THE IMPORTANCE OF PREQUALIFICATIONS AND PENALTIES
A model-based assessment of the UK renewables auction scheme

Marijke Welisch, TU Wien, +43-1-58801 370365, welisch@eeg.tuwien.ac.at

Overview

This paper assesses the technology neutral auctioning of Contracts for Difference (CfDs) in the UK, with a special focus on pre-qualifications and penalties and how they affect bidders' behaviour, risk aversion and bidding strategies and thus the auction outcomes in terms of prices and realisation probability. The auctions are modeled to closely represent the auction design foreseen by the implementing agency, the Department of Energy and Climate Change (DECC) and replicates its criteria, technology pots, budget caps and ceiling prices.

Methods

An agent based model is used in this paper to assess the UK CfD auction scheme with a special focus on penalties and pre-qualifications. The analysis draws on auction theory. Individually rational and independent agents are assumed and a further focus lies on agents learning over time by adapting their behaviour to new information. The auction scheme and agents are represented in an agent-based model which closely replicates the CfD auctions that took place in 2014. After implementing a default round with the penalty and pre-qualication sytem in place, sensitivities are then performed, to show how agent behaviour and thus auction results change by adapting these design elements. I specifically analyse how bidding behaviour changes, depending on whether the bidder factors a penalty into her bid function or not.

Two cases are modelled: In the first one, bidders bid their true costs as a drop-out after being awarded would be penalized. The second one does not include a penalty. This means that if bidders refuse to accept the bid afterwards, i.e. because of winners' curse or because they strategically underbid and now cannot cover their costs as the strike price is too low, they will not receive any kind of penalty. In that case, bidders are modelled with a larger range of insecurity concerning the price signal they receive. As the bidders do not have to fear a penalty in case of non-realisation due to a low bid, they can bid up to the lowest point of their signal's distribution in the no-penalty case. If the auction outcome is not favourable for the bidder (i.e. resulting in a negative profit), she merely rejects the bid. These cases are shown as a one-shot auctions with the option to bid into several delivery years, as foreseen by the UK auction scheme. A comparison is then made concerning the auction outcome in terms of strike prices and default rates.

Results

The model results show that low pre-qualifications and low or no penalties lead to an increased drop-out of agents after being awarded. For the policy-maker this means a lower realisation rate for the auctions. At the same time, participants have the incentive to underbid, as they are not going to be penalized in case of default due to an insufficiently high strike price. In the modelling results, the no penalty case shows a certain percentage of non-realisation without the benefit of lower prices. As the UK auctions' outcome is based on the highest accepted bid, auction participants have the incentive to bid strategically, due to the fact that their own bid might be the highest accepted one and thus determine the clearing price (Ausubel, 2008). Taking this into account, the modelling outcomes could actually underestimate the drop-out rates, leading to an even higher percentage of non-realisation in reality.

Conclusions

Policy makers receive important insights from this analysis on how to design their auction policies according to their respective goals. While risking a reduced realisation rate, according to the model results, lower prices cannot be achieved in auctions with little or no pre-qualifications or no penalty for drop-out. If achieving a certain amount of installed capacity is important to the commissioning authority, higher pre-qualifications or an efficient penalty system could ensure this, as drop-out can be decreased and strategic underbidding avoided.

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