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- Definition of antitrust markets and implications for competition when consumers are substituting between complements on a given platform and between platforms
- Tools and analysis of mergers between platforms

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### Behavioral Biases and Competition
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### Legal Papers
### PLATFORM COMPETITION

#### Analysis of competition in light of the multi-sided nature of digital platforms

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<td>Platform Competition</td>
<td>Multi-Sided Platforms</td>
<td>Multi-Sided Platforms</td>
<td>Andrei Hagiu and Julian Wright</td>
<td>2015</td>
<td>Increasingly, professional service firms are moving away from pure vertically integrated (VI) models in which all client services are provided by their employees (e.g. taxi companies), and towards the multi-sided platform (MSP) model, in which they enable independent contractors or professionals to deal directly with clients (e.g. Uber). In this paper, the authors study the economic trade-offs that organizations themselves face in order to further away from the MSP model. First, however, they provide a new definition of MSPs with two fundamental features: multi-sided platforms enable direct interactions between two or more distinct sides, and each of those sides is affiliated with the platform. Under this definition, network effects are neither necessary nor sufficient to classify a MSP. In their model, the authors identify a key trade-off between the need to coordinate decisions that generate spillovers across platforms (best achieved by a VI firm) and the need to both mobilize unobservable effort by professionals and ensure that they adapt their decisions to private information (best achieved by a MSP). The authors show how this baseline trade-off is impacted by the nature of contracts (&quot;make or buy,&quot; VI contracts and &quot;sale or employ&quot; MSP contracts) available to the firm or platform, as well as by professional pessimists' expectations (i.e. coordinating not to join) when deciding whether or not to join.</td>
<td>y</td>
<td>Andrei Hagiu and Julian Wright, &quot;Multi-Sided Platforms,&quot; International Journal of Industrial Organization 43 (2015): 162–174.</td>
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<td>Platform Competition</td>
<td>Multi-Sided Platforms</td>
<td>Information Gatekeepers on the Internet and the Competitiveness of Homogeneous Product Markets</td>
<td>Michael R. Baye and John Morgan</td>
<td>2001</td>
<td>This paper analyzes the equilibrium interaction between two platforms competing for price information (controlled by a profit-maximizing &quot;gatekeeper&quot;) and the homogeneous product market it serves. In the market for price information, consumers can choose a list of advertised prices and then buy from the lowest-priced seller or pass on the list of advertised prices. The gatekeeper charges fees to firms that advertise prices and to consumers who access the list of advertised prices. The level of activity in the market for information directly impacts the competitiveness of the product market, and this in turn affects the willingness of consumers and firms to participate in the market for information. The authors find that gatekeeper profits are maximized in an equilibrium where the product market exhibits the following four properties: price dispersion (variation in prices across sellers); access fees that are sufficient to cover all consumer subscriptions; advertising fees that exceed socially optimal levels, thus inducing partial firm participation; and advertised prices that are below unadvertised prices. Introducing the market for information has ambiguous social welfare effects.</td>
<td>y</td>
<td>Michael R. Baye and John Morgan, &quot;Information Gatekeepers on the Internet and the Competitiveness of Homogeneous Product Markets,&quot; American Economic Review 91 (3) (2001): 454–474.</td>
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<td>Platform Competition</td>
<td>Multi-Sided Platforms</td>
<td>Price Disclosure by Two-Sided Platforms</td>
<td>Paul Belleflamme and Martin Peitz</td>
<td>2019</td>
<td>Users of two-sided platforms often do not observe the price charged to users on the other side of the platform. Meanwhile, platforms may decide whether and to what extent to disclose this information. This paper examines how market outcomes are affected if platforms do not inform all users about prices charged to users on other sides of the platform. In particular, the authors focus on the strategic choices of platforms to disclose prices, which users can observe before making their participation decisions. Using standard models of competition between two-sided platforms, the authors find that, in equilibrium, a monopoly platform does not benefit from openess and optimally reveals price information. However, in a two-sided single-homing duopoly, platforms benefit from openness and, thus, do not have an incentive to disclose price information. In competitive bottleneck markets (users on one side single home while users on the other side can multi-home), results are more nuanced. If one side is fully informed (for exogenous reasons), platforms may decide to inform users on the other side either fully or partially or not at all, depending on the strength of cross-group network effects and the degree of horizontal differentiation between competing platforms.</td>
<td>y</td>
<td>Paul Belleflamme and Martin Peitz, &quot;Price Disclosure by Two-Sided Platforms,&quot; International Journal of Industrial Organization 87 (2019).</td>
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<td>Platform Competition</td>
<td>Multi-Sided Platforms</td>
<td>Platform Competition for Advertisers and Users in Media Markets</td>
<td>Markus Reisinger</td>
<td>2012</td>
<td>This paper analyzes a two-sided market model where platforms compete for advertisers and users. Platforms are differentiated from the user perspective but are homogenous for advertisers. Although there is standard competition for advertisers (platforms competing on price, which typically leads to all platforms pricing at marginal cost and making zero profit), the author shows that platforms obtain positive marginal profits in the advertising market. This is because users dislike advertising, so one platform cannot attract all advertisers by undercutting its competitor's price. Platform profits can increase as users' dislike for advertising increases, even as they spend less time on the platform. A key finding from this model is that factors that directly affect competition in the user market also indirectly affect the advertiser market. These direct and indirect effects are only apparent when incorporating competition on both sides of a platform into models of platform competition.</td>
<td>y</td>
<td>Markus Reisinger, &quot;Platform Competition for Advertisers and Users in Media Markets,&quot; International Journal of Industrial Organization 30 (2) (2012): 243–252.</td>
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<td>Platform Competition</td>
<td>Multi-Sided Platforms</td>
<td>Media See-Saws: Winners and Losers in Platform Markets</td>
<td>Simon P. Anderson and Martin Peitz</td>
<td>2020</td>
<td>This paper studies two-sided media markets where firms (media platforms), consumers, and advertisers interact. When media are ad-financed and consumers dislike advertising, the authors explore a media &quot;see-saw&quot; for advertiser and platform interests are aligned, while advertiser and consumer interests are opposed. The authors explore the conditions consumer surplus, but decreases advertiser surplus and total platform profits decrease with entry. A merger between platforms decreases consumer surplus, but advertiser surplus tends to increase. In contrast, when platforms use two-sided pricing or are differentiated from the user perspective but are homogenous for advertisers, like advertising, advertiser and consumer interests are often aligned. These considerations vary over to other two-sided markets, such as digital marketplaces that host shops in different product categories. It is important to note that the authors focus on situations where media consumers are &quot;single-home&quot; while advertisers are &quot;multi-home,&quot; and therefore competition is primarily for viewers. When consumers multi-home, see-saws seem unlikely to arise and competition for advertisers plays a stronger role than when consumers single-home.</td>
<td>y</td>
<td>Simon P. Anderson and Martin Peitz, &quot;Media See-Saws: Winners and Losers in Platform Markets,&quot; Journal of Economic Theory 188 (2020): 1–43.</td>
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<td>Platform Competition</td>
<td>Multi-Sided Platforms</td>
<td>Search Engines: Left Side Quality: Versus Right Side Profit</td>
<td>Alexander White</td>
<td>2013</td>
<td>Search engines display two main types of results: unpaid or &quot;organic&quot; links to other websites, selected according to the search engine's algorithm, and paid or &quot;sponsored&quot; links belonging to websites who bid to appear when users enter particular search terms. When a user clicks on an organic link, the search engine receives nothing. By side-by-side arrangement of organic and sponsored links generates a potential tradeoff for search engines. While high quality organic links are important to users, search engines often allow paid or &quot;sponsored&quot; links to appear in results, reducing the user experience. The search engine's profitability. This paper develops a model to clarify this tradeoff facing search engines, in which search engines must choose the quality level of organic results, as well as how much to charge merchants who bid for sponsored slots. The author uses this model to illustrate distortions in market power and quality of search results when there is a profit-maximizing monopoly search engine that chooses a level of search quality to offer its users. In addition, the model examines comparative statics between organic and sponsored slots. Finally, the author illustrates the price and quality implications of these comparative statics results in light of Google's 2007 acquisition of DoubleClick, an advertising firm.</td>
<td>y</td>
<td>Alexander White, &quot;Search Engines: Left Side Quality: Versus Right Side Profit,&quot; International Journal of Industrial Organization 31 (6) (2013): 690–701.</td>
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When choosing a platform to join, users form beliefs about the participation decisions of other users; a platform can gain competitive advantage if users expect the platform to attract other users. The authors call these "focal" platforms. Conversely, users may be reluctant to join "non-focal" platforms because they do not expect other users to join. This paper considers platform competition when one of the platforms has a focal position. In particular, the authors ask whether a high-quality, non-focal platform can overcome its disadvantage of being non-focal when competing against a low-quality, focal platform. The authors develop a model to study "partial focality" (user beliefs about focality which provide platforms a partial incumbency advantage) and focality advantage in static and dynamic environments. They find that a low-quality, fully focal platform dominates the market if network effects are more important to users than the quality gap between platforms. When the low-quality platform benefits from only a partial degree of focality, the high-quality platform can dominate the market (even though network effects are more important than the quality gap). As long as the focality advantage of the low-quality platform is below some threshold, dynamic considerations (e.g. platforms compete in multiple periods and the winning platform gains weak focality) make it more or less likely that the high-quality, non-focal platform wins the market, depending on how user beliefs evolve between periods.

This paper studies pricing strategies of competing firms that sell heterogeneous products to consumers in a social network. Goods are substitutes and there are network externalities between neighboring consumers. The authors show that there is an equilibrium in the first stage, firms compete on price in the second stage, individuals consume differentiated goods. In equilibrium, firms price discriminate based on network positions and charge lower prices to more central consumers. The authors also show that, under some conditions, it is possible for equilibrium profits to decrease when either the network becomes denser or network effects increase. Though consumers always benefit from being more connected to each other because this increases their utility, prices decrease due to intensified competition between firms. The authors determine the optimal network structure both for firms and consumers, and compare uniform pricing from the perspectives of firms and consumers.

