Insurers and Real Estate Credit

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October 2026

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We study the supply side of commercial real estate (CRE) credit

- Second-largest collateralized credit market in the U.S.
  - $5tn of mortgage debt across office towers, warehouses, shops, multifamily apartments
  - Extraordinarily heterogeneous set of borrowers, contracts, risk characteristics

    $\Rightarrow$ Financing requires *more than one kind of lender*; literature studies banks in isolation
    [e.g., Glancy–Kurtzman (2024); Jiang et al. (2025); Hinzen et al. (2025)]

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  - Interest rates affect all lenders but in potentially different ways

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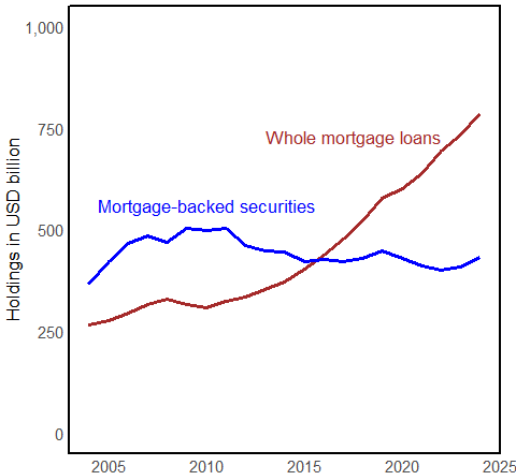
- We study CRE credit supply and its dynamics through the lens of *life insurers*

Life insurers' direct mortgages now dwarf securitized exposure



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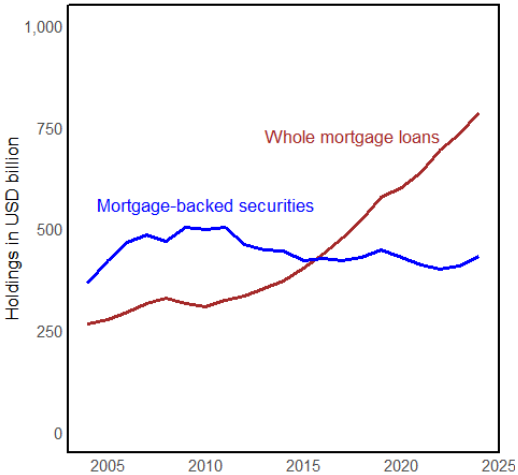

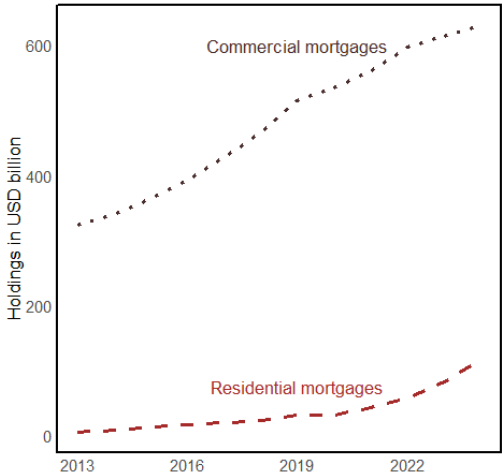

What mortgage contracts do insurers write, and what happens when interest rates move?

This paper: how life insurers complete and support the CRE market

1. **Insurers are large and dominate the long maturity segment**
   - Relative to banks: overall market share $>$20%; long-tenor share $>$60%; lower leverage

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   - And do so only at the short end ($\leq$10Y maturities)

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2. **Distinct reaction to monetary policy**
   - When interest rates rise, insurers lend more at lower spreads (opposite to banks)
   - And do so only at the short end ($\leq$10Y maturities)

3. **Two mechanisms, identified in the cross-section**
   - Balance sheet channel – *annuity inflows* and a *narrower duration gap*:
     $\Rightarrow$insurers with long-duration liabilities and shorter duration assets expand the most
   - Market channel – *bank retrenchment*:
     $\Rightarrow$insurers' expansion concentrated in regions where banks pull back the most

Literature

Understanding the Commercial Mortgage Market

#1. Mortgage loans are a core asset for life insurers

- **Data**: NAIC Schedule B: U.S. life insurers' mortgage holdings at loan-level (2014–2024)
  - $\sim$75,000 originations, 372 entities; loan terms, collateral value, property type, ZIP code
  - Year-end snapshots $\Rightarrow$ new originations, dated by original investment date

#1. Mortgage loans are a core asset for life insurers

- **Data**: NAIC Schedule B: U.S. life insurers' mortgage holdings at loan-level (2014–2024)

Loan-level (Commercial)	Mean	SD	p25	p50	p75	N
Amount ($ thousand)	10,470.18	19,305.83	939.47	3,372.78	10,400.00	75,464
Spread (vs treasury)	2.16	1.61	1.49	1.94	2.49	74,812
Loan-to-value (LTV) ratio	0.54	0.18	0.46	0.58	0.67	75,304
Maturity (years)	12.78	8.13	6.00	10.00	20.00	75,464
Property value ($ thousand)	23,937.36	46,741.27	1,805.59	7,390.00	23,000.00	75,464

E.g., Empire State Building (MetLife); Mall of America (TIAA); John Hancock Tower...

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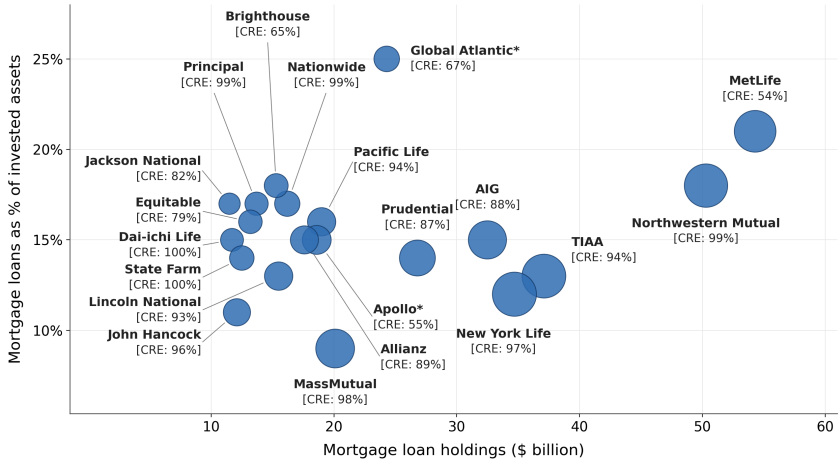
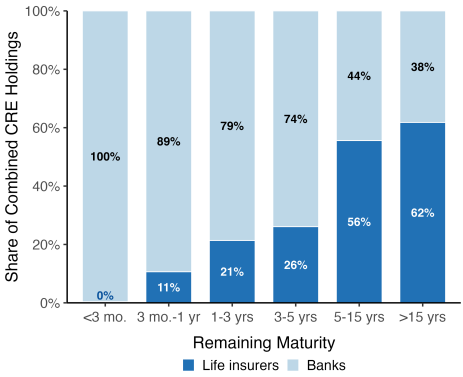
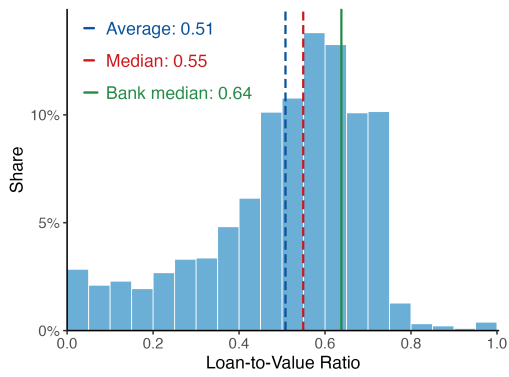


Full stats | Geography | How loans arrive

#2. Insurers dominate the long end of maturity distribution





Nearly **two-thirds** of the >15Y segment[1] | median LTV **0.55** vs **0.64** for banks

New loan maturities | Insurer holdings by maturities

[1] See also Glancy et al. (2022), Brown et al. (2024).

