PERSPECTIVES

PHOENIX CENTER FOR ADVANCED LEGAL & ECONOMIC PUBLIC POLICY STUDIES

Will Bidder Exclusions Increase Auction Revenue? A Review of the Arguments

George S. Ford, PhD*

June 11, 2013

Introduction

Commercial mobile wireless carriers need spectrum—and a lot of it. With very little spectrum lying fallow, the Middle Class Tax Relief and Job Creation Act of 2012 directs the Federal Communications Commission ("FCC") to design an auction to incent broadcasters to voluntarily surrender spectrum to the mobile wireless industry.[1] Since the auction addresses both the supply-side and demand-side for spectrum, this incentive auction will be the most complex spectrum auction to date. Adding to the inherent complexity of the auction is the fact the FCC is on the hook to design an auction that generates significant revenues. The Congressional Budget Office has scored the auction to produce around $24.5 billion and these expected revenues from the incentive auction have already been allocated to specific (and very expensive) purposes.[2] As such, expectations for the upcoming auction's success remain high.

As spectrum is scarce, it should come as no surprise that the battle over who can participate as a potential bidder in the auction is fierce. For example, Sprint and T-Mobile—who did not participate in the last major auction of 700 MHz spectrum—are now arguing that the FCC should limit the ability of AT&T and Verizon to pursue the spectrum they may want to acquire in the auction.[3] Excluding the two most successful wireless companies with a penchant for paying big in spectrum auctions is an obvious threat to auction revenues. However, Sprint and T-Mobile claim that excluding AT&T and Verizon will actually *increase* auction revenues.[4]

> ***... Sprint and T-Mobile are playing fast-and-loose with economic theory. *** [E]xcluding the two larger carriers will, in fact, reduce auction revenues.***

In this PERSPECTIVE, I will review the arguments made by Sprint and T-Mobile to determine whether or not economics support their "revenue enhancement by exclusion" hypothesis. It does not. As I explain, Sprint and T-Mobile are playing fast-and-loose with economic theory. Upon inspection, the research used by the companies to support the revenue-enhancement hypothesis show that excluding the two larger carriers will, in fact, *reduce* auction revenues. Additionally, the research cited by Sprint and T-Mobile consistently and fervently warns about the dangers of such exclusions, but neither of the companies discusses such hazards in their advocacy.

The "Revenue Enhancement by Exclusion" Argument

The promise of billions of dollars in potential auction revenue from the broadcast incentive auction is eagerly anticipated by Congress. Indeed, revenue from the upcoming voluntary incentive auctions are supposed to, *inter alia*, (a) pay for the costs of the auction; (b) pay for the repacking of television stations after the conclusion of the auction; (c) provide a portion of the revenue to the participating broadcasters; (d) provide funding for a new, interoperable public safety network (FirstNet); (e) provide funding for next generation 911 services; and if anything is left, (f) provide much needed funds to help balance a huge deficit and pay down America's ballooning national debt. Given such high expectations, it would be safe to assume that any rules that curb auction revenues will be frowned upon by Congress.

Recognizing the power of this sentiment, Sprint and T-Mobile, and their representatives, are working hard to convince policymakers and the public that restricting the two largest carriers' participation in the incentive auction will actually *increase,* rather than decrease, auction revenues. The argument goes like this: Auction prices are typically higher the more bidders there are. However, if AT&T and Verizon participate in the auction, then their mere involvement will scare potential bidders away from the auction and, violà, the two dominant companies get to buy the spectrum on the cheap.[5] Ergo, argue Sprint and T-Mobile, if the FCC *excludes* AT&T and Verizon from the auction, then more bidders will show up and auction revenues could rise.