To reach an efficient allocation of users on their platform, two-sided platforms need to coordinate among users on both sides. The literature on multi-sided platforms has emphasized the risks of price structure in solving coordination problems. For instance, platforms may set "negative" prices (i.e. users benefit without making pecuniary payments) on one side in order to enhance participation on that side. However, when a platform is constrained to set non-negative prices, one alternative is to rely on tying. In this paper, tying is not viewed as in the context of entry deterrence or price discrimination. Rather, the purpose of tying is to stimulate demand on one side in order to increase the membership value and profits on the other. The authors develop a model where a platform constrained to set non-negative prices ties the sales of another good with access to the platform as a way to relax the non-negativity constraint. They find that for a monopoly, tying raises participation and benefits consumers on both sides of the platform. In a duopoly, tying on one side makes a platform more or less competitive on the other side depending on externalities. The impact on consumer surplus depends on whether competition is softened or intensified on the profitable side of the platform. Moreover, tying increases total welfare if network effects are strong. From a competition policy perspective, this paper offers a framework for assessing situations in which bundles are offered for free to users of multi-sided platforms.

This paper studies multi-platform competition in the context of entry deterrence or price discrimination. Rather, the purpose of tying is to stimulate demand on one side in order to increase the membership value and profits on the other. The authors develop a model where a platform constrained to set non-negative prices ties the sales of another good with access to the platform as a way to relax the non-negativity constraint. They find that for a monopoly, tying raises participation and benefits consumers on both sides of the platform. In a duopoly, tying on one side makes a platform more or less competitive on the other side depending on externalities. The impact on consumer surplus depends on whether competition is softened or intensified on the profitable side of the platform. Moreover, tying increases total welfare if network effects are strong. From a competition policy perspective, this paper offers a framework for assessing situations in which bundles are offered for free to users of multi-sided platforms.

Market intermediaries, i.e., two-sided platforms, must attract both buyers and sellers. To solve this coordination problem, many two-sided platforms offer their own content, known as first-party content, to users of the platform in order to make participation more attractive; often, this content is provided for free or as part of a product bundle. In contrast, third-party content (e.g. advertising) is used as a complement to first-party content (e.g. online marketplaces). Platforms' first-party content is strategically significant because it is either a substitute for or complement to seller participation and buyer demand. For example, e-commerce sites (Amazon, eBay, Alibaba) provide product information and customer ratings that are complementary to the products offered by sellers. This paper studies the interplay between platform investment in first-party content and pricing strategies. The authors find that this interplay is driven by two key factors: the nature of buyer and seller expectations (favorable versus unfavorable) and the nature of the relationship between first-party content and third-party content (components or substitutes). They conclude with implications for antitrust policies towards mergers and acquisitions among platform firms.

This paper shows that a two-sided platform can successfully compete by limiting the choice of potential matches to consumers while charging higher prices than platforms with unrestricted choice. The authors use a stylized model of online dating where participants with different valuations for each other have limited visibility. First, the authors derive the strength and direction of network effects. They find that increasing the number of potential matches has a positive network effect due to larger choice, but a negative network effect due to competition between participants on the same side. Participants with different valuations for finding a match receive the trade-off between the two effects differently. For those with a higher desire to find a match, the competitive effect is stronger than the choice effect. Hence, these participants are more competitive in online platforms which restrict choice, while those with a lower willingness to pay for a platform restricting choice (e.g. eHarmony.com). Those with a lesser desire to find a match prefer a platform offering unrestricted choice (e.g. Match.com). Therefore, the platforms may coexist without the market tipping. This model may help explain how platforms with different business models coexist in markets.

Competition between two-sided platforms is shaped by the possibility of multi-homing. Multi-homing occurs when some users join and use services from both platforms. If, initially, both sides single-home, each platform provides users on one side exclusive access to the other side. If then one side single-homes, markets converge on the single-home monopoly on the multi-homing side. This paper explores the allocative effects of a change from single to multi-homing. The results challenge the conventional wisdom, which says that the possibility of multi-homing hurts the side that multi-homes, while benefiting the side that does not. The authors find that this is not always true, as the opposite may happen or both sides may in fact benefit from multi-homing.

This paper studies advertising markets in settings where consumers allocate their attention across multiple publishers. The authors examine how an increase in consumer switching or multi-homing affects advertising prices, publisher profits, and publisher content strategy. They find that switching-influenced inefficiencies lead to lower-value advertisers to advertise on a limited set of publishers, effectively reducing demand for advertising and thus depressing prices. As the share of multi-homing consumers increases (which might happen if, for example, consumers adopt the Internet for news or increase their use of search aggregation), ad prices fall. Increased multi-homing creates an incentive for publishers to invest in quality and increase their number of unique users because larger publishers are favored by advertisers seeking broader "reach" (more unique users) while avoiding inefficient duplication (impressing the same consumers too much).
When consumers multi-home, platforms are also competing for advertisers. Platforms compete for exclusive consumers rather than just trying to increase their number of users. Platform competition means that platforms may be different from rivals in order to deliver exclusive content to multi-homing advertisers. In this paper, the authors develop a model of platform competition with multi-homing consumers and show that platforms locate too far apart (i.e. they are too differentiated) if consumers highly value overlapping content, and/or their second-impressions have low value. Exclusive consumers are more valuable for the platforms, so their tastes will be strongly represented in platform offerings, while consumers with preferences for overlapping content will be under-weighted. Regarding competitive effects in the presence of multi-homing consumers, this model shows that entry of new platforms decreases advertisement prices, while a merger increases them.

This paper examines the effects of network externalities on the welfare properties of mergers between digital platforms. The authors analyze a model of oligopoly (few firms dominating the market) with multiproduct firms and firm-level direct and indirect network effects. The analysis shows that network externalities can benefit or harm consumers, depending on the degree of the city, and relative costs of delays versus consumer disutility of waiting. This paper examines competition among ridesharing platforms where firms compete by choosing both the price of rides and the extent of idleness. Idleness means that drivers receive compensation without picking up passengers, instead acting to reduce passenger wait time (e.g. by idling in a densely populated area). The authors show that when consumers are the only agents who multi-home among ridesharing platforms, idleness is lower in the downtown than when consumers face a monopoly ridesharing platform. When both drivers and consumers multi-home, idleness falls to zero as it involves costs for each platform that are apportioned, in part, by their rival. Socially superior outcomes may involve monopoly or competition under various multi-homing regimes, depending on the density of the city, and relative costs of delays versus consumer disutility of waiting. This paper explores how mergers affect consumer welfare by analyzing the effects. Mergers of horizontal mergers increase consumer welfare by reducing the number of platforms, while vertical mergers may benefit consumers but are likely to increase prices. This paper examines competition among ridesharing platforms where firms compete by choosing both the price of rides and the extent of idleness. Idleness means that drivers receive compensation without picking up passengers, instead acting to reduce passenger wait time (e.g. by idling in a densely populated area). The authors show that when consumers are the only agents who multi-home among ridesharing platforms, idleness is lower in the downtown than when consumers face a monopoly ridesharing platform. When both drivers and consumers multi-home, idleness falls to zero as it involves costs for each platform that are apportioned, in part, by their rival. Socially superior outcomes may involve monopoly or competition under various multi-homing regimes, depending on the density of the city, and relative costs of delays versus consumer disutility of waiting. This paper examines how mergers affect consumer welfare by analyzing the effects. Mergers of horizontal mergers increase consumer welfare by reducing the number of platforms, while vertical mergers may benefit consumers but are likely to increase prices. This paper explores how mergers affect consumer welfare by analyzing the effects. Mergers of horizontal mergers increase consumer welfare by reducing the number of platforms, while vertical mergers may benefit consumers but are likely to increase prices.

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This paper develops a theory of tying in two-sided markets. In this paper, tying provides a mechanism for a monopolist to leverage its monopoly power to monopolize another market where it faces competition. The authors find that, in their model, tying provides a mechanism to circumvent a non-negative price constraint, as the tying firm can engage in negative price discrimination across its markets. In major merger cases, including network effects, multi-sidedness, big data, and rapid innovation. They then analyse the impact of intermediation on the allocation of revenues in sponsored search. The authors cluster target companies by their area of economic activity and show that they span a wide range of economic sectors. In most cases, their products and services appear to be complementary to those supplied by the acquirers. Moreover, targeted companies seem to be particularly young, being four-years-old or younger in nearly 60% of cases at the time of acquisition. The authors conclude with case studies of the Facebook/Instagram and Google/YouTube mergers presented before UK competition authorities, and offer suggestions for a more effective merger control regime in light of the features of digital platforms.

THE ROLE OF COMPLEMENTS/APPS ON THE PLATFORM

Analysis of competition and foreclosure on a platform between a vertically-integrated complement and a complement that is independent.

Role of Complements

- **Foreclosing Competition**
  - A Leverage Theory of Tying in Two-Sided Markets
    - Jay P. Choi and Doh-Sihn Jeon
    - 2020
    - This paper develops a theory of tying in two-sided markets. In this paper, tying provides a mechanism for a monopolist to leverage its monopoly power to monopolize another market where it faces competition. The authors find that, in their model, tying provides a mechanism to circumvent a non-negative price constraint, as the tying firm can engage in negative price discrimination across its markets. In major merger cases, including network effects, multi-sidedness, big data, and rapid innovation. They then analyse the impact of intermediation on the allocation of revenues in sponsored search. The authors cluster target companies by their area of economic activity and show that they span a wide range of economic sectors. In most cases, their products and services appear to be complementary to those supplied by the acquirers. Moreover, targeted companies seem to be particularly young, being four-years-old or younger in nearly 60% of cases at the time of acquisition. The authors conclude with case studies of the Facebook/Instagram and Google/YouTube mergers presented before UK competition authorities, and offer suggestions for a more effective merger control regime in light of the features of digital platforms.

- **Internal versus External Growth in Industries with Scale Economies: A Computational Model of Optimal Merger Policy**
  - Elena Argentesi, Emiliano Calvino, Tommaso Dusci, Alessia Marrassò, and Salvatore Nava
  - 2019
  - This paper provides a broad retrospective evaluation of mergers and merger decisions in the digital sector. The authors first discuss features of digital markets that have been key determinants for major merger cases, including network effects, multi-sidedness, big data, and rapid innovation. They then analyse the impact of intermediation on the allocation of revenues in sponsored search. The authors cluster target companies by their area of economic activity and show that they span a wide range of economic sectors. In most cases, their products and services appear to be complementary to those supplied by the acquirers. Moreover, targeted companies seem to be particularly young, being four-years-old or younger in nearly 60% of cases at the time of acquisition. The authors conclude with case studies of the Facebook/Instagram and Google/YouTube mergers presented before UK competition authorities, and offer suggestions for a more effective merger control regime in light of the features of digital platforms.

