Optimal asset-allocation strategies on DC pension plans with uncertain wages

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March 11, 2010

Abstract

The aim of this paper is to analyze a DC pension plan when the wage profile of the participant is uncertain during his working life period due to the nature of his profession or due to the economic prevailing conditions, as it may occurs on some developing economies. In this paper, the wage profile of the pension plan participant and the dynamics of the assets included in the fund are modelled as two correlated processes. On one hand, wage profile and periods of employment and unemployment are captured by a continuous-time discrete-space Markov process. On the other, the risk and return of the assets included in the pensions fund are modelled by a switching GBM process aiming to capture the dynamics of the market: a bear market state (characterized by a volatile environment, higher correlation among equity indices and lower correlation among equity and bonds) and a bull market state (characterized by a lower volatility environment, high correlation among equity and bonds and low correlation among equity indices). Both processes are correlated, in order to reflect the level of wage uncertainty related to the market: working participants with safe jobs are less sensitive to market movements and economic conditions while working participants with uncertain wages are much more sensitive to them. Under this model, optimal asset-allocation strategies are derived for different levels of wage uncertainty and numerical simulations are included to illustrate the performance of the model and the strategies derived from it.

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