Sprint and T-Mobile cite a number of academic papers they allege support this "revenue enhancement by exclusion" hypothesis; however, the research they cite does not provide support for their arguments. The two companies are referencing economic arguments based on a stylized "incumbent versus entrant" model with a monopoly incumbent facing potential entry. For example, Cramton, et al. (2009) provide the following model. Let $\pi(k)$ be the per-firm profit obtained from the purchase of spectrum, where k is the number of competitors in the market. The model assumes a monopoly incumbent, and one license at auction. If the monopolist wins the auction, then its profits are $\pi(1)$. Alternately, if a new entrant gets the spectrum, then the incumbent's and entrant's profits are $\pi(2)$ each (i.e., the duopoly profit). The entrant, therefore, is willing to bid up to $\pi(2)$. Economic theory holds that the monopoly profit is more than twice the duopoly profit $[\pi(1) > 2\pi(2)]$; thus, the incumbent firm will offer a bid slightly higher than $\pi(2)$ and thereby win the auction.[6]

A numerical example based on Sprint's FCC submissions illustrates the point.[7] Say the monopoly profit is $200 and the duopoly profit is $70 (which is less than half the monopoly profit). An entrant is willing to offer only $70 for the spectrum (the expected duopoly profit), but the incumbent loses $130 if the entrant wins, so the incumbent is willing to bid more than $70 to win (up to $130). Thus, in an open auction where the incumbent and the potential entrants participate, the expected winning bid is $70 plus some change. The incumbent wins. Alternately, if the incumbent is excluded from the auction, then the winning bid is $70 (assuming multiple potential entrants).

Obviously, this simple scenario isn't enough to get auction revenues to rise from the incumbent's exclusion (in both cases, the bids are about $70). To get revenues to rise, the presence of the incumbent must scare off *all* potential entrants, therefore leaving the incumbent the lone bidder. So, once more, the argument goes like this: If the entrant believes it has no chance to win but bidding is costly, then the entrants don't enter the auction and the incumbent gets the spectrum for less than $70, presumably paying near nothing or the minimum bid if required.[8] This line of reasoning—that is, no other bidders show up—

is the essence of the argument that revenues will rise if AT&T and Verizon are excluded from the incentive auction.

There are serious flaws in this reasoning. First, the theory, to the extent it is relevant, calls for the exclusion of *all* incumbents. Incumbents are firms already in the business that have something to lose if an entrant obtains spectrum and enters the business. Thus, the analysis Sprint and T-Mobile are using to suggest AT&T and Verizon be restricted should also apply to Sprint and T-Mobile (along with anyone else already in the business).

Second, the mobile wireless market is not served by a monopolist threatened with entry. The market is served by multiple incumbents, and there is very little threat of additional large-scale entry given the relatively low profitability of the market.[9] Thus, the assumptions of the theory in no way match the reality, and in this case, that disconnect between theory and reality is critical.[10] Why? Because in an (ascending) auction, the winning bid is equal to the second highest valuation (plus a little).

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Crampton et al. (2009) notes the distinction between the monopoly and the multiple incumbent cases. If there are two incumbents with profit $\pi(2)$, then the winning bid is $\pi(2)$, since the incumbents are both incented to participate in the auction. If the incumbents are excluded, then the winning bid is $\pi(3)$, which is normally less than $\pi(2)$.[11] The exclusion lowers auction revenues if incumbents are excluded.

Ayres and Cramton (1996) provide an even better example. Let there be multiple incumbents and potential entrants, with the incumbents having higher valuations for spectrum than do entrants (based on use value, foreclosure value, or both).[12] In their lingo, incumbents are "strong" and entrants are "weak." Say there are four bidders, two incumbents with reservation values (i.e., maximum willingness-to-pay) of $110 and $90, and two entrants with reservation values of $60 and $40, respectively. There are two licenses to be auctioned in an English auction (ascending bid) and each bidder is interested in only one license.

In an auction without restrictions, each license sells for $60 (plus some change) since the two incumbents outbid the entrant with the higher valuation. Total auction proceeds are $120. Alternately, let's consider a scenario consistent with excluding AT&T and Verizon from the auction. Using the same valuations, say that the firm with the largest valuation ($110) is excluded from bidding, but the other incumbent (with a $90 valuation) is not excluded. Now, the two licenses are sold for $40 each, for a total auction take of only $80. One license is acquired by the remaining incumbent, and the other by the entrant with the highest valuation.