Role of Complements

- **Upstream Bundling and Leverage of Market Power**
  - Alexandre de Comble and Greg Taylor
  - 2019
  - This paper provides a rationale for bundling in vertical relations. In many markets, upstream firms compete to be in the best downstream slots (e.g., the best shelf in a retail store or the default application on a platform). The authors suggest a mechanism through which an upstream, multi-product firm can leverage its market power through bundling. The mechanism works in environments with the following three features: downstream firms are willing to pay a slotting fee only if they expect to earn a positive markup from the new product B when they buy product A because A increased price (that can be estimated using market-level demand data or elicited in surveys). Then, the authors apply the model in a hypothetical merger in the Dutch daily newspaper market, showing that it is important to consider the two-sidedness of markets when evaluating UPP. The authors acknowledge this approach has shortcomings, such as under- or overestimating incentives to raise prices after a merger because UPP does not account for supply-side responses by competitors. However, they conclude that UPP can be especially useful in the initial screening phase, and may be complemented with a full-fledged merger simulation in a later stage. This paper should be read in conjunction with the Compendium (2018) that identifies two issues in the original paper.

- **Upward Pricing Pressure in Two-Sided Markets**
  - Pauline Affeldt, Lapo Filistrucchi, and Tobias J. Klein
  - 2013
  - Measuring upward pricing pressure (UPP) has been proposed by Farrell and Shapiro (2010) as an alternative screening device for horizontal mergers. This paper extends the concept of UPP, which characterizes the incentives to raise the price of a product after a merger, to two-sided markets such as the market for online search, where advertising demand depends on the number of users. The authors argue that it is important to account for the presence of indirect network effects in two-sided markets. These effects depend on four sets of diversion effects (fraction of consumers that buy product B when they buy product A because A increased price) that can be estimated using market-level demand data or elicited in surveys. Then, the authors apply their model to a hypothetical merger in a Dutch daily newspaper market, showing that it is important to consider the two-sidedness of markets when evaluating UPP. The authors acknowledge this approach has shortcomings, such as under- or overestimating incentives to raise prices after a merger because UPP does not account for supply-side responses by competitors. However, they conclude that UPP can be especially useful in the initial screening phase, and may be complemented with a full-fledged merger simulation in a later stage. This paper should be read in conjunction with the Compendium (2018) that identifies two issues in the original paper.

- **From Bad Men to Math Men: Concentration and Buyer Power in Online Advertising." /t American Economic Review. Forthcoming.


This paper studies how bundling affects price competition between two asymmetric multi-product firms when one firm has symmetric dominance in all of its product markets. In this model, one firm dominates the other when it produces better products more efficiently. The authors find that the relative levels of dominance and bundling determine the market outcome, with competition and lower profits. Conversely, for low levels of dominance, bundling relaxes price competition and raises both firms’ profits. For intermediate dominance levels, bundling increases the dominant firm’s market share substantially, thereby raising its profit even further. Hence, the threat to bundle is then a credible foreclosure strategy. The authors also identify two circumstances in which a firm that dominates only in some markets (“tying good markets”) can profitably leverage its dominance to other markets (“bundled good markets”) by tying all its products: when price competition in tied good markets is sufficiently more fierce than in the tying good market; and when the tying firm leverages dominance from multiple markets. These findings are relevant to antitrust cases and policies that involve the bundling of dominant products.

Competition authorities worry that integration between search engines and publishers could lead to abuses of dominant positions. In particular, one concern is that of own-content bias, meaning that a search engine would bias its rankings in favor of the publishers it owns or has an interest in, to the detriment of competitors. This paper develops a theoretical framework in which the search engine allocates search results to publishers and competes with publishers to attract advertisers. The authors show that the search engine is biased against publishers that display many ads, even without integration. Although integration may lead to a reduction in competition, it can also reduce bias by increasing the value of a marginal consumer to the search engine. Incentives also have a positive effect on users by reducing the nuisance costs due to excessive advertising. The net welfare effects of integration between a search engine and a publisher are therefore ambiguous, and the authors provide conditions for integration to be desirable or not.

As platform owners continue to expand their ecosystems, many of them have started to provide consumers with their own complementary applications. These moves position platform owners as direct competitors with their complementors. This paper surveys empirical studies that examine the direct entry of platform owners into complementors’ product spaces. The author finds that the impact of such entries on complementors is multifaceted. In contrast to the theoretical literature, empirical studies suggest that the motivation behind platform owners’ direct entry goes beyond value capture (entering just for profit). For example, platform owners may enter product spaces because they are dissatisfied with complementors’ products and want to incentivize innovation by introducing competition. While none of the studies document harmful effects on platform users, there is mixed evidence on whether platform-owner entry is harmful for complementors. The author identifies a lack of evidence on the long-term effects of platform-owner entry and concludes by noting that platform owners can also use other means to appropriate value to their platforms, such as increasing service fees to capture more value from sellers.

In platform-based markets, a range of firms called complementors leverage platform resources to offer complementary products or services to prospective users. Many of these complementors are concerned that platform owners may imitate them and enter their product spaces with similar offerings. This paper analyzes how major updates of Apple’s iOS operating system, Apple uses its own offerings to compete against third-party developers. This paper is an empirical study of the impact of platform-owner entry on complementors. The authors examine how app developers on the Android mobile platform adjust value-creation (e.g., innovation efforts) and value-capture strategies (e.g., pricing) in response to the threat of platform-owner entry threats. The authors find that after Google’s entry threat increases, affected developers reduce innovation (shifting innovation to unaffiliated apps) and raise prices for affected apps. Overall, Google’s entry may have pushed complementors into other areas (which might be less lucrative) and strengthened Google’s position in the mobile market. However, Google’s entry may have had unobservable welfare effects in the development of redundant applications. The overall welfare implication is thus ambiguous.

Intermediaries can choose between functioning as a marketplace (suppliers sell their products directly to buyers) or reseller (purchasing products from suppliers and selling them to buyers). For example, Best Buy allows companies like Apple, Samsung, and Microsoft to host their own virtual stores within its Best Buy stores, and also takes ownership over products from other branded suppliers and chooses how to sell them. This paper identifies a fundamental distinction between marketplaces and resellers: the control rights suppliers have over exclusive supply agreements and the intermediary over non-contradictory decisions about products sold (e.g., prices and advertising). Whether an intermediary acts as a marketplace or a reseller depends on which party (suppliers or intermediary) has more important information about the ideal choice of marketing activities for specific products. The authors show that reseller mode is more prevalent when marketing creates and segments the market and network effects lead to unfavorable expectations about supplier participation. On the other hand, if the reseller has a variable-cost advantage (disadvantage) relative to the marketplace, then the intermediary shifts toward marketplace mode for unprofitable (profitable) products. The authors provide a theory of which products an intermediary should offer in each mode and hybrid, and an empirical illustration for their theory.
### Role of Complements

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<td>Complements</td>
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<td>Geoffrey Parker and Marshall Van Alstyne</td>
<td>2018</td>
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<td>2019</td>
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### BEHAVIORAL BIASES AND COMPETITION

The role of behavioral biases in the creation of barriers to entry and market power

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**Analysis of competition on a platform between complements when the complement could grow into a rival of the platform itself**

In this paper, the author develops a model where a platform marketplace such as Amazon provides products with different demand functions, and can decide, for each product, whether to monetize sales by third party sellers through linear commissions or become a seller, either by commercializing a private label version or by managing a vendor to resell as a third-party retailer. In particular, the author investigates whether entry for such a platform is underprovided or overprovided (i.e. the platform introduces less or more than the optimal amount of product, from a vendor’s or consumer’s point of view, of its own products). In an environment of competitive sellers (e.g. sellers are ready to sell at marginal cost in order to win the Buy Box in the case of Amazon), the model shows that prices are reduced for consumers and aggregate consumer welfare is maximized when the platform enters, though platform entry may be underprovided or overprovided. Introducing market power of third-party sellers tends to incentivize the provision of private label products by the platform, disincetivize first-party retail, and entry is underprovided. The author also considers how a platform’s logistics capabilities (e.g. fulfillment by Amazon) and advertising affect platform entry. Finally, the author examines how platform entry may impact third-party incentives to invest in innovation of products for the platform.
Consumer Search and Retail Market Structure,


This paper analyzes the implications of consumer privacy on competition in the marketplace. Firms compete for consumer information and derive revenue both from consumer purchases and from disclosing consumer information in a secondary market. Consumers choose which firm or platform to use and how much personal information to provide. The authors show that firms maximize profits by focusing on a single revenue source and competing at the extensive (competing for as many consumers as possible) rather than the intensive margin (competing for consumers to spend the most time on their platform). They also show that competition drives the provision of services with a low level of consumer information disclosure (i.e. a high level of privacy). However, higher competition intensity in the marketplace need not improve privacy when consumers have low valuations for it. These findings are relevant to the business models of Internet firms and the regulatory debate on consumer privacy.

Privacy Regulation and Market Structure,


Platforms have evolved beyond just being organized as multi-sided markets, with complementors selling to users. Complementors are often unpaid, working outside of a price system, and driven by heterogeneous sources of motivation, conditions which should affect how they respond to platform growth. Does reliance on network effects and strategies to attract large numbers of complementors remain advisable in such contexts?

This paper tests hypotheses related to these issues using data from 85 multi-sided market structures and unpaid complementors. The authors find that complementor development responds to platform growth even without sales incentives, but that attracting complementors has a net zero effect on ongoing development and fails to stimulate network effects. The authors also discuss conditions under which a strategy of using unpaid crowd complementors remains advantageous.

The Digital Privacy Paradox: Small Money, Small Costs, Small Talk.


Advertisers use online consumer data to target consumer marketing appeals. This has heightened consumers’ privacy concerns, leading governments to pass laws designed to protect consumer privacy by restricting the use of data and restricting online tracking techniques used by websites. This paper uses the responses of 3.3 million survey takers who had been randomly exposed to 9,596 online display (banner) advertising campaigns to examine how privacy regulation in the European Union (EU) has influenced advertising effectiveness. Privacy regulation has restricted advertisers’ ability to collect data on Web users in order to target ads. The authors find that, on average, display advertising became far less effective at changing stated purchase intent after the EU laws were enacted, relative to displaying advertising in other countries. The loss in effectiveness was more pronounced for websites that had general content (such as news sites), where non-data-driven targeting is particularly hard to do. The loss of effectiveness was also more pronounced for ads with a smaller presence on the webpage and for ads that did not have additional interactive, video, or audio features.

