Extend-and-Pretend in the U.S. CRE Market

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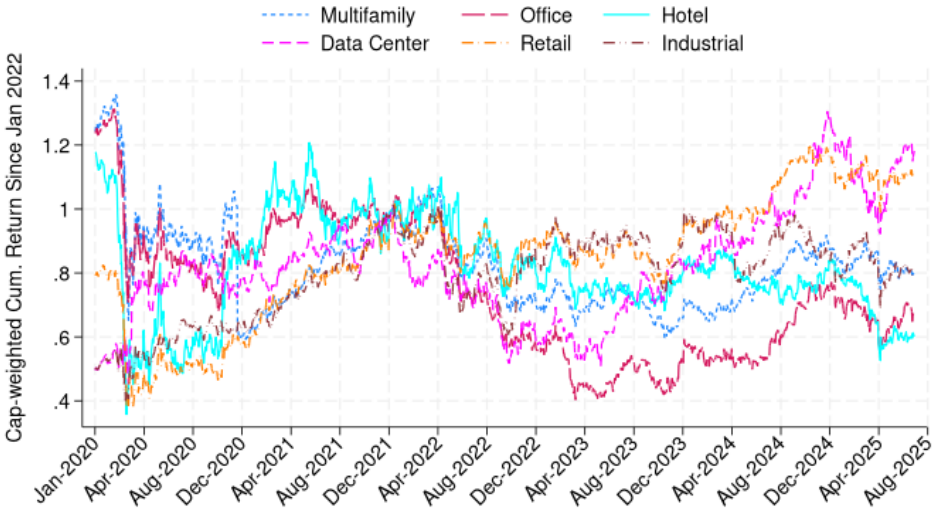
Sizable decline in CRE valuations

REIT Stock Prices



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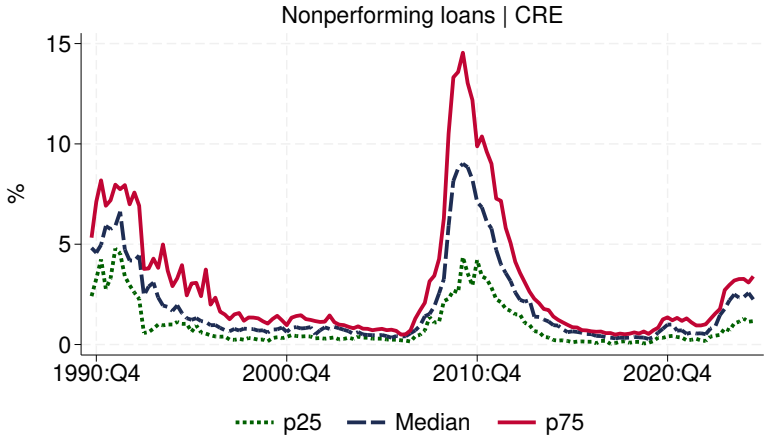
   - Borrower cannot wait for high interest rates to reverse.
5. Banks hold around 1/2 of all CRE mortgages

Low CRE loan losses by historical standards

NPL rates



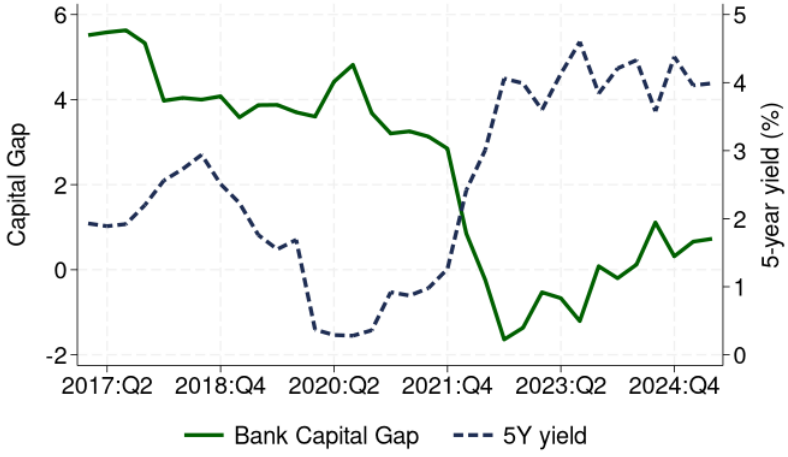
Why aren't we seeing more defaults?