#3. Why hold whole loans? Illiquidity + credit premia

- Compare yields earned by *same insurer* $\times$ *same acquisition year* $\times$ *same maturity bucket*

	Interest rate (%)	
	Loans and agency CMBS	Loans and non-agency CMBS
	(1)	(2)
Commercial mortgage loan	1.077***	0.493***
	(0.089)	(0.062)
Insurer $\times$ Year $\times$ Maturity bucket FE	Y	Y
Observations	79,348	120,806
Adj. R^2	0.78	0.72

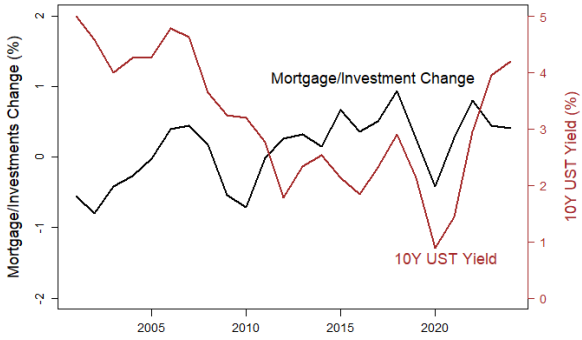
$\sim$**100 bps** over agency CMBS $\Rightarrow$ credit risk + illiquidity

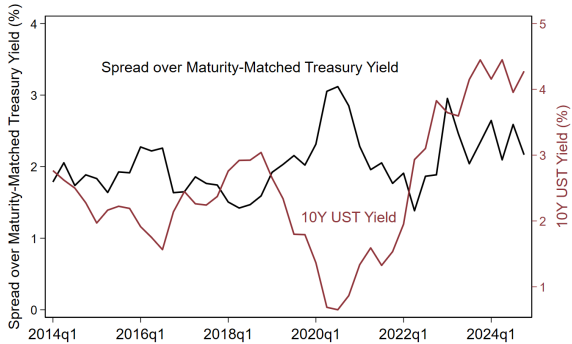
$\sim$**50 bps** over non-agency CMBS $\Rightarrow$ illiquidity + monitoring

Full table

Interest Rates and Lending

Mortgage originations (+) and spreads (-) correlate with interest rates





Quantity ↑ and price ↓ point to a supply shift rather than demand alone

Changes vs. changes

Insurer-level analysis: originations rise, spreads fall at higher rates

$$y_{i,t} = \beta \underbrace{MPS_{t-1}}_{\text{10Y FOMC surprise}} + \gamma' \underbrace{X_{i,t}}_{\text{e.g., lags, RBC, LTV}} + \underbrace{\theta_i}_{\text{Insurer FE}} + \varepsilon_{i,t}$$

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	Originations (log $)			Spreads (%)		
Commercial loans	(1)	(2)	(3)	(4)	(5)	(6)
MPS (lagged)	0.739**	0.692**	0.670**	-0.788***	-0.887***	-0.821***
	(0.318)	(0.312)	(0.296)	(0.250)	(0.248)	(0.234)
N	5,322	5,105	4,791	5,304	5,089	4,775
Loan controls	N	Y	Y	N	Y	Y
Insurer controls	N	N	Y	N	N	Y
Insurer FE	N	N	Y	N	N	Y

1 s.d. (5 bps) ↑ MPS ⇒ originations +3.4%, spreads −4 bps (≈3% of mean)

Full table | By property type | Price staleness | Alternative shocks | Alternative outcomes & no LTV | By insurer features | Spreads robustness

Banks do the opposite: lend less and at higher rates

- Call Reports, ∼5,700 banks, 2014–2023; same shock

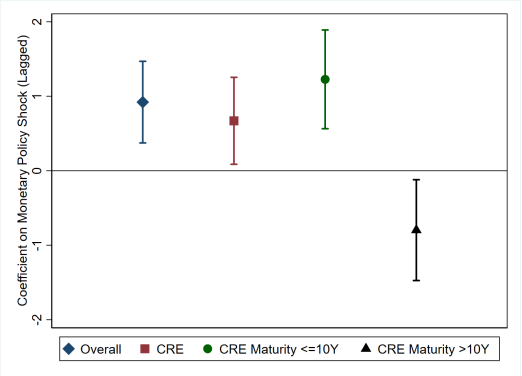
	Δ CRE loans		Δ CRE loan rate	
	(1)	(2)	(3)	(4)
MPS (lagged)	-0.190***	-0.206***	0.122***	0.055**
	(0.006)	(0.006)	(0.027)	(0.028)
N	186,515	180,731	185,468	179,714
Bank controls	N	Y	N	Y
Bank FE	N	Y	N	Y

At the same 1 s.d. shock ⇒ bank CRE growth -1%, bank CRE rate $+0.3$ bps

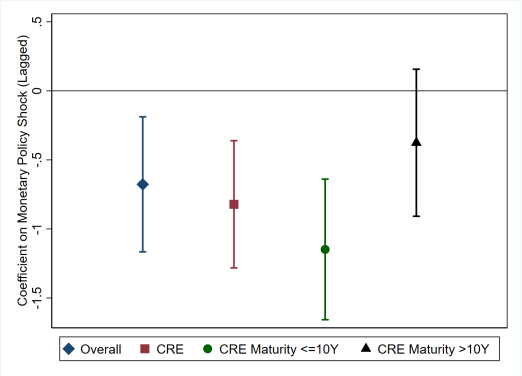
⇒ opposite sign on *both* quantity and price

Design

Higher originations and lower spreads at shorter maturities ($\leq$10Y)



Quantity

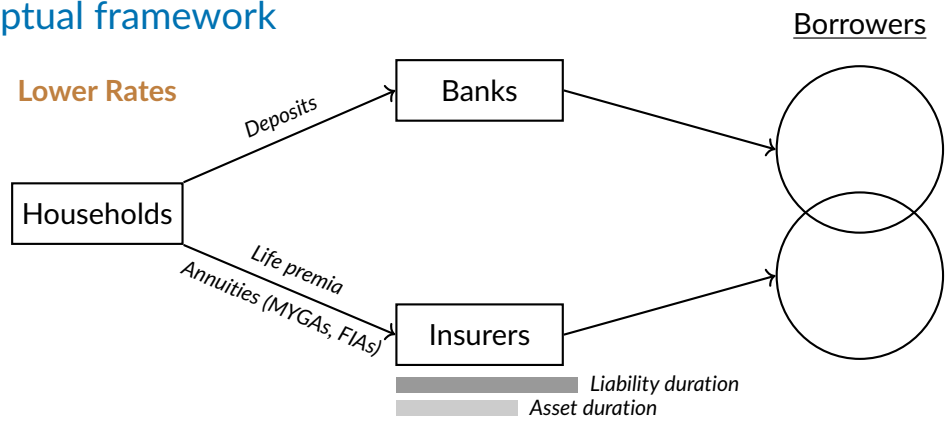


Spreads

Table | Loan duration histogram

Mechanisms

Conceptual framework



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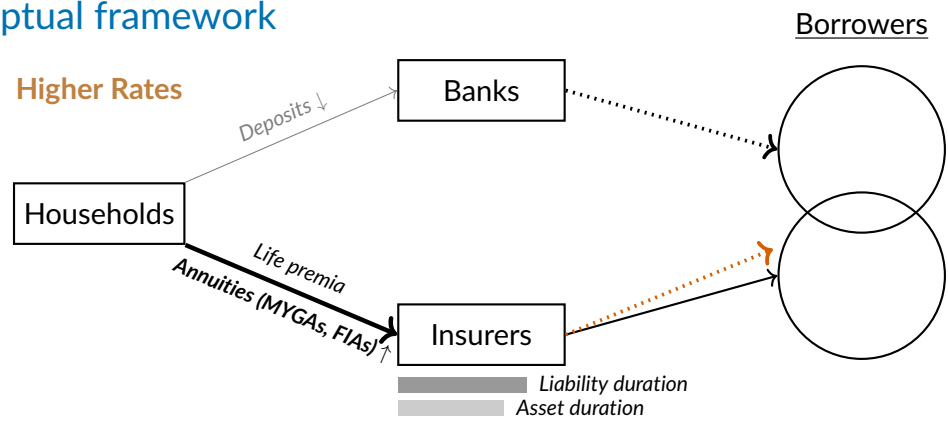

Channel	Originations	Spreads
Balance sheet		
↪ Annuity flows	↑	↓
↪ Duration gap	↑	↓
Market: bank retrenchment	↑	↑

Demand-supply equilibrium | Convexity

What makes insurers different? The balance sheet channel

Identification strategy:

- Do insurers with more rate-sensitive balance sheets lend more and at lower spreads?
- Compare lending responses across insurers within the same ZIP code and year
- Assumption: within ZIP code-year, borrower demand is orthogonal to insurer balance sheets

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Measurement: Duration gaps are neither observed nor randomly assigned. We estimate –

1. *Liability duration: Long* $= 1$ if legacy variable annuities (VA) with guarantees or above-median duration on traditional non-VA products (Huber 2022). Validation:
   - Stock betas significantly more sensitive to yield changes (Gap) Full table
   - Higher propensity to offer fixed-guarantee annuities, and higher rate sensitivity (Flows) Flows: aggregate Flows: insurer
2. *Asset duration:* using corp. bonds, Treasuries, MBS (ex. mortgages to avoid mechanical relation)

Measurement details | Why liabilities differ | Why asset durations differ | Hedging using swaps | Comparison with literature

Rate-sensitive insurers originate more CRE loans after tightening

$$\log(Orig_{i,z,t}) = \beta_1 MPS_{t-1} \times \underbrace{Long_i}_{\text{Liabilities duration}} + \beta_3 MPS_{t-1} \times Long_i \times \underbrace{D^A_{i,t-1}}_{\text{Asset duration}} + \underbrace{\alpha_{i,z}}_{\text{Insurer-ZIP}} + \underbrace{\tau_{z,t}}_{\text{ZIP-Year}} + \varepsilon_{i,z,t}$$