A puzzling feature of many retail markets is the coexistence of large firms offering many different products and smaller firms offering relatively few. This paper provides a possible explanation by studying how consumer search frictions influence the structure of retail markets. In this model, single-product firms that supply different products can merge to form a multiproduct firm, and, due to search frictions, value the one-stop shopping convenience associated with a multiproduct firm. When search frictions are relatively large, the authors find that all firms are multi-product in equilibrium. However, when search frictions are smaller, the equilibrium market structure is asymmetric, with different retail formats coexisting. This allows smaller firms offering relatively few.

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Firms using consumer data to price discriminate is a central concern for the economics of privacy. A common response is that consumers should have control over their data and the ability to choose how firms access it. Since firms can infer information about consumers based on both the data seen and consumer disclosure choices, the strategic implications of this practice are unclear. This paper investigates whether such measures improve consumer welfare in monopolistic and competitive environments. The authors find that consumer control can guarantee gains for every consumer type in situations where there is perfect price discrimination as well as no price discrimination. This result is driven by two ideas. First, consumers can use disclosure to amplify competition between firms. Second, consumers can share information that induces a seller—even a monopolist—to make price concessions. Whether consumer control improves consumer surplus depends on the technology of disclosure and market competition. In a competitive setting, simple disclosure technologies such as "track / do-not-track" are enough to guarantee gains in consumer welfare. In a monopolistic market, welfare gains require richer forms of disclosure technology, such as consumers deciding how much information to share.

The findings have implications for understanding search behavior on the Internet and the management of paid search advertising.

This paper studies a model in which competing firms use costly marketing devices to influence the set of options. First, firms can affect sales efforts by means of commission payments, through which the salesman introduces a potentially smaller set that the authors call a "consideration set." This set is influenced by marketing devices in the industry profit, consumer surplus, and welfare. The model is extended by introducing heterogeneous product qualities, in which the firm with the highest differences among firms, the authors find that the prominent firm will charge a lower price than its less prominent competitor. Making a firm prominently will typically lead to higher industry profit but lower consumer surplus and welfare. The model is extended by introducing heterogeneous product qualities, in which the firm with the highest-quality product has the greatest incentive to become prominent, and making it prominent will boost industry profit, consumer surplus, and welfare.

This paper investigates how firms can become "prominent" and influence the order in which consumers consider options. First, firms can affect sales efforts by means of commission payments, through which the salesman steers consumers towards expensive products. Second, sellers can advertise prices on a price comparison website, so consumers investigate the suitability of products in order of increasing price. Here, prices are lower when search costs are higher. Finally, consumers might first consider their existing supplier for subsequent purchases, which suggests a relevant benchmark for cross-selling in markets such as retail banking.

This paper studies a model in which competing firms use costly marketing devices to influence the set of alternatives that consumers perceive as relevant. The core of this model is that consumers face an overwhelmingly large variety of products in the modern marketplace and thus use screening criteria to identify products. The main result is that screening criteria are insufficient for comparably small differences in product attributes, but if the consumer finds a product that is a new product for her consideration set, then this product is preferred over all other products. The authors find that the equilibrium search environment embeds sufficiently high search costs to prevent consumers from evaluating too many sellers, but not too high to cause them to evaluate sellers' products at a price.

This paper studies a model of a search environment designed to reduce search frictions and determine market outcomes. The authors consider the strategic incentives of an intermediary in the design of its search environment as a means to ease search costs. An important aspect of the analysis is that consumers optimally decide how many sellers to evaluate and how deeply (e.g., number of attributes) to evaluate each of them. The authors find that the equilibrium search environment embeds sufficiently high search costs to prevent consumers from evaluating too many sellers, but not too high to cause them to evaluate sellers' products at a price.

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Quality

In this paper, the authors examine prominent placement of search engines’ own services and effects on user choices. Evaluating a natural experiment in which different page rankings for the same query were shown to users who performed multiple searches, the authors find that Google’s prominent placement of its Flight Search service increased the clicks on paid advertising listings by more than half the time. The authors test this effect using organic search listings by building a dataset that covers searches from 2008 to 2013, during which consumers were introduced to many new and notable sites and new platforms on which to access them. In their analysis, the authors assess how search engines supply their attention along various dimensions, such as the concentration of attention across the universe of sites and the amount of attention expenditure per domain visit. Notably, there was no change in how “few” households allocated their attention, despite drastically changing where they allocated it. In addition, conditional on total attention expenditure, demographics fail to predict household behavior and its persistence over time. The authors interpret these findings for policy discussions on universal service, data caps, and merger analysis.

Quality

In several markets, firms compete for consumer attention. This paper examines user priorities based on the allocation of their time, using data on user online choice to characterize demand for online services. The dataset covers searches from 2008 to 2013, during which consumers were introduced to many new and notable sites and new platforms on which to access them. In their analysis, the authors assess how search engines supply their attention along various dimensions, such as the concentration of attention across the universe of sites and the amount of attention expenditure per domain visit. Notably, there was no change in how “few” households allocated their attention, despite drastically changing where they allocated it. In addition, conditional on total attention expenditure, demographics fail to predict household behavior and its persistence over time. The authors interpret these findings for policy discussions on universal service, data caps, and merger analysis.

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Quality

People seek to learn about worst events, but they also seek to learn what others know about those events. Shared knowledge might be useful to coordinate actions among individuals, such as deciding whether to attend a protest. Meanwhile, news sources rely on monetizing people’s attention to thrive in the market. In this paper, the authors develop a model which finds that competition for attention leads to a homogeneous supply of information: news sources are equally accurate in reporting events and equally clear in conveying their reports. This occurs even though people would demand different accuracies and clarieties. The authors also find that the type of supplied sources (in terms of clarity and accuracy, e.g. the distinction between “soft” or “clear” news, high-accuracy news) depends on the cost structure of producing information and people’s coordination motives. By becoming the “currency” by which people pay for information, attention causes novel market inefficiencies, whose form and size depend on people’s coordination motives. The authors investigate supply-side policies, such as introducing sufficiently clear and accurate news to consumers and eliminating sources that are insufficiently clear and accurate, that tackle such inefficiencies.

Quality

The rise of social media has provoked optimism about potential societal benefits, as well as concern about harms such as addiction, depression, and political polarization. In a randomized experiment, this paper finds that deactivating Facebook for the four weeks before the 2016 US midterm election reduced online activity, while increasing offline activities such as watching TV alone and socializing with family and friends; reduced both factual news knowledge and political polarization; increased subjective well-being; and caused a large persistent increase in in-person face-to-face socializing. The authors then examine the effect of Facebook on consumers’ attention, despite drastically changing where they allocated it. In addition, conditional on total attention expenditure, demographics fail to predict household behavior and its persistence over time. The authors interpret these findings for policy discussions on universal service, data caps, and merger analysis.

Quality

This paper surveys a recent and growing literature on markets for information. It identifies one of the primary sources of information today as social media, which provide users with a large set of applications ranging from sponsored-search advertising to credit scores to information sharing among competitors. The theory of competition in markets for information suggests that traditional metrics may overstate consumer surplus from using social media.

Quality

This paper models social media platforms as attention brokers that have proprietary information about their users’ behavior. By becoming the “currency” by which people pay for information, attention causes novel market inefficiencies, whose form and size depend on people’s coordination motives. The authors develop a model which finds that competition for attention leads to a homogeneous supply of information: news sources are equally accurate in reporting events and equally clear in conveying their reports. This occurs even though people would demand different accuracies and clarieties. The authors also find that the type of supplied sources (in terms of clarity and accuracy, e.g. the distinction between “soft” or “clear” news, high-accuracy news) depends on the cost structure of producing information and people’s coordination motives. By becoming the “currency” by which people pay for information, attention causes novel market inefficiencies, whose form and size depend on people’s coordination motives. The authors investigate supply-side policies, such as introducing sufficiently clear and accurate news to consumers and eliminating sources that are insufficiently clear and accurate, that tackle such inefficiencies.

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Role of Data

Market Power

The Economics of Social Data

Dirk Bergemann, Alessandro Bonatti, and Tan Gan

2020

This paper investigates the effects of price discrimination on privacy, profits, and consumer surplus. When more than one competing firm sells consumers' private information, price discrimination can pay a price that is high enough to avoid it. This is not true for the competing, monopolistic case. In a duopoly, firms' individual profits are decreasing, while consumer surplus is increasing. The authors show that this is the case because the consumer data is sold exclusively with one firm in order to create maximum competition between the winner and the loser of data, which brings inefficiencies. These findings suggest that policymakers should focus their attention on this problem, rather than making it easier for consumers to protect their privacy.

Role of Data

Market Power

The Value of Personal Information: An Online Model with Endogenous Privacy

Rodrigo Monteiro, Williend Sand-Zantman, and Tommaso M. Valletti

2018

This paper provides a theoretical model of privacy in which data collection requires consumers' consent and privacy is fully aware of the consequences of such consent. Nonetheless, excessive collection of personal information is in the monopoly market equilibrium which results in excessive loss of privacy compared to the social optimum. The main mechanism for this result is information externalities and users' coordination failure in which some users' decisions to share their personal information may allow the data controller to infer more information about non-users. Also, the emergence of the data brokerage industry can facilitate the collection and monetization of users' personal data, even in a fragmented market where no individual website has incentive to do so independently due to scale economies in data analytics. The authors discuss privacy implications of their analyses in the light of the recent EU General Data Protection Regulation.

