Lending Next to the Courthouse: Exposure to Adverse Events and Mortgage Lending Decisions

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Motivations

What can happen in the financial market after an adverse shock?

- Macro-level channels:
  - Deteriorating fundamentals and drained liquidity
  - Collapsed collateral value
  - …

  (e.g., Gan 2007; Ivashina and Scharfstein, 2010; Cornett et al., 2011, …)

- **Micro-level channels:**
  - Changes in risk preference and risk beliefs of households

  (Malmendier and Nagel, 2011; Guiso et al., 2018; …)
  - **Changes in risk preference and risk beliefs of lending decision makers**

Motivations

Think about mortgage lending in the last foreclosure crisis:

- Macro-level channels:
  - Weak bank balance sheets and liquidity constrain credit supply
  - Depreciation in housing collateral makes lending risky
  - …

- **Micro-level channels:**
  - **Lending decision makers become more cautious in making loans**

Motivations

The potential consequences of this micro-level risk-taking channel:

- Amplifying the negative impacts of the fundamental shocks
  - Credit crunch can be tightened when lenders become more cautious

- Slowing down recovery
  - Lenders may continue to hoard safe assets despite the improvement in fundamentals

- Dampening the effectiveness of policies
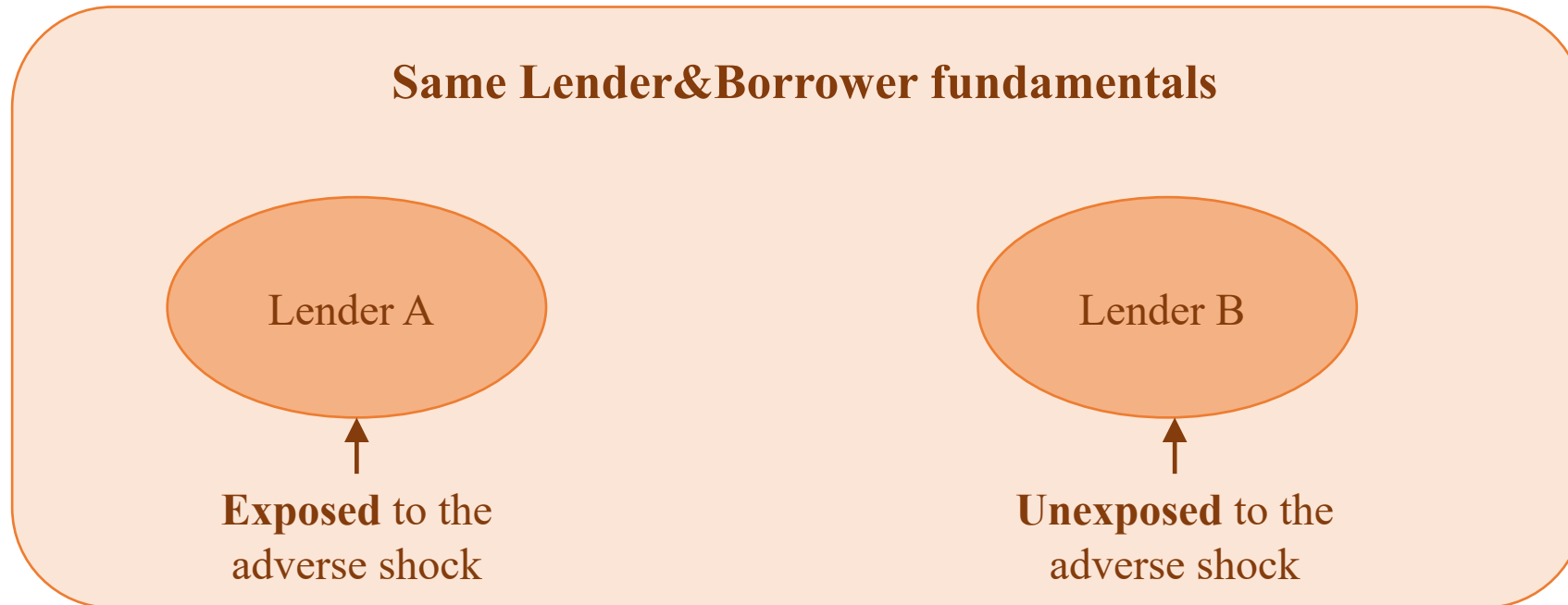 - Lenders can be less responsive to bailout policies

This Paper:

Provides micro-level empirical evidence in the US mortgage market:

