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Applying regret theory to investment choices: Currency hedging decisions☆

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A B S T R A C T

We apply regret theory, an axiomatic behavioral theory, to derive closed-form solutions to optimal currency hedging choices. Investors experience regret of not having chosen the ex post optimal hedging decision. Hence, investors anticipate their future experience of regret and incorporate it in their objective function. We derive a model of financial decision-making with two components of risk: traditional risk (volatility) and regret risk. We find results that are in sharp contrast with traditional expected utility, loss aversion, or disappointment aversion theories. We discuss the empirical implications of our model and its ability to explain observed hedging behavior.

1. Introduction

> "I should have computed the historical covariance of the asset classes and drawn an efficient frontier. Instead I visualized my grief if the stock market went way up and I wasn't in it – or if it went way down and I was completely in it. My intention was to minimize my future regret, so I split my [pension scheme] contributions 50/50 between bonds and equities." Harry Markowitz. As quoted in Zweig (1998), "America's top pension fund", Money, 27, p. 114.

Regret is a cognitively mediated emotion of pain and anger when agents observe that they took a bad decision in the past and could have taken one with better outcome. In financial markets, agents

☆ The Appendix is available from the authors upon request.

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will experience regret when their investment yields, ex post, a lower performance than an obvious alternative investment they could have chosen. Contrary to disappointment, which is experienced when a negative outcome happens relative to prior expectations, regret is strongly associated with a feeling of responsibility for the choice that has been made. There is an extensive literature in experimental psychology and, to a lesser extent, neurobiology that supports the assumption that regret influences decision-making under uncertainty. Regret is such a powerful negative emotion that the prospect of its future experience may lead individuals to make seemingly sub-optimal, non-rational decisions relative to the expected utility paradigm. As the opening quote suggests, the anticipation of future regret was strong enough to turn Harry Markowitz away from his very own asset allocation theory when faced with a financial decision on his pension plan.

Bell (1982) and Loomes and Sugden (1982) derived an economic theory of regret. They propose a normative theory of choices under uncertainty that explains many observed violations of the axioms used to build the traditional expected utility (EU) approach. Regret theory (RT) assumes that agents are rational but base their decisions not only on expected payoffs ("value") but also on expected regret. Investors reach their investment decision by maximizing the expected value of this modified utility. So investors try to anticipate regret and take it into account in their investment decisions in a consistent manner. Risk takes two dimensions: traditional risk (volatility of final wealth) and regret risk. RT offers a parsimonious specification with strong cognitive and axiomatic foundations. It predicts Allais' paradox ("common consequences effect") and many other axiom violations[1] reported in experiments by Kahneman and Tversky (1979) and others.

Regret is clearly relevant to investment choices, when investors care about the outcome of their choice relative to other strategies they could have followed, passive benchmarks and peers. With the observed evidence in favor of the influence of regret on decision-making under uncertainty[2] as well as the axiomatic and normative appeal of RT for investment choices, it is surprising that RT has caught so little attention in the field of finance. Braun and Muermann (2004) apply RT to demand for insurance, and Muermann et al. (2006) apply RT to asset allocation in defined contribution pension schemes. Dodonova and Khoroshilov (2005) include some simplified form of regret in a model of asset pricing, but their utility function is not consistent with RT, as developed by Bell, Loomes and Sugden. All these models but focus on comparative statics. Comparative statics allow to get a sign on the influence of the level of regret aversion, but do not allow to derive explicit solutions for investment rules. Our methodological approach is quite different: using a second-order approximation, we can derive quantitative investment implications. Gollier and Salanié (2006) study the properties of a class of utility functions that exhibit some form of regret aversion, in an Arrow–Debreu economy. They derive some interesting implications for asset allocation decisions and asset pricing. In contrast to this existing literature, our methodology allows to derive closed-form (approximated) solutions for optimal investment choices. While the intuition of applying regret to currency hedging is not new (see Section 3), this is the first time that a formal theoretical approach is applied to currency hedging.

It must be stressed that RT, although intuitively appealing, is difficult to apply because of the technical difficulties associated with the optimization of an expected utility function with two attributes: value and regret. Indeed, applying RT to a general portfolio problem involving numerous assets is a difficult technical task. This is because regret stems from a comparison of the actual return outcome of each portfolio with the actual return outcome of all other feasible portfolios. This differs markedly from EU, where utility is solely defined over the chosen portfolio; hence portfolio risk is simply measured relative to preset expectations.[3] In addition, applying RT to dynamic decision-making where an agent makes decisions at different points in time renders the analysis even more intricate. These two

[1] These are commonly referred to as the "common ratio effect", the "isolation effect", the "preference reversal effect", the "reflection effect", and "simultaneous gambling and insurance".

[2] Connolly and Zeelenberg (2002, p. 212) state that "the emotion that has received the most research attention from decision theorists is regret".

[3] The same comment applies to other behavioral extensions of traditional utility, where investors put a larger weight (or value) on losses than on gains relative to a reference point. Such a utility feature is often called "disappointment".