How can observed CRE losses be so small?
Our hypothesis: "extend-and-pretend"

- Weakly capitalized banks have an incentive to prevent defaults to avoid losses
  - This incentive should be particularly pronounced from 2022:Q1 onward as rapidly rising interest rates created large MTM losses
  - MTM losses make banks more likely to be monitored by regulators and credit rating agencies, and make them vulnerable to runs (Drechsler et al., '24; Haddad et al., '23)
- Lack of defaults prevents efficient reallocation in CRE market

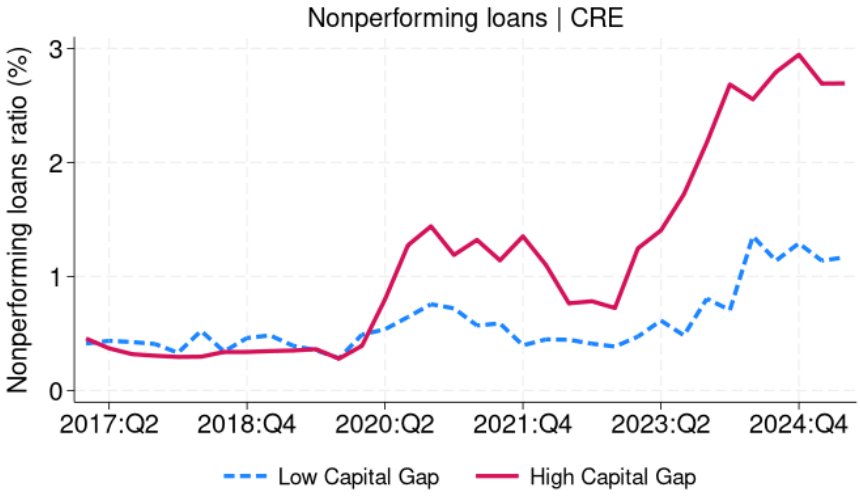
Persistent declines in bank capitalization

