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Title: The Role of Strategic Load Participants in Two- Stage Settlement
                  Electricity Markets

Abstract: Two-stage electricity market clearing is designed to maintain market
                  efficiency under ideal conditions, e.g., perfect forecast and
                  nonstrategic generation. To gain a deep insight into this mechanism,
                  we develop a model for two-stage settlement electricity markets that
                  explicitly characterizes the interconnection between day-ahead and
                  real-time markets. Given the model, we attribute systematic negative
                  spreads, widely observed in real electricity market operation, to the
                  strategic behavior of inelastic load participants that takes advantage
                  of the two-stage settlement mechanism. We therefore argue that
                  strategic load participation in electricity markets can deteriorate
                  market efficiency and should be taken into account in the
                  characterization of nonzero spreads, in addition to empirical factors
                  like load forecast errors or market power of strategic generators. Our
                  analysis generalizes to accommodate virtual bidding and
                  demonstrates its role in alleviating the loss of efficiency by mitigating
                  market power of strategic load participants. Real-world market data
                  from New York ISO are employed to justify our argument. Our current
                  model and analysis focus on strategic behavior by inelastic load
                  participants only but are extendable to account for other factors that
                  might also result in degradation of market efficiency. A more
                  comprehensive framework is the subject of ongoing work.

Key words: Electricity market, two-stage settlement, market efficiency, strategic
                  load participation, virtual bidding