ensure the stability of an agreement which would then be qualified as a vertical agreement.

Another situation concerns the case where several companies will use the same algorithm which would be provided by a third party (a platform for example). These companies do not necessarily work together. However, this algorithm will contribute to decision-making in terms of pricing: this necessarily leads to price alignment, even if the companies have not agreed on this beforehand[18). This is the example of applications for booking private drivers or VTC: the driver is

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14) Linda Arcelin, « Concurrence – Le droit de la concurrence mis à l'épreuve par le numérique », *La semaine juridique Entreprise et Affaires* n° 45 (November 2020) : 1493.

15) Authority of Competition and Bundeskartellamt, *supra* note 11; Sophie Troussard and Frédéric de Bure, *supra* note 8.

16) Authority of Competition and Bundeskartellamt, *supra* note 11 : 4. (personal translation)

17) Jean-Christophe Roda, *supra* note 2.

18) OECD, Directorate for financial and enterprise affaires competition committee, « Algorithms and Collusion – Note by the United *States* », *DAF/COMP(2017)4*, June 2017: 7.

considered a self-employed worker. The platform, via an algorithm, puts him in touch with customers. It also sets the amount of travel. The consequence is that the prices are standardized without the drivers having to consult each other in order to agree on them[19]. Moreover, is it possible to prove that these drivers are adhering to an anti-competitive practice?

A fourth situation concerns pricing algorithms that could allow competing firms to tacitly align their business strategy. Thanks to machine learning, and therefore without any human intervention, the algorithms individually used by each company will learn from their environment. They are then able to collect data on the practices of competitors, which would allow the company to align its prices with them. This would nullify any incentive to compete. Be careful, however, the progress of artificial intelligence is such that it would be quite possible to envisage the situation of price coordination without any human decision-making having taken place: this maneuverer would therefore be done without the human decision maker did not intend to[20]. So, these extremely sophisticated algorithms that work thanks to artificial intelligence could manage to set prices themselves without human intervention. This raises the question of the algorithm that will be based on the data contained in a blockchain: the algorithm would then be able to identify profitable pricing strategies, which would inevitably lead to a collusive equilibrium[21].

Finally, algorithms can be used to hide the possible presence of a cartel in the market, this is called "anti-competitive coding". This is also the technology used by the protagonists in the *Topkins* affair[22]: the algorithms had been used to align prices, in fact, their objective was to allow price stability (upward) in order to mislead the distributor's algorithm that was used to detect the lowest prices[23].

Collusion is defined as the covert agreement between two or more people with a view to deceiving one or more others. That is to say: when companies in the same market agree to achieve higher profits than they should achieve in a competitive situation. The report of the French and German competition authorities highlights several factors that influence these maneuverers. In general, this is

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19) Sophie Troussard and Frédéric de Bure, *supra* note 8.

20) Jean-Christophe Roda, *supra* note 2: *1373*.

21) Lucas Bettoni, « Problématiques soulevées par la blockchain en droit de la concurrence », *Contrats concurrence consommation*, n° 2, (February 2020) : 4.

22) *United States of America v. David Topkins,* United States District Court, Northern District of California, 30 avr. 2015.

23) Jean-Christophe Roda, *supra* note 2: 1375.

explained by the number of companies active in a market, the prices charged, for examples. The pricing algorithms will allow these companies to be able to reach these agreements without really communicating, or in any case, "without human communication" to use the exact terms of the report. Otherwise, the Treaty on the Functioning of the European Union prohibits concerted practices and vertical agreements. Concerted practices are "*the parallel or coordinated behavior of two or more companies on the market which results from prior informal consultation between them*"[24]. They are illegal from the moment they undermine competition by creating a cooperation making it abnormal (again referring to the characteristics of the market concerned). Thus, pricing algorithms could be used to allow manufacturers to control sellers who fail to meet asking prices.

B – The second consequence: algorithms and abuses of dominant position

The article 102 of the Treaty on the Functioning of the European Union provides that "*any abuse by one or more undertakings of a dominant position within the internal market or in a substantial part of it shall be prohibited as incompatible with the internal market in so far as it may affect trade between Member States*"[25]. The article then gives a series of examples of practices that could amount to abuse of a dominant position. A company will be penalized when it makes prohibited use of its power in the market. It is interesting to note that this idea adopted by European Union law is similar to other legal systems[26]: for example, in the United States, the Sherman Act sanctions "*every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other*

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24) Authority of Competition and Bundeskartellamt, *supra* note 11 : 40. (personal translation)

25) Art. 102 Treaty on the functioning of the European Union: "*Any abuse by one or more undertakings of a dominant position within the internal market or in a substantial part of it shall be prohibited as incompatible with the internal market in so far as it may affect trade between Member States. Such abuse may, in particular, consist in:*
(a) directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions;
(b) limiting production, markets or technical development to the prejudice of consumers;
(c) applying dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage;
(d) making the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts".