- Capital Gap = CET1 - Regulatory Threshold - MTM losses

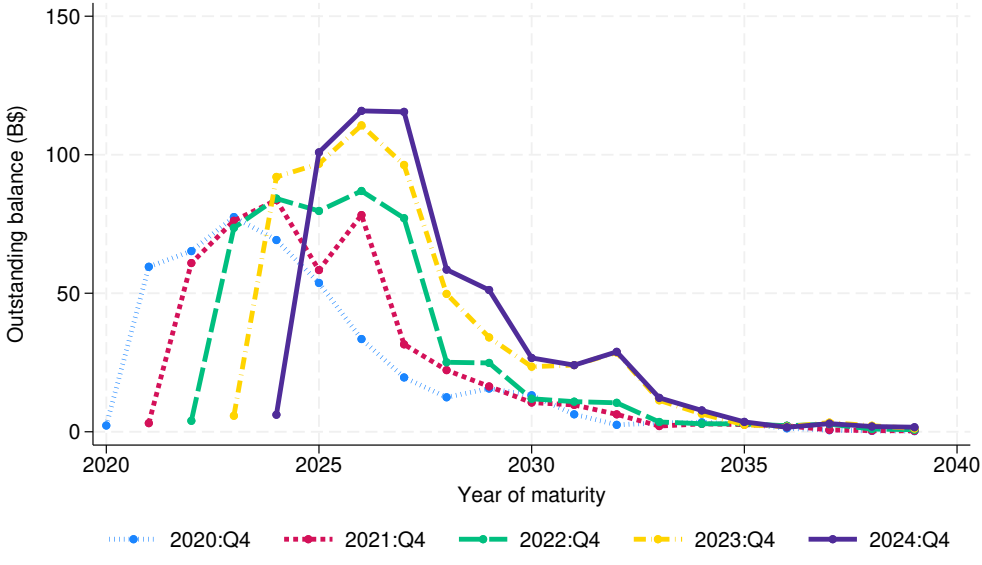


▸ Distribution of banks' undercapitalization

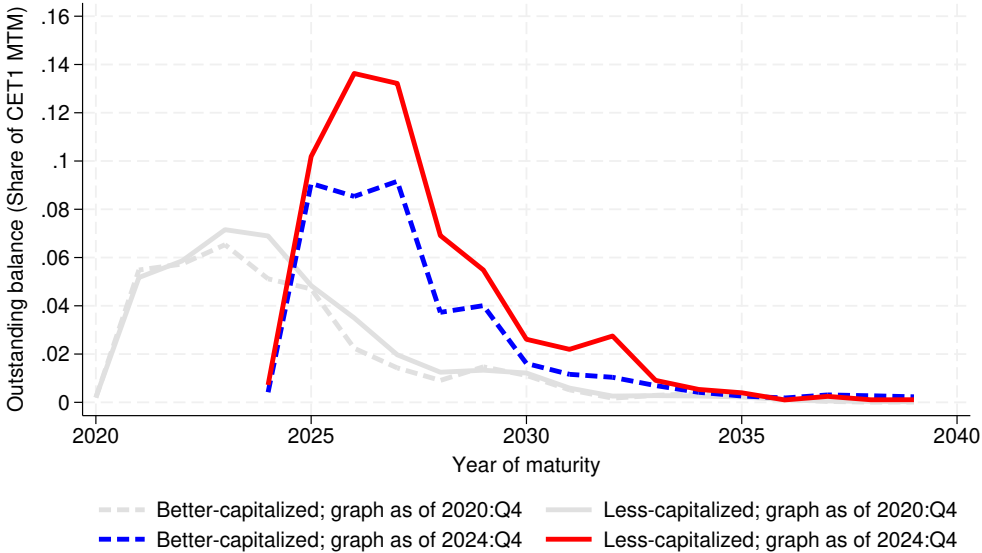
Sluggish CRE loss recognition by weak banks



A rapidly expanding maturity wall



Maturity wall by bank capitalization



Contribution to the literature

1. Effects of post-pandemic monetary tightening on banking sector (Jiang et al., '24; Drechsler et al., '24; Greenwald et al., '24; Haddad et al., '23)
   - ⋆ Monetary tightening → undercapitalization → E&P → misallocation
   - ⋆ E&P can create maturity wall and increase vulnerability to future rate hikes
2. Extend-and-pretend manifestation of zombie lending (Caballero et al., '08, Acharya et al., '22), extensively documented in Japan and Europe
   - \- Mixed evidence on zombie lending in US C&I market (Faria-e-Castro et al., '24; Favara et al., '24)
   - ⋆ First evidence of zombie lending in the U.S. CRE market, with rich data on mechanisms
   - ⋆ Since land is a fixed factor, zombie lending arguably more distortionary in CRE than C&I
3. Real estate markets in the post-pandemic period (Bloom and Ramani, '22; Gokan et al., '23; Van Nieuwerburgh, '23; Gupta et al., '26)
   - ⋆ Financial frictions delay capital reallocation and creative destruction in CRE market

Data

Loan-level supervisory data on CRE mortgages (FR Y-14Q H.2)

- Mostly issued and held by banks (50.7% of the $5.8T CRE market as of 2023:Q4)
- Our data captures 26.8% of all CRE mortgages held by banks
- Detailed property characteristics (e.g., zip code, occupancy rate, NOI, property type)
- Interest rate, maturity extensions, assigned prob. of defaults, realized defaults

