Algorithms are maximising profits for online retailers by colluding to keep prices high

By Graeme McLean   5 Mar 2019

Have you ever searched for a product online in the morning and gone back to look at it again in the evening only to find the price has changed? In which case you may have been subject to the retailer's pricing algorithm.

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Traditionally when deciding the price of a product, marketers consider its value to the buyer and how much similar products cost, and establish if potential buyers are sensitive to changes in price. But in today's technologically driven marketplace, things have changed. Pricing algorithms are most often conducting these activities and setting the price of products within the digital environment. What's more, these algorithms may effectively be colluding in a way that's bad for consumers.

Originally, online shopping was hailed as a benefit to consumers because it allowed them to easily compare prices. The increase in competition this would cause (along with the growing number of retailers) would also force prices down. But what are known as revenue management pricing systems have allowed online retailers to use market data to predict demand and set prices accordingly to maximise profit.

These systems have been exceptionally popular within the hospitality and tourism industry, particularly because hotels have fixed costs, perishable inventory (food that needs to be eaten before it goes off) and fluctuating levels of demand. In most cases, revenue management systems allow hotels to quickly and accurately calculate ideal room rates using sophisticated algorithms, past performance data and current market data. Room rates can then be easily adjusted everywhere they're advertised.

These revenue management systems have led to the term "dynamic pricing". This refers to online providers ability to instantly alter the price of goods or services in response to the slightest shifts in supply and demand, whether it's an unpopular product in a full warehouse or an Uber ride during a late-night surge. Accordingly, today's consumers are becoming more comfortable with the idea that prices online can and do fluctuate, not just at sale time, but several times over the course of a single day.

However, new algorithmic pricing programmes are becoming far more sophisticated than the original revenue management

systems because of developments in artificial intelligence. Humans still played an important role in revenue management systems by analysing the collected data and making the final decision about prices. But algorithmic pricing systems largely work by themselves.

In the same way that in-home voice assistants like Amazon Echo learn about their users over time and change the way they operate accordingly, algorithmic pricing programmes learn through experience of the marketplace.

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The algorithms study the activity of online shops to learn the economic dynamics of the marketplace (how products are priced, normal consumption patterns, levels of supply and demand). But they can also unintentionally "talk" to other pricing programmes by constantly watching the price points of other sellers in order to learn what works in the marketplace

These algorithms are not necessarily programmed to monitor other algorithms in this way. But they learn that it's the best thing to do to reach their goal of maximising profit. This results in an unintended collusion of pricing, where prices are set within a very close boundary of each other. If one firm raises prices, competitor systems will immediately respond by raising theirs, creating a colluded non-competitive market.

Monitoring the prices of competitors and reacting to price changes is normal and legal activity for businesses. But algorithmic pricing systems can take things a step further by setting prices above where they would otherwise be in a competitive market because they are all operating in the same way to maximise profits.

This might be good from the perspective of companies but is a problem for consumers who have to pay the same everywhere they go, even if prices could be lower. Non-competitive markets also result in less innovation, lower productivity and ultimately less economic growth.

What can we do?

This poses an intriguing question. If programmers have (unintentionally) failed to prevent this collusion from happening, what should happen? In most countries, tacit collusion (where companies don't directly communicate with each other) isn't currently seen as an illegal activity.

However, the companies and their developers could still be held responsible as these algorithms are programmed by humans and have the ability to learn how to communicate and exchange information with competitor algorithms. The European Commission has warned that the widespread use of pricing algorithms in e-commerce could result in artificially high prices throughout the marketplace, and the software should be built in a way that doesn't allow it to collude.

But as long as the algorithms are programmed to deliver the greatest profit possible, and can learn how to do this independently, it may not be possible for programmers to overcome this collusion. Even with some restrictions put in place, the algorithms may well learn ways to overcome them as they look for new ways to meet their objective.

Attempting to control the market environment to prevent conscious price monitoring or market transparency will also undoubtedly result in more questions and create new problems. With this in mind, we need to better understand this kind of machine learning and its capabilities before we bring in new regulations.

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