Role of Data

Market Power

Privacy and Personal Data Collection with Information Externalities

Jay Pil Choi, Doh-Shin Jeon, and Byung-Cheol Kim

2019

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The Design and Price of Information

Dirk Bergemann, Alessandro Bonatti, and Alex Smolin

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Pricing Network Effects

Itay P. Fairmesser and Andrea Galeotti

2015

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Role of Data

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Targeting in Advertising Markets: Implications for Offline Versus Online Media

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2011

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Role of Data

Market Power

Online Advertising: Heterogeneity and Conflation in Market Design

Jonathan Levin and Paul Milgrom

2010

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Role of Data

Market Power

Search Engines and Data Retention: Implications for Privacy and Antitrust

Lesley Chiou & Catherine Tucker

2017

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### The role of user-specific data on quality of content experienced by consumers

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<td>Mark Armstrong and Jidong Zhou</td>
<td>2021</td>
<td>Information travels in both directions between two sides of a platform. Firms obtain information about consumer preferences from data brokers, social media, past interactions with consumers, etc. This can enable them to make personalized offers and price discriminate in a targeted manner. On the other side, consumers obtain information about their preferences for various products from platforms such as search engines and product comparison websites. The precision of consumers’ information about products affects both the quality of the consumer-product match and the intensity of competition between firms. In this paper, the authors develop a model to derive signal structures which are optimal for firms and firms structures which are optimal for consumers. The firm-optimal signal structure amplifies product differentiation, thereby relaxing competition, while ensuring that consumers purchase their preferred product, thereby maximizing total welfare. The cost-optimal structure dampens differentiation, which intensifies competition, but induces some consumers with weak preferences between products to buy their less-preferred product. The analysis sheds light on the limits to competition when the information possessed by consumers can be designed flexibly.</td>
<td>wp</td>
<td>Mark Armstrong and Jidong Zhou, “Consumer Information and the Limits to Competition.” Working paper, available at <a href="https://drive.google.com/file/d/1V4it9Xk0z8KJk8Iv8lppenZAiJ_1u6XB/view">https://drive.google.com/file/d/1V4it9Xk0z8KJk8Iv8lppenZAiJ_1u6XB/view</a>.</td>
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<tr>
<td>Quality</td>
<td>Role of Data</td>
<td>The Limits of Price Discrimination</td>
<td>Dirk Bergemann, Benjamin Brooks, Susan Athey, and Ittai Abraham</td>
<td>2015</td>
<td>This paper analyzes the welfare consequences of a monopolist having additional information about consumers’ tastes, beyond the prior distribution, and the additional information can be used to charge different prices to different segments of the market (first-degree price discrimination) or, given complete information about buyers’ valuations, charge each buyer his valuation (first-degree price discrimination). The authors show that the market can be segmented in this way (induced by additional information) to achieve several different combinations of consumer and producer surplus. In each scenario, additional information (profits are at least as high as under uniform monopoly price), while social and consumer surplus may increase or decrease. The authors’ findings suggest that while market segmentation based on additional information often harms consumers and favor producers, this is not always the case; the relationship between data collection and efficiency depends on the preferences of those who collect the information, and thus future research should pinpoint which forms of price discrimination arise endogenously and for whose benefit.</td>
<td>Dirk Bergemann, Benjamin Brooks, Susan Athey, and Ittai Abraham, “The Limits of Price Discrimination,” American Economic Review, 105 (3) (2015): 921-57.</td>
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<tr>
<td>Quality</td>
<td>Role of Data</td>
<td>Conditioning Prices on Purchase History</td>
<td>Alessandro Acquisti and Hal Varian</td>
<td>2005</td>
<td>Search engines enable advertisers to target consumers based on the query they have entered. Using a framework in which consumers search sequentially after entering a query, this paper shows that such targeting reduces search costs, improves matches, and intensifies price competition. However, profit-maximizing monopolistic search engines impose a distortion by charging high advertising fees, which may negate the benefits of targeting. The search engine also has incentives to provide a suboptimal quality of sponsored links. Competition among search engines can increase or decrease welfare, depending on the extent of multi-homing by advertisers.</td>
<td>wp</td>
<td>Alessandro Acquisti and Hal Varian, “Conditioning Prices on Purchase History,” Marketing Science 24 (3) (2005): 367-381.</td>
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<tr>
<td>Quality</td>
<td>Role of Data</td>
<td>Search Advertising</td>
<td>Alexandre de Comblé and Andrei Hitcu</td>
<td>2016</td>
<td>Search engines enable advertisers to target consumers based on the query they have entered. Using a framework in which consumers search sequentially after entering a query, this paper shows that such targeting reduces search costs, improves matches, and intensifies price competition. However, profit-maximizing monopolistic search engines impose a distortion by charging high advertising fees, which may negate the benefits of targeting. The search engine also has incentives to provide a suboptimal quality of sponsored links. Competition among search engines can increase or decrease welfare, depending on the extent of multi-homing by advertisers.</td>
<td>y</td>
<td>Alexandre de Comblé, “Search Advertising,” American Economic Journal: Microeconomics 8 (3) (2016): 156-188.</td>
</tr>
<tr>
<td>Quality</td>
<td>Role of Data</td>
<td>Why Do Intermediaries Divert Search?</td>
<td>Andrei Hitcu and Bruno Jullien</td>
<td>2011</td>
<td>This paper analyzes the incentives to divert search for an information intermediary who enables buyers (consumers) to search affiliated sellers (stores). The authors identify two original motives for diverting search, i.e., inducing consumers to search more than they would like to (1) trading off higher total consumer traffic for higher revenues per consumer visit and (2) influencing stores’ choices of strategic variables (e.g. pricing) once they have decided to affiliate. The authors characterize the conditions under which there would be no role for search diversion as a strategic instrument for the intermediary, thereby showing that it occurs even when the contracting space is significantly related to online and brick-and-mortar intermediaries.</td>
<td>y</td>
<td>Andrei Hitcu and Bruno Jullien, “Why Do Intermediaries Divert Search?” The RAND Journal of Economics 42 (2) (2011): 337-362.</td>
</tr>
<tr>
<td>Quality</td>
<td>Role of Data</td>
<td>Position Auctions with Consumer Search</td>
<td>Susan Athey and Glenn Ellison</td>
<td>2011</td>
<td>This paper integrates a model of consumer search into a model of auctions for “sponsored-link” advertising slots on search engine results. The authors analyze consumer search behavior, and the welfare benefits of position auctions. Notably, the authors find that click-weighted auctions (where advertisers that receive more clicks pay less to maintain their positions) do not necessarily generate the right selection of ads—general ads may be displayed when it would be more efficient to display ads that serve a narrower population segment well. There can also be welfare losses when asymmetries in the click-through weights change the ordering of the ads less informative about quality. They also note that the introduction of click-weighting can create incentives for firms to write misleading and overly broad text. Finally, the authors discuss implications for reserve prices, as well as a number of other auction design questions.</td>
<td>y</td>
<td>Susan Athey and Glenn Ellison, “Position Auctions with Consumer Search.” The Quarterly Journal of Economics 126 (3) (2011): 1213–1270.</td>
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</table>
This paper studies the information intermediation problem in the context of dynamic matching markets, examples of which include Uber and Lyft for ride-hailing; Airbnb and Craigslist for accommodation rental; and Upwork and TaskRabbit for freelance labor. Typically, short-lived buyers arrive to a platform over time and randomly match with sellers. The platform designs what buyer information the sellers observe before deciding to form a match. The authors argue that full information disclosure leads to a market failure because of excessive rejections by the sellers, who exhibit “cream-skimming” behavior. In short, the authors make a case for using information design as a way to mitigate the adverse effects of cream-skimming and improve platform performance.


### The measurement of quality in light of zero money prices and implications for quality-adjusted prices

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<tbody>
<tr>
<td>Role of Data</td>
<td>Measuring Quality</td>
<td>The Specialness of Zero</td>
<td>Erik Brynjolfsson and others, “GDP-B: Accounting for the Value of New and Free Goods in the Digital Economy.” Working Paper No. 25965 (2019), available at <a href="https://www.nber.org/papers/w25965">https://www.nber.org/papers/w25965</a>.</td>
<td>Daron Acemoglu, Ali Almeida, and Virgílio A. F. Ribeiro, Raphael Makhdoumi, W. J. Fox</td>
<td>2019</td>
<td>The welfare contributions of the digital economy, characterized by the proliferation of new and free goods, are not well-measured in our current national accounts. This paper derives explicit terms for the welfare contributions of these goods and introduces a new metric, GDP-B, which quantifies their benefits, rather than costs. The authors apply this framework to several empirical examples including Facebook and smartphone cameras, and estimate their valuations through incentive compatible choice experiments. For example, including the welfare gains from Facebook would have added between 0.05 and 0.11 percentage points to GDP-B growth per year in the US.</td>
<td>wp</td>
<td><a href="https://www.nber.org/papers/w25965">https://www.nber.org/papers/w25965</a>.</td>
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### The role of machine learning and use of big data

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<tr>
<td>Role of Data</td>
<td>Machine Learning</td>
<td>Competition in Pricing Algorithms</td>
<td>Zach Brown and Alexander Mackay</td>
<td>2021</td>
<td>Retailers have increasing access to better pricing technology, especially in online markets. Pricing algorithms allow retailers to commit to pricing strategies that depend on the prices of competitors. This paper develops a model in which firms choose algorithms, rather than prices. The competitive equilibrium in this scenario (with firms choosing algorithms) tend to have higher prices than the competitive equilibrium in which firms set prices simultaneously. Using hourly prices of over-the-counter drugs from five major online retailers, the authors find evidence that these retailers choose different pricing technologies. The model also suggests that pricing algorithms lead to meaningful increases in markups, especially for firms whose algorithms change prices quickly in response to changes in rivals’ price changes.</td>
<td>wp</td>
<td><a href="https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3480924">https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3480924</a>.</td>
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### Role of Data and Algorithms

- **GDP-B:** Accounting for the Value of New and Free Goods in the Digital Economy
- **GDP:** Accounting for the Value of New and Free Goods in the Digital Economy
- **Daron Acemoglu, Ali Almeida, and Virgílio A. F. Ribeiro, Raphael Makhdoumi, W. J. Fox**
Toward Controlling Discrimination in Online Ad Auctions

L. Elisa Celis, Anay Mehrotra, and Nisheeth K. Vishnoi

2019

Online advertising platforms thrive on offering customizable audiences to advertisers. However, recent studies show that such audience personalization can be discriminatory and may cross legal boundaries. This paper introduces an algorithmic framework that maximizes platform revenue while distributing the audience across gender, race, and other characteristics. The authors present an optimal ad auction mechanism for a large class of fairness constraints. Empirical results on the A1 Yahoo! dataset demonstrate that the algorithm can achieve uniform coverage across different user types at a lower loss to platform revenue and to the size of audience reached.

Controlling Polarization in Personalization: An Algorithmic Framework

L. Elisa Celis, Sayash Kapoor, Farnoosh Salehi, and Nishelth Vishnoi

2019

Personalization individualizes the most relevant content for each user, which leads to higher user efficiency and higher platform revenue. Recent studies suggest that personalization can propagate systemic biases and polar opinions have called for regulation. This paper proposes a versatile framework that allows users to constrain the distribution from which they select content. The authors illustrate this framework on a curated dataset of online news articles that are conservative or liberal. It shows that control polarization. They further, the authors test this framework on a political news dataset and a movie ratings dataset.

