Cost Pass-Through and Mortgage Credit: The Case of Guarantee Fees

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Motivation

- Home mortgages are the largest category of household debt in the United States.
- Because of this, the cost of mortgage credit affects not only household borrowing and spending decisions, but the transmission of fiscal and monetary policy.
- Lender decisions and market structure determine how regulatory or macroeconomic cost shocks will be transmitted to consumers.

Our Setting: The US Mortgage Market

- In 2023 the mortgage market experienced a significant cost shock, the change in Loan Level Pricing Adjustments, that is almost ideal for examining heterogeneous pass-through.
  - LLPAs had been fairly stable since 2015
  - The size and the direction of the cost shock varied across mortgages, allowing for estimates of the shape of pass-through
  - Further, mortgage prices are multi-dimensional and consist of both rate and various types of fees (discount points, lender credits, origination fees)

Key Findings

1. Complete pass-through on average, with 2/3 of pass-through via rate and 1/3 through fees. However, fee pass-through is mostly through points selected by borrowers
2. Asymmetry in the cross-section of changes, with less than complete pass-through of cost declines but overshifting of cost increases.
3. No evidence of:
   - Shrouding by passing through costs to unobserved fees
   - Differences in pass-through by borrower information/sophistication, or by competitive environment
   - heterogeneity across protected class, such as age or sex

Basic Research Design

For a mortgage i in LLPA cell c delivered to the GSEs in month d, the regression model is:

$$P_{i,c,d} = \alpha + \rho L_{c,d} + \delta_c + \delta_d + \varepsilon_{i,c,d}$$

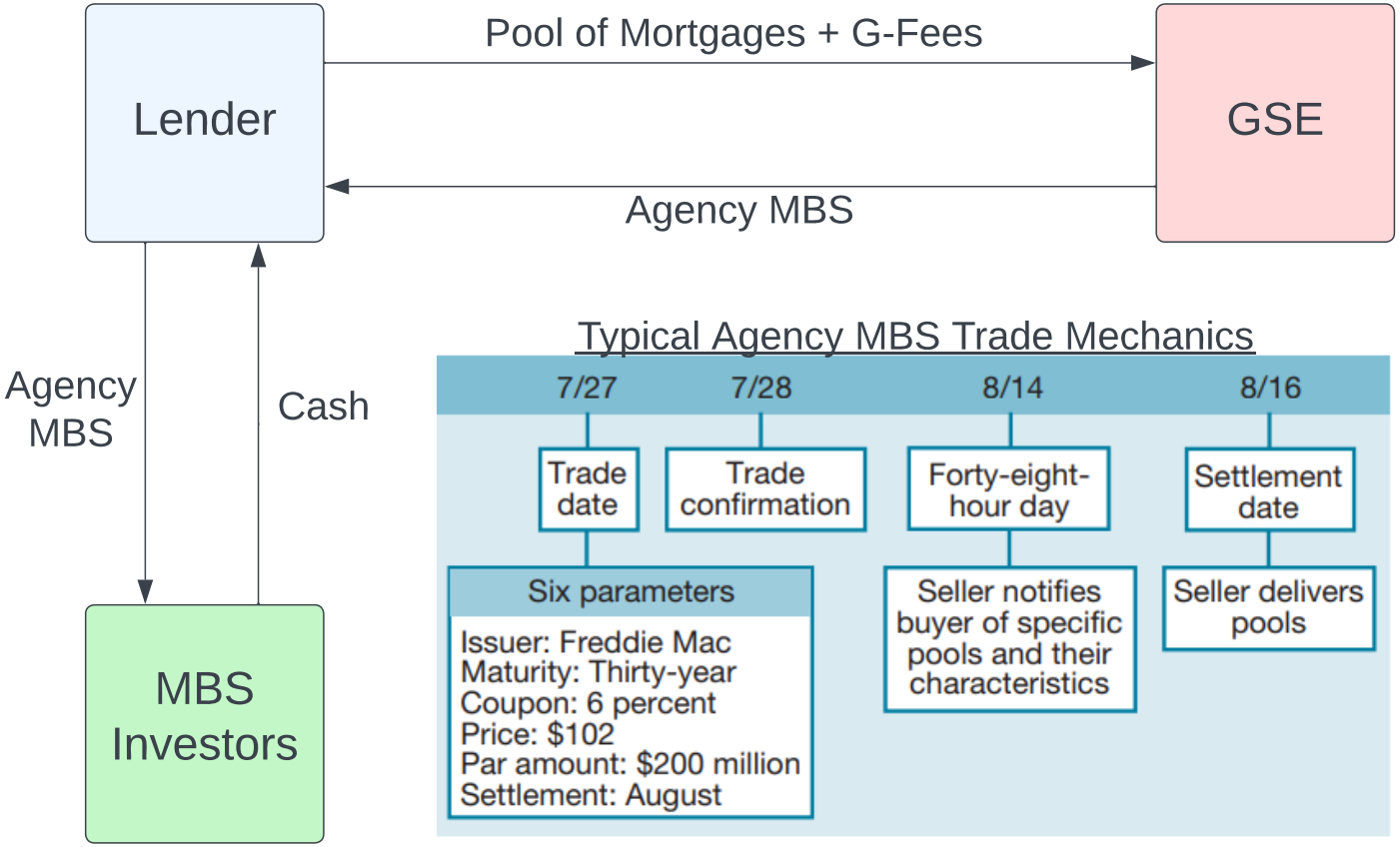
where ρ is the average pass-through rate and:

$P_{i,c,d}$ = all-in measure of the mortgage price capturing both interest rates and upfront fees for a mortgage delivered in month d.

$L_{c,d}$ = flow LLPA assigned to cell c based on the active LLPA matrix in month d.

δ's = cell and month fixed effects. Later include lender $\times$ month, DTI $\times$ month, and loan amount $\times$ month effects.

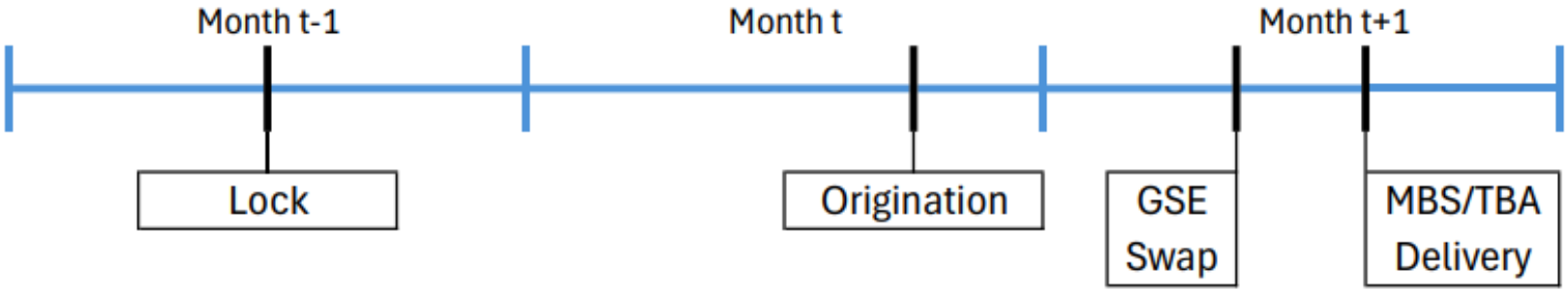
Conforming Mortgage Origination and Sale Process



[1]

[1] MBS Trade Mechanics from Vickery and Wright 2013 "TBA Trading and Liquidity in the Agency MBS Market"

Timing of LLPA Assignment



- The change in LLPAs is announced months in advance. The actual LLPA is charged when the loan is delivered
- The LLPA incorporated into a rate sheet will be for the month a lender expects them to be delivered
- We have the origination month of each loan (month t). Based on when most originated loans are sold, we assume that they are sold and delivered and the LLPA charged in the next month (t+1 or d)

