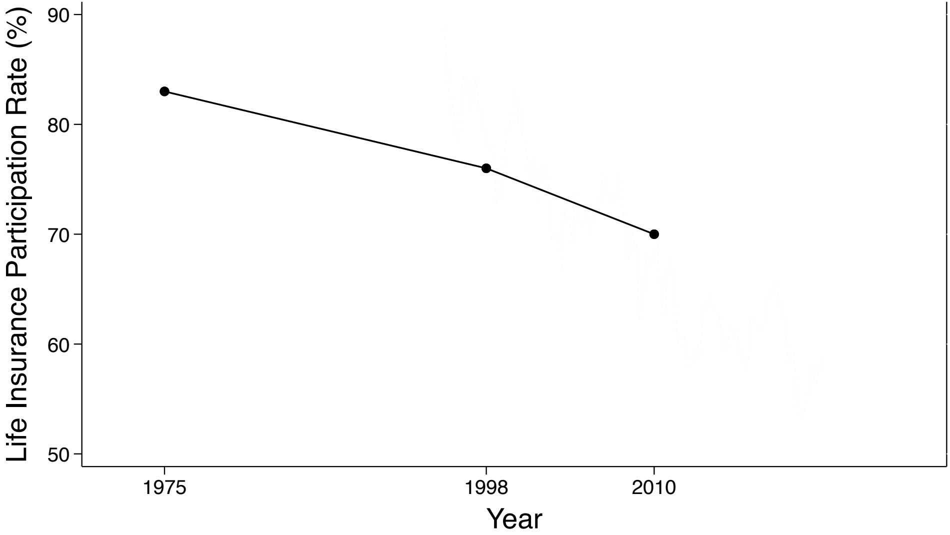
From Long to Short:
How Interest Rates Shape Life Insurance Markets

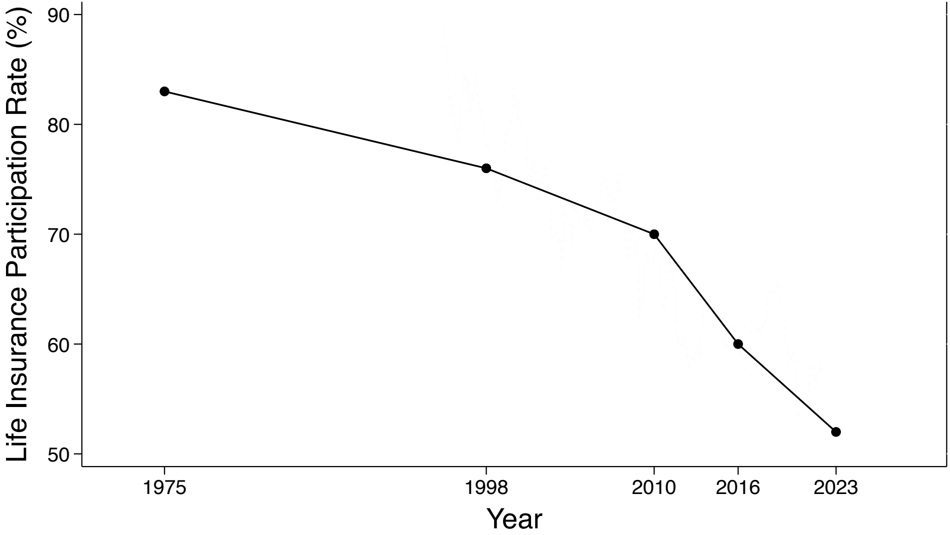
Ziang Li
Imperial College

Derek Wenning
Indiana Kelley

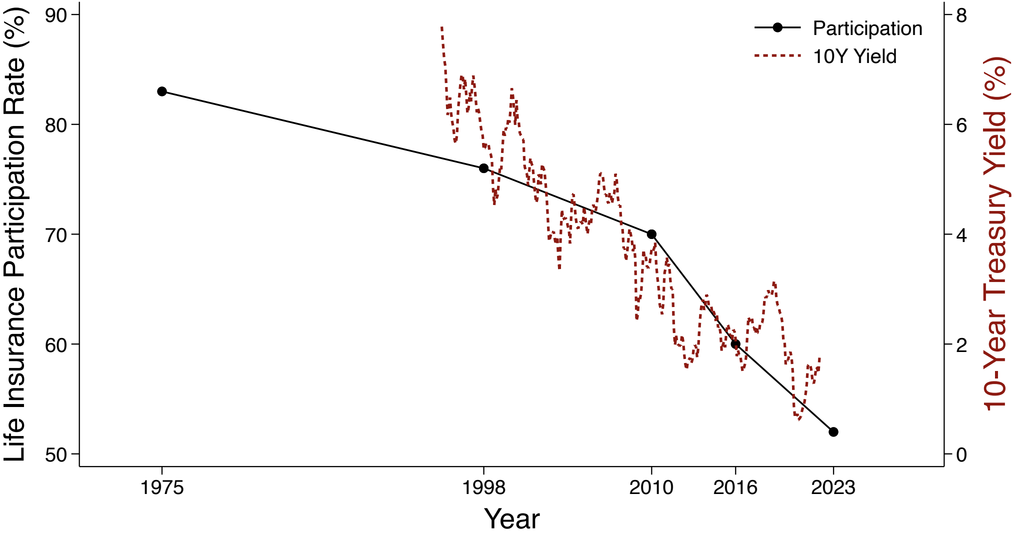
October 2, 2025
HEC Paris



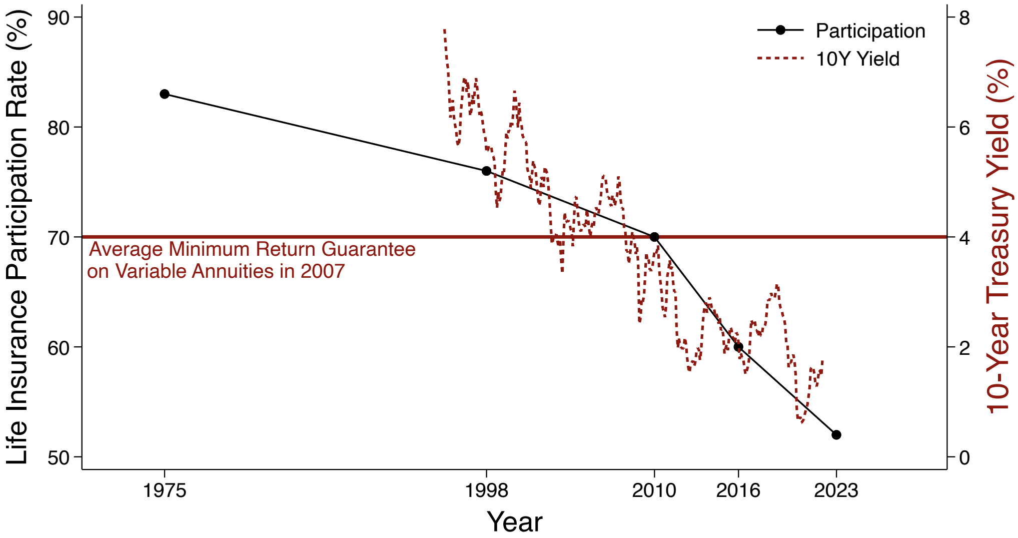
* Source: Guardian Life Insurance report, based on data from LIMRA



