

The Cross-Market Spillover of Shocks through Multi-Market Banks

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Introduction

- The recent financial crisis has renewed concerns about the transmission of financial shocks through the financial system.
- This paper studies the implications of multimarket banking for the spillover of shocks across regional mortgage markets.
- We focus on the U.S. housing market collapse of 2007-2009.

Main Questions

- Do multimarket banks transmit economic shocks across markets?
 - The shock is an increase in mortgage default rates
- Is the sensitivity of a bank's local lending to outside economic shocks bigger in its more peripheral markets?
 - Peripheral markets are those in which a multimarket bank does a small share of its mortgage lending
- Are changes in a bank's local portfolio lending (kept on books) offset by changes in its local securitized lending?
 - Securitized lending should be less sensitive to bank capital

Transmission of Outside Shock

Multimarket banks may respond to an outside shock by:

- **Decreasing** local lending because the shock reduces bank's overall capital (supply shock)
→ Spillover effect
- **Increasing** local lending because shock reduces borrowers' creditworthiness/demand in outside market (demand shock)
→ Substitution effect

Main Findings

- **Spillover effect outweighs substitution effect:**
multimarket banks reduce local portfolio lending in response to increased defaults in other markets.
- **Effect is bigger in a bank's more peripheral markets:**
local portfolio lending falls by a greater percent in such markets.
- **Changes in securitized lending are partly offsetting:**
total lending also falls, though by somewhat smaller percent than portfolio lending.

Related Literature

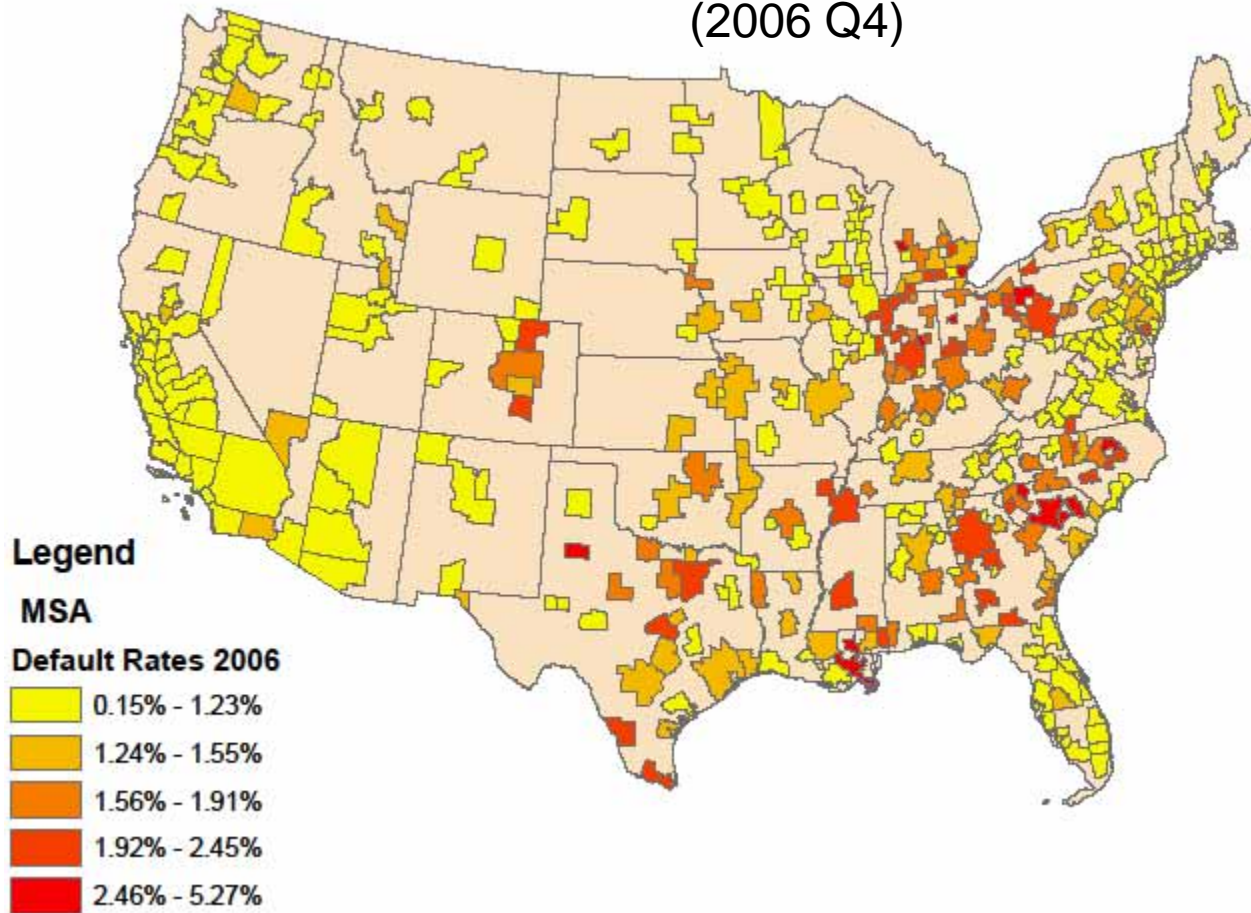
- Supply-side shocks
 - Bernanke and Lown (1991), Bernanke and Gertler (1995)
- Internal capital markets
 - Campello (2002), Ashcraft (2006), Huang (2008)
- Geographic diversification and local shocks
 - Morgan, Rime, and Strahan (2004), Becker (2007), Keeton (2009)
- International transmission of financial shocks
 - Peek and Rosengren (2000)
 - Khwaja and Mian (2008), Schnable (2010), Cetorelli and Goldberg (2008), Popov and Udell (2010)

