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A Comment on Börgers and Dustmann**

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# Efficiency of the British UMTS Auction

## A Comment on Börgers and Dustmann\*

By *Klaus M. Schmidt*

Auction theorists have developed very sophisticated tools to analyse optimal bidding behavior under various informational assumptions and for different auction rules. They have invented several new auction formats with interesting and desirable properties, and they played an important role in designing the auction formats of various large spectrum auctions in the US and in Europe. Thus, it is often claimed that auction theory is the most spectacular success story of the application of game theory in economics. However, while some (but not all) of the recent spectrum auctions are generally believed to have been “very successful”, it is not clear whether auction theory does accurately describe the actual bidding behavior of the involved players.

Börgers and Dustmann’s paper is one of the very few attempts to take the data generated by a spectrum auction seriously. Using the data on the actual bids in the British UMTS auction, they ask whether the observed bidding behavior is consistent with two assumptions, namely that bidders have *private values* and that they use *straightforward bidding* as a bidding strategy. Of course, if the observed behavior was inconsistent with these two assumptions, this would not falsify auction theory. It is conceivable that bidders do not have private values. Even if they have, straightforward bidding is not a dominant strategy and there may be many other equilibria in this game. However, if the observed behavior was consistent with private values and straightforward bidding, then the employed bidding strategies would form an equilibrium that achieves the efficient allocation. Thus, in this case the frequently made claim that the outcome of the British UMTS auction was efficient would be on much safer grounds.

Unfortunately, however, the data are not consistent with private values and straightforward bidding. The authors show that the behavior of several bidders, in particular of BT3G, TIW and NTL Mobile, cannot be reconciled with these assumptions. From this, the Börgers and Dustmann (2002, Abstract) conclude:

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\* I would like to thank *Tilman Börgers* and participants at the CESifo conference on “Spectrum Auctions and Competition in Telecommunication” in Munich on November 22-23, 2001, for helpful comments.

“As a consequence we are cautious regarding the success of the auction in achieving an efficient allocation of licenses.”

There are several possible reasons why the outcome of the auction may have been inefficient.<sup>1</sup> Some of these reasons have little to do with the rules of the auction but are related to the (imperfect) environment in which the auction has been conducted:

- It could have been inefficient to divide the spectrum in this particular way. However, the decision on the division of the spectrum was taken at a political or perhaps technical level and there is nothing that the auction itself could have done about it. This is why Börgers and Dustmann are right to take the form of the licenses as given.
- It may have been the case that the involved companies had incorrect or inconsistent valuations for the licenses, for example because of bounded rationality or because of principal-agent problems or collective decision making problems within the firms. This argument is very plausible, but it is not clear whether the auction format could or should be used to solve these internal problems of the involved companies.
- It is possible that some bidders were forced to quit the auction before the price reached their valuation because of credit constraints. This is true, but, again, the question arises whether the auction format could and should be used to correct market failures of other markets. If credit constraints are a problem, it seems preferable that the government deals with this problem directly, for example by offering loans at a reasonable interest rate to all participating bidders, but it should not fiddle around with the rules of the auction.

It is more interesting to ask whether the rules of the auction themselves could have induced an inefficient allocation. In principle, this cannot be ruled out, but a closer look at the data shows that this is rather unlikely:

- It could have been the case that some bidders had private information about future market demand for 3G telecommunication services or that there was some other common value component present. However, Börgers and Dustmann (2002, p. 13) argue that “it does not seem plausible that at the time of the auction any one bidder had highly significant private information,” and that if such an effect was present, then it is likely to be of minor quantitative importance. In Börgers and Dustmann (2001, p. 14) the authors point out: “At the time of the UK auction there had been long public discussions about the future potential of the UMTS technology, and about possible customers’ demand for UMTS products. Clearly, these discussions had left a huge amount of uncertainty. However, it seems well possible that all relevant information had already reached the public domain, and that no firm had important insider infor-

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<sup>1</sup> Börgers and Dustmann (2001, p. 6) define efficiency as follows: “We use the term efficiency here in the following sense: licenses are allocated to maximize the sum of the valuations of licence holders, subject to the constraint that each bidder can hold only one license.”

mation, except for information that concerned only its own situation, with no immediate relevance for other firms. If that is correct, then the private value assumption may well be a valid approximation.”

- Allocative externalities could have caused an inefficient allocation. However, Börgers and Dustmann (2002) argue convincingly that allocative externalities did not leave any obvious footprints in the data and are unlikely to have played a significant role.
- The outcome would be inefficient if one bidding firm dropped out of the auction, even though it had a valuation for at least one of the licenses that was larger than the final price of that license (and larger than the valuation of the successful bidder for this license). If the firm is not credit constrained this can happen only if it uses a strictly dominated strategy, namely to drop out even though there was still a chance to obtain one of the licenses at a price lower than its reservation value. This dominance argument is easy to understand and it seems unlikely that any firm used such a strictly dominated strategy.
- The outcome would be inefficient if one firm got stuck with one type of license and had to buy it even though its incremental valuation for some other license was larger than the price difference to this other license. To see this consider the following example in which there are just the two licenses B and C:
  - BT3G has valuations (150, 100) for these licenses and placed a bid of 95 on license C.
  - Vodafone has valuations (140, 92) and placed a bid of 135 on license B.

Suppose that the bidding stops at this point. Note that in this case it would be more efficient if BT3G owned license B and Vodafone owned license C. In fact, BT3G would like to make a bid of 136 on license B, but it cannot do so because it has to stick to license C until there is another bidder who takes over this license.

Is it likely that this has happened? Consider first the bidding for license B. In Phase 3 BT3G placed six bids, only one of which was for license B. After BT3G was outbid by Vodafone on license B, it made three other bids for the smaller licenses. So it was not stuck with a small license in the very end, but it could have chosen at least three times to outbid Vodafone on license B. If BT3G did not do so, then this seems to be a strong indication that they did not want to do so because it would not have paid off.

A similar argument can be made for license A: TIW placed the winning bid on license A in round 133. Because this bid was not challenged thereafter, TIW could not switch to any of the licenses C to E, which may have given rise to an inefficiency. However, the price for license A remained constant after period 133 while the prices for licenses C to E continued to rise. Therefore, it seems difficult to imagine that TIW would have wanted to switch to a smaller licence after period 133.

To conclude, I think that the Börgers and Dustmann papers are very interesting and important to better understand the actual bidding behavior in real auctions with high stakes. However, I am less skeptical than the authors about the efficiency of the allocation of licenses. Even if the outcome was inefficient, this would not seem to be due to the rules of the auction that was employed in the U.K. but rather to the environment in which the auction had to be conducted.

### References

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