Algorithmic Bias? An Empirical Study of Apparent Gender-Bias in the Display of STEM Career Ads

Anja Lambrecht and Catherine Tucker

2019

This paper explores data from a field test of an algorithm delivering ads promoting opportunities in the sciences, technology, engineering and math fields. The ad was explicitly intended to be gender neutral in its delivery. Empirically, however, fewer women saw the ads than men. This happened because younger women are a prized demographic and are more expensive to show ads to. An algorithm that simply optimizes cost-effectiveness in ad delivery will deliver ads that were intended to be gender neutral in an apparently discriminatory way, because of crowding out. The authors show that this empirical regularity extends to other major digital platforms.

The Effect of Big Data on Algorithmic Pricing, and Collusion

Emilio Calvano, Gábor Czakó, Vincenzo Deienno, and Stefano Pastorino

2020

Pricing algorithms are increasingly replacing human decision making in real marketplaces. To inform the competition policy debate on possible consequences, the authors run experiments with pricing algorithms powered by artificial intelligence in controlled environments, i.e., computer simulations. In particular, they study the interaction of Q-learning algorithms, standard learning algorithms that adapt their behavior past on past experience, in the context of an oligopoly model of repeated price competition. They find that the algorithms converge in equilibrium to supra-competitive prices without communicating with each other, to a point of the environment in which they operate. The authors introduce an empirical exercise to show how their model can be used with data. These findings point to the anticompetitive potential of certain algorithms; the use of deep learning techniques can make algorithms particularly effective at bolstering the revenues of agency clients. Implementing the type of collusion discussed in this paper simply requires an agency to use a bidding algorithm that optimizes joint profits.

The Impact of Big Data on Firm Performance: An Empirical Investigation

Patrick Bajari, Victor Chernozhukov, Ali Hortacsu, and Junichi Suzuki

2019

Using proprietary panel retail sales data obtained from Amazon, this paper examines the influence of “Big Data” on firm performance in the context of forecast accuracy: with more data, firms can improve forecast accuracy. This allows the firms to better serve customers, which leads to more data (the “data feedback loop”). The authors measure the accuracy of forecasts in two relevant dimensions: the number of products (N), and the number of time periods for which a product is available for sale (T). The authors find that as the data feedback loop grows, it is more likely that improved forecast accuracy will be passed on to consumers, leading to better outcomes.

The Effect of Big Data on Recommendation Quality: The Example of Internet Search

Maximilian Schaefer, Geza Sapi, and Szabolcs Lorincz

2018

This paper is the first to use real search engine query logs to empirically investigate how data drives the quality of internet search results. It finds evidence that the quality of search results improves with more data on previous queries. However, the type of data matters as well: personalization information is particularly valuable as it massively increases the speed of learning. The authors also observe that factors that condition the performance of the algorithm as the general quality of the applied algorithms, play an important role. The suggested methods to disentangle the effect of data from other factors driving the quality of search results can be applied to assess the returns to data in various recommendation systems in science, technology, engineering and math fields.

The Display of STEM Career Ads

Francesco Decarolis, Maris Goldmanis, and Antonio Penta

2020


This paper studies a dynamic model of competition between an incumbent platform and potential entrants in an industry featuring network externalities, i.e., an industry in which users prefer to use the same platform as other consumers. Network externalities attract consumers toward the market's most popular platform and can therefore lead an industry to be dominated by a single platform. Although competition in such a market is often said to result in lower prices, this paper shows that increased competition can significantly enhance consumer surplus. In particular, the paper presents a model where the incumbent advantage arises endogenously and assesses the impacts of various types of migration opportunities and strategies on the incumbency advantage.

The authors find that the possibility of multi-homing decreases, but does not eliminate, incumbency advantage. They develop a simple model of how these markets enable entry by small or flexible suppliers, and how they impact existing firms. The model highlights how peer entry can lead to changes in market structure, allow for trade in new services, and generate lower consumer prices. Finally, the authors consider the regulation of peer-to-peer markets and the economic arguments for different approaches to licensing and certification, data, and employment regulation.

### Tools to assess the impact of potential competitors and nascent competition on consumer welfare

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<tr>
<th>Topic (Primary)</th>
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<tr>
<td>Potential Competition</td>
<td>Consumer Surplus in the Digital Economy: Estimating the Value of Increased Product Variety at Online Bookstores</td>
<td>Consumer Surplus in the Digital Economy: Estimating the Value of Increased Product Variety at Online Bookstores</td>
<td>Erik Brynjolfsson, Yu (Jeffrey) Hu, and Michael D. Smith</td>
<td>2003</td>
<td>This paper examines the effects of the Internet on markets in which match quality is important, including an analysis of the market for used books. The authors develop a model in which sellers of unsalable goods will offer them for sale on the Internet, and the model predicts that the Internet will significantly increase the value of books, especially rare books.</td>
<td>Y</td>
<td>Erik Brynjolfsson, Yu (Jeffrey) Hu, and Michael D. Smith, &quot;Consumer Surplus in the Digital Economy: Estimating the Value of Increased Product Variety at Online Bookstores,&quot; Management Science 49 (11) (2003): 1580–1596.</td>
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<tr>
<td>Potential Competition</td>
<td>Match Quality, Search, and the Internet Market for Used Books</td>
<td>Match Quality, Search, and the Internet Market for Used Books</td>
<td>Glenn Ellison and Sara Fisher Ellison</td>
<td>2018</td>
<td>This paper examines the effects of the Internet on markets in which match quality is important, including an analysis of the market for used books. The authors develop a model in which sellers of unsalable goods will offer them for sale on the Internet, and the model predicts that the Internet will significantly increase the value of books, especially rare books.</td>
<td>Y</td>
<td>Glenn Ellison and Sara Fisher Ellison, &quot;Match Quality, Search, and the Internet Market for Used Books,&quot; Working Paper No. w24197 (2018).</td>
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<tr>
<td>Potential Competition</td>
<td>The Impact of Aggregators on Online Consumption</td>
<td>The Impact of Aggregators on Online Consumption</td>
<td>Susan Athey, Mark Mobius, and Jeno Pal</td>
<td>2017</td>
<td>Do news aggregators such as Google News decrease or increase traffic to online news sites? In this paper, the authors use two natural experiments because Google News shut down in December 2014, in response to copyright reform that allowed newspapers to charge aggregators for linking to news snippets. The authors compare the news consumption of a large number of Google News users with a synthetic control group of similar non-Google News users. They find that the shutdown of Google News reduces overall news consumption by about 20% for treatment users, and it reduces page views on publishers other than Google News by 10%. This decrease is concentrated among small publishers while large publishers do not see significant changes in their overall traffic. The authors further find that when Google News shut down, its users are able to replace some but not all of the top news that they previously read. Post-shutdown, users read less breaking news, hard news (low-clarity, high accuracy), and news that is not well covered on their favorite news publishers. These findings shed light on the consumer welfare implications for digital intermediaries such as news aggregators.</td>
<td>Y</td>
<td>Susan Athey, Mark Mobius, and Jeno Pal, &quot;The Impact of News Aggregators on Online News Consumption,&quot; Working Paper No. 23353 (Stanford Graduate School of Business, 2017).</td>
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</table>
Digital platforms have a variety of technology-enabled tools that enhance market transparency, including real-time monitoring of sales, consumer reviews, and user-generated content. These platforms may also offer low-cost, high-quality services, but they can also create a "kill zone" where high-priced acquisitions of entrants by incumbent firms may not necessarily stimulate more innovation and competition. The authors describe the possible effects of a merger on innovation by referencing economic theory and empirical evidence. They find that the impact of a merger on innovation is often non-uniform, with the greatest impact on lower-cost and more productive acquisitions. Overall, the authors argue that the impact of a merger on innovation is an important consideration in antitrust enforcement.
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<th>Innovation</th>
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<td></td>
<td>Antitrust Limits on Startup Acquisitions</td>
<td>Kevin A. Bryan and Erik Hovenkamp</td>
<td>2020</td>
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<td></td>
<td>Should there be limits on startup acquisitions by dominant firms? The principle of efficiency requires startups to sell their technology to the right incumbents, develop the right technology, and invest the right amount in R&amp;D. Using a model of differentiated oligopoly (i.e., a market structure with few firms producing similar products), this paper shows distortions along all three of these margins if there are no limits on startup acquisition. In part, leading incumbents make acquisitions to keep lagging incumbents from catching up technologically. When startups can choose what technology they invent, they are biased toward inventions which improve the leader's technology, rather than those which help the lagging incumbent catch up. When the leading incumbent obtains a pure monopoly, their marginal willingness to pay for new technologies falls abruptly, which diminishes private returns on future innovations. The authors consider antitrust measures that could help mitigate these problems.</td>
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<td>A firm’s incentives to innovate deteriorate when other firms benefit from its R&amp;D activities without incurring a cost. This paper examines the conditions under which common ownership of firms can mitigate this impediment to corporate innovation. The authors test their model’s empirical predictions using data from S&amp;P’s Compustat, a database of market information for global firms. Empirical estimates show that common ownership increases R&amp;D when technological spillovers (measured by how closely firms are related in terms of capacity to innovate) are large relative to product market spillovers (measured by how closely firms are related in terms of competitors in a product market). Otherwise, costly innovation leads to more business stealing which is detrimental for common owners. These results help inform the debate about the drivers of declining corporate R&amp;D and the welfare effects of increased levels of common ownership among U.S. firms.</td>
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## LEGAL PAPERS

