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Office of the Secretary
Federal Trade Commission
600 Pennsylvania Avenue NW
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Re: The Sixth and Seventh of the FTC's Hearings on Competition and Consumer Protection in the 21st Century, and Specifically, How Algorithmic and Data-Driven Pricing Exacerbate The Consumer Harm Associated with Market Power and Give the FTC a Mandate to More Vigorously Enforce the Antitrust Laws

Dear Commissioners,

I commend the FTC for holding hearings on the challenges posed by algorithms and data to competition policy in the 21st century. Debates regarding algorithms, data, and antitrust have so far focused too much on data as a barrier to entry and algorithms as facilitators of collusion and not enough on the power that data and algorithms give firms to raise prices to consumers, quite independently of any power algorithms and data may give firms to reduce competition in their own industries. How can algorithms and data possibly raise prices without harming competition? Because algorithms and data enable firms better to exploit market power to the detriment of consumers, a fact that makes algorithms and data relevant to antitrust enforcers deciding how much power to allow firms, even if algorithms and data do not directly harm competition.

Personalized Pricing¹

One way in which algorithms and data enable firms to more fully exploit market power to the disadvantage of consumers is by allowing firms to (1) identify individual consumers at the point of sale, (2) determine the maximum that consumers are willing to pay, and (3) personalize prices at those maxima. Such personalized pricing – called first-

¹ For more on the material discussed in this and subsequent sections, see Ramsi A. Woodcock, *Big Data, Price Discrimination, and Antitrust*, 68 HASTINGS L.J. 1371 (2017); Ramsi A. Woodcock, *Price Discrimination as Monopolization*, 51 CONN. L. REV. ____ (2019) (forthcoming); Ramsi A. Woodcock, *The Bargaining Robot*, CPI ANTITRUST CHRON., May 2017, at 40.

degree price discrimination by economists – increases profits, and harms consumers, relative to traditional one-size-fits-all pricing, because it liberates firms from the discipline of the marginal consumer. If a firm wants to sell a given quantity of output to a group of buyers at a uniform price, the firm must choose a price that the buyer with the lowest willingness to pay, out of the group, can afford, otherwise the firm will miss its sales target. But that means that, apart from that lowest-willingness-to-pay buyer, every other buyer pays less than that buyer's own willingness to pay. By giving the firm the ability to charge different prices to different buyers, personalized pricing allows the firm to raise prices for all of the “below-marginal” or “infra-marginal” buyers, up to the maximum willingness of each buyer to pay, while still charging a price that the marginal buyer can afford. Because willingness to pay is a measure of the value consumers place on the products they buy, the raising of all prices to maximum willingness to pay represents the appropriation from consumers of all of the value created for them by production. Consumers are left only slightly better off than they would be were they to make no purchases at all.

For the moment, firms appear focused on tailoring prices to groups instead of individuals, a practice called third-degree price discrimination by economists. For example, Uber engages in route-based pricing, which might involve charging riders in Manhattan higher prices than riders in Queens for trips of identical length, because Uber's data shows that Manhattan riders as a group are willing to pay more. Group-based pricing is less lucrative than personalized pricing, because prices remain uniform within each group. Some Manhattan Uber riders are doubtless willing to pay more than others, but Uber charges them all the same price, albeit a higher price than what Uber charges to Queens riders.

Given the less lucrative character of group-based pricing, firms have embraced it only because they have so far been unable to go further to implement personalized pricing. Firms may still lack enough data to look inside groups to identify the willingness to pay of individuals or perhaps firms wish to use group-based pricing gently to acculturate consumers to the idea that they have no right to the prices charged to others before subjecting consumers to the indignity of individually-tailored prices. As firms amass more data, expand their ability to process it, and continue to accustom consumers to receiving prices different from their peers, firms will surely start to implement personalized pricing.

A Second Dimension of Power

When they do, firms will realize the power to expand profits and harm consumers without needing to undermine whatever level of competition happens to prevail in the market. The power of personalized pricing to harm consumers along a second dimension quite independent of market power is best illustrated by the following numerical example. Suppose that a firm sells a product to a market of three consumers, who value the product at \$3, \$2, and \$1, respectively, and that the cost of producing the product is \$4. In a market of differentiated products, perfect competition will drive price to \$2, at which two units are sold and total revenue of \$4 just covers costs. Now suppose that the firm acquires enough data to personalize prices. The firm will raise the price charged to

the \$3 consumer from \$2 to \$3, allowing the firm to earn a profit despite remaining in a competitive market. That \$1 of profit represents the redistribution of all of the gains from trade once enjoyed by consumers over to the firm, leaving consumers with zero value from the product once the prices they pay are taken into account. This remarkable increase in profit at the expense of consumers is accomplished without any harm to competition – the market remains as competitive as ever.