26) Catherine Prieto & David Bosco, *Droit européen de la concurrence. Ententes et abus de position dominante*, (Bruylant, 2013) : 792.

person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations"[27]. Abuse of a dominant position therefore presupposes that one or more undertakings occupy a dominant position in a market and is defined as the "*economic offense of abusing a dominant position in the internal market or a substantial part*"[28]. Article L. 420-2 of the French Commercial Code provides that to be characterized, the abuse of a dominant position presupposes that one or more companies occupy a dominant position on the market, and that they have illegally exploited this dominant position[29]. Although these articles only list a list of examples that could lead to abuse of a dominant position, it is possible to group them into two types of behaviour: those which aim to exclude competitors from the market by reducing their market shares for example, and those who would be qualified as unfair to partners since Article 102 of the Treaty on the Functioning of the European Union mentions among the examples the purchase and sale prices which would constitute an abusive exploitation aimed at excluding competitors[30].
Thus, an algorithm can thus be the cause of an abuse of a dominant position[31].

This is how Google was fined 2.42 billion euros by the European Commission

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27) The text of the Sherman Act (1890) provides at Section II that "*Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony, and, on conviction thereof, shall be punished by fine not exceeding $100,000,000 if a corporation, or, if any other person, $1,000,000, or by imprisonment not exceeding 10 years, or by both said punishments, in the discretion of the court*"; Catherine Prieto & David Bosco, *supra* note 26 : 792.

28) Gérard Gorrias, Madeline Gorrias-Dousset, Pascal Gorrias, *Lexique juridique pour l'entreprise*, (Editions d'organisation 2004) : 12. (personal translation)

29) The article L. 420-2 of the French Commercial code provides that : "Is prohibited, under the conditions provided for in Article L. 420-1, the abusive exploitation by an enterprise or group of enterprises of a dominant position on the domestic market or a substantial part thereof. Such abuse may in particular consist in refusing to sell, in tying sales or in discriminatory conditions of sale, as well as in the termination of established commercial relations, for the sole reason that the partner refuses to submit to unjustified commercial conditions. In addition, when it is likely to affect the functioning or structure of competition, the abusive exploitation by an enterprise or group of enterprises of the state of economic dependence in which a client or supplier enterprise finds itself with respect to it is prohibited. These abuses may in particular consist of refusal to sell, tied sales, discriminatory practices referred to in Articles L. 442-1 to L. 442-3 or range agreements".

30) André Decocq & Georges Decocq, *Droit de la concurrence. Droit interne et droit de l'Union européenne*, (LGDJ 2018) : 358.

31) Linda Arcelin, *supra* note 14 : 1493.

for abusing a dominant position in the search engine market for promoting its own price comparison service[32) : Google's search engine provides search results to consumers. The investigation started at the end of 2010 after complaints were lodged by Google's competitors with the European Commission. The latter had observed a non-compliance with the competition rules defined by European Union law relating to the Google shopping price comparison service, called "Google product Search". Google had given a top spot to its comparison service on Google Shopping. When the Internet user searched through Google's search engine, they found Google's first. As a result, the price comparison services of competitors appear after. The data that the users of the search engine transmit by carrying out these searches make it possible to finance the service offered by Google: the company shows them advertisements that respond to their search requests. By giving its price comparison service a top position, and by putting those of competitors in the background in its search results, Google has made its service more visible than those of its competitors. Indeed, the decision "*explains how certain algorithms make competing price comparison services likely to be demoted on Google's general search results pages and how this affects their visibility on Google's general search results pages*"[33).The investigation carried out by the European Commission has shown that the demotion was actually done using two different algorithms. The reflex of any consumer who conducts a search on a search engine is to click on the results that appear first. So by bringing its comparison shopping service to the fore and showing that after those of its competitors, Google has given its service a serious advantage. This therefore constitutes an infringement of competition law, and more particularly an abuse of a dominant position because there is an abuse of its market power which restricts competition.

