



**GOLUB CENTER
FOR FINANCE AND POLICY**

4th Annual Conference

Government Financial Products, Policies, and Institutions

September 28, 2017

The Time-Varying Price of Financial Intermediation in the Mortgage Market

Andreas Fuster¹ Stephanie Lo² Paul Willen³

¹Federal Reserve Bank of New York

²Harvard

³Federal Reserve Bank of Boston and NBER

June 2017

Disclaimer: The views expressed in this paper are solely those of the authors and not necessarily those of the Federal Reserve Banks of Boston or New York, or the Federal Reserve System.

Motivation

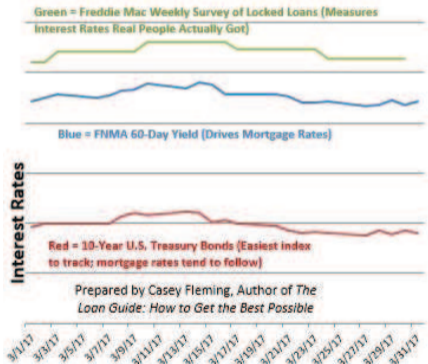
- We study intermediation in the U.S. mortgage market, which connects borrowers with capital market investors through mortgage-backed securities (MBS)
- A large and important market: Over 2000-2014, residential mortgage originations in U.S. averaged about \$2.2 trillion per year
 - Since 2008: 80% of mortgages securitized through “agency” MBS (Fannie Mae, Freddie Mac, Ginnie Mae)
- One of the main activities of the U.S. financial sector and a principal driver of its growth in recent decades (Greenwood and Scharfstein, 2013)
- Direct impact on households: mortgage borrowers implicitly pay financial intermediaries for originating and servicing the loan
- Policy implications: Fed MBS purchases (“QE”) have been an important monetary policy tool post-crisis
 - Affect MBS prices – how much passes through to borrowers?

Summary

1. Develop a new methodology, using a novel dataset, to measure *price of intermediation* in mortgage market over 2008-2014
2. Characterize high-frequency pass-through of price changes in secondary (MBS) market to primary market
 - Of particular interest: QE case studies
3. Study the time-variation in the price of intermediation and investigate its economic drivers

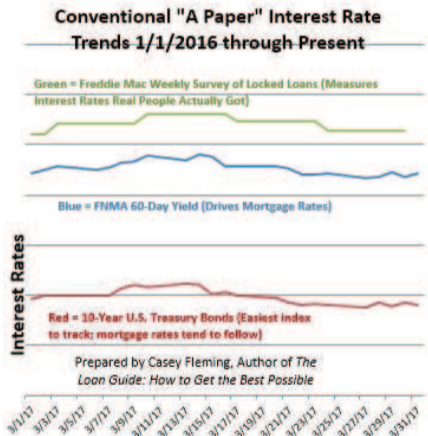
Measuring the price of intermediation

Conventional "A Paper" Interest Rate Trends 1/1/2016 through Present



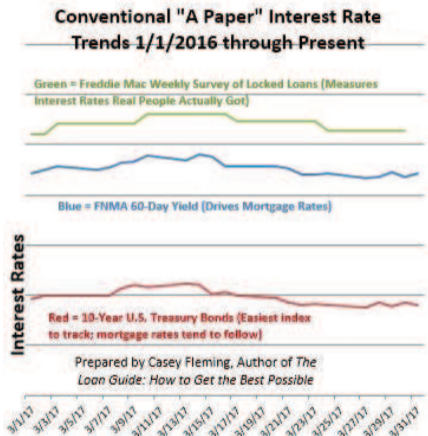
- Compare
 - Note rate on mortgage
 - Cost of funds

Measuring the price of intermediation



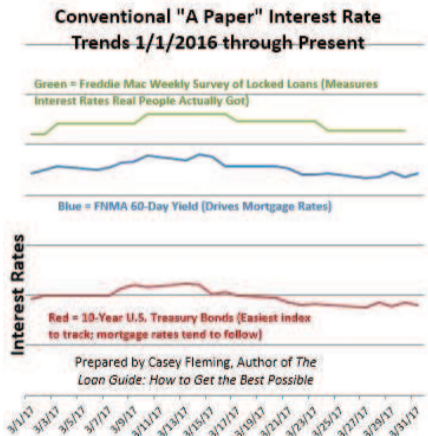
- Compare
 - Note rate on mortgage
 - Cost of funds
- *Flow* of payments of

Measuring the price of intermediation



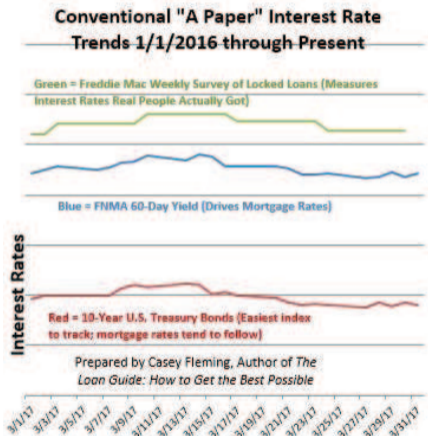
- Compare
 - Note rate on mortgage
 - Cost of funds
- *Flow* of payments of
- Profit is PDV of flow
 - Uncertain timing
 - Stochastic discount factor

Measuring the price of intermediation



- Compare
 - Note rate on mortgage
 - Cost of funds
- *Flow* of payments of
- Profit is PDV of flow
 - Uncertain timing
 - Stochastic discount factor
- Hard problem – need a model

Measuring the price of intermediation



- Compare
 - Note rate on mortgage
 - Cost of funds
- *Flow* of payments of
- Profit is PDV of flow
 - Uncertain timing
 - Stochastic discount factor
- Hard problem – need a model
- Alternative: Do what lenders actually do!

Intermediation in the mortgage market

Borrower

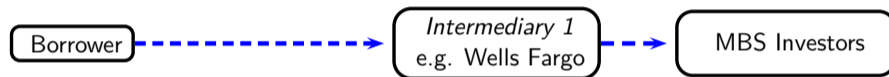
- Individual mortgage borrower

Intermediation in the mortgage market



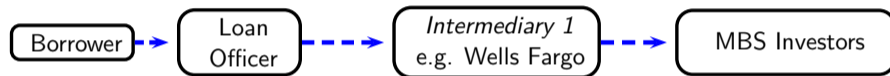
- Individual mortgage borrower
- Gets quotes from intermediary

Intermediation in the mortgage market



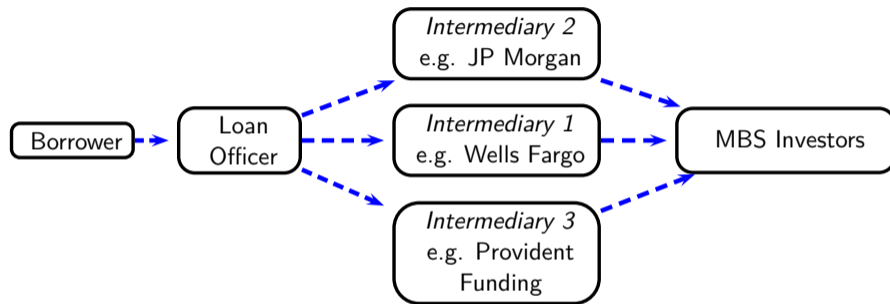
- Individual mortgage borrower
- Gets quotes from intermediary
- Intermediary then sells loan to investors

Intermediation in the mortgage market



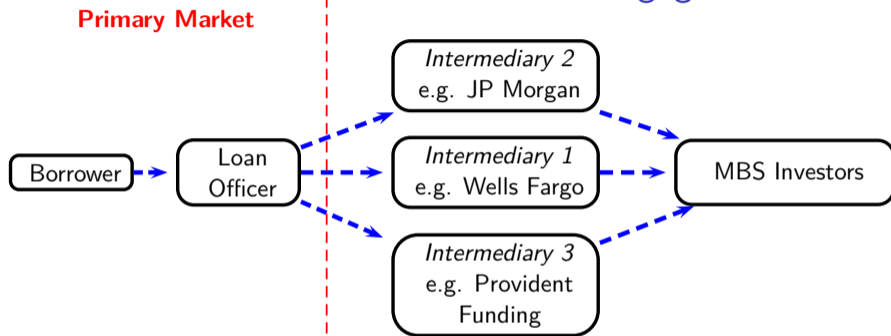
- Individual mortgage borrower
- Gets quotes from intermediary
- Intermediary then sells loan to investors
- In reality, borrowers receive quotes through loan officer, who gets commission from intermediary

Intermediation in the mortgage market



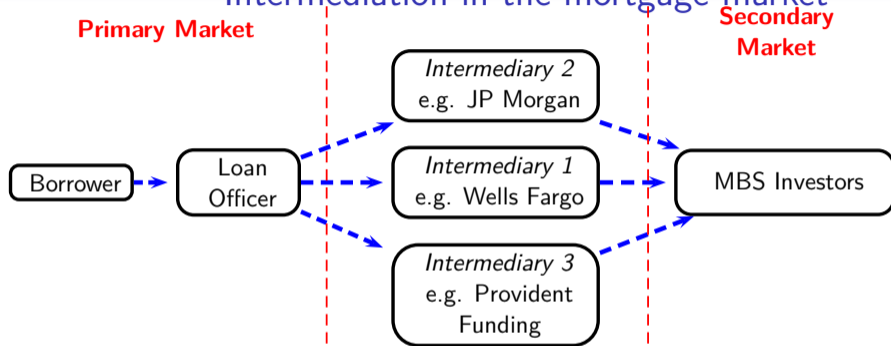
- Individual mortgage borrower
- Gets quotes from intermediary
- Intermediary then sells loan to investors
- In reality, borrowers receive quotes through loan officer, who gets commission from intermediary
- Focus on LOs working with multiple intermediaries (“TPO”)

Intermediation in the mortgage market



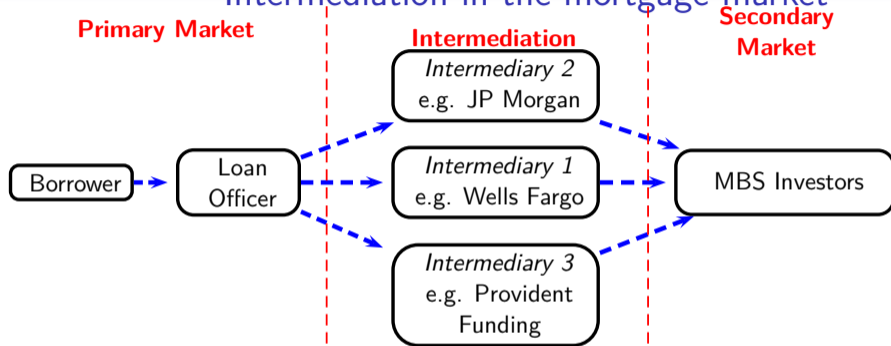
- Individual mortgage borrower
- Gets quotes from intermediary
- Intermediary then sells loan to investors
- In reality, borrowers receive quotes through loan officer, who gets commission from intermediary
- Focus on LOs working with multiple intermediaries (“TPO”)

Intermediation in the mortgage market



- Individual mortgage borrower
- Gets quotes from intermediary
- Intermediary then sells loan to investors
- In reality, borrowers receive quotes through loan officer, who gets commission from intermediary
- Focus on LOs working with multiple intermediaries (“TPO”)

Intermediation in the mortgage market



- Individual mortgage borrower
- Gets quotes from intermediary
- Intermediary then sells loan to investors
- In reality, borrowers receive quotes through loan officer, who gets commission from intermediary
- Focus on LOs working with multiple intermediaries (“TPO”)

Rates and Yield Spread Premia (YSPs)



19500 Jamboree Road, Suite 400, Irvine, CA 92612

Fannie 30yr Fixed				CF30
Rate	15 day	30 day	45 day	60 day
5.500				(7.757)
5.375	(7.618)	(7.560)	(7.498)	(7.436)
5.250	(7.293)	(7.234)	(7.173)	(7.110)
5.125	(6.629)	(6.570)	(6.509)	(6.446)
5.000	(6.089)	(6.015)	(5.939)	(5.861)
4.875	(5.884)	(5.811)	(5.734)	(5.656)
4.750	(5.454)	(5.381)	(5.305)	(5.226)
4.625	(4.908)	(4.835)	(4.758)	(4.680)
4.500	(4.356)	(4.282)	(4.206)	(4.128)
4.375	(3.807)	(3.728)	(3.650)	(3.572)
4.250	(3.461)	(3.373)	(3.287)	(3.201)
4.125	(2.859)	(2.771)	(2.684)	(2.598)
4.000	(2.209)	(2.121)	(2.035)	(1.949)
3.875	(1.482)	(1.394)	(1.307)	(1.221)
3.750	(0.839)	(0.765)	(0.689)	(0.611)
3.625	(0.131)	(0.058)	0.019	0.097

- Intermediary pays: $P_{YSP}^n = 100 + YSP(r^n)$

Rates and Yield Spread Premia (YSPs)



19500 Jamboree Road, Suite 400, Irvine, CA 92612

Fannie 30yr Fixed				CF30
Rate	15 day	30 day	45 day	60 day
5.500				(7.757)
5.375	(7.618)	(7.560)	(7.498)	(7.436)
5.250	(7.293)	(7.234)	(7.173)	(7.110)
5.125	(6.629)	(6.570)	(6.509)	(6.446)
5.000	(6.089)	(6.015)	(5.939)	(5.861)
4.875	(5.884)	(5.811)	(5.734)	(5.656)
4.750	(5.454)	(5.381)	(5.305)	(5.226)
4.625	(4.908)	(4.835)	(4.758)	(4.680)
4.500	(4.356)	(4.282)	(4.206)	(4.128)
4.375	(3.807)	(3.728)	(3.650)	(3.572)
4.250	(3.461)	(3.373)	(3.287)	(3.201)
4.125	(2.859)	(2.771)	(2.684)	(2.598)
4.000	(2.209)	(2.121)	(2.035)	(1.949)
3.875	(1.482)	(1.394)	(1.307)	(1.221)
3.750	(0.839)	(0.765)	(0.689)	(0.611)
3.625	(0.131)	(0.058)	0.019	0.097

REAL-TIME PRICING		
30 YR	15 YR	
MBS	Price	My Change
Fannie Mae 30 Year		10:15AM EST ▾
FNMA 3.0	97-14 +0-10	-0-02
FNMA 3.5	101-05 +0-08	+0-01
FNMA 4.0	104-01 +0-07	+0-01

- Intermediary pays: $p_{YSP}^n = 100 + YSP(r^n)$
- Intermediary receives: $p_{TBA}^n = 100 + TBA(r^n)$

Rates and Yield Spread Premia (YSPs)



19500 Jamboree Road, Suite 400, Irvine, CA 92612

Fannie 30yr Fixed				CF30
Rate	15 day	30 day	45 day	60 day
5.500				(7.757)
5.375	(7.618)	(7.560)	(7.498)	(7.436)
5.250	(7.293)	(7.234)	(7.173)	(7.110)
5.125	(6.629)	(6.570)	(6.509)	(6.446)
5.000	(6.089)	(6.015)	(5.939)	(5.861)
4.875	(5.884)	(5.811)	(5.734)	(5.656)
4.750	(5.454)	(5.381)	(5.305)	(5.226)
4.625	(4.908)	(4.835)	(4.758)	(4.680)
4.500	(4.356)	(4.282)	(4.206)	(4.128)
4.375	(3.807)	(3.728)	(3.650)	(3.572)
4.250	(3.461)	(3.373)	(3.287)	(3.201)
4.125	(2.859)	(2.771)	(2.684)	(2.598)
4.000	(2.209)	(2.121)	(2.035)	(1.949)
3.875	(1.482)	(1.394)	(1.307)	(1.221)
3.750	(0.839)	(0.765)	(0.689)	(0.611)
3.625	(0.131)	(0.058)	0.019	0.097

REAL-TIME PRICING		
30 YR	15 YR	
MBS	Price	My Change
Fannie Mae 30 Year		10:15AM EST ▾
FNMA 3.0	97-14 +0-10	-0-02
FNMA 3.5	101-05 +0-08	+0-01
FNMA 4.0	104-01 +0-07	+0-01

- Intermediary pays: $P_{YSP}^n = 100 + YSP(r^n)$
- Intermediary receives: P_{TBA}^n
 $= 100 + TBA(r^n)$
- Definition: price of intermediation
 $\phi^n \equiv P_{TBA}^n - P_{YSP}^n$
 - Dollar margin per \$100 principal
 - Market measure of PDV of flow.

