Using discrimination to foster heterogeneity: Insights from industry decarbonization support auctions

(Working title)

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Extended abstract

Introduction

Auctions have become the dominant allocation mechanism for awarding support for renewable energy in the EU. Due to their success, support award auction are expanding to other fields, like the decarbonization of industry. The EU Innovation Fund (EU-IF), Dutch SDE++ and the German Carbon Contract for Difference (CCfD) scheme are the most notable support schemes that make use of competitive mechanisms to award financial support. In contrast to renewables, in industry diverse sectors and technologies are eligible in the same auction. This heterogeneous project structure leads to significant differences in project size, required support and actors. Additionally, policy makers pursue multiple goals, namely effectiveness, static efficiency, dynamic efficiency, and actor diversity. This heterogeneous structure and multiple goals lead to challenges in auction design. Posing the research question: *How to design an auction to optimally allocate support for industrial decarbonization?*

Methodology and structure

To extend the understanding of options to steer auction outcomes in heterogeneous settings this paper combines a literature review, with an auction-theoretical design analysis of support schemes and an empirical analysis of auction outcomes. The literature review focuses on insights gained from auction theory as well as analysis of auction design and results in renewables, especially multi-technology auctions. Afterwards discriminatory approaches for steering auction outcomes are briefly discussed. In the next steps the support schemes: EU-IF, Dutch SDE++ and the German CCfD-scheme are introduced and the heterogeneities they face and discriminatory approaches they apply are analyzed. Thereafter an empirical analysis of auction outcomes of the schemes, focusing on budget distribution along technological, sectoral and geographical heterogeneity, is conducted. This allows for evaluating to which extent the discriminatory design elements led to intended results and show strengths and weaknesses of the approaches found in literature. Based on the findings overall conclusions and recommendations are formulated.

Literature

Auction theory is a broad field of research. One stream analyzes heterogeneities or asymmetries between bidders, with a focus on how best to exploit it or achieve an efficient resource allocation. As goals in support award auctions deviate from traditional auctions, a rich body of literature on renewable support auctions has emerged. Discrimination is typically analyzed in multi-technology auctions and is separated into implicit and explicit. Thereby implicit discrimination refers to framework or eligibility conditions that unintentionally favor one technology. Explicit discrimination is the application of discriminatory design elements, like baskets, quotas, ceiling prices or discriminatory scoring. In publications on auction design for CCfD schemes to support industrial decarbonization the challenge of heterogeneity and which explicit discriminatory design elements to apply are discussed briefly.

Main results

The design analysis shows that the schemes have different auction goals. They all face significant, sectoral and technological heterogeneities between projects that translate into cost and size differences for the auction. The EU-IF additionally faces geographical heterogeneity. However, the applied discriminatory design elements differ widely. Whereas the EU-IF introduces different technological and size restricted baskets, SDE++ applies a combination of strict technology specific ceiling prices and since 2023 technology baskets. The German CCfD scheme introduced possibilities for technology or sector specific baskets, ceiling prices, quotas or a novel discriminatory scoring approach. However, in the first auction only a sectoral quota was applied.

The results of conducted auction rounds of the EU-IF show low attractiveness for small projects, but a balanced sectoral distribution. The geographical distribution shows regional imbalances. In the results of SDE++ a high volatility of budget allocation between two technologies occurred between 2020 and 2022, while other technologies received very little support. Literature suggests this to be typical for the applied ceiling prices. The introduction of baskets in 2023 helped stabilize and balance the support distribution. The first auction of the German CCfD scheme saw low competition with 15 out of 17 projects being awarded. Nevertheless, the applied quota seems to have prevented one sector to receive more funding. It showed the role of quotas as a safeguard.

Conclusions

Overall, the study shows how different discriminatory approaches can help distributing support in heterogeneous bidder structures. It also reveals adjustments in auction design between rounds, indicating refinements. Due to differences in goals, eligible technologies, maturity and bidder participation, the quantitative results between the analyzed schemes can hardly be compared. Nonetheless, the analysis unveils pros and cons of different discriminatory approaches and possibilities for combining approaches. The gained insights provide guidance for policy makers willing to adjust existing or design new support schemes facing structural heterogeneities.