DECEMBER 17, 2024

The Cost of Anticompetitive Pricing Algorithms in Rental Housing

Housing costs remain one of the biggest challenges for many American households. While the root cause of high housing costs is the under-supply of housing, insufficient competition in the housing industry exacerbates the costs significantly. In this CEA analysis, we quantify the anticompetitive impact of algorithmic pricing on rents across the country to demonstrate how households are harmed when competition in rental housing is weakened. We find that anticompetitive pricing costs renters in algorithm-utilizing buildings an average of $70 a month. In total, we estimate the costs to renters in 2023 was $3.8 billion. This estimate is likely a lower bound on the true costs.

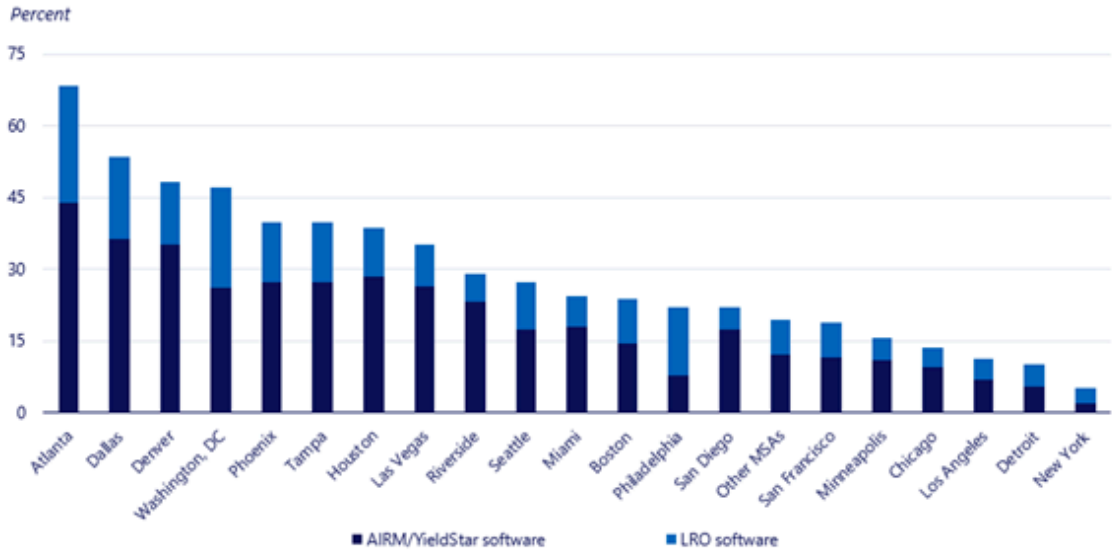
Our findings underscore the importance of the Biden-Harris Administration's efforts to lower costs and promote competition. Last year, the Administration's crackdown on junk fees in rental housing markets led to increased price transparency on major rental listing platforms, making it easier for renters to compare prices. Earlier this year, the FTC and DOJ filed a joint legal brief explaining that the law banning price fixing applies even when an algorithm is used for pricing instead of a human, and even if the algorithm is only a price recommendation. In August, the DOJ, together with eight State Attorneys General, filed a lawsuit against technology company RealPage for its alleged monopolization of the market for software that landlords use to price apartments, and for decreasing competition among landlords.[1]

Algorithmic pricing weakens competition because it can facilitate price coordination among landlords who would otherwise be competing. Our analysis indicates that if price coordination was eliminated, there would be an economically meaningful decrease in price mark-ups for rental units using pricing algorithms.

Background on rental pricing algorithms

Rental pricing algorithms use extensive market data to predict and recommend profit-maximizing rents. RealPage is the primary provider of rental pricing algorithms for multifamily housing. Its main pricing software is "AI Revenue Management" (AIRM, formerly "YieldStar"), but RealPage also owns "Lease Rent Options" (LRO), which it acquired from its main competitor in 2017. The two software products are used in at least 10% of all rental units nationally. Using data on software usage from a RealPage report and the American Community Survey, we estimate that in the multifamily housing sector nearly 1 in every 4 rental uses a RealPage pricing algorithm.[2] As shown in Figure 1, usage rates vary widely across metropolitan areas.

Figure 1. RealPage Rental Pricing Software Usage: Share of Multifamily Rental Units by Metro in 2023



Council of Economic Advisers
Sources: RealPage, American Housing Survey, American Community Survey; CEA calculations.
Note: Multifamily units are in buildings with at least five units. Each label refers to a metropolitan statistical area (MSA). "Other MSAs" is defined as average over all MSAs not listed above.
As of December 12, 2024 at 8:00am.

In our analysis, we do not quantify the overall effect of algorithmic pricing on rents, but instead isolate the anticompetitive effect of price coordination.[3] Pricing algorithms may help landlords and building managers set prices that are more responsive to market conditions, which could increase market efficiency in a competitive market. But the algorithms can also facilitate price coordination, which decreases market efficiency by harming competition. Small yet coordinated landlords can act as if they are a single dominant landlord, and use their collective market power to increase profits by setting higher prices. When algorithmic recommendations are based on profit-

maximizing prices for a set of landlords collectively, the algorithm will recommend prices that are higher than the profit-maximizing price each landlord would set independently.