* Source: Guardian Life Insurance report, based on data from LIMRA

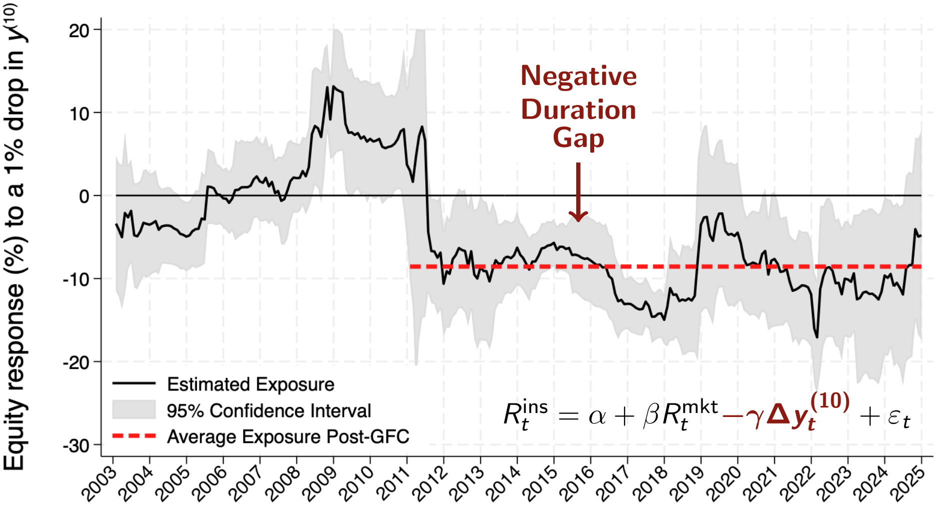


* Source: Guardian Life Insurance report, based on data from LIMRA



* Source: Guardian Life Insurance report, based on data from LIMRA

In-the-Money Guarantees → Elevated Interest Rate Risk Exposure



How can life insurers address duration mismatch?

- **Interest rate swaps**
  - Idea: swap duration with other institutions that would like to sell it
  - Limits: regulatory + accounting disincentives (Sen, 2023)

How can life insurers address duration mismatch?

- ~~**Interest rate swaps**~~
  - Idea: swap duration with other institutions that would like to sell it
  - Limits: regulatory + accounting disincentives (Sen, 2023)

- **Reaching for duration**
  - Idea: rebalance assets to **lengthen asset duration** to match liability duration
  - Limits: market incompleteness, trade costs (Ozdagli & Wang, 2019; Ellul et. al, 2022)

How can life insurers address duration mismatch?

- ~~**Interest rate swaps**~~
  - Idea: swap duration with other institutions that would like to sell it
  - Limits: regulatory + accounting disincentives (Sen, 2023)

- ~~**Reaching for duration**~~
  - Idea: rebalance assets to **lengthen asset duration** to match liability duration
  - Limits: market incompleteness, trade costs (Ozdagli & Wang, 2019; Ellul et. al, 2022)

- **This paper: liability rebalancing**
  - Idea: **shorten liability duration** to match asset duration

Main Results: Theoretical + Empirical

- Build a tractable model of insurance product markets
  - Key ingredient: life insurer risk aversion $\implies$ **duration matching motive**
  - Interest rate risk exposure $\uparrow$ $\implies$ product market distortions $\uparrow$

- Take the model to the data using statutory filings + monthly pricing data
  - Contrast **VA issuers (exposed)** with **non-VA issuers (non-exposed)**
  - Focus on the post-GFC period when duration mismatch is highest

- Document several novel findings consistent with our theory
  1. **Duration gaps** turned negative post-2010, especially for exposed insurers
  2. **Prices** increase more for long-term products and exposed insurers
  3. **Quantities (issuance)** shift to favor short-term products $\rightarrow$ *liability rebalancing*
  4. **Aggregate life insurance (issuance + in force)** shrinks relative to GDP

Literature

- **Insurers face interest rate risk, imperfectly hedge using assets and derivatives.**
  Berends et al., 2013 – Hartley et al., 2016 – Ozdagli & Wang, 2019 – Koijen & Yogo, 2021, 2022 – Huber, 2022 – Ellul et. al, 2022 – Sen, 2023 – Barbu & Sen, 2024 – Kirti & Singh, 2024 – Li, 2024
  This paper: Insurers also rebalance their liabilities to hedge their duration mismatch

- **Insurers' financial health affects their product characteristics.**
  Gron, 1994 – Froot, 2001 – Zanjani, 2002 – Koijen & Yogo, 2015 – Ge, 2022 – Ellul et al., 2022 – Knox & Sorensen, 2024 – Barbu, 2023 – Barbu et al., 2024 – Damast et al., 2025 – Ellis et al., 2025
  This paper: Insurers distort prices on the maturity margin when exposed to interest rate risk

- **(The decline in) life insurance participation is largely demand driven.**
  Koijen et al., 2016 – Hartley et al., 2017 – Rampini & Vishwanathan, 2022 – Briggs et al., 2023
  This paper: Insurers offer less accessible coverage due to interest rate risk, reducing participation

Theory

Broad Layout of the Model

- Set of insurers (j) that sell products ($i \in \{s, \ell\}$) over time ($t \in \mathbb{N}$)
  - Note: paper generalizes to any number of insurers and products

Broad Layout of the Model

- Set of insurers (j) that sell products ($i \in \{s, \ell\}$) over time ($t \in \mathbb{N}$)
  - Note: paper generalizes to any number of insurers and products

- **Insurer j's (Legacy) Balance Sheets:** $K_{jt} = A_{jt} - L_{jt}$
  - Asset returns: $R^A_{jt+1} = \overline{R}^A_{jt+1} - \boldsymbol{D^A_{jt}} \Delta R_{t+1}$
  - Liability returns: $R^L_{jt+1} = \overline{R}^L_{jt+1} - \boldsymbol{D^L_{jt}} \Delta R_{t+1}$

Broad Layout of the Model

- Set of insurers (j) that sell products ($i \in \{s, \ell\}$) over time ($t \in \mathbb{N}$)
  - Note: paper generalizes to any number of insurers and products

- **Insurer j's (Legacy) Balance Sheets:** $K_{jt} = A_{jt} - L_{jt}$
  - Asset returns: $R^A_{jt+1} = \overline{R}^A_{jt+1} - \boldsymbol{D^A_{jt}} \Delta R_{t+1}$
  - Liability returns: $R^L_{jt+1} = \overline{R}^L_{jt+1} - \boldsymbol{D^L_{jt}} \Delta R_{t+1}$

- Capital growth rate **without** new policy issuance

$$\widetilde{R}^K_{jt+1} = \frac{R^A_{jt+1} A_{jt} - R^L_{jt+1} L_{jt}}{K_{jt}} = \text{constant} - \underbrace{\left(\frac{\boldsymbol{D^A_{jt}} A_{jt} - \boldsymbol{D^L_{jt}} L_{jt}}{K_{jt}} \right)}_{\text{Duration Gap } D^K_{jt}} \Delta R_{t+1}$$

New Product Issuance

- Insurers to their capital by issuing new policies — premiums $P_{ijt}Q_{ijt}$, reserves $V_{it}Q_{ijt}$
  - Premium revenues invested at return R^A_{jt}
  - Reserves grow according to $R_{it+1} = \overline{R}_{it+1} - \boldsymbol{D_{it}} \Delta R_{t+1}$
  - Note: paper also adds extensive margin using commissions/agent-based distribution

New Product Issuance

- Insurers to their capital by issuing new policies — premiums $P_{ijt} Q_{ijt}$, reserves $V_{it} Q_{ijt}$
  - Premium revenues invested at return R^A_{jt}
  - Reserves grow according to $R_{it+1} = \overline{R}_{it+1} - \boldsymbol{D_{it}} \Delta R_{t+1}$
  - Note: paper also adds extensive margin using commissions/agent-based distribution

- Capital growth rate **with** new policy issuance

$$R^K_{jt+1} = \widetilde{R}^K_{jt+1} + \frac{\sum_i (R^A_{jt+1} P_{ijt} Q_{ijt} - R_{it+1} V_{it} Q_{ijt})}{K_{jt}}$$

