Three Components of This Paper

1. Electricity generators' bidding decisions in the balancing market deviate from Nash Equilibrium
   - ! Observe marginal cost + a game-theoretic model with imposed Nash Equilibrium = predicted optimal bidding
   - ! Compare optimal bidding and observed bidding
   - ! Remarkable departure by small firms!

2. Characterize such deviations using a behavioral game-theoretic model: players have different levels of cognitive hierarchy

3. Simulations: exogenous increase of level; mergers b/w firms with different levels

Bottom line: pushes Hortacsu and Puller (2008) forward with Camerer, Ho and Chong (2004)

Big Questions of IO

! How do we model firm behavior?

 ! Insight from this paper: room for limited rationality in firm strategy in a high-stake, game-theoretic setting

! When might government intervention improve market

Comment 1: Horizontal Merger Guidelines

Section 10, "Efficiencies":

- ! "A primary benefit of mergers to the economy is their potential to generate significant efficiencies and thus enhance the merged firm's ability and incentive to compete"
- ! "Efficiencies are most likely to make a difference in merger analysis

Comment 2: Why Cognitive Hierarchy?

! Plenty of reasons why firms depart from optimal bidding:

   ! The chaotic first few years of industry restructuring; less consequential markets; very different firms

! Is CH is *the* model of limited rationality here?

! It doesn't have to be: the goal is more about the race b/w CH and Nash Equilibrium bidding than the race b/w CH and alternative behavioral models.

! Suggestion 1: Non-nested model selection tests

! Suggestion 2: Be explicit about why CH is a good fit

Comment 3: Small Firms' Behaviour

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Money on the Table
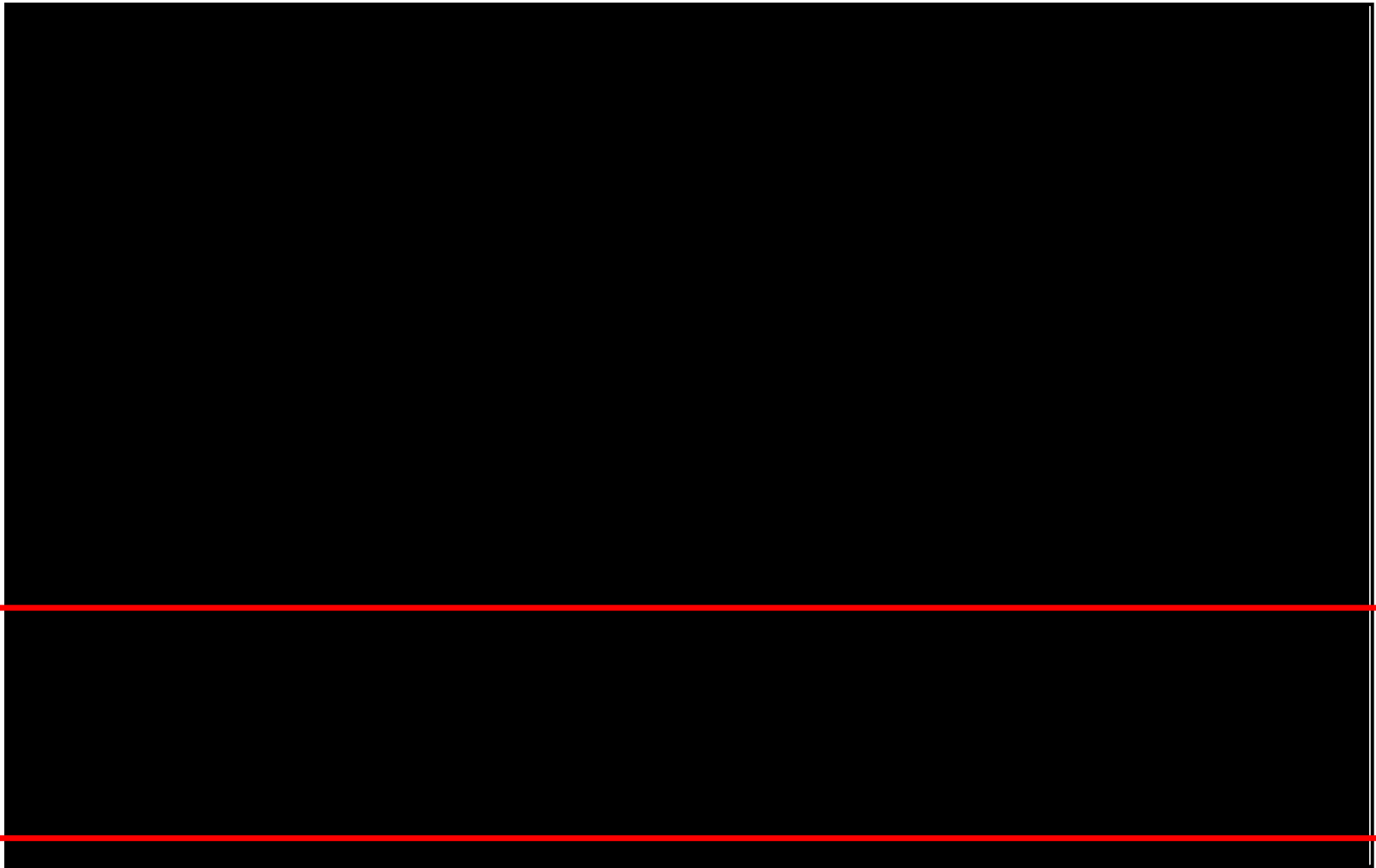
Comment 4: Evolution of Strategic Sophistication

! Are firms making better decisions now?

   ! If yes, why?

      ! Survival of the fittest: time weeding out the less capable firms?

      ! Learning --- about demand, cost, or competitors?

   !

Summary

! This paper: document the incidence of lack of strategic sophistication and quantify its impact in a critical, heavily regulated infrastructure industry

! Clean identification of deviations: nails down deviations as MC is observed (and optimal decisions can be inferred)

! Effective use of Cognitive Hierarchy framework to capture hcSr:ogeneityin aecisions making

Expanding from our IO box

! Citing Severin Borenstein (2016)

"The big gains in the next decade will come much more from broadening than from deepening: from combining an IO approach with thinking about firm behavior that is outside the narrow IO box."

! This papers is a much needed step into this direction

Thank you!