Discussion of "The Fragility of Market Risk Insurance" (By Ralph Koijen and Motohiro Yogo)

Discussion by: Borghan Narajabad

Federal Reserve Board

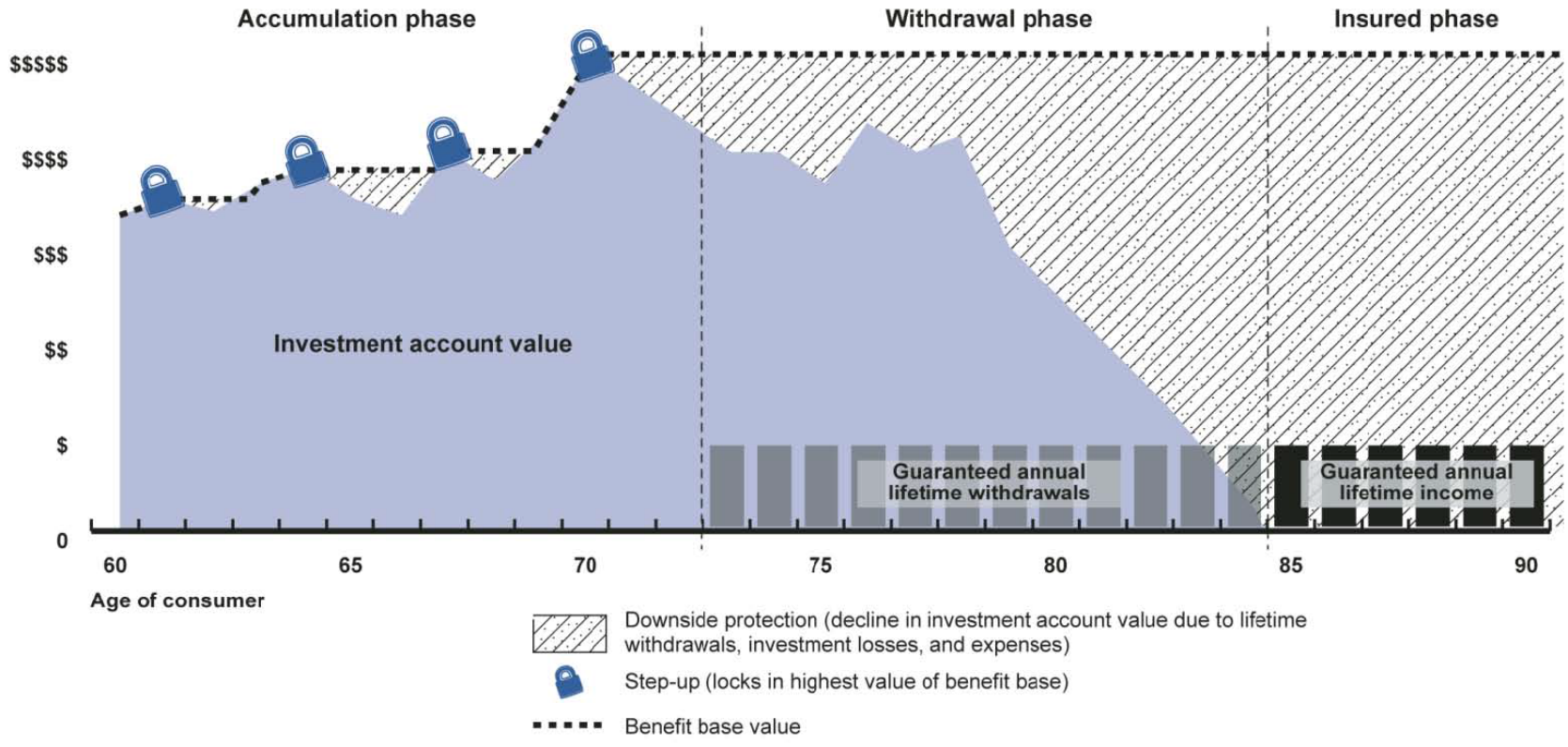
NBER Conference on Financial Market Regulation
October 2017

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How do financial frictions and market power contribute to incompleteness of saving instruments?