The use of these specific pricing algorithms has helped demote competitors thereby constituting an infringement of competition law[34). The Commissioner for Competition Policy commented on Google's actions, explaining that "*what Google has done is illegal under EU competition rules. It has prevented other companies from competing on their merits and from innovating. Above all, it has prevented European consumers from benefiting from a real choice of services and from taking full advantage of innovation*"[35). The European Commission has also

32) Comm. UE, déc. 27 juin 2017, aff. AT.39740, *Search (Shopping)*, spéc. Pt 359 et suiv.

33) Comm. UE, abstract of the legal decision *op. cit*.

34) Jean-Christophe Roda, *supra* note 2 : 1376.

35) About the offence committed by Google and the fine, an online press release published on the website of the European Commission on June 27 2017 : https://ec.europa.eu/commission/↗

clarified that the complaints were not against the design of search algorithms or even their use, but against having taken advantage of its dominant position in the market. In a decision of January 27, 2017, the European Commission therefore condemned Google to an amount of 2,424,495,000 euros based on the value of the revenue made, and an obligation to stop illegal practices.

Indeed, to return to the conviction for having taken advantage of a dominant position, Article 102 of the Treaty on the Functioning of the European Union provides for the prohibition for any company to abuse a dominant position on the internal market. Indeed, the Commission explains that "*Article 102 of the Treaty and Article 54 of the EEA Agreement prohibit not only practices by an undertaking in a dominant position which tend to strengthen that position,348 but also the conduct of an undertaking with a dominant position in a given market that tends to extend that position to a neighbouring but separate market by distorting competition*"[36]. That kind of conduct obviously "*constitutes a wellestablished, independent, form of abuse falling outside the scope of competition on the merits*"[37]. The abuse evoked by the decision is indeed that of favoring his service[38]. Algorithms were just a tool.

III – The powers of investigations of the competition authorities

The competition authorities are in charge of the implementation of competition policy. Their powers of intervention concern all companies within a defined territory. They can intervene when anti-competitive practices are suspected. In France, this is the Autorité de la concurrence: it is an independent administrative authority with powers of investigation and decision. In terms of European Union law, the European Commission (among others) has the task of enforcing competition policy: it is the Directorate-General for Competition which performs this function. Its decisions can be appealed to the General Court of the European Union, then to the Court of Justice of the European Union[39].

The competent competition authority will be able to use its traditional investigative prerogatives in order to collect as much information as possible. According to the article two of the Council Regulation on the implementation of

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↘presscorner/detail/fr/IP_17_1784. (personal translation)

36) Comm. UE, *supra* note 32, Pt 334.

37) *Ibid.,* Pt 649.

38) David Bosco, « Affaire Google : sanction d'un abus par inégalité de traitement », *Contrats concurrence consommation*, n° 3 (March 2018) : 52.

39) Emmanuel Combe, *Economie et politique de la concurrence,* (Dalloz 2020) : 92.

the rules on competition laid down in Articles 81 and 82 of the Traeaty on the functioning of the European union, the burden of proving an infringement rests "*on the party or the authority alleging the infringement*"[40]. It is certain that competition authorities will have to adapt their skills in order to face these new challenges posed by tariffication algorithms. It is true that they are sometimes confronted with situations that require the analysis of algorithms, but not yet enough to say whether their investigation tools are sufficiently adapted or not[41]. Two types of evidence are possibly possible, according to the report of the French and German competition authorities[42]. First, they can study the informations associated with the role of the algorithm: the competition authority must then understand the role of the algorithm. This will allow him to deduce the purposes of its use. Secondly, they can study the operation of the algorithm: the aim here is to study how it was designed, how it is implemented, and whether competitors use similar algorithms. The competition authority has many powers of investigation: requests for information, interviews, but above all: it must be able to carry out a careful analysis of the role and operation of the algorithm (source code analysis, test of the algorithm in real situation, etc).

Conclusion

There seems to be no doubt that these algorithms can influence the economic market. they represent a new challenge for competition authorities. Two imperatives are emerging strengthen the powers of competition authorities and regulate more precisely the use of pricing algorithms. Maybe starting by defining them legally.

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40) Council 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 (Text with EEA relevance), art. 2.

41) Authority of Competition and Bundeskartellamt, *supra* note 11 : 75.

42) *Ibid.* : 75 – 76.