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An equivalence theorem for a differential information economy

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Abstract

In a pure exchange economy with differential information and a finite set of traders, physical commodities and states of nature, we characterize the Walrasian expectations or Radner equilibria by using the veto power of the grand coalition. We prove that an allocation x is a Radner equilibrium allocation if and only if it is “privately non-dominated” by the grand coalition in every economy obtained by perturbing the original initial endowments in the direction of x . The first and second welfare theorems become particular cases of our main result. Since the deterministic Arrow–Debreu–McKenzie model is a special case of the differential information economy model we also provide a new characterization of the Walrasian equilibria.

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1. Introduction

The classical Arrow–Debreu–McKenzie (A–D–M) model consists of a finite number of commodities and a finite number of agents, each of whom is characterized by her preferences and initial endowments. Arrow and Debreu introduced uncertainty into the classical A–D–M model and showed (see [Debreu, 1959, Chapter 7](#)) how the deterministic results are still valid in the presence of uncertainty. [Radner \(1968\)](#) introduced differential (asymmetric) information into the A–D–M model. In particular, an exchange economy with differential information (or a Radner-type economy) consists of a finite set of agents, each of whom is characterized by a random utility function, a random initial endowment, a private information set, and a prior. For such an economy [Radner \(1968\)](#) defined a notion of a Walrasian expectations equilibrium, here called Radner equilibrium. This notion is analogous to the Walrasian equilibrium in the Arrow–Debreu–McKenzie deterministic model. The Radner equilibrium notion is of interest because it captures trades under asymmetric information. In such an economy, agents maximize ex-ante expected utility subject to their budget constraint. However, each agent's allocation is measurable with respect to her own private information, and thus, all choices made reflect the informational asymmetries. It should be noted that the Radner equilibrium differs from the rational expectations equilibrium (REE) (e.g., [Radner, 1979](#)), which is an interim concept allowing prices to reveal some or all of the private information in the economy. A major criticism of the REE is that it does not provide an adequate explanation as to how prices reveal the same information to agents who are differentially informed and, therefore, prices do not reflect the differential information of agents. This is not an issue for the Radner equilibrium since decisions are made in an ex-ante stage; however, since net trades are private information measurable for each agent, the equilibrium outcome reflects the asymmetric information. Furthermore, the Radner equilibrium exists under the standard assumptions which guarantee the existence of the deterministic Walrasian equilibrium, whereas the REE may not exist in well-behaved economies (e.g., [Kreps, 1977](#)). In addition, in the absence of free disposal, the Radner equilibrium is coalitional Bayesian incentive compatible (that is, no coalition can misreport the realized state of nature to the complementary set of agents and become better off) and can be supported as a perfect Bayesian equilibrium (see [Glycopantis et al., 2003](#)), contrary to the REE. Therefore, the Radner equilibrium seems to be an appealing concept.

The purpose of this paper is to study further the Radner equilibrium concept and obtain some new results.

The main result in this paper provides a characterization of Radner equilibria (and, in particular, of Walrasian equilibria) in terms of non-dominated allocations. The notion of non-dominated allocation that we consider states that it is not possible for the grand coalition to redistribute their initial endowments using their own private information and make each member of the grand coalition better off (in terms of their ex-ante expected utility). Since agents do not necessarily share their own private information, we call those allocations privately non-dominated allocations. Thus, privately non-dominated allocations have similar features to the (ex-ante) private core ([Yannelis, 1991](#)). In particular, the private core is contained in the set of all privately non-dominated allocations and, therefore, the existence of private core allocations implies the existence of private non-dominated allocations.

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