- Variable annuities (VA) market
  - Mutual funds with guaranteed death and **living** benefits
    - **Benefit base**: Minimum amount available for annuity, regardless of the investment performance
  - Sizeable market: $2 trillion (2016Q4)
    - About one-third of U.S. life insurance
    - And one-sixth of the mutual fund market
  - Appear to have been driven by the supply side
    - Rapid growth from late 1990s to 2008
    - Lackluster growth afterward
    - Pre-2009 business accounts for three-quarter of VA

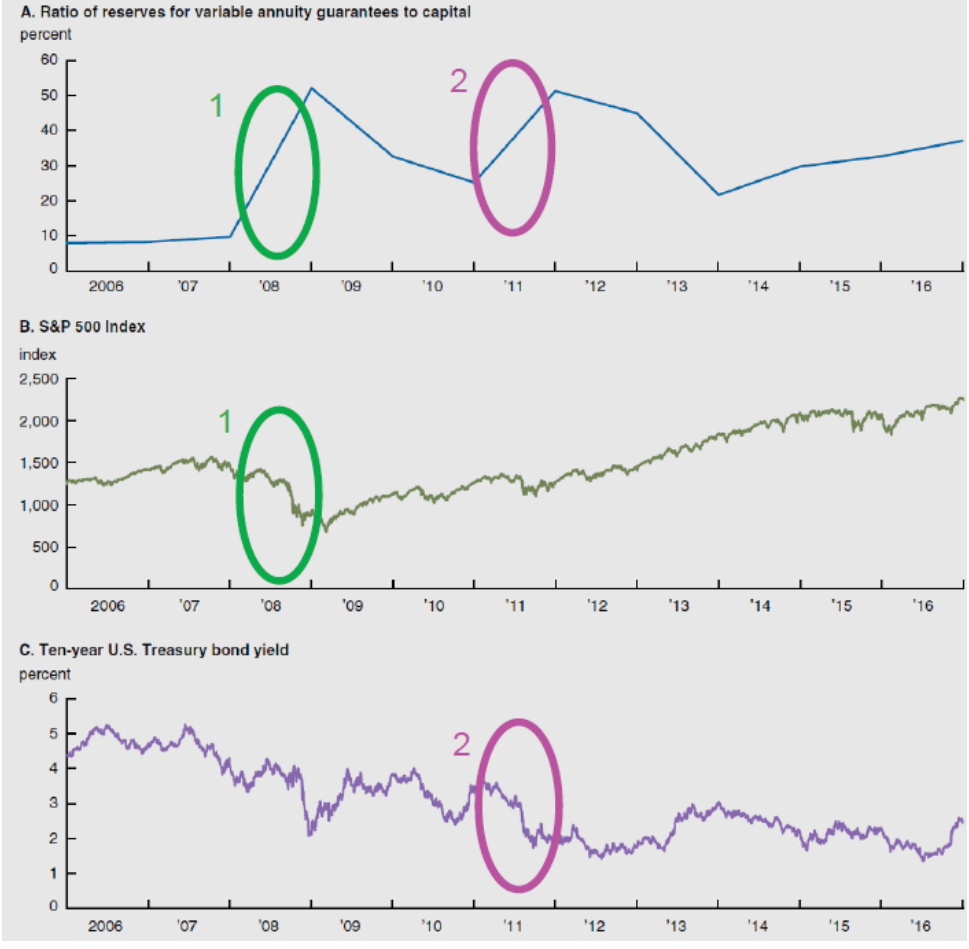
A typical VA offers two main guarantees to investors



Source: GAO-13-17

1. Guaranteed lifetime income $\rightarrow$ traditional diversifiable risk
2. Return guarantees (ratchets and **rollups**) $\rightarrow$ market risk