Measuring the price of a loan in the primary market

- YSPs aka rebates are hard to measure
 - Generally not publicly disclosed and not included in any standard loan level dataset

Measuring the price of a loan in the primary market

- YSPs aka rebates are hard to measure
 - Generally not publicly disclosed and not included in any standard loan level dataset
- We obtain digitized versions from a company called “Optimal Blue” over Oct 2008 – Dec 2014
 - End-of-day snapshots from the point of view of actual loan officers
 - On average 22 intermediaries per day (63 unique ones in data overall)
 - Anonymized but know that contains largest players

Measuring the price of a loan in the primary market

- YSPs aka rebates are hard to measure
 - Generally not publicly disclosed and not included in any standard loan level dataset
- We obtain digitized versions from a company called “Optimal Blue” over Oct 2008 – Dec 2014
 - End-of-day snapshots from the point of view of actual loan officers
 - On average 22 intermediaries per day (63 unique ones in data overall)
 - Anonymized but know that contains largest players
- Mostly focus on (interpolated) rate that gets YSP of 1: “Rate101”
 - Taking median across lenders (i.e. no x-sectional analysis in this paper)
 - Fixed, plain-vanilla loan characteristics

Measuring the value of a loan in the MBS market

- After buying the loan from the borrower (and paying p_{YSP}), the intermediary sells the loan in the forward (“To-Be-Announced” or TBA) market
 - Highly liquid OTC market; >\$100bn trading vol./day
 - Settlement 1-3 months in the future
- Several coupons traded at increments of 50 bps; price per \$100 principal is p_{TBA}^n (obtained from JPM):

Stylized MBS prices

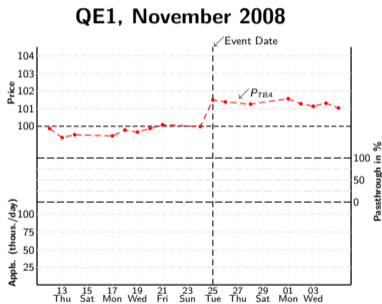
Coupon	p_{TBA}
3.50%	100.510
4.00%	102.732
4.50%	104.698

- To go from mortgage note rate to MBS coupon, we subtract “g-fees” (22-42 bps over sample) and required upfront payments to agency insuring the credit risk (e.g. Fannie Mae)

Example

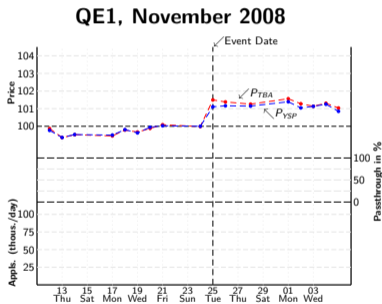
Quantitative easing case studies

- Holding rate fixed, what was passthrough after major monetary policy announcements?



Quantitative easing case studies

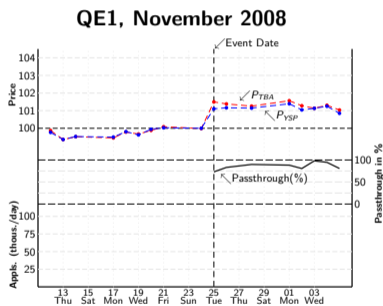
- Holding rate fixed, what was passthrough after major monetary policy announcements?



- Both primary and secondary market prices increased; passthrough 75-100%

Quantitative easing case studies

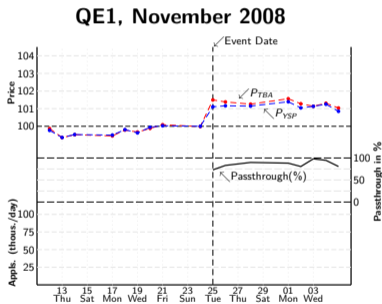
- Holding rate fixed, what was passthrough after major monetary policy announcements?



- Both primary and secondary market prices increased; passthrough 75-100%

Quantitative easing case studies

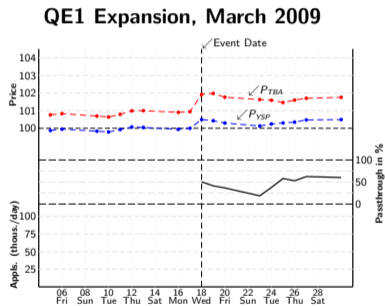
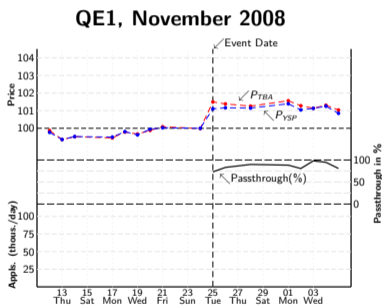
- Holding rate fixed, what was passthrough after major monetary policy announcements?



- Both primary and secondary market prices increased; passthrough 75-100%

Quantitative easing case studies

- Holding rate fixed, what was passthrough after major monetary policy announcements?

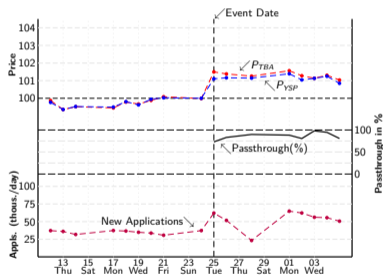


- Both primary and secondary market prices increased; passthrough 75-100%
- QE1 Expansion: Passthrough much lower

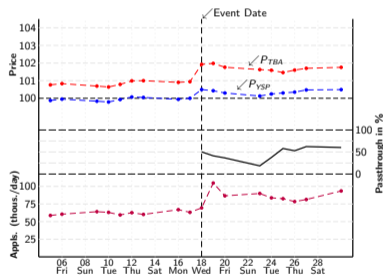
Quantitative easing case studies

- Holding rate fixed, what was passthrough after major monetary policy announcements?

QE1, November 2008



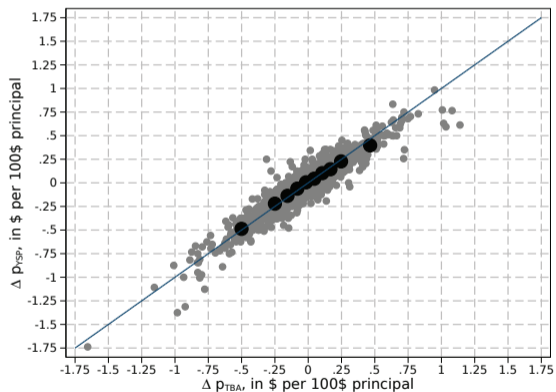
QE1 Expansion, March 2009



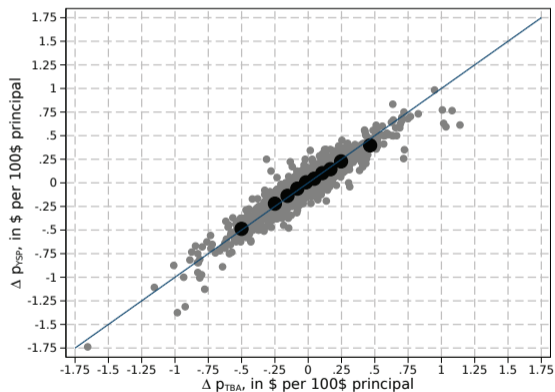
- Both primary and secondary market prices increased; passthrough 75-100%

- QE1 Expansion: Passthrough much lower
- Volume higher (from HMDA)

Passthrough

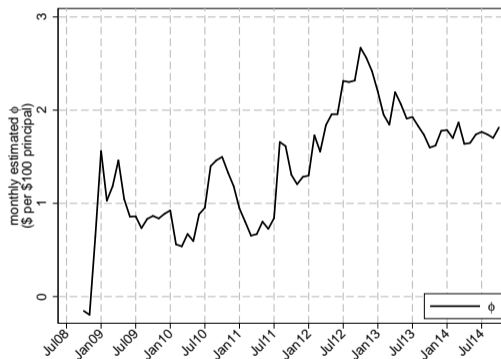


Passthrough



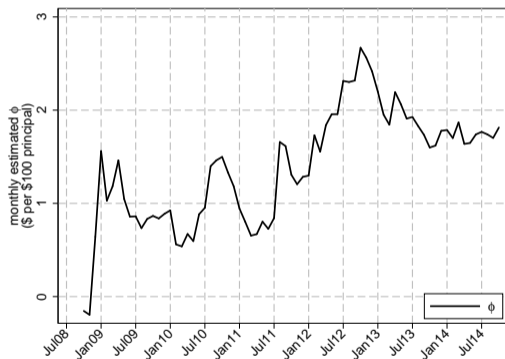
- Regressions of primary market change on secondary
 - Average pass-through 0.92; high R^2
 - Significant asymmetry: decreases fully passed through, increases “only” 0.8 on day 1, 0.87 over two days
 - Pass-through of price increases smaller when applications $_{t-1}$ higher. E.g. 2 SD above average: pass-through 0.59 (= 0.78 - 2 * 0.096)

Monthly average price of intermediation ϕ



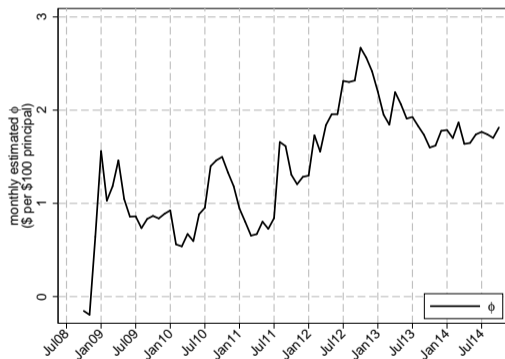
- $\phi = p_{TBA} - p_{YSP}$ varies substantially over sample: from 0 to 3 (\$ per 100\$ principal) – this range corresponds to \$9k on \$300k mortgage

Monthly average price of intermediation ϕ



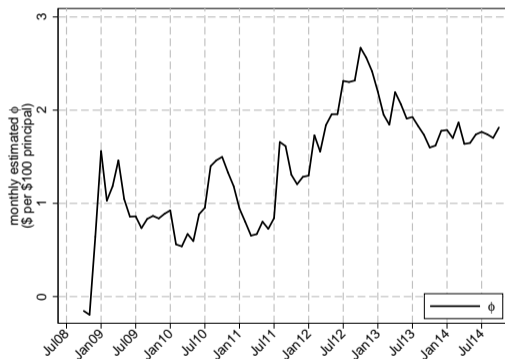
- $\phi = p_{TBA} - p_{YSP}$ varies substantially over sample: from 0 to 3 (\$ per 100\$ principal) – this range corresponds to \$9k on \$300k mortgage
- Strong upward trend & large variation around trend

Monthly average price of intermediation ϕ



- $\phi = p_{TBA} - p_{YSP}$ varies substantially over sample: from 0 to 3 (\$ per 100\$ principal) – this range corresponds to \$9k on \$300k mortgage
- Strong upward trend & large variation around trend
- Note: level in late 2008 not unusually low vs. prior years [More](#)

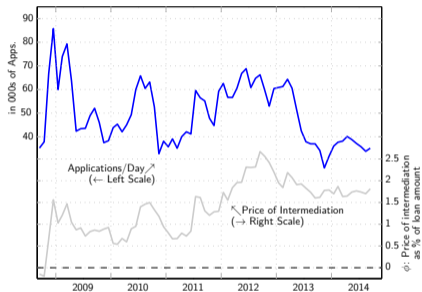
Monthly average price of intermediation ϕ



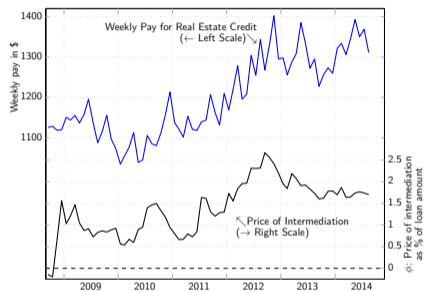
- $\phi = p_{TBA} - p_{YSP}$ varies substantially over sample: from 0 to 3 (\$ per 100\$ principal) – this range corresponds to \$9k on \$300k mortgage
- Strong upward trend & large variation around trend
- Note: level in late 2008 not unusually low vs. prior years [More](#)
- Next: what explains this?

What drives the price of intermediation?

ϕ vs. Loan Applications



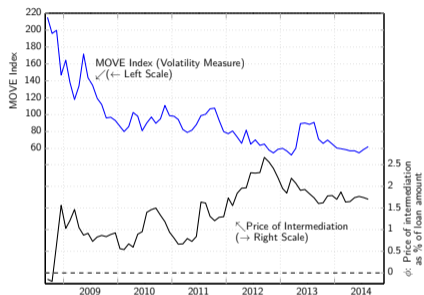
vs. R.E. Credit Wages



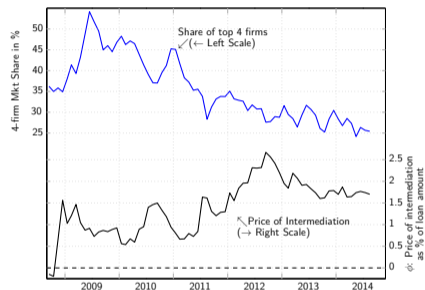
- ϕ highly correlated with level of new mortgage applications
 - suggests increasing marginal costs of originating loans / limited capacity
- ϕ time trend consistent with increase in wages for R.E. credit employees

What drives the price of intermediation?

ϕ vs. Interest Volatility



vs. Concentration



- ϕ seems unrelated to MOVE index (implied Treasury volatility), which proxies for hedging costs
- ϕ time trend not driven by increase in concentration (measured as share of top 4 lenders in HMDA, as in Scharfstein and Sunderam 2016)

Determinants of the price of intermediation

- High correlation with applications

	ϕ , OLS			ϕ , IV
	(1)	(2)	(3)	(4)
Applications	0.199* (0.108)	0.357*** (0.042)	0.331*** (0.049)	0.407*** (0.058)
Time Trend		0.026*** (0.002)	0.016** (0.008)	0.025*** (0.007)
Volatility			-0.094 (0.077)	-0.027 (0.074)
Lender Conc.			0.060 (0.085)	0.148** (0.069)
R.E. Payroll			0.199*** (0.063)	0.154** (0.063)
Constant	1.398*** (0.124)	-14.485*** (1.319)	-8.725* (4.981)	-14.263*** (4.578)
Obs.	73	73	73	73
Adj. R ²	0.10	0.84	0.87	
1st st. F-stat				38

Newey-West standard errors (4 lags) in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Determinants of the price of intermediation

- High correlation with applications
- More or less consistent with figures

	ϕ , OLS			ϕ , IV
	(1)	(2)	(3)	(4)
Applications	0.199* (0.108)	0.357*** (0.042)	0.331*** (0.049)	0.407*** (0.058)
Time Trend		0.026*** (0.002)	0.016** (0.008)	0.025*** (0.007)
Volatility			-0.094 (0.077)	-0.027 (0.074)
Lender Conc.			0.060 (0.085)	0.148** (0.069)
R.E. Payroll			0.199*** (0.063)	0.154** (0.063)
Constant	1.398*** (0.124)	-14.485*** (1.319)	-8.725* (4.981)	-14.263*** (4.578)
Obs.	73	73	73	73
Adj. R ²	0.10	0.84	0.87	
1st st. F-stat				38

Newey-West standard errors (4 lags) in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

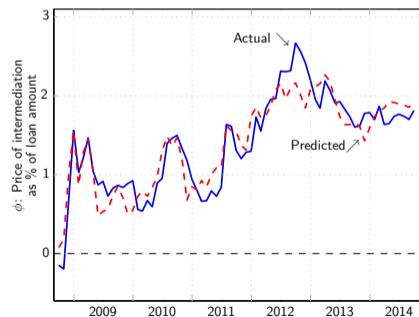
Determinants of the price of intermediation

- High correlation with applications
- More or less consistent with figures

	ϕ , OLS			ϕ , IV
	(1)	(2)	(3)	(4)
Applications	0.199* (0.108)	0.357*** (0.042)	0.331*** (0.049)	0.407*** (0.058)
Time Trend		0.026*** (0.002)	0.016** (0.008)	0.025*** (0.007)
Volatility			-0.094 (0.077)	-0.027 (0.074)
Lender Conc.			0.060 (0.085)	0.148** (0.069)
R.E. Payroll			0.199*** (0.063)	0.154** (0.063)
Constant	1.398*** (0.124)	-14.485*** (1.319)	-8.725* (4.981)	-14.263*** (4.578)
Obs.	73	73	73	73
Adj. R ²	0.10	0.84	0.87	
1st st. F-stat				38

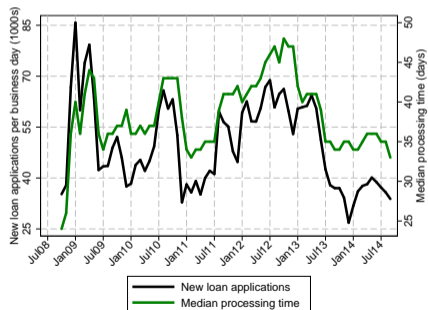
Newey-West standard errors (4 lags) in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$



