

Spectrum Auction Design Assessment and A Posteriori Auction Structure Model

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Abstract—The Federal Communications Commission (FCC) has completed eighty-two spectrum auctions since 1994 comprising over \$78 billion of net winning bids for 36,397 radio frequency licenses. In February 2012, President Obama signed the Middle Class Tax Relief and Job Creation Act into law allowing the FCC to initiate the world's first voluntary incentive auction to help the deficit reduction effort and for an ongoing support to the spectrum demand from ever-increasing wireless broadband innovation as recommended in the 2010 National Broadband Plan. Spectrum auction is one of the most important functions of the FCC requiring optimal auction structure to not only on maximizing revenue receipts, but also promoting economic opportunities and fostering rural areas for rapid wireless broadband access infrastructure.

This paper researches the effects of the previous wireless spectrum auction designs and their impacts on the U.S. wireless industry. To assess FCC's spectrum auction design it is imperative to analyze the correlation between auction expenditure and growth of wireless industry. A consequence of the analysis shall indicate the significance of sunk cost, winner's curse, and associated cost synergy phenomena. Following to the assessment, an optimum model is proposed based upon statistical analysis, such as regression analysis and factor analysis, in order to empirically estimate future spectrum auction revenues relative to various independent variables. The proposed model contributes to both spectrum regulators and wireless industry on dynamically modeling auction and market outcomes with incorporation of demographic, auction rule, and procedure factors.

Index Terms—factor analysis, frequency allocation, incentive auction, regression analysis, spectrum auction, spectrum management.

Manuscript received July 17, 2012.

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