Market risks, bearish stock market and low interest rates, raise cost of offering VA for life insurers



Source: Chicago Fed Letter Number 384

New contracts depend on the value of past liabilities

- Optimal pricing of rollup rate r_t which has option value $V_{t,t}$

$$P_t = \left(1 - \frac{1}{\epsilon_{P,t}}\right)^{-1} \underbrace{\left(V_{t,t} + \frac{c_t \phi \left(V_{t,t} - 1\right)}{1 + c_t}\right)}_{\text{marginal cost}}$$

  - $c_t = \frac{\partial C(K_t)}{\partial K_t}$: shadow cost of capital

- Current value of **past liabilities** increases required risk-based capital and K_t, thus, raises price and lowers rollup

$$\frac{\partial P_t}{\partial V_{t-1,t}} > 0 > \frac{\partial r_t}{\partial V_{t-1,t}},$$

  if demand elasticities, $\epsilon_{P,t}$ and $\epsilon_{r,t}$, are constant

- Counterpart for $V_{t-1,t}$ in data: *Reserve valuation*
  - Ratio of gross reserve to total related account value

Random coefficients logit model of VA demand

$$q_{i,t}(\alpha, \beta) = \frac{\exp\{\alpha P_{i,t} + \beta' x_{i,t} + \xi_{i,t}\}}{1 + \sum_j \exp\{\alpha P_{j,t} + \beta' x_{j,t} + \xi_{j,t}\}}$$

- $x_{i,t}$ includes $r_{i,t}$, # of investment options, A.M. Best rating, risk-based capital, log liabilities, and VA share of liabilities
- α with lognormal distribution
- β with normal i.i.d

- **Identification assumption:** unlike supply, demand is independent of $V_{t-1,t}$, conditional on insurer characteristics

Result: heterogeneous rise in marginal cost of VA supply

Insurer	Fee	Marginal cost
Hartford	0.89	0.87
Metropolitan Life	0.46	0.42
Sun Life	0.44	0.42
Aegon	0.35	0.33
AXA	0.29	0.30
Voya	0.30	0.29
Prudential	0.32	0.28
AIG	0.23	0.23
Genworth	0.22	0.22
Ameriprise	0.22	0.21
Pacific Life	0.18	0.20
Nationwide	0.16	0.16
John Hancock	0.03	0.04

Note: Fee $= P$

Change in marginal cost of typical VA from 2007 to 2009

Understanding VA market is essential for financial stability

- Stability of life insurance industry
  - The sudden rise of VA reserves during crisis put pressure on the core business of life insurers
- The rise of mutual fund industry, following the VA slowdown
  - Mutual funds without guarantees are more prone to runs

Structural break in demand during the crisis?

- Shocks to insurers' capital and rating
  - Direction of controls might be more important than their level
  - Policy holders paid attention to stock price of insures

STATE OF CONNECTICUT

INSURANCE DEPARTMENT

FOR IMMEDIATE RELEASE
October 9, 2008

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Consumer Alert

Consumers Concerned About The Hartford Group

Commissioner Sullivan reminds consumers to remain calm and make only educated decisions during this time, and that the Connecticut Insurance Department is a great resource. The Consumer Affairs division has received several consumer inquiries about the financial stability of The Hartford Group.

"Protecting consumers is the hallmark of state regulation, and I am committed to that task," Commissioner Thomas R. Sullivan said, "as regulators, we monitor the financial strength of all insurance companies doing business in Connecticut."

"As one of the largest and oldest Connecticut domiciled insurance companies, The Hartford continues to perform with a well established core business platform" Commissioner Sullivan said, "The Hartford Group's financial strength remains solid and will continue to meet policyholder obligations."

Connecticut residents who have questions or concerns about their insurance policies should contact the Consumer Affairs Division at 1-800-203-3447, or visit the department web site at www.ct.gov/cid.