More direct evidence of capacity constraints

- HMDA: when applications increase by 1 S.D., time to process new applications increases 3-4 days
- Upward trend in processing time is consistent with increase in labor intensity of underwriting over this period



Implicit cost to borrowers

- Over 73-month period in our paper:
 - \$6.4T in refinancing and \$3.5T in new mortgage debt
 - Households implicitly paid \$147B to intermediaries (\approx \$25B/year)

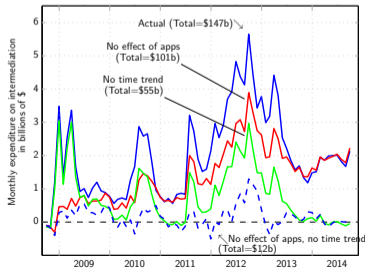
Implicit cost to borrowers

- Over 73-month period in our paper:
 - \$6.4T in refinancing and \$3.5T in new mortgage debt
 - Households implicitly paid \$147B to intermediaries (\approx \$25B/year)
- How much would borrowers have paid if ϕ did not react to applications or time trend? (*holding Q fixed*)

Implicit cost to borrowers

- Over 73-month period in our paper:
 - \$6.4T in refinancing and \$3.5T in new mortgage debt
 - Households implicitly paid \$147B to intermediaries (\approx \$25B/year)
- How much would borrowers have paid if ϕ did not react to applications or time trend? (*holding Q fixed*)

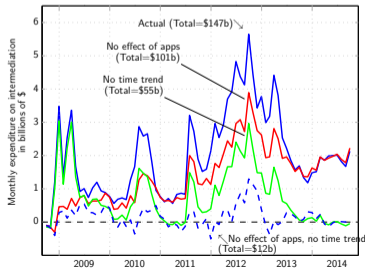
Borrower Costs



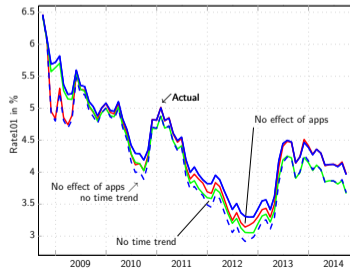
Implicit cost to borrowers

- Over 73-month period in our paper:
 - \$6.4T in refinancing and \$3.5T in new mortgage debt
 - Households implicitly paid \$147B to intermediaries (\approx \$25B/year)
- How much would borrowers have paid if ϕ did not react to applications or time trend? (*holding Q fixed*)

Borrower Costs



Borrower Rates



Policy Implications

- Refinancing mortgages was a key instrument of policy
 - Extremely expensive for borrowers
 - Especially as costs explode precisely when people want to refinance
- Time trend
 - Typically blamed on regulation
 - More research to be done.



**GOLUB CENTER
FOR FINANCE AND POLICY**

4th Annual Conference

Government Financial Products, Policies, and Institutions

September 28, 2017

Eyes Wide Shut?

Mortgage Insurance During the Housing Boom

Neil Bhutta (Federal Reserve Board)*

Ben Keys (The Wharton School and NBER)

***Views expressed are those of the authors and do not necessarily represent those of the Federal Reserve Board or its staff**

September 2017

Risk in the Mortgage Market

- Borne across public (GSEs, FHA) and private (banks, investors, borrowers, insurers) sectors
- Popular view: Exposing private capital to more risk will “discipline” the market
 - Lead to appropriate pricing and better risk management
- Essentially all current GSE reform proposals increase the role of private capital in the housing market

Motivating question

Why didn't Private Mortgage Insurance (PMI) Companies safeguard the GSEs (or their investors)?

PMI firms and Risk Management

- **First loss position**
 - Most sensitive to fluctuations in the market
- **Decades of experience in mortgage markets**
 - Should be most wary of changing lending standards, “global savings glut,” or irrational house price expectations
- **Ability to review loans prior to origination**
 - Could raise the price on insurance or decline to insure certain mortgage contracts

PMI's Role - An unanswered question

- Almost no academic attention paid to this large and important sector's role in the housing boom
 - PMI insured over 1.1m purchase mortgages in 2007
 - Roughly $\frac{1}{4}$ of the market for purchase loans
 - By end of 2007, PMI had outstanding policies on over \$800b of mortgage debt
- Virtually all of the riskiest loans the GSEs purchased needed approval by the PMI companies
 - GSEs could not have taken on so much risk if not for PMI

PMI Firms' Perceived Responsibility

“Mortgage insurers were designed to be review underwriters. Because they are in the first loss position on insured mortgages, they are the second set of eyes looking at potential loans to check and see if it is safe for both the investor and the borrower.”

- Mortgage Insurance Companies of America 2008-2009 Factbook

“MI companies can smell change in the air just as much if not more than lenders can; being on the hook for losses does tend to sharpen one's wits.”

- Calculated Risk Blog, 03/22/2007

The “PMI Puzzle”

- Instead, we show that the opposite happened:
- In late 2006 and 2007, PMI firms insured
 - High-risk (high-LTV, low-fico, low-documentation) loans
 - In the riskiest markets where prices were already falling or expected to fall based on their own market research
 - With no increase in premiums (!)
- They did this after the “piggyback” market dried up
 - Other informed participants appeared to reduce their willingness to bear housing risk
- Three firms failed, others massively rescinded policies

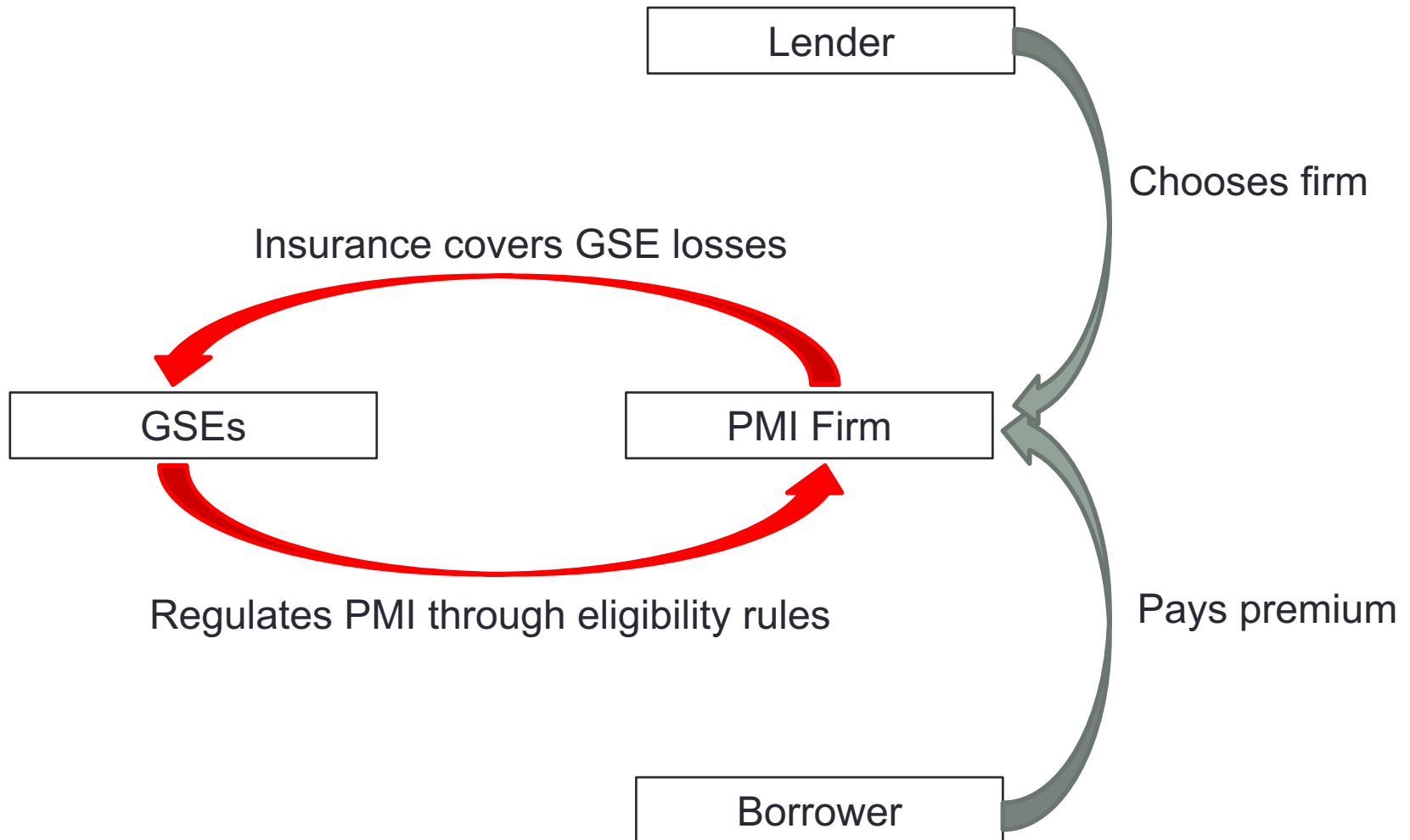
Outline

- 1) Institutional Details about the PMI Industry
- 2) Data on PMI activity
- 3) PMI activity 2000-2009
- 4) The GSEs, Lenders, and PMI
- 5) Concluding Thoughts

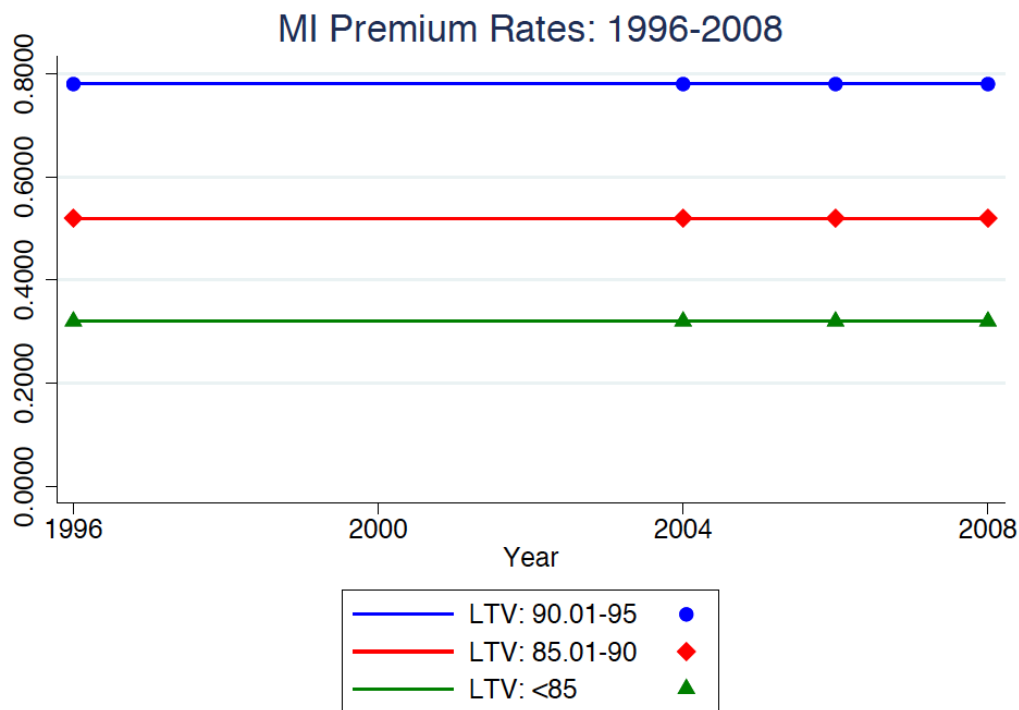
The Private Mortgage Insurance Market

- PMI is often required if the LTV ratio is above 80%
 - Important source of access for low-wealth borrowers
 - Main alternative during boom is private 2nd lien market
- PMI is mandated for all high-LTV GSE-backed loans
 - First-loss position relative to Fannie and Freddie
 - >90% of PMI business in 2007 was through GSEs
- Market consisted of 8 firms (e.g. Genworth, Radian)
 - Monoline industry standard (Jaffee 2006)
 - Set their own underwriting criteria

PMI designed to check GSE risk-taking



PMI firms did not change premiums:



- 1) When automated underwriting drove down application costs (late 1990s / early 2000s)
- 2) When faced with new aggressive competition from 2nd lien market (2004 - 2006)
- 3) When received tax equalization relative to 2nd liens (2007)

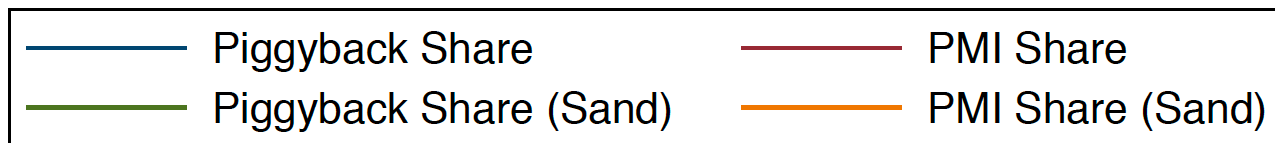
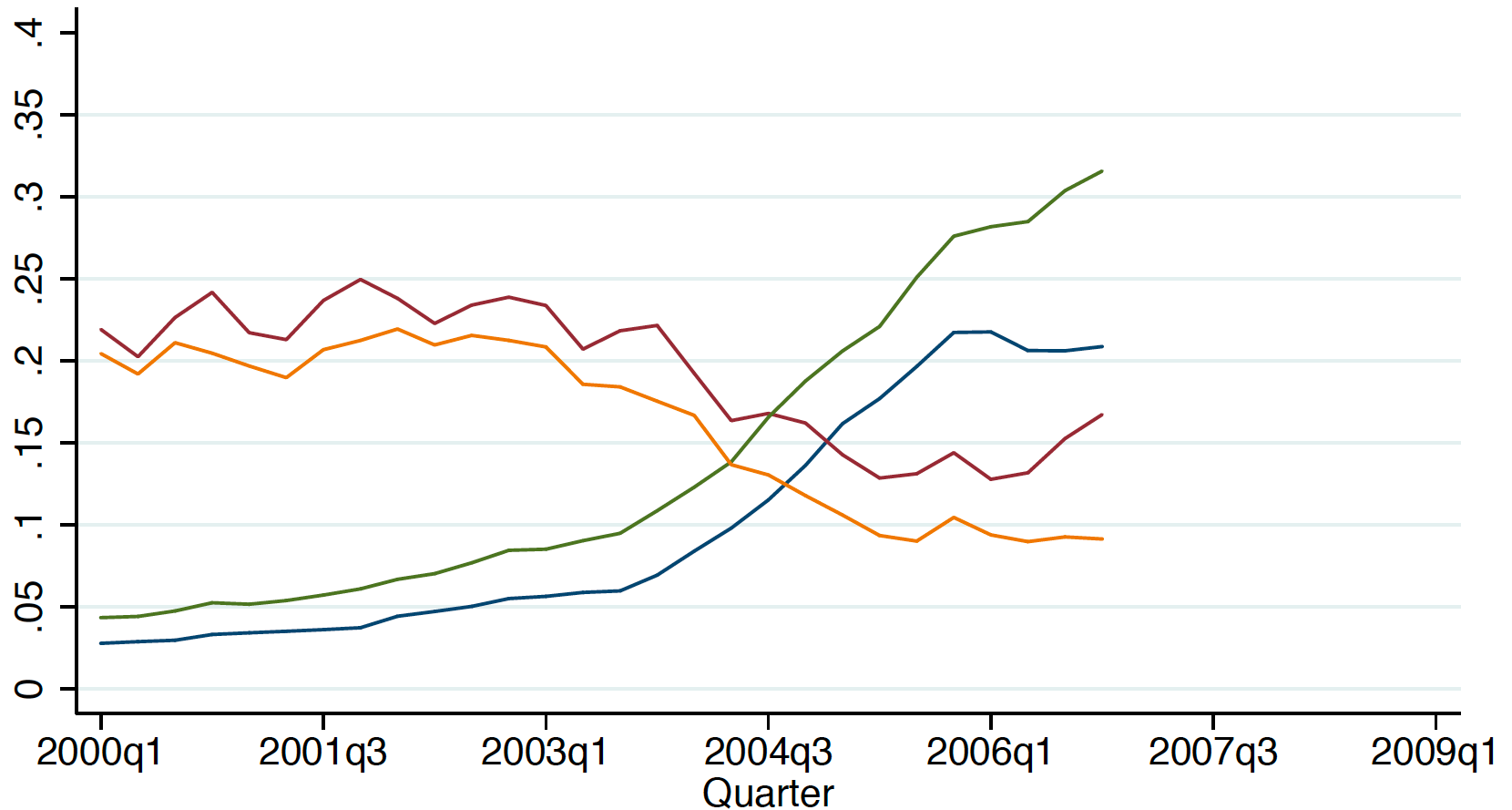
Data on PMI Activity

- FFIEC PMI company data
 - Similar to HMDA, collected from all PMI firms, 1993-2013
 - Details on location, loan amount, gender, race, income
 - Whether PMI was approved or not
 - Used first by Canner and Passmore (Fed Bulletin 1994)
- FFIEC HMDA data
 - Loan applications, approval rates, by geography
 - Details on location, loan amount, gender, race, income
 - No FICO score, etc.
- LPS / McDash Analytics
 - FICO score, LTV, location, documentation, whether has PMI,
 - Sold to GSE vs. private market vs. portfolio
 - Performance of loans

High-LTV Lending in 2004-2006

- Extremely generous financing for “piggyback” 2nd liens
 - Both held on books and securitized
 - Tax advantage from mortgage interest deduction
- PMI companies lost market share
 - Also sounding the alarm about lending and foreclosure risks
- Many obvious and public danger signs as of late 2006
 - Homebuilders stocks down 20-40% from peak
 - Mortgage delinquencies rising (especially in sand states)
 - Prices level or falling (88% of sand state MSAs already peaked)

PMI and Piggyback Shares of Home Purchase Loans



PMI's Trade Group Voiced Concerns in August 2006

Insurers Urge Action On Risky Mortgages

By Kirstin Downey
Washington Post Staff Writer
Saturday, August 19, 2006

"We are deeply concerned about the **potential contagion effect** from poorly underwritten or unsuitable mortgages and home equity loans," Suzanne C. Hutchinson, executive vice president of the Mortgage Insurance Companies of America, wrote in a recent letter to regulators. ". . . The most recent market trends show alarming signs of undue risk-taking that puts both lenders and consumers at risk."