Mortgage lending standards are more stringent
   when loan officers are more exposed to the foreclosure news,
   despite the same housing market fundamentals and bank characteristics
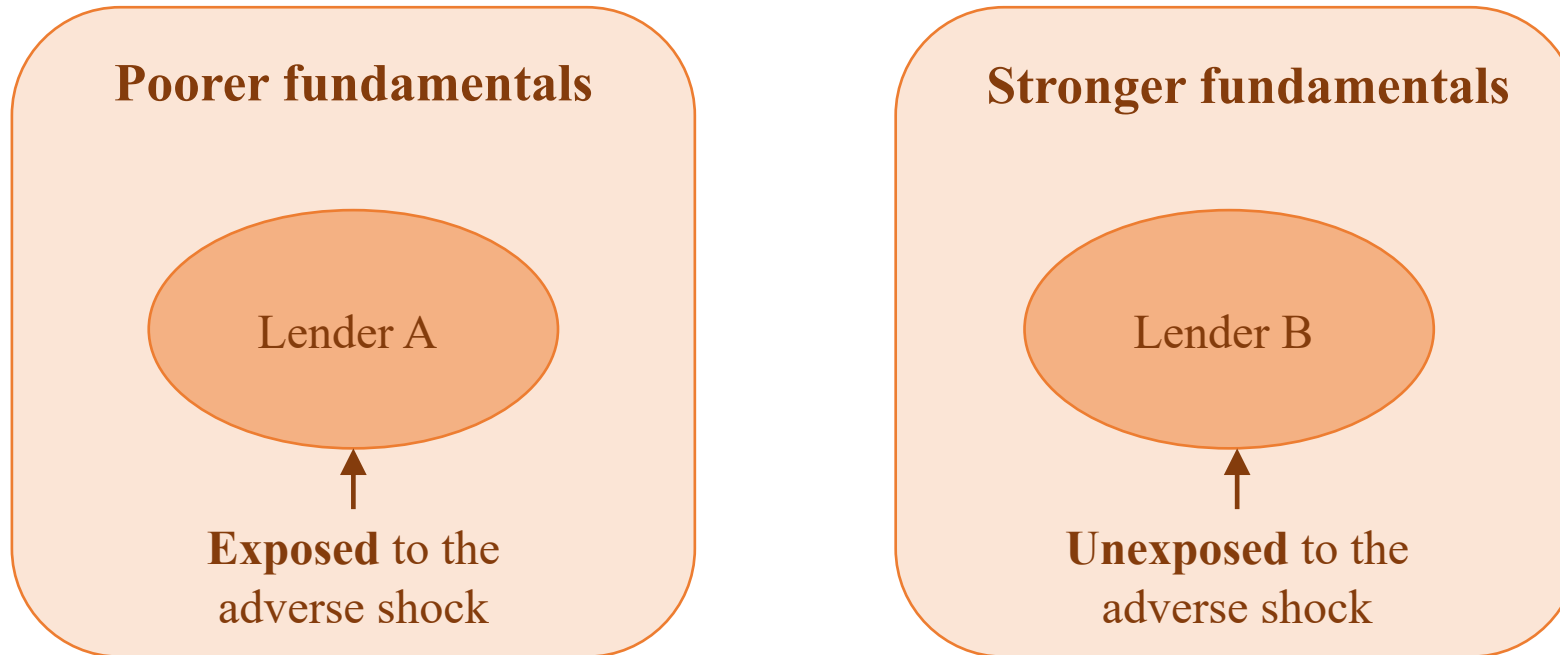
Empirical Challenge

The *ideal* empirical setting:

Same Lender&Borrower fundamentals

Lender A

Lender B

Exposed to the adverse shock

Unexposed to the adverse shock

Empirical Challenge

The *reality*:
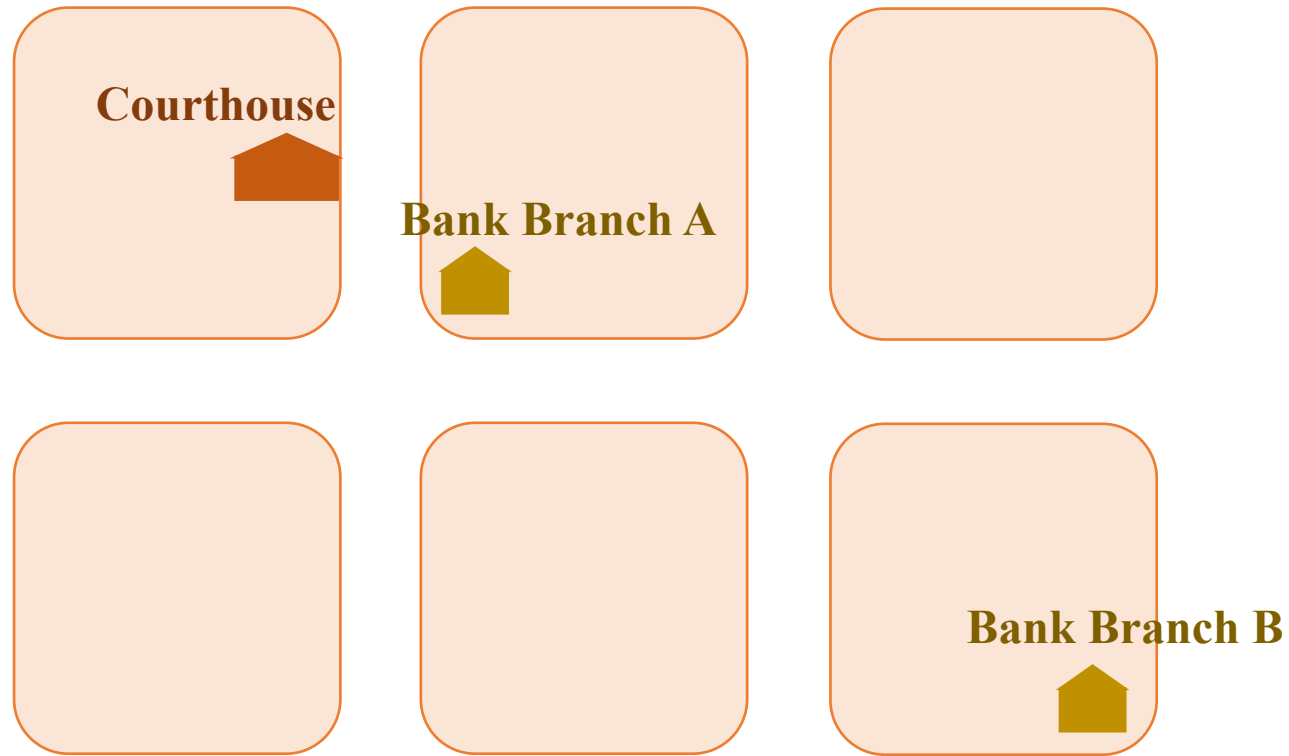
Identification Strategy

Variation in exposures to foreclosure auction events:

- Foreclosure auctions are held at the county courthouse
- Typically at the steps or in front of the main entrance

Identification Strategy

Variation in exposures to foreclosure auction events:

Courthouse

Bank Branch A

Bank Branch B

Identification Strategy

- Same adverse market shock:
  - The county-wise foreclosure shock

- Different exposure to the shock:
  - Treatment: branches that can easily observe the shock (next to the courthouse)
  - Control: branches that do not directly observe the shock from the courthouse

Compare mortgage lending decisions:

- Within the same county (neighborhood) and year
  - Conditional on the same local economic and housing market fundamentals

- Within the same bank and year
  - Conditional on the same lender balance sheet strength and liquidity conditions

Main Findings

Conditional on the same local and lender fundamentals:

- More stringent lending standards by branches exposed to the foreclosure events

- Lending standards by the exposed branches are more sensitive to the county-wise foreclosures, especially
    - For high DTI applications with high DTI or low neighborhood HP (high-risk applications)
    - For relatively smaller banks (more like to have human decision makers)

- The results are reflected as:
    - Higher rejection rates on mortgage applications (extensive margin)
    - Smaller loan size on approved mortgage loans (intensive margin)
    - Overall lower credit supply

- Rejections reasons:
    - *Likely* due to greater concerns given the same risk level
    - *Not likely* due to more careful screening or information acquisition

Related Literatures

- How market dynamics shape individual preferences and beliefs
  - Investment activities (Malmendier and Nagel, 2011; Gennaioli et al., 2015; Anagol, Balasubramaniam, and Ramadorai, 2020);
  - Corporate activities such as cash holding, leverage, and investment (e.g., Bernile et al., 2017);
  - Analyst forecasts (e.g., Cen et al., 2013)

- How dynamic changes of credit conditions are driven by preferences and beliefs
  - Koudijs and Voth (2016): financiers who experience adverse market events lend with increased haircuts even without personal losses;
  - Chernenko et al. (2016): fund managers' investments in high-risk securities are affected by their personal experiences

- Bank credit activities subsequent to adverse shocks
  - Impacts of adverse shocks on bank fundamentals and the consequences (Gan 2007; Ivashina and Scharfstein, 2010; Cornett et al., 2011, …)
  - Impacts on individual lending decision makers (this paper)