Data

- Home Mortgage Disclosure Act (HMDA)
 - Loan-level data on mortgage originations in U.S. metro areas.
 - Loans kept on books (portfolio) versus loans sold to GSEs or non-affiliates in private sector (securitized).
- TrenData
 - Mortgage delinquency rates (past due 90+ days) by county.
- Call Reports (bank-level data)
 - Bank size (assets)
 - Ratio of tangible capital to assets.
 - Delinquency rate on loans other than residential real estate.
- Structure of data
 - 5,500 banks and thrifts (at the top-holder level).
 - 376 Metropolitan Statistical Areas (MSAs).
 - Four years (2006-2009)

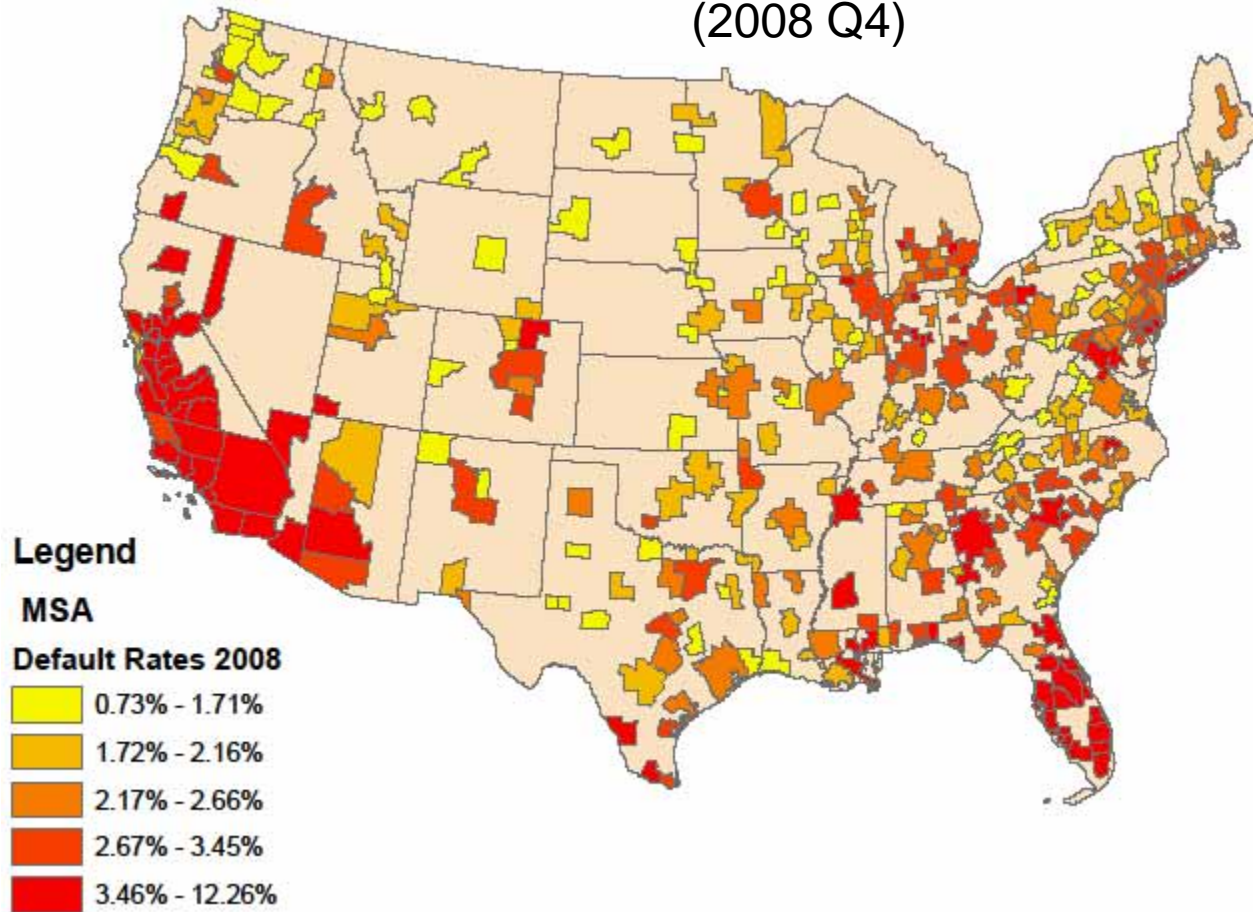
Geography of Mortgage Defaults

Mortgage Defaults by MSA
(2006 Q4)



Geography of Mortgage Defaults

Mortgage Defaults by MSA
(2008 Q4)



Sample Statistics on Mortgage Originations

Type of bank and type of lending	Pre-crisis originations (2006-2007), millions of dollars	Crisis originations (2008-2009), millions of dollars	Percent change
Single-market banks (1,273)	8,385.2	8,621.8	2.8
Portfolio	5,617.1	5,451.0	-3.0
Securitized	2,768.1	3,170.8	14.6
Multi-market banks (4,222)	951,285.5	407,140.7	-57.2
Portfolio	487,200.0	164,501.4	-66.3
Securitized	464,085.5	242,639.3	-47.7

Sample Statistics on Bank Size, Growth in Total Originations and Loss Rates

Type of bank/market observation (share of market in bank's total pre-crisis originations)	Number of observations	Median bank size at end of 2007 (millions of dollars)	Median log growth of originations, pre-crisis to crisis (percent)	Median change in local loss rate, 2005- 2007 (percentage points)	Median change in other loss rate , 2005-2007 (percentage points)
Single-market bank (>.99)	1,273	156	5.0	0.26	NA
Multi-market bank, core market (.50 to .99)	1,774	359	-14.2	0.30	0.35
Multi-market bank, moderately peripheral market (.01 to .50)	4,801	1,572	-35.0	0.41	0.55
Multi-market bank, highly peripheral market (<.01)	6,643	72,600	-93.2	0.29	0.90

