Comment to the FCC on Contingent Re-Auctions

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1 Introduction

The U.S. Federal Communications Commission (FCC) held Spectrum License Auction 73 in the winter of 2008 using a contingent re-auction format. The licenses were offered with restrictions that the FCC viewed as in the public interest but that reduced the value of the licenses to bidders. The FCC committed to re-auction the licenses in less restricted form in the event the reserve prices for the restricted licenses were not met. The motivation for this auction format is straightforward. The FCC believed the restrictions were in the public interest, but did not want to sacrifice too much revenue in the process of imposing those restrictions. If the restricted licenses could be sold in the first auction for a price greater than the reserve, then the FCC preferred that outcome, but in the absence of bids greater than the reserve, it preferred to sell the licenses without the restrictions.

In this comment, we show that the contingent re-auction format can generate significant inefficiencies, and we propose an alternative mechanism, which we refer to as an *exclusive buyer mechanism,* that can achieve the first-best outcome. We provide suggestions for how the FCC might implement the exclusive buyer mechanism.

For complete details on our results, please see Brusco, Lopomo, and Marx (2008).[1]

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[1]Sandro Brusco, Giuseppe Lopomo, and Leslie M. Marx (2008), "The Economics of Contingent Re-Auctions," Working Paper, Duke University. Available at

2 Model

The essential features of the problem faced by the FCC can be described as follows: The FCC has a license for sale and can restrict its use. In addition to revenue, the sale of the restricted license generates a public benefit B, while the unrestricted license generates no public benefit beyond the sale revenue. Bidders value the unrestricted license more than the restricted license. In such an environment, efficiency requires that the license be restricted when the public benefit from the restriction is greater than the loss in value to the bidders from the restriction, but not restricted otherwise.

To formalize this, we assume a seller has a single object that can be offered in either restricted or unrestricted form, with public benefit $B > 0$ if the restricted version is sold. We assume n bidders, with bidder i having private values (l_i, h_i),[2] where l_i denotes the value to buyer i when i wins the restricted object and h_i denotes the value to buyer i when i wins the unrestricted object. To capture the idea that the restriction reduces the value of the object to the bidders, we assume $l_i < h_i$.

In a contingent re-auction, the seller first offers the restricted object for sale in an ascending-bid auction with reserve price r and then, if the reserve price is not met, offers the unrestricted object in an ascending-bid auction with reserve price r.[3]

As one might expect, bidders in the contingent re-auction may have an incentive to suppress their bids in the first auction in an attempt to trigger the second auction for the unrestricted object. As we show in Brusco, Lopomo, and Marx (2008), in equilibrium each bidder i has a threshold value $g_i(h_i)$ such that when $l_i < g(h_i)$ bidder i prefers to suppress its bid and wait for the second auction. We show that in every equilibrium there are bidder types that prefer to wait for the second auction.

We now show that the contingent re-auction can be highly inefficient. To illustrate this, consider the case in which bidder i's value for the restricted object is a fixed proportion α of its value for the unrestricted object, $l_i = \alpha h_i$ for $\alpha \in (0, 1)$. In this case, we can characterize each bidder i by one number, its value for the unrestricted object h_i. In addition, given a reserve price r, we can calculate the cutoff g^* such

http://faculty.fuqua.duke.edu/~marx/bio/papers/contingentre.pdf.

[2]For the theoretical results on the contingent re-auction, we assume that $\theta_i = (l_i, h_i)$ is obtained as the realization of random variable $\widetilde{\theta}_i$ having cumulative distribution function $F(l, h)$ and differentiable density $f(l, h)$ satisfying a regularity condition described in Brusco, Lopomo, and Marx (2008). The random variables $\{\widetilde{\theta}_i, \ldots, \widetilde{\theta}_n\}$ are assumed to be independent and identically distributed.

[3]Our qualitative results remain unchanged if the reserve prices in the two auctions are different.

that bidder i suppresses its bid in the first auction when its value h_i is less than the cutoff g^*; otherwise, bidder i bids up to its value for the restricted object αh_i.

Figure 1 depicts the outcome of the contingent re-auction graphically for the case of two bidders. Bidder 1's value h_1 is shown on the horizontal axis, and bidder 2's value h_2 is shown on the vertical axis. When both bidders' values are less than g^*, then neither bids in the first auction, and so the object is re-auctioned without the restrictions. If one or both of the bidders has a value greater than g^*, then there is bidding in the first auction and the object is sold in restricted form. The shaded area in the graph corresponds to cases in which the restricted object is sold.

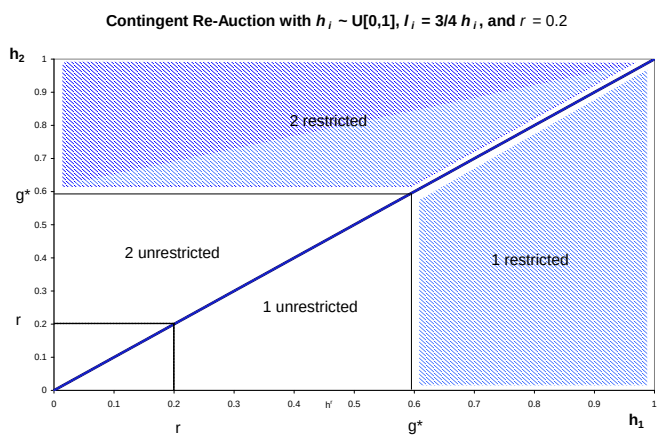

Figure 1: Allocations in the contingent re-auction

Now consider the efficient allocation. Efficiency requires that the object be restricted if the public benefit B is greater than the cost to the bidders of the restriction, i.e., if $B > \max_i(h_i - \alpha h_i)$. We can rewrite this inequality as $B/(1-\alpha) > \max_i h_i$, which says that the object should be restricted if all bidders' values are less than the cutoff $B/(1-\alpha)$. We depict this graphically in Figure 2. The shaded area in the graph corresponds to cases in which the efficient outcome is for the restricted object to be sold.

