

Life Insurance Markets in the Low Rate Environment

Keynote Bernácer Prize

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The role of insurers in the broader economy

- ▶ Insurance companies play an essential role to share idiosyncratic risks across households and firms.
- ▶ As life and health events are truly about tail risks, mistakes in insurance portfolios are more costly than mistakes in investment portfolios.¹
- ▶ In addition, insurance companies manage large pools of capital as insurance premiums are paid upfront.

¹Koijen, Van Nieuwerburgh, and Yogo, 2016, *Health and Mortality Delta: Assessing the Welfare Cost of Household Insurance Choice*, Journal of Finance.

From insuring idiosyncratic to aggregate risks

- ▶ Modern insurers also offer long-term savings products with embedded minimum-return guarantees.
 - ▶ E.g., variable annuities and profit participation products.
 - ▶ In part driven by the decline in defined-benefit pension plans.

From insuring idiosyncratic to aggregate risks

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 - ▶ In part driven by the decline in defined-benefit pension plans.
- ▶ As a result, life insurers now insure **aggregate risks**.
- ▶ Due to the long-term nature of the insurance contracts, the pricing and risk management are challenging, and require complex financial engineering.
- ▶ Imperfect hedging leaves insurers exposed to declines in interest rates and equity prices as well as spikes in volatility.

Financial fragility: Evidence from the 2008 financial crisis

- ▶ Several life insurers received government support, both in the Europe and in the United States.
- ▶ Faced with regulatory capital constraints, US insurers distorted prices of life insurance and annuity products.²
 - ▶ Average markup on annuities: -19%
 - ▶ Average markup on life insurance: -57%

²Koijen and Yogo, *The Cost of Financial Frictions for Life Insurers*, 2015, American Economic Review.

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 - ▶ Average markup on annuities: -19%
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- ▶ While this extraordinary pricing behavior relaxed regulatory constraints, it weakens their economic position.
- ▶ Raising regulatory discount rates during times of stress can have unintended consequences.
 - ▶ This is worth exploring in the context of the volatility adjuster in the Solvency 2 framework.

²Koijen and Yogo, *The Cost of Financial Frictions for Life Insurers*, 2015, American Economic Review.

Low rates, quantitative easing, and the insurance sector

- ▶ Following the financial crisis, interest rates have declined in Europe and in the US, at least in part due to QE.³
- ▶ For bonds with little credit or sovereign risk, this hurts the insurance sector when holding the bonds for the long run.
 - ▶ The long-term return is unaffected, yet the reinvestment yield is lower.
- ▶ Evidence that the insurance sector remained fragile:
 1. Exposure to interest rates.
 2. The COVID-19 crisis.

³Koijen, Koulischer, Nguyen, and Yogo, *Inspecting the Mechanism of Quantitative Easing in the Euro Area*, 2021, *Journal of Financial Economics*.

Risk exposure of U.S. life insurers

- ▶ The low-rate environment has stressed insurance companies.

Factor	1999–2007	2010–2017
Stock market return	0.56 (0.15)	1.11 (0.08)
10-year bond return	-0.38 (0.29)	-1.28 (0.16)
Observations	108	96

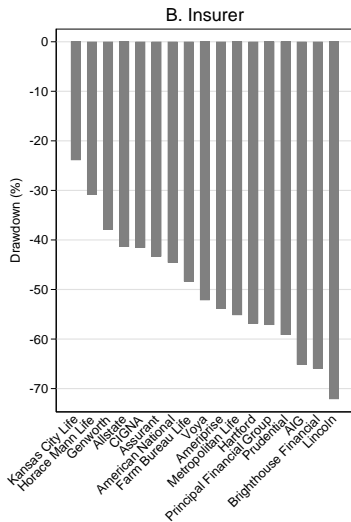
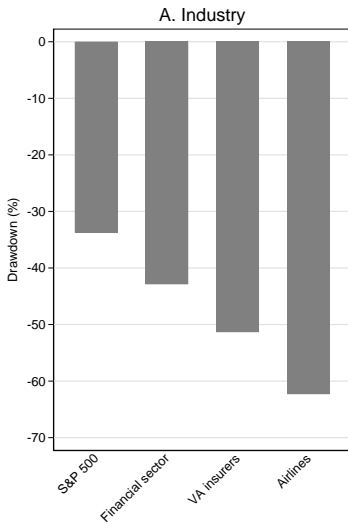
- ▶ Implied duration gap of approximately 10 years.