Data

- Mortgage applications and lending decisions: HMDA
  - Loan-level information on borrower characteristics, location, lender, and approval status

- Foreclosure information: Zillow
  - County-level annual foreclosure counts in 541 populous counties from major metropolitan areas across 44 states

- Courthouse location: Google

- Branch location: SOD

- Distance to courthouse
  - Vincenty's formulae, a widely used method in geodesy, with accuracy to within 0.5 mm on the Earth ellipsoid

An Illustration

Miami County, FL
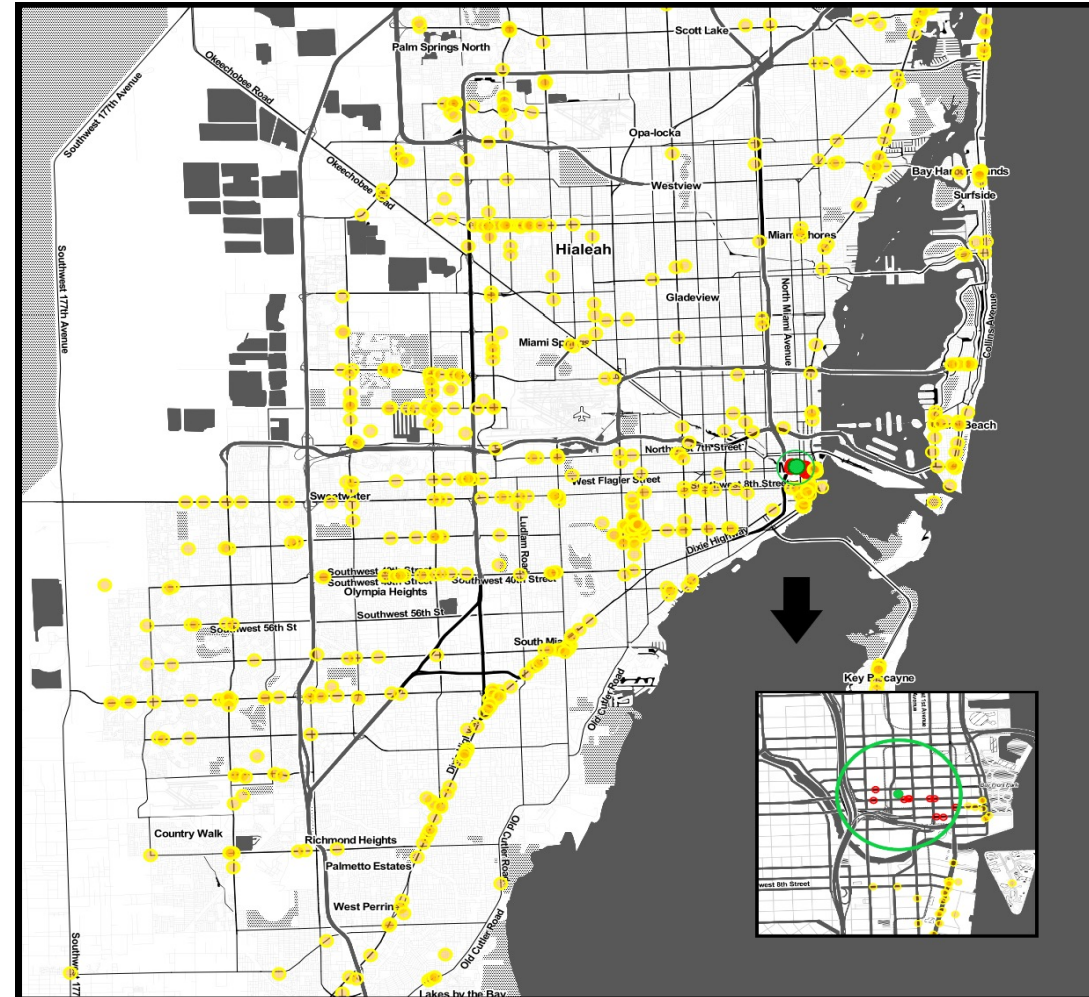
Summary Statistics

	(1) N	(2) Mean	(3) S.D.	(4) P5	(5) P25	(6) P50	(7) P75	(8) P95
Loan-level								
Rejection	1,471,410	0.130	0.337	1	0	0	0	0
Debt-to-Income	1,432,604	2.515	1.536	0.478	1.506	2.362	3.311	4.893
White	1,471,410	0.830	0.376	0	1	1	1	1
Hispanic	1,471,410	0.068	0.251	0	0	0	0	1
Second Lien	1,471,410	0.032	0.175	0	0	0	0	0
HP Growth (Property Tract)	1,471,410	0.000	0.091	-0.140	-0.040	0.002	0.051	0.132
Branch-level								
HP Growth (Branch Zip)	160,082	0.000	0.074	-0.118	-0.038	-0.001	0.043	0.117
Income Growth (Branch Zip)	160,082	0.024	0.063	-0.061	0.000	0.022	0.046	0.112
County-level								
Log Foreclosure (per 10k Households)	5,520	0.956	0.736	0.000	0.325	0.894	1.447	2.279