It is plain in this example that excluding some incumbents reduces auction proceeds. Furthermore, the incumbent with the lower valuation pays $20 less than it does in the open auction, and presumably would be willing to expend some portion of this amount to encourage regulators to exclude the incumbent with the higher valuation. We see this strategy playing out today in the efforts of Sprint and T-Mobile to exclude their larger rivals from the auction.

Efficiency Consequences of Bidder Exclusions

In the previous section, we saw that Sprint and T-Mobile's "revenue enhancement by exclusion" hypothesis is not supported by the research papers they cite in support of their position. It is worth noting too that Sprint and T-Mobile are highly selective in their references to these documents. In each, the authors issue strong warnings about the use of spectrum caps, set asides, and other auction manipulations.

For example, Cramton et al. (2009) argue that spectrum caps and other auction manipulations "must be used with care to avoid unintended harm."[13] And while they recognize that a portion of the incumbent's value may come from "the value of deterring new entry," it is also true that "the incumbent may have important economies of scale and scope that would allow it to use the additional spectrum more efficiently" and that "some aggregation of spectrum may be necessary to develop a new generation of services (for example, a high-speed wireless data service)."[14] We see the same type of argument in other papers. The tradeoff between scale economies (or quality) and additional entry is detailed in our recent published paper entitled *A Policy Framework for Spectrum Allocation in Mobile Communications*, and our findings are consistent with the warnings issued in the research cited by Sprint and T-Mobile.[15]

Consistently, the research calls for the spectrum to go to the most efficient firms, and recognizes that open auctions typically produce that result. The literature also consistently warns that meddling with auctions runs the risk of forgoing efficiencies, thus harming consumers.

Moreover, in the literature cited by Sprint and T-Mobile, the key motivation for manipulating the auction is the creation of a new entrant, which presumably would lower price (under the assumption of Cournot Competition). Yet, the marginal price effect of an additional entrant in the U.S. mobile wireless market is likely to be very small (also under the Cournot assumption), and the evidence suggests that the likelihood of additional entry in the U.S. mobile wireless market is near zero.[16] Thus, the potential gain from caps, credits, and so forth are virtually non-existent. Other countries have tried recently to induce entry through auction rules, but the efforts failed.[17] As we have mentioned repeatedly, merely having spectrum does not ensure a viable business plan.[18] Spectrum is mostly a grant of permission. Using the spectrum requires billions in investment, and it is these fixed and sunk costs that largely determine market structure. As noted by Cramton et al. (2009), "the underlying economies of scale may well undo the regulator's desires for more competitors."[19]

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Exclusions and Willingness to Pay for Spectrum

As described in our recent paper *Equalizing Competition Among Competitors*, the private value of spectrum for an incumbent firm is equal to its use value plus its foreclosure value.[20] To clarify, say that current profits for Firm A are $100. If Firm A gets the spectrum, then its profits rise to $130. If a rival gets the spectrum, then Firm A's profits fall to $80. The difference between getting the spectrum and losing the spectrum is $50, and this is the maximum willingness to pay (and the maximum bid) of the spectrum in an auction. This private value of $50 to Firm A can

be decomposed into $30 of use value and $20 of foreclosure value.

For firm A, its foreclosure value is equal to the reduction in its profit when a rival, whether an incumbent or a new entrant, obtains spectrum that Firm A does not. This loss of profit occurs because a rival incumbent will use the spectrum to its increase efficiency, thus lowering price and taking market share from Firm A. Similarly, a new entrant will use the spectrum to offer service, reducing price and taking market share from Firm A.

At this stage of the industry's evolution, costly interventions to serve bureaucratic preferences for unsustainable market structures are difficult to justify.