Risk exposure of European life insurers

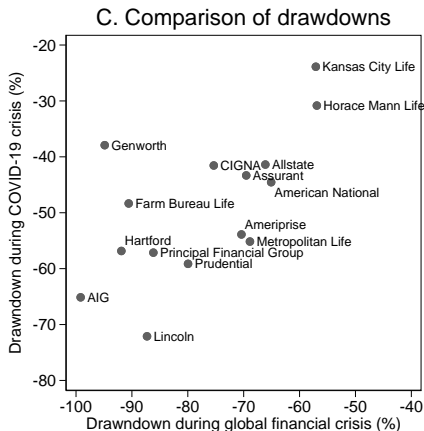
Factor	By subsample		
	2011-2019	2014-2019	2017-2019
Stock market return	1.09 (0.08)	1.00 (0.08)	0.98 (0.11)
10-year bond return	-0.40 (0.19)	-0.55 (0.21)	-0.66 (0.31)
Alpha (%)	0.54 (0.27)	0.50 (0.28)	0.43 (0.35)
Observations	98	72	36

- ▶ Implied duration gap of approximately 6 years.

Stock returns during the COVID-19 crisis



Comparison between the GFC and the COVID-19 crisis



- ▶ Top 9 insurers by variable annuity liabilities in 2007 coincides with top 9 insurers by drawdowns during the COVID-19 crisis.

Consequences of risk mismatch

1. Asset demand.⁴
 - ▶ After 2008, duration increases and credit risk decreases in the general account bond portfolio.
 - ▶ Due to the long duration of the contracts, asset demand affected for a long period of time.
2. Pricing, design, and reinsurance of variable annuity liabilities.⁵
 - ▶ Variable annuity liabilities move off balance sheet, which reduces transparency.⁶

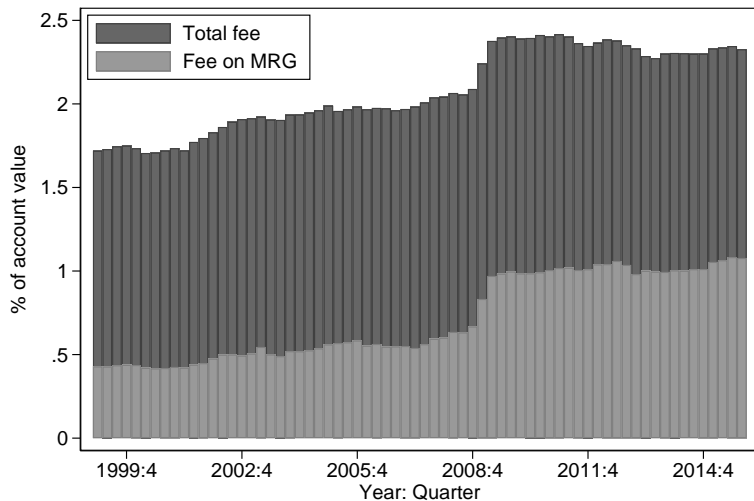
⁴Koijen and Yogo, *A Demand System Approach to Asset Pricing*, 2019, *Journal of Political Economy*.

⁵Koijen and Yogo, *The Fragility of Market Risk Insurance*, 2022, *Journal of Finance*.

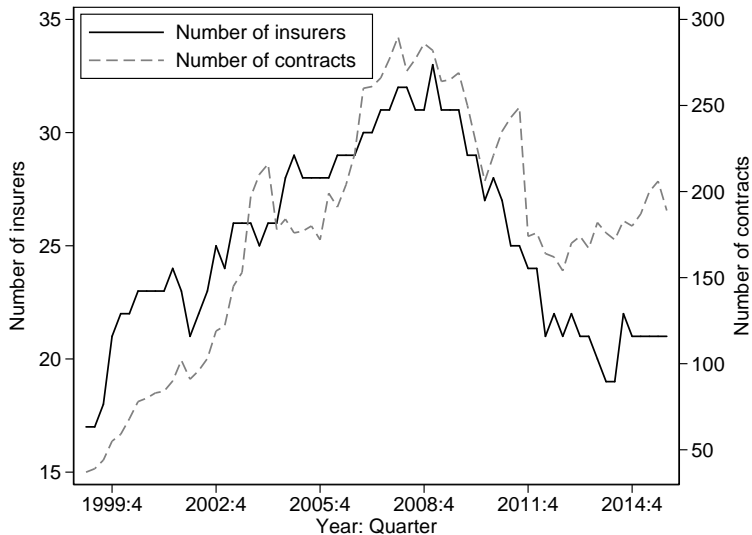
⁶Koijen and Yogo, *Shadow Insurance*, 2016, *Econometrica*.