New Product Issuance

- Insurers to their capital by issuing new policies — premiums $P_{ijt}Q_{ijt}$, reserves $V_{it}Q_{ijt}$
  - Premium revenues invested at return R^A_{jt}
  - Reserves grow according to $R_{it+1} = \overline{R}_{it+1} - \boldsymbol{D_{it}}\Delta R_{t+1}$
  - Note: paper also adds extensive margin using commissions/agent-based distribution

- Capital growth rate **with** new policy issuance

$$R^K_{jt+1} = \widetilde{R}^K_{jt+1} + \frac{\sum_i (R^A_{jt+1} P_{ijt} Q_{ijt} - R_{it+1} V_{it} Q_{ijt})}{K_{jt}}$$

- Contribution of a new policy to the insurer's **interest rate risk exposure**:

$$R^A_{jt+1} P_{ijt} Q_{ijt} - R_{it+1} V_{it} Q_{ijt} = \text{constant} - (\boldsymbol{D^A_{jt}} P_{ijt} - \boldsymbol{D_{it}} V_{it}) Q_{ijt} \Delta R_{t+1}$$

  - Issuing policy i adds **negative duration** to the insurer if $\boldsymbol{D_{it}} \gg \boldsymbol{D^A_{jt}}$

Insurers' Objectives: Profits + Risk Management

$$\max_{\{P_{ijt}\}} \quad \underbrace{\sum_i (P_{ijt} - V_{ijt}) Q_{ijt}(P_{ijt})}_{\text{new capital from issuance}} + \underbrace{\mathbf{E}_t \left[\boldsymbol{\Lambda}_j \left(\boldsymbol{R}^{K}_{jt+1} - \mathbf{E}_t \left[\boldsymbol{R}^{K}_{jt+1} \right] \right) \right]}_{\text{expected value of risk management}}$$

- Risk management function $\boldsymbol{\Lambda_j(\cdot)}$ is decreasing and concave

Insurers' Objectives: Profits + Risk Management

$$\max_{\{P_{ijt}\}} \underbrace{\sum_i (P_{ijt} - V_{ijt}) Q_{ijt}(P_{ijt})}_{\text{new capital from issuance}} + \underbrace{\mathbf{E}_t \left[\boldsymbol{\Lambda}_j \left(\boldsymbol{R}^K_{jt+1} - \mathbf{E}_t \left[\boldsymbol{R}^K_{jt+1} \right] \right) \right]}_{\text{expected value of risk management}}$$

- Risk management function $\boldsymbol{\Lambda_j(\cdot)}$ is decreasing and concave
- Example (mean-variance utility): if $\Lambda_j(x) \propto x^2$, risk management motive $\propto \mathrm{Var}_t(R^K_{jt+1})$
- The general form of $\Lambda_j(\cdot)$ can capture other risk management motives (e.g., VaR, RBC)

Risk Management Motives Affects Optimal Price Setting

- Optimal markup over reserve value can be (approximately) written

$$\log \frac{P_{ijt}}{V_{it}} \approx \underbrace{\log \mu_{it}}_{\substack{\text{product-specific}\\ \text{markup}}} + \underbrace{\overbrace{\bar{\lambda}'_{jt}}^{<0} \sigma^2_{t+1} \overbrace{D^K_{jt}}^{\leq 0} (D_{it} - D^A_{jt})}_{\substack{\text{risk management}\\ \text{markup/discount}}} \equiv \mathcal{M}_{ijt}$$

Intuition:

If $D^K_{jt} = 0$, no need for risk management

If $D^K_{jt} < 0$, mark up long duration policies, discount short duration policies

Liability Rebalancing: $D^K_{jt} \downarrow \implies Q_{sjt} \uparrow, Q_{\ell jt} \downarrow \implies \frac{Q_{sjt}}{Q_{sjt} + Q_{\ell jt}} \uparrow$

Insurance Supply Shifts more for Insurers with more Convexity

- **Convexity** of capital: $\gamma^K_{jt} = -\partial D^K_{jt+1}/\partial R_{t+1} < 0$
- Consider two otherwise identical insurers, j and j', where j' has more convex capital

$$|\boldsymbol{\gamma^K_{jt}}| \;<\; |\boldsymbol{\gamma^K_{j't}}|$$

Insurance Supply Shifts more for Insurers with more Convexity

- **Convexity** of capital: $\gamma_{jt}^{K} = -\partial D_{jt+1}^{K} / \partial R_{t+1} < 0$
- Consider two otherwise identical insurers, j and j', where j' has more convex capital

$$|\gamma_{jt}^{K}| \; < \; |\gamma_{j't}^{K}|$$

- Initially, $D_{jt}^{K} = D_{j't}^{K} \leq 0$. Following declines in R_{t+1},

$$R_{t+1} \downarrow \implies D_{jt+1}^{K} \downarrow, D_{j't+1}^{K} \downarrow\downarrow \implies \frac{Q_{sjt+1}}{Q_{sjt+1} + Q_{\ell jt+1}} \uparrow, \frac{Q_{sj't+1}}{Q_{sj't+1} + Q_{\ell j't+1}} \uparrow\uparrow$$

Role of Capital Convexity: Liability rebalancing is stronger for more convex insurers

Broad Changes in Net Duration Can Expand or Contract Product Markets

- With logit demand, (new customer) participation rate for product i is

$$\mathcal{P}_{\boldsymbol{it}} = \frac{\sum_j \alpha_{jt}\mu_{jt}^{1-\varepsilon_{it}} \boldsymbol{\mathcal{M}}_{\boldsymbol{ijt}}^{\boldsymbol{1-\varepsilon_{it}}}}{\alpha_{it}^0 + \sum_j \alpha_{jt}\mu_{jt}^{1-\varepsilon_{it}} \boldsymbol{\mathcal{M}}_{\boldsymbol{ijt}}^{\boldsymbol{1-\varepsilon_{it}}}}$$

Impact on Market-wide Participation:

If $\boldsymbol{D_{jt}^K} \downarrow$ (weakly) for all insurers, participation rate $\mathcal{P}_{\boldsymbol{st}}^{\boldsymbol{0}} \uparrow$ and $\mathcal{P}_{\boldsymbol{\ell t}}^{\boldsymbol{0}} \downarrow$

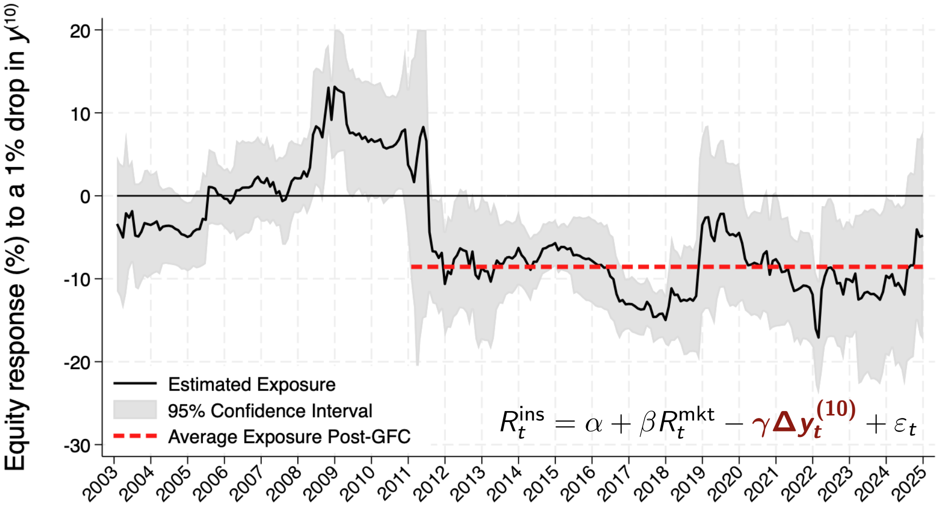
(*Total* participation depends on relative market sizes, distribution costs, etc.)