Components and Mechanics of the Guarantee Fee

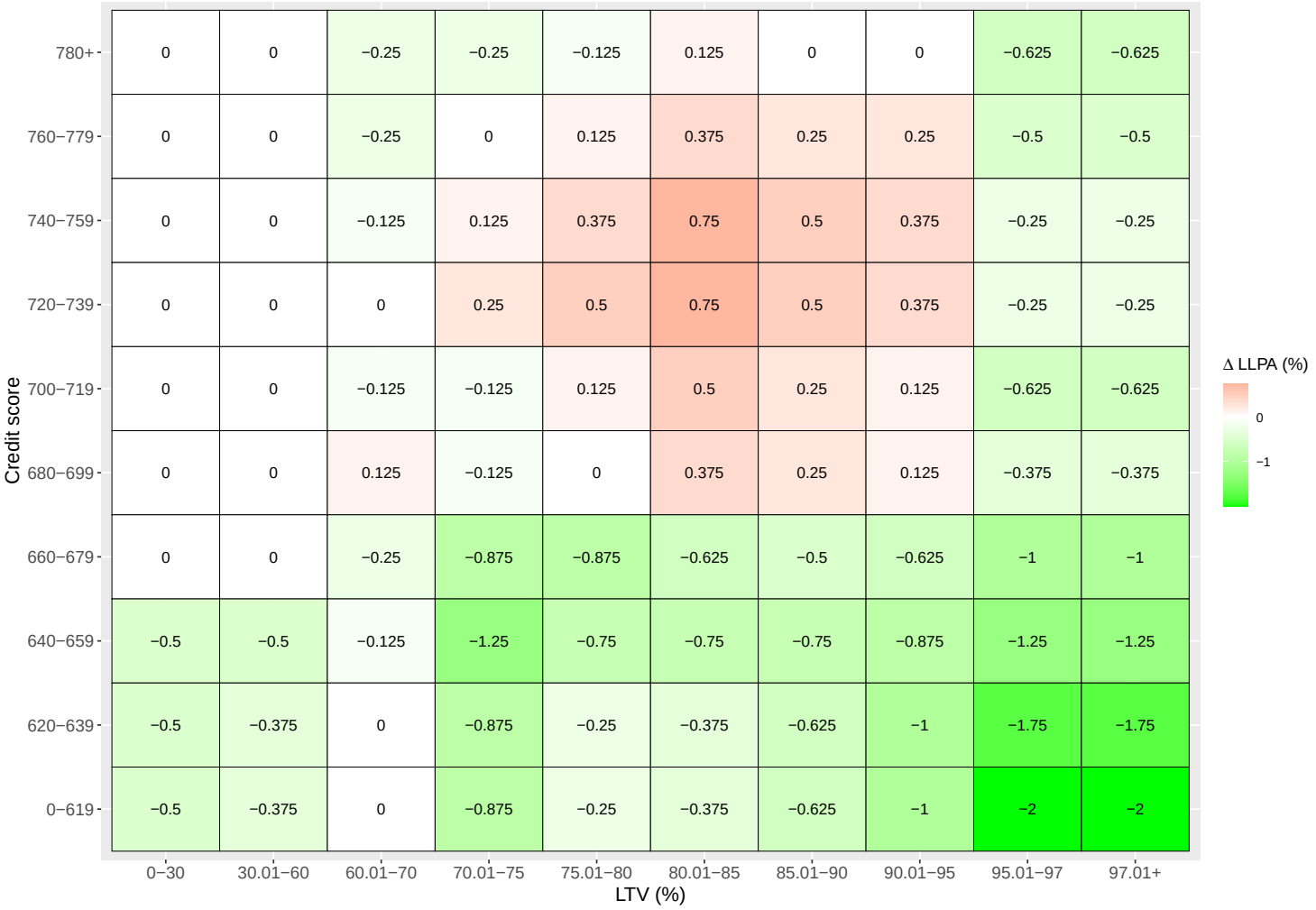
- When lenders deliver a conforming mortgage to the GSEs, they are charged a two-part guarantee fee to insure against default risk
  - The first part is a flat ongoing fee, which is 44 bps in the case of a 30-year loan
  - The second part is the LLPA, which varies by purpose, LTV, and Credit Score, as well as other characteristics for specialized loans
- LLPAs can be paid upfront or converted into an equivalent ongoing fee using a multiple:

$$\text{Flow LLPA} = \frac{\text{Upfront LLPA}}{\text{GSE Multiple}}$$

Base Fannie LLPA Grid - Post Shock

Purchase Money Loans – LLPA by Credit Score/LTV Ratio										
Credit Score	LTV Range									
	Applicable for all loans with terms greater than 15 years									
	≤ 30.00%	30.01 – 60.00%	60.01 – 70.00%	70.01 – 75.00%	75.01 – 80.00%	80.01 – 85.00%	85.01 – 90.00%	90.01 – 95.00%	>95.00%	SFC
≥ = 780	0.000%	0.000%	0.000%	0.000%	0.375%	0.375%	0.250%	0.250%	0.125%	N/A
760 – 779	0.000%	0.000%	0.000%	0.250%	0.625%	0.625%	0.500%	0.500%	0.250%	N/A
740 – 759	0.000%	0.000%	0.125%	0.375%	0.875%	1.000%	0.750%	0.625%	0.500%	N/A
720 – 739	0.000%	0.000%	0.250%	0.750%	1.250%	1.250%	1.000%	0.875%	0.750%	N/A
700 – 719	0.000%	0.000%	0.375%	0.875%	1.375%	1.500%	1.250%	1.125%	0.875%	N/A
680 – 699	0.000%	0.000%	0.625%	1.125%	1.750%	1.875%	1.500%	1.375%	1.125%	N/A
660 – 679	0.000%	0.000%	0.750%	1.375%	1.875%	2.125%	1.750%	1.625%	1.250%	N/A
640 - 659	0.000%	0.000%	1.125%	1.500%	2.250%	2.500%	2.000%	1.875%	1.500%	N/A
≤ 639[1]	0.000%	0.125%	1.500%	2.125%	2.750%	2.875%	2.625%	2.250%	1.750%	N/A

The Shock: May 2023 Changes to the LLPA Grid



Credit score	0–30	30.01–60	60.01–70	70.01–75	75.01–80	80.01–85	85.01–90	90.01–95	95.01–97	97.01+
780+	0	0	−0.25	−0.25	−0.125	0.125	0	0	−0.625	−0.625
760–779	0	0	−0.25	0	0.125	0.375	0.25	0.25	−0.5	−0.5
740–759	0	0	−0.125	0.125	0.375	0.75	0.5	0.375	−0.25	−0.25
720–739	0	0	0	0.25	0.5	0.75	0.5	0.375	−0.25	−0.25
700–719	0	0	−0.125	−0.125	0.125	0.5	0.25	0.125	−0.625	−0.625
680–699	0	0	0.125	−0.125	0	0.375	0.25	0.125	−0.375	−0.375
660–679	0	0	−0.25	−0.875	−0.875	−0.625	−0.5	−0.625	−1	−1
640–659	−0.5	−0.5	−0.125	−1.25	−0.75	−0.75	−0.75	−0.875	−1.25	−1.25
620–639	−0.5	−0.375	0	−0.875	−0.25	−0.375	−0.625	−1	−1.75	−1.75
0–619	−0.5	−0.375	0	−0.875	−0.25	−0.375	−0.625	−1	−2	−2

Estimate model using data from the GSEs and HMDA

Intersection of the GSE and HMDA data allows us to calculate the LLPA for each mortgage and its all-in mortgage price P:

$$\text{Price} = \text{Interest Rate} + \left(\frac{\text{Upfront Fees}}{\text{Loan Amount} \times \text{GSE Multiple}} \right).$$

Restrict sample to 30-year, fixed-rate, first-lien, purchase loans for single-family, site-built homes that only have base LLPAs.

Final sample: 84,685 vanilla purchase mortgages that were originated within six months of the May 2023 treatment date.