An Efficiency Worthless to Consumers

At this point, the objection normally arises that the losses suffered by inframarginal consumers as a result of personalized pricing may be offset by gains to new consumers who can now receive personalized prices below the uniform price that the firm would otherwise charge. The firm could not sell to these consumers at a uniform price because reducing that price to a level those consumers would be willing to pay would have required reducing prices to all buyers, not just those low-willingness-to-pay consumers, and the losses from doing so would have exceeded the gains from selling to these additional consumers. By contrast, the price-personalizing firm can sell to those low-willingness-to-pay consumers without reducing the prices charged to others. The firm can charge a price to the \$1 consumer that the \$1 consumer can afford, permitting the firm to sell a third unit, an expansion in output that represents an increase in efficiency, and perhaps in gains to consumers as well, that might offset the losses to inframarginal consumers and render personalized pricing benign.

While it is true that personalized pricing is efficient in the sense that it increases output, that efficiency is of no value to consumers, because personalized pricing also permits firms to capture all of the gains from the expansion in output. No firm will choose to charge the \$1 consumer \$0.50 or \$0.75 if the firm knows that the consumer is willing to pay \$1. The firm will charge the \$1 consumer \$1, leaving that consumer with no gains to show for having been brought into the market to consume the firm's expanded output.

Competition as Antidote

Personalized pricing harms consumers by giving firms the power to undermine the safety umbrella created for them by the inflexibility of uniform pricing, a power that is distinct from the market power that comes from undermining competition. But the distinction between power due to personalized pricing and power due to anticompetitive conduct does imply that antitrust has no role to play in limiting the harmful effects of personalized pricing on consumers, because the extent, if not the existence, of power due to personalized pricing is determined by the level of competition in markets.

The more competition a firm faces from undifferentiated, rather than differentiated, products, the smaller the price increases made possible by personalized pricing, and the less the harm to consumers. If competitors sell products that are very similar to those of the price-personalizing firm, then the willingness of all consumers to pay for the firm's product will converge to the same level, because all consumers will be able to get the exact same product elsewhere at the same alternative price. The special

preference of some consumers, relative to others, for the product, can no longer be reflected in different willingnesses to pay, because all can buy the same product elsewhere for the same price. Thus willingness to pay in our numerical example will in a competitive market converge to the original competitive price of \$2, even if the firm personalizes prices.

Antitrust enforcers can therefore limit harm to consumers from personalized pricing by stopping practices, such as refusals to deal in intellectual property rights, that prevent close substitutes from entering markets. Indeed, personalized pricing requires enforcers to act, because personalized pricing increases the harm to consumers associated with these anticompetitive practices, throwing more of these practices across the harm threshold required to make them violations of the antitrust laws.

Competition in Personalization

One possible critique of the notion that personalized pricing represents a threat to consumers is that even without competition from close substitutes, competition in the personalization of prices itself will prevent firms from using personalized pricing to extract all of the gains from trade from consumers. When the firm in our numerical example personalizes a price increase for the \$3 consumer from \$2 to \$3, other firms cannot respond competitively so long as these other firms lack the ability to personalize prices themselves. These other firms are presumably already charging uniform prices that maximize their profits, and lowering their prices to try to attract the business of that exploited \$3 consumer can therefore only reduce these firms' profits.

But the situation changes if these firms acquire the power to personalize prices themselves, for now they can compete for the business of each buyer on a personalized basis, and need not sacrifice profits from some consumers in order to lower prices to others. These firms may reduce their prices to the \$3 consumer, reducing that consumer's willingness to pay the first firm to an amount below \$3, because now that consumer can buy alternative products at lower prices. This then prevents the first firm from raising price to that consumer all the way up to \$3, and if competition is fierce enough, prices will fall back down to \$2, the amount needed to cover production costs. The market now remains just as competitive as it was before the onset of personalized pricing, except that competition for the \$1 consumer will have pushed prices down for that consumer as well, and so output will have expanded, and consumers, instead of the firm, will now have appropriated all of the gains from trade.

This is an important objection, but it actually strengthens the case for using vigorous condemnation of anticompetitive practices to counteract personalized pricing, because it shows that more competition of all kinds, not just competition from very close substitutes, can counteract the harmful effects of personalized pricing. If, as in the example in the last paragraph, competition in the personalizing of prices, whether from differentiated or undifferentiated products, is vigorous, then personalized pricing inflicts no harm on consumers and even benefits them, by bringing more consumers into the market. But if competition in the personalizing of prices is weak, then competition from other firms will not drive personalized prices all the way down to costs, and so some

consumers will suffer. Whether the benefits to consumers of expanded output outweigh the losses in terms of higher prices to inframarginal consumers will depend on the extent of the rise in price, the value placed by inframarginal consumers on the good, and the value placed on the good by the new consumers brought into the market. As competition falls off, gains to consumers will fall until the balance goes against consumers, and in the limiting case consumers will suffer a total loss of their gains from trade, just as in the original numerical example given above. Thus if competition is great enough, personalized pricing will benefit consumers, but if competition is too low, consumers will be made worse off. Personalized pricing here still changes the consumer welfare effects of any given level of competition, magnifying the harm to consumers of less competitive markets and increasing the benefit to consumers of more competitive markets.