Empirical Analysis

Data Sources

- **Statutory Filings** — regulatory reports filed annually
  - Products: insurance/policies issued and in force, gross reserves, commissions
  - Balance Sheet: assets, liabilities, leverage
  - Asset/Liability duration: bond-level holdings + Huber (2022) liability duration estimates
- **Compulife** — agent software with life insurance quotes
  - 10, 15, 20, and 30-year term life prices
  - $\sim$ 39 insurers per month
- **CRSP** — market monthly stock returns for life insurers
- **Exposed Insurers:** top 10% of (relative) variable annuity liabilities pre-GFC
  - Relatively large (assets $95B vs. $8.3B) and levered (19.62 vs. 6.56)
  - Similar market shares across products (43% vs. 54%)

Life Insurers Had Negative Net Duration After the GFC



Duration Gaps were Exacerbated Only for Exposed Insurers

- **Duration Gap**

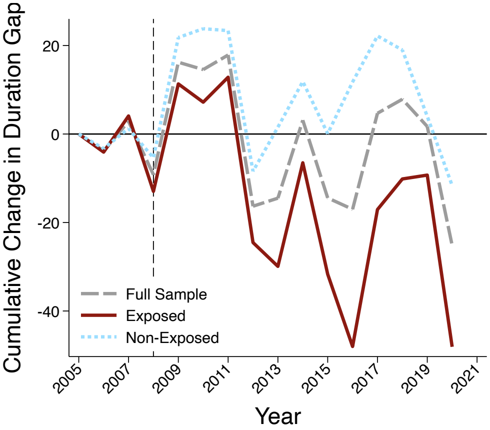
$$\text{Duration Gap} = D_{jt}^{A} + \text{LevRatio}_{jt}(D_{jt}^{A} - D_{jt}^{L})$$

  - D_{jt}^{A}: asset duration, approximated by corporate bond duration
  - D_{jt}^{L}: liability duration, taken from Huber (2022)
  - LevRatio_{jt}: Liabilities / *Surplus* Capital

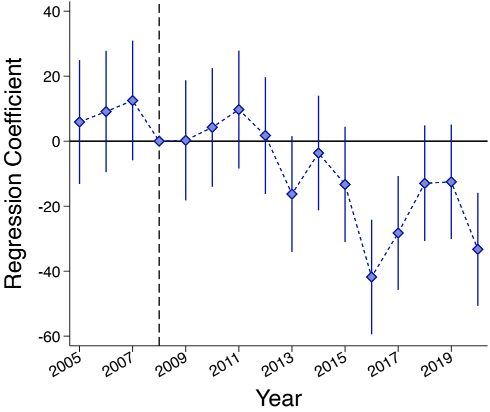
- **Regression Analysis**

$$D_{jt}^{K} = \sum_{\tau=2005}^{2020} \beta_{\tau} \mathbf{1}\{t = \tau\} \times \text{Exposed}_{j} + \delta_{j} + \delta_{t} + \varepsilon_{jt}$$

Duration Gaps were Exacerbated Only for Exposed Insurers



(a) Duration Gap Changes, Raw Data



(b) Gap Differences, Regression Output

▸ Decomposition of ΔDuration Gap

How Does Duration Mismatch Affect Product Pricing?

- Our theory admits the following approximation for the **long-short markup spread**

$$\mathbb{E}_{\text{Ex}}\left[\log \frac{P_{\ell jt}/V_{\ell t}}{P_{sjt}/V_{st}}\right] - \mathbb{E}_{\text{NonEx}}\left[\log \frac{P_{\ell jt}/V_{\ell t}}{P_{sjt}/V_{st}}\right]$$

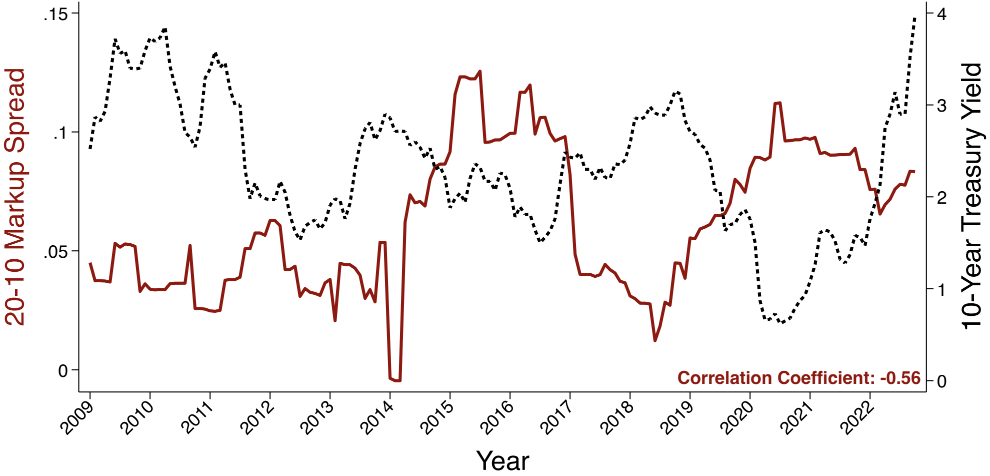
$$\approx \sigma_{t+1}^2 \times \underbrace{\left(\mathbb{E}_{\text{Ex}}\left[\bar{\lambda}'_{jt} D_{jt}^K\right] - \mathbb{E}_{\text{NonEx}}\left[\bar{\lambda}'_{jt} D_{jt}^K\right]\right)}_{\geq 0, \text{ increases when interest rates fall}} \times \underbrace{(D_{\ell t} - D_{st})}_{>0}$$

- **Idea:** Exposed insurer duration gaps $\uparrow$ relative to non-exposed when yields $\downarrow$

  $\rightarrow$ **Relative maturity spreads** should <u>widen</u> when yields $\downarrow$

  (**Note**: Double differencing nets out firm-specific components, e.g. RBC treatments)

Relative Maturity Spreads Negatively Correlate with Long Rates



▸ Adjust for Volatility

Empirical Specification

- **Three Margins of Comparison** $\rightarrow$

Data	**Treatment**	vs.	**Control**
Insurers	VA issuers	vs.	Non-VA issuers
Products	Long term	vs.	Short term
$y_t^{(10)}$	Low	vs.	High

- **Triple Interaction**

$$\log \text{Price}_{ijt} = \beta \times y_t^{(10)} \times \text{Exposed}_j \times \text{Long}_i + \delta_{jt} + \delta_{it} + \delta_{ij} + \varepsilon_{ijt}$$

- $\beta < 0$: exposed insurers mark up long products when rates are low
- δ_{jt} absorbs the impacts of insurer characteristics (e.g., size, leverage) on product supply
- δ_{it} absorbs the time-varying demand for a specific insurer i
- δ_{ij} absorbs heterogeneous insurer productivity across products

Long-Short Spreads Move more for Exposed Insurers

$$\log \text{Price}_{ijt} = \beta \times y_t^{(10)} \times \text{Exposed}_j \times \text{Long}_i + \delta_{jt} + \delta_{it} + \delta_{ij} + \varepsilon_{ijt}$$

(Long, Short) Category:	(15,10)	(20,15)	(20,10)
$y_t^{(10)} \times \text{Exposed}_j \times \text{Long}_i$	-0.006^{***}	-0.018^{***}	-0.023^{***}
	(0.002)	(0.002)	(0.003)
Insurer × Month FE	✓	✓	✓
Insurer × Product FE	✓	✓	✓
Month × Product FE	✓	✓	✓
Observations	8956	8956	8956
Within-R^2	0.001	0.023	0.020

▸ Control for Size

Long-Short Spreads Move more for Exposed Insurers

$$\log \text{Price}_{ijt} = \beta \times \text{MPU}_t \times \text{Exposed}_j \times \text{Long}_i + \delta_{jt} + \delta_{it} + \delta_{ij} + \varepsilon_{ijt}$$

(Long, Short) Category:	(15,10)	(20,15)	(20,10)	(15,10)	(20,15)	(20,10)
$y_t^{(10)} \times \text{Exposed}_j \times \text{Long}_i$	−0.006***	−0.018***	−0.023***			
	(0.002)	(0.002)	(0.003)			
$\text{MPU}_t \times \text{Exposed}_j \times \text{Long}_i$				0.007***	0.013***	0.020***
				(0.002)	(0.002)	(0.003)
Insurer × Month FE	✓	✓	✓	✓	✓	✓
Insurer × Product FE	✓	✓	✓	✓	✓	✓
Month × Product FE	✓	✓	✓	✓	✓	✓
Observations	8956	8956	8956	8956	8956	8956
Within-R^2	0.001	0.023	0.020	0.002	0.014	0.017

▸ Control for Size

How Do Pricing Distortions Affect Quantities?

