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The Impact of Transmission Pricing in Network Industries

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The management of scarce transmission capacity is an important issue for the proper functioning of liberalized electricity markets. In principle, two different methods are used: With locational marginal pricing, market prices can differ among locations in the same market and thus, implicitly price transmission constraints directly at the spot market. Such a system is widely used in the U.S., where seven regional electricity markets have introduced locational marginal pricing: The PJM electricity market in 1998, the New York (NYISO) market in 1999, the New England market (ISO-NE) in 2003, the Midwest market (MISO) in 2005, the California market (CAISO) and the Southwest Power Pool (SPP) in 2007 and the Texas market (ERCOT) in 2010. In contrast, most European electricity markets continue to use redispatch systems with a single market price in the whole electricity network. With a redispatch system the price for electricity does not differ within the network and thus, transmission constraints are ignored at the spot market. These are subsequently resolved by the system operator after the spot market has taken place. Recently, discussions on shifting towards locational marginal pricing have emerged on the national as well as the European level.

Many contributions have extensively analyzed the impact of the different transmission management regimes. However, all these articles typically focus on short run spot market conduct, leaving aside long run aspects such as investment incentives in transmission and generation facilities. Recently, experts as well as policy makers have increasingly emphasized that for the proper functioning of electricity markets not only short run efficiency, but also long run incentives are of central importance.

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This paper analyzes the long run impact of these two different transmission management methods on market investment in generation and regulated investment in transmission capacity. Thereby, we find that locationally differentiated prices produce the socially optimal investment outcome. Redispatch systems with a uniform market price, on the other hand, lead to overinvestment in total generation and transmission capacity. A uniform market price disentangles the price signal from the location of production and hence, from its locational marginal value. This leads to higher generation scarcity rents and therefore, to exaggerated investment incentives in generation and transmission. Moreover, a uniform market price also distorts the generation technology mix towards more peakload and less baseload generation capacity.

The central message of our findings is that policy makers should be aware that switching from a uniform market price towards locationally differentiated market prices leads to a reduction of investment incentives. If investment incentives in a specific market are already perceived as too low, a change of the transmission management regime might then further aggravate these problems. Inadequate investment incentives might be a result of market imperfections and institutional constraints in electricity markets, such as price caps, which suppress electricity prices below the efficient level. Hence, generation revenues might be insufficient to provide adequate generation capacity. Policy makers should then be aware of the potentially increased necessity to adopt appropriate measures to enhance firms' investment activities.

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