

Algorithmic Pricing, Anticompetitive Counterfactuals, and Antitrust Law

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I. Introduction

One of antitrust law's core contributions to social welfare is to prohibit explicit collusion between would-be competitors on price. As economist George Stigler observed, without a legal ability to collude, firms must rely on [informal means](#) to stabilize an understanding to set prices above marginal costs. They must be able to reach a mutual understanding on what prices to set without communicating and agreeing on price (which would be illegal); they must be able to detect deviations from that understanding; and they must be able to punish such cheating.

These conditions for sustaining uncompetitive outcomes are undoubtedly met in some contexts. But antitrust law, for the most part, accepts these unfortunate outcomes for two basic reasons. First, there is a recognition that such coordination, while possible, is difficult to achieve in many settings. Firms in relatively unconcentrated markets, for example, may find it difficult to reach an understanding on optimal prices. Markets in which demand and costs fluctuate make reaching such understandings more difficult and, moreover, make it harder to detect cheating: Was a drop in sales at a firm caused by cheating or by a [drop in demand](#)?

Second, even in markets where there is a high degree of confidence that a cooperative outcome is manifest, crafting an appropriate remedy poses a formidable [challenge](#). As then-Judge Breyer once [wrote](#), “[I]t is close to impossible to devise a judicially enforceable remedy for ‘interdependent’ pricing. How does one order a firm to set its prices *without regard* to the likely reactions of its competitors?” Given that reliance on competition to promote socially desirable outcomes rests on an assumption that firms will act in their own self-interest, and given that telling firms not to act in their self-interest is impracticable in any event, law cannot do much to remedy independent action that leads to cooperative outcomes.

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Given these two reasons, antitrust law typically eschews attempts to address tacit collusion directly and instead relies on merger law to impede the emergence of concentrated markets that are conducive to tacit collusion.

Algorithmic pricing changes the prospects for tacit cooperation amongst firms and, therefore, has implications for merger law. The [burgeoning](#) literature identifies several different kinds of algorithmic pricing, from manually generated pricing formulae to artificial intelligence–driven algorithmic pricing (AI pricing). The literature also identifies different anticompetitive concerns about such pricing. Some of the concerns relate to algorithmic pricing supporting an [illegal cartel](#). Agreements between competitors to rely on a particular pricing algorithm are illegal under existing law, which makes sense in part because there is a straightforward remedy: do not agree with a competitor on pricing algorithms.

The more difficult policy issues arise with AI pricing that does not support an otherwise illegal agreement. Independently adopted, and therefore legal, AI-pricing technologies may support cooperative outcomes more effectively than human-driven pricing. [The literature identifies several reasons for this dynamic](#). As a base condition, data on pricing are increasingly available. In the future, AI will allow the gathering of even more data, either directly or through inference. For example, a sophisticated [AI pricing package may be able to infer that a rival has lowered price](#) from outcomes and data on costs and demand rather than observing price directly.

Moreover, especially as AI becomes more sophisticated, one would expect highly intelligent pricing strategies that not only learn from past patterns of pricing and outcomes but are also capable of making profit-maximizing decisions that turn on past patterns and anticipated reactions, and on raw data about demand and costs. AI pricing will also be capable of responding immediately to rivals' changes in price, which implies smaller gains from cheating on a pricing understanding.

In short, AI pricing may generate more profitable understandings that underlie cooperative outcomes, may be better able to detect cheating, and may be better able to mete out punishment for deviations by immediately updating the non-cheating firm's pricing to punish the cheater, all of which will stabilize monopolistic, cooperative pricing.

There are some skeptics about the importance of AI pricing for contemporary law. For example, economists Kai-Uwe Kühn and Steven Tadelis [observe](#) that markets in the real world are complicated and

that reaching agreement may not be feasible even with AI-pricing technology. But there is evidence that AI pricing is already affecting markets. Experiments reveal that machine learning tends to lead to anticompetitive outcomes in [simulations](#), and AI pricing resulted in supercompetitive prices in the [German gasoline retail market](#). Whatever the status quo, recent remarkable progress in AI and massive growth in data availability suggest that AI pricing will become both more powerful and less costly, which in turn will increase the future probability of monopoly pricing because of cooperative understandings between would-be competitors.