But the mortgage insurers, which cover the losses when loans go bad, see big problems. Their trade group, in a plea to regulators delivered in a comment letter last month, alluded to its **fear of widespread foreclosures** if some of these new borrowers default on their loans. An increase in such problem properties could weaken the real estate market and drive down home values even for those who bought conservatively and diligently paid their mortgages.

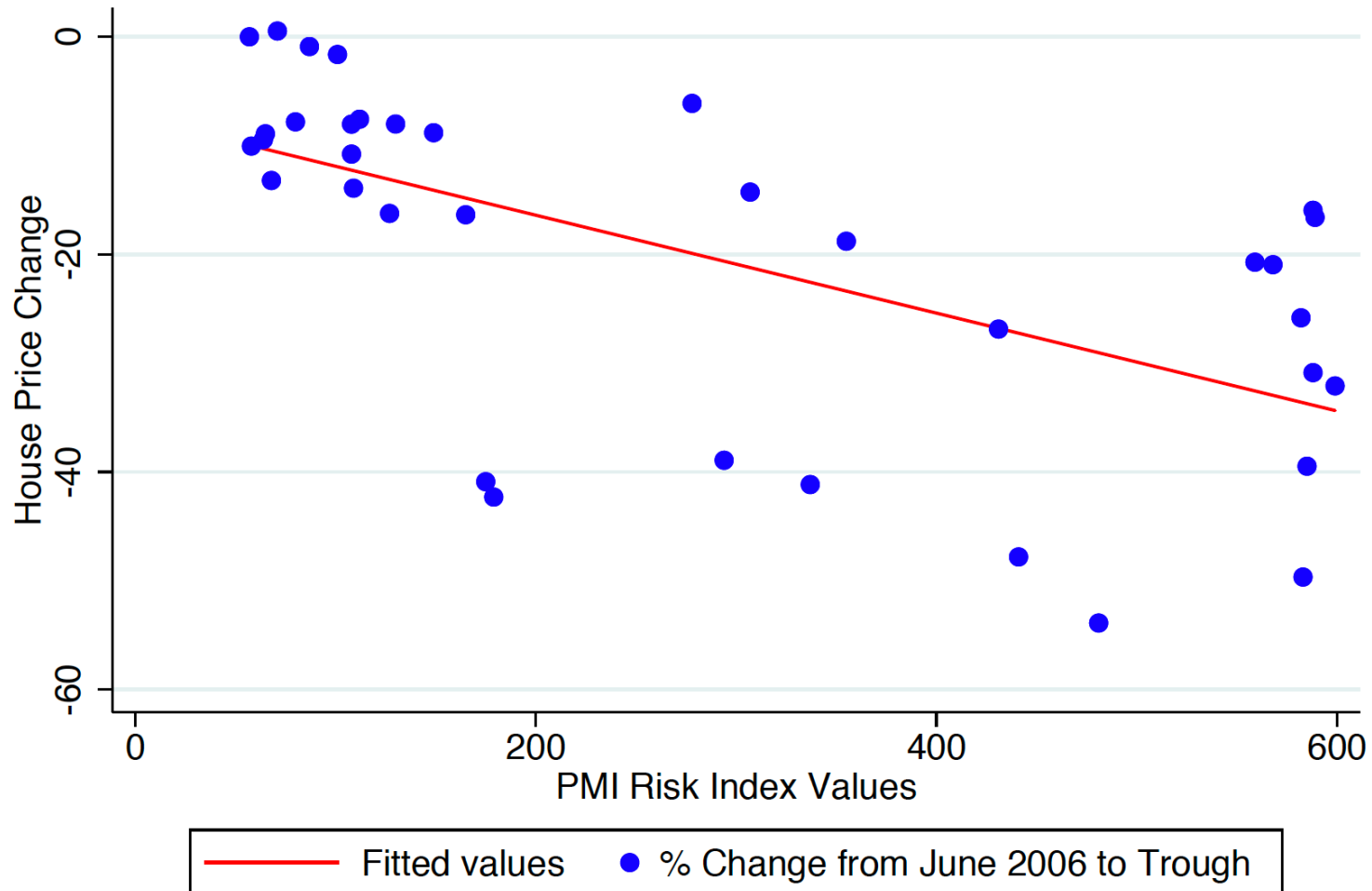
PMI Summer 2006 Report

MSA

	RISK MEASURES
	Risk Index ¹
San Diego-Carlsbad-San Marcos, CA	599
Nassau-Suffolk, NY (MSAD)	589
Boston-Quincy, MA (MSAD)	588
Santa Ana-Anaheim-Irvine, CA (MSAD)	588
Sacramento-Arden-Arcade-Roseville, CA	585
Riverside-San Bernardino-Ontario, CA	583
Oakland-Fremont-Hayward, CA (MSAD)	582
Los Angeles-Long Beach-Glendale, CA (MSAD)	575
Providence-New Bedford-Fall River, RI-MA	568
San Francisco-San Mateo-Redwood City, CA (MSAD)	560
San Jose-Sunnyvale-Santa Clara, CA	559
Cambridge-Newton-Framingham, MA (MSAD)	537
Edison, NJ (MSAD)	536
New York-White Plains-Wayne, NY-NJ (MSAD)	498
Las Vegas-Paradise, NV	481

59.9%
chance of
price
decline in
next 2
years

PMI Risk Score is Ex Post Accurate



First line of the PMI Fall 2006 Report:
“There is no longer any doubt that the housing market is cooling”

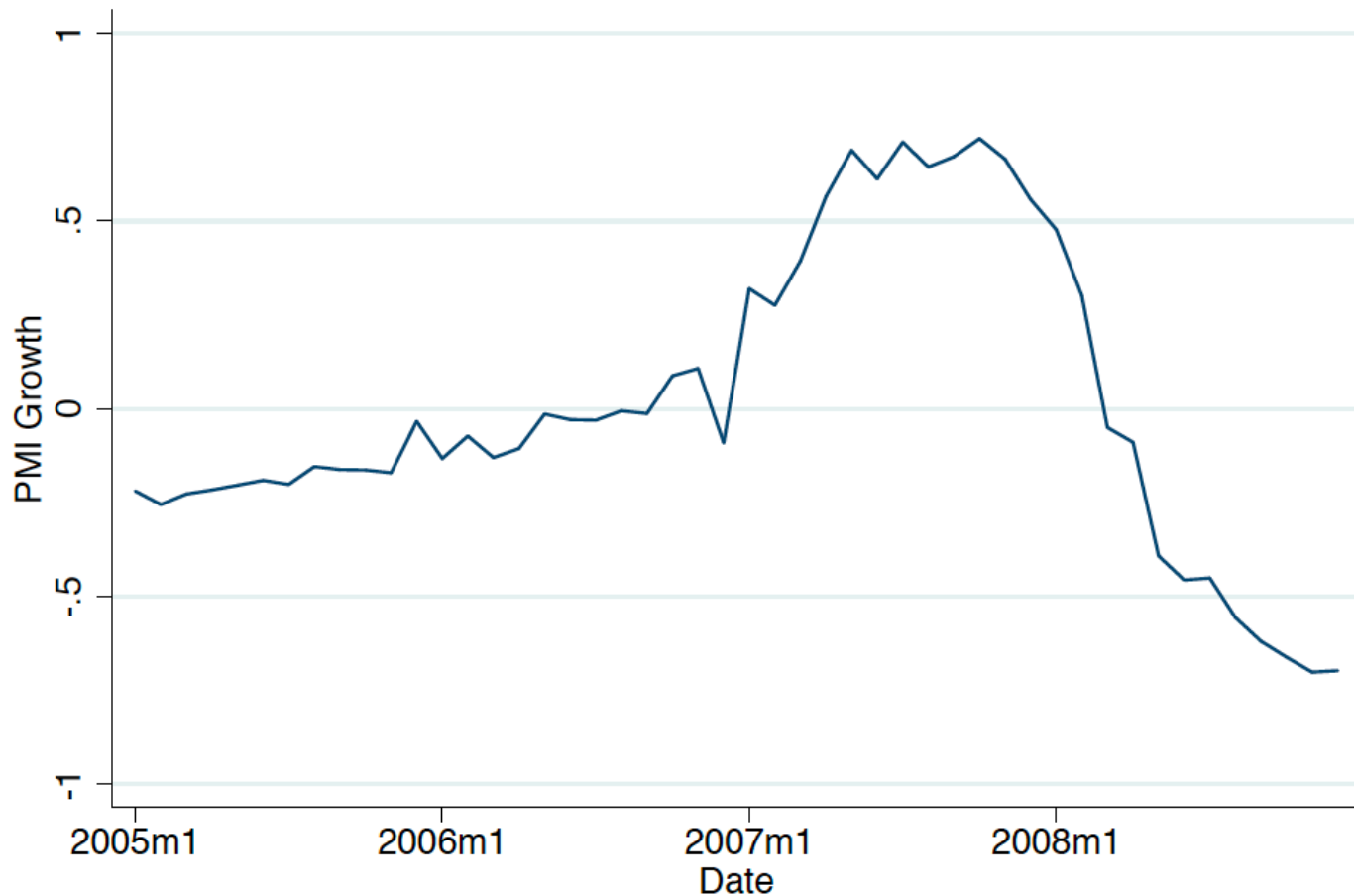


Understanding a Changing Market

By Mark F. Milner, Chief Risk Officer, PMI Mortgage Insurance Co.

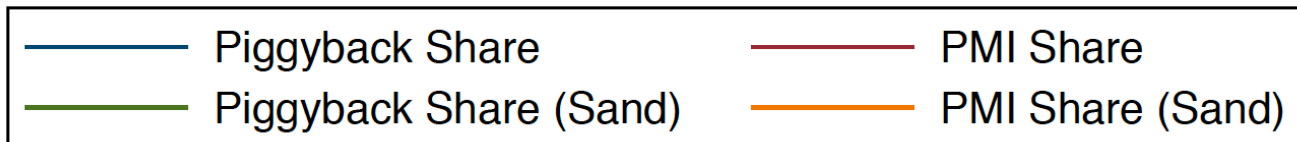
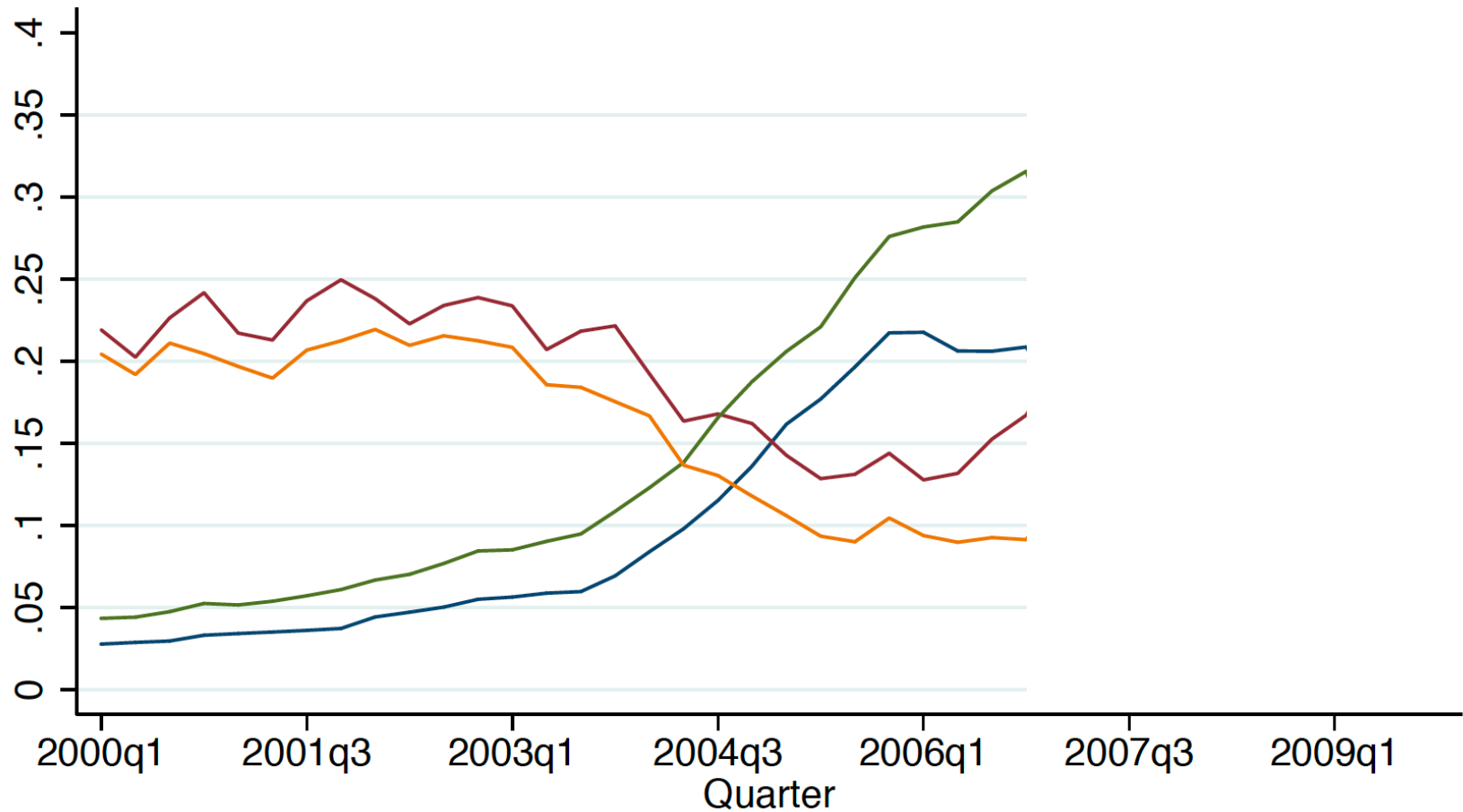
There's no longer any doubt that the housing market is cooling. As home-

