

Collusion and technological innovation – the case of algorithms  
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Mesdames et Messieurs,

Je voudrais féliciter le Conseil de la concurrence et en particulier le président Driss Guerraoui l'initiative d'organiser cette conférence et pour une première année de mandat très réussie.

C'est un vrai plaisir pour moi de partager nos points de vue sur la concurrence dans les marchés numériques – un domaine prioritaire pour l'Autoridade da Concorrência (AdC) – l'autorité de concurrence portugaise.

Il est clair qu'en tant qu'autorités de concurrence nous sanctionnons les ententes illégales. Il est donc également essentiel de pouvoir détecter, enquêter et sanctionner la collusion dans le domaine numérique, afin de nous permettre de remplir notre mission. Je me concentrerai aujourd'hui sur les algorithmes.

Being able to detect, investigate and sanction collusion in the digital age is essential to our fulfilling our mission as competition authorities. Today I will focus on algorithms and how they may facilitate collusion.

We have all acknowledged that technological innovation and big data bring significant **benefits to consumers**. Big datasets make it easier for both consumers and firms to compare prices and products. They help them find the products that best satisfy their needs and help firms make products better customized to their clients.

But we have reached a point in which we cannot ignore that technological innovation and big data also create **significant risks to competition**. This may happen for example if –when- **algorithms** are used to **facilitate firms reaching and sustaining collusion in the market**.

As part of our priority on cartel detection, we have a keen interest in **understanding the various possible collusion scenarios** between companies through such new tools. Our goal is to be **up-to-date with the analytical framework** that may be used to assess these issues.

In July, the AdC published an **Issues Paper**<sup>1</sup> focusing on the interplay between the digital economy and competition. In particular, the paper looks at the impact of **digital ecosystems, big data and algorithms**.

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<sup>1</sup> Digital Ecosystems, Big Data and Algorithms (July 2019):  
[http://www.concorrenca.pt/vEN/Estudos\\_e\\_Publicacoes/Estudos\\_Economicos/Other/Pages/Digital-Ecosystems-Executive-Summary.aspx?lst=1](http://www.concorrenca.pt/vEN/Estudos_e_Publicacoes/Estudos_Economicos/Other/Pages/Digital-Ecosystems-Executive-Summary.aspx?lst=1)

The paper addresses **key issues in digital markets** that may impact competition, including the specificities of digital ecosystems, network effects and multi-sided markets. It also looks at access to data and data portability and algorithms, among others.

We have seen **several reports** over the past months that have been excellent food for thought on digital issues. Our paper, which builds on these reports, reaches conclusions that are in line with them.

In our report, we chose to have a **greater focus on algorithms and their implications**.

Today I would like to share our insight into algorithms, and in particular pricing algorithms, and their impact on competition practice.

Big data allows companies to use algorithms that help them take decisions regarding prices. These **pricing algorithms** are mainly used in e-commerce or multi-sided platforms. For example, they may take into account sales volume, customer information and other market data to help companies take strategic decisions.

Companies also use pricing algorithms together with **monitoring algorithms**, which follow the pricing behavior of competitors. They allow for example for a real-time detection in price changes.

The point is: algorithms can be a **game changer in the way competition** takes place.

In an enquiry carried out in early 2019 by the AdC with companies active in e-commerce in Portugal, **37% of the respondents** said they **use software to track the prices** of the competitors, i.e. **monitoring algorithms**. Of these, most adjust prices according to the information received. If most adjust prices manually, 8% adjust them according to an automatic **pricing algorithm**.

So, it is key for competition agencies to better understand these new tools. They may already have impact in some marketplaces, or may have in the future, as they become more common.

Now let us look closer to algorithms, and how they can be facilitators of collusion.

Pricing algorithms, when used together with so-called monitoring algorithms, **make it easier for firms to collude**, both explicitly and tacitly:

**Explicitly**, because pricing algorithms can work as an **implementation mechanism** monitored by monitoring algorithms;

**Tacitly**, because there is increased **transparency**. Firms no longer face uncertainty regarding their competitors' strategies.

They may even buy the **same pricing algorithms** from a third party or use the same open-source software – an example of **explicit and/or implicit collusion**.

Explicit if the collusion between market operators occur in the context of a hub and spoke system where spokes coordinate their pricing strategies in the market through a common provider of algorithms.

Tacit if market transparency increases as firms understand the decision-making process of their competitors.

