

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 θ_t may depend on past types and past decisions θ_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 and 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