Hedging Longevity Risk in Life Settlements

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1. Introduction and Motivation

Longevity has become a high-profile risk for pension funds, insurers and other companies. However, efforts to transfer longevity risk to capital market investors have been limited and, so far, unsuccessful (Loeys et al. 2007). An existing area for longevity investments is the life settlement market and its related securitizations. Life settlements are transactions where individuals aged 65 or above transfer life insurance policies to third-party investors (usually life settlement companies) instead of surrendering them back to insurance companies. Life settlements can be beneficial to both investors and policyholders: policyholders usually receive purchase prices greater than the surrender values of the policies and investors obtain exposures to longevity risk at a competitive price.

The securitization of life insurance policies can be traced back to the late 1980s, when those with terminal diseases (e.g., AIDS) and a short life expectancy (usually no more than two years) could sell their life policies to companies such as Legacy Benefits and Dignity Partners, which in turn would securitize them (Stone and Zissu 2006). Viatical industry faced great challenges when the lives of viators were extended via medical breakthroughs. Investors had to switch to buying life insurance policies from senior life settlers, whose life expectancy has been increased substantially in recent years.

To our best knowledge, there are only a few papers addressing longevity risk in life settlements and its related securitizations, most of which are written by Stone and Zissu (2006, 2007a, 2007b, 2008a, 2008b, 2009). They, however, mainly focus on the reliability of Macauly duration and convexity in the existence of longevity risk. Little research has been done on capturing longevity risk and developing an efficient mechanism of transferring and pricing the risk in life settlements. In this paper, we mathematically demonstrate the longevity risk inherent in life settlement transactions and argue that it can be hedged by a Vanilla survival swap. We adopt a generalized Lee-Carter model with asymmetric jump effects to accommodate both positive, transitory jumps for mortality deterioration and negative, permanent jumps for mortality improvement. We then apply the maximum entropy principle to price the survival swap.