To be sure, AI pricing will not result in anticompetitive outcomes in all markets. Bidding on a massive, one-off project in a sealed bid auction, for example, may remain prone to uncoordinated outcomes given the short-run gains from cheating and the lag that likely exists before a cheater could be punished. And it is possible that some markets are too complex, or entry is too easy, for anticompetitive outcomes to be sustained. But, many markets that currently find it difficult or impossible to sustain cooperative pricing because of the complexity involved will become coordinated as data becomes more available and AI pricing becomes more powerful.

What can antitrust law do about this? As I elaborate below, the algorithmic pricing literature identifies two alternative paths, one conduct-based and the other structural. For example, with respect to conduct, antitrust law could address high prices directly, perhaps by banning [certain kinds of AI pricing algorithms](#), analogously to what it presently does by banning explicit price-fixing agreements. To address structure, antitrust law could challenge more mergers to reduce the prevalence of concentrated markets that are susceptible to [anticompetitive outcomes in the presence of AI pricing](#).

This Essay will focus largely on structural responses to AI pricing in antitrust, outlining the bulk of its argument in the context of merger law but also considering monopolization law and exclusionary conduct. Section II outlines the promise and shortcomings of relying on merger law in antitrust to address AI pricing. It argues that the relationship between the strictness of the law and the sophistication of AI pricing is not straightforward. In the short run, a stricter approach to merger review might well make sense, but as AI pricing becomes more sophisticated, merger policy ought to become *less* strict: if anticompetitive outcomes are inevitable with or without a merger because of highly sophisticated AI pricing, antitrust interventions to stop mergers will not affect pricing and instead will create social losses by impeding efficient acquisitions. Section III considers the same questions in the context of monopolization. Section IV concludes by

observing that the rise of AI pricing will strengthen the case for antitrust law to shift its focus away from high prices and static, allocative inefficiency and toward innovation and dynamic efficiency.

II. AI Pricing and Merger Policy

Professor [Michal Gal](#) and Professor [Daniel Rubinfeld](#) consider various responses to the dangers of coordinated behavior resulting from AI pricing, including merger law. Because AI-pricing technology may result in stable supracompetitive pricing even in markets with many firms, merger law, in their view, ought to be sensitive to AI pricing. In particular, they would have the law account for the risks of AI pricing by focusing on novel questions for merger review and by lowering concentration standards in assessing markets prone to uncompetitive outcomes. The novel questions would concern whether a particular merger would enhance AI pricing in a market, in which case the authorities ought to be more willing to challenge the merger. For example, if a merger gives a firm access to a database that would help sustain cooperation through AI pricing going forward, then perhaps the merger ought to be stopped. Or if a firm has a particularly powerful AI pricing tool, then perhaps its acquisition might harm competition by spreading the impact of that tool.

The concentration argument is straightforward: since AI pricing may sustain cooperative outcomes even where markets are not especially concentrated, merger authorities ought to scrutinize mergers for the prospects of anticompetitive cooperative outcomes at lower levels of concentration that would not be problematic under human-driven pricing.

These suggestions are sensible reactions to AI pricing at present. But they are less likely to be effective in the future. Currently, there are limitations on the availability of both data and AI-pricing technology such that mergers could well be motivated by access to either data or technology and should, therefore, be scrutinized accordingly. But data are increasingly available. Moreover, AI-pricing technology is in its relative infancy, and its costs will drop over time; its future ubiquity suggests that access to technology will not motivate many mergers going forward.

The idea of lowering concerning concentration thresholds to account for AI pricing also has force at present but will be less suitable in the future. The problem is that as AI pricing becomes more sophisticated, what we would now consider to be significantly unconcentrated markets may be prone to cooperative outcomes because of sophisticated AI pricing. That is, as AI pricing improves,

concentration levels will say less and less about the probability of cooperative outcomes on price.