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Dep. var: **Originations (log $)**	(1)	(2)	(3)	(4)
MPS (lagged) × Long-dur. liab.	5.002**	7.226***	6.605**	5.927***
	(2.292)	(2.694)	(2.622)	(2.238)
MPS (lagged) × Long-dur. liab. × Asset dur.	-0.438*	-0.608**	-0.527*	-0.504*
	(0.226)	(0.285)	(0.282)	(0.267)
Δ Slope × Long-dur. liab.		1.133***	1.117***	1.370***
		(0.419)	(0.422)	(0.392)
Δ Slope × Long-dur. liab. × Asset dur.		-0.096**	-0.093**	-0.123***
		(0.044)	(0.044)	(0.042)
N	9,291	9,291	8,109	7,890
Loan controls	N	N	Y	Y
Insurer controls	N	N	N	Y
Insurer×ZIP Code FE; ZIP Code×Time FE	Y	Y	Y	Y

Long-dur.-liability insurers originate 15% more (at median asset dur.) than others in *same ZIP, same year*

Larger loans at tighter spreads, concentrated in short maturities

	Maturity $\leq$ 10Y	
	Loan size (log $)	Spreads (%)
MPS (lagged) $\times$ Long-dur. liab.	12.994***	-11.010***
	(4.569)	(3.883)
MPS (lagged) $\times$ Long-dur. liab. $\times$ Asset dur.	-1.214***	1.064***
	(0.454)	(0.375)
N	8,325	8,192
Loan controls	Y	Y
Slope controls	Y	Y
Insurer$\times$ZIP Code FE	Y	Y
ZIP Code$\times$Property Type$\times$Time FE	Y	Y

Spread $\downarrow$ 11 bps (4% of avg.) for a long-duration liability insurer at median asset duration

Overall table | Δ UST 10Y | Cum. MPS 10Y

Larger loans at tighter spreads, concentrated in short maturities

	Maturity $\leq$ 10Y		Maturity $>$ 10Y	
	Loan size (log $)	Spreads (%)	Loan size (log $)	Spreads (%)
MPS (lagged) $\times$ Long-dur. liab.	12.994***	-11.010***	0.879	-1.098
	(4.569)	(3.883)	(7.273)	(0.872)
MPS (lagged) $\times$ Long-dur. liab. $\times$ Asset dur.	-1.214***	1.064***	0.175	0.126
	(0.454)	(0.375)	(0.752)	(0.099)
N	8,325	8,192	7,131	6,995
Loan controls	Y	Y	Y	Y
Slope controls	Y	Y	Y	Y
Insurer$\times$ZIP Code FE	Y	Y	Y	Y
ZIP Code$\times$Property Type$\times$Time FE	Y	Y	Y	Y

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What makes mortgages unique? The market channel

Identification strategy:

- Do insurers meet residual demand specifically where banks retrench (à la Cournot)?
- Exploit geographic variation in *bank credit supply* that is orthogonal to local demand conditions
- Compare within-insurer lending response across ZIP codes in the same year

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Measurement:

- County exposure to banks with high *deposit outflow sensitivity* (Drechsler, Savov, Schnabl 2017)
- High-exposure banks lose deposits when rates rise; impact some counties disproportionately
  $\Rightarrow$ Funding-side shock to bank lending, not a local demand shock
- MPS $\times$ Deposit beta exposure; controls for lagged bank originations and mortgage applications

Validation Summary stats

Insurers expand originations where banks retrench

	Originations (log $)			
	(1)	(2)	(3)	(4)
MPS (lagged) × Deposit beta exposure	3.917*	4.775**	4.772***	4.781**
	(2.164)	(1.840)	(1.773)	(2.001)
MPS (lagged) × Bank originations (log)	-0.218***	-0.219***	-0.398***	-0.360***
	(0.060)	(0.060)	(0.147)	(0.132)
MPS (lagged) × Total application amount (log)			0.214	0.269**
			(0.140)	(0.115)
N	16,194	16,194	16,194	14,550
Slope controls	N	Y	Y	Y
Loan controls	N	N	N	Y
Insurer×Time FE; Insurer×ZIP Code FE	Y	Y	Y	Y

- A 1-s.d. contractionary surprise ↑ originations ∼8 pp more in p90 vs. p10 exposure counties
- *Both channels* (balance sheet and market) in the same specification also load positively Table

Spreads indicate that balance sheet channel dominates loan pricing

- Triple interaction: MPS $\times$ deposit beta exposure $\times$ long-duration liabilities indicator

Spreads indicate that balance sheet channel dominates loan pricing

- Triple interaction: MPS × deposit beta exposure × long-duration liabilities indicator

	Spreads (%)			
	(1)	(2)	(3)	(4)
MPS (lagged) × Deposit beta exposure	0.743	1.443	1.432	1.444
	(1.560)	(1.773)	(1.770)	(1.714)
MPS (lagged) × Deposit beta exposure × Long-dur. liab.	-4.149*	-4.264*	-4.265*	-3.981*
	(2.325)	(2.308)	(2.300)	(2.293)
MPS (lagged) × Bank originations (log)	0.052	0.051	0.073	0.074
	(0.060)	(0.060)	(0.101)	(0.103)
MPS (lagged) × Total application amount (log)			-0.024	-0.024
			(0.080)	(0.081)
N	14,412	14,412	14,412	14,412
Slope controls	N	Y	Y	Y
Loan controls	Y	Y	Y	Y
Loan×MPS (lagged) controls	N	N	N	Y
Insurer×Time FE; Insurer×ZIP Code FE	Y	Y	Y	Y

Main takeaways

- We analyze life insurers' lending in mortgage markets and show that
  - Insurers complete this market and expand lending when interest rates rise
  - Bank-centered analyses may misstate credit contraction at higher rates
  - Monetary policy reallocates credit across intermediaries, maturities, borrowers
- More broadly, the transmission of macroeconomic shocks to the real economy depends on
  - Who intermediates household savings
  - How intermediaries manage financial risks
  - How competitive the market structure is

Appendix

Related literature

- **CRE credit and its intermediation:** Peek–Rosengren (2000); Ghent–Valkanov (2016); Black et al. (2020); Glancy et al. (2022); Crosignani–Prazad (2024); Glancy–Kurtzman (2024); Brown et al. (2024); Anenberg et al. (2025); Jiang et al. (2025); Hinzen et al. (2025)
  This paper: beyond banks and static segmentation: segmentation is *state dependent*

- **Insurers in private and directly originated credit:** Kirti–Sarin (2024); Meisenzahl et al. (2025); Sen et al. (2025); Huber et al. (2026); Gschossmann et al. (2026)
  This paper: direct mortgage lending; supply varies with rates and with banks' lending capacity

- **Monetary policy transmission through banks and non-banks:** Kashyap–Stein (2000); Jiménez et al. (2012); Drechsler et al. (2017); Buchak et al. (2018); Chen et al. (2018); Elliott et al. (2019, 2024); Xiao (2020); Agarwal et al. (2023); Cucic–Gorea (2025); Sarto–Wang (2026)
  This paper: a distinct *insurer* channel: loans held on balance sheet, funded by insurance liabilities

- **Insurer balance sheets and asset demand:** Koijen–Yogo (2015, 2022); Domanski et al. (2017); Ozdagli–Wang (2019); Chodorow-Reich et al. (2021); Sen (2023); Khetan et al. (2023); Kaufmann et al. (2024); Coppola (2025); Bhardwaj et al. (2025); Kirti–Singh (2025); Li (2025); Li–Wenning (2026)
  This paper: first to show direct mortgage lending as a rate-sensitive margin

Back

Summary statistics

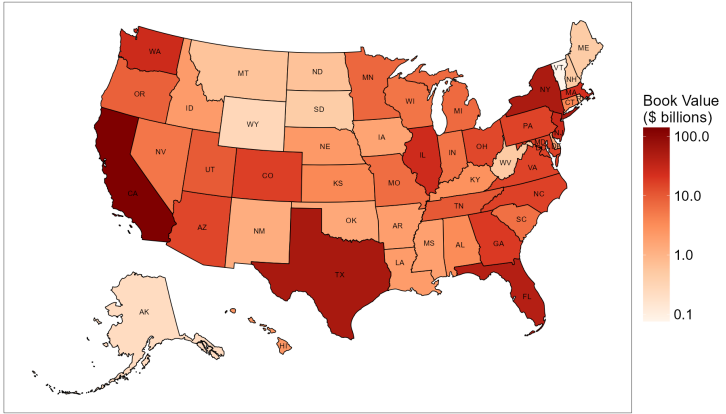
Panel B: Loan-level (Residential)	Mean	SD	p25	p50	p75	N
Amount ($ thousand)	291.94	306.95	103.22	197.27	359.47	472,815
Interest rate (%)	5.70	2.35	4.00	5.88	7.51	472,779
Spread (vs treasury)	2.53	2.20	1.62	2.83	3.74	420,312
Loan-to-value (LTV) ratio	0.68	0.29	0.57	0.72	0.79	472,698
Maturity (years)	26.07	8.92	25.00	30.00	30.00	472,815
Property value ($ thousand)	468.93	527.05	163.21	306.00	560.00	472,815
Appraisal time (days)	630.26	1,237.58	46.00	92.00	260.00	461,197

Panel C: Insurer-quarter-level	Mean	SD	p25	p50	p75	N
Total assets ($ million)	36,592.30	69,813.36	1,226.42	7,459.26	30,381.63	7,846
Total liabilities ($ million)	34,418.67	66,153.31	1,107.25	6,659.57	28,518.02	7,846
Surplus ratio	0.11	0.11	0.05	0.07	0.13	7,846
Mortgage originations (all) ($ million)	126.16	333.95	4.59	19.39	91.39	7,907
– Commercial (CRE)	105.75	248.63	3.66	17.47	83.20	7,907
– Residential (RRE)	20.41	147.90	0.00	0.00	0.00	7,907
CRE as a fraction of total originations	0.89	0.29	1.00	1.00	1.00	7,907
RBC ratio	10.07	12.14	7.20	8.67	11.03	7,457

Panel D: Interest rates (quarterly)	Mean	SD	p25	p50	p75	N
US Treasury Yield (10Y)	2.49	1.00	1.79	2.31	2.99	44
Δ US Treasury Yield (10Y)	0.03	0.35	-0.20	0.00	0.27	44
Monetary Policy Shock (10Y)	0.00	0.05	-0.02	0.00	0.03	44
Monetary Policy Shock (30Y)	0.00	0.04	-0.02	0.00	0.02	44

Back

Geographic distribution of insurers' CRE mortgage holdings (2022)



Book value by property state, $ billion, log color scale. Spread across the U.S. roughly in proportion to the stock of commercial property.