Empirical Analysis 1

$$Rejection_{ijbct} = \boldsymbol{\beta_1} \times \boldsymbol{Courthouse_{jc}} + X_{it} + X_{jt} + \alpha_{ct} + \alpha_{bt} + \epsilon_{ijbct}, \qquad (1)$$

where:
- $Rejection_{ijbct}$: =1 if mortgage application i from county c in year t is rejected
- $Courthouse_{jc}$: =1 if branch j is within the 500m circle around the courthouse of county c
- X_{it} and X_{jt}: borrower and branch characteristics
- α_{ct} and α_{bt}: county-year (or tract-year) and bank-year FE

Hypothesis:

The rejection probability is higher by branches next to the courthouse: $\boldsymbol{\beta_1 > 0}$

Lending Next to the Courthouse

Empirical Result 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Distance to Court <500m	0.0058** (0.0029)	0.0075*** (0.0029)	0.0106*** (0.0029)				0.0107*** (0.0029)
Distance to Court <300m				0.0085** (0.0036)	0.0088** (0.0036)		
Distance to Court <1,000m						0.0076*** (0.0021)	
Distance to Court 300-500m					0.0140*** (0.0040)		
Distance to Court 500-1,000m							0.0033 (0.0030)
Loan-level Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Branch-level Controls	No	No	Yes	Yes	Yes	Yes	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,468,908	1,430,100	1,424,528	1,424,528	1,424,528	1,424,528	1,424,528
R-Squared	0.071	0.091	0.091	0.091	0.091	0.091	0.091

Empirical Analysis 2 (Main)

$$Rejection_{ijbct} = \beta_1 \times Courthouse_{jc} + \beta_2 \times Foreclosure_{ct}$$
$$+ \boldsymbol{\delta \times Courthouse_{jc} \times Foreclosure_{ct}} + X_{it} + X_{jt} + \alpha_{ct} + \alpha_{bt} + \epsilon_{ijbct}, \quad (2)$$

where:

- $Rejection_{ijbct}$: =1 if mortgage application i from county c in year t is rejected
- $Courthouse_{jc}$: =1 if branch j is within the 500m circle around the courthouse of county c
- $Foreclosure_{ct}$: log monthly-average foreclosures per 10,000 households in county c in year t
- X_{it} and X_{jt}: borrower and branch characteristics
- α_{ct} and α_{bt}: county-year (or tract-year) and bank-year FE

Hypothesis:

The rejection probability is more sensitive to the county-wise foreclosure by branches next to the courthouse: $\boldsymbol{\delta > 0}$

Empirical Result 2 (Main)

	(1)	(2)	(3)	(4)	(5)	(6)
Distance to Court <500m	0.0058**	-0.0054	-0.0035	-0.0009	-0.0008	-0.0008
	(0.0029)	(0.0048)	(0.0047)	(0.0048)	(0.0048)	(0.0063)
Log Foreclosure	0.0096**	0.0093***	0.0120***	0.0106***	0.0106***	
	(0.0026)	(0.0026)	(0.0025)	(0.0024)	(0.0024)	
Log Foreclosure × (Distance to Court <500m)		0.0103***	0.0101***	0.0104***	0.0104***	0.0108***
		(0.0032)	(0.0032)	(0.0033)	(0.0033)	(0.0038)
Dis. Court 500-1000m					0.0031	
					(0.0050)	
Log Foreclosure × (Distance to Court 500-1,000m)					0.0004	
					(0.0039)	
Loan-level Controls	No	No	Yes	Yes	Yes	Yes
Branch-level Controls	No	No	No	Yes	Yes	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,468,908	1,468,908	1,430,100	1,424,528	1,424,528	959,127
R-Squared	0.071	0.071	0.091	0.091	0.091	0.088

Empirical Result: By Auction Location

- Rationale for the "Courthouse" effect:

    Foreclosure auctions are held in the county courthouse

    ⇓

    People next to the courthouse are more aware of the events

    ⇓

    They become more cautious when making lending decisions

- Awareness is more likely when:
    - Foreclosure auctions are held **in person** in the courthouse instead of online
    - Foreclosure auctions are held **outside** the courthouse instead of indoor

