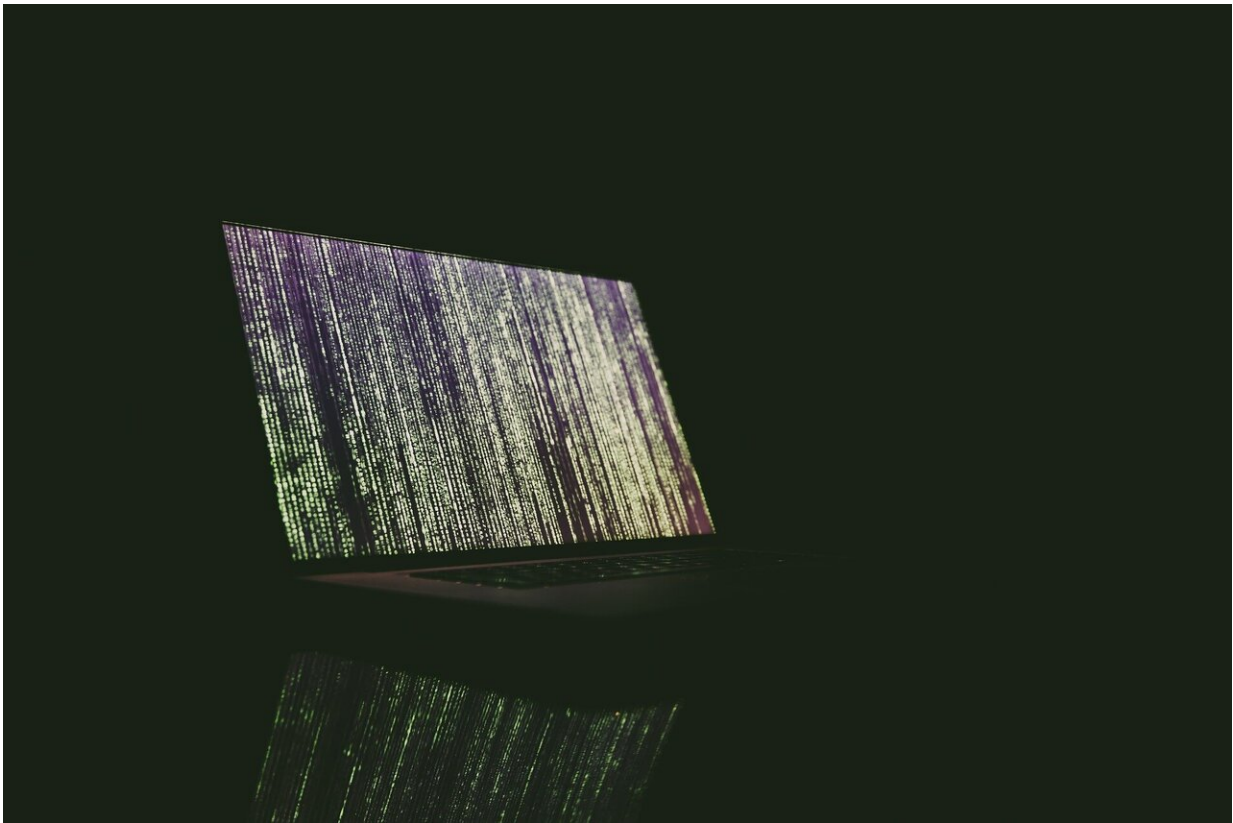# When AI is used to set prices, can inadvertent collusion be a result?

January 12 2021

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Machine learning and artificial intelligence (AI) are perfectly suited to help companies and marketers monitor and set prices based on real-time dynamic pricing. But new research has identified some possible

unintended consequences of AI in this area.

Machine learning algorithms don't always account for factors outside of the seller's control, such as competitor prices. Researchers found that if AI algorithms are setting prices over the long term, a monopolistic price effect is possible, essentially creating a collusive pricing environment in the marketplace. This represents a challenge for policymakers as the researchers show that independent AI pricing algorithms can result in supracompetitive market outcomes.

The research study to be published in the January issue of the INFORMS journal *Marketing Science*, "Algorithmic Collusion: Supracompetitive Prices via Independent Algorithms," is authored by Karsten Hansen and Kanishka Misra of the University of California, San Diego, and Mallesh Pai from Rice University.

The researchers study a setting where competitive online retailers are using machine learning algorithms to set real-time prices. Researchers add to a growing body of literature that has raised concerns that such algorithms might induce collusive pricing behavior. The authors then contributed to this literature and find that independent algorithms, without observing competitive prices, can result in supracompetitive prices.

Machine learning algorithms automate a pricing experimentation to learn the profit maximizing price. The researchers show the market outcome of independent firms using these algorithms depends on the quality of short pricing experiments. "We were able to show that where our price experiments had high information value (low noise), competitors' prices from independent algorithms inadvertently became correlated, and over time, prices became supracompetitive," said Misra. "This means that a consequence of using AI for pricing could be creating an atmosphere of price collusion in a given marketplace, leading to a monopolistic pricing

effect."

"The real-world impacts are quite broad," said Hansen. "The machine learning algorithms rely upon the informational value of the underlying pricing experiment data, and not all of the variables that feed market outcomes, such as competitors' prices, may be accessible to those systems. Our results provide guidance for when machine learning algorithms are less reliable for setting prices."

"We believe the identification of this pattern raises fresh practical concerns for managers and policymakers," said Pai. "The challenge for regulators in the future will be to strike a balance. There are existing antitrust concerns about algorithms that set collusive prices when tracking competitors' prices (e.g., through implicit threats of retaliation)." Pai continued, "Here we show that similar effects can occur even when the algorithms explicitly do not account for competitors' prices. They will need to take into account factors beyond the scope of what algorithms can identify and track, while working to ensure that competitive pricing does not always mean the same, monopolistic pricing structures."

Provided by Institute for Operations Research and the Management Sciences