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Avoiding Regret in an Agent-Based Asset Pricing Model

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Abstract

We use an agent-based asset pricing model to test the implications of the disposition effect (avoiding regret) on investors' interactions and price settings. We show that it has a direct impact on the returns series produced by the model, altering important stylized facts such as its heavy tails and volatility clustering. Moreover, we show that the horizon over which investors compute their wealth has no effect on the dynamics produced by the model.

Keywords: agent-based model, asset pricing, disposition effect, behavioural bias
Classification JEL Codes: G12, G14, G15, G41

1. Introduction

One of the building blocks of modern financial theory relies on the belief that asset prices are determined by the market interactions of utility maximising agents that form rational expectations about future outcomes. This is the theoretical underpinning of the efficient market hypothesis (Fama, 1970), which for a long time has been used to explain the behaviour of asset prices. In a setting where all agents are fully rational, they are assumed to follow the expected utility theory (von Neumann and Morgenstern, 1944) for making decisions under uncertainty.

However, this belief has been challenged over the years. Alternative theories describing how decision makers behave under uncertainty have been proposed, leading to the development of prospect theory (Kahneman and Tversky, 1979). Some of its important implications are that, in reality, people deviate from rationality and use biases or heuristics in decision making (Barberis and Thaler, 2003). Specifically, Shefrin and Statman (1985) use prospect theory to show that investors may hold losing trades longer than profitable ones – a now well-known phenomenon labelled as the disposition effect. Furthermore, evidence suggests that investors' unwillingness to cut their losses is closely related to the notion of regret, which may be accentuated by having to admit their mistakes to other people (Kahneman et al., 1982). Put differently, investors may not realise a loss because they are trying to avoid the regret associated with their initial (wrong) judgement.

Although behavioural biases have been clearly observed in real-life settings, examining their implications on markets is still a challenging topic. For this reason, a considerable focus has shifted towards developing models of human psychology as it relates to financial markets (Shiller, 2003). In particular, heterogeneous agent-based models that rely on simple trading strategies have proven themselves very efficient in generating important dynamics of real markets (Hommes, 2006). They attempt to explain these properties endogenously, by considering the interaction of market participants. Moreover, a well-defined agent-based model is an important tool for testing behavioural (Pruna et al., 2016) and economical theories (Chen, 2016) and understanding their influence on the interplay between agents and prices.

To this end, we extend the well-known structural stochastic volatility model of Franke and Westerhoff (2012) (FW) – one of the most successful in capturing empirically observed traders' behaviour (Barde et al.,

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