→ ≈ 900,000 CRE loans granted by 22 domestic banks in 2020:Q1–2025:Q2

Loan-level supervisory data on C&I lending (FR Y-14Q H.1) to REITs

- Matched with stock prices and REITs' classification from CRSP and Capital IQ

→ Stock prices and loan-level observations for 76 out of 100 CRE REITs

Bank-level information (FR Y-9C)

- Nonperforming loan ratios and net charge-offs by market
- RWA, CET1, fair and book value of HTM and AFS securities

→ Measure MTM capital adding unrealized gains/losses on securities to regulatory capital

→ Calculate the distance between MTM capital and each bank-level regulatory threshold

Detecting “extend-and-pretend” at the loan-level

Loan-level test to detect "extend-and-pretend"

Ideal Specification

$$\begin{aligned} \text{Y}_{lt} = \alpha + \beta_1 &\text{Capital Gap}_{bt} \times \text{Impaired}_{lt} \\ &+ \beta_2 \text{Capital Gap}_{bt} + \beta_3 \text{Impaired}_{lt} + \boldsymbol{\gamma'} \boldsymbol{X}_{lt} + \eta_{zpt} + \epsilon_{lt} \end{aligned}$$

- l is a loan outstanding in quarter t granted by bank b to obligor j
- Y_{lt}: outcomes like extensions and defaults
- Impaired=1 if debt yield (NOI/Balance)<0.08
- η_{zpt}: zip code-property type-time FE
- Quarterly frequency from 2022:Q1 to 2025:Q2
- Coefficient of interest β_1

Fewer defaults on mortgages granted by undercapitalized banks

	Default$_{lt}$ ×100			
	(1)	(2)	(3)	(4)
Capital Gap$_{bt}$ × Impaired$_{lt}$	0.358**	0.267**	0.188**	0.190**
	(0.139)	(0.117)	(0.081)	(0.084)
Capital Gap$_{bt}$	0.036	0.087	−0.190*	
	(0.081)	(0.146)	(0.085)	
Impaired$_{lt}$	0.927**	0.816*	0.676*	0.659*
	(0.393)	(0.385)	(0.338)	(0.333)
Fixed Effects				
Zip Code-Property Type-Quarter	✓	✓	✓	✓
Bank		✓	✓	
Bank-Quarter				✓
$\boldsymbol{X}_{lt}$			✓	✓
Observations	747,118	747,118	587,116	587,115
R^2	0.280	0.287	0.331	0.333

Undercapitalized banks provide maturity extensions and financial relief

$\text{Relief}_{lt} = 1\{\text{lower interest rate or interest-only amortization upon extension}\}$

	$\text{Extension}_{lt} \times 100$				$\text{Relief}_{lt} \times 100$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{Capital Gap}_{bt} \times \text{Impaired}_{lt}$	−0.138**	−0.193***	−0.164**	−0.153***	−3.111**	−2.920***	−3.815**
	(0.045)	(0.057)	(0.055)	(0.042)	(1.071)	(0.878)	(1.552)
Capital Gap_{bt}	−0.018	−0.062	0.0183		2.969***	0.268	0.955
	(0.139)	(0.225)	(0.316)		(0.501)	(0.862)	(1.857)
Impaired_{lt}	0.025	0.022	0.120*	0.090	4.631**	4.860**	4.041**
	(0.129)	(0.092)	(0.054)	(0.054)	(1.977)	(1.818)	(1.183)
Fixed Effects							
ZipCode-PropType-Quarter	✓	✓	✓	✓	✓	✓	✓
Bank		✓	✓			✓	✓
Bank-Quarter				✓			
$\boldsymbol{X}_{lt}$			✓	✓			✓
Sample	Full Sample				Subsample of extensions		
Observations	747,118	747,118	587,116	587,115	8,660	8,660	4,969
R^2	0.325	0.329	0.305	0.314	0.660	0.678	0.665