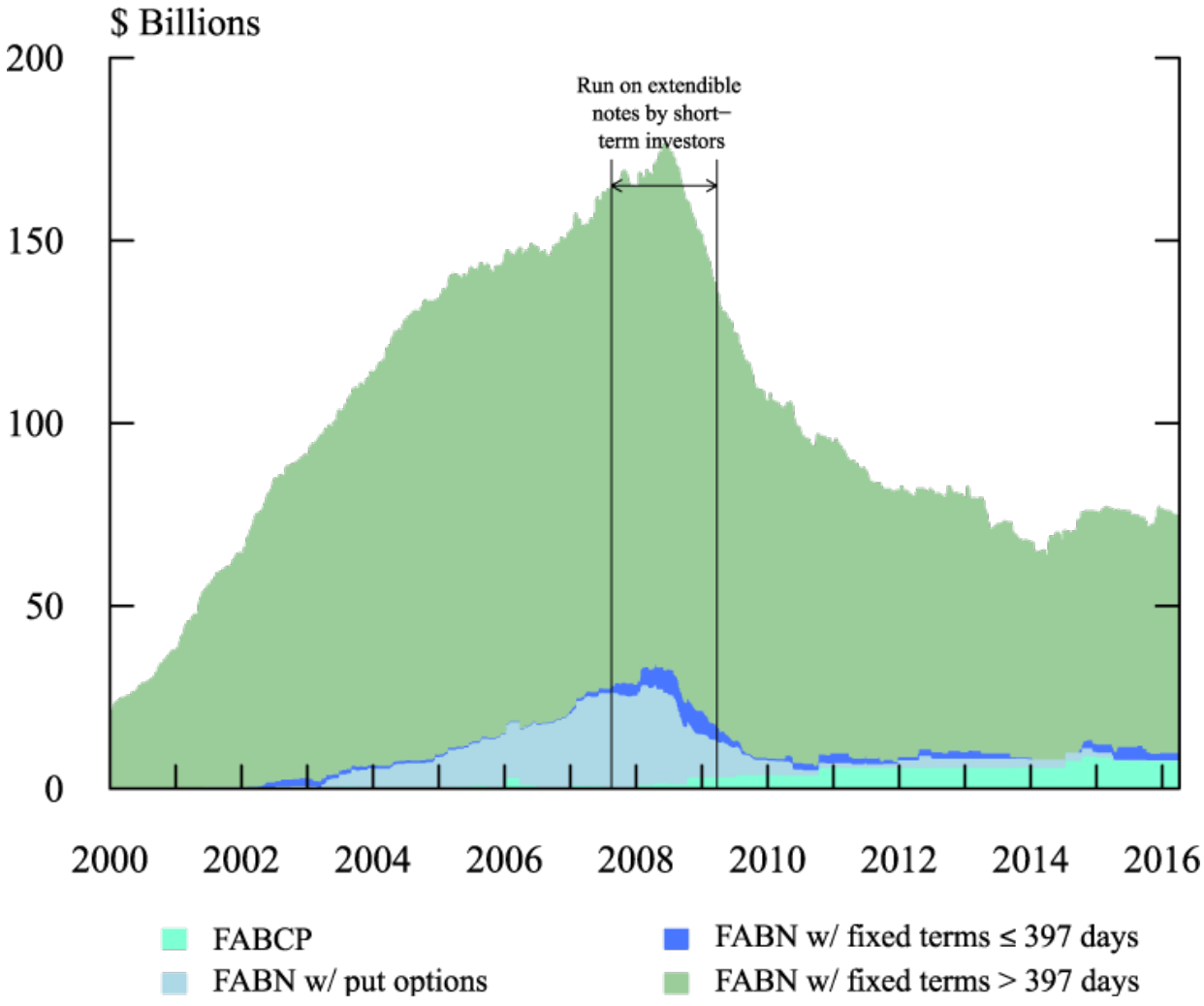
Controlling for possible structural break in demand

- Excluding the crisis period from the sample
- Additional controls
  - Stock price of insurers
  - Changes in insurers' rating and capital

Pressure on supply: capital or liquidity?

