Dynamic Mechanism Design: Discussion of Alessandro Pavan and Liran Einav

Juuso Välimäki, Aalto University

August 21, 2015 ESWC, Montreal
Dynamic Mechanism Design: General Setting

- Information dispersed amongst a set of privately interested agents
- This private information $\theta_t \in \Theta$ arrives over time
- How to choose a mechanism to decide on a collective allocation $a_t \in A$ over time?
  - Taking into account that $\theta_t$ may depend on past types and past decisions $\theta_s$, and $a_s$ for $s < t$
  - New agents may arrive over time, existing agents may exit over time
  - The set of available allocations may depend on past allocations
- Objective: Find incentive compatible direct dynamic mechanism to implement a desirable allocation
General Setting Continued

- Choice of perspective: Utilitarian planner or expected profit maximizing seller?
  - For the former (easier) case: Dynamic Pivot Mechanism (Bergemann and Välimäki, 2010) and Dynamic AGV-Mechanism (Athey ansd Segal, 2014) have been proposed for the private values model
  - Extensions to interdependent (He and Li, 2015) and correlated values (Liu, 2015) have also been given

- Alessandro’s talk (mostly): Profit maximization in the Principal-Agent setting
  - Illustrations of methods and models developed in a sequence of papers with Garrett, Segal, Toikka and ongoing further research
  - Extension of the Myersonian approach to dynamic settings
Contribution

- A systematic study of the implications of local incentive compatibility for dynamic models
  - Building on Baron and Besanko (1984), Battaglini (2005), Eso and Szentes (2007)
  - Equilibrium payoff to agent obtained via envelope theorem
  - Dynamics focus on Impulse Response Functions

- What about binding global IC constraints?
  - Example by Battaglini and Lamba (2015) shows that it is not easy to get general conditions
  - But this is hard already in static problems without single crossing

- Emphasis here: What properties of the solution must be true robustly (i.e. even if non-local IC constraints bind)?
What Do We Learn?

- A blueprint for approaching dynamic auctions and screening models
- Under reasonable assumptions, many of the properties of static optimal mechanisms are preserved robustly
  - Individual Rationality binds in the first period for the lowest type
  - Distortions vanish over time
  - Maximization of the expected virtual surplus in expectation at all points in time
  - These give a picture of dynamic effects (at least in expectation) over time
- With endogenous types, additional effects emerge
  - These have quantitatively significant effects for models of optimal taxation
Where Next?

- Can the initial distribution of types depend on the chosen mechanism?
  - Agents participate in the mechanism only once their realized type yields a high enough payoff from the mechanism
  - Covert information acquisition by the agents
  - Relating to Liran’s talk, unobservable investments in health

- What about indirect implementations? How do existing dynamic allocation mechanisms perform relative to optimal mechanism?
  - Answering these questions is also an open issue with the utilitarian criterion.

- More generally: Models of dynamic contracting with multiple sellers of contracts
  - New issues arise: sellers get differentially informed as a function of past allocations