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Steady states in matching and bargaining

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Abstract

We establish the existence of steady states in two classic matching and bargaining models with general trader asymmetries, search processes, and production functions.

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1. Introduction

The steady state assumption is ubiquitous in matching and bargaining models with heterogeneous agents and search frictions (Diamond and Maskin, 1979; Rubinstein and Wolinsky, 1985; Gale, 1987; Shimer and Smith, 2000; Duffie et al., 2005; Atakan, 2006; Satterthwaite and Shneyerov, 2007; Manea, 2011; Lauermann, 2013; Lauermann and Noldeke, 2015). From an applied perspective, steady states provide a natural description of markets in which the relevant variables are stable over time. From a theoretical perspective, stationary models are tractable and provide insights into important market forces. Most of the existing research focuses on equilibrium outcomes contingent on a given stationary distribution of traders in the market and does not explain how such steady states are maintained or provide conditions under which steady

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states exist. In this paper, we develop a unified approach for establishing the existence of steady states in two standard matching and bargaining models with general random search processes and production functions. The first model contributes to the literature on bargaining in markets and encompasses the stationary settings of Rubinstein and Wolinsky (1985), Gale (1987), and Manea (2011). The second model pertains to search theory, extending the framework of Shimer and Smith (2000) in several directions. We refer to the former model as the bargaining game and to the latter as the matching model.

Following convention, search proceeds in discrete periods in the bargaining game and in continuous time in the matching model, with an infinite horizon in both cases. We assume that there is a finite set of player types in either setting. This assumption is common in the bargaining literature but constitutes a key technical departure from the matching model of Shimer and Smith (2000). Players of each type have a common discount rate. A continuum of players is active in the market at every date. Active players meet available bargaining partners according to a stochastic search process. Each player meets at most one partner at a time, and partners observe each other's type. A production function determines the output that each pair of types can create and share upon meeting. In a steady state, the distribution of player types is constant over time. Steady states are sustained by means of endogenous entry decisions in the bargaining game and through exogenous match dissolutions in the matching model.

For simplicity, we integrate the bargaining protocol with the search process by modeling meetings as ordered pairs in which the first player assumes the role of the proposer and the second acts as the responder. A search process specifies the frequency of meetings for every pair of types as a function of the distribution of types among active players in the market. We assume that the search technology satisfies some minimal regularity conditions. The main assumption is that meeting frequencies vary continuously with the market composition.

The bargaining game is specified as follows. In every period, meetings take place with probabilities determined by the search technology and the distribution of active players in the market. In each meeting, the designated proposer makes an offer to the responder stipulating a division of the output available to the pair. If the responder accepts the offer, then the two players permanently exit the game with the shares agreed upon. If the proposal is rejected, then the two players part ways and search for new bargaining partners independently thereafter. We focus on stationary economies in which the distribution of active players is constant over time. To maintain a stationary market path, we assume that a constant measure of new players of each type decides whether to enter the game at the beginning of every period. New players who choose to join the market (as well as initial market participants) incur a one-time, type-dependent entry cost. Entry decisions then hinge on how entry costs compare to the payoffs achievable in the bargaining game. Equilibrium payoffs and incentives for agreements in the bargaining game depend on the underlying market distribution and the meeting probabilities it generates. Hence, both the inflows of players joining the market and the outflows of players reaching agreements are endogenous in the model. In a steady state, the inflows must balance the outflows for every player type. We establish that the bargaining game admits a steady state for every configuration of small entry costs.

In a companion paper (Manea, 2013), we study market dynamics in a version of the bargaining game considered here with exogenous non-stationary inflows. One result in that paper shows that if players engage in meetings with exogenous and possibly non-stationary frequencies over time, then the game can be solved using iterated conditional dominance. In the present steady state setting, the result implies that the market distribution and the induced meeting probabilities uniquely determine the balance of bargaining power and the equilibrium payoffs in the game.