Implications of fragility: Product prices

A. Fee



Implications of fragility: Market incompleteness



Supply-side theory of insurance

	Traditional view	Supply-side view
Products	Life/health insurance & traditional annuities	Minimum return guarantees
Insures	Idiosyncratic risk	Market risk
Frictions	Informational	Financial/regulatory & market power
Consequences	Variation in prices, contract characteristics & degree of market incompleteness	

Long-term risk regulation

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- ▶ How to regulate modern life insurance companies?
- ▶ A key difference between banks and insurance companies is that, with some exceptions, liabilities are not runnable.
- ▶ The nature of the risks calls for long-term expected shortfall or value-at-risk measures.
- ▶ While conceptually appealing, long-term risk measures are challenging to implement in practice.
 - ⇒ E.g., they depend on the mean-reversion in interest rates and other asset prices, which are hard to measure.

Two facts and a key question

- ▶ Switching gears . . .
 1. Rapid progress in several areas of medicine is leading to meaningful and durable **gains in longevity**.
 2. Many of the new medical treatments are very **expensive**.
 - ▶ Resulting in high out-of-pocket costs for patients, financial toxicity, and even lack of uptake and access.
 - ▶ How to assure access for all to medical frontier technologies?

Existing financing solutions have issues

1. Health insurance.

- ▶ Co-pays, to limit moral hazard, lead to high OOP costs.
- ▶ Some treatments not covered (incomplete contracts).

Existing financing solutions have issues

1. Health insurance.
2. Credit markets (“life loans”).
 - ▶ But, households cannot pledge their future labor income.
 - ▶ May default on loans received for medical treatment.
 - ▶ High labor income uncertainty after diagnosis reduces borrowing capacity.

Existing financing solutions have issues

1. Health insurance.
2. Credit markets (“life loans”).
 - ▶ Under status quo, we face a dystopian future where life-saving treatments are unavailable for large population segment. Conundrum will only get worse as
 - ▶ The world population ages.
 - ▶ New therapies become more effective, approved for more diseases, and increasingly as first-line therapies.
 - ▶ Cost of drugs continues to rise faster than incomes.
 - ▶ The fiscal position of governments everywhere worsens.

Life Insurance benefits from life-extending innovation

- ▶ Our insight: **Life insurers** experience a large windfall on existing policies as a result of life-extending medical innovation.⁷

⁷Koijen and Van Nieuwerburgh, *Combining Life and Health Insurance*, 2020, Quarterly Journal of Economics

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- ▶ Benefit per dollar of face value for stage-IV melanoma:

Age of purchase	Insurer's benefit			
	Age of diagnosis			
	30	40	50	60
30	0.48	0.44	0.37	0.30
40		0.49	0.42	0.33
50			0.49	0.39
60				0.49

- ▶ Gain is \$159,000 for \$369,000 death benefit [30,40]
- ▶ Gain is \$20,000 for \$46,000 death benefit [30,40]

⁷Koijen and Van Nieuwerburgh, *Combining Life and Health Insurance*, 2020, Quarterly Journal of Economics

Financing the war on cancer

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- ▶ If consumers have all bargaining power.
 - ▶ The life insurer would cover the patient's out-of-pocket cost of treatment up to the insurer's marginal benefit.
 - ▶ Even in this scenario, the insurer profits as the benefit (\$9.8bn) exceeds the aggregate OOP cost (\$4.8bn).

Financing the war on cancer

- ▶ The benefits to life insurers are large. How to use these benefits to finance life-extending medical treatments?
- ▶ If consumers have all bargaining power.
- ▶ If life insurers have all bargaining power.
 - ▶ Insurer wants the patient to have access to immunotherapy:
 1. Allow patient to borrow against the collateral tied up in the life insurance policy.
 2. Reduce face value of policy by cost of treatment.

Long-term implications

- ▶ Improved affordability of life-extending treatments.
 - ▶ By improving access to life-extending treatments, marginal cost of providing life insurance declines.
 - ▶ Lowers the price of life insurance (in competitive market place).
 - ▶ Increases demand for life insurance (price- and non-price-based demand).
 - ▶ Increases demand for life-extending treatments.
 - ▶ Further stimulates development of treatments, via R&D spending at pharmaceuticals (possibly subsidized by LI firms).
 - ▶ Resulting in additional survival gains.
- ⇒ virtuous cycle ensues.

Alzheimer and Long-Term Care Insurance

- ▶ Innovative cancer treatments benefit life insurers.
- ▶ Innovative treatments that slow the onset of Alzheimer's and Parkinson's, thereby slowing the entry into a nursing home benefit long-term care insurers (LTCI).
- ▶ By the same logic, LTCI firms may have an incentive to help finance such treatments for patients, as well as stimulate R&D.