Empirical Result: By Auction Location

	(1)	(2)	(3)	(4)
Distance to Court <500m, Outdoor Auction	-0.016	-0.0153	-0.0119	-0.012
	(0.0130)	(0.0128)	(0.0128)	(0.0128)
Distance to Court <500m, Other types of Auction	0.0005	0.0013	0.0036	0.0036
	(0.0073)	(0.0071)	(0.0074)	(0.0074)
Log Foreclosure	0.0113***	0.0144***	0.0126***	
	(0.0033)	(0.0032)	(0.0030)	
Log Foreclosure, Outdoor Auction				0.0122***
				(0.0028)
Log Foreclosure, Other Types of Auction				0.0154***
				(0.0047)
Log Foreclosure × (Distance to Court <500m, Outdoor Auction)	0.0251***	0.0255***	0.0261***	0.0260***
	(0.0068)	(0.0067)	(0.0066)	(0.0066)
Log Foreclosure × (Distance to Court <500m, Other types of Auction)	0.0043	0.0057	0.0063	0.0064
	(0.0054)	(0.0053)	(0.0055)	(0.0055)
Loan-level Controls	No	Yes	Yes	Yes
Branch-level Controls	No	No	Yes	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes
Obs.	1,468,908	1,468,908	1,430,100	1,424,528
R-Squared	0.071	0.071	0.091	0.091

Empirical Result: By Borrower Risk

- Mortgage screening is a "lemon-dropping" process

  Loan officers pick out the bad applications ("lemons") and reject them
  ⇓

  The marginal applications are the high-risk ones
  ⇓

  When risk-taking drops, the marginal high-risk applications face a higher rejection probability

- The "courthouse" effect is likely more prominent for:
  - Mortgage applications with **high DTI**
  - Mortgage applications from **negative HP growth neighborhoods**

Empirical Result: By Borrower Risk

	Low DTI			High DTI		
	(1)	(2)	(3)	(4)	(5)	(6)
Distance to Court <500m	0.0016	0.0018	0.0046	-0.0144**	-0.0100	-0.0077
	(0.0061)	(0.0058)	(0.0058)	(0.0068)	(0.0071)	(0.0073)
Log Foreclosure	0.0084***	0.0087***	0.0075***	0.0114***	0.0115***	0.0100***
	(0.0027)	(0.0025)	(0.0024)	(0.0038)	(0.0032)	(0.0031)
Log Foreclosure × (Distance to Court <500m)	0.0058	0.0053	0.0050	0.0164***	0.0115**	0.0125**
	(0.0045)	(0.0041)	(0.0041)	(0.0047)	(0.0049)	(0.005)
Loan-level Controls	No	Yes	Yes	No	Yes	Yes
Branch-level Controls	No	No	Yes	No	No	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	712,688	712,688	709,514	713,550	713,550	711,145
R-Squared	0.086	0.094	0.094	0.081	0.125	0.125

Empirical Result: By Borrower Risk

	Negative HP Growth (Property Tract)			Positive HP Growth (Property Tract)		
	(1)	(2)	(3)	(4)	(5)	(6)
Distance to Court <500m	-0.0039	-0.0006	0.0016	0.0028	0.0052	0.0082
	(0.0064)	(0.0068)	(0.0068)	(0.0068)	(0.0069)	(0.0069)
Log Foreclosure	0.0061**	0.0072***	0.0060**	0.0131***	0.0152***	0.0147***
	(0.0030)	(0.0025)	(0.0025)	(0.0033)	(0.0031)	(0.0030)
Log Foreclosure	0.0124***	0.0098**	0.0104**	-0.0024	-0.0039	-0.0040
× (Distance to Court <500m)	(0.0035)	(0.0048)	(0.0047)	(0.0063)	(0.0063)	(0.0063)
Loan-level Controls	No	Yes	Yes	No	Yes	Yes
Branch-level Controls	No	No	Yes	No	No	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	714,514	698,333	695,512	750,731	728,113	725,367
R-Squared	0.083	0.103	0.103	0.070	0.093	0.093

Empirical Result: By Bank Size

- The premise for the foreclosure exposure to affect lending decisions:
  - Decisions are made by the local branch instead of the centralized system
  - Decisions are made by human instead of machine (automatic system)

- The "courthouse" effect is likely more prominent for:
  - **Smaller banks**, which are:
  - Less likely to have mortgage centers
  - Less likely to have automatic screening system