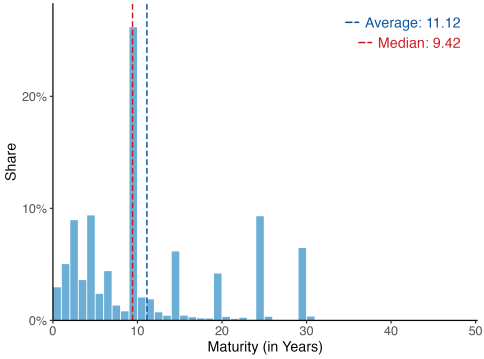
Back

How loans reach insurers' balance sheets

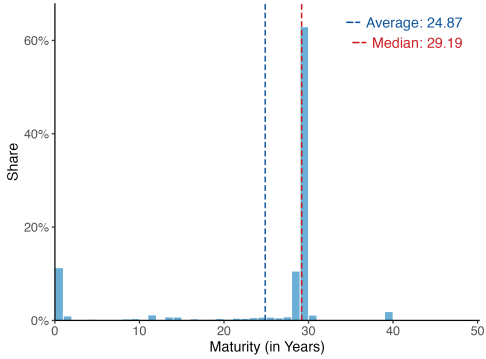
- Data do not record how loans arrive; conversations with insurer portfolio managers
- **Commercial:** insurers are *primary-market* lenders
  - Deals arrive through brokers and mortgage banking firms
  - The insurer underwrites, prices, and funds each loan
  - Servicing in-house or through contracted servicers
    $\Rightarrow$ CRE portfolios reflect insurers' *own* lending standards
- **Residential:** almost exclusively *secondary-market* purchases
  - Bought mainly from the lenders that originated them
  - Over 90% estimated to be conforming (GSE-eligible)

Back

Distribution of insurers' loan maturities (2022)



(c) CRE new loans



(d) RRE new loans

- CRE originations span all maturities; residential mortgages cluster at 30 years
  $\Rightarrow$ maturity segmentation between lenders is specific to CRE

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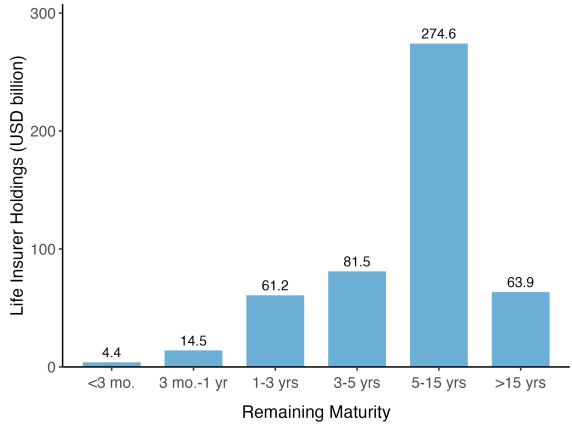
Insurers' CRE holdings by remaining maturity (2019)



Outstanding CRE mortgage holdings in each remaining-maturity group, $ billion. NAIC Schedule B.

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Whole loans vs. CMBS: credit risk and illiquidity premia

	Interest rate (%)			
	Pairwise samples		Pooled sample	
	Loans and agency CMBS	Loans and non-agency CMBS	Loans and all CMBS	
	(1)	(2)	(3)	(4)
Commercial mortgage loan	1.077*** (0.089)	0.493*** (0.062)	1.000*** (0.075)	0.997*** (0.076)
Non-agency CMBS			0.488*** (0.072)	0.490*** (0.073)
Remaining maturity (years)				-0.030*** (0.004)
Omitted category			Agency CMBS	Agency CMBS
Insurer × Year × Maturity bucket FE	Y	Y	Y	Y
Observations	79,348	120,806	126,725	126,725
Adj. R^2	0.78	0.72	0.72	0.72

$y_{p,c} = \beta' G_p + \gamma M_p + \alpha_c + \varepsilon_{p,c}$; cell c = insurer × acquisition year × remaining-maturity bucket. New commercial mortgages and newly acquired CMBS, 2014–2024. Agency status from Ginnie Mae, Fannie Mae, Freddie Mac CUSIP prefixes. S.e. clustered by insurer.

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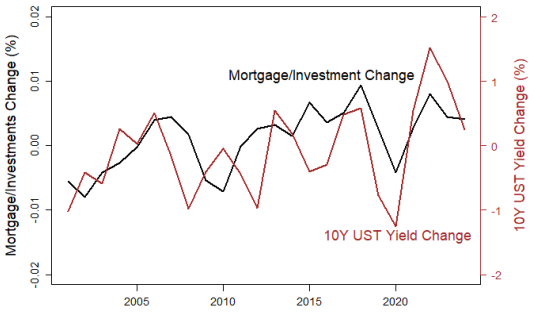
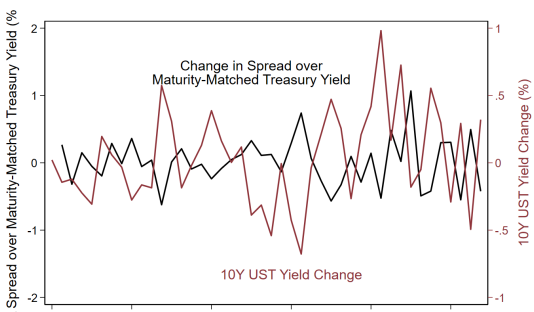
Mortgage investments and spreads vs. *changes* in rates



(e) Δ mortgage holdings / total investments



(f) Δ spreads over maturity-matched Treasury

Black: insurer series (left axis). Red: change in 10Y Treasury yield (right axis). Panel (a) annual; panel (b) quarterly, loan-amount weighted.

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Monetary policy, originations, and spreads: full table

	Originations (log $)			Spreads (%)		
Panel A: All loans	(1)	(2)	(3)	(4)	(5)	(6)
MPS (lagged)	0.859***	0.914***	0.921***	-0.663**	-0.694***	-0.677***
	(0.297)	(0.296)	(0.278)	(0.263)	(0.252)	(0.248)
N	5,756	5,559	5,198	5,737	5,542	5,181
Loan controls	N	Y	Y	N	Y	Y
Insurer controls	N	N	Y	N	N	Y
Insurer FE	N	N	Y	N	N	Y
Adj. R^2	0.80	0.80	0.83	0.75	0.77	0.79
Panel B: CRE loans	(1)	(2)	(3)	(4)	(5)	(6)
MPS (lagged)	0.739**	0.692**	0.670**	-0.788***	-0.887***	-0.821***
	(0.318)	(0.312)	(0.296)	(0.250)	(0.248)	(0.234)
N	5,322	5,105	4,791	5,304	5,089	4,775
Loan controls	N	Y	Y	N	Y	Y
Insurer controls	N	N	Y	N	N	Y
Insurer FE	N	N	Y	N	N	Y
Adj. R^2	0.77	0.78	0.82	0.76	0.78	0.80

Insurer-quarter. All columns: two lags of dep. var., cumulative Δ10Y over prior 8 quarters; spread columns also contemporaneous Δ10Y. Loan controls: LTV, maturity, appraisal time. Insurer controls: assets, surplus ratio, RBC ratio. S.e. clustered by insurer.

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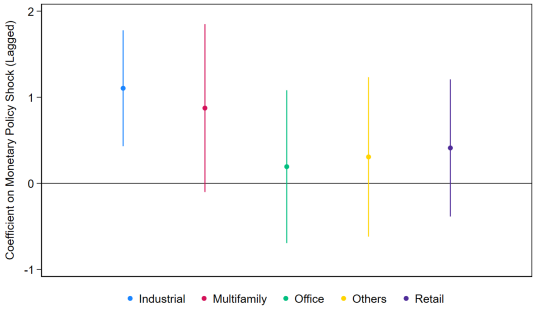
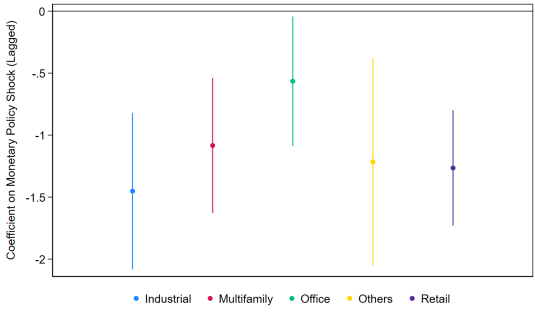
Originations and spread responses by property type



(g) Originations



(h) Spreads

Coefficient on lagged MPS, estimated separately by property type; 95% CIs. Largest responses for industrial, multifamily, and retail.