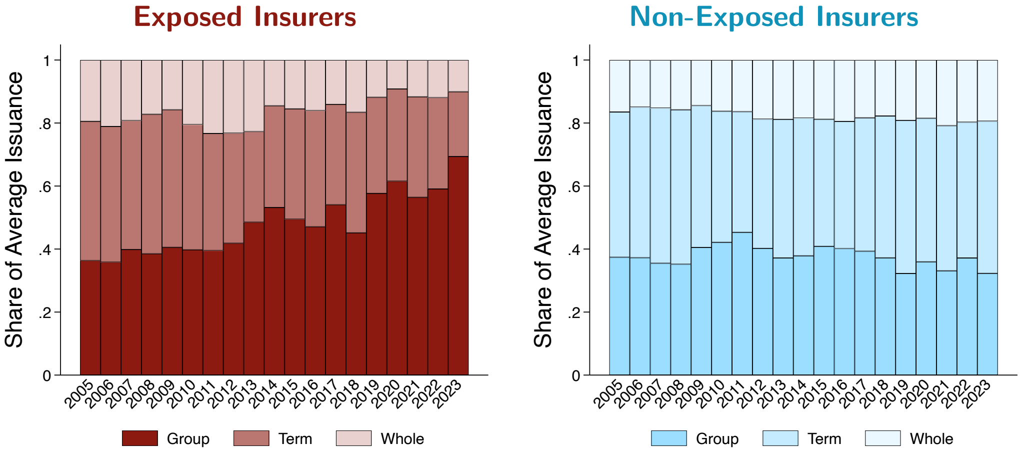
- **Ordinary Life:** long term (term or whole life), accessible through agents
  - Interest sensitive due to whole life guarantees, surrender/lapsation risk
- **Group Life:** yearly renewable, accessible through employers
  - No dynamic component $\rightarrow$ little to no duration

How Do Pricing Distortions Affect Quantities?

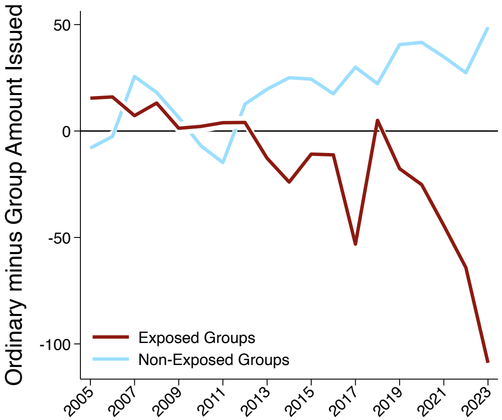
- **Ordinary Life:** long term (term or whole life), accessible through agents
  - Interest sensitive due to whole life guarantees, surrender/lapsation risk
- **Group Life:** yearly renewable, accessible through employers
  - No dynamic component $\rightarrow$ little to no duration

Theory: Exposed insurer duration gaps $\uparrow \implies Q_{jt}^{\text{group}} \uparrow$ and $Q_{jt}^{\text{ordinary}} \downarrow$

Exposed Insurers Transition to Short Term Group Policies



Exposed Insurers Transition to Short Term Group Policies

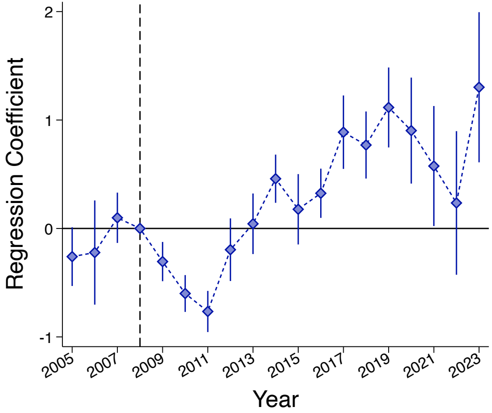


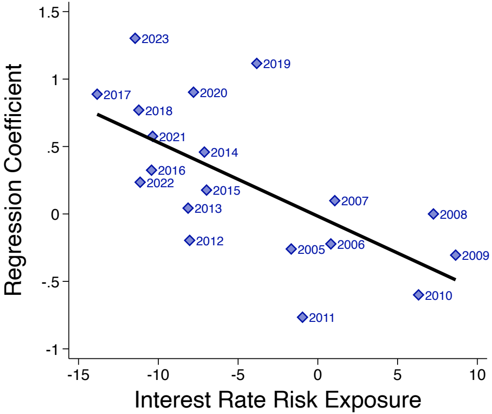
Ordinary Issuance – Group Issuance

‣ Excluding MetLife

Exposed Insurers Transition to Group Policies – Poisson Regression

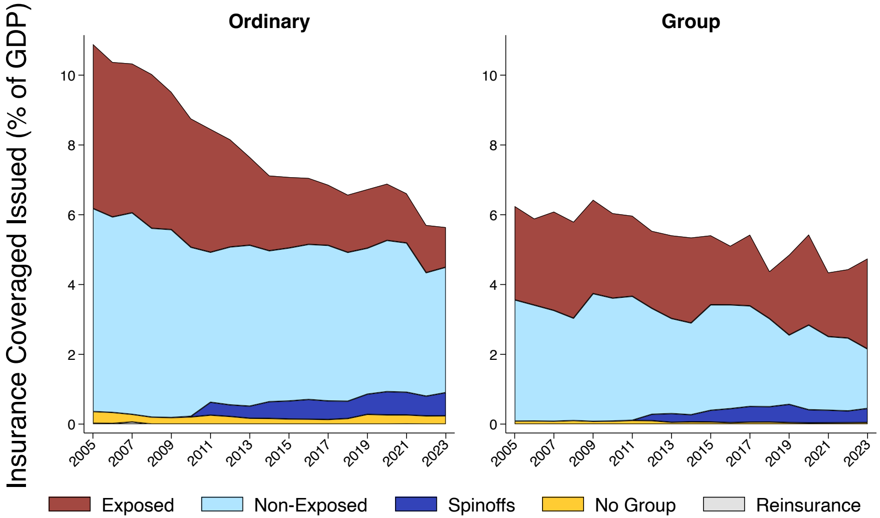
$$\log \mathbb{E}[\text{Issuance}_{ijt}] = \sum_{\tau=2005}^{2023} \beta_\tau \mathbf{1}\{\tau = t\} \times \text{Exposed}_j \times \text{Group}_i + \delta_{ij} + \delta_{jt} + \delta_{it} + \varepsilon_{ijt}$$





