



Statistical Sciences
UNIVERSITY OF TORONTO

SEMINAR

October 8, 2015 at 3:30pm

**Refreshments at 3:10pm*

Sidney Smith Hall, Room 1087

**Speaker: Jonathan González Salgado, The National
Autonomous University of Mexico (UNAM)**

Host: Andrey Feuerverger

Optimal Asset Allocation for Defined Benefit Plans under a Heavy-Tailed-Coupled Portfolio

Optimal Asset Allocation on pension funds has been widely studied during the last years; variables as mortality improvements, financial crisis, salary risks and unexpected inflation affect directly pension funds. Nowadays, plan sponsors are seeking alternative investment strategies and uniform costs for their pension plans under the ever changing conditions.

In the actual literature, most of optimal asset allocation strategies are based on stochastic differential equations, which relays on normality distribution of log returns, but in practice this assumption is replaced by heavy-tailed distributions and non-linear relationships. This paper addresses such issue improving heavy-tailed distributions and an extreme-value copula for the correlation structure to obtain the optimal strategy.

The aim of this paper is to compare under a heavy-tailed-coupled portfolio, in a traditional Defined Benefit Plan, several investment strategies depending on the funding level in terms of probabilities of

financial ruin. The paper, estimates the probability via stochastic simulations for a closed group of employees until extinction and where the contributions to the fund are fixed at time zero. The simulations show that for an specified funding level, the probability of financial ruin is not significantly greater than the optimal strategy in a range of 10% of the proportion invested in stocks. The heavy tails of the investment returns affect strongly investment strategies near the optimal, making them almost equal in terms of probabilities. In addition, scenarios where the expected return in bonds are less than assumed in valuations, impact drastically the probabilities, and for reaching an optimal strategy, is needed assuming more risk, but with significant greater probabilities.

Keywords: Stochastic simulation, copulas, extreme value, probability of financial ruin, optimal asset allocation, heavy-tailed-coupled portfolio, pensions.