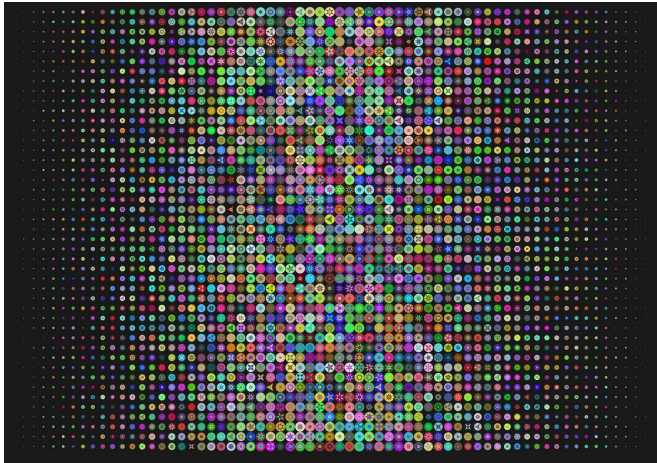


Can an AI algorithm mitigate racial economic inequality? Only if more Black hosts adopt it

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Machine learning algorithms can leverage vast amounts of consumer data, allowing automation of business decisions such as pricing, product offerings, and promotions. Airbnb, an online marketplace for vacation rentals and other lodging, created an algorithm-based smart-pricing tool that is free to all Airbnb hosts and allows hosts to set their properties' daily price automatically. A new study investigated the impact of Airbnb's algorithm on racial disparities among Airbnb hosts. Adopting the tool narrowed the revenue gap between white and Black hosts considerably, but because far fewer Black hosts used the algorithm, the revenue gap between white and Black hosts actually increased after the tool's introduction.

The study, by researchers at Carnegie Mellon University (CMU), is forthcoming in *Marketing Science*.

"The disparity in revenues earned by white and Black hosts has been the subject of a lot of

negative publicity for Airbnb in the last few years," explains Param Vir Singh, Professor of Business Technologies and Marketing at CMU's Tepper School of Business, who led the study. "Our results show that a smart-pricing algorithm can be effective in mitigating racial disparities, but that effectiveness is limited by the extent to which the tool is adopted."

The pricing algorithm was introduced in November 2015, and the study ran from July 2015 to August 2017. Researchers randomly selected 9,396 Airbnb properties in 324 [zip codes](#), primarily in seven large U.S. cities; 2,118 hosts adopted the algorithm during the study. Researchers looked at each property's average daily revenue by month. Hosts' race/ethnicity (white, Black, or other) was determined from profile photos of host pages.

Prior to the introduction of the algorithm, white hosts earned \$12.16 more in daily revenues than Black hosts after controlling for other observed [host](#), property, and neighborhood characteristics. While both Black and white hosts charged similar [prices](#) for their properties, demand for rentals hosted by Black hosts was 20% less than that for white hosts. This suggests the presence of racial biases among Airbnb guests against Black hosts, the researchers concluded.

Adopting the algorithm benefited Black hosts in the study more than white hosts, according to the study. This is because it led to a much larger increase in demand for rentals hosted by Black hosts than for rentals hosted by white hosts, largely because demand for rentals hosted by Black hosts was more responsive to price changes than that for rentals hosted by white hosts.

But Black hosts were 41% less likely than white hosts to adopt the algorithm. Thus, while adopting the tool narrowed the revenue gap between white

and Black hosts in the study, when researchers applied their findings at the population level, the [revenue](#) gap increased.

Even though Black and white hosts faced different demand curves, the price suggested by the algorithm was the same across Black and white hosts. This is because the algorithm pools the data of Black and white hosts to determine the same optimal price for both groups, in effect, ignoring racial differences between hosts. As a result, although the optimal price suggested by the algorithm should lie between the optimal price for Black hosts and the optimal price for white hosts, since fewer Black hosts adopted the algorithm, the suggested optimal price is likely to be closer to the optimal price for white hosts and farther than that for Black hosts.

"Our study has implications for policymakers and managers," says Kannan Srinivasan, Professor of Management, Marketing, and Business Technologies at CMU's Tepper School, who coauthored the study. "For policymakers, our study shows that when racial biases exist in the marketplace, an algorithm that ignores those biases may not succeed in reducing [racial disparities](#)."

"Given the much lower rate of adoption of the algorithm by Black hosts than white hosts, managers may want to devise strategies to encourage Black hosts to adopt the algorithm," Shunyuan Zhang, Assistant Professor of Marketing at Harvard Business School and co-author added. "Otherwise, an [algorithm](#) that could reduce disparities may end up increasing them."

More information: Zhang, Shunyuan et al, Can an AI Algorithm Mitigate Racial Economic Inequality? An Analysis in the Context of Airbnb (January 21, 2021). [DOI: 10.2139/ssrn.3770371](https://doi.org/10.2139/ssrn.3770371)

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