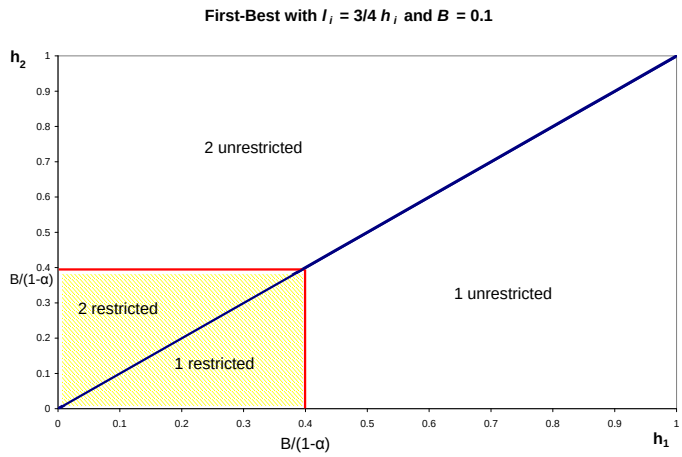

Figure 2: Efficient allocations

As one can see from a comparison of Figures 1 and 2, the contingent re-auction allocates the object in restricted form when one or more of the bidders' values are high, but efficiency requires that the object be allocated in restricted form when all of the bidders' values are low, exactly the opposite set of cases.

This fundamental problem with the contingent re-auction suggests that we should look for other mechanisms with better efficiency properties.

3 Exclusive Buyer Mechanism

We now show that not only are there better mechanisms than the contingent re-auction, but a mechanism exists that implements the first-best (i.e., maximally efficient) outcome.

To achieve the first-best, we must allocate the restricted object to bidder i if bidder i's value for the restricted object plus the public benefit B is greater than the total value achieved from the other possible allocations, i.e., $l_i + B > \max\{\max_j h_j, \ \max_{j \neq i} l_j + B\}$. Similarly, we must allocate the unrestricted object to bidder i if $h_i > \max\{\max_{j \neq i} h_j, \ \max_j l_j + B\}$. We can achieve this outcome with an *exclusive buyer mechanism* in which buyers compete in an ascending-bid auction for the right to be the single buyer that then gets to choose between the restricted object and the unrestricted object, with a bidding credit if it chooses the restricted object. If the bidding credit is set equal to B, then this mechanism implements the first-best outcome.

To see this, note that if the bidding credit is C, then bidder i's value from winning

the auction is $\max\{l_i + C, h_i\}$, so it will be willing to bid up to this amount. This guarantees that the bidder with the maximal value of $\max\{l_i + C, h_i\}$ will win the auction, and then that bidder will choose the restricted object if $l_i + C > h_i$. Setting $C = B$ induces the first-best outcome.

Even though the exclusive buyer mechanism with a bidding credit equal to B is customized to maximize efficiency, not seller surplus, our simulations show that in many cases it generates greater surplus for the seller than a contingent re-auction. In fact, we show in Brusco, Lopomo, and Marx (2008) that an exclusive buyer mechanism with appropriately chosen bidding credit for the restricted object is optimal as far as maximizing seller surplus in some environments. Thus, by using an exclusive buyer mechanism, the seller has the ability to choose a bidding credit that maximizes efficiency or maximizes seller surplus or that produces an outcome that is intermediate between the two.

4 Implementation

We believe it would be straightforward for the FCC to implement an exclusive buyer mechanism.

For the initial auction phase of the exclusive buyer mechanism, the FCC could run its most recent version of a simultaneous multiple round auction (with or without package bidding).

The FCC would need to determine the bidding credit it is willing to give for restricted licenses. The choice of bidding credit would need to balance the goals of efficiency and the recovery of value for the taxpayers.

In contrast, in the contingent re-auction format, the FCC must determine a reserve price to balance those same goals, but the contingent re-auction format is such that no choice of reserve price can do a particularly good job on either dimension.

To maximize efficiency in the exclusive buyer mechanism, the FCC would want to choose a bidding credit equal to the public value associated with the restriction. To maximize seller surplus, our simulations suggest that one would typically want a smaller bidding credit, although the theory allows for the possibility that one might want a larger bidding credit. In balancing goals of efficiency and revenue, the bidding credit would need to be some intermediate value.

Since the expected surplus generated is continuous in the choice of bidding credit,

small deviations from the optimal value would not have a large effect on the outcome. This suggests that using percentage bidding credits, as is common in FCC auctions, rather than a fixed dollar bidding credit, would still allow one to approach the desired outcome.

In addition, an exclusive buyer mechanism allows the FCC the option of specifying multiple possible restrictions with different associated bidding credits. For example, the FCC might offer a 30% bidding credit to a bidder accepting a build-out requirement of 60% of the geography, but a 40% bidding credit to a bidder willing to accept a build-out requirement of 75% of the geography.

5 Conclusion

We recommend that in cases when the FCC would consider using a contingent re-auction, the FCC should instead use an exclusive buyer mechanism, tailored to maximize a mixture of efficiency and seller surplus as appropriate given the FCC's objectives. Our theoretical results show that an exclusive buyer mechanism can always improve efficiency relative to a contingent re-auction. In addition, our numerical simulations show that an exclusive buyer mechanism has the potential to improve efficiency, seller surplus, *and* buyer surplus, making all parties better off.