This is not to say that all markets will always result in monopoly prices. For example, as noted above, markets with one-off, high-value transactions and secret pricing (e.g., sealed bid auctions) may remain competitive on price even with AI pricing. Markets with firms with radically different cost structures may also not support cooperative pricing. But while other factors may become more relevant, concentration levels, which merger law directly affects, may no longer affect anticompetitive pricing.

How should the law evolve as AI pricing evolves? It is superficially appealing to argue that if the first generation of AI pricing calls for stricter merger enforcement, then as AI pricing becomes extremely powerful, merger enforcement ought to become extremely strict. This would be wrong as a matter of policy, though perhaps consistent with current approaches to enforcement, as I will discuss.

If monopoly pricing is inevitable in a market, the concerns about anticompetitive pricing that motivate merger law at present become irrelevant: there will be anticompetitive pricing if the merger takes place, and if the merger does not take place, stopping the merger has no impact on pricing. If anticompetitive pricing is inevitable, as a matter of logic, merger law concerned about anticompetitive pricing should become permissive because anticompetitive pricing is not motivating the merger. Even a radical change in concentration from a merger or series of mergers would not affect the competitiveness, or lack thereof, of pricing.

The policy case for a permissive approach to mergers given the anticompetitive counterfactual from AI pricing sits uncomfortably with antitrust enforcement at present. Existing approaches to merger enforcement tend not to treat anticompetitive counterfactuals as supporting nonintervention, but rather the opposite. The U.S. Department of Justice and Federal Trade Commission Merger Guidelines (2023) provide a prominent example. Section 2.3.A [states](#) in part:

Prior Actual or Attempted Attempts to Coordinate.

Evidence that firms representing a substantial share in the relevant market appear to have previously engaged in express or tacit coordination to lessen competition is highly informative as to the market's susceptibility to coordination. Evidence of failed attempts at coordination in the relevant market suggest that successful

coordination was not so difficult as to deter attempts, and a merger reducing the number of rivals may tend to make success more likely.

The second sentence is straightforward to understand and plausible: a merger in the wake of failed attempts to cooperate seems more likely to have anticompetitive motivations and outcomes than a merger in a market without such failed attempts. On the other hand, it is less obvious why the Guidelines treat as a negative the fact that firms have engaged in explicit or tacit collusion in the past: if the purpose of the inquiry is to compare competition with and without the merger, then it might be reasonable to conclude that an anticompetitive outcome pre-merger would tend to *reduce* the negative competitive impact of the merger.

In the current state of the world, there are good reasons to treat a cooperative outcome amongst firms pre-merger as a negative for merger approval. First, there is the risk that the cooperative understanding will break down, perhaps because of conflict between the merging parties, while post-merger the understanding will be more stable—at the very least, the merger eliminates the risk of competitive conflict between the merging parties themselves.

Second, while cooperative outcomes pre-merger may not reflect competitive outcomes, they may not reflect monopoly outcomes either. There is a risk that a merger would aggravate the problem of supracompetitive pricing that exists pre-merger. For example, a duopoly may have a stable, shared understanding to set prices above competitive levels but is not able to have a stable understanding to set monopoly prices. A merger of duopolists will increase prices to monopoly levels. This is significant for merger review not just because a merger may harm competition even when markets are not competitive pre-merger, but also because the harms of higher prices are disproportionately worse if prices rise from supracompetitive levels than if they rise from competitive levels. This is because the marginal consumers priced out of the market when prices rise from supracompetitive levels value the product more than consumers who are priced out of the market when prices rise from competitive levels; all things equal, the social losses are greater in the former than the latter context.

Thus, there are justifications for current enforcement approaches to treat pre-merger cooperation as a negative for a merger. Those justifications lose force, however, in the presence of AI pricing. As AI pricing becomes more sophisticated, pre-merger cooperative outcomes will be more stable and more likely to mimic monopoly outcomes. Sophisticated tools with access to vast amounts of data will

recognize not just that cooperation is better than competition, given instant responses to lower prices by competitors, but also that cooperation at monopoly levels is better than cooperation at high but sub-monopoly-level prices. In such a case, there is considerably less reason to expect competition over price to be stronger without the merger, either because of instability or sub-monopoly pricing. Comparing the merger to the anticompetitive counterfactual without the merger, it will become difficult to substantiate an allegation that the merger would harm competition because of higher prices.