Undercapitalized banks assign lower internal default probabilities

	Probability of Default — PD_{lt} ×100			
	(1)	(2)	(3)	(4)
Capital Gap_{bt} × $Impaired_{lt}$	0.406**	0.380**	0.532***	0.548***
	(0.174)	(0.166)	(0.158)	(0.163)
Capital Gap_{bt}	−0.080	−0.329***	−0.232*	
	(0.082)	(0.086)	(0.115)	
$Impaired_{lt}$	2.667***	2.635***	2.721***	2.696***
	(0.449)	(0.432)	(0.382)	(0.373)
Fixed Effects				
Zip Code-Property Type-Quarter	✓	✓	✓	✓
Bank		✓	✓	
Bank-Quarter				✓
$\boldsymbol{X}_{lt}$			✓	✓
Observations	599,015	599,015	498,393	498,392
R^2	0.339	0.348	0.363	0.365

Evidence from REITs

Within-Obligor Design for REITs

The analysis of banks' lending to REITs has two advantages

1) Measure distress using market equity prices
2) Use stock tickers to match *borrowers* across different banks
   $\rightarrow$ within-borrower estimation

$$\begin{aligned} \text{Y}_{lbjt} = \alpha + \beta_1 &\text{Capital Gap}_{bt} \times \text{Impaired}_{jt} \\ &+ \beta_2 \text{Capital Gap}_{bt} + \boldsymbol{\gamma}' \boldsymbol{X}_{lt} + \eta_{jt} + \epsilon_{lbjt} \end{aligned}$$

- l is a loan outstanding in quarter t granted by bank b to REIT j
- Impaired_{jt} is the change in market cap of REIT j from 2020:Q1 to quarter t
- Borrower-time fixed effects η_{jt} fully controls for borrower-level unobservables
- $\boldsymbol{X}_{lt}$: log of the outstanding amount, interest rate, and time to maturity

Within-Obligor Design for REITs

	Maturity Extension$_{lbjt}$			Probability of Default (PD$_{lbjt}$)		
Capital Gap$_{bt}$ × Impaired$_{jt}$	−0.793***	−1.043***	−0.662	0.151***	0.170***	0.308
	(0.118)	(0.270)	(0.701)	(0.027)	(0.022)	(0.468)
Capital Gap$_{bt}$	−0.677***			0.119*		
	(0.206)			(0.059)		
Fixed Effects						
Borrower-Quarter	✓	✓	✓	✓	✓	✓
Bank-Quarter		✓	✓		✓	✓
$\boldsymbol{X}_{lt}$		✓	✓		✓	✓
Placebo			✓			✓
Observations	6,394	4,858	4,858	5,959	3,619	4,519
R^2	0.234	0.367	0.367	0.546	0.632	0.632

Extend-and-pretend leads to credit misallocation in CRE

Detecting credit misallocation

$$\text{New Origination}_{bzt} = \alpha + \beta \text{Impaired Extensions}_{bt} \times \text{Capital Gap}_{bt} + \boldsymbol{\omega'} \boldsymbol{Z}_{bt} + \mu_b + \eta_{zt} + \epsilon_{bzt}$$

- b is a bank, z is a zip code, and t is a quarter

$$\text{New Origination}_{bzt} = \frac{\sum_l \text{OutstandingAmt}_{blzt} \times \mathbb{I}(\text{New Orig})_{blzt}}{\sum_l \text{OutstandingAmt}_{blzt}}$$

$$\text{Impaired Extensions}_{bzt} = \frac{\sum_l \text{OutstandingAmt}_{blzt} \times \mathbb{I}(\text{Extension})_{blzt} \times \mathbb{I}(\text{Impaired})_{blzt}}{\sum_l \text{OutstandingAmt}_{blzt}}$$

- Zip code-quarter fixed effects (η_{zt}):
- Bank characteristics ($\boldsymbol{Z}_{bt}$): $\text{Undercapitalized}_{bt}$, $\text{Impaired Extensions}_{bt}$, Log Assets_{bt}, $(\text{(CRE+C\&I lending)/assets})_{bt}$, interactions of last two variables with $\text{Undercapitalized}_{bt}$

