

# Spectrum Auctions and Economic Welfare: A Cautionary Tale for Policymakers

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## INTRODUCTION

Over the years, economists have devoted considerable attention to the possibility that a vertically integrated firm might deny access to an upstream input in order to foreclose its downstream rivals in retail markets.<sup>1</sup> This literature has provided considerable insight into the conditions under which such foreclosure may arise. Recently, however, the specter of foreclosure has arisen in a new and less-explored area. Specifically, in the context of auctions for radio spectrum, a concern has arisen that larger incumbent wireless services providers might strategically outbid erstwhile rivals in downstream markets in order to anticompetitively foreclose these rivals from competing effectively in the downstream markets.

Set against these concerns is what has been a palpable public policy affinity with the auction mechanism. Indeed, since the mid-1990s dozens of auctions for spectrum have been conducted and have successfully allocated billions of dollars of this scarce resource. This popularity stems at least in part from the fact that, in contrast to bureaucratic allocation methods, well-designed auctions typically ensure that the input is allocated to the users who value that input most highly.<sup>2</sup> Given the centrality of the auction mechanism as a policy tool, claims of potential foreclosure when firms compete at auction for a scarce resource such as spectrum and then subsequently compete in downstream markets warrants careful attention.

## ECONOMIC FINDINGS

Our recent paper (Mayo and Sappington, 2014) seeks to provide such attention. In particular, we analyze an economic model of the interactions among retail competitors that bid for a scarce input (spectrum, for example) to determine the particular elements of industry competition that act to promote or limit the ability of an unfettered auction to maximize economic welfare. In our context, an “unfettered auction” is one that ensures the input is allocated to the firm that values it most highly. Our model embodies several features that are germane to the controversy

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<sup>1</sup> See Rey and Tirole (2007) for a review.

<sup>2</sup> Within the economics community, this affinity dates back at least to Coase (1959).

surrounding the auctioning of spectrum. In particular, we envision that each firm values additional units of the scarce input because the input has the prospect of reducing the firm's production costs and/or enhancing the quality of its subsequent service offerings. In short, prospective auction bidders value the incremental input for its "use value." Firms also may value acquiring the input because, once acquired, the input is not available for use by their competitors. That is, incremental spectrum acquired at auction may also include a "foreclosure value".

Although our formal analysis necessarily abstracts from some of the nuanced complexities of input (spectrum) and output (retail wireless) markets in the modern telephone and broadband industries, it nonetheless provides potentially useful conclusions for policymakers. Most importantly, while some have suggested that the presence of "foreclosure value" might limit the merits of unfettered auctions for spectrum, our analysis (which fully incorporates the foreclosure value of inputs) reveals that unfettered auctions often will ensure the welfare-maximizing allocation of scarce inputs. Even when all firms enjoy foreclosure value, and even in settings where some firms serve far more retail customers than other firms, unfettered auctions can maximize economic welfare. Indeed, when competitors perceive the same marginal value of spectrum, unfettered auctions can be relied upon to (i.e., they always) generate the welfare-maximizing allocation of inputs. Similarly, when consumers base their purchase decisions predominantly on important "vertical" dimensions of quality<sup>3</sup> and purchase service from the supplier that sets the lowest price and/or provides the highest such quality, unfettered auctions also emerge as a robust platform for generating welfare-maximizing spectrum allocations.

Although these generally salubrious effects of unfettered auctions are not guaranteed to arise in all conceivable settings, the information required to ensure welfare-enhancing modifications of auction rules is extensive and typically unavailable in practice.

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<sup>3</sup> Our model distinguishes between vertical dimensions of product quality (e.g., call clarity, the frequency of dropped calls, and geographic coverage) that are affected by the allocation of the input, and horizontal dimensions of product quality that are not affected by the input allocation (e.g., handset color or the proximity of a firm's showrooms to the city center).

## TAKEAWAYS

Collectively, these observations provide a powerful cautionary message about the wisdom of implementing auction designs that overtly favor particular, e.g., “small,” industry competitors. This cautionary message from our work is underscored by at least three additional considerations. First, firms' initial market shares are exogenous in our model. In actual competitive settings, firms devote considerable effort to expanding their market shares, and prevailing market shares will change over time. Consequently, attempts by policymakers to favor today's “small” suppliers may inappropriately advantage tomorrow's “large” suppliers. Furthermore, and perhaps more importantly, policies that favor small suppliers may limit the incentive of all suppliers to deliver the effort required to become large, successful suppliers. Such effort can be instrumental in benefitting consumers and enhancing economic welfare.

Second, our model does not explicitly incorporate capacity constraints. Such constraints can further limit the rationale for designing auction rules to favor small suppliers. A firm with a large market share that faces binding capacity constraints often will experience a large “use value” and a small “foreclosure value” for spectrum relative to small firms that face less binding capacity constraints. Consequently, auction rules that favor small suppliers may favor suppliers whose incentives are least closely aligned with the objective of maximizing economic welfare.

Collectively, these two considerations further suggest that attempts to micro-manage auction rules to favor particular competitors may have the unintended consequence of reducing, not enhancing, economic welfare.

Finally, although our model does not explicitly consider the revenue implications of the upcoming spectrum auctions, our analysis has implications for this important issue. Specifically, if anticompetitive, welfare-reducing foreclosure were to emerge as a clear consequence of an unfettered auction, then a policy that “buys” enhanced competition with foregone revenues could conceivably be warranted. However, our analysis indicates that anticompetitive bidding strategies designed to foreclose rivals in an open auction are far from certain. Consequently, an attempt to “buy” enhanced competition by imposing a constrained auction design may provide little or no

direct gains in welfare while sacrificing considerable revenue for the U.S. Treasury. Indeed, Treasury losses from restrictive auction design may amount to billions of dollars (Shapiro, Holtz-Eakin and Bazelon, 2013; Haile, Meidan and Orszag, 2013). Losses of this magnitude raise the question of whether any possible gains to competition might be “purchased” in a manner that is less expensive than imposing restrictive *ex ante* rules on selected potential bidders. For instance, an unfettered auction with *ex post* enforcement of existing spectrum screens might ensure competition goals without sacrificing Treasury revenue.

While considerable policy controversy has circulated around the openness of the impending incentive auction of spectrum, this controversy has not benefitted in significant measure from careful economic analysis of the salient issues. Our study is intended to help provide such analysis. We view our work as providing a cautionary tale for policymakers regarding the potential hazards of restricting participation in the impending auction of scarce radio spectrum in 2015.

## REFERENCES

Coase, Ronald, "The Federal Communications Commission," *Journal of Law and Economics*, Vol. 2, October 1959, pp. 1-40.

Haile, Philip, Maya Meidan and Jonathan Orszag, "The Impact on Federal Revenues from Limiting Participation in the FCC 600 MHz Spectrum Auction," October 30, 2013.

Mayo, John W. and David E.M. Sappington "Employing Spectrum Auctions to Allocate Scarce Resources," Georgetown Center for Business and Public Policy, working paper, January 2014.

Rey, Patrick and Jean Tirole, "A Primer on Foreclosure," in *Handbook of Industrial Organization*: Volume 3, North-Holland, 2007.

Shapiro, Robert, Douglas Holtz-Eakin and Coleman Bazon, "The Economic Implications of Restricting Spectrum Purchases in the Incentive Auctions," Georgetown Center for Business and Public Policy, April 30, 2013.