

Statistical Methods for Large Economies with Individual Risk: Malinvaud's Model Revisited

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Abstract

Following Aumann and Hildenbrand, it has become standard in general equilibrium theory and macroeconomics to model large economies as having a continuum of agents and measurable mappings from agents' labels to their characteristics. But with individual risk, this framework is well known to create measurability problems. Instead, here a large economy with individual characteristics in a compact Polish space is considered as a continuum limit that completes a compact Polish space of finite economies in appropriate distributional form. The usual law of large numbers can then be applied. Walrasian equilibria in the finite economies converge to a limit "Malinvaud equilibrium" with all individual risk fully insured. Conversely, even with individual risk, any continuum economy in suitable distributional form will almost surely be the weak limit of a Monte Carlo simulated sequence of finite economies. Under a regularity assumption, any Malinvaud equilibrium in the limit economy will be the limit of a sequence of Walrasian equilibria in the Monte Carlo simulated economies. In contrast to recent work by Khan and Sun and by Al-Najjar, a similar approach can also be advantageously applied to large games while retaining a standard Lebesgue measure. Indeed, our completion approach makes it natural to consider a Nash equilibrium refinement that retains only robust limit equilibria.