In addition, we also have **self-learning algorithms** which may lead to collusive equilibria on their own. Here competition analysis is still rather speculative.

Concerns include their **black box nature**, as well as the capacity for continuous optimization.

Perhaps most worrisome, we can envisage a collusive outcome where the developer did not anticipate the algorithm to behave that way, raising **liability concerns**.

In this case, as in the other cases, competition enforcers need to be able to **ascertain responsibility** for the behavior.

Let us take a closer look at what this all looks like in practice.

Most algorithms allow firms to set rules. Firms may, for example, set pricing rules to match the prices of their competitors or undercut them by a given percentage. Some of these simple-rule pricing algorithms include features **explicitly designed to avoid price wars**, which will see in just a moment.

For instance, **online marketplaces**, such as Amazon, have interfaces for third-party vendors (the so-called API, Application Programming Interface) which are built to be **used along with external pricing algorithms, or repricers**.<sup>2</sup>

This means that, to a certain extent, these marketplaces facilitate the use of external pricing algorithms by companies wishing to sell their products in such marketplaces.

Companies may use these algorithms to **automatically set minimum and maximum prices** according to a set of rules defined by the user. This can then limit the extent of undercutting between competitors.

Indeed the **range of parameters** available to companies is impressive. Companies can choose to incorporate information about their stocks. They can choose who to use as their benchmark, thus effectively picking and choosing their direct competition.

As said before, algorithms may also be **programmed to detect** and avoid price wars, using the **frequency and/or magnitude of price changes**. That is, firms may detect sudden or frequent price decreases in a given time span which may be price wars.

Once a price war is detected, a firm may set its algorithm to change pricing regimes. For example, an algorithm may include an **option to stop undercutting competitors** and, instead, return to the base price. And therefore avoiding a price war.

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<sup>2</sup> Amazon built an Application Programming Interface (API) for third party vendors to sell their products on the Amazon platform. The API also allows vendors to use third party algorithms that can monitor rivals' prices and set the vendor's price automatically. These algorithms are called "repricers".

Firms may also **define a “sleep mode” during which the pricing algorithm is inactive**. According to what is shown in the demonstration video of this specific pricing algorithm<sup>3</sup>, this feature may be used “if you want to **force your competitors’ prices to increase**, by increasing your own price overnight”.

Firms may also use fora in the platform to communicate and disclose information on the implications of adopting different strategies when using pricing algorithms. This information may include, for example, the impact on profits of adopting certain strategies within the pricing algorithm.

This is an **example** of such communication that we have found online where market operators highlight the losses that may result from undercutting strategies.

This is **another example** that we have found in a **marketplace forum** where market operators highlight the losses that may result from competition while revealing that they are aware that this type of communication between sellers is not licit.

This shows that despite all the innovation and technology surrounding their business, they still communicate in an old-fashioned way, with old-fashioned, simple terms.

This said, the **monitoring** of prices from competitors are **not new** market features. Monitoring has always happened, over decades, over centuries.

However, **big data and algorithms have amplified these strategic interactions** and their potential effects.

In our recent Issues Paper, the AdC has warned that the **use of these tools as a way to coordinate strategies** in the market, or through the **subcontracting of pricing algorithms to a common supplier**, is **not compatible with competition law**.

As noted by Margrethe Vestager, EU Commissioner for Competition, in a conference in 2017 “companies can’t escape responsibility for collusion by hiding behind a computer program”<sup>4</sup>.

The main take away is: **firms are responsible for the algorithms they use**.

As a final remark, a word about the **importance of competition authorities understanding these new dynamics**.

New technologies bring added risk of anti-competitive practices, including abuse of dominance, but also collusion as we have seen.

And because of the digitization of the economy, they can be present in any type of economic activity – ranging from emerging business models to traditional sectors, such as telecommunications, transport and retail distribution.

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<sup>3</sup> RepricerExpress

<sup>4</sup> [https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/bundeskartellamt-18th-conference-competition-berlin-16-march-2017\\_en](https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/bundeskartellamt-18th-conference-competition-berlin-16-march-2017_en)

It is therefore essential that we are **aware and conscious** of these challenges **horizontally across our agencies** – not just in any specialized unit. Case handlers across the organization must be comfortable with new business models and new mechanisms for implementing anti-competitive practices in order to be effective in tackling them.

Thank you, choucran, merci de votre attention.