Empirical Result: By Bank Size

	Small Bank			Large Bank		
	(1)	(2)	(3)	(4)	(5)	(6)
Distance to Court <500m	-0.0091	-0.0089	-0.0059	-0.0015	0.0011	0.0035
	(0.0062)	(0.0063)	(0.0063)	(0.008)	(0.0078)	(0.0081)
Log Foreclosure	0.0023	0.003	0.0027	0.0171***	0.0224***	0.0197***
	(0.002)	(0.0019)	(0.0019)	(0.0049)	(0.0047)	(0.0044)
Log Foreclosure	0.0160***	0.0177***	0.0172***	0.0063	0.0052	0.0066
× (Distance to Court <500m)	(0.0054)	(0.0055)	(0.0056)	(0.005)	(0.0045)	(0.0047)
Loan-level Controls	No	Yes	Yes	No	Yes	Yes
Branch-level Controls	No	No	Yes	No	No	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	693,509	673,898	669,388	774,324	755,105	754,043
R-Squared	0.098	0.116	0.116	0.051	0.073	0.074

Empirical Result: Robustness Checks

What if the exposed branches receive more risky applications?

- Not likely, because:
  - The results quickly diminish beyond 500m
  - The results are robust with tract-year FE
  - Borrower characteristics and housing market conditions are not any worse or more sensitive to county-wise foreclosure in exposed neighborhoods
  - The results are robust under a matched sample

Empirical Result: Robustness Checks

	(1)	(2)	(3)
Distance to Court <500m	-0.0135*	-0.0143**	-0.0124*
	(0.0076)	(0.0072)	(0.0072)
Log Foreclosure	0.0061**	0.0072***	0.0068***
	(0.0024)	(0.0024)	(0.0024)
Log Foreclosure × (Distance to Court <500m)	0.0132**	0.0143***	0.0141***
	(0.0053)	(0.0052)	(0.0052)
Loan-level Controls	No	Yes	No
Branch-level Controls	No	Yes	No
FE: Bank-Year	Yes	Yes	Yes
FE: Census Tract-Year	**Yes**	**Yes**	**Yes**
Obs.	1,256,092	1,221,082	1,216,723
R-Squared	0.1814	0.2016	0.2019

Empirical Result: Robustness Checks

Panel A	(1) Ln No. Appl.	(2) DTI	(3) White	(4) Hispanic	(5) HP Growth	(6) Inc Growth
Distance to Court <500m	0.0341	-0.0678***	0.0166***	0.0052	-0.0003	0.0049***
	(0.0323)	(0.0184)	(0.0038)	(0.0046)	(0.0007)	(0.0012)
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	154,462	153,299	154,462	154,462	154,462	154,462
R-Squared	0.462	0.321	0.333	0.2829	0.829	0.388

Panel B	(1) Ln No. Appl.	(2) DTI	(3) White	(4) Hispanic	(5) HP Growth	(6) Inc Growth
Distance to Court <500m	0.0318	-0.0647**	0.0152**	-0.0005	0.0014	0.0011
	(0.0484)	(0.0326)	(0.0064)	(0.0051)	(0.0015)	(0.0023)
Log Foreclosure	-0.0763***	-0.1088***	0.0133	0.0052	-0.0055***	-0.0024**
	(0.0280)	(0.0325)	(0.0101)	(0.0100)	(0.0015)	(0.0012)
Log Foreclosure *× (Distance to Court <500m)*	0.0029	-0.0019	0.0012	0.0053	-0.0015	0.0036
	(0.0359)	(0.0277)	(0.0054)	(0.0060)	(0.0015)	(0.0024)
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	154,462	153,299	154,462	154,462	154,462	154,462
R-Squared	0.462	0.322	0.333	0.2829	0.829	0.388

Empirical Result: Robustness Checks

	Full-Sample Matching		Same-Bank Matching	
	(1)	(2)	(3)	(4)
Distance to Court <500m	0.0101**	-0.0055	0.0099**	-0.0066
	(0.0049)	(0.0083)	(0.0051)	(0.0095)
Log Foreclosure		0.0168***		0.0028
		(0.0057)		(0.0087)
Log Foreclosure × (Distance to Court <500m)		0.0146**		0.0152**
		(0.0061)		(0.0070)
Loan-level Controls	Yes	Yes	Yes	Yes
Branch-level Controls	Yes	Yes	Yes	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes
Obs.	181,491	181,491	88.003	88.003
R-Squared	0.130	0.130	0.119	0.119