Methodology

- **Divide the four years into two periods:** pre-crisis (2006-2007) and crisis (2008-2009).
- Restrict sample to bank/market observations with positive portfolio originations in both periods.
- **Compute growth in originations from pre-crisis to crisis** for each bank/market observation, merger-adjusted.
- For independent variables, use value at end of pre-crisis period or change during pre-crisis period
- **Run cross-section regression** on market dummies, bank-level controls, and measures of the bank's exposure to other markets with increased delinquencies.

Basic Regression Equation

Regression for growth of originations of bank i in metro area m :

$$(1) \text{LNGROWTH}_{i,m} = a_m \cdot \text{MARKET}_{i,m} + b \cdot \text{SIZE}_i + c \cdot \Delta \text{TCE}_i + d \cdot \Delta \text{NRNPL}_i \\ + e \cdot \Delta \text{LOCALLOSS}_{i,m} + f_k \cdot \text{PERIPHERAL}_{i,m}^k \\ + g_k \cdot \text{PERIPHERAL}_{i,m}^k \cdot \Delta \text{OTHERLOSS}_{i,m} + \varepsilon_{i,m}$$

$\text{LNGROWTH}_{i,m}$:

growth of originations from pre-crisis to crisis

$\text{MARKET}_{i,m}$:

market dummy to control for local loan demand

SIZE_i , ΔTCE_i , ΔNRNPL_i :

bank-level controls for pre-crisis period

$\Delta \text{LOCALLOSS}_{i,m}$:

control for within-market variation in delinquencies

$\text{PERIPHERAL}_{i,m}^k$:

dummy measuring how unimportant the market is in bank's total lending

$\Delta \text{OTHERLOSS}_{i,m}$:

average change in delinquency rate in bank's other markets in pre-crisis period

Interpretation of Coefficients

$$(1) \text{ LNGROWTH}_{i,m} = a_m \cdot \text{MARKET}_{i,m} + b \cdot \text{SIZE}_i + c \cdot \Delta \text{TCE}_i + d \cdot \Delta \text{NRNPL}_i \\ + e \cdot \Delta \text{LOCALLOSS}_{i,m} + f_k \cdot \text{PERIPHERAL}_{i,m}^k \\ + g_k \cdot \text{PERIPHERAL}_{i,m}^k \cdot \Delta \text{OTHERLOSS}_{i,m} + \varepsilon_{i,m}$$

