



Making Pension Systems Stronger via Financial Markets

Life expectancy keeps increasing and pension payout levels are often higher than what a company or fund originally accounted for. This risk of ‘longevity’ can be transferred to financial markets, but pricing and risk management of longevity risk are urgently needed.

Rapidly aging populations are forcing policymakers to rethink pensions. In addition to the challenge of keeping pension systems financially sustainable for a larger pool of older people, the ongoing increase in life expectancy brings the additional challenge of managing “longevity risk”, i.e. the chance that people will live longer than expected. Pension schemes often fail to predict such trends accurately.

If retirees live from their accumulated assets, then longevity risk involves the possibility of people outliving their assets. This is a latent risk that can grow after recent pension reforms in many countries give people more control over the administration of retirement assets (for example, via defined-contribution pension funds) and also over how to withdraw such assets. If people choose to withdraw the whole retirement pot at once, they renounce periodic pension payments that are guaranteed for life.

Yet, many pension schemes still make periodic pension payments to retirees as long as they are alive. In traditional defined-benefit pension schemes, retirees are promised an annual payment (i.e. an annuity) and, therefore, the pension provider becomes the one facing the longevity risk, whose balance sheets may be exposed as a result of higher-than-expected payout ratios. A recent article of The

Economist notes that, globally, private defined-benefit schemes already have US\$23 trillion of liabilities. According to the IMF, each additional year of life expectancy adds about 3–4 percent to the present value of the liabilities of a typical defined-benefit pension scheme.

Pension schemes could try to achieve greater accuracy in their longevity assumptions. But this is not an easy task. In the meantime, some pension schemes are trying to hedge longevity risk via *longevity derivatives*, which are financial products and securitisation options that indemnify against unexpected changes in pension liabilities.

A new market with different products...

This is a relatively new market. In the United Kingdom, new life-insurance companies, backed by global investment banks, were emerging by the mid-2000s with the express purpose of buying-out the defined-benefit pension liabilities of British corporations. Since then new financial products are being created around the world both by the insurance/reinsurance industry and by the capital markets.

Longevity risk can be transferred via three types of transactions:

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- *Buy-out transaction*: transfers all of the pension plan's assets and liabilities to an insurer in return for an upfront premium. Hence there is full risk transfer (investment and longevity, plus inflation in the case of indexed plans).
- *Buy-in transaction*: the pension plan sponsor retains the assets and liabilities, but pays an upfront premium to an insurer to receive periodic payments matching the pension payments. In this case, the risk transfer is only partial because there is still counterparty risk to the insurer, and the sponsor remains directly responsible to the pensioners.
- *Longevity swap transaction*: periodic fixed payments are made to the swap counterparty (or reinsurer), based on agreed mortality assumptions for pension expenses; in return, the counterparty pays a 'floating' premium based on the difference between the agreed and the actual pension projections (i.e. the premium increases the longer people live in order to cover the extra pension expenses). The swap counterparty is usually an investment bank, which then lays off most, if not all, of the risk to a reinsurer or into the capital markets.

Insurers are associated with pension buy-ins, buy-outs. For instance, General Motors reached a US\$26bn pension buy-out deal with Prudential Insurance.

Longevity swap transactions are associated with investment banks and reinsurers and can be arranged in different ways. Some banks (for example, Deutsche Bank) write longevity swaps as derivative contracts, while others (for example, Goldman Sachs' *Rothsay Life*) use insurance vehicles. If a company has large pension liabilities, then they have the possibility to arrange a customised longevity swap. In other cases, the payments are based on the mortality experience of standardised population cohorts ("index swaps"). Index-based longevity hedging instruments (for example, Credit Suisse *Longevity Index*; the *LifeMetrics Index*, etc) provide a standardised alternative for smaller companies seeking to hedge longevity risk.

Banks and other market participants have also devised variations of "*mortality bonds*", a type of insurance-linked security whose value falls if deaths occur earlier than expected (Swiss Re was a pioneer using this bonds since 2003). *Longevity bonds* are indexed to longevity: bondholders get paid a coupon, but start to lose money if life expectancy pushes beyond a pre-agreed rate.

But deals have not taken off...

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Investors may be attracted to buying pension liabilities via longevity derivatives for two main reasons:

- *Diversification*: longevity risk has shown very low correlations with other types of investing risks, such as market risk or currency risk. Many institutional investors are attracted to anything that does not move lockstep with equity or debt market returns.
- *Counterweight*: longevity swaps usually involve big pension schemes and insurers such as Prudential and Swiss Re. The deals should help insurers hedge a risk they already have through their other businesses, which pay out if clients die unexpectedly early. In other words, the mortality risk they carry as a result of subsuming life assurance and catastrophe risk can be offset.

The market for hedging longevity risk is, nevertheless, still small. The reason is that the structuring and pricing of longevity risk using modern securitisation methods, common in financial markets (for example, for credit or interest rate risk), has yet to be successfully implemented for longevity risk management. Disagreements between schemes and financial institutions on price remain an important barrier to more deals being done (and academics have been busy trying to determine the optimal design and pricing of longevity derivatives). The market also remains a niche area, largely the preserve of big pension schemes.

The challenge for longevity bonds is that they are only useful over longer periods—enough time needs to pass for past projections to have been proved wrong. This does not suit the average investor, particularly in the absence of a liquid secondary market. The first attempt to issue a longevity bond in capital markets in 2004 (a cooperation between the European Investment Bank, BNP Paribas and PartnerRe) was not successful and other attempts have raised questions surrounding these products and their optimal pricing. Some academics and industry experts advocate government-issued longevity bonds that would provide benchmarks and liquidity to the market in the same way that government-issued inflation-linked bonds helped that market thrive.

Longevity Swaps will expand

Longevity swaps have occurred in small numbers. Big players such as Credit Suisse (which had struck substantial deals with schemes including at broadcaster ITV and engineers Babcock International) and JPMorgan (which had previously reached a deal in a £70m swap with the U.K. pension scheme of Pall) have not concluded longevity swaps

since 2011.

Yet, swaps have been carried out in a variety of industries (from pharmaceuticals to carmakers) and some have involved an important amount of money. A deal between BT and U.S.-based Prudential in 2014 has drawn international attention. The deal has covered 25 percent of the scheme's total exposure to improvements in longevity by hedging about £16bn of liabilities. It is U.K.'s largest corporate defined-benefit pension scheme (assets of £40bn as of July 2013). In another example, Deutsche Bank concluded a €12bn longevity swap with Aegon, a Dutch insurer.

The longevity swaps market is expected to grow significantly in the near future because the cost of arranging the derivatives contract, which relies on the scheme making regular payments over time, is perceived to be more achievable than a buy-out (which involves a large upfront cost), especially for a scheme struggling with funding. Insurance companies are more likely than banks to continue to be active in this market. The reason is that this is their core business: they are more familiar with the risk and they have other risks – mortality – for which longevity can act as a hedge.

What next?

Scholars such as David Blake, who has done extensive research on longevity derivatives, has argued in favour of having the government share longevity risk with the private sector via longevity bonds (many potential solutions are discussed in the context of the *International Longevity Risk and Capital Markets Solutions Conference*). Some questions that require attention include:

- Should governments intervene? How?
- What would be an optimal regulatory approach?
- Does the introduction of government longevity bonds help, by establishing key price points along the mortality term structure, to develop the private-sector longevity derivatives market?
- How should longevity bonds' payoffs be structured?
- How to avoid the concentration of risk among a small number of insurance companies?

Subsequent posts from **INSEAD Work and Pensions Blog** will explore in detail the most recent developments in this area.

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