### Platform competition

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<tr>
<td>Platform Competition</td>
<td>Multi-Sided Platforms</td>
<td>Antitrust in Digital Markets</td>
<td>John M. Newman</td>
<td>2019</td>
<td>Antitrust law has largely failed to address the challenges posed by digital markets. Economic theory, empirical research, and extant judicial and regulatory authority all contradict and presuppose monopolistic conduct and, efficiencies in digital markets. Far from being self-correcting, digital markets facilitate the creation and maintenance of unique and valuable market power. Digital markets are conducive to complex anticompetitive strategies that have largely escaped regulatory scrutiny. Perhaps most importantly, conduct in digital markets tends to lack significant offsets efficiencies. As a result, digital markets do require a different approach. This paper concludes by offering a set of doctrinal and policy proposals towards a more robust, vigilant, and welfare-enhancing digital antitrust enterprise.</td>
<td>y</td>
<td>John M. Newman, &quot;Antitrust in Digital Markets,&quot; Vanderbilt Law Review 72 (5) (2019): 1497–1516.</td>
</tr>
<tr>
<td>Platform Competition</td>
<td>Multi-Sided Platforms</td>
<td>Is There a Market for Organic, Search Engine Results and Can Their Manipulation Give Rise to Antitrust Liability?</td>
<td>James D. Ratifff and Daniel L. Rubinfeld</td>
<td>2014</td>
<td>In recent years Google has been accused of manipulating its organic search results to favor its own services. This paper explores possible choices of relevant antitrust markets that might make various antitrust allegations meaningful. The authors argue that viewing Internet search in isolation ignores the two-sided nature of the search advertising platform and the feedback effects that link the provision of organic search results to consumers and the sale of advertising slots to businesses. They conclude that Google satisfies both requirements of a two-sided search-advertising market. The authors also ask whether Google has a duty to provide organic search results that are neutral with respect to whether the displayed listing is for a Google or a non-Google business. They articulate and apply a standard that asks whether various practices related to Google's organic search results would harm competition that would have otherwise occurred.</td>
<td>y</td>
<td>James D. Ratiff and Daniel L. Rubinfeld, &quot;Is There a Market for Organic, Search Engine Results and Can Their Manipulation Give Rise to Antitrust Liability?&quot; Journal of Competition Law &amp; Economics 10 (3) (2014): 517–541.</td>
</tr>
<tr>
<td>Platform Competition</td>
<td>Mergers</td>
<td>Vertical Mergers and Entrepreneurial Exit</td>
<td>D. Daniel Sokol</td>
<td>2018</td>
<td>Entrepreneurial exit is critical to a well-functioning entrepreneurial ecosystem, as the possibility of entrepreneurial exit via vertical merger is now the most usual form of liquidity event for founders and venture capitalists. Vertical merger policy that would unduly restrict large tech firms from undertaking acquisitions in industries diverse as finance, pharmaceauticals, medical devices, technology hardware, and internet platforms would hurt incentives for innovation in the economy by chilling business formation in start-ups. Increased difficulty in the exit for founders and venture capitalists makes investment in such ventures less likely, since the purpose of such investment is to reap the rewards of scaling a venture to exit. Thus, a general inference that makes vertical acquisitions, particularly in tech, more difficult to undertake leads to direct contravention of antitrust's role in promoting competition and innovation. This paper explores how entrepreneurial exit for founders and venture capitalists is best served by promoting a robust vertical merger policy, through one that intervenes in cases of specific anticompetitive harm.</td>
<td>y</td>
<td>D. Daniel Sokol, &quot;Vertical Mergers and Entrepreneurial Exit,&quot; Florida Law Review 70 (2018): 1357–1378.</td>
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<tr>
<td>Platform Competition</td>
<td>Mergers</td>
<td>Data Privacy in European Merger Control: Critical Analysis of Commission Decisions Regarding Privacy as a Non-Price Competition Parameter</td>
<td>Samson Esayas</td>
<td>2019</td>
<td>Given the central role that personal data plays in mergers between data-rich firms and associated privacy concerns for users, competition authorities have started to experiment with ways to incorporate privacy into merger assessment. One approach is to factor in privacy as a non-price competition parameter. In its merger decisions involving Facebook/Whatsapp and subsequently Microsoft/LinkedIn, the European Commission held that data privacy constitutes a key parameter of non-price competition in the market for consumer social networking and for professional social networking. This paper provides a critical analysis of these decisions regarding competition in privacy and Privacy Enhancing Technologies (PETs). The analysis is conducted from two angles. One looks at the Commission’s approach in defining the market, particularly on how competition in privacy and PETs is manifested and when two firms are considered competitors based on these parameters and thereby of interest to competition law. The second angle looks at the competitive assessment and the theories of harm, particularly when a merger is considered to lead to reduction in privacy as a non-price competition parameter. The author maintains that the Commission’s decision in Microsoft/LinkedIn represents a step forward in the discussion of privacy as a non-price (quality) competition parameter and the use of market power to harm such competition.</td>
<td>y</td>
<td>Samson Esayas, &quot;Data Privacy in European Merger Control: Critical Analysis of Commission Decisions Regarding Privacy as a Non-Price Competition Parameter,&quot; European Competition Law Review 40 (4) (2019): 166–181.</td>
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### The role of complements/apps on the platform

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<tr>
<td>Role of Complements</td>
<td>Forecasting Competition</td>
<td>The Separation of Platforms and Commerce</td>
<td>Lina Khan</td>
<td>2019</td>
<td>A handful of digital platforms mediate a growing share of online commerce and communications. By structuring access to markets, these firms function as gatekeepers for billions of dollars in economic activity. One feature dominant digital platforms share is that they have integrated across business lines such that they both operate a platform and market their own goods and services on it. This structure places dominant platforms in direct competition with some of the businesses that depend on them, creating a conflict of interest that platforms can exploit to further entrench their dominance, thwart competition, and stifle innovation. This paper argues that the potential hazards of integration by dominant tech platforms invite recovering structural separations. Traditionally applied to critical networks and essential infrastructure, structural separations prohibited entry in certain markets and prevented dominant intermediaries from directly competing with the businesses reliant on their services. Neglecting structural remedies results in both substantive harms and institutional misalignments—effects that are especially pronounced in digital platform markets.</td>
<td>y</td>
<td>Lina M. Khan, &quot;The Separation of Platforms and Commerce,&quot; Columbia Law Review 119 (4) (2019): 973–1039.</td>
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<td>Role of Complements</td>
<td>Complements Growing Into Rivals</td>
<td>Uber as For-Profit Hiring Hall: A Price-Fixing Paradox and Its Implications</td>
<td>Sanjukta M. Paul</td>
<td>2017</td>
<td>If the members of a hiring hall, run by a labor union or directly by workers, were independent contractor service providers, they would be engaging in impermissible price-fixing under the conventional interpretation of antitrust law. Yet Uber has thus far been permitted to engage in precisely this sort of price coordination between independent contractors, for its own economic benefit rather than workers. Uber is operating a virtual, for-profit hiring hall, and it is doing so on terms that would not be allowed to workers themselves. It has thus far been permitted to do so simply because it is organized as a business firm. This paper shows that, in a contemporary service economy, the firm exemption in fact leads to a regulatory inconsistency. This problem can be remedied by permitting independent contractor service providers, such as Uber drivers, to engage in collective action with regard to their bargaining with the firm that sets prices for the services they perform. The author furnishes an argument in favor of collective bargaining rights for this group of workers that relies on a simple principle of consistency in applying existing price-fixing norms. In making this argument, the author draws upon two recent, high-profile antitrust cases involving Uber, Uber drivers, and Uber consumers.</td>
<td>y</td>
<td>Sanjukta M. Paul, &quot;Uber as For-Profit Hiring Hall: A Price-Fixing Paradox and Its Implications,&quot; Berkeley Journal of Employment and Labor Law 38 (2) (2017): 233–284.</td>
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### Behavioral biases and competition

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### The role of data on competition