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Are spread responses driven by stale appraisals?

- Concern: rates set early in the origination pipeline $\Rightarrow$ mechanical negative comovement of spreads with Treasury yields
- Test: interact MPS with a long-pipeline indicator (appraisal time $>$ 90 days)

	Spreads (%)	
	(1)	(2)
Long pipeline = 1	-0.016	-0.028
	(0.074)	(0.074)
Long pipeline = 1 $\times$ MPS (lagged)	-0.146	-0.399
	(0.882)	(0.824)
N	7,534	7,527
Loan controls	N	Y
Insurer FE	Y	Y
Time FE	Y	Y
Adj. R^2	0.65	0.66

No more negative response for long-pipeline loans; spread results also hold on loans with appraisal time $<$ 90 days

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Originations: alternative shocks and estimators

Panel A: Alternative rate measures	Originations (log $)					
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (contemporaneous)	1.508***	1.507***	1.502***			
	(0.235)	(0.240)	(0.249)			
Δ 10Y Treasury				0.118***	0.120***	0.196***
				(0.032)	(0.032)	(0.031)
N	5,756	5,559	5,198	5,756	5,559	5,198
Loan controls	N	Y	Y	N	Y	Y
Insurer controls	N	N	Y	N	N	Y
Insurer FE	N	N	Y	N	N	Y
Adj. R^2	0.80	0.80	0.83	0.80	0.80	0.83

Panel B: MPS (monetary event) / Poisson	Originations (log $)			Originations ($)		
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (monetary event, lagged)	0.590***	0.590***	0.490***			
	(0.154)	(0.156)	(0.140)			
MPS (lagged)				0.703***	0.775***	0.786***
				(0.270)	(0.265)	(0.207)
N	5,756	5,559	5,198	9,725	7,010	6,563
Loan controls	N	Y	Y	N	Y	Y
Insurer controls	N	N	Y	N	N	Y
Insurer FE	N	N	Y	N	N	Y
Adj. R^2	0.80	0.80	0.83			

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Originations: alternative outcomes, and no loosening of LTV

Panel A: Changes and counts	Δ Originations (log $)			Originations (log count)		
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (lagged)	0.674**	0.722***	0.625**	0.486*	0.526**	0.441*
	(0.276)	(0.271)	(0.273)	(0.254)	(0.242)	(0.236)
N	5,165	4,999	4,689	5,756	5,559	5,198
Panel B: MPS (30Y) / Std. errors	Originations (log $)			Originations (log $)		
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (30Y, lagged)	1.309***	1.320***	1.007***			
	(0.394)	(0.395)	(0.367)			
MPS (contemporaneous)				1.692***		
				(0.510)		
Δ 10Y Treasury					0.202***	
					(0.067)	
MPS (lagged)						1.067*
						(0.642)
N	5,756	5,559	5,198	5,534	5,534	5,534
Panel C: Scaled originations / LTV	Δ Originations / Assets			Loan-to-value		
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (lagged)	0.003***	0.002**	0.002*	-0.011	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.034)	(0.034)	(0.035)
N	9,244	6,720	6,336	5,737	5,555	5,194

Monetary policy responses by insurer characteristics

	Originations (log $)				Spreads (%)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MPS (lagged)	0.861***	0.967***	1.894***	1.078***	-1.118***	-1.069***	-1.240***	-0.772**
	(0.248)	(0.234)	(0.451)	(0.378)	(0.244)	(0.225)	(0.457)	(0.332)
× Swap usage	0.387				0.386			
	(0.643)				(0.452)			
× Total assets		0.038				0.268		
		(2.906)				(3.122)		
× RBC ratio			-0.960**				0.329	
			(0.409)				(0.394)	
× Surplus ratio				-0.453				-2.714
				(2.634)				(2.626)
N	5,024	5,197	4,951	5,197	5,006	5,179	4,933	5,179
Insurer FE	Y	Y	Y	Y	Y	Y	Y	Y
Adj. R^2	0.83	0.82	0.82	0.82	0.78	0.78	0.78	0.78

Origination response stronger for insurers with *lower* RBC ratios; size, surplus ratio, and swap use not significant

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Spreads: robustness

Panel A: Alternative rate measures	Spreads (%)					
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (contemporaneous)	-1.925***	-1.958***	-1.580***			
	(0.220)	(0.219)	(0.242)			
MPS (30Y, lagged)				-0.661*	-0.684**	-0.615*
				(0.346)	(0.337)	(0.329)
N	5,737	5,542	5,181	5,737	5,542	5,181

Panel B: Monetary event / Weights	Spreads (%)			Spreads (weighted, %)		
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (monetary event, lagged)	-0.655***	-0.664***	-0.543***			
	(0.102)	(0.098)	(0.093)			
MPS (lagged)				-0.864***	-0.883***	-0.881***
				(0.268)	(0.266)	(0.260)
N	5,737	5,542	5,181	5,737	5,542	5,181

Panel C: Changes / Restricted sample	Δ Spreads (%)			Spreads (%)		
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (lagged)	-0.766***	-0.870***	-0.901***	-0.702***	-0.712***	-0.691***
	(0.252)	(0.254)	(0.271)	(0.246)	(0.246)	(0.231)
N	5,148	4,984	4,672	4,874	4,872	4,579

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Bank analysis: design

- Quarterly panel of commercial banks (charter type 200), Call Reports 2014Q1–2023Q4
  - $\sim$185,000 bank-quarters, $\sim$5,700 banks; definitions follow Drechsler et al. (2017, 2022)

$$\Delta y_{b,t} = \beta\, MPS_{t-1} + \gamma' X_{b,t-1} + \theta_b + \varepsilon_{b,t}$$

- Δy: YoY log change in total / CRE loans, or change in implied loan rate
  - Call Reports record stocks, not originations $\Rightarrow$ log change is the closest counterpart
  - CRE $=$ total real estate loans net of 1–4 family residential
  - Implied rate $=$ annualized interest income / lagged quarterly balance
- $X_{b,t-1}$: log total assets, equity ratio; bank FE; s.e. clustered by bank
- Cannot fully absorb credit demand, but consistent with the bank lending channel

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Asymmetric response by maturity group

	Originations (log $)			Spreads (%)		
	(1)	(2)	(3)	(4)	(5)	(6)
MPS (lagged)	1.237***	1.227***		-1.161***	-1.148***	
	(0.324)	(0.336)		(0.260)	(0.258)	
Maturity >10Y × MPS (lagged)	-1.989***	-2.024***	-1.887***	0.827**	0.772**	0.935**
	(0.480)	(0.482)	(0.472)	(0.336)	(0.348)	(0.378)
N	6,343	6,322	6,322	6,326	6,305	6,305
Loan and Insurer controls	Y	Y	Y	Y	Y	Y
Insurer FE	Y	N	N	Y	N	N
Insurer×Maturity group FE	N	Y	Y	N	Y	Y
Time FE	N	N	Y	N	N	Y
Adj. R^2	0.79	0.80	0.81	0.79	0.79	0.80

Insurer-quarter-maturity group. Omitted group: maturity $\leq$10Y. All columns: two lags of dep. var., cumulative Δ10Y over prior 8 quarters, loan and insurer controls. S.e. clustered by insurer.

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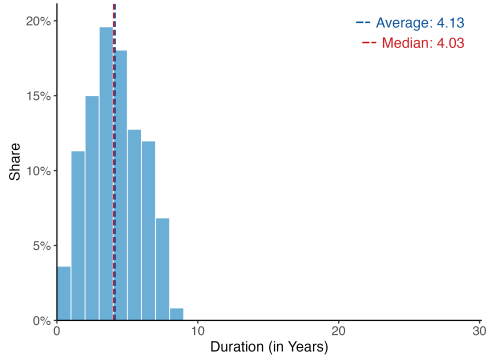
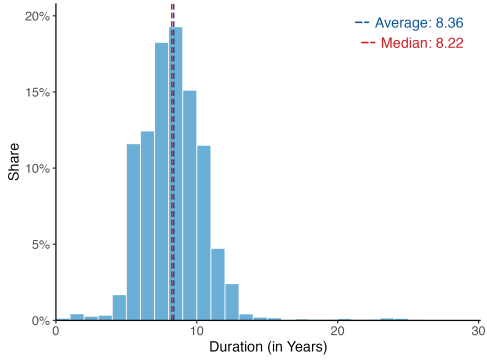
Distribution of CRE loan duration (2022)



(i) Original maturity $\leq$ 10Y



(j) Original maturity $>$ 10Y

- $\leq$10Y loans have duration of about 4 years: well below insurers' liabilities and other fixed income
- Ignores prepayment, which would shorten effective duration further (Hanson 2014)

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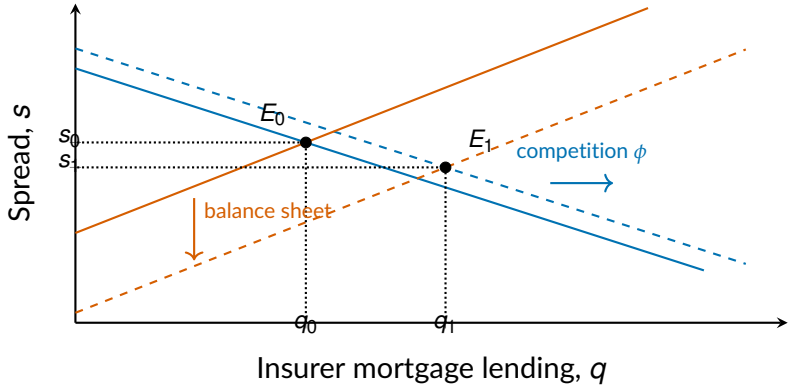
Equilibrium quantity and price of insurer mortgage credit



Both channels raise q. Spread effect ambiguous; figure shows the case where the supply shift dominates ($s_1 < s_0$). Cournot logic: bank retrenchment expands insurers' residual demand; capacity-then-pricing as in Kreps–Scheinkman (1983).

