The Inevitability of Price Spikes and Tight Capacity in Competitive Electricity Markets

By

Irena Milstein
Holon Institute of Technology

and

Asher Tishler
Faculty of Management, Tel Aviv University

Abstract

Underinvestment in generation capacity and price volatility in competitive electricity markets are major concerns to policymakers in the USA and Europe. Using a two-stage decision model describing a competitive electricity market with endogenous capacity and operations, and with two generating technologies and uncertain demand, this paper shows that both price volatility and tight generation capacity in deregulated electricity markets are closely related, inevitable, and result from the optimal (non-abusive) behavior of market participants. This paper presents easy-to-use conditions for the existence and uniqueness of the solution of the model and shows that the probability of a price spike increases when the capacity cost of the peaking technology rises, decreases when the volatility of demand increases, and is independent of the number and distribution of producers in the market. The theoretical predictions of the model are illustrated by applying it to the Israeli electricity market.

Keywords: Electricity markets, endogenous capacity, optimal capacity mix, price volatility
JEL codes: D43, L11, L94, D24

The Maurice Falk Institute for Economic Research in Israel
Jerusalem, November 2007  •  Discussion Paper No. 07.05