While some landlords might achieve higher profits by setting lower prices than recommended by the algorithm, it appears RealPage takes extensive measures to prevent such behavior. As alleged in the DOJ complaint, RealPage pushes its software users to turn on the auto-accept setting so that price recommendations are automatically accepted. The complaint also alleges that the process of rejecting a price recommendation can be onerous. For instance, in order to reject a recommendation from AIRM software, users must provide a "business" reason for doing so, and they must do so separately for each floorplan in the building. When it is costly for software users to override algorithmic recommendations, supracompetitive prices—prices above what would occur under normal competition—can be sustained.

The anticompetitive effect of pricing algorithms has a meaningful impact on rent levels

We quantify the costs to renters of anticompetitive rental pricing among RealPage software users by comparing coordinated prices to the prices predicted by a model of independent profit maximization. The difference between the coordinated price mark-up and the independently-set price mark-up is our estimate of the coordination cost. We estimate the cost for each metro area included in the RealPage data on software usage for 2023.

Our cost estimate relies on the assumption that observed rental prices reflect algorithmic coordination, which is supported by prior research. A recent analysis conducted by researchers at the Wharton School uses highly detailed rent and occupancy data to statistically test whether or not algorithmic price coordination occurs. The analysis finds empirical support for price coordination among landlords using the same pricing software. Our methodology builds off of the Wharton School research and uses more recent, publicly available data.

We find that coordinated rents from algorithmic pricing cost renters in algorithm-utilizing units $70 a month, or 4% of rent, on average nationally. In six major metros, the cost exceeds $100 a month. Monthly costs of price

coordination for units using RealPage software by metro are shown in Figure 2. The total cost to renters in 2023 was approximately $3.8 billion.

Figure 2. Average Monthly Cost of Price Coordination for Units using RealPage Software in 2023

Council of Economic Advisers
Sources: American Housing Survey, American Community Survey, RealPage, *Calder-Wang and Kim (2024)*, Zillow Observed Rent Index; CEA calculations.
Note: Each observation is a Metropolitan Statistical Area (MSA). Average is over units using AIRM/YieldStar software and LRO software. "Other MSAs" is defined as average over all MSAs not listed above.
As of December 12, 2024 at 8:00am.

To arrive at our estimate, we follow three main steps. First, we approximate the aggregate elasticity of demand that is faced by the group of rental units using the AIRM/YieldStar software, and the group using LRO software. The elasticity of demand captures how sensitive renters are to price increases, which provides a measure of market power. Next, we combine the elasticity estimates with data on market-rate apartment rents to calculate price mark-ups under coordinated prices. For data on rents, we use the Zillow Observed Rent Index for multifamily housing. Finally, we calculate the price mark-ups that would occur if prices were set independently across competing buildings that use the same software, and take the difference between the two price mark-ups. See our Appendix for the estimation details.

Crucially, the estimates are an approximation based on several simplifying assumptions and limited data. The data we have from RealPage and Zillow measure both algorithm usage and rental prices at the level of a metro area, and not at the level of a rental unit. But in reality, the costs to renters of landlords using algorithms to collectively maximize profits differ across individual rental units. The cost for each unit depends on the characteristics of the unit and the availability of alternative units, among other market-specific factors which we do not capture with our data. Thus, we interpret

the estimates as informative of the magnitude of cost averages, rather than as precise values.

Moreover, the estimates likely understate the true aggregate cost of landlords using algorithms to collectively maximize profits because they do not include the price effects on rental units that do not use pricing algorithms. In other words, our analysis captures the partial equilibrium effects of price coordination, but not the full equilibrium effects. In the full market equilibrium, higher rents set by algorithm-utilizing landlords lead to higher rents set by non-algorithm utilizing landlords as well.[4] The equilibrium price effects on units not using pricing algorithms will be larger in areas where housing supply is more constrained, all else equal.

The aggregate costs to renters of the full equilibrium effects are likely large, even if the per-unit price effect is small, because many units are affected. We therefore view the cumulative estimate of $3.8 billion in 2023 as a lower bound on the true cost to renters nationally. Regardless, our estimate indicates that eliminating this cost would meaningfully decrease price mark-ups for rental housing across the country.

---

[1] Our analysis was conducted using publicly available data, independent of DOJ and its lawsuit.

[2] RealPage reports usage rates for AIRM/YieldStar and LRO software in May 2023 as a share of the total rental units in the 2022 American Community Survey (ACS). To calculate software usage as a share of multifamily rental units (defined as rent units in buildings with 5 or more units), we multiply the rates in the RealPage report by the total rental units in the 2022 ACS and then divide by the total number of multifamily rental units, measured using data from the 2023 ACS and American Housing Survey. We make this adjustment to the RealPage reported rates because the software is specifically intended for apartment buildings, so it does not make sense to include non-multifamily units in the denominator.

[3] Our analysis focused on the cost to renters of landlords collectively maximizing profits through algorithmic pricing; however, collective profit

maximization is not the only way in which landlords may charge renters prices above what would occur under normal competition.

[4] The result comes from the fact that prices are strategic complements. A non-software utilizing landlord will face higher demand when the software-utilizing landlords raise their rents, and find it optimal to raise their prices as well because demand is sufficiently concave (*Calder-Wang and Kim, 2024*).