Empirical Result: Robustness Checks

	Similar HP (1)	Similar Income (2)	Similar PPL (3)
Distance to Court <500m	-0.0008	-0.0067	-0.0039
	(0.0074)	(0.0067)	(0.0081)
Log Foreclosure	-0.0014	0.0055	0.0003
	(0.0040)	(0.0053)	(0.0051)
Log Foreclosure × (Distance to Court <500m)	0.0139***	0.0158***	0.0120**
	(0.0049)	(0.0049)	(0.0056)
Loan-level Controls	Yes	Yes	Yes
Branch-level Controls	Yes	Yes	Yes
FE: Bank-Year	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes
Obs.	217,637	201,668	156,194
R-Squared	0.1194	0.1218	0.1268

Empirical Result: Denial Reasons

When loan officers become more cautious, them may:

- Become more inclined to reject a loan given the same risk level
    - Risk-related reasons: high leverage, low income, poor credit history, …
- Make more efforts to collect information that can reveal the loan type
    - Documentation-related reason: insufficient or unverifiable information

Empirical Result: Denial Reasons

	Risk-related Reasons			Documentation-related reasons		
	(1)	(2)	(3)	(4)	(5)	(6)
Distance to Court <500m	-0.018	-0.0162	-0.0162	-0.0013	-0.0007	-0.0015
	(0.0136)	(0.0136)	(0.0137)	(0.0100)	(0.0096)	(0.0098)
Log Foreclosure	0.0084	0.0102*	0.0091*	-0.0033	-0.0045	-0.0034
	(0.0055)	(0.0056)	(0.0055)	(0.0046)	(0.0046)	(0.0045)
Log Foreclosure × (Distance to Court <500m)	0.0174**	0.0157*	0.0177**	-0.0045	-0.0046	-0.0059
	(0.0082)	(0.0085)	(0.0084)	(0.0063)	(0.0062)	(0.0063)
Loan-level Controls	No	Yes	Yes	No	Yes	Yes
Branch-level Controls	No	No	Yes	No	No	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	187,347	180,624	180,051	187,347	180,624	180,051
R-Squared	0.355	0.370	0.369	0.277	0.286	0.286

Empirical Results

- Effect on the **extensive margin**: higher rejection rate

- Effect on the **intensive margin**: smaller approved loan size

- **Overall effect**: reduction in aggregate credit supply

Empirical Result: Loan Size

	(1)	(2)	(3)	(4)	(5)	(6)
Distance to Court <500m	-0.0844***	-0.0577***	-0.0636***	-0.0391	-0.0277*	-0.0276
	(0.0173)	(0.0099)	(0.0106)	(0.0288)	(0.0156)	(0.0169)
Log Foreclosure				-0.0795***	-0.0590***	-0.0515***
				(0.0201)	(0.0117)	(0.0107)
Log Foreclosure × (Distance to Court <500m)				-0.0493*	-0.0289**	-0.0331**
				(0.0299)	(0.0140)	(0.0169)
Loan-level Controls	No	Yes	Yes	No	Yes	Yes
Branch-level Controls	No	No	Yes	No	No	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,277,185	1,245,107	1,240,097	1,277,185	1,245,107	1,240,097
R-Squared	0.393	0.698	0.699	0.393	0.698	0.699

Empirical Result: Overall Effect

	Log Loan Number		Log Loan Amount	
	(1)	(2)	(3)	(4)
Distance to Court <500m	-0.0125***	0.0016	-0.0946***	-0.0125
	(0.0048)	(0.0087)	(0.0226)	(0.0354)
Log Foreclosure		-0.0155***		-0.1572***
		(0.0058)		(0.0383)
Log Foreclosure × (Distance to Court <500m)		-0.0129**		-0.0742**
		(0.0063)		(0.0289)
Log Number of Applications	Yes	Yes	Yes	Yes
Average Applicant Characteristics	Yes	Yes	Yes	Yes
Branch-level Controls	Yes	Yes	Yes	Yes
FE: Bank-Year	Yes	Yes	Yes	Yes
FE: County-Year	Yes	Yes	Yes	Yes
Obs.	152,677	152,677	152,677	152,677
R-Squared	0.943	0.943	0.696	0.696

Conclusion

- A micro-level individual decision making channel:
    - Individuals' exposure to adverse market events can change their risk preferences or beliefs
    - The changes in risk taking behaviors can affect financial decision makings of finance professionals
    - This can amplify the negative consequences on aggregate credit supply

- No efficiency conclusion:
    - If people took too much risk ex ante, exposure to the adverse events can lead to more efficient level of risk taking
    - If people took the optimal level of risk ex ante, exposure to the adverse events can lead to biases and even slow down recovery