- Spillover effect of outside shocks dominates substitution effect: $g_k < 0$
- Effect is bigger in the bank's more peripheral markets:
 $g_{k+1} < g_k$
- Securitized lending partially offsets result for g_k and g_{k+1}

Regression for Portfolio Lending

Dependent variable: Growth in originations from pre-crisis (2006-2007) to crisis (2008-2009)

	(1)	(2)
Multi Market (=1 if bank lends in other markets)	17.8*** [3.9]	
Multi market * Δ Other loss rate	-25.1*** [2.6]	
Core (=1 if market accounts for more than half of bank's total originations but not all)		-1.5 [5.1]
Core * Δ Other loss rate		-17.1** [7.78]
Peripheral (=1 if market accounts for less than half of bank's total originations)		30.8*** [4.1]
Peripheral * Δ Other loss rate		-39.8*** [3.0]
Observations	14,491	14,491
Market Fixed Effects	yes	yes
Adjusted R Squared	0.20	0.21

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Summary of Results for Portfolio Lending

- We find that growth in a multimarket bank's local portfolio lending falls in response to outside shocks.
- A 50 bp increase in other loss rate leads to a 13 percentage point fall in a multimarket bank's local lending growth.
- Effect is greater in peripheral markets than core markets:
 - A 50 bp increase in other loss rate leads to a 9 percentage point fall in lending growth in core markets but a 20 point fall in lending growth in peripheral markets.
- Results suggest that the **spillover effect of outside economic shocks dominates the substitution effect** (supply shocks play bigger role than demand shocks).

From Pre-crisis to Crisis: Securitized Loans

Dependent Variable: Growth in Originations

	(1)	(2)
Multi Market	0.711 [6.355]	
Multi market * Other loss rate	3.369 [2.794]	
Core		-9.416 [8.864]
Core * Other loss rate		28.296** [13.483]
Peripheral		1.485 [6.575]
Peripheral * Other loss rate		0.524 [3.532]
Observations	7897	7897
Market Fixed Effects	Yes	Yes
Adjusted R Squared	0.11	0.11

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Observations	7897	7897
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Results for Securitized Loans

- We find evidence of the **substitution effect** through securitized loans.
 - Banks appear to reduce securitized lending less in response to outside shocks.
 - Banks may even increase securitized lending in the local market to compensate for the reduced ability to do portfolio lending in these markets.

Regression for Total Lending

Dependent Variable: Growth in originations from pre-crisis (2006-2007) to crisis (2008-2009)

	(1)	(2)
Multi Market	6.1*	
	[3.7]	
Multi market * Δ Other loss rate	-14.6***	
	[2.3]	
Core		-7.9*
		[4.7]
Core * Δ Other loss rate		-6.8
		[6.9]
Peripheral		14.8***
		[3.9]
Peripheral * Δ Other loss rate		-23.8***
		[2.8]
Observations	14,491	14,491
Market Fixed Effects	yes	yes
Adjusted R Squared	0.18	0.18

Regression for Total Lending

Dependent Variable: Growth in originations from pre-crisis (2006-2007) to crisis (2008-2009)

	(1)	(2)
Multi Market	6.1*	
	[3.7]	
Multi market * Δ Other loss rate	-14.6***	
	[2.3]	
Core		-7.9*
		[4.7]
Core * Δ Other loss rate		-6.8
		[6.9]
Peripheral		14.8***
		[3.9]
Peripheral * Δ Other loss rate		-23.8***
		[2.8]
Observations	14,491	14,491
Market Fixed Effects	yes	yes
Adjusted R Squared	0.18	0.18

Summary of Results for Total Lending

- We find that growth in a multimarket bank's total local lending falls in response to outside economic shocks.
- A 50 bp-increase in the other loss rate leads to a 7 percentage point fall in total lending growth.
- As before, effect is greater effect in peripheral markets than core markets:
 - A 50 bp-increase in other loss rate leads to insignificant effect in core markets but a 12 percentage point reduction in lending growth in peripheral markets.
- Result suggest that **securitized lending partially compensates for decline in portfolio lending** in response to outside economic shocks.

Planned Extensions

- Look at interaction with capitalization
 - E.g. Interaction of Other Loss Rate with (Residential Mortgage Portfolio/Capital)
- Evaluate measures based on distance
- Construct measures of local branch presence and investigate influence on bank response.

Conclusions

- We find evidence for **cross-market transmission** of economic shocks through multimarket banks.
- Multimarket banks reduce local mortgage lending in response to increased delinquencies in other markets, consistent with **spillover effect**.
- As expected, effects on local lending are bigger in multimarket banks' **peripheral markets**.
- **Securitized lending** partially offsets the decline in local portfolio lending due to outside shocks.
- **Policy implication:** Regulators of SIFIs may want to consider the transmission of shocks through multimarket banking.