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RESEARCH BRIEF

Designing Effective Auctions for Renewable Energy Support

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Current strategies to mitigate climate change rely on policy instruments providing incentives for investment in clean energies. Over 90 countries, among them some of the largest economies, e.g., Brazil, California, China, Germany, or India, have shifted support instruments towards auctions for renewable energy support. The main challenge in auction design is the trade-off between cost-efficiency and post-auction realization (i.e., effectiveness). My empirical analysis provides empirical evidence for and against prevailing theoretical findings on auction design.

The climate crisis urges policymakers to accelerate decarbonization. A first step in climate strategies is to decarbonize power markets, as two-thirds of global greenhouse gas emissions originate from the energy sector. Emissions reduction typically requires a shift of production from fossil fuels towards nuclear and renewable generation. Although the cost of renewable energy production has dropped drastically in the last decades, new capacities still depend on subsidies—worldwide transfer payments for renewables amounted to US$ 170 billion in 2018.

Governments have used different support schemes, such as feed-in-tariffs, feed-in premiums, and tax reductions, to foster investment in renewable technologies. For many years, regulators have mainly determined subsidy rates based on cost estimates. Recently, governments started to allocate subsidies with auctions for renewable energy capacity. In renewable auctions, governments auction off contracts that guarantee subsidized remuneration for producers of renewable energies. Regulators try thereby to exploit competition in order to discover relevant needs for subsidies.

Price discovery and competition have dropped auction prices far below expectations. But amid enthusiasm about cost-efficiency in renewable auctions, authorities started to realize that winning bidders might have bid below cost, consequently not realizing their projects. In view of the climate crisis and the state of renewable generation in many countries, effectiveness (i.e., how much capacity is deployed) is just as important as efficiency (i.e., at what subsidy rate it is deployed). Obviously, the choice of the policy instrument is as important as its design. In a recent strand of literature, researchers have discussed auction design and its impact on the trade-off between

efficiency and effectiveness.

In this paper, I empirically analyze the effect of prevalent auction design elements on the effectiveness of renewable auctions. I use a unique hand-collected dataset comprising auction results from 1990 until 2017. Particularly, I find that pre-qualifications and penalties can act as powerful enforcement mechanisms to drive effectiveness. This is intuitive and confirms results from recent literature. However, I do not find evidence for effects of technological banding or pricing rule on effectiveness. This sheds new light on findings from auction models and case studies, which argue in favor of specific configurations of technological banding or pricing rule to steer effectiveness

The study is the first to present a global dataset of renewable auction results over a multi-year period. Therefore, it is also the first to provide policymakers with empirical evidence for and against prevailing theoretical findings and anecdotal evidence on the design of renewable auctions.

My study provides policy makers with two major implications on the design for renewable auctions. First, regulators should include pre-qualifications or penalties if they aim to boost realization rates. Both reduce the real-option value inherent in non-realization drastically and might impede highly aggressive market entry strategies, attracting more serious bids through both channels. Second, policymakers can use other design criteria to adapt the auction design to the regulatory scheme, social norms, or non-monetary goals without deteriorating effectiveness. Regulators can, for example, indiscriminately choose between technological banding or technology-neutral auctions. The former can help to ensure a reliable mix of generation technologies and foster small scale, immature technologies. The latter has the potential to maximize efficiency.

References

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About the Author

David Matthäus is a doctoral candidate and researcher at the TUM Center for Energy Markets of the Technical University of Munich. He has a background in mathematics, engineering, and economics. His research focuses on the design of policy instruments to support clean energies. David has been a CEEPR visiting student in fall 2019.

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