If a merger is not motivated by the prospect of higher prices or a more stable cooperative outcome among firms, the justification for intervention weakens dramatically—and justifications for lax policy strengthen—because it is more likely that the merger is motivated by efficiency considerations than anticompetitive considerations. For example, [Gal and Rubinfeld](#) note that if higher prices are not motivating a merger, a concentrative merger motivated by economies of scale would have positive social impacts. It could also be [that capital structure is more efficient](#) from a governance perspective with two firms' assets combined into one legal entity than in two legal entities. Whatever the specifics, the fact that the merger is motivated by something other than higher prices suggests that it is more likely to be motivated by efficiency gains and ought to be permitted. (Nonprice anticompetitive motivations are addressed in the Conclusion.)

This new world of increasingly anticompetitive counterfactuals is not all bad. At present, with a more aggressive merger regime and less effective coordination, it is more likely that markets will have competitive and, thus, efficient pricing but less likely that firms will make efficient merger decisions. The latter is true because while combining assets may or may not be efficient from either a productive or capital structure perspective, combining assets increases the probability of supracompetitive pricing. While merger review is intended to catch anticompetitive mergers, this review is inevitably imperfect. If the gains from anticompetitive mergers are great enough, then there is a bias to merge for anticompetitive reasons even if from a productive perspective it would be better if the firms stayed separate.

In the future with sophisticated AI pricing and a permissive merger regime, there is more likely to be supracompetitive pricing, but decisions to merge will be more efficient. A merger that creates a suboptimal capital structure or diseconomies of scale in order to achieve supracompetitive pricing will not make sense, given that supracompetitive pricing will occur regardless. Rather, would-be merging parties can set pricing considerations to the side and focus

only on the efficiency of the combination. This mitigates the harms of AI pricing and supracompetitive pricing.

Whatever productive efficiencies might accrue from a merger, a first-best world would be one in which aggressive, competitive pricing results regardless of the merger. For this to arise, antitrust would have to shift tactics. At the moment, independent behavior—even if cooperative—is legal, which creates space for independently adopted AI pricing to result in monopoly pricing even in unconcentrated markets. I am skeptical, as are [other commentators](#), that interventions to address AI pricing tools directly will succeed. Attempts to require AI pricing tools to ignore competitive reactions would run into the same problems that the law confronts in the “old” world of human-set prices: the authorities would essentially require the firm not to act in its self-interest, which is fraught with unintended consequences given the foundational role that economic self-interest plays in markets.

Alternatively, authorities could [punish anticompetitive pricing](#). The debate over treating tacit collusion as problematic under antitrust law has [long recognized](#) that doing so would be tantamount to price regulation, given that the authorities would require knowledge of the competitive price in order to punish supracompetitive prices. I am doubtful that the state would do an effective job of enforcing such a law at present, but in a future world of sophisticated AI pricing tools such price regulation [may be feasible](#). Just as AI pricing tools adopted by firms in the market could get access to data and vast computational power to converge on monopoly prices, the authorities could adopt AI tools that rely on extensive data and computing power to determine competitive price benchmarks. Judge Richard Posner’s decades-old [suggestion of fines for supracompetitive prices](#) becomes practical in this context.

The conclusion that merger law ought to become more permissive as AI pricing tools become more powerful holds, however, whether or not it becomes practical to regulate supracompetitive prices with AI regulatory tools. If it remains impractical to address supracompetitive pricing from AI pricing in a market, then mergers in many markets will not be motivated by the prospect of supracompetitive pricing because it will arise with or without the merger; given that the merger and the no-merger counterfactual are both equally anticompetitive, merger policy should be permissive in this case. On the other hand, if there are rational and effective interventions that deter supracompetitive pricing, then mergers will not be motivated by the prospect of supracompetitive pricing because it will *not* arise with or without the merger; merger policy should also be permissive in this case. While the world in which the law can

effectively address supracompetitive pricing is the better one from a social welfare perspective, merger policy to counter high prices will recede in importance in any event.