PMI Issuance Growth Late in the Boom

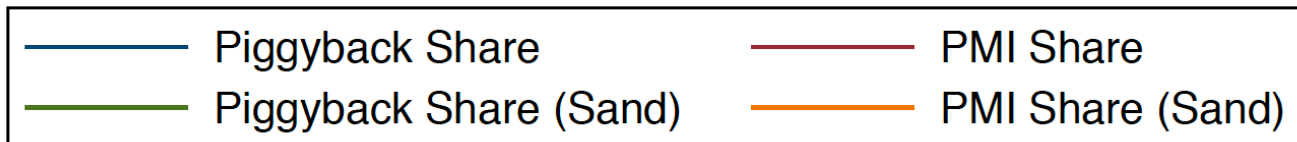
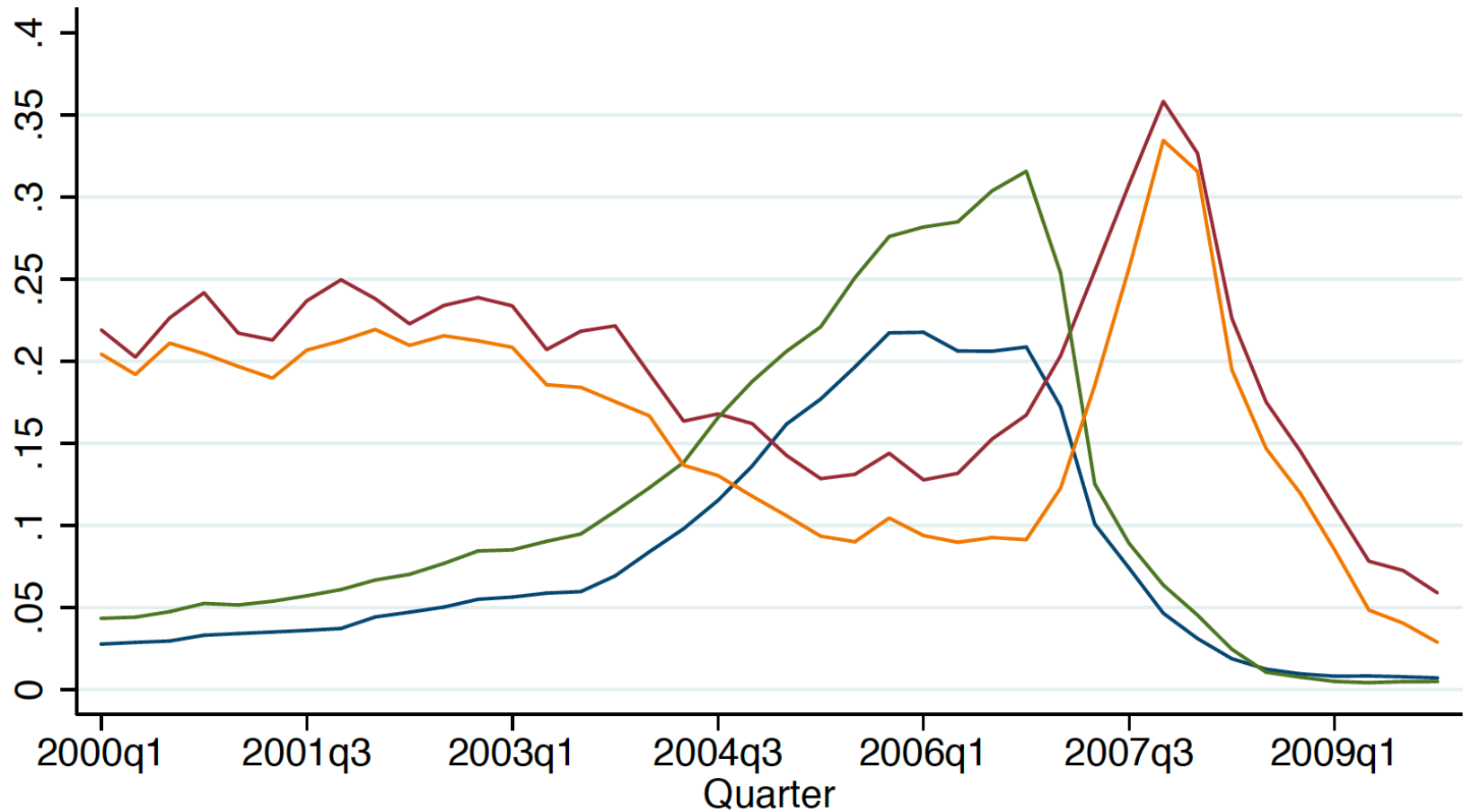


PMI issuance growth occurred sharply in late-2006 and 2007!

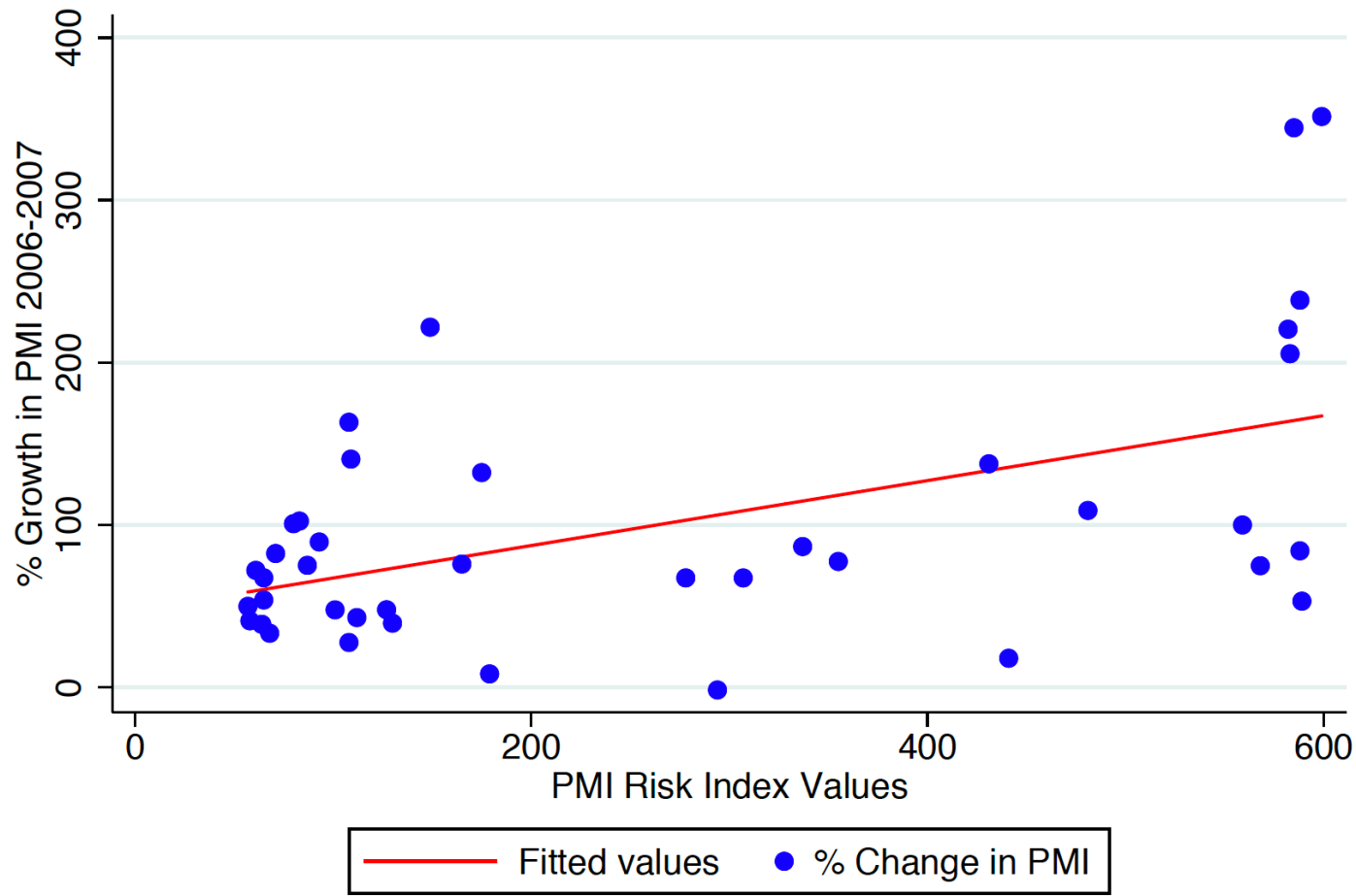
PMI and Piggyback Shares of Home Purchase Loans



PMI and Piggyback Shares of Home Purchase Loans

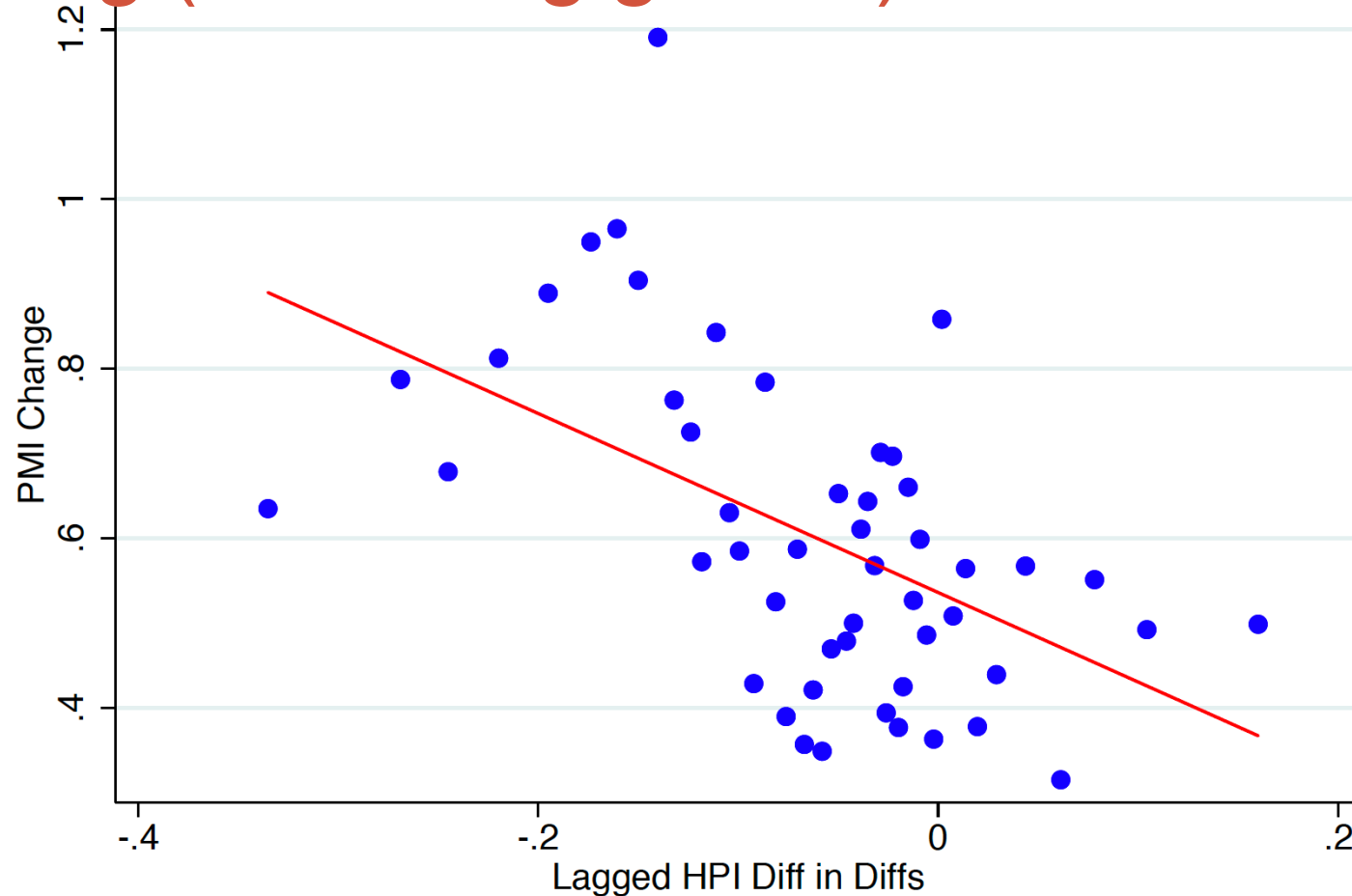


PMI Issuance positively correlated with Risk Index



Change in PMI Issuance 2006 to 2007 vs. PMI Risk Index

PMI expanded where prices were already falling (or slowing growth)



Change in PMI from 2006 to 2007 vs.
Log Change in Price Growth (2006-2005) – (2005-2004)

Issuance to Safer Applicants?

- Possible that PMI firms expanded in risky locations but adjusted the composition of policies to safer borrowers and safer loans
 - Trade more house price risk for less individual credit risk
- From the 2007 10-K statement of PMI Co. on mortgage characteristics:

	<u>2005</u>	<u>2007</u>
LTV>97%	14.3%	24.6%
Alt-A	17.2%	22.8%
Interest Only	6.2%	14.2%
Over \$250k	21.4%	32.1%

Huge Losses: >90% of Market Value

RDN, Adj Close



Radian: From \$67/share in February 2007 to \$2.30/share in June 2008

GNW, Adj Close



Genworth: From \$33/share in January 2007 to \$1.60/share in February 2009

Total PMI Industry Market cap estimate:

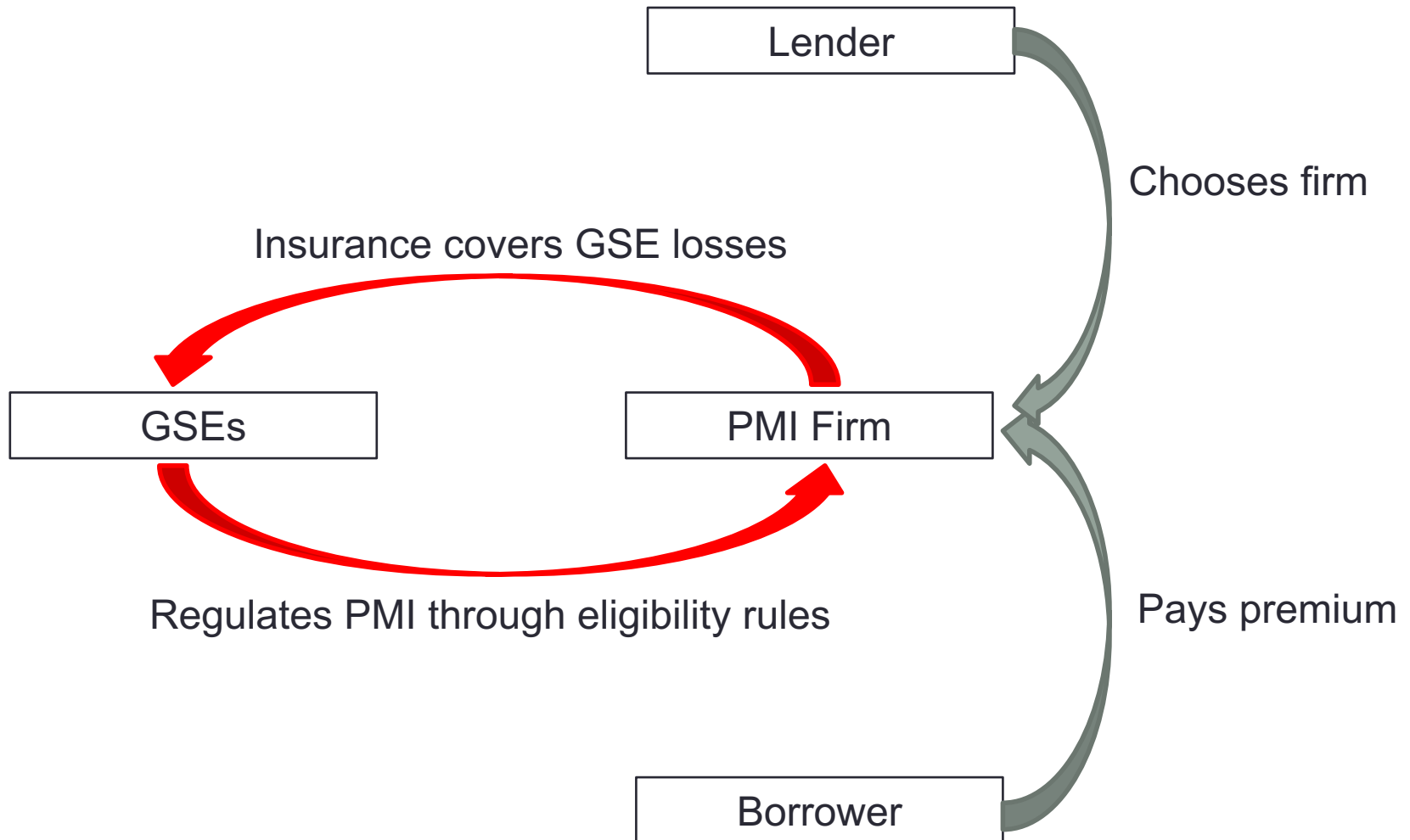
2006: \$26 billion

2008: \$1.7 billion

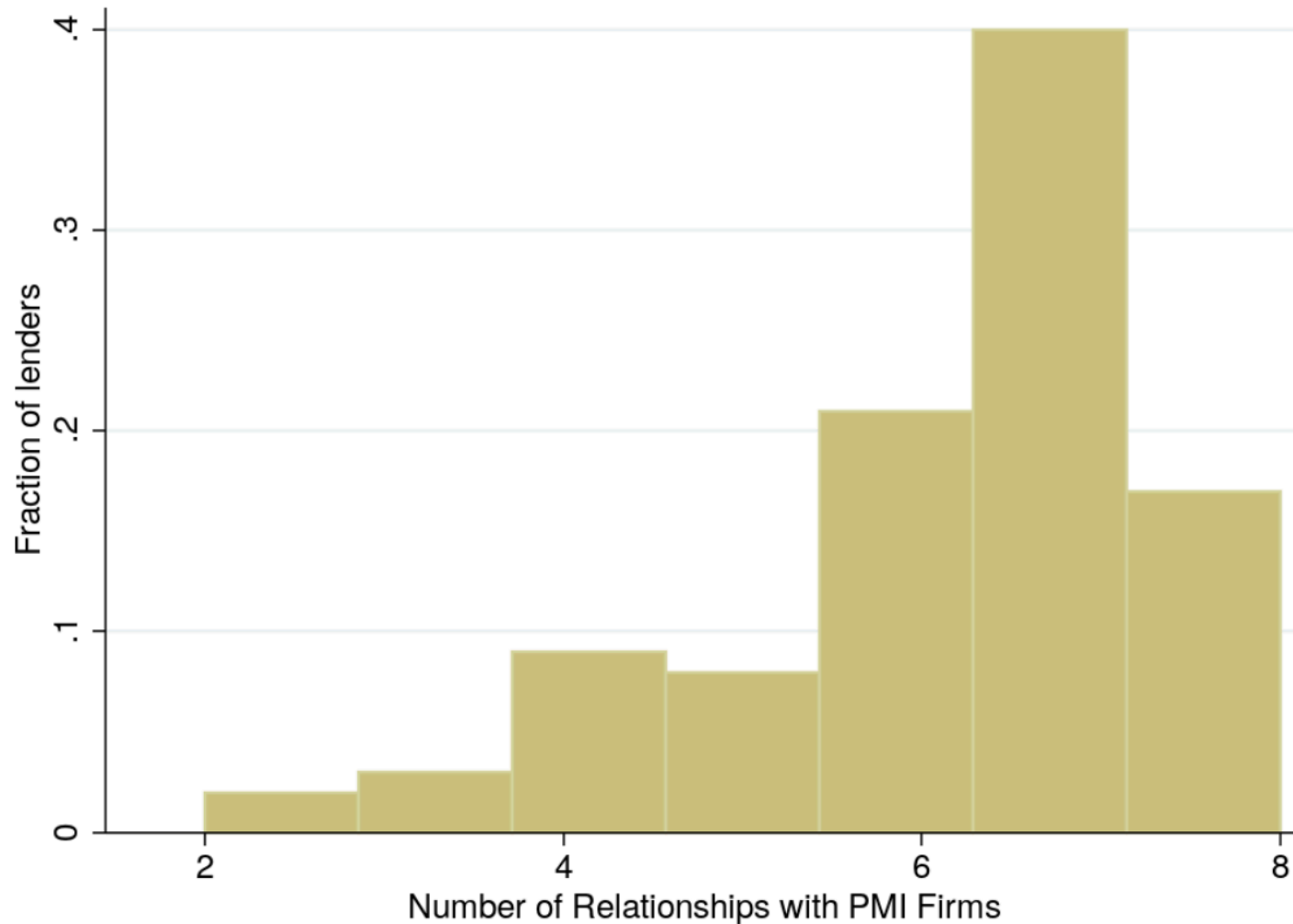
Interpreting these facts

- Massive increase in PMI issuance in 2007
- Growth disproportionately in high-risk markets
- Growth disproportionately toward high-risk contracts
- No change in premiums, no regional pricing
- Waves of defaults, market cap falls by >90%, multiple firms fail

PMI, Lenders, and the GSEs



Lender-PMI Relationships

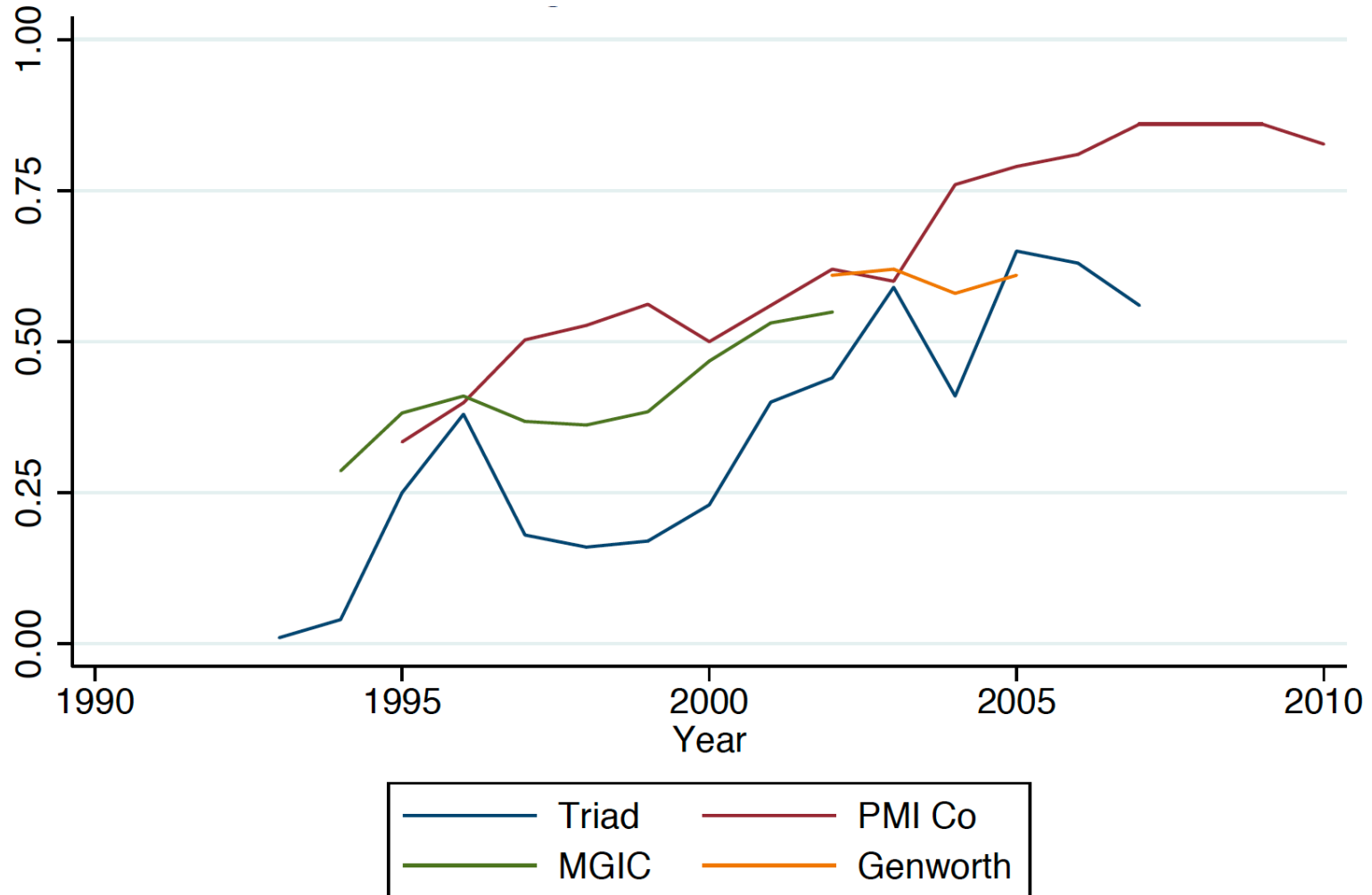


Most of top 100 mortgage lenders work with 4+ PMI firms per year

PMI Underwriting and Moral Hazard

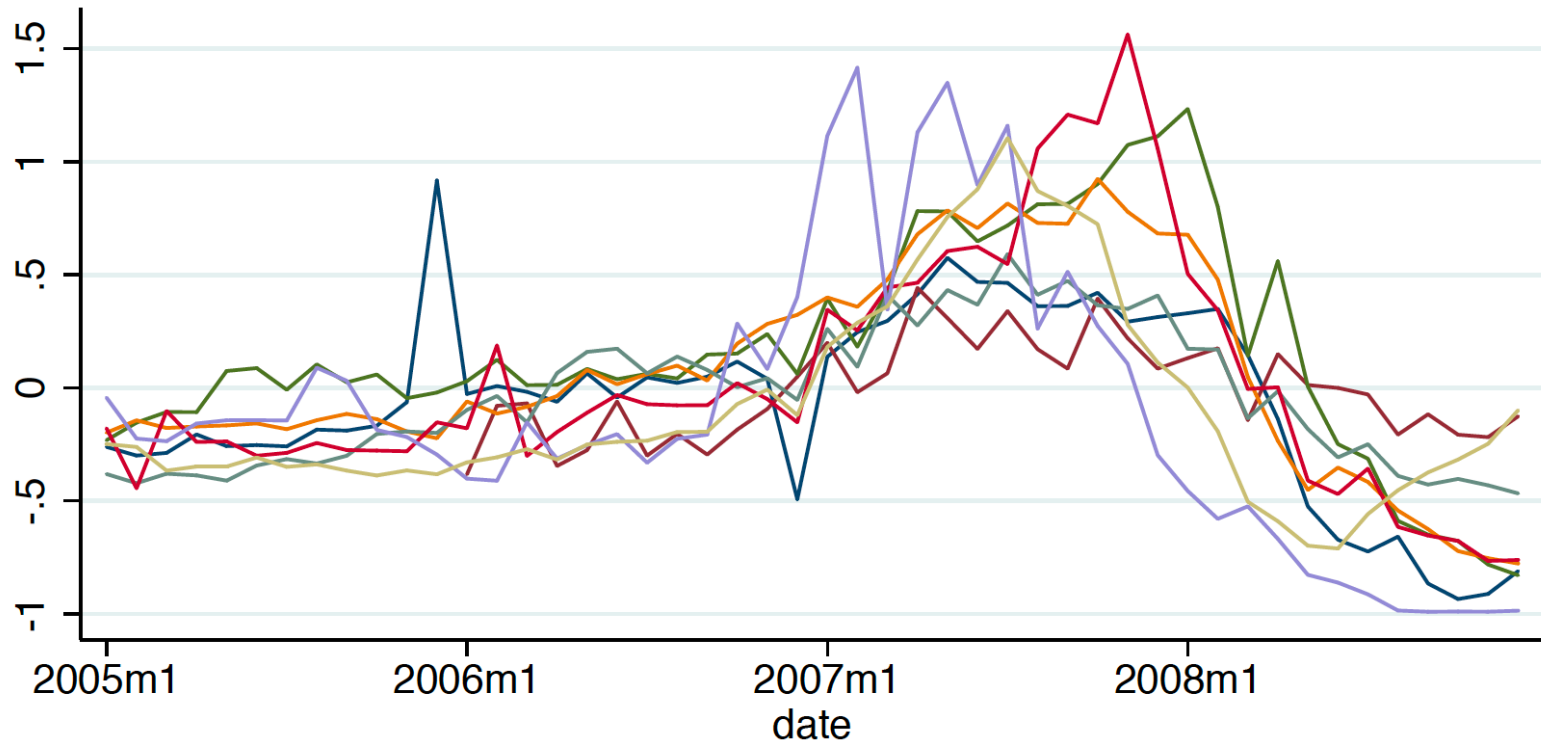
- Competing for lender business, PMI companies aggressively reduced their review process
 - Early 1990s: Could take 7-10 days to review
 - By 2007, goal was decision in 2-3 minutes!
 - MGIC General Counsel: **“if it’s good for them, it’s good for us.”**
- “Delegated Underwriting” allowed lenders to approve mortgages on their behalf, but reserved right to impose additional standards or further scrutiny
- In some cases, MI firms ceded underwriting outright to GSEs
 - e.g. MGIC: “Beginning in 2000, loans approved by DU or LP were automatically approved for MGIC mortgage insurance...***even if the loans were outside of MGIC’s published guidelines.***”