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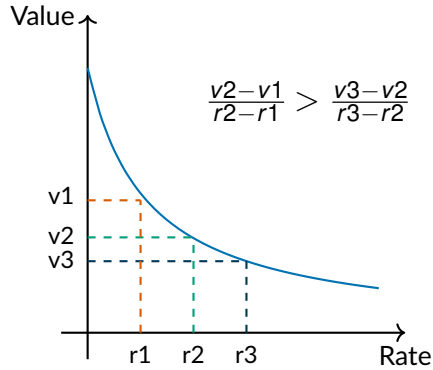
Duration gap shrinks when interest rates rise

- Due to convexity, a security's sensitivity to interest rate changes **declines** as rates rise
- Both asset and liability durations ↓ as rates ↑, but liability durations decline more rapidly
- While liabilities still have longer duration than assets, the duration *gap* becomes smaller



⇒ Higher rates lead to smaller duration gap

⇒ A smaller duration gap allows for a shift to low-duration assets in the portfolio

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Validation of the liability-duration classification

	Shorter-duration liab.		Long-duration liab.		Difference in	
	Mean	SD	Mean	SD	Means	Distributions
Stock beta (Δ10Y Yield)	5.6	7.7	8.7	6.0	3.1**	0.29*
Interest rate swap usage	0.08	0.22	0.29	0.36	0.21***	0.26***
Assets ($ billion)	8.6	23.7	31.9	66.8	23.3***	0.26***
Asset duration (excl. mortgages)	9.1	2.9	9.4	2.4	0.3	0.13
Asset duration (incl. mortgages)	8.8	2.8	9.1	2.3	0.3	0.13
Individual annuities offered (0/1)	0.80	0.40	0.94	0.24	0.14***	

- Long-duration-liability insurers: stock prices more rate-sensitive, more swap use, larger, more likely to offer individual annuities
- Asset durations do not differ significantly across the two groups

Insurer-level averages. Means: unequal-variance *t*-test; distributions: two-sample Kolmogorov–Smirnov.

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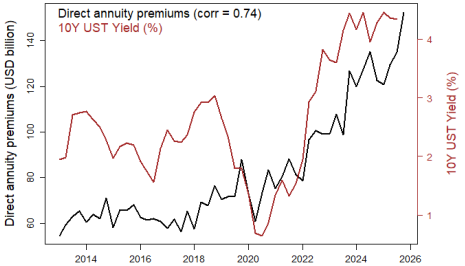
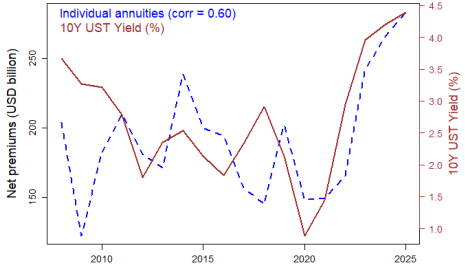
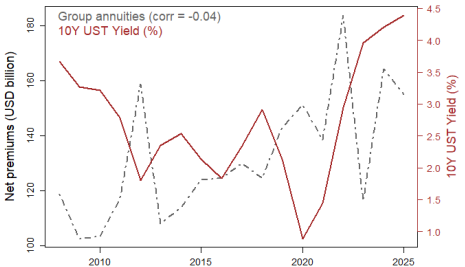
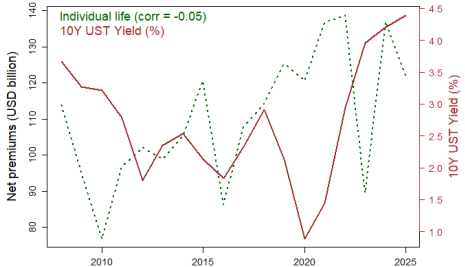
Interest rates and annuity flows: aggregate









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Insurer-level sensitivity of annuity flows to rates

	Direct annuity considerations			
	(change in $ thousand)		Scaled by lagged assets	
	(1)	(2)	(3)	(4)
MPS (lagged) × Long-duration liab.	182,863.4**	184,326.1**	1.13*	1.17*
	(76,114.9)	(76,559.0)	(0.568)	(0.648)
N	15,632	15,521	15,848	15,848
Insurer controls	N	Y	N	Y
Insurer FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Adj. R^2	0.01	0.01	0.49	0.50

- Long-duration-liability insurers receive larger inflows after a contractionary surprise
- They are also more likely to offer the products: nearly all offer individual annuities, vs. 80% of others; ∼90% of individual annuity flows by volume

Insurer-quarter. Direct annuity considerations; s.e. clustered by insurer and year.

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Estimation of liability durations (Huber 2022)

What is measured

- Macaulay dur. of fixed-rate life insurance and annuity reserves by insurer-year, 2001-2020 (900 firms)
- Excluded and set to zero: VA and variable life, VA guarantee reserves, deposit-type contracts, health
- Data posted publicly: firm-year value of liabilities, duration, statutory reserves by NAIC company number

Procedure

- Exhibit 5 of statutory annual statement lists reserves by valuation standard: mortality table, reserve discount rate, reserve method, issue years. Text analysis splits each line into these components, giving a reserve position per insurer, standard, and issue year
- The reserve discount rate is fixed at issuance. Tracking the same position across statements reveals net cash paid out. Allows one to figure out weighted avg time to cash flows
- The decay rate (cash flow over lagged reserve) is regressed on fixed effects for years since issuance, separately by policy type (life, immediate annuity, deferred annuity)
- Fitted decay profiles project each position's future cash flows; these are discounted at the Treasury zero curve to obtain a market-based value and duration
- Position-level durations are value-weighted up to the company and industry

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Why liability durations differ across insurers

- Liability duration is determined largely by **product mix**, reflecting both
  - **Structural primitives:** business model, distribution channel, target clientele
  - **Legacy and path dependence:** today's book reflects products sold decades ago under different rate regimes; acquired blocks, reinsurance, and regulatory changes
- Protection-oriented products (term life, group insurance) $\Rightarrow$ relatively short-dated obligations
- Long-dated savings promises (whole life, fixed and fixed-indexed annuities) extend over decades $\Rightarrow$ dominate savings-oriented insurers' books
- Longest and most convex: **variable annuities with minimum-return guarantees**
  - Guarantee = option written to policyholder; value and duration rise sharply as rates fall
  - Far more rate-sensitive than contractual maturities suggest
    (Koijen–Yogo 2022; Sen 2023; Li–Wenning 2026)
  - Moneyness, and hence duration, depends on realized equity and rate paths since issuance

$\Rightarrow$ liability duration is largely predetermined relative to current rate shocks; for long-duration insurers, rising rates bring higher annuity flows *and* compress duration gaps

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Why asset durations differ across insurers

- Long liabilities alone do not imply a large gap

  $\Rightarrow$ asset-side variation is key to identifying exposure

- Non-trivial dispersion in insurer-level asset duration (excl. mortgages)
  - Interquartile range roughly 7 to 11 years; median about 9 years

- Reflects a mix of choices and constraints
  - **Choices:** yield targets, credit risk appetite, and regulatory capital shape portfolio and hedging decisions (Ellul et al. 2011; Berends et al. 2013)
  - **Constraints:** limited supply of long-dated assets, especially in private and lower-rated segments (Du et al. 2023); legacy portfolios built when rates and spreads differed

- Duration gaps are therefore partly chosen and partly inherited; the empirical design does not require random assignment, only that gaps are predetermined relative to the shock and that insurers with different gaps face the same local lending opportunities (same ZIP $\times$ year)

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Hedging with interest rate swaps

- Insurers can hedge duration mismatch off balance sheet by receiving fixed in swaps

  $\Rightarrow$ on-balance-sheet asset duration may understate effective duration of hedged insurers

