

Accepted Manuscript

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PII: S0167-6687(17)30271-8

DOI: <https://doi.org/10.1016/j.insmatheco.2018.02.003>

Reference: INSUMA 2449

To appear in: *Insurance: Mathematics and Economics*

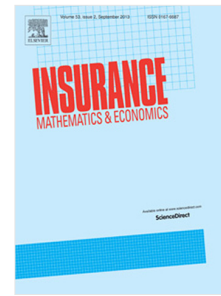
Received date: May 2017

Revised date: November 2017

Accepted date: 15 February 2018

Please cite this article as: Wang S., Lu Y., Sanders B., Optimal investment strategies and intergenerational risk sharing for target benefit pension plans. *Insurance: Mathematics and Economics* (2018), <https://doi.org/10.1016/j.insmatheco.2018.02.003>

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Optimal investment strategies and intergenerational risk sharing for target benefit pension plans

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Abstract

In this paper, we consider a stochastic model for a target benefit pension fund in continuous time, where the plan members' contributions are set in advance while the pension payments depend on the financial situation of the plan, with risk sharing between different generations. The pension fund is invested in both a risk-free asset and a risky asset. In particular, stochastic salary rates and the correlation between salary movements and financial market fluctuations are considered. Using the stochastic optimal control approach, we derive closed-form solutions for optimal investment strategies as well as optimal benefit payment adjustments, which minimize the combination of benefit risk (in terms of deviating from the target) and intergenerational transfers. Numerical analysis is presented to illustrate the sensitivity of the optimal strategies to parameters of the financial market and salary rates. We also consider how the optimal benefit changes with respect to different target levels.

Keywords: Target benefit plan; Intergenerational risk sharing; Hamilton-Jacobi-Bellman equation; Stochastic optimal control; Optimal investment

1 Introduction

The economic and demographic challenges of the past decade have resulted in the continuation of the global trend away from guaranteed benefits in occupational pensions. At the same time, there has been a growing interest in many industrialized countries in collective pension schemes with “soft guarantees”; that is, schemes with benefit ambitions they aim to fulfill but which are contingent on being “affordable” in some sense. This includes various forms of collective defined contribution plans and “defined ambition” plans in the Netherlands (Bovenberg et al., 2016; Kortleve, 2013) and in the United Kingdom (DWP, 2014; Thurley, 2014), as well as target benefit plans in Canada (CIA, 2015; Munnell and Sass, 2013).

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