

Discussion of:
"Geographical diversification in annuity portfolios"
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This paper

- Question: Are longevity diversification gains across populations sizable?
- This paper:
 - model of joint mortality dynamics
 - calibration and estimation of diversification gains
 - synthetic replication using a longevity swap

In a nutshell

Start with initial portfolio with value:

$$\Pi^0(t) = \underbrace{AV_{\Pi^0}(t)}_{\text{actuarial value}} + \underbrace{RM_{\Pi^0}(t)}_{\text{risk margin = discounted VaR}}$$

Compare:

- Domestic expansion

$$\Pi^1(t) = AV_{\Pi^0}(t) + AV_{\Pi^D}(t) + RM_{\Pi^1}(t)$$

- Foreign expansion

$$\Pi^2(t) = AV_{\Pi^0}(t) + AV_{\Pi^F}(t) + RM_{\Pi^2}(t)$$

In a nutshell (ctd)

1. Assume Cox processes for death modelling, with idiosyncratic components for F
2. Calibrate on UK and Italian data (males, aged 65 – 75)
3. Use Gaussian mapping techniques to derive correlation estimates between cohorts

Findings

Effects of geographical diversification ($r = 0\%$)

Portfolio	AV	RM	Π	%RM	DI
Π^0	$1.9097 \cdot 10^4$	$2.1318 \cdot 10^3$	$2.1228 \cdot 10^4$	11.16%	-
Π^F	$2.0093 \cdot 10^4$	$1.9060 \cdot 10^3$	$2.1999 \cdot 10^4$	9.49%	-
Π^1	$3.8193 \cdot 10^4$	$4.2636 \cdot 10^3$	$4.2457 \cdot 10^4$	11.16%	0
Π^2	$3.9189 \cdot 10^4$	$4.0378 \cdot 10^3$	$4.3227 \cdot 10^4$	10.30%	0.0925
Π_{opt}^1	$4.1675 \cdot 10^4$	$3.6480 \cdot 10^3$	$4.5323 \cdot 10^4$	8.75%	0
Π_{opt}^2	$4.2400 \cdot 10^4$	$3.4234 \cdot 10^3$	$4.5824 \cdot 10^4$	8.07%	0.1801

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Conclusion

- Elegant model of joint longevity risk
- Applicable to other datasets
- Implications both for insurers and reinsurers
 - "sizable" gains

Comments

- Good for SS, but what about pandemia/systematic risk?
- Anything new we would learn from multiple countries?
- Risk margins reductions are highest for low interest rates
 - comparison to interest-rate swap diversification gains? FX risk hedging?
- "conservative estimates since the two populations have similar mortality dynamics": 0% interest rate is not so conservative
- Should we compare portfolios with highest DI, or domestic vs foreign expansion?
 - Would the results hold true if the RM of F was higher than that of D ?
- International M&As explained solely by Solvency II?
 - corollary: do we observe a lot of longevity swaps?
- How much do annuities represent: what are the ultimate quantitative implications for LIs?

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