III. Monopolization

The rise of AI pricing has implications for more than just permissive merger policy; it also ought to render monopolization law more permissive. Monopolization cases often concern efforts by a dominant firm to protect its position not by competing effectively but by excluding competition. Outlawing such exclusionary behavior rests on various justifications, including two that will lose force in the presence of AI pricing.

First, there is a concern that a monopolist may seek to prevent entry in order to preserve monopoly pricing. In a world of AI pricing (and no practical regulatory response), however, it is predictable that monopoly pricing levels will exist regardless of entry conditions in many markets. The monopolist would rather realize all monopoly profits for itself than share them with an entrant, but this is inherently neutral from a social welfare perspective: whether monopoly profits are realized by the monopoly or shared by duopolists is irrelevant. There is no justification for preventing exclusion out of concern for higher prices if they would occur with or without the conduct.

Second, there is a concern that a monopolist may exclude a more efficient competitor, which may occur, for example, because of collective action problems that distort buyer choices to accept [exclusive contracts](#). In a world of AI pricing, this concern should also dissipate. Even with heterogenous costs, there will remain, in many cases, a joint profit-maximizing price that AI algorithms would be able to attain should there be entry. Because AI pricing would generate monopoly pricing whether or not there is entry, which implies that mergers are likely to be motivated by efficiency, merger policy ought to be permissive, as discussed. Thus, even if a potential entrant decides to acquire an incumbent monopolist rather than enter and compete with it, merger policy should adopt a permissive position. If a potential entrant has lower costs, it would be able, all things equal, to realize greater profits than the incumbent. It would make sense, therefore, for it to acquire the incumbent. There will remain a single firm and monopoly pricing in the market, but the more efficient firm will take over. There is no benefit to intervening with either merger or monopolization law, and indeed there is an efficiency gain from not intervening and allowing the more efficient firm to become dominant.

There are exceptions. For example, if the entrant is sufficiently efficient relative to the incumbent, it may be profitable for that entrant to set prices just below the rival's cost, thus capturing the market for itself. This too would result in a single firm serving the market, but at submonopoly prices, at least until the high-cost incumbent fully exits and becomes incapable of competing. Exclusion of such a radically more efficient competitor would be harmful. Similarly, exclusion of an innovative competitor with a better product could be harmful. Just as some markets are not prone to supra-competitive prices even with AI pricing, there will be some contexts where conventional anticompetitive concerns will arise with respect to exclusion. But this domain will shrink over time.

Conclusion: Dynamic Versus Static Efficiency

Merger policy and monopolization law designed to address concerns about high prices will become less important with the rise of AI pricing tools. If supracompetitive pricing, and attendant allocative efficiency losses, arise with or without a merger, or with or without exclusionary conduct, there is no pricing reason to stop mergers or exclusionary conduct. This does not imply that merger and monopolization law concerned about price will cease to have all force in all settings. For example, there will be markets that are not susceptible to supracompetitive, AI-driven pricing, such as those with only occasional, high-value transactions and secret pricing. And heterogenous costs across firms may imply that monopolistic exclusion could be harmful.

Concerns over pricing reflect concerns over static allocative efficiency: buyers priced out of the market create social deadweight losses. Much of antitrust enforcement is presently motivated by concerns over these static efficiency losses. AI pricing will predictably shift competition law's focus away from such concerns and toward areas that existing law inadequately and unsystematically addresses: [innovation](#) and [dynamic efficiency](#).

Mergers and monopolization may diminish competition in static models, but also are likely to influence innovation. The rise of AI pricing and the growing irrelevance of static efficiency considerations in merger and monopolization review ought to provide further impetus to antitrust enforcers to shift their focus away from the familiar but potentially less important question of static efficiency toward building a systematic approach to antitrust law and innovation. Antitrust will remain important in the presence of ubiquitous and sophisticated AI pricing, but AI pricing will strengthen the case for shifting emphasis from static to dynamic concerns.

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