- Hedging is common but unlikely to be complete:
  - **Across insurers:** swap usage is more prevalent among long-duration-liability insurers (0.29 vs. 0.08), but not universal; requires derivatives infrastructure and collateral
  - **Within insurers:** hedge ratios are typically below one; receive-fixed positions require variation margin when rates rise, and vanilla swaps do not cover embedded options (lapse, guarantees) or credit spread risk

- Test: control for swap usage interacted with the lagged 30Y MPS
  - MPS $\times$ swap usage is negative: hedgers rebalance on balance sheet less
  - MPS $\times$ long-duration liabilities only modestly affected; remains large and significant

  $\Rightarrow$ the balance sheet channel operates alongside hedging

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Comparison of classification with Li and Wenning (2026)

Exposed vs. non-exposed

- Exposure: VA liabilities (account value + net reserves) as a share of total liabilities (KY, 2022)
- Exposed $\equiv$ top decile of all groups over 2005-07, fixed once and never re-sorted
- Only a quarter of groups issued VAs pre-crisis: 27 exposed, 239 non-exposed
- Exposed further split by AG43: risk-sensitive (RS) if issued any GMAB/GMWB VAs in 2005-07

Validation with Huber (2022) duration gaps

- Insurer-year duration gaps built from Huber (2022) liability durations, own corporate bond durations, and statutory leverage
- Diff-in-diff in three-year bins, exposed vs. non-exposed, with insurer and year fixed effects
- Gaps of all exposed insurers drift negative after 2011; decline is driven by RS exposed insurers
- RS vs. non-RS difference is significant in every post-crisis bin and near zero pre-crisis
- Huber durations exclude VA guarantee reserves, so convexity enters only through leverage

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Flows pass-through vs. reallocation - quantitative decomposition

For a 100bps rise in 10Y yield	USD bn / yr	Share (%)
Panel A: Change in CRE originations		
Net change, all maturities	$+15$	
Decline in $>$10Y originations	-5	
Gross increase in $\leq$10Y originations	$+20$	
Panel B: Funding of gross increase in $\leq$10Y originations		
Annuity inflows (15% $\times$ \$60–80 bn)	9–12	45–60
Reallocation within mortgages (from $>$10Y)	5	25
Reallocation across asset classes (residual)	3–6	15–30
Total	20	100

Notes: Net change in originations applies the Panel A, column (6) semi-elasticity (0.196) to average annual originations of \$78 bn (2014–2024). The maturity split allocates the net change in proportion to the lagged MPS coefficients for $\leq$10Y and $>$10Y loans. Annuity inflows assume a \$60 bn/yr premium response per 100 bp and a 15% general-account allocation to mortgages. Reallocation across asset classes is the residual.

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Duration gap: 30Y monetary policy shock

Dep. var: **Originations (log $)**	(1)	(2)	(3)	(4)
MPS 30Y (lagged) × Long-dur. liab.	9.956***	10.882***	10.754***	10.320***
	(3.293)	(3.394)	(3.147)	(2.899)
MPS 30Y (lagged) × Long-dur. liab. × Asset dur.	-0.936***	-1.006***	-0.958***	-0.959***
	(0.338)	(0.373)	(0.356)	(0.354)
Δ Slope × Long-dur. liab.		0.681**	0.663*	0.906**
		(0.340)	(0.384)	(0.358)
Δ Slope × Long-dur. liab. × Asset dur.		-0.059	-0.056	-0.084**
		(0.036)	(0.040)	(0.038)
N	9,291	9,291	8,109	7,890
Loan controls	N	N	Y	Y
Insurer controls	N	N	N	Y
Insurer×ZIP Code FE; ZIP Code×Time FE	Y	Y	Y	Y
Adj. R^2	0.76	0.76	0.78	0.78

Insurer-ZIP-year, log CRE originations. Columns (2)–(4) add slope interactions; loan controls: LTV, maturity, appraisal time; insurer controls: assets, surplus ratio, RBC ratio, in levels and × shock. S.e. two-way clustered by insurer and ZIP.

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Duration gap: changes in 10Y Treasury yield

Dep. var: **Originations (log $)**	(1)	(2)	(3)	(4)
Δ UST 10Y (lagged) × Long-dur. liab.	1.028**	1.248***	1.198**	0.974**
	(0.466)	(0.471)	(0.477)	(0.414)
Δ UST 10Y (lagged) × Long-dur. liab. × Asset dur.	-0.096**	-0.114**	-0.112**	-0.086*
	(0.047)	(0.049)	(0.050)	(0.046)
Δ Slope × Long-dur. liab.		0.953***	0.973***	1.109***
		(0.328)	(0.333)	(0.329)
Δ Slope × Long-dur. liab. × Asset dur.		-0.083**	-0.087**	-0.100***
		(0.034)	(0.035)	(0.035)
N	9,291	9,291	8,109	7,890
Loan controls	N	N	Y	Y
Insurer controls	N	N	N	Y
Insurer×ZIP Code FE; ZIP Code×Time FE	Y	Y	Y	Y
Adj. R^2	0.76	0.76	0.77	0.77

100 bps rise in 10Y yield $\Rightarrow$ $\approx$22% higher originations for a long-liability insurer at median asset duration

Mechanism reflects both anticipated and unanticipated changes in long rates

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Duration gap: changes in 30Y Treasury yield

Dep. var: **Originations (log $)**	(1)	(2)	(3)	(4)
Δ UST 30Y (lagged) × Long-dur. liab.	1.159**	1.239**	1.220**	1.040**
	(0.521)	(0.515)	(0.520)	(0.492)
Δ UST 30Y (lagged) × Long-dur. liab. × Asset dur.	-0.109**	-0.115**	-0.115**	-0.094*
	(0.053)	(0.054)	(0.055)	(0.054)
Δ Slope × Long-dur. liab.		0.568*	0.608*	0.763**
		(0.312)	(0.345)	(0.330)
Δ Slope × Long-dur. liab. × Asset dur.		-0.048	-0.055	-0.069**
		(0.032)	(0.035)	(0.035)
N	9,291	9,291	8,109	7,890
Loan controls	N	N	Y	Y
Insurer controls	N	N	N	Y
Insurer×ZIP Code FE; ZIP Code×Time FE	Y	Y	Y	Y
Adj. R^2	0.76	0.76	0.77	0.77

Controls and fixed effects as in the baseline, with insurer controls interacted with the yield change. S.e. two-way clustered by insurer and ZIP.

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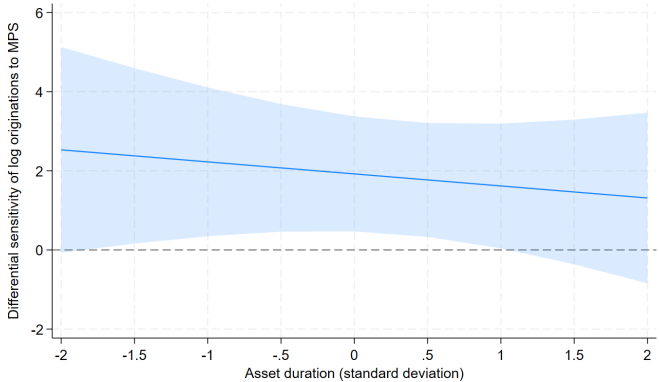
Differential sensitivity of originations by asset duration



- Long-liability insurer at mean asset duration: ≈20% higher originations after a 1 s.d. surprise
- Differential falls by ≈15 pp per s.d. of asset duration ⇒ driven by wider duration gaps

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Duration gap: cumulative 10Y monetary policy shocks

Dep. var: **Originations (log $)**	(1)	(2)	(3)	(4)
MPS 10Y (2Y cum.) × Long-dur. liab.	5.472**	6.042***	5.549**	4.251**
	(2.243)	(2.256)	(2.189)	(1.801)
MPS 10Y (2Y cum.) × Long-dur. liab. × Asset dur.	-0.525**	-0.574**	-0.529**	-0.408*
	(0.228)	(0.232)	(0.228)	(0.210)
Δ Slope × Long-dur. liab.		0.731**	0.762**	0.896***
		(0.301)	(0.312)	(0.298)
Δ Slope × Long-dur. liab. × Asset dur.		-0.065**	-0.069**	-0.082***
		(0.030)	(0.031)	(0.030)
N	9,291	9,291	8,109	7,890
Loan controls	N	N	Y	Y
Insurer controls	N	N	N	Y
Insurer×ZIP Code FE; ZIP Code×Time FE	Y	Y	Y	Y
Adj. R^2	0.76	0.76	0.77	0.77

MPS cumulated over the preceding two years: portfolio reallocation reflects slow-moving capital. Insurer controls interacted with the cumulative shock.

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Duration gap: cumulative 30Y monetary policy shocks

Dep. var: **Originations (log $)**	(1)	(2)	(3)	(4)
MPS 30Y (2Y cum.) × Long-dur. liab.	7.464***	7.591***	6.880***	6.159***
	(2.222)	(2.223)	(2.037)	(1.799)
MPS 30Y (2Y cum.) × Long-dur. liab. × Asset dur.	-0.729***	-0.735***	-0.644***	-0.597***
	(0.237)	(0.240)	(0.221)	(0.225)
Δ Slope × Long-dur. liab.		0.380	0.375	0.537
		(0.327)	(0.368)	(0.341)
Δ Slope × Long-dur. liab. × Asset dur.		-0.032	-0.031	-0.047
		(0.033)	(0.037)	(0.034)
N	9,291	9,291	8,109	7,890
Loan controls	N	N	Y	Y
Insurer controls	N	N	N	Y
Insurer×ZIP Code FE; ZIP Code×Time FE	Y	Y	Y	Y
Adj. R^2	0.76	0.76	0.77	0.77

MPS cumulated over the preceding two years. Insurer controls interacted with the cumulative shock.

