Survival with ambiguity

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Abstract

We analyze a market populated by expected utility maximizers and smooth ambiguity-averse consumers. We study conditions under which ambiguity-averse consumers survive and affect prices in the limit. If ambiguity vanishes with time or if the economy exhibits no aggregate risk, ambiguity-averse consumers survive, but have no long-run impact on prices. In both scenarios ambiguity-averse consumers are fully insured against ambiguity in equilibrium and thus behave as expected utility maximizers with correct beliefs. If ambiguity-averse consumers are not fully insured against ambiguity, their behavior mimics expected utility maximizers with wrong beliefs and a stochastic discount factor which might be consistently higher or lower than their actual discount factor. We use this insight to analyze a Markov economy with large persistent ambiguity. Consumers with decreasing absolute ambiguity aversion whose prudence with respect to ambiguity exceeds twice their absolute ambiguity aversion a.s. survive in the presence of expected utility maximizers with correct beliefs. If the economy further exhibits aggregate risk, they drive the expected utility maximizers out of the market and determine prices in the limit. In contrast, consumers with increasing or constant absolute ambiguity aversion only survive in the absence of aggregate risk and have no impact on limit prices.
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1. Introduction

The simplicity and tractability of the representative consumer model has established it as the work-horse of macroeconomics and finance. However, a growing body of literature suggests that (under reasonable assumptions on the parameters) a representative expected utility maximizer cannot account for the historically observed prices and dividends in the financial markets. This in turn has created interest for models which consider a representative agent with alternative preference specifications and try to account for the observed price anomalies, see, for example, Backus, Routledge and Zin [1]. Among the models that have been proposed, theories of ambiguity aversion have established themselves as a viable alternative to expected utility maximization. They capture experimentally observed behavior and have been used to explain some of the empirical phenomena documented in financial markets such as the home bias, as in Uppal and Wang [32], the equity premium puzzle, as in Epstein and Schneider [14], Collard et al. [7], negative correlation between asset prices and returns, as in Ju and Miao [17].

The limitation of this approach consists in the fact that it replaces one representative agent by another without seriously considering the impact of heterogeneity of preferences on prices and market allocations. The literature on market selection pioneered by Sandroni [31] and Blume and Easley [4] provides the tools to examine the long-term effects of heterogeneity in markets. In particular it allows us to analyze the robustness of such explanations by examining whether agents with alternative preference specifications can survive in the presence of expected utility maximizers and exert persistent influence on market prices.

It has been established that in economies with bounded endowments, when markets are complete, Sandroni [31], or when the allocation is Pareto optimal, Blume and Easley [4], investors' survival only depends on the accuracy of beliefs and the size of discount factors. In particular, among equally patient investors only those with correct beliefs survive; among investors with correct beliefs only the most patient survive. Risk attitudes, and more generally preferences, do not matter.

These results pose a serious caveat for any of the behavioral approaches which are alternative to expected utility maximization. In fact one can typically represent non-expected utility maximizing behavior as expected utility maximizing behavior for some wrong beliefs. Hence any deviation from expected utility maximization can only be seen as a short term phenomenon, with no long term effect on market prices. This would suggest that this type of preference heterogeneity can be disregarded provided one is only interested in long term outcomes. Indeed, so far existing studies of survival of non-expected utility maximizing agents in the presence of expected utility maximizers with correct beliefs (max–min expected utility in Condie [8], variational preferences in Da Silva [10], loss-aversion in Easley and Yang [11]; see Section 2 for a discussion of these results) have failed to identify a persistent impact of such agents on market outcomes.

In this paper we argue that even though ambiguity-averse investors behave as expected utility maximizers with wrong beliefs, they may nevertheless survive and affect market outcomes in the long run. Hence, differently from other alternatives to expected utility maximization and in contrast to the results obtained in Condie [8], ambiguity aversion might represent an important source of heterogeneity in financial markets which cannot be ignored even in the long run.

We address these issues by examining a market populated by expected utility maximizers and smooth ambiguity-averse investors, as in Klibanoff, Marinacci and Mukerji [19], henceforth KMM [19]. We choose this model because it allows us to separate the objective ambiguity present in the market, to which all investors are exposed, from the subjective attitude towards ambiguity. Furthermore, it also allows us to vary the degree of ambiguity aversion and relate