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Optimal risk-sharing rules and equilibria with Choquet-expected-utility

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Abstract

This paper explores risk-sharing and equilibrium in a general equilibrium set-up wherein agents are non-additive expected utility maximizers. We show that when agents have the same convex capacity, the set of Pareto-optima is independent of it and identical to the set of optima of an economy in which agents are expected utility maximizers and have the same probability. Hence, optimal allocations are comonotone. This enables us to study the equilibrium set. When agents have different capacities, the matters are much more complex (as in the vNM case). We give a general characterization and show how it simplifies when Pareto-optima are comonotone. We use this result to characterize Pareto-optima when agents have capacities that are the convex transform of some probability distribution. Comonotonicity of Pareto-optima is also shown to be true in the two-state case if the intersection of the core of agents' capacities is non-empty; Pareto-optima may then be fully characterized in the two-agent, two-state case. This comonotonicity result does not generalize to more than two states as we show with a counter-example. Finally, if there is no-aggregate risk, we show that non-empty core intersection is enough to guarantee that

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optimal allocations are full-insurance allocation. This result does not require convexity of preferences.

Keywords: Choquet expected utility; Comonotonicity; Risk-sharing; Equilibrium

1. Introduction

In this paper, we explore the consequences of Choquet-expected-utility on risk-sharing and equilibrium in a general equilibrium set-up. There has been over the last 15 years an extensive research on new decision-theoretic models (see Karni and Schmeidler (1991) for a survey), and a large part of this research has been devoted to the Choquet-expected-utility model introduced by Schmeidler (1989). However, applications to an economy-wide set-up have been relatively scarce. In this paper, we derive the implications of assuming such preference representation at the individuals level on the characteristics of Pareto-optimal allocations. This, in turn, allows us to (partly) characterize equilibrium allocations under that assumption.

Choquet-expected-utility (CEU henceforth) is a model that deals with situations in which objective probabilities are not given and individuals are a priori not able to derive (additive) subjective probabilities over the state space. It is well-suited to represent agents' preferences in situation where ''ambiguity'' (as observed in the Ellsberg experiments) is a pervasive phenomenon.[1] This model departs from expected-utility models in that it relaxes the sure-thing principle. Formally, the (subjective) expected-utility model is a particular subclass of the CEU of model. Our paper can then be seen as an exploration of how the results established in the von Neumann–Morgenstern (vNM henceforth) case are modified when allowing for more general preferences, whose form rests on sound axiomatic basis as well. Indeed, since CEU can be thought of as representing situations in which agents are faced with ''ambiguous events'', it is interesting to study how the optimal social risk-sharing rule in the economy is affected by this ambiguity and its perception by agents.

We focus on a pure-exchange economy in which agents are uncertain about future endowments and consume after uncertainty is resolved. Agents are CEU maximizers and characterized by a capacity and a utility index (assumed to be strictly concave).

When agents are vNM maximizers and have the same probability on the state space, it is well-known since Borch (1962) that agents' optimal consumptions depend only on aggregate risk, and is a non-decreasing function of aggregate resources: at an optimum, an agent bears only (some of) the aggregate risk. It is

[1] See Schmeidler (1989), Ghirardato (1994), and Mukerji (1997).