



Competitive equilibrium with search frictions: A general equilibrium approach [☆]

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Received 20 December 2012; final version received 24 September 2013; accepted 17 April 2014

Available online 10 July 2014

Abstract

When the trading process is characterized by search frictions, traders may be rationed so markets need not clear. We build a general equilibrium model with transferable utility where the uncertainty arising from rationing is incorporated in the definition of a commodity, in the spirit of the Arrow–Debreu theory. Prices of commodities then depend not only on their physical characteristics, but also on the probability that their trade is rationed. The standard definition of competitive equilibrium is extended by replacing the market clearing condition with an exogenous matching function which describes a trading technology that is not frictionless. As is typical in search models, the matching function relates the rationing probabilities of buyers and sellers to the ratio of buyers to sellers in the market. When search frictions vanish, our model is equivalent to the continuous assignment model of Gretsky et al. [20]. We adapt their approach, which uses linear programming techniques and duality theory, to show that a competitive equilibrium exists and is constrained efficient in our environment. Our competitive equilibrium notion is equivalent to that of directed (or competitive) search. The strength of our formulation and the linear programming approach is that they

[☆] I thank the editor, Christian Hellwig, and several anonymous referees for valuable comments and suggestions which have greatly improved the paper. I am grateful to Joe Ostroy for very helpful comments, and both to him and Louis Makowski for an insightful conversation that inspired this work. I also thank Jan Eeckhout, Onésimo Hernández, Philipp Kircher, Juan Pablo Rincón, Victor Ríos-Rull, Joon Song, and participants at the 2011 SAET Conference at Faro, VIII REDgWorkshop and the departmental seminar at Carlos III. This work started while I was visiting the University of Pennsylvania. I thank the Economics Department, and specially Victor Ríos-Rull, Kenn Burdett and Randy Wright, for their kind hospitality. Financial support from the Spanish DGICYT (projects SEJ2004-07861, SEJ2007-65169, ECO2010-20614 and Ramón y Cajal Program), the Bank of Spain's Programme of Excellence in Research (2011–2013), and Fundación Ramón Areces ("Economía Pública del Sector Comercial", IV Concurso Nacional para la adjudicación de Ayudas a la Investigación en Economía) is gratefully acknowledged. Any errors are mine.

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allow us to generalize the constrained efficiency and existence results in the directed search literature to a much broader class of economies. Our framework also opens the door to the use of existing algorithms for computing equilibria and taking these models to the data.

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JEL classification: D50; D61; D83

Keywords: Search frictions; Transferable utility; Competitive equilibrium; Linear programming; Duality; Directed search

1. Introduction

The Arrow–Debreu model is the cornerstone for the analysis of competitive markets. In the classical theory of Arrow [4] and Debreu [7], trade is represented as a costless process. Any agent seeking to buy or sell a good at a given point in time can do so at the equilibrium market price. Trade involves no further costs in terms of time and resources. Search theory, on the other hand, highlights the costly nature of the trading process. In particular, this theory has become the dominant paradigm to study labor markets since the seminal work of Diamond [9,10], Mortensen [38,39] and Pissarides [44,45]. In these markets workers usually take time and spend resources in order to find a suitable employer, and vice versa. Also, rationing arises in the form of unemployment, which tends to coexist with unfilled job vacancies. The key assumption of the Diamond–Mortensen–Pissarides model is that workers and firms must search for trading opportunities, and the outcome of their search is uncertain. Search frictions are typically modeled via an exogenous matching function which describes a random meeting process between workers and firms.² This random process implies that at any point in time some agents will manage to trade and others will not. Hence, unlike in the classical Arrow–Debreu model, agents may be rationed in equilibrium (so markets need not clear), and in general it will take time to trade.

In this paper we use a notion of competitive equilibrium in the spirit of Arrow and Debreu to study a general class of exchange economies with search frictions and transferable utility³ (e.g. with a large variety of different goods, general distributions of buyer and seller types, with or without complementarities, general matching technologies which may differ across markets,...). We show that a competitive equilibrium exists and is constrained efficient. The definition of constrained efficiency takes into account the fact that the social planner, just like the market, is restricted by the matching technology.

Our equilibrium notion is equivalent to that of directed (or competitive) search.⁴ We elaborate on this below, but let us already mention at this point that our results generalize earlier results in the directed search literature in a significant way. It is well-known that directed search equilibria are constrained efficient both in simple environments with homogeneous buyers and sellers (see Moen [35] and Shimer [53]) and in several environments with heterogeneity (e.g.

² The matching function gives the measure of meetings between a worker and a firm as a function of the measures of workers and firms in the market, and possibly other variables such as the agents' search efforts.

³ The transferable utility assumption is standard in the search literature.

⁴ See, among others, Montgomery [37], Peters [41–43], Moen [35], Acemoglu and Shimer [1,2], Burdett et al. [5], Shi [50,51], Mortensen and Wright [40], Shimer [52], Menzio and Shi [34,33] and Eeckhout and Kircher [11], as well as the survey by Rogerson et al. [47].

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