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Comment   Judith Chevalier

Varian provides an excellent overview of industrial organization issues arising out of the adoption of machine learning and artificial intelligence. A number of these issues have potential competition policy implications. For example, exploitation of AI technologies may either increase or decrease economies of scale, leading potentially to situations of market power. Ownership of data, if crucial to competition in a specific industry, may create barriers to entry. The potential for algorithmic collusion clearly leads to antitrust enforcement concerns. Here, I briefly address one of these issues, data ownership, and highlight some potential antitrust policy responses. While I focus here on data ownership as a barrier to entry, some of the policy trade-offs I discuss are germane to the other potential market structure changes highlighted in Varian.

Artificial intelligence and machine-learning processes often use raw data as an input. As Varian points out, it is not at all clear that data defies our usual expectation that a scarce asset or resource will eventually face decreasing returns to scale. Nonetheless, one can certainly imagine circumstances where exclusive ownership of a body of data will create a nearly insurmountable advantage to a market incumbent. While the concern that access to a

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scarce asset creates entry barriers may be relatively new as it applies to data, the underlying fundamental economic issue is not new. Antitrust authorities in all jurisdictions have long wrestled with optimal policy toward firms for which the ownership of scarce assets creates barriers to entry. In the United States, analysis of this issue dates back at least to *United States v. Terminal Railroad Assocation* (224 US 383 (1912), a case in which consortia of railroads denied rival access to the only railroad bridges traversing the St. Louis River. In that case and subsequent ones, courts have occasionally articulated a duty to deal for a firm with market power that controls access to an asset (or facility) that is essential to competition and for which it is impractical for rivals to duplicate the asset. However, determining the precise circumstances under which a monopolist has an affirmative duty to deal with a rival remains an unsettled area of antitrust law.

In principle, this very kind of antitrust essential facilities doctrine could be applied to data ownership. Indeed, while Varian remains silent on the issue of remedies, recent legal literature in the United States has shown some enthusiasm for essential facilities doctrine as applied to data (see, e.g., Meadows 2015; Abrahamson 2014). Further, European antitrust authorities have begun to articulate principles for the control of big data that suggest an essential facilities doctrine. For example, Margrethe Vesteger (2016), the EU Commissioner for Competition, recently stated in a speech "it's true that we shouldn't be suspicious of every company which holds a valuable set of data. But we do need to keep a close eye on whether companies control unique data, which no one else can get hold of, and can use it to shut their rivals out of the market." In the speech, she highlighted a 2014 case in which the French competition authority required a French energy producer, GDF Suez, to share a customer list with industry rivals.

Despite enthusiasm in some quarters, the application of essential facilities doctrine to data sharing creates both important trade-offs and important practical concerns. I begin with the trade-offs. In evaluating antitrust policies in innovative industries, it is important to recognize that consumer benefits from new technologies arise not just from obtaining goods and services at competitive prices, but also from the flow of new and improved products and services that arise from innovation. Thus, antitrust policy should be evaluated not just in terms of its effect on prices and outputs, but also on its effect on the speed of innovation. Indeed, in high-technology industries, it seems likely that these dynamic efficiency considerations dwarf the static efficiency considerations. In the case of an application of the essential facilities doctrine to data, the trade-offs are numerous and they are directionally unclear.

An often-cited criticism of essential facilities doctrine is that creating an ex post duty to share diminishes the incentive to invest in the essential facility in the first place (see, e.g., Pate 2006). In this case, creating an ex post duty to share data could diminish the incumbent incentive to invest in data creation, thus slowing the pace of innovation. However, the overall incentive

trade-offs are not as simple as that. In circumstances in which new entrants are an important source of potential innovation, exclusionary conduct by incumbents that reduces the incentive of entrants to invest in R&D can slow the pace of innovation. That is, in the case of data, if particular data is an essential complement to an AI innovation, exclusive ownership of the data by an incumbent can slow the pace of innovation by entrants. Issues of the impact of antitrust enforcement on the pace of innovation remains a nascent area of research, but is explored theoretically in, for example, Segal and Whinston (2007). Thus, in sum, while a broad application of the essential facilities doctrine to proprietary data may be tempting from an ex post static efficiency perspective, caution about ex ante incentives is warranted.

In addition to the trade-offs already discussed, any application of an essential facilities doctrine to data sharing also implies a host of practical considerations. As in any essential facilities scenario, once a court or antitrust authority establishes a duty to deal, it must also articulate terms of trade. Clearly, absent some articulation of terms, an incumbent can de facto refuse to deal by establishing transaction terms that are unattractive to any potential rival user of the data. Given that market conditions are continually changing, an ongoing regulation of the terms of trade will become unavoidable. There are certainly instances in which US courts have become ongoing regulators of the transactions of companies for which a court has imposed a duty to deal. The continuing oversight of the contracts of the music licensing firms ASCAP and BMI are good examples of a duty to deal leading to de facto regulation by the courts. However, the creation of such an ongoing regulatory structure brings with it costs to both the regulatory entity and the regulated firms. Essential facilities is not a quick fix.

Finally, while essential facilities doctrine may not always be the best tool for addressing data whose ownership has become concentrated, the potential for mergers to create importantly concentrated data should be considered in merger analysis, just as merger analysis considers the potential for mergers to substantially concentrate some other element of productive capacity.

Clearly, there are important trade-offs in implementing antitrust solutions to the problems potentially created by exclusive ownership of key data. This raises at least a few other public policy avenues to be explored. For example, given the public goods nature of data, there may be circumstances in which public investment in data creation and public ownership of the data thus created is worth exploring, particularly in circumstances when private creation of such data would lead to antitrust concerns.

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