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Competitive bargaining equilibrium

J. Dávila[a, b], J. Eeckhout[c, *]

[a] *Centre d'Economie de la Sorbonne, CNRS, France*
[b] *ECARES, Université Libre de Bruxelles, Belgium*
[c] *Department of Economics, University of Pennsylvania, USA*

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Abstract

In a simple exchange economy we propose a bargaining procedure that leads to a Walrasian outcome as the agents become increasingly patient. The competitive outcome therefore obtains even if agents have market power and are not price-takers. Moreover, where in other bargaining protocols the final outcome depends on bargaining power or relative impatience, the outcome here is determinate and depends only on preferences and endowments. Our bargaining procedure involves bargaining over prices and maximum quantity constraints, and it guarantees convergence to a Walrasian outcome for *any* standard exchange economy. In contrast, without quantity constraints we show that equilibrium is generically inefficient.

JEL classification: C60; C78; D41; D51

Keywords: Bargaining; Walrasian equilibrium; Price-setting

1. Introduction

Price-taking behavior is typically invoked as a necessary requirement to obtain the competitive outcome. In this paper, we propose a bargaining foundation for the Walrasian equilibrium in a small exchange economy where agents are not price-takers. The bargaining procedure we analyze relates to those studied in Binmore [2] and Yildiz [17]. More specifically, in our set-up each agent alternatingly offers a price and a maximum amount to be exchanged, and the respondent either accepts and chooses the quantities to be traded at the terms of the offer, or rejects and makes an offer in the next period in which utilities are discounted. We show in this set-up that the competitive outcome obtains when bargaining frictions vanish, even without price-taking

* Corresponding author.
E-mail addresses: julio.davila@univ-paris1.fr (J. Dávila), eeckhout@ssc.upenn.edu (J. Eeckhout).

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behavior. This convergence result holds for any standard exchange economy. Moreover, the outcome does not depend on details such as relative impatience and bargaining power or outside options. Paradoxically, by explicitly introducing price-setting as a strategic variable in an otherwise standard bargaining environment, the competitive outcome is restored. Price-taking is therefore not a necessary requirement for attaining a perfectly competitive outcome.

The main implication of the convergence result is that, as discounting frictions vanish, the bargaining outcome does not depend on the exact specification of time preferences. Instead, the bargaining outcome converges to a Walrasian allocation which is determined by the preferences and endowments of the agents. It seems natural after all that the bargaining outcome is not exclusively determined by relative patience (or by exogenous bargaining power in axiomatic Nash bargaining) as is the case in the alternating-offers bargaining of Rubinstein [11] or Ståhl [16]. There, the relatively patient agent obtains a proportionally larger share of the surplus (see for example Binmore, Rubinstein and Wolinsky [1]). Rather, in many economic environments the bargaining outcome may depend, at least in part, on preferences and endowments, for example on the degree of substitutability between the goods consumed.

The bargaining procedure with price offers that guarantees our convergence results *necessarily* involves maximum trade constraints. This indicates that the details of the bargaining procedure are important (see also Binmore [2]). We show that the conditions for convergence obtained in Yildiz [17] for a bargaining procedure over prices *without maximum trade constraints* are too strong in the sense that almost no economy satisfies the assumptions made in Yildiz [17]. In general, for any economy in an open and dense subset of the set of standard exchange economies there will exist at least one stationary equilibrium of the bargaining game without quantity constraints that converges to an inefficient outcome. This inefficient outcome leaves each agent indifferent between two distinct allocations. The utility obtained when accepting a price offer on her own offer curve is the same as the utility obtained from her own price offer. In the latter case, her accepted offer induces the other agent to choose an allocation on his own offer curve.

Intuitively, the maximum constraint provides a credible tool for the offering agent to induce the outcome to be efficient. Without the constraint, the two agents may get locked into an inefficient outcome in which each agent is indifferent between accepting an unfavorable price now while choosing the quantity, and having a favorable price accepted tomorrow letting the quantity to be chosen by the other agent. The proposer of a price cannot prevent the responder from asking for his demand at this price, so that no agent can deviate by offering a Pareto-improving outcome within the lens formed by the indifference curves corresponding to the inefficient levels of utility. In contrast, the maximum trade constraint allows the offering agents to undo this inefficient outcome with a deviating offer of a price and maximum trade that induces the responder to accept and ask for an allocation within this lens of Pareto-improving allocations. This highlights the role played by the maximum quantity constraints in order to obtain efficiency. Such maximum constraints are common in commodity markets, limit orders in stock transactions, and wage bargaining.

The importance of maximum trade constraints is first established by Binmore [2] in the context of axiomatic bargaining. He is the first in the modern bargaining literature to connect the competitive equilibrium to bargaining outcomes in two person economies. He presents a modified Nash demand game with minimum prices and maximum quantity constraints and shows that the (large) set of Nash equilibria of this game includes the Walrasian allocation. [1]

[1] See also Serrano and Volij [13] for the relation between axiomatic bargaining and Walrasian allocations.