Prevalence of Delegated Underwriting

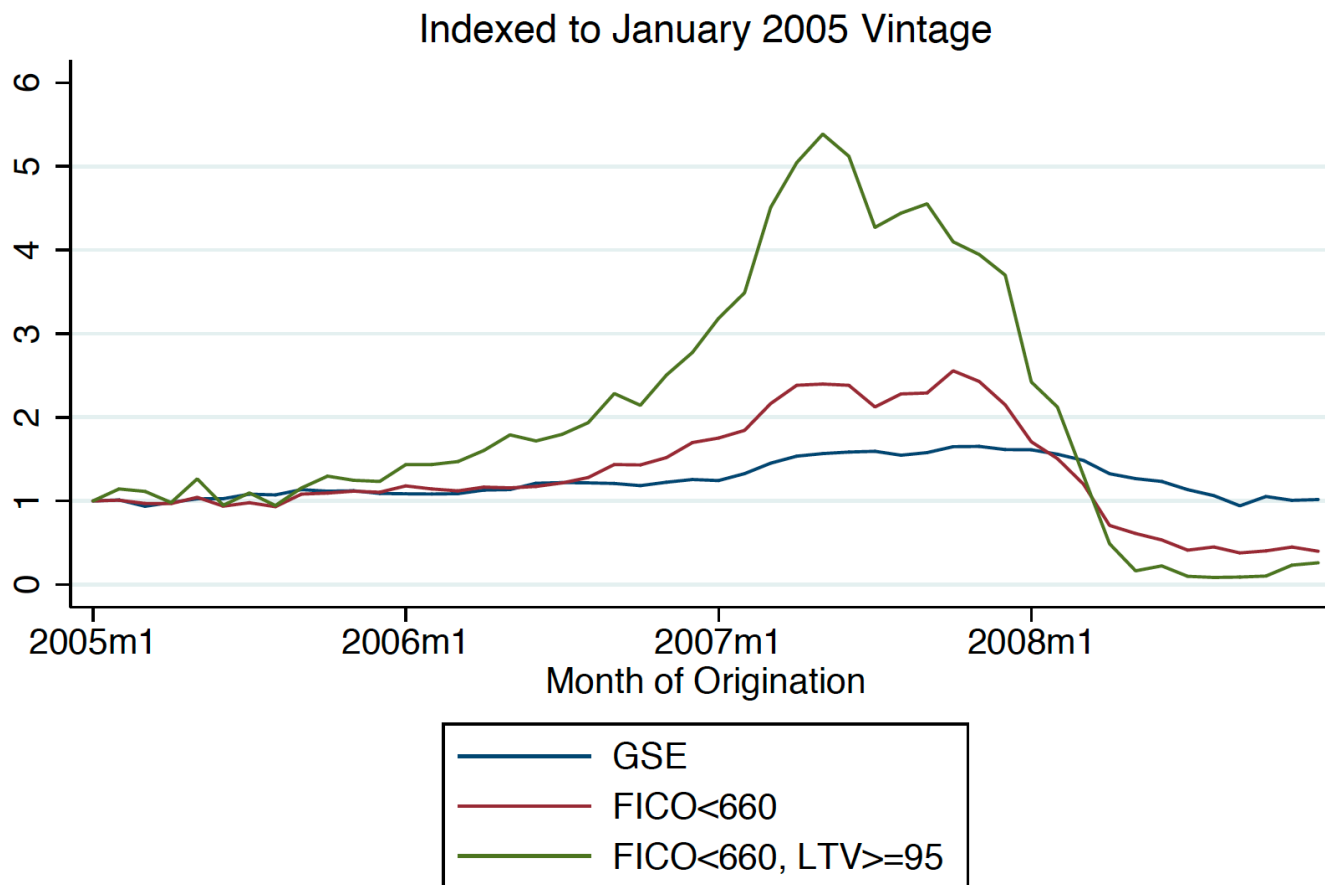


Collected from PMI companies' 10-K reports

Behavior across PMI firms - Growth

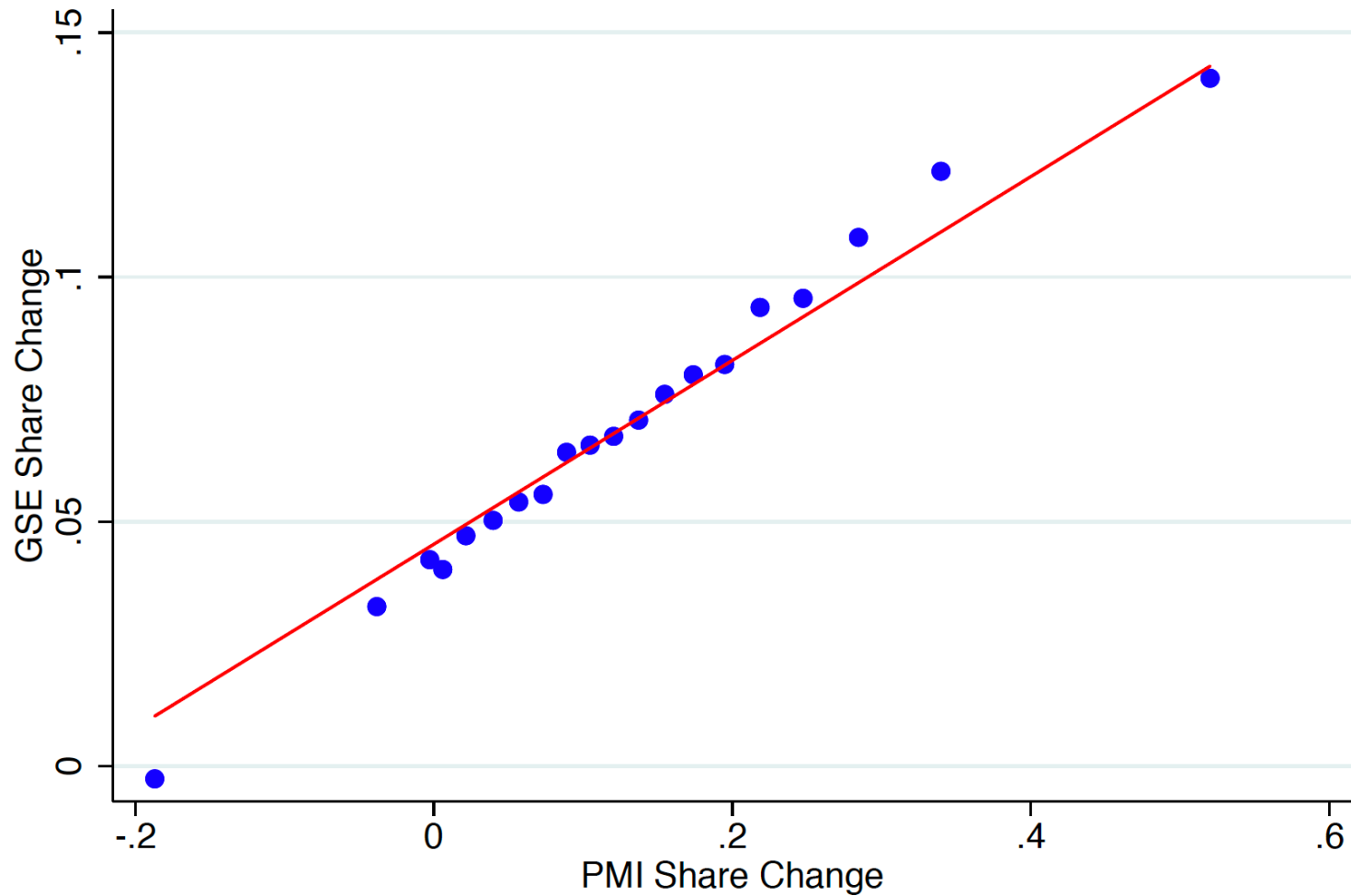


The GSEs take on greater risk in 06-07



Share of home loans with FICO<660 bought by GSEs,
Share of home loans with FICO<660 and LTV>=95 bought by GSEs,
Overall share of home purchase loans, indexed to 100 in Jan 2005

GSE Growth and PMI Growth in lockstep



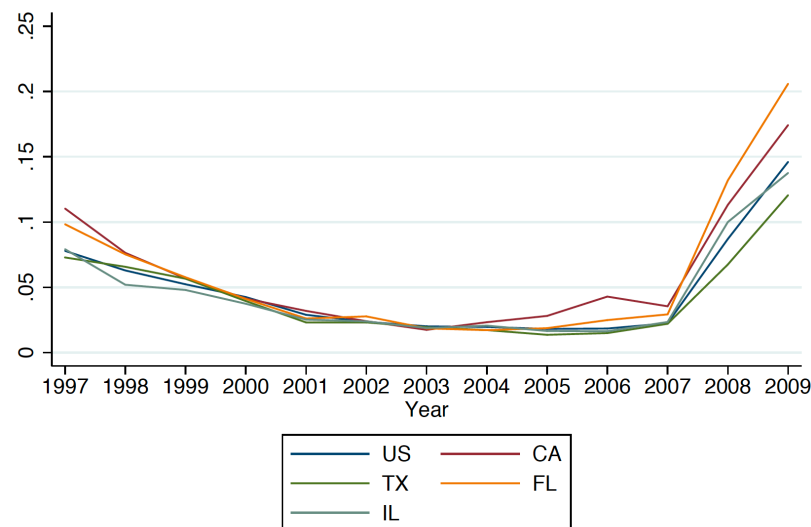
GSEs and PMI firms created moral hazard problem

- PMI firms did not perform due diligence on loan quality, instead passively followed increase in GSE risk-taking
- Delegated underwriting re-enforced GSE origination policies rather than acting as a check on behavior
 - All PMI firms behaved similarly during the boom
- Both took on tremendous risk in 2007, contributing to their collapse
- Lenders choose PMI firm, but have no incentive to provide check on risk-taking
 - If anything, the opposite!

PMI Industry Responses

- 1) Review

- More sophisticated pricing models
- Sharp increase in denial rates
- Introduce regional risk-based pricing
 - unlike the GSEs (Hurst, et al. 2016)



- 2) Rescissions

- Denial of insurance claims ex post
- In 2008-2009, issuers denied 20-25% of claims (>\$6b in claims)
 - (source: American Banker Magazine 12/14/09)
- Our back-of-envelope calculation suggests all firms fail if rescission rates stay near historical 5% average

Conclusions

- PMI is a huge and understudied market
 - Crucial to accessing the mortgage market for low-wealth HHs
 - >\$500b in GSE mortgages are currently covered
- The conventional wisdom about the PMI firms being more astute than the rest of the market was wrong
 - Placed large bets on high-risk borrowers, high-risk contracts, and high-risk markets despite capital exposure and expertise
 - Clear evidence of risk-shifting hypothesis (Jensen-Meckling 1976)
- More evidence that GSEs dictate not just the rules but also market participant behavior in the mortgage market

Contributions

- Results provide new evidence on how the IO of the mortgage market can undermine its stability
 - Ashcraft and Schuermann (2008), Frame and White (2005, 2010)
- Contributes to an IO literature about bargaining and relationship leverage
 - e.g. Clemens and Gottlieb (2017) on Medicare
 - Rogerson (1994) on Dept. of Defense Procurement
- Shows that private capital exposure does not necessarily act as a disciplining device for firm decision-making
 - Extensive theories of financial intermediation, “skin-in-the-game,” and risk-shifting literatures



**GOLUB CENTER
FOR FINANCE AND POLICY**

4th Annual Conference

Government Financial Products, Policies, and Institutions

September 28, 2017

Economics of Reorganizing Secondary Mortgage Market

MIT GCFP Conference
September 2017

Jane Dokko

Edward Golding*

*Senior Fellow at Urban Institute

Views are those solely of the authors

Overview & Motivation

- Little analysis of market structure and specific criteria for evaluating policy alternatives in proposals for reforming secondary mortgage market (SMM).
- We take a step (or two) toward defining the alternatives in terms of economics of market structure and then analyze them in terms of efficiency and equity.
- We make explicit the tradeoffs among the various options for organizing the SMM.

Description of Four Market Structures

	(1) Insurance: Insurer insures loans sold into security	(2) Purchase: Buyer buys loans, issues security, guarantees P&I	(3) PLS: Issuer buys/transfers loans & issues security; Trustee administers	(4) Portfolio: Lender funds & services loans
Funding Mechanism	TBA, single security issued by originator/issuer	TBA, single security issued by buyer	No TBA, securities issued through a trustee	No TBA, core deposits
Government Guarantee?	Y	Y	N	N/Y
Underwriting	Insurer sets and enforces standards; lenders choose insurer	Purchaser sets and enforces standards; lenders choose buyer	Issuer sets guidelines; lenders choose issuer and may vertically integrate	Each lender sets own standards
Pricing of credit risk	Insurer sets pricing	Purchaser sets pricing	Issuer sets credit enhancement in conjunction with rating agencies; prices set by market	Implicit in price of mortgage
Servicing NPLs	Insurer sets servicing standards with servicer acting as agent	Purchaser sets servicing standards over time with servicer acting as agent	Issuer sets standards upfront; Trustee & servicer execute	Lender sets standards & executes

Six Criteria to Evaluate SMM Efficiency

Criteria	Description
1. Cost of Funding	Cost of selling loans to investors or raising capital to originate mortgages
2. Scale Economies- G&A	Cost of operating SMM
3. Market Power	“ $P=MC$ ”, i.e. degree of competition in SMM, whether rent-seeking behavior likely to be observed, ability of SMM firms to set prices, likelihood of risk-based pricing
4. Information Costs	Degree to which adverse selection and asymmetric information are costly
5. Innovation	Likely pace of innovation in underwriting and servicing (not innovation in terms of product variety)
6. Macroeconomic Stability	Whether structure can provide credit “through the cycle” and at what cost; Whether structure amplifies/mitigates financial market disruptions to real economy

Ordinal Efficiency Rankings & Considerations

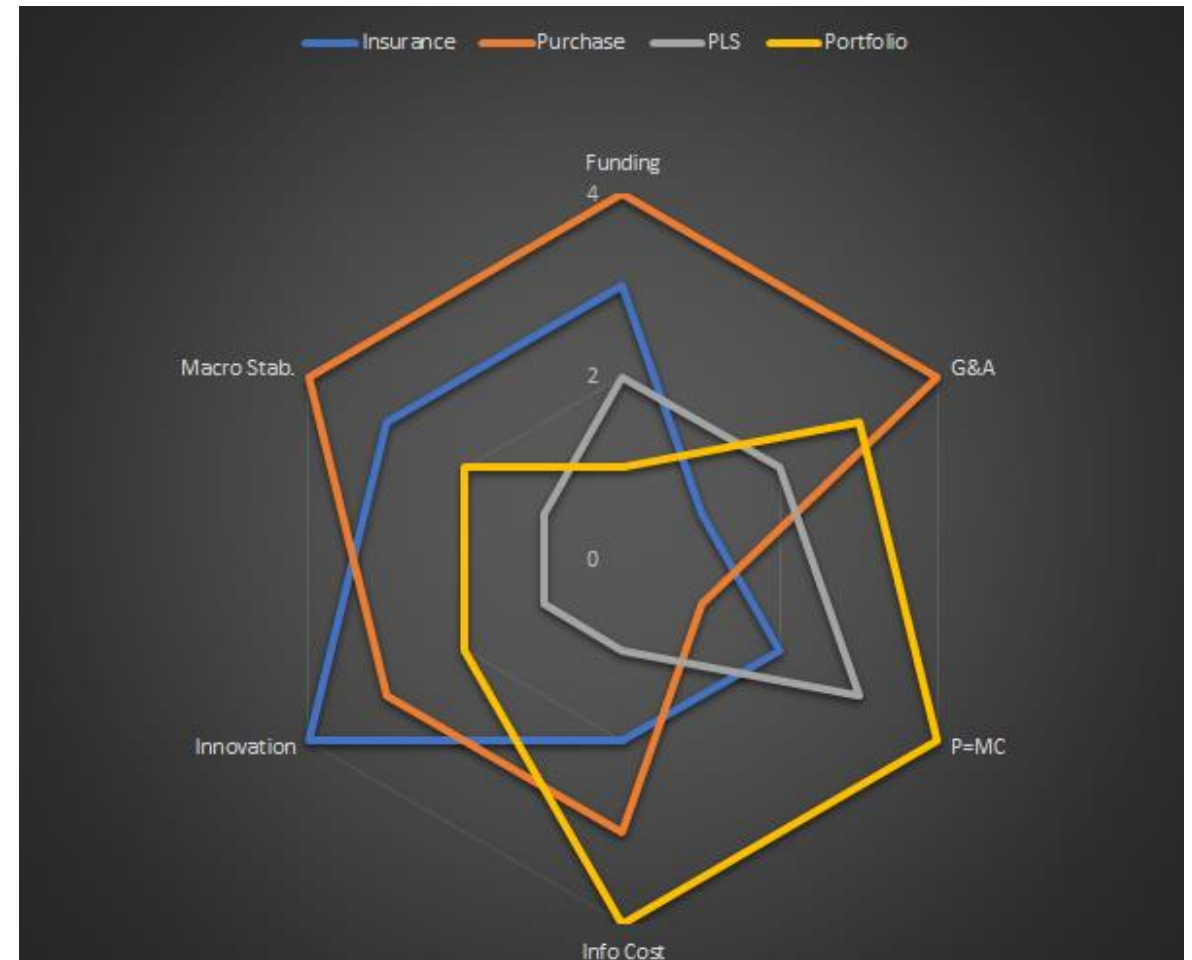
	(1) Insurance	(2) Purchase	(3) PLS	(4) Portfolio
1. Cost of Funding	2- TBA market but some heterogeneity	1-liquid TBA market	3 – no guarantee or TBA	4 - Core deposits are expensive; no separation of credit & interest rate risks
2. Scale Economies (G&A)	4 - Competition for volume drives up costs	1 - Standardization and scale	3 – Inability to achieve MES in underwriting	2 – Vertically integrated
3. Market Power (P=MC)	3 - Some barriers to entry and limited number of firms	4 – Monopoly power from few firms and barriers to entry	2 –Relatively competitive industry	1 – Competitive industry
4. Information Costs	3 – Standardization reduces agency costs	2 - control over asset reduces agency costs	4 - very little vertical integration	1 – vertical integration addresses many issues
5. Innovation*	1	2	4	3
6. Macroeconomic Stability	2 – guarantee & TBA	1 – guarantee & TBA, likely TBTF firms	4 - market procyclical	3 - deposit insurance limits procyclicality

1=Least Expensive, 4=Most Expensive

* Here, we follow Aghion et al. (2005) and assume an inverted U-shape between competition and innovation.

No Obvious Dominance, Need Weights

Each hexagon represents a model. No one model encompasses (dominates) all others based on the 6 Efficiency Criteria. So weights matter. And many of the rankings are uncertain/subjective based on theory and conjecture, e.g., innovation.



Equity/Efficiency Tradeoffs Depend on Structure

- Certain aspects of efficiency may not lead to desirable distributional outcomes. For example:
 - Competitive markets tend to drive towards risk-based pricing but many do not want low-wealth individuals to pay higher prices
 - Competitive markets have fewer rents to distribute
 - Funding advantages of TBA/guarantee should be weighed against average pricing of prepayment risk, which leads to lower wealth individuals overpaying for the prepayment option.
- Tax and subsidy system is possible, e.g., Housing Trust Fund, but limited by competition from non-covered entities.
- Competition and other aspects of efficiency could help with credit rationing
 - While information costs (adverse selection) leads to a rationing equilibrium, the existence of rationing, overrides, and lack of flexible underwriting seem to be an outcome of profit satisfying behavior or risk aversion arising from rents earned over time.

Each structure has own approach to equity

- Insurance – Efficacy of assigned risk pools unclear
- Purchase – GSE housing goals have been widely criticized; literature finds little effect on credit supply (Ambrose & Thibodeau 2004, Gabriel & Rosenthal 2008); Still waiting evidence on Duty to Serve Regs and Housing Trust Fund programs
- PLS – 2000-2007: PLS helped expand credit supply to higher-risk borrowers (Green & Wachter 2007, Mian & Sufi), but PLS morphed into products that contributed to the Great Recession
- Portfolio – Some evidence that CRA expands credit supply, including among high-risk groups (e.g., Bhutta 2008)

What Is Missing in Current Proposals

- The current proposals span range of structures. For example:
 - Parrott, Ranieri, Sperling, Zandi and Zigas proposal and the MBA proposal are closer to the purchase structure.
 - Bright and DeMarco closer to insurance structure.
- Implicit weights so far in discussion seem to focus on funding costs and less on the other factors.
 - In addition, many of the proposals emphasize protecting existing institutions and arrangements (which may be just protecting rents or may be limiting transition costs which we don't consider).
- Little discussion of how to address equity concerns.

Concluding Thoughts

- No dominance so need weighting that will likely reflect political environment
- Innovation important and hard to know how to get, may need explicit provisions to address
- Equity concerns are intertwined with choice of structure, not as add-on
- Equity concerns may be better addressed in larger context ranging from tax policy to local zoning to safety net. Can't put burden entirely on SMM.
- Transition costs – how should these be factored in?
- Rent seeking...how do we get competition to focus on cost and innovation and not DC?