Importantly, the foreclosure value associated with a rival incumbent's acquisition of spectrum may be very different from that related to a new entrant. Certainly, increasing the efficiency of a successful and large incumbent could be a greater threat to profits than the entry of a small newcomer. If so, then excluding the large incumbent from the auction will reduce the private value of the spectrum to the small incumbent by reducing its foreclosure value. Going back to the example, say that Firm A's profit only falls to $90 (versus $80) if a new entrant gets the spectrum since the additional entry has only a small effect on price competition. Now, Firm A's maximum willingness to pay for spectrum is only $40, or $10 less than before. As a consequence of excluding an efficient and successful incumbent, the private values of remaining incumbents shrink, and this reduction in value could negatively impact auction revenues, and reduce the efficiency with which scarce spectrum resources are deployed.[21]

Conclusion

The upcoming voluntary incentive auction for broadcast spectrum will be the most complicated ever implemented for spectrum allocation. Establishing rules that exclude or limit the participation of the two largest mobile wireless carriers will only add to the complexity, and, as explained here, the bidder restrictions are near certain to lower auction revenues. For Sprint and T-Mobile's "revenue enhancement by exclusion" argument to work, there needs to be a monopoly incumbent mobile wireless carrier whose mere presence scares off all other potential bidders. Yet, there are many incumbents, and history has shown that many non-incumbent bidders show up even when incumbents do participate in spectrum auctions. The "revenue enhancement by exclusion" argument doesn't hold water.

Given spectrum exhaust, society is best off if spectrum goes to those firms that can most efficiently use it, and there are good reasons to believe that an auction including all carriers will result in the most efficient use of spectrum and the highest potential auction revenues. At this stage of the industry's evolution, costly interventions to serve bureaucratic preferences for unsustainable market structures are difficult to justify.

NOTES:

[*] **Dr. George Ford** ***is Chief Economist of the Phoenix Center for Advanced Legal and Economic Public Policy Studies. The views expressed in this*** **PERSPECTIVE** ***do not represent the views of the Phoenix Center or its staff.***

[1] Middle Class Tax Relief and Job Creation Act of 2012, Public Law 112-96 (February 22, 2012) (available at: http://www.gpo.gov/fdsys/pkg/PLAW-112publ96/pdf/PLAW-112publ96.pdf); A large block of broadcast television spectrum was repurposed for mobile wireless use as part of the digital television transition, which lead to an auction that moved 52 MHz of spectrum from broadcasters to the commercial mobile wireless sector. The auction generated about $19 billion in revenues for the government (http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=73).

[2] Congressional Budget Office, *S.911: Public Safety Spectrum and Wireless Innovation Act* (July 20, 2011)(available at: http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/123xx/doc12322/s911.pdf); *see also* Letter from House Energy & Commerce Committee Chairman Fred Upton *et al.*, to the Federal Communications Commission (April 19, 2013) at 3 (available at: http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/letters/20130419FCC.pdf).

[3] T-Mobile has proposed a 30% spectrum cap on all spectrum below 1 GHz. *See, e.g., Competitive Spectrum Auctions,* T-Mobile *Ex Parte*, FCC Docket No. 12-268 (May 29, 2013) (available at: http://apps.fcc.gov/ecfs/document/view?id=7022420142). Since the amount of broadcast spectrum made available by the incentive auction is unknown, the 30% limit may block AT&T and Verizon from acquiring additional spectrum below the 1 GHz limit.

[4] *See, e.g., T-Mobile Ex Parte, id.*, and Reply Comments of Sprint Nextel Corporation, GN Docket No. 12-268 (March 12, 2013) (available at: http://apps.fcc.gov/ecfs/document/view?id=7022130342).

