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Optimal portfolio selection with life insurance under inflation risk

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Abstract

This paper investigates a continuous-time optimal consumption, investment, and life insurance decision problem of a family under inflation risk. In the financial market, there is a liquid inflation-linked index bond market which can be utilized to hedge the inflation risk. The explicit solutions are derived for constant relative risk aversion (CRRA) utility case by using martingale approach. The roles of index bond are investigated and it is verified that the index bond may have different roles depending on the market parameters. We analyze the effects of parameters on the optimal strategies with focus on the optimal demand for index bond and the optimal life insurance premium. Especially, the changes of expected inflation rate and volatility of inflation rate can have both positive and negative impacts on the life insurance premium and their quantitative impacts are considerable.

JEL classification : E31, G11, G22

Keywords : Optimal consumption/investment; Inflation risk; Index bond; Life insurance

1. Introduction

For long-term financial planning of a family, not only financial risk but also inflation risk and mortality risk of the breadwinner must be considered carefully. The mortality risk of breadwinner can usually be hedged by entering insurance market. In particular, the life insurance is a typical instrument for a sudden death of breadwinner which causes financial problem of the family. On the other hand, there has been little opportunity or method for hedging inflation risk even though inflation risk affects the optimal financial decision significantly. Moreover, after expansionary monetary policy, inflation risk has become one of the most anxious factors among the side effects of the policy. So there has been high demand for inflation-linked securities and it was (partially) resolved by introducing Treasury Inflation-Protected Securities (TIPS) in the US or indexed government bonds for

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