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The impact of variable renewables' heterogeneity on their market values in the Iberian wholesale electricity market

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Summary

The negative impact of increasing market shares of wind and solar power on their market values in electricity spot markets, i.e., the cannibalization effect, has been described and quantified extensively using both historical market data and energy market models. Yet, most previous work is limited to estimations on an aggregated level and does not account for heterogeneity of solar and wind power plants within one bidding zone. Applying panel data methods to a unique dataset with unit-wise revenues of variable renewable power plants in the Iberian electricity day-ahead market in 2020 and 2021 that also includes unit characteristics, allows me to (i) estimate average cannibalization effects and to (ii) quantify the impact of heterogeneity within renewable power plants on their market values. My results provide evidence that the impact of wind power plants' location is almost as high as or even higher than the effect of the contemporary market share of renewable production, while for solar power plants only the technology seem to matter. In terms of energy policy, this result underlines that integrating renewables in wholesale markets can incentivize choosing renewable projects' technologies and locations according to price signals. For electricity market models, it provides insights into the relevance of heterogeneous production profiles when studying variable renewables' market performances.

Highlights

- Unique dataset includes unit-wise revenues and unit characteristics, namely location, size and solar power technology (thermal or photovoltaics), of wind and solar power plants operating in the Iberian electricity day-ahead market in 2020 and 2021
- Pooled OLS estimations of average absolute and relative (cross-)cannibalization effects and the impact of power plant characteristics on daily market values
- Impact of wind power plant location is close to cannibalization effect
- Thermal power plants' market values significantly differ from those of PV power plants

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