[5] The general argument is summarized by economist Jonathan Baker, filing on behalf of T-Mobile in the Spectrum Screen docket: "Given the non-trivial fixed costs of auction participation, a firm expecting to be outbid could readily be deterred from participating in the auction in the first place. If auction participation is thin as a result of this dynamic, the large incumbent firms that are in principle willing to pay to obtain foreclosure benefits may enjoy these benefits without bidding up the auction price to a level that pays for those benefits fully, leaving the [] government with lower revenues than could be obtained." J.B. Baker, *Spectrum Auction Rules That Foster Mobile Wireless Competition* (March 12, 2013) at 10-11 filed on behalf of T-Mobile in FCC WT Docket No. 12-269 (available at: http://apps.fcc.gov/ecfs/document/view?id=7022130299).

[6] For a similar use of this analysis, T.W. Hazlett and G.S. Ford, *The Fallacy of Regulatory Symmetry: An Economic Analysis of the Level Playing Field in Cable TV Franchising Statutes*, 3 BUSINESS & POLITICS 21-46 (April 2001) (available at: http://mason.gmu.edu/~thazlett/pubs/the_fallacy_of_regulatory_symm.pdf).

[7] Sprint Reply, *supra* n. 4 at 4.

[8] Also, U.S. spectrum auctions include healthy reserve prices. In the example, if the reserve price is $70, there's no effect on auction revenue even if the theory fits the situation (which it does not).

[9] *See* G.S. Ford and L.J. Spiwak, PHOENIX CENTER POLICY PERSPECTIVE NO. 12-05, *What is the Effect of Regulation on Broadband Investment? Regulatory Certainty and the Expectation of Returns* (September 19, 2012) (available at: http://www.phoenix-center.org/perspectives/Perspective12-05Final.pdf); G.S. Ford and L.J. Spiwak, PHOENIX CENTER PERSPECTIVE NO 10-04, *Substantial Profits in the Broadband Ecosystem: A Look at the Evidence* (April 22, 2010) (available at: http://www.phoenix-center.org/perspectives/Perspective10-04Final.pdf).

[10] The monopoly assumption does not always lead to deceptive results, but in this case, it does. In any auction, it takes two to tango, so having multiple incumbents is theoretically and practically very important.

[11] Under Bertrand Competition, profit is equal to zero with two firms.

[12] I. Ayres and P. Cramton, *Deficit Reduction Through Diversity: How Affirmative Action at the FCC Increased Auction Competition*, 48 STANFORD LAW REVIEW 761-814 (1995-6) (available at: http://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=2520&context=fss_papers).

[13] P. Cramton, E. Kwerel, G. Rosston, A. Skrzypacz, *Using Spectrum Auctions to Enhance Competition in Wireless Services*, 54 JOURNAL OF LAW AND ECONOMICS S167-S188 (2011) at p. S169. Like this *Cramton et al.* paper, research in the area does point to

NOTES CONTINUED:

strategies that have the potential to increase auction revenues, but the schemes are not of the sort proposed for the broadcast incentive auction and each still risks the inefficient allocation of spectrum. Of course, a poorly designed auction can reduce auction revenues.

14 *Id.*

15 T.R. Beard, G.S. Ford, L.J. Spiwak and M. Stern, *A Policy Framework for Spectrum Allocation in Mobile Communications*, 63 FEDERAL COMMUNICATIONS LAW JOURNAL 639-666 (2011) (available at: http://www.phoenix-center.org/papers/FCLJSpectrum.pdf).

16 *Id.*

17 Cramton *et al.*, *supra* n. 13 at pp. S179-80.

18 *See, e.g.,* Beard *et al. supra* n. 15 at Section IV.

19 Cramton *et al.*, *supra* n. 13 at p. S180.

20 G.S. Ford and L.J. Spiwak, *Equalizing Competition Among Competitors: A Review of the DOJ's Spectrum Screen Ex Parte Filing,* PHOENIX CENTER POLICY BULLETIN No. 33 (May 2013)(available at: http://www.phoenix-center.org/PolicyBulletin/PCPB33Final.pdf).

21 However, it must be kept in mind that the final auction price depends on the second highest valuation, not the highest valuation.