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<tr>
<td><strong>Role of Data</strong></td>
<td>Market Power</td>
<td>Search, Antitrust, and the Exclusionary Significance of User Data</td>
<td>Nathan Newman</td>
<td>2014</td>
<td>This paper argues for revisiting many antitrust investigations (and, more generally, regulatory approaches) to focus on how control of personal data by corporations can entrench monopoly power in an economy shaped by the power of &quot;big data.&quot; What is largely missed in analyses defining Google from antitrust action is how Google's ever-expanding control of user data and its critical value to online advertisers creates an insurmountable barrier to entry for new competition. The authors argue that Google did not just inherit that business advantage through its innovation in search engine technology. Rather, Google has aggressively expanded its control of user data both by moving into new product sectors to collect additional user data and by invading users' privacy.</td>
<td>y</td>
<td>Nathan Newman, &quot;Search, Antitrust, and the Economics of the Control of User Data,&quot; Yale Journal on Regulation 31 (4) (2014): 401–454.</td>
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<tr>
<td><strong>Role of Data</strong></td>
<td>Market Power</td>
<td>Self-Regulation and Competition in Privacy Policies</td>
<td>Florencia Marotta-Wurgler</td>
<td>2018</td>
<td>This paper investigates alternative explanations for the content of privacy policies. Under one model of self-regulation, firms signal their privacy protections to consumers by highlighting compliance with third-party guidelines. However, in a sample of 249 policies, only 27 percent claim compliance with a specific guideline, and the policies that do claim compliance with at least one guideline are generally inconsistent with their requirements. Alternatively, under a market-based mechanism, firms incorporate consumers' preferences directly. Consistent with this influence, there are intuitive differences in terms across markets. Adult sites, none of which claim certification, are much more likely to give concise and clear notice of privacy policies and limit data sharing with third parties, while cloud-computing sites are particularly likely to follow stringent data security standards. Overall, privacy policy content appears to be shaped at least as much by market forces as by a self-regulatory regime based on external guidelines.</td>
<td>y</td>
<td>Florencia Marotta-Wurgler, &quot;Self-Regulation and Competition in Privacy Policies,&quot; The Journal of Legal Studies 45 (3) (2018): 13–40.</td>
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<td><strong>Role of Data</strong></td>
<td>Market Power</td>
<td>The Limits of Antitrust in Privacy Protection</td>
<td>Eugene Kimmelman, Harold Feld, and Agustín Rossi</td>
<td>2018</td>
<td>In the 21st century, it has become virtually impossible to meaningfully participate in society without revealing our personal data. Consumers in the USA, the European Union, and elsewhere want more control over their data and they demand privacy protection. This paper argues that antitrust regulation encourages non-price competition and can be a remedy for fighting the anticompetitive hoarding of personal data. However, the authors argue that antitrust should not be the sole tool used to analyze privacy harms. Instead, a comprehensive approach to consumer protection is needed.</td>
<td>y</td>
<td>Eugene Kimmelman, Harold Feld, and Agustín Rossi, &quot;The Limits of Antitrust in Privacy Protection,&quot; International Data Privacy Law 8 (3) (2018): 270–276.</td>
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<tr>
<td><strong>Role of Data</strong></td>
<td>Market Power</td>
<td>Antitrust and Coexistence Verification: An Optimistic and a Pessimistic View of the Impacts of Blockchain Technology</td>
<td>Christian Catalini and Catherine Tucker</td>
<td>2019</td>
<td>Blockchain technology allows a network of individuals, institutions or devices to coordinate economic activity on a global scale (&quot;Internet-level consensus&quot;) without assigning the degrees of control to the intermediary operating and facilitating transactions in the marketplace. This allows for the creation of new types of decentralized digital platforms where the benefits of network effects are separated from the traditional costs they entail in terms of market power. This paper discusses both the opportunities and challenges blockchain technology involves from an antitrust perspective. In particular, the authors discuss how it can be used to facilitate the creation of extremely efficient and competitive digital markets, as well as to facilitate collusion and make antitrust enforcement more difficult.</td>
<td>y</td>
<td>Christian Catalini and Catherine Tucker, &quot;Antitrust and Coexistence Verification: An Optimistic and a Pessimistic View of the Impacts of Blockchain Technology,&quot; Antitrust Law Journal 82 (2) (2018): 581–872.</td>
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<tr>
<td><strong>Role of Data</strong></td>
<td>Market Power</td>
<td>The Hidden Costs of Free Goods: Implications for Antitrust Enforcement</td>
<td>Michal S. Gal and Daniel L. Rubinfeld</td>
<td>2016</td>
<td>Most of the economic literature on free goods has focused on two-sided markets in which the free good is provided in exchange for attention or information. In this paper, the authors analyze the welfare effects of additional cases that are becoming commonplace in the economy. They stress the need to evaluate pricing strategies of firms that offer free goods, in light of new research about the &quot;irrational&quot; response of consumers faced with a free option. This welfare analysis serves as a basis for exploring the antitrust implications for providing free goods. Indeed, free goods raise significant issues for antitrust enforcement, which run the gamut from market definition to market power to the evaluation of the competitive effects of mergers, and more generally, to strategic business behavior. The authors use examples from diverse jurisdictions and markets, particularly focusing on three case studies: free search services, free internet browsers and free newspapers.</td>
<td>y</td>
<td>Michal S. Gal and Daniel L. Rubinfeld, &quot;The Hidden Costs of Free Goods: Implications for Antitrust Enforcement,&quot; Antitrust Law Journal 80 (3) (2016): 521–582.</td>
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<td><strong>Role of Data</strong></td>
<td>Machine Learning</td>
<td>Sustainable and Unchallenged, Algorithmic Tacit Collusion</td>
<td>Ariel Ezrachi and Maurice E. Stucke</td>
<td>2020</td>
<td>Algorithmic tacit collusion has the potential to transform future markets, leading to higher prices and consumer harm. And yet, algorithmic collusion may remain undetected and unchallenged, particularly when it is used to facilitate conscious parallelism. The risks posed by such undetected collusion have been debated within antitrust circles (in Europe, the US, and beyond). Some algorithms tacit collusion is unlikely. Yet, if not impossible, arguing that future prices will remain competitive. This paper explores the rise of algorithmic tacit collusion and responds to those who dismiss the gap between the law and this particular economic theory. The authors explain why algorithmic tacit collusion is not only possible but warrants the increasing concerns of many enforcers.</td>
<td>y</td>
<td>Ariel Ezrachi and Maurice E. Stucke, &quot;Sustainable and Unchallenged Algorithmic Tacit Collusion,&quot; Antitrust Law Journal and Intellectual Property 17 (2) (2020): 217–260.</td>
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<td><strong>Role of Data</strong></td>
<td>Big Data</td>
<td>The Role of Big Data and Digital Privacy in Merger Review</td>
<td>Maria C. Wasastjerna</td>
<td>2018</td>
<td>This paper examines the implications of big data for competition law, with a focus on personal data and the concerns that data may give rise to in merger review. One of the biggest challenges for competition authorities in the digital age is how to deal with data and privacy issues in their competitive analysis. An emerging issue is the role of competition in protecting consumers from potential privacy risks flowing from the increasing number of mergers in digital markets. The authors consider how personal data in the economy is considered a currency in exchange for online offerings, and how a loss of privacy can be factored into quality competition. The author concludes by addressing some of the challenges with incorporating privacy as a non-price parameter in competition analysis.</td>
<td>y</td>
<td>Maria C. Wasastjerna, &quot;The Role of Big Data and Digital Privacy in Merger Review,&quot; European Competition Journal 14 (2–3) (2018): 417–444.</td>
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### Potential Competition

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<td><strong>Potential Competition</strong></td>
<td>Entry</td>
<td>Blind Spot: The Attention Economy and the Law</td>
<td>Tim Wu</td>
<td>2019</td>
<td>An increasingly large and important sector of the economy, including well known firms like Google and Facebook, now depends on attentional markets. This development has created a blind spot that affects the antitrust and consumer protection laws, which are premised on cash markets and monetary harms. As a connection, this paper introduces a new means of assessing competition in attentional markets centered on “attention brokerage.” In antitrust, it gives a better sense of the market power of contemporary firms like Facebook, whose power is mainly in attentional markets. In the realm of consumer protection, it provides regulators with a paradigm for protecting captive audiences from cognitive impairments caused by non-consensual seizure of attention.</td>
<td>y</td>
<td>Tim Wu, &quot;Blind Spot: The Attention Economy and the Law,&quot; Antitrust Law Journal 82 (3) (2019): 771–806.</td>
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Potential Competition

Consumer Welfare

Amazon's Antitrust Paradox

Lina M. Khan
2017

Amazon has positioned itself at the center of e-commerce and now serves as essential infrastructure for a host of other businesses. Elements of the firm's structure and conduct pose anticompetitive concerns, yet it has escaped antitrust scrutiny. This paper argues that the current framework in antitrust, specifically its pegging of competition to "consumer welfare" (defined as short-term price effects), is unequipped to capture the architecture of market power in the modern economy. The author argues that current doctrine underappreciates the risk of predatory pricing and how integration across distinct business lines may prove anticompetitive. These concerns are heightened in the context of online platforms for two reasons. First, the economics of platform markets create incentives for a company to pursue growth over profits, a strategy that investors have rewarded. Under these conditions, predatory pricing becomes highly rational, even as existing doctrine treats it as irrational and therefore implausible. Second, because online platforms serve as critical intermediaries, integrating across business lines positions these platforms to control the essential infrastructure on which their rivals depend. This dual role also enables a platform to exploit information collected on companies using its services to undermine them as competitors.

Potential Competition

Innovation

Anticompetitive Product Design in the New Economy

John M. Newman
2012

Claims alleging anticompetitive product design and redesign lie at the core of one of antitrust law’s most challenging dilemmas: the intersection between innovation and regulation, invention and intervention. For over three decades, courts and scholars have struggled to determine the proper analytical framework within which to address such cases. Meanwhile, the very industries in which challenged conduct occurs have been undergoing fundamental changes. As demonstrated by the ongoing and recent antitrust litigation involving high technology firms Apple, Intel, and Microsoft, distinctive features characterize most product markets in what has been called the "New Economy," which increasingly has become, simply, "the economy." Many of these features not only incentivize anticompetitive, design-related conduct but also render such conduct susceptible to antitrust scrutiny. Accordingly, this paper supplies a proper understanding of code-based product markets and, perhaps more importantly, provides a structured, efficient, and rational method for analyzing design-related conduct in those markets.

Potential Competition

Innovation

Information, Innovation, and Competition Policy for the Internet

Howard A. Shelanski
2013

Antitrust agencies around the world are increasingly focusing on digital industries. Critics have justifiably questioned the ability of competition agencies to make beneficial enforcement decisions given the complexity and rapid pace of change in online markets. This paper discusses those criticisms and addresses the argument that, because the error costs of overenforcement of antitrust laws in digital markets would be much higher than the error costs of underenforcement, courts and antitrust agencies should presume against antitrust intervention in digital industries. While acknowledging that there is often good reason for such modesty in enforcement, the author discusses several ways in which competition policy can adjust to better account for potential costs and benefits of enforcement in digital platform markets. The author argues that nonprice effects related to information and innovation are particularly important to the performance of online platforms, and may hold the key to a better understanding of the costs of antitrust underenforcement and the assessment of the competitive effects of conduct and transactions in digital industries.

Potential Competition

Innovation

Predatory Innovation: The Definite Need for Legal Recognition

Thibault Schrepel
2018

It is widely recognized that the process of competition generally encourages companies to lower their prices, which benefits consumers. Yet, in certain specific cases, antitrust rules intend to sanction predatory prices because they eliminate the competitive process itself. A similar situation applies to innovation. Innovation is one of the main bases for competition between companies and it is beneficial to consumers who enjoy new products that are better suited to their needs. But certain innovative behaviors are also considered predatory and are punished accordingly, despite the fact that no legal concept specifically addresses this issue. This absence of a legal category specifically dedicated to anticompetitive innovation makes judges more likely to judge cases of innovation that are better suited to their needs. This study addresses the problem of innovation that is not yet generalized the etiquette of predatory innovation, which nevertheless answers some of the problems encountered by antitrust law with high tech market development. The apparent lack of interest in that notion by courts has led the doctrine to devote few studies to the subject, which has accentuated judges' reluctance to use it and so on. This paper seeks to substantiate the value of the notion of predatory innovation, which covers a wide range of practices, many of which are not reached by actual antitrust rules.

Potential Competition

Innovation

Does Sharing Mean Caring? Regulating Innovation in the Sharing Economy

Sofia Ranchordás
2015

Sharing economy practices have become increasingly popular in recent years. Although Uber, Airbnb, and other online platforms have democratized access to a number of services and facilities, concerns have been raised as to public safety, health, and limited liability of these sharing economy practices. In addition, these innovative activities have been contested by professionals offering similar services who claim the sharing economy is opening the door for anticompetition. Rights are an on-demand service: on the one hand, innovation in the sharing economy should not be stifled by excessive and outdated regulation; on the other hand, there is a real need to protect the users of these services from fraud, liability, and unlawful service providers. This paper analyzes the challenges of regulating the sharing economy from an "innovation law perspective," by arguing that these innovations should not be stifled by regulation, but should also not be left unregulated. The author closes by suggesting that innovation in the sharing economy requires fewer, but broader rules that do not stifle innovation, but also impose a minimum of legal requirements that take into account the specificities of innovative sharing economy practices, and that are open for future developments.