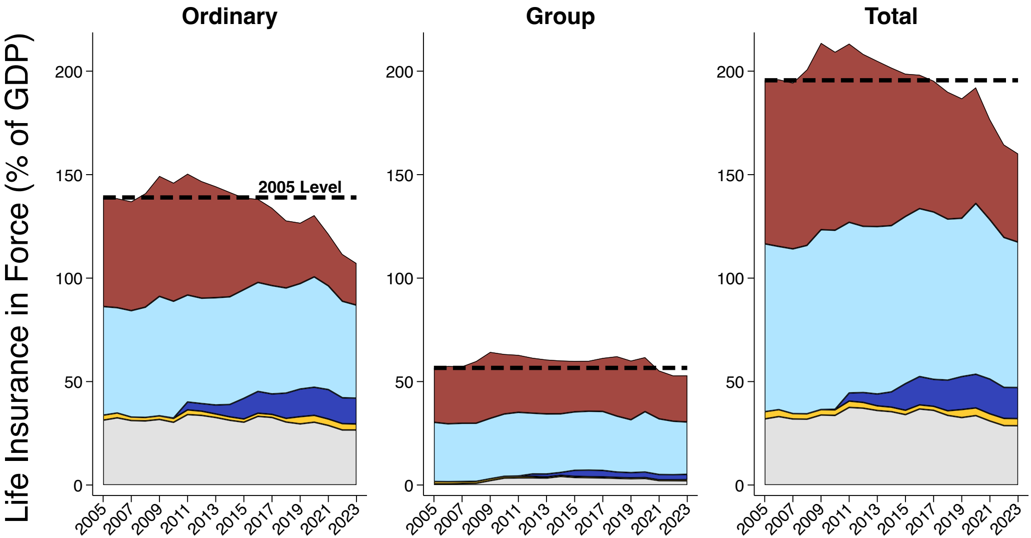
‣ Number of Policies ‣ Excluding MetLife ‣ Control for Size

Exposed Insurers were Responsible for the Aggregate Decline in Issuance



▸ Nominal ▸ Number of Policies ▸ Commissions

As a Result, The Life Insurance Market Has Shrunk



Conclusion

Interest Rate Risk Matters for Product Markets

- **Today** — Large swings in product issuance and distortions due to interest rate risk
  - Risk management by financial institutions has major impacts on product markets
  - Large consequences for products with different maturities!

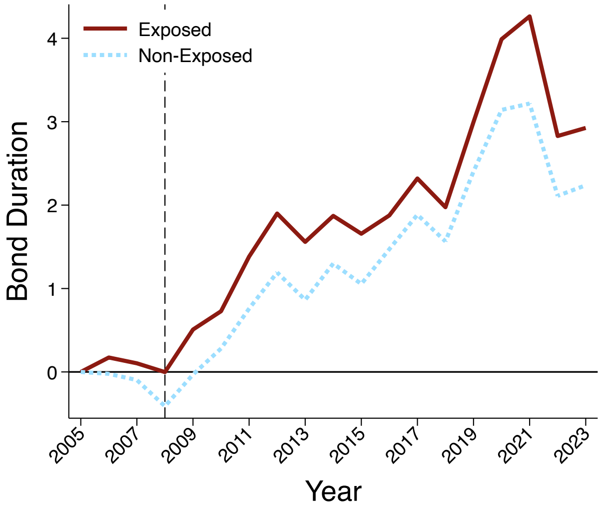
- **Future Work** — Structural Estimation + Counterfactuals
  1. Decompose the market trend into demand and supply forces
  2. Quantity the welfare implications for households
  3. How would the market look today if duration gaps never opened up?

Appendix

Summary Statistics for Statutory Filings Data

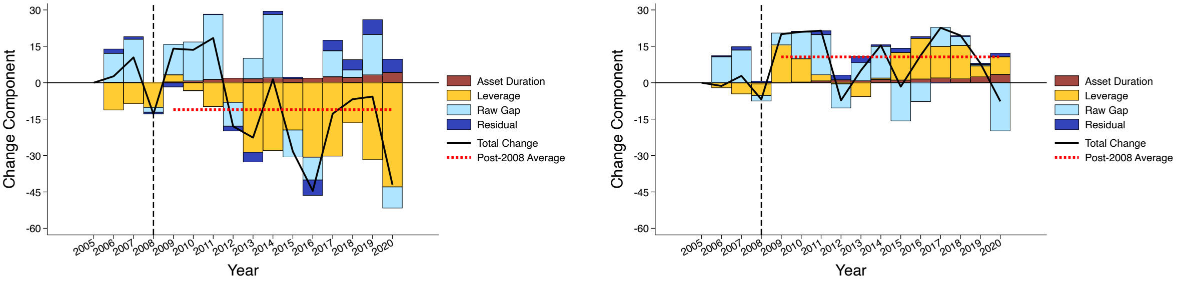
	Exposed Insurers		Non-Exposed Insurers	
	2005-2008	2009-2023	2005-2008	2009-2023
Number of Groups				
Full Sample	26	25	239	198
Compulife Sample	12	15	39	43
Assets	94.68	100.30	8.31	14.57
Surplus	5.09	5.39	0.67	1.25
Leverage Ratio	19.62	19.17	6.56	8.97
Leverage Ratio (Weighted)	20.13	21.15	17.94	16.26
VA Liability Share	0.57	0.50	0.01	0.01
IS Reserve Share	0.67	0.65	0.24	0.25
Issuance Market Share				
Ordinary	0.43	0.29	0.54	0.61
Group	0.45	0.42	0.54	0.51
In Force Market Share				
Ordinary	0.38	0.29	0.37	0.39
Group	0.48	0.44	0.49	0.47

Exposed Insurers Reach for Duration More After the GFC



Duration Gap Decomposition

$$\Delta D^K_{jt} = \Delta D^A_{jt} + \Delta\left[\text{Lev}_{jt} \times G_{jt}\right] = \underbrace{\Delta D^A_{jt}}_{\substack{\text{Asset}\\\text{Duration}}} + \underbrace{\Delta \text{Lev}_{jt} \times G_{jt}}_{\text{Leverage}} + \underbrace{\text{Lev}_{jt} \times \Delta G_{jt}}_{\substack{\text{Duration}\\\text{Mismatch}}} + \underbrace{\Delta \text{Lev}_{jt} \times \Delta G_{jt}}_{\text{Residual}}$$



