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Do Smart Grids Boost Investments in Domestic PV Plants? Evidence from the Italian Electricity Market

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Abstract

Large-scale development of distributed generation power plants has given rise to new critical problems for the design and management of energy systems and electric grids. It is commonly agreed that contingent problems affecting local grids (e.g. inefficiency, congestion rents, power outages, etc.) may be solved by implementing smarter electric grids. Smart grids give producers and consumers, the opportunity to be active in the market and decide their optimal production/consumption patterns strategically. This paper provides a theoretical framework modeling prosumers' decision to invest in photovoltaic power plants, assuming that they are integrated in Smart Grids. To capture the value of managerial flexibility, a real option approach is implemented. The model was calibrated and tested with data from the Italian energy market. Our findings show that the possibility of selling energy via the Smart Grid increases investment values. The connection to Smart Grids increases managerial flexibility: prosumers can optimally exercise the option to decide the prosumption quota and switch from prosumption to production. The opportunity to sell energy in the market encourages prosumers to invest in a larger plant compared with that needed for self-consumption, and there is a positive relation between optimal

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