A Mandate for Antitrust Reform

Because personalized pricing magnifies the harm created by uncompetitive markets of all kinds, the rise of personalized pricing creates a broad mandate for antitrust enforcers to ramp up enforcement of the antitrust laws relative to current levels. Suppose, for example, that today the FTC would approve a merger that results in only four large firms remaining in the market, but block one that results in only three large firms remaining in the market, out of concern that in the case of three remaining firms any reductions in price due to efficiencies associated with the tieup would be negated by the increased market power of a firm having only two significant competitors. The possibility that the industry will embrace personalized pricing after the tieup should now trigger blockage of both the merger to four dominant players and the merger to three dominant players, reflecting the increased harm inflicted by market power on consumers in a world of personalized pricing. Levels of market power in an industry with only four large firms are likely high enough to fall within the zone of market power for which personalized pricing will reduce aggregate consumer welfare, preventing consumers from gaining from the efficiencies created by the merger.

A similar calculus should influence the error cost considerations that go into the FTC's decision whether to bring any case. In recent decades, antitrust enforcers have been careful to bring rule of reason cases against only those firms most likely to be engaged in consumer-harmful conduct, out of concern that should a firm not actually engaged in harming consumers be mistakenly condemned, consumers will suffer. Because personalized pricing magnifies the harm to consumers from failing to condemn firms with genuinely large amounts of market power, personalized pricing places new weight on the error cost scale in favor of bringing cases when doubt about harm exists.

Dynamic Pricing²

Dynamic pricing, another pricing practice that has been supercharged by the algorithms and data revolutions, but which is far more common today than is personalized pricing, provides a separate ground for increased antitrust enforcement.

² For more on dynamic pricing, see Ramsi A. Woodcock, *The Efficient Queue and the Case against Dynamic Pricing* (2018) (working paper), <https://ssrn.com/abstract=3230425>.

Both personalized pricing and dynamic pricing have a temporal component. Unless all buyers purchase simultaneously, even personalized pricing involves changing prices over time based on the identity of the purchaser. Dynamic pricing is distinguished from personalized pricing by the kind of information dynamic pricing uses to vary prices. Whereas personalized pricing uses old information to personalize prices, dynamic pricing updates prices based on new information about demand. Because dynamic pricing is characterized by its response to new information, not the extent to which the pricing is tied to individuals or groups, the varying of any kind of price, whether personalized or market-wide, counts as dynamic pricing so long as the price change represents a reaction to new information. Data-revolution-enabled dynamic pricing has spread across the economy over the last ten years, becoming a part of everything from the pricing of airplane tickets, to stocks and bonds, to Broadway shows, to Disney World, to hundreds of thousands of the products sold by Amazon.

Dynamic pricing can benefit consumers, for instance when new information shows that demand is less than expected, and firms reduce prices in order to move inventory, but dynamic pricing can also harm consumers, as when new information reveals that consumers are desperate to buy, allowing firms to increase prices accordingly. A responsible antitrust policy, operating under a consumer welfare standard, should view this risk of harm to consumers as unacceptable, unless dynamic pricing affords firms profits they need to grow the economy and benefit consumers in the long run.

Dynamic pricing does no such thing, however, because of the wealth of the pre-information-age world out of which dynamic pricing arose. The world of ten or fifteen years ago, before the data revolution spread dynamic pricing, was characterized by innovation and growth, giving rise, for example, to the smartphone revolution. Clearly, markets afforded enough profit opportunities to firms to create the incentives for innovation and risk-taking that are key to economic growth. It follows that the economy has no need for the additional profit opportunities afforded firms by dynamic pricing. The same argument may be made of personalized pricing, which also increases firm profitability where none is needed, while exposing consumers to the risk of loss in markets in which there is sufficient market power.

Dynamic pricing, like personalized pricing, is more pronounced in its effects the greater the market power of firms, because market power gives firms more control over price, affording more dynamic adjustments. Antitrust enforcers should therefore treat evidence of data-driven dynamic pricing in the same way that they should treat evidence of personalized pricing: as a factor exacerbating the harmfulness of market power and militating in favor of condemnation of the anticompetitive practices at issue. Given the prevalence of dynamic pricing today, dynamic pricing also provides a reason for enforcers to ramp up enforcement today, to counteract the increased harm inflicted on consumers by dynamically-priced market power.

In the case of both dynamic pricing and personalized pricing, it should be emphasized that the threat posed by the practice comes from its combination with the

tools – big data sets and powerful algorithms – of the data economy. Dynamic and personalized pricing existed before the information age – firms always have adjusted prices based on new information and hawkers in the bazaar personalized prices – but without contemporary information technology, these practices could not be deployed at the scales and with the frequencies that today make them an important challenge to the consumer protection mission of the antitrust laws. I am

Very sincerely yours,

A handwritten signature in black ink that reads "Ramsi Woodcock". The signature is written in a cursive, flowing style with a large initial "R".

Ramsi Woodcock.