(a) Exposed Insurers

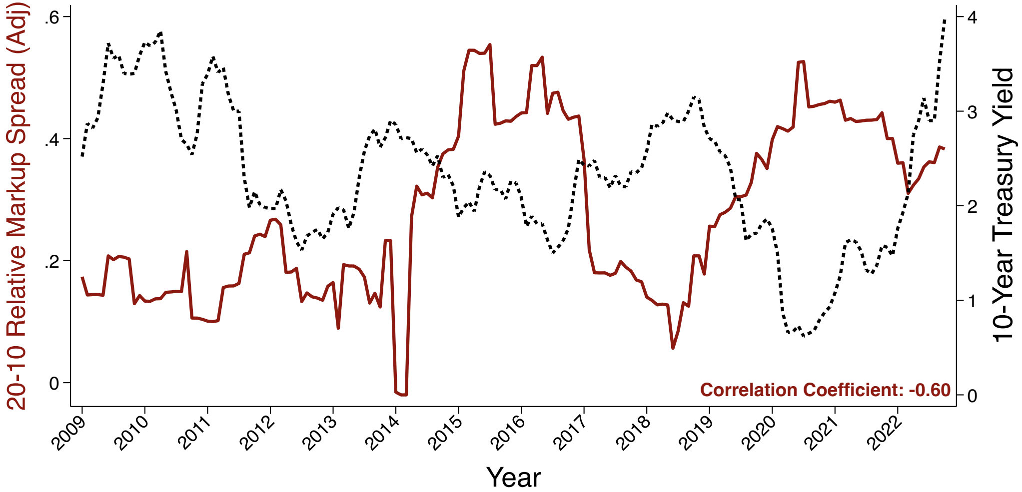
(b) Non-Exposed Insurers

Long-Short Spreads Move more for Exposed Insurers

(Long, Short) Category:	(15,10)	(20,15)	(20,10)	(15,10)	(20,15)	(20,10)
$y_t^{(10)} \times \text{Exposed}_j \times \text{Long}_i$	−0.004*	−0.015***	−0.019***			
	(0.002)	(0.002)	(0.003)			
$y_t^{(10)} \times \text{Assets}_{jt} \times \text{Long}_i$	−0.005***	−0.006***	−0.011***			
	(0.001)	(0.001)	(0.002)			
$\text{MPU}_t \times \text{Exposed}_j \times \text{Long}_i$				0.008***	0.012***	0.020***
				(0.002)	(0.002)	(0.003)
$\text{MPU}_t \times \text{Assets}_{jt} \times \text{Long}_i$				0.004***	−0.003***	0.001
				(0.001)	(0.001)	(0.001)
Insurer × Month FE	✓	✓	✓	✓	✓	✓
Insurer × Product FE	✓	✓	✓	✓	✓	✓
Month × Product FE	✓	✓	✓	✓	✓	✓
Observations	8956	8956	8956	8956	8956	8956
Within-R^2	0.009	0.044	0.052	0.011	0.023	0.017

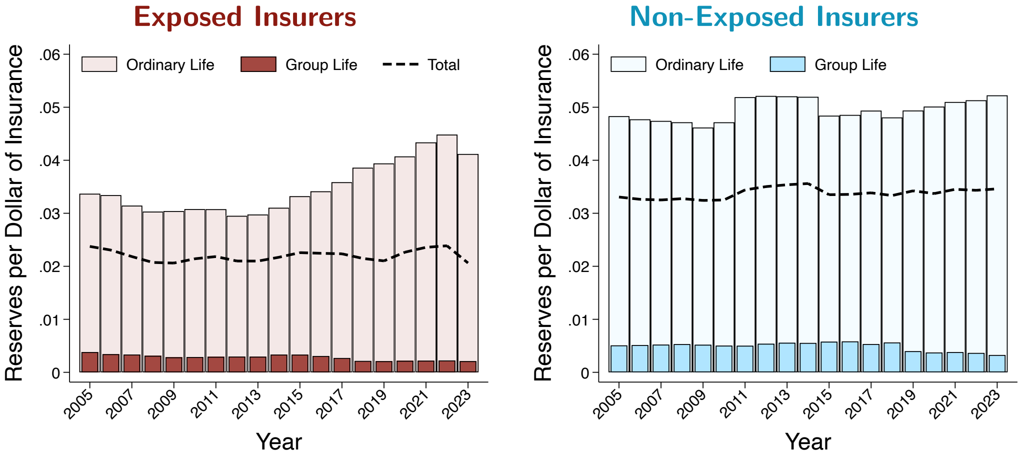
▸ Back

Relative Markups Negatively Correlate with Long Rates (Adjusted)

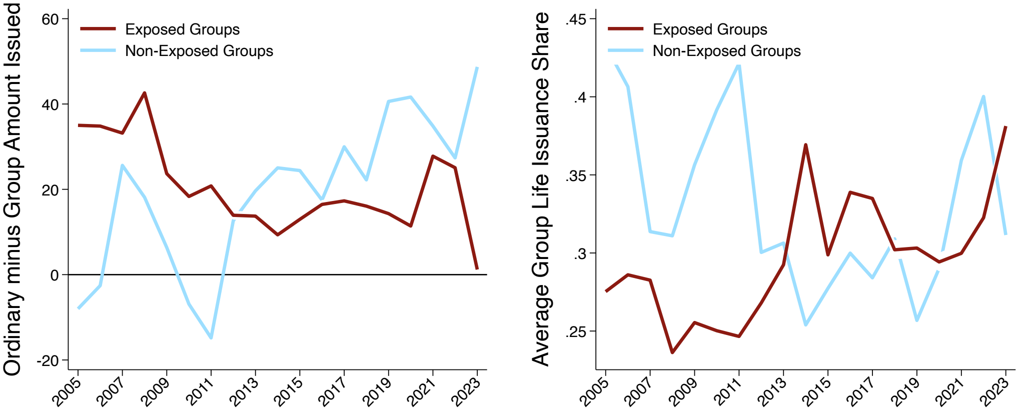


▸ Back

Ordinary life reserves are larger and more interest sensitive than Group



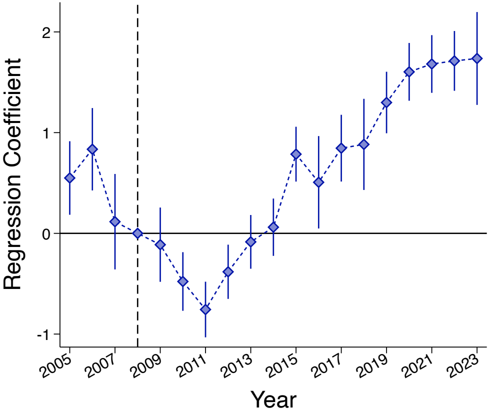
Results Without MetLife

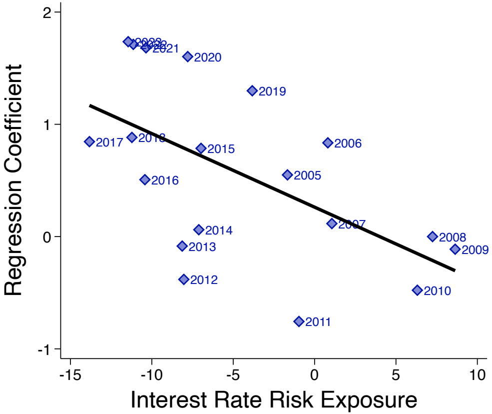


(a) Ordinary Life (b) Group Life

Poisson Regression: Number of Policies

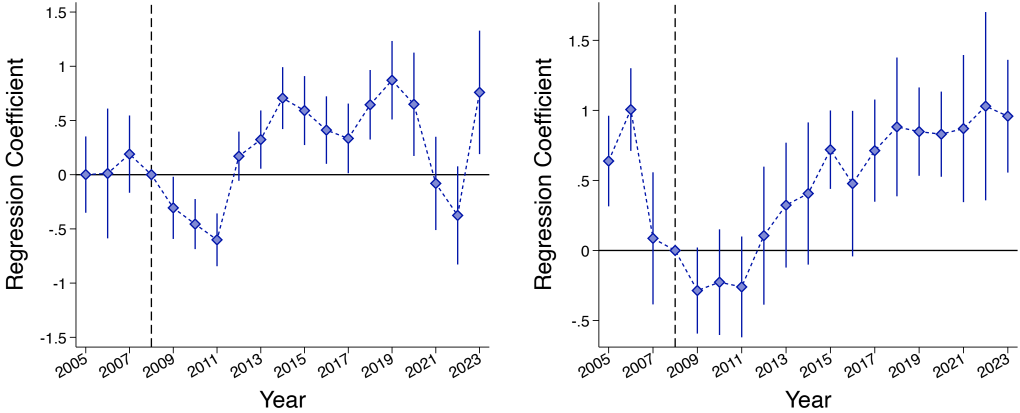
$$\log \mathbb{E}[\#\text{Policies}_{ijt}] = \sum_{\tau=2005}^{2023} \beta_\tau \mathbf{1}\{\tau = t\} \times \text{Exposed}_j \times \text{Group}_i + \delta_{ij} + \delta_{jt} + \delta_{it} + \varepsilon_{ijt}$$