**GOLUB CENTER
FOR FINANCE AND POLICY**

4th Annual Conference

Government Financial Products, Policies, and Institutions

September 28, 2017

Informing Mortgage Market Reform

Discussion of

“The Time-Varying Price of Financial Intermediation in the Mortgage Market”

“Eyes Wide Shut? Mortgage Insurance During the Housing Boom”

“Economics of Underwriting, Pricing and Managing (Mitigating) Credit Risk: Implications for (Re)Organizing the Mortgage Market”

Karen Dynan

Harvard University and Peterson Institute for International Economics

MIT Golub Center for Finance and Policy Annual Conference

September 28, 2017

Credit to conference organizers

Credit to conference organizers

3 really excellent papers!

Credit to conference organizers

3 really excellent papers!

Important in different ways

Context

9 years, 22 days since Fannie and Freddie went into conservatorship

9 years, 22 days since Fannie and Freddie went into conservatorship

“It is clear to all that conservatorship is a temporary form ...”

9 years, 22 days since Fannie and Freddie went into conservatorship

“It is clear to all that conservatorship is a temporary form ...”

-- Treasury Secretary Paulson 1/7/2009

9 years, 22 days since Fannie and Freddie went into conservatorship

“It is clear to all that conservatorship is a temporary form ...”

-- Treasury Secretary Paulson 1/7/2009

Housing finance reform called out many times as a “priority” by key policymakers

9 years, 22 days since Fannie and Freddie went into conservatorship

“It is clear to all that conservatorship is a temporary form ...”

-- Treasury Secretary Paulson 1/7/2009

Housing finance reform called out many times as a “priority” by key policymakers

Senate bipartisan reform bill made it through committee in 2014 but did not get a vote on the Senate floor

9 years, 22 days since Fannie and Freddie went into conservatorship

“It is clear to all that conservatorship is a temporary form ...”

-- Treasury Secretary Paulson 1/7/2009

Housing finance reform called out many times as a “priority” by key policymakers

Senate bipartisan reform bill made it through committee in 2014 but did not get a vote on the Senate floor

So conservatorship continues ...

Why no reform yet?

Why no reform yet?

NOT BECAUSE of a lack of proposals!

Why no reform yet?

NOT BECAUSE of a lack of proposals!

Political obstacles—plans have winners and losers

Why no reform yet?

NOT BECAUSE of a lack of proposals!

Political obstacles—plans have winners and losers

Problems and solutions hard to understand

Why no reform yet?

NOT BECAUSE of a lack of proposals!

Political obstacles—plans have winners and losers

Problems and solutions hard to understand

Try to explain it to smart non-experts, let alone your parents

Why no reform yet?

NOT BECAUSE of a lack of proposals!

Political obstacles—plans have winners and losers

Problems and solutions hard to understand

Try to explain it to smart non-experts, let alone your parents

Substantive disagreements

Why no reform yet?

NOT BECAUSE of a lack of proposals!

Political obstacles—plans have winners and losers

Problems and solutions hard to understand

Try to explain it to smart non-experts, let alone your parents

Substantive disagreements

Lack of evidence re what actually would happen to cost, access, systemic risk under different proposals

Why no reform yet?

NOT BECAUSE of a lack of proposals!

Political obstacles—plans have winners and losers

Problems and solutions hard to understand

Try to explain it to smart non-experts, let alone your parents

Substantive disagreements

Lack of evidence re what actually would happen to cost, access, systemic risk under different proposals

Different goals and how to weight them

Why no reform yet?

NOT BECAUSE of a lack of proposals!

Political obstacles—plans have winners and losers

Problems and solutions hard to understand

Try to explain it to smart non-experts, let alone your parents

Substantive disagreements

Lack of evidence re what actually would happen to cost, access, systemic risk under different proposals

Different goals and how to weight them

All of the above make for a messy policy process!

Contributions

Fuster, Lo, and Willen (FLW)

Fuster, Lo, and Willen (FLW)

Thoughtful intensive exploration of new data on the cost of financial intermediation (originating, underwriting, servicing, maybe profits)

Fuster, Lo, and Willen (FLW)

Thoughtful intensive exploration of new data on the cost of financial intermediation (originating, underwriting, servicing, maybe profits)

Find degree of pass-through from secondary market to primary market large *and timely*

Fuster, Lo, and Willen (FLW)

Thoughtful intensive exploration of new data on the cost of financial intermediation (originating, underwriting, servicing, maybe profits)

Find degree of pass-through from secondary market to primary market large *and timely*

But varies with demand likely reflecting capacity constraints

Fuster, Lo, and Willen (FLW)

Thoughtful intensive exploration of new data on the cost of financial intermediation (originating, underwriting, servicing, maybe profits)

Find degree of pass-through from secondary market to primary market large *and timely*

But varies with demand likely reflecting capacity constraints

Implications for affordability and monetary policy

Fuster, Lo, and Willen (FLW)

Thoughtful intensive exploration of new data on the cost of financial intermediation (originating, underwriting, servicing, maybe profits)

Find degree of pass-through from secondary market to primary market large *and timely*

But varies with demand likely reflecting capacity constraints

Implications for affordability and monetary policy

Uptrend in intermediation costs over time

Fuster, Lo, and Willen (FLW)

Thoughtful intensive exploration of new data on the cost of financial intermediation (originating, underwriting, servicing, maybe profits)

Find degree of pass-through from secondary market to primary market large *and timely*

But varies with demand likely reflecting capacity constraints

Implications for affordability and monetary policy

Uptrend in intermediation costs over time

Implications for affordability

Fuster, Lo, and Willen (FLW)

Thoughtful intensive exploration of new data on the cost of financial intermediation (originating, underwriting, servicing, maybe profits)

Find degree of pass-through from secondary market to primary market large *and timely*

But varies with demand likely reflecting capacity constraints

Implications for affordability and monetary policy

Uptrend in intermediation costs over time

Implications for affordability

CAVEAT:

Importantly, we are not making any welfare statements.

Bhutta and Keys (BK)

Bhutta and Keys (BK)

Looks at important mortgage sub-industry that has received almost no attention in the academic literature --- HUGE!

Bhutta and Keys (BK)

Looks at important mortgage sub-industry that has received almost no attention in the academic literature --- HUGE!

Striking finding:

Bhutta and Keys (BK)

Looks at important mortgage sub-industry that has received almost no attention in the academic literature --- HUGE!

Striking finding:

PMI companies had the tools and incentives to impose constraints on GSE lending when risks increased

Bhutta and Keys (BK)

Looks at important mortgage sub-industry that has received almost no attention in the academic literature --- HUGE!

Striking finding:

PMI companies had the tools and incentives to impose constraints on GSE lending when risks increased

But PMI *surged* as troubles in housing market started to ramp up

Bhutta and Keys (BK)

Looks at important mortgage sub-industry that has received almost no attention in the academic literature --- HUGE!

Striking finding:

PMI companies had the tools and incentives to impose constraints on GSE lending when risks increased

But PMI *surged* as troubles in housing market started to ramp up

Key factor seems to have been relationship with GSEs

Bhutta and Keys (BK)

Looks at important mortgage sub-industry that has received almost no attention in the academic literature --- HUGE!

Striking finding:

PMI companies had the tools and incentives to impose constraints on GSE lending when risks increased

But PMI *surged* as troubles in housing market started to ramp up

Key factor seems to have been relationship with GSEs

The institutional details of the system really matter

Dokko and Golding (DG)

Dokko and Golding (DG)

One way to distinguish different proposals is that they are associated with different secondary market structures

Dokko and Golding (DG)

One way to distinguish different proposals is that they are associated with different secondary market structures

Create matrix showing how different market structures perform with regard to different possible goals of reform

Dokko and Golding (DG)

One way to distinguish different proposals is that they are associated with different secondary market structures

Create matrix showing how different market structures perform with regard to different possible goals of reform

Inherently stylized exercise:

Dokko and Golding (DG)

One way to distinguish different proposals is that they are associated with different secondary market structures

Create matrix showing how different market structures perform with regard to different possible goals of reform

Inherently stylized exercise:

Proposals don't actually fit neatly into the columns

Dokko and Golding (DG)

One way to distinguish different proposals is that they are associated with different secondary market structures

Create matrix showing how different market structures perform with regard to different possible goals of reform

Inherently stylized exercise:

- Proposals don't actually fit neatly into the columns

- Many of the rankings are informed guesses based on limited evidence

Dokko and Golding (II)

Dokko and Golding (II)

But anyone who has sat at the policymaking table can tell you such exercises are IMMENSELY USEFUL

Dokko and Golding (II)

But anyone who has sat at the policymaking table can tell you such exercises are IMMENSELY USEFUL

Policymaking often involves operating in a 2nd (or nth) best world!

Dokko and Golding (II)

But anyone who has sat at the policymaking table can tell you such exercises are IMMENSELY USEFUL

Policymaking often involves operating in a 2nd (or nth) best world!

In addition to compiling *and distilling* a lot of information (both from research and authors' own institutional expertise), the paper:

Dokko and Golding (II)

But anyone who has sat at the policymaking table can tell you such exercises are IMMENSELY USEFUL

Policymaking often involves operating in a 2nd (or nth) best world!

In addition to compiling *and distilling* a lot of information (both from research and authors' own institutional expertise), the paper:

Moves the debate to thinking about trade-offs

Dokko and Golding (II)

But anyone who has sat at the policymaking table can tell you such exercises are IMMENSELY USEFUL

Policymaking often involves operating in a 2nd (or nth) best world!

In addition to compiling *and distilling* a lot of information (both from research and authors' own institutional expertise), the paper:

- Moves the debate to thinking about trade-offs

- Points out that the weights you assign to different goals make a big difference

Dokko and Golding (II)

But anyone who has sat at the policymaking table can tell you such exercises are IMMENSELY USEFUL

Policymaking often involves operating in a 2nd (or nth) best world!

In addition to compiling *and distilling* a lot of information (both from research and authors' own institutional expertise), the paper:

- Moves the debate to thinking about trade-offs

- Points out that the weights you assign to different goals make a big difference

- Heightens focus on features (like system's ability to mitigate shocks) that probably haven't gotten enough attention

All told, this set of papers helps reduce the obstacles to reform

All told, this set of papers helps reduce the obstacles to reform

FLW and BK fill in some missing evidence relevant to cost, access, systemic risk

All told, this set of papers helps reduce the obstacles to reform

FLW and BK fill in some missing evidence relevant to cost, access, systemic risk

DG help to organize what we do know, simplify the conversation, provide a concrete framework for comparing options => should generally make the policy process less messy

Where to go next?

Obvious scope for FLW and BK to help inform the DG boxes

	(1) Insurance	(2) Purchase	(3) PLS	(4) Portfolio
1. Cost of Funding	2- TBA market but some heterogeneity	1-liquid TBA market	3 – no guarantee or TBA	4 - Core deposits are expensive; no separation of credit & interest rate risks
2. Scale Economies (G&A)	4 - Competition for volume drives up costs	1 - Standardization and scale	3 – Inability to achieve MES in underwriting	2 – Vertically integrated
3. Market Power (P=MC)	3 - Some barriers to entry and limited number of firms	4 – Monopoly power from few firms and barriers to entry	2 –Relatively competitive industry	1 – Competitive industry
4. Information Costs	3 – Standardization reduces agency costs	2 - control over asset reduces agency costs	4 - very little vertical integration	1 – vertical integration addresses many issues
5. Innovation*	1	2	4	3
6. Macroeconomic Stability	2 – guarantee & TBA	1 – guarantee & TBA, likely TBTF firms	4 - market procyclical	3 - deposit insurance limits procyclicality

Obvious scope for FLW and BK to help inform the DG boxes

	(1) Insurance	(2) Purchase	(3) PLS	(4) Portfolio
1. Cost of Funding	2- TBA market but some heterogeneity	1-liquid TBA market	3 – no guarantee or TBA	4 - Core deposits are expensive; no separation of credit & interest rate risks
2. Scale Economies (G&A)	4 - Competition for volume drives up costs	1 - Standardization and scale	3 – Inability to achieve MES in underwriting	2 – Vertically integrated
3. Market Power (P=MC)	3 - Some barriers to entry and limited number of firms	4 – Monopoly power from few firms and barriers to entry	2 –Relatively competitive industry	1 – Competitive industry
4. Information Costs	3 – Standardization reduces agency costs	2 - control over asset reduces agency costs	4 - very little vertical integration	1 – vertical integration addresses many issues
5. Innovation*	1	2	4	3
6. Macroeconomic Stability	2 – guarantee & TBA	1 – guarantee & TBA, likely TBTF firms	4 - market procyclical	3 - deposit insurance limits procyclicality

← More to say with FLW data?

Obvious scope for FLW and BK to help inform the DG boxes

	(1) Insurance	(2) Purchase	(3) PLS	(4) Portfolio
1. Cost of Funding	2- TBA market but some heterogeneity	1-liquid TBA market	3 – no guarantee or TBA	4 - Core deposits are expensive; no separation of credit & interest rate risks
2. Scale Economies (G&A)	4 - Competition for volume drives up costs	1 - Standardization and scale	3 – Inability to achieve MES in underwriting	2 – Vertically integrated
3. Market Power (P=MC)	3 - Some barriers to entry and limited number of firms	4 – Monopoly power from few firms and barriers to entry	2 –Relatively competitive industry	1 – Competitive industry
4. Information Costs	3 – Standardization reduces agency costs	2 - control over asset reduces agency costs	4 - very little vertical integration	1 – vertical integration addresses many issues
5. Innovation*	1	2	4	3
6. Macroeconomic Stability	2 – guarantee & TBA	1 – guarantee & TBA, likely TBTF firms	4 - market procyclical	3 - deposit insurance limits procyclicality

← More to say with FLW data?

← Lessons from BK?

But BK raises a further question about the DG framework

	(1) Insurance	(2) Purchase	(3) PLS	(4) Portfolio
1. Cost of Funding	2- TBA market but some heterogeneity	1-liquid TBA market	3 – no guarantee or TBA	4 - Core deposits are expensive; no separation of credit & interest rate risks
2. Scale Economies (G&A)	4 - Competition for volume drives up costs	1 - Standardization and scale	3 – Inability to achieve MES in underwriting	2 – Vertically integrated
3. Market Power (P=MC)	3 - Some barriers to entry and limited number of firms	4 – Monopoly power from few firms and barriers to entry	2 –Relatively competitive industry	1 – Competitive industry
4. Information Costs	3 – Standardization reduces agency costs	2 - control over asset reduces agency costs	4 - very little vertical integration	1 – vertical integration addresses many issues
5. Innovation*	1	2	4	3
6. Macroeconomic Stability	2 – guarantee & TBA	1 – guarantee & TBA, likely TBTF firms	4 - market procyclical	3 - deposit insurance limits procyclicality

But BK raises a further question about the DG framework

	(1) Insurance	(2) Purchase	(3) PLS	(4) Portfolio
1. Cost of Funding	2- TBA market but some heterogeneity	1-liquid TBA market	3 – no guarantee or TBA	4 - Core deposits are expensive; no separation of credit & interest rate risks
2. Scale Economies (G&A)	4 - Competition for volume drives up costs	1 - Standardization and scale	3 – Inability to achieve MES in underwriting	2 – Vertically integrated
3. Market Power (P=MC)	3 - Some barriers to entry and limited number of firms	4 – Monopoly power from few firms and barriers to entry	2 –Relatively competitive industry	1 – Competitive industry
4. Information Costs	3 – Standardization reduces agency costs	2 - control over asset reduces agency costs	4 - very little vertical integration	1 – vertical integration addresses many issues
5. Innovation*	1	2	4	3
6. Macroeconomic Stability	2 – guarantee & TBA	1 – guarantee & TBA, likely TBTF firms	4 - market procyclical	3 - deposit insurance limits procyclicality

How do you deal with goal of not causing another global financial crisis?

Answer unclear

Answer unclear

Maybe you simply assume structures will have best possible design

Answer unclear

Maybe you simply assume structures will have best possible design

Realistic? (costs of being wrong big)

Answer unclear

Maybe you simply assume structures will have best possible design

Realistic? (costs of being wrong big)

Could incorporate concerns into “macro stability” row

Answer unclear

Maybe you simply assume structures will have best possible design

Realistic? (costs of being wrong big)

Could incorporate concerns into “macro stability” row

But hard and don't want to distract from important point that some structures are better once you are in a crisis

Answer unclear

Maybe you simply assume structures will have best possible design

Realistic? (costs of being wrong big)

Could incorporate concerns into “macro stability” row

But hard and don't want to distract from important point that some structures are better once you are in a crisis

Add more rows?

Answer unclear

Maybe you simply assume structures will have best possible design

Realistic? (costs of being wrong big)

Could incorporate concerns into “macro stability” row

But hard and don't want to distract from important point that some structures are better once you are in a crisis

Add more rows?

Scope for regulatory capture? Transparency? Safeguards against incentives to take excessive risk?



**GOLUB CENTER
FOR FINANCE AND POLICY**

4th Annual Conference

Government Financial Products, Policies, and Institutions

September 28, 2017