Insurers as Asset Managers and Systemic Risk

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Summary: Empirical Facts

- Large insurers provide variable annuities (VA), 77% of which are guaranteed against common stocks
- Insurers with VA exposures lower the fractions of stocks and liquid bonds in their portfolios, and raise the fraction of illiquid bonds

	stock	liquid bonds	illiquid bonds
With VA exp.	4.6%	73.7%	19.5%
W/O VA exp.	0.0%	65.3%	32.6%

- During the 2008 crisis, insurers with VA exposures had much larger drops in stock returns and return on equity, and a larger systemic risk (SRISK)

Summary: Model

- The portfolio of an insurer: stocks, illiquid bonds, liquid bonds with decreasing returns
$$r_S > r_I > r_L = 0$$

- The insurer maximizes its return subject to the capital constraint
$$\frac{E}{(\alpha_S \gamma_S + \alpha_I \gamma_I)A} \leq \rho \quad \text{and} \quad \frac{\gamma_S}{r_S} = \frac{\gamma_I}{r_I}$$
and the hedging constraint
$$\alpha_L + \alpha_I \geq \underbrace{h}_{\text{hedging ratio}} \overbrace{|\delta| g}^{\text{VA exposure}}$$

- Whenever there is a negative shock to asset values, insurer needs to sell s fraction of all three assets to satisfy the capital constraint: price of illiquid bonds drop by $c_0 S$ where S is the amount of sales – fire-sale discount

Summary: Model Predictions

- Stock is the most preferred asset: highest return, and zero fire-sale cost (as liquid assets)
- Own as many stocks as possible until capital constraint and hedging constraint bind

$$\alpha_S = 1 - h|\delta|g$$

- Illiquid bonds are preferred over liquid bonds because of higher return. Own as many illiquid bonds as possible until the capital constraint binds

$$\alpha_I = \frac{E}{A\rho\gamma_I} - (1 - h|\delta|g)\frac{\gamma_S}{\gamma_I}$$

Summary: Calibration and Counterfactuals

- The model parameters are calibrated based on the sensitivity of α_S and α_I w.r.t. $|\delta|g$ using insurer-level data: $h = 0.69$, $\gamma_I = 0.113$ ($\gamma_S = 0.3$), $c_0 = 0.186\%$ per 10 billion sales of illiquid assets

- Run two counterfactuals using the model: (i) With VA exposure but no yield-reaching; (2) Without VA exposure
  - Negative shocks to assets lead to large fire sale costs due to fire-sale externality
  - Over 69% fire sale costs are due to "reaching for yield"

Comment: Model and Calibration

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- In the data, share of common stocks is very small even for insurers with no VA exposure ($< 5\%$) and zero for with VA exposure

$$\alpha_S = 1 - h|\delta|g, \quad \text{with} \quad h = 0.69, |\delta| < 1, g \leq 1 \Rightarrow \alpha_S > 30\%$$

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- Expected return may not be the only concern, volatility also matters. Stocks have lower Sharpe ratio than risky bonds historically. Maybe

$$\frac{\gamma_S}{r_S} \neq \frac{\gamma_I}{r_I}$$

Comment: Fire-Sale Discount

- Suppose an insurer needs to sell 30 billion illiquid bonds. Whether these are the same bonds makes a difference in the fire-sale discount.
  - If these are the same bonds: price drop $0.186\% \times 3 = 0.55\%$
  - If these are three different bonds, each worth 10 billion: price drop 0.186% for each type of bond

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	Private ABS in NAIC 1	Mortgages	Loans	Others
With VA exp.	0.108	0.087	0.045	0.086
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- How much is the estimated large loss due to the mortgage crisis during 2008

Conclusion

- A very novel and unique angle to examine the origin of systemic risks
- The paper pushs us to think hard whether the financial insurance business is welfare enhancing
- A novel way to calibrate the model and quantify the impacts of different elements of the model.