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Simplified Market Mechanisms for Non-Convex Markets: Evidence from Italian Electricity Market

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Overview

- In the presence of **non-convex costs** (e.g. start-up costs, minimum load, indivisibilities), the decentralized solution need not be efficient
- Two electricity market designs:
  - **Zonal pricing (EU):** "Simplified approach"
    - non-convexities initially ignored + re-dispatch
  - **Nodal pricing (US):** "Integrated approach"
    - all (declared) costs taken into account to optimize the dispatch with no need to re-dispatch

What do the authors do?

1. Identify incentives for strategic behavior under zonal pricing
2. Report empirical evidence consistent with this
3. Show the results are robust
4. Compute the costs of strategic behavior
5. Compare zonal vs. nodal pricing
   - Under nodal pricing, which (time-invariant) markup would give rise to the same cost for consumers?

Main Finding

- Suppliers change their day-ahead offers to increase profits if they expect to be re-dispatched
  - Re-dispatch market less competitive
  - More profitable to be re-dispatched than to be dispatched in the day-ahead market
  - Plants that expect to be INCed (DECed) increase (decrease) their markup to make sure they are INCed (DECed)
  - Potential effects also in the day-ahead market as this behaviour may end up affecting the clearing price

Implications

- The costs of re-dispatch are substantial:
  - approx. 15% of the total cost
  - increasing with renewables penetration
- Under nodal pricing, a 40% (time-invariant) markup would give rise to the same cost for consumers as the costs of re-dispatch under zonal pricing

General Comments

Extremely **important question** in
the context of the market design debate

Very **well written** despite
the complexity of the issues

Everything you ever wanted to know about nodal pricing
but never dared to ask!

Remarks

- Gaming under zonal pricing is a problem…but why would it be less likely under nodal pricing?
- In order to compare the two designs, we would need to know equilibrium behavior under the two designs, under the same rules
  - Equilibrium markups? Time-varying?
  - Inflated start-up costs?
  - Is a 40% markup too high or too low?
  - Market Power Mitigation mechanism under the two designs for a balanced comparison?

Market power *vs.* asymmetric information trade-off

- If gaming is the problem, and this can occur under the two designs, why not consider alternative market designs e.g., with audited costs as in Latin American markets?