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Duration gap: pre-2022 sample

Dep. var: **Originations (log $)**	(1)	(2)	(3)	(4)
MPS (lagged) × Long-dur. liab.	5.651**	7.523**	7.351**	6.979**
	(2.454)	(2.908)	(3.091)	(2.779)
MPS (lagged) × Long-dur. liab. × Asset dur.	-0.413	-0.594*	-0.554	-0.578
	(0.284)	(0.323)	(0.350)	(0.351)
Δ Slope × Long-dur. liab.		0.944	1.039*	1.264**
		(0.589)	(0.571)	(0.579)
Δ Slope × Long-dur. liab. × Asset dur.		-0.084	-0.088	-0.116*
		(0.068)	(0.066)	(0.069)
N	6,947	6,947	6,184	6,002
Loan controls	N	N	Y	Y
Insurer controls	N	N	N	Y
Insurer×ZIP Code FE; ZIP Code×Time FE	Y	Y	Y	Y
Adj. R^2	0.76	0.76	0.77	0.77

Sample restricted to before 2022: results not driven by the single 2022–23 tightening cycle.

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Duration gap: controlling for interest rate swap usage

Dep. var: **Originations (log $)**	(1)	(2)	(3)	(4)
MPS 30Y (lagged) × Long-dur. liab.	6.273**	7.769**	7.143**	7.008**
	(2.848)	(3.198)	(3.248)	(3.093)
MPS 30Y (lagged) × Long-dur. liab. × Asset dur.	-0.607*	-0.750**	-0.663*	-0.659*
	(0.311)	(0.380)	(0.386)	(0.369)
Δ Slope × Long-dur. liab.		0.687**	0.693*	0.868**
		(0.347)	(0.387)	(0.354)
Δ Slope × Long-dur. liab. × Asset dur.		-0.064*	-0.063	-0.081**
		(0.038)	(0.042)	(0.038)
MPS 30Y (lagged) × Swap usage	-3.180***	-3.040***	-3.402***	-3.639**
	(1.060)	(1.062)	(1.177)	(1.546)
N	9,090	9,090	7,920	7,890
Loan controls	N	N	Y	Y
Insurer controls	N	N	N	Y
Insurer×ZIP Code FE; ZIP Code×Time FE	Y	Y	Y	Y
Adj. R^2	0.76	0.76	0.77	0.78

Swap usage and its interaction with the lagged 30Y MPS account for off-balance-sheet hedging.

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Duration gap at loan level: all maturities

	Loan size (log $)				Spreads (%)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MPS (lagged) × Long-dur. liab.	8.905***	9.755***	10.373***	8.078***	-2.093*	-2.484*	-2.912**	-2.713**
	(2.447)	(3.200)	(3.155)	(2.444)	(1.064)	(1.416)	(1.360)	(1.359)
× Asset dur.	-0.765***	-0.897***	-0.898***	-0.754***	0.181	0.265*	0.287*	0.302*
	(0.241)	(0.343)	(0.329)	(0.282)	(0.110)	(0.155)	(0.148)	(0.157)
N	17,284	17,331	17,284	16,507	16,969	17,016	16,969	16,218
Loan controls	Y	N	Y	Y	Y	N	Y	Y
Insurer controls	N	N	N	Y	N	N	N	Y
Slope controls	N	Y	Y	Y	N	Y	Y	Y
Insurer×ZIP Code FE	Y	Y	Y	Y	Y	Y	Y	Y
ZIP Code×Prop. Type×Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Adj. R^2	0.78	0.69	0.78	0.77	0.41	0.38	0.41	0.39

Long-liability insurers with shorter asset books originate larger loans at lower spreads; no increase in LTV

Loan controls: property value, LTV, maturity. S.e. two-way clustered by insurer and ZIP.

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Duration gap at loan level: changes in 10Y Treasury yield

	Loan size (log $)		Spreads (%)	
	(1)	(2)	(3)	(4)
Δ UST 10Y (lagged) × Long-dur. liab.	1.815***	1.500***	-0.354**	-0.422***
	(0.550)	(0.444)	(0.154)	(0.162)
Δ UST 10Y (lagged) × Long-dur. liab. × Asset dur.	-0.169***	-0.139***	0.040**	0.052***
	(0.056)	(0.048)	(0.016)	(0.017)
N	17,284	16,507	16,969	16,218
Loan controls	Y	Y	Y	Y
Insurer controls	N	Y	N	Y
Slope controls	Y	Y	Y	Y
Insurer×ZIP Code FE	Y	Y	Y	Y
ZIP Code×Property Type×Time FE	Y	Y	Y	Y
Adj. R^2	0.78	0.77	0.41	0.39

All maturities pooled. Insurer controls interacted with the yield change. S.e. two-way clustered by insurer and ZIP.

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Duration gap at loan level: cumulative 10Y shocks

	Loan size (log $)		Spreads (%)	
	(1)	(2)	(3)	(4)
MPS 10Y (2Y cum.) × Long-dur. liab.	8.025***	4.815**	-2.364***	-2.600***
	(2.798)	(1.925)	(0.755)	(0.837)
MPS 10Y (2Y cum.) × Long-dur. liab. × Asset dur.	-0.794***	-0.503**	0.277***	0.332***
	(0.287)	(0.224)	(0.086)	(0.099)
N	17,284	16,507	16,969	16,218
Loan controls	Y	Y	Y	Y
Insurer controls	N	Y	N	Y
Slope controls	Y	Y	Y	Y
Insurer×ZIP Code FE	Y	Y	Y	Y
ZIP Code×Property Type×Time FE	Y	Y	Y	Y
Adj. R^2	0.78	0.77	0.41	0.39

All maturities pooled. MPS cumulated over the preceding two years; insurer controls interacted with the shock.

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Validation: deposit beta exposure and bank originations

	Bank originations (thousands)			
	(1)	(2)	(3)	(4)
MPS (lagged) × Deposit beta exposure	-105.057**	-94.203**	-94.139**	-94.146**
	(47.994)	(43.108)	(43.384)	(43.355)
MPS (lagged)	7.625	6.637		
	(12.526)	(11.552)		
N	49,458	49,458	49,458	49,458
County FE	N	Y	Y	Y
Time FE	N	N	Y	Y
Loan Type FE	N	N	N	Y
Adj. R^2	0.06	0.83	0.85	0.86

Bank CRE originations (HMDA) fall more after tightening in counties with higher deposit beta exposure

County-loan type-year, weighted by lagged application amounts. S.e. clustered by county.

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Summary statistics: variables in annual analysis

	Mean	SD	p25	p50	p75	N
Asset duration (excl. mortgages)	9.51	2.51	7.81	9.59	11.27	2,439
Deposit beta exposure (county-level)	0.35	0.06	0.33	0.37	0.39	1,524
Monetary Policy Shock (10Y)	-0.02	0.10	-0.12	0.01	0.06	11
Monetary Policy Shock (30Y)	-0.01	0.07	-0.06	0.01	0.02	11
US Treasury Yield (10Y)	2.49	0.99	1.84	2.33	2.95	11
Δ US Treasury Yield (10Y)	0.17	0.80	-0.40	0.25	0.58	11
US Treasury Yield (30Y)	2.96	0.82	2.58	2.89	3.34	11
Δ US Treasury Yield (30Y)	0.09	0.64	-0.50	0.22	0.50	11
Slope (10Y-2Y)	0.63	0.79	-0.04	0.50	1.18	11
Δ Slope (10Y-2Y)	-0.20	0.56	-0.59	-0.21	0.33	11

Asset duration at insurer-year level (years). Deposit beta exposure at county level, for counties where sample insurers lend. Shocks and yield changes annual, in pp.

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Both channels: bank retrenchment and liability duration

	Originations (log $)			
	(1)	(2)	(3)	(4)
MPS (lagged) × Deposit beta exposure	4.458*	4.501***	4.478***	3.804**
	(2.295)	(1.502)	(1.484)	(1.561)
MPS (lagged) × Long-duration liab.	2.742**	2.743**	2.735**	2.798*
	(1.166)	(1.163)	(1.154)	(1.514)
MPS (lagged) × Total application amount (log)			0.139	0.138
			(0.109)	(0.120)
N	16,731	16,731	16,731	14,754
Slope controls	N	Y	Y	Y
Loan, Insurer controls	N	N	N	Y
Insurer, Time, Insurer×ZIP Code FE	Y	Y	Y	Y
Adj. R^2	0.68	0.68	0.68	0.70

Both interactions positive and significant $\Rightarrow$ balance sheet and market channels each contribute

Log CRE originations. Insurer×year FE would absorb MPS × Long, so insurer, year, insurer×ZIP FE. S.e. two-way clustered by insurer and county.

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