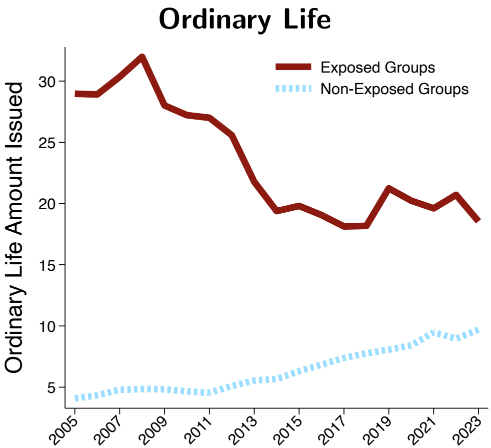
Poisson Regression: Excluding MetLife

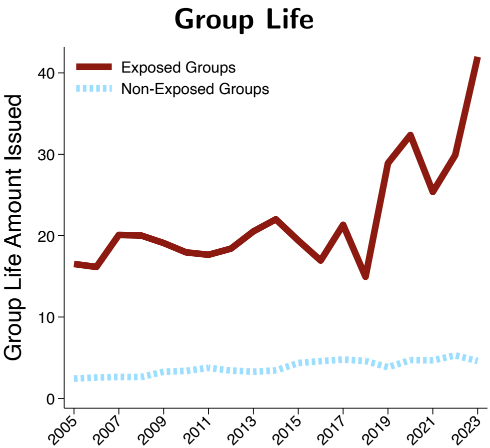
$$\log \mathbb{E}[\#\text{Policies}_{ijt}] = \sum_{\tau=2005}^{2023} \beta_\tau \mathbf{1}\{\tau = t\} \times \text{Exposed}_j \times \text{Group}_i + \delta_{ij} + \delta_{jt} + \delta_{it} + \varepsilon_{ijt}$$



‣ Back

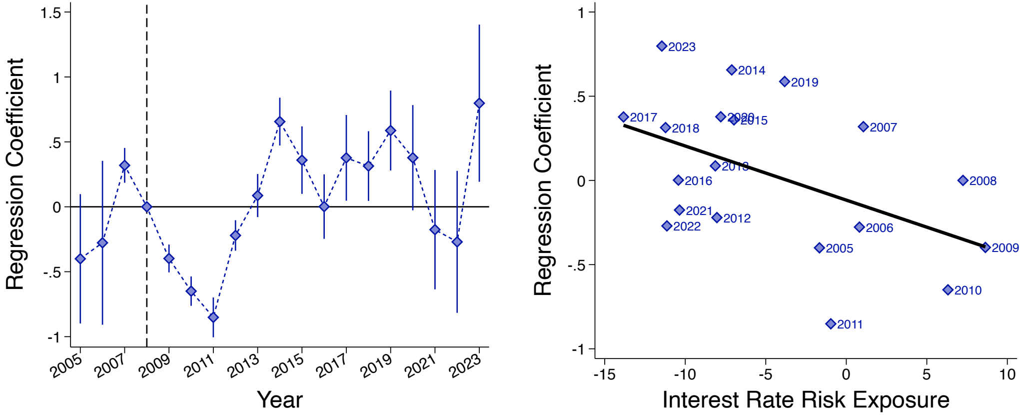
Average Ordinary Issuance Declined (Group Increased) For Exposed Groups





Exposed Insurers Transition to Group Policies – Poisson Regression

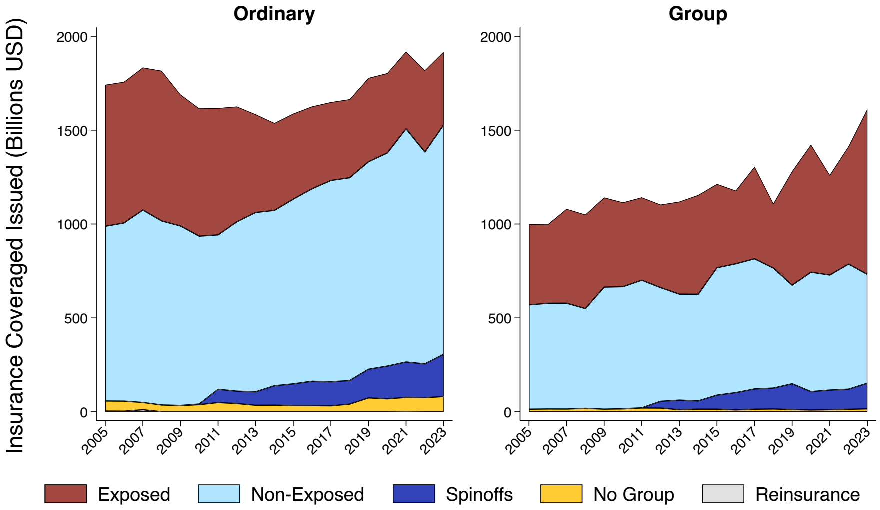
Control for $\mathbf{1}\{\tau = t\} \times \text{Assets}_{it} \times \text{Group}_i$



(a) Regression results over time

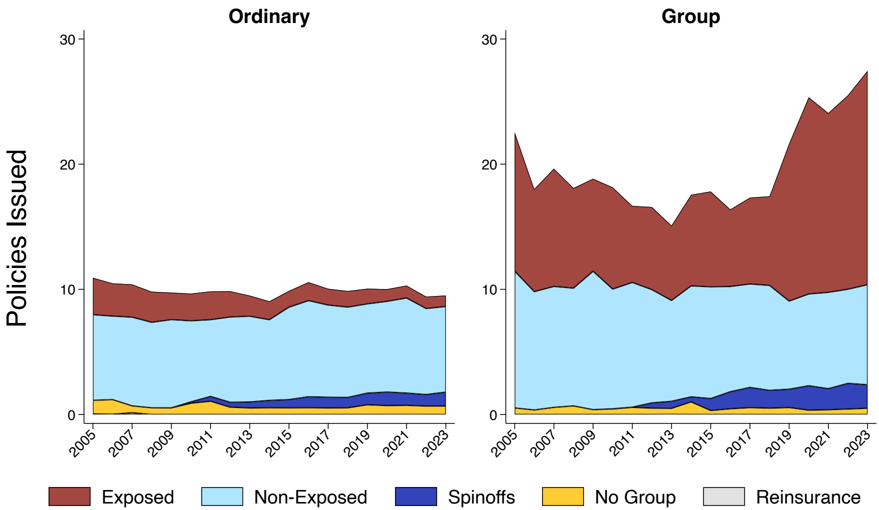
(b) Regression results vs Risk Exposures

Nominal Ordinary Issuance Steady While Group Life Increases



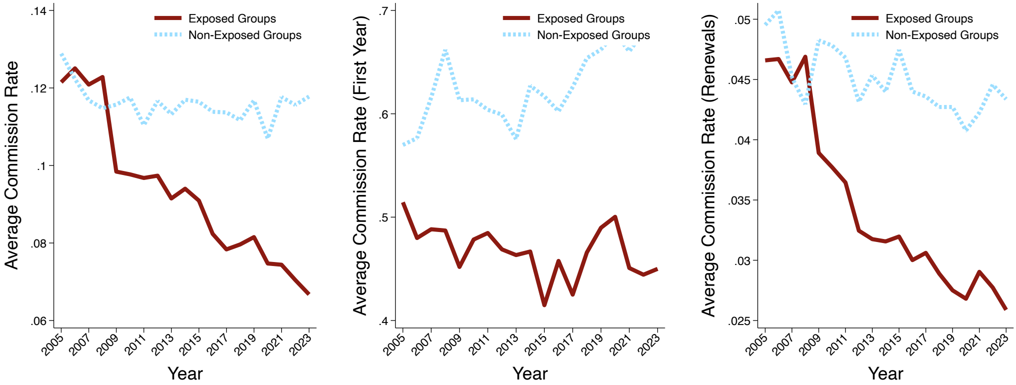
Back

Policy Issuance Followed the Same Trends as Amounts



Back

Commissions Followed the Same Trends as Issuance



(a) Total (b) New Policies (c) Renewals

▸ Back