Crowding out new CRE credit

	CRE Origination$_{bzt}$			
	(1)	(2)	(3)	(4)
CRE Distressed Extensions$_{bt}$ × Capital Gap$_{bt}$	0.158**	0.104**		
	(0.072)	(0.042)		
CRE Distressed Extensions$_{bt}$	0.325**	0.064		
	(0.133)	(0.118)		
Capital Gap$_{bt}$	0.004	−0.025	0.016	−0.0082
	(0.020)	(0.023)	(0.023)	(0.026)
CRE Non-Distressed Extensions$_{bt}$ × Capital Gap$_{bt}$			−0.039	−0.052
			(0.036)	(0.030)
CRE Non-Distressed Extensions$_{bt}$			0.092	0.041
			(0.063)	(0.044)
Bank-Level Controls	✓	✓	✓	✓
Placebo			✓	✓
Fixed Effects				
Zip Code-Time	✓	✓	✓	✓
Bank		✓		✓
Observations	249,126	249,126	249,126	249,126
R^2	0.304	0.307	0.304	0.307

Crowding out new C&I credit

	C&I New Origination$_{bist}$			
	(1)	(2)	(3)	(4)
CRE Distressed Extensions$_{bt}$ × Capital Gap$_{bt}$	0.216**	0.111**		
	(0.093)	(0.034)		
CRE Distressed Extensions$_{bt}$	0.018	0.030		
	(0.014)	(0.021)		
Capital Gap$_{bt}$	−0.018	−0.030	0.002	−0.017
	(0.014)	(0.021)	(0.014)	(0.020)
CRE Non-Distressed Extensions$_{bt}$ × Capital Gap$_{bt}$			−0.030	−0.029
			(0.045)	(0.027)
CRE Non-Distressed Extensions$_{bt}$			0.089	0.066
			(0.105)	(0.045)
Bank-Level Controls	✓	✓	✓	✓
Placebo			✓	✓
Fixed Effects				
Industry-State-Quarter	✓	✓	✓	✓
Bank		✓		✓
Observations	142,496	142,496	142,496	142,496
R^2	0.181	0.194	0.180	0.194

Regional and community banks

Extend-and-pretend among regional and community banks?

Group	**CRE/ MTM CET1**	**CRE/ Assets**
Community (< \$10B)	**3.88**	0.328
Regional (\$10B-\$100B)	**3.94**	0.302
Large (\$100B <)	1.00	0.070

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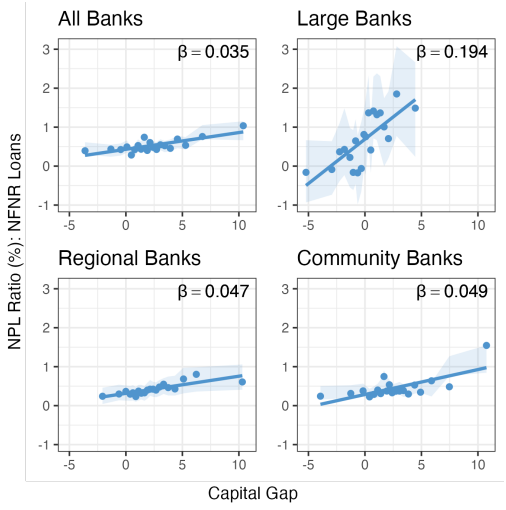

But strong credit quality at smaller banks (Glancy and Kurtzman, '24; Hinzen et al, '25)

Final thoughts

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Since 2022, banks have extended the maturity of impaired CRE mortgages coming due, pretending such credit was not as risky to avoid capital depletion

- This behavior is driven by banks with weak marked-to-market capitalization
- This behavior is absent before 2022:Q1
- This behavior is also present in bank lending to REITs that hold large CRE portfolios

The effects of this behavior open up several research avenues

- The resulting crowding-out slows down the efficient reallocation of CRE credit
- Maturity extensions might fuel a rising wave of impaired loans in the future