A new algorithm to compute conjectured supply function equilibrium in electricity markets

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Abstract-

Several types of market equilibria approaches, such as Cournot, Conjectural Variation (CVE), Supply Function (SFE) or Conjectured Supply Function (CSFE) have been used to model electricity markets for the medium and long term. Among them, CSFE has been proposed as a generalization of the classic Cournot. It computes the equilibrium considering the reaction of the competitors against changes in their strategy, combining several characteristics of both CVE and SFE. Unlike linear SFE approaches, strategies are linearized only at the equilibrium point, using their first-order Taylor approximation. But to solve CSFE, the slope or the intercept of the linear approximations must be given, which has been proved to be very restrictive. This paper proposes a new algorithm to compute CSFE. Unlike previous approaches, the main contribution is that the competitors’ strategies for each generator are initially unknown (both slope and intercept) and endogenously computed by this new iterative algorithm. To show the applicability of the proposed approach, it has been applied to several case examples where its qualitative behavior has been analyzed in detail.

Index Terms- Conjectured supply functions, conjectural variation, conjecture price-response, electricity market equilibrium

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