

Networks and Spatial Economics 2016, pages 1-37

Dynamic Spatial Auction Market Models with General Cost Mappings

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Abstract

© 2016 Springer Science+Business Media New York The deregulation of electricity markets in Europe has deeply changed the organization of this sector. Vertically integrated generating companies have been unbundled to create competition and to increase the competitiveness of electricity markets. Directive 96/92/EC was issued by the European Commission to liberalize electricity markets and to pave the way for the creation of the Internal Electricity Market. In particular, this Directive aimed at promoting the competition in the activities of electricity generation and wholesale through the creation of a “marketplace” and the maximization of transparency and efficiency. Competition in European day-ahead electricity markets has been established through auction markets where electricity producers and consumers offer/bid prices and volumes. This paper suggests a dynamic equilibrium model for a system of auction markets linked by transmission lines and subject to energy balance and transmission constraints, such as those characterizing restructured electricity markets. This model is treated as a system of variational inequalities with arbitrary monotone mappings. An inexact splitting type method is proposed to find its solution. Numerical experiments are conducted on the Italian day-ahead electricity market.

<http://dx.doi.org/10.1007/s11067-016-9330-1>

Keywords

Arbitrary mappings, Day-ahead electricity markets, Dynamic equilibrium model, Inexact splitting method, Spatial system of auction markets, Variational inequality problem