- Sensitivity of outflows to bad past performance was stronger for mutual funds with illiquid assets (Chen, Goldstein, and Jiang 2010)
- Life insurers were under significant liquidity pressure
  - Life insurers utilized Troubled Asset Relief Program (TARP)
  - Collapse of securities lending and return of cash collateral (remember AIG)
  - Run on Funding Agreement Backed Notes (FABN)

Pressure on life insurers' access to wholesale market

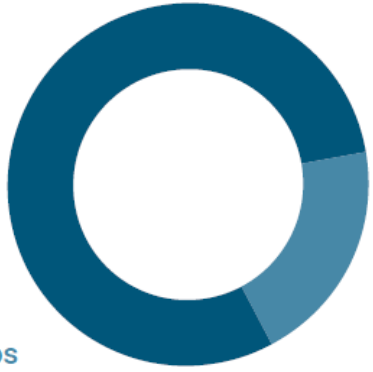


Source: Foley-Fisher et al. (2016)

Controlling for liquidity pressure (on separate accounts)

- A liquidity squeeze could limit supply of the underlying *investment* vehicle
  - External mutual funds offered by a third-party
  - In-house investment funds
- Possible additional instrumental variable
  - Share of cash in separate account portfolio
  - Established instrument in the literature

80%



20%

Minimum Allocation: 80%

Risk Managed Global Multi-Asset Portfolios

AB Global Dynamic Allocation Portfolio[F,H,Z]

Allianz Global Investors Dynamic Multi-Asset Plus Portfolio[D,F,Z]

AQR Global Risk Balanced Portfolio[D,F,Z]

BlackRock Global Tactical Strategies Portfolio[F,FF,Z]

Invesco Balanced-Risk Allocation Portfolio[D,F,Z]

JPMorgan Global Active Allocation Portfolio[F,H,Z]

Brighthouse Balanced Plus Portfolio[FF,Z]

MetLife Multi-Index Targeted Risk Portfolio[FF,Z]

PanAgora Global Diversified Risk Portfolio[D,F,Z]

Pyramis® Managed Risk Portfolio[F,FF,Z]

Schroders Global Multi-Asset Portfolio[F,Z]

Fixed Income

MetLife Aggregate Bond Index Portfolio

Pyramis® Government Income Portfolio

Maximum Allocation: 20%

Asset Allocation Portfolios[AA]

Brighthouse Asset Allocation 20 Portfolio

Brighthouse Asset Allocation 40 Portfolio

Brighthouse Asset Allocation 60 Portfolio

American Funds® Balanced Allocation Portfolio

American Funds® Moderate Allocation Portfolio

State Street Global Advisors Growth and Income ETF Portfolio

Source: VA brochure for Brighthouse financial (Established by MetLife)

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Effect of market power on intergenerational risk sharing

- Offering generous policies to current generation is possible if
  - Life insurers do not need to raise more new capital
  - Due to profits from contracts made to past generations

$$P_{t-1} \uparrow \implies A_t \uparrow \implies K_t \downarrow \implies P_t \downarrow$$

- Market power reduces generosity of current contracts, $\epsilon_{P,t} \downarrow \implies P_t \uparrow$
  - Could strengthen the insurer's capital adequacy in future and result in more generous/complete contracts

Using results to evaluate risks and benefits of market concentration

- Inferring shadow cost of capital from estimated marginal costs

$$c_{i,t} = \frac{\phi\left(V_{t,t} - 1\right)}{mc_{i,t} - V_{t,t}} - 1$$

- Is there significant heterogeneity across insurers?
- Is shadow cost of capital correlated with insurers' size?
- Following acquisition of a weak insurer by a strong one, how would prices change?
    - Assuming no change in the strong insurer's cost of capital

Concluding comments

- Important question
- Nice identification, excellent data work
- More robustness may be needed
- More questions could be answered with these results