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Introduction to Symposium on Dynamic Contracts and Mechanism Design

Dirk Bergemann [a,*], Alessandro Pavan [b]

[a] *Department of Economics, Yale University, New Haven, CT 06511, United States*
[b] *Department of Economics, Northwestern University, Evanston, IL 60208, United States*

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Abstract

The Introduction to the Symposium Issue on "Dynamic Contracts and Mechanism Design" of the Journal of Economic Theory provides an overview of the dynamic mechanism design literature. We then introduce the papers that are contained in the Symposium issue and finally conclude by discussing avenues for future research. Several of the papers contained in the Symposium issue were presented at the Economic Theory Workshop of the Cowles Foundation for Research in Economics at Yale University in June 2013.

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Mechanism design has proved to be a powerful tool to examine a variety of phenomena, including auctions, nonlinear pricing, regulation, taxation, political economy, the provision of public goods, and the design of organizations.[1] A recent monograph, Börgers (2015), provides an excellent and comprehensive overview of the theory of mechanism design.

* Corresponding author.
E-mail addresses: dirk.bergemann@yale.edu (D. Bergemann), alepavan@northwestern.edu (A. Pavan).

[1] For earlier contributions to auctions, see Myerson (1981) and Riley and Samuelson (1981); to nonlinear pricing, see Mussa and Rosen (1978), and Wilson (1993); to regulation, see Baron and Myerson (1982) and Laffont and Tirole (1986); to taxation, see Mirrlees (1971); to political economy, see Dasgupta et al. (1979), and Acemoglu et al. (2011); to the provision of public goods, see Vickrey (1961), Clarke (1971), Groves (1973), and Green and Laffont (1979); to the design of organizations, see Cremer (1995).

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Most of the early path-breaking work assumed that information is dispersed but given once and for all at the outset of the game. It also confined attention to settings with a single allocative decision to be taken. For many problems of interest, though, information arrives gradually over time and there is a stream of decisions to be made. Think, for example, of the allocation of private or public goods to agents whose valuations evolve over time as the result of experimentation, or the design of multi-period procurement auctions when firms' costs are endogenous and are the firms' private information.

As a result, the last fifteen years have witnessed significant interest in extending the theory of mechanism design to dynamic environments. This Symposium advances our understanding of dynamic contracts and mechanism design by bringing together recent contributions that cover a wide range of issues at the research frontier of the dynamic mechanism design literature. Several of these papers were presented at the Economic Theory Workshop of the Cowles Foundation for Research in Economics at Yale University in June 2013.

In this Introduction, we first provide an overview of the dynamic mechanism design literature. We then introduce the various papers, and finally conclude by discussing avenues for future research.

1. A brief review of the dynamic mechanism design literature

A stream of the literature investigates how to implement dynamically efficient allocations in settings in which the agents' types change over time, thus extending the Vickrey–Clarke–Groves (VCG) and d'Aspremont–Gérard-Varet (AGV) results from static to dynamic settings (see, for example, Bergemann and Välimäki, 2010, Athey and Segal, 2013 and the references therein). The dynamic pivot mechanism and the dynamic AGV mechanism are shown to preserve most of the properties of their static analogs: the dynamic pivot mechanism guarantees that, in each period, all agents receive their expected marginal contribution to social welfare, thus guaranteeing participation in all periods, whereas the dynamic AGV mechanism achieves budget balance in all periods.

Another stream of the literature investigates the design of revenue-maximizing mechanisms in dynamic settings. Earlier contributions include Baron and Besanko (1984), Besanko (1985), and Riordan and Sappington (1987); for more recent contributions, see Courty and Li (2000), Battaglini (2005), Eső and Szentes (2007), Board (2007), and Kakade et al. (2013).

The approach typically followed in the design of optimal mechanisms consists in first identifying necessary conditions for incentive compatibility that permit one to express transfers as a function of the allocation rule and express the principal's objective as dynamic virtual surplus. The second step then consists in optimizing dynamic virtual surplus across all possible allocation rules, including those that are potentially not incentive compatible. The third and final step consists in verifying that the allocation rule that solves the relaxed program (along with a transfer rule that guarantees that all the local constraints hold) constitute a fully incentive-compatible and individually-rational mechanism. This last step typically involves identifying appropriate primitive conditions that guarantee that the allocation rule that solves the relaxed program is sufficiently monotone in an appropriate dynamic sense.

The approach described above, which traces back to Myerson (1981), Guesnerie and Laffont (1984), and Maskin and Riley (1984), has been recently extended to dynamic problems by Pavan et al. (2014). They consider a general dynamic model with a continuum of types, in which agents receive private information over time, and decisions are made in multiple periods over an arbi-