Selected Descriptive Statistics

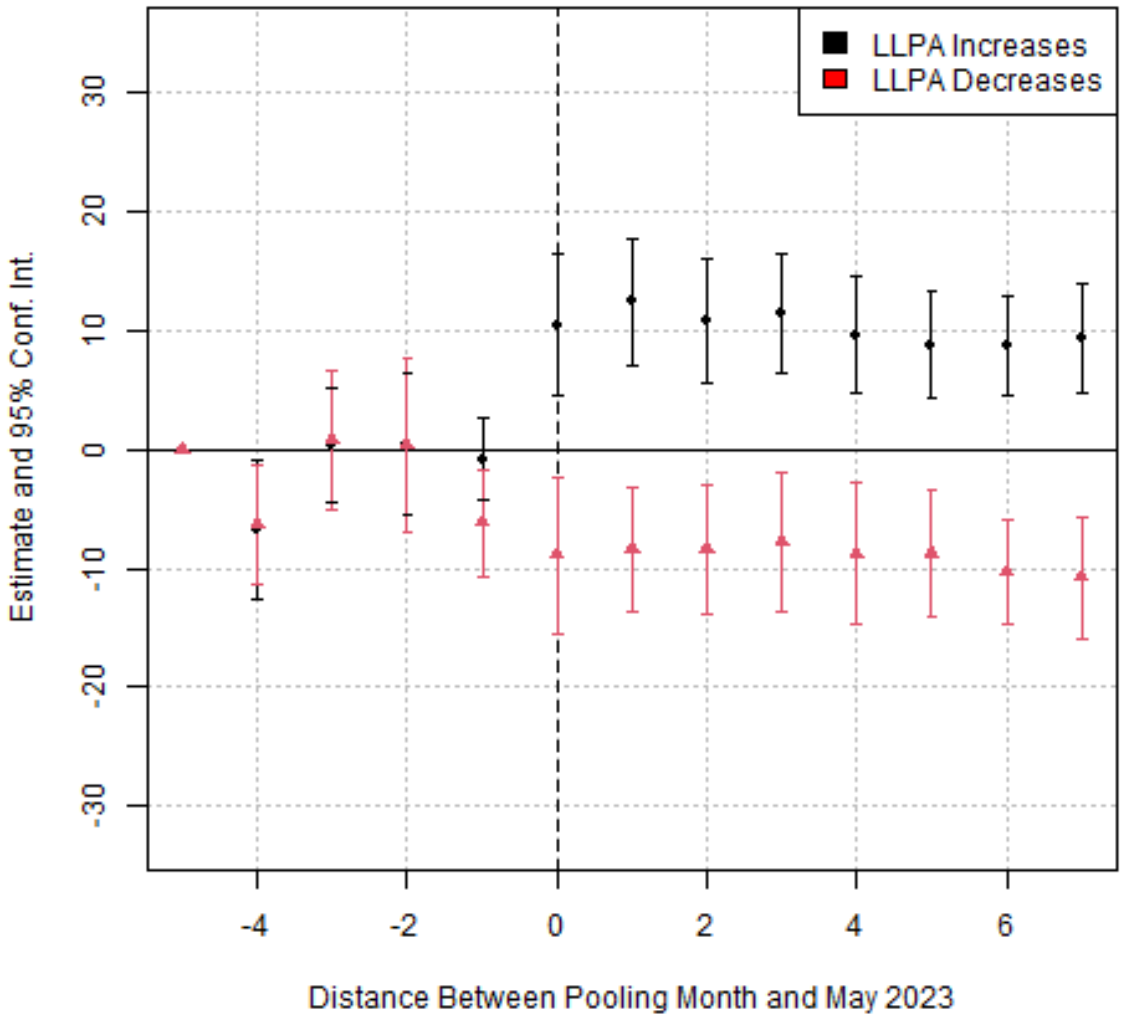
	Mean (1)	SD (2)	P25 (3)	P50 (4)	P75 (5)
Total Loan Price (%)	7.07	0.63	6.62	7.06	7.50
Interest Rate (%)	6.73	0.61	6.38	6.75	7.12
Net Upfront Fees (%)	0.34	0.29	0.11	0.27	0.50
Loan Amount ($)	359,972	157,262	240,000	336,000	465,000
Loan-to-Value Ratio (%)	81.82	15.03	80.00	80.00	95.00
Credit Score	757.12	40.29	733.00	765.00	789.00
Debt-to-Income Ratio (%)	33.76	9.20	27.00	34.00	41.00
Household Income	162,536	122,536	103,000	139,000	191,000
Upfront LLPA (%)	0.58	0.52	0.25	0.50	0.75
Flow LLPA (%)	0.18	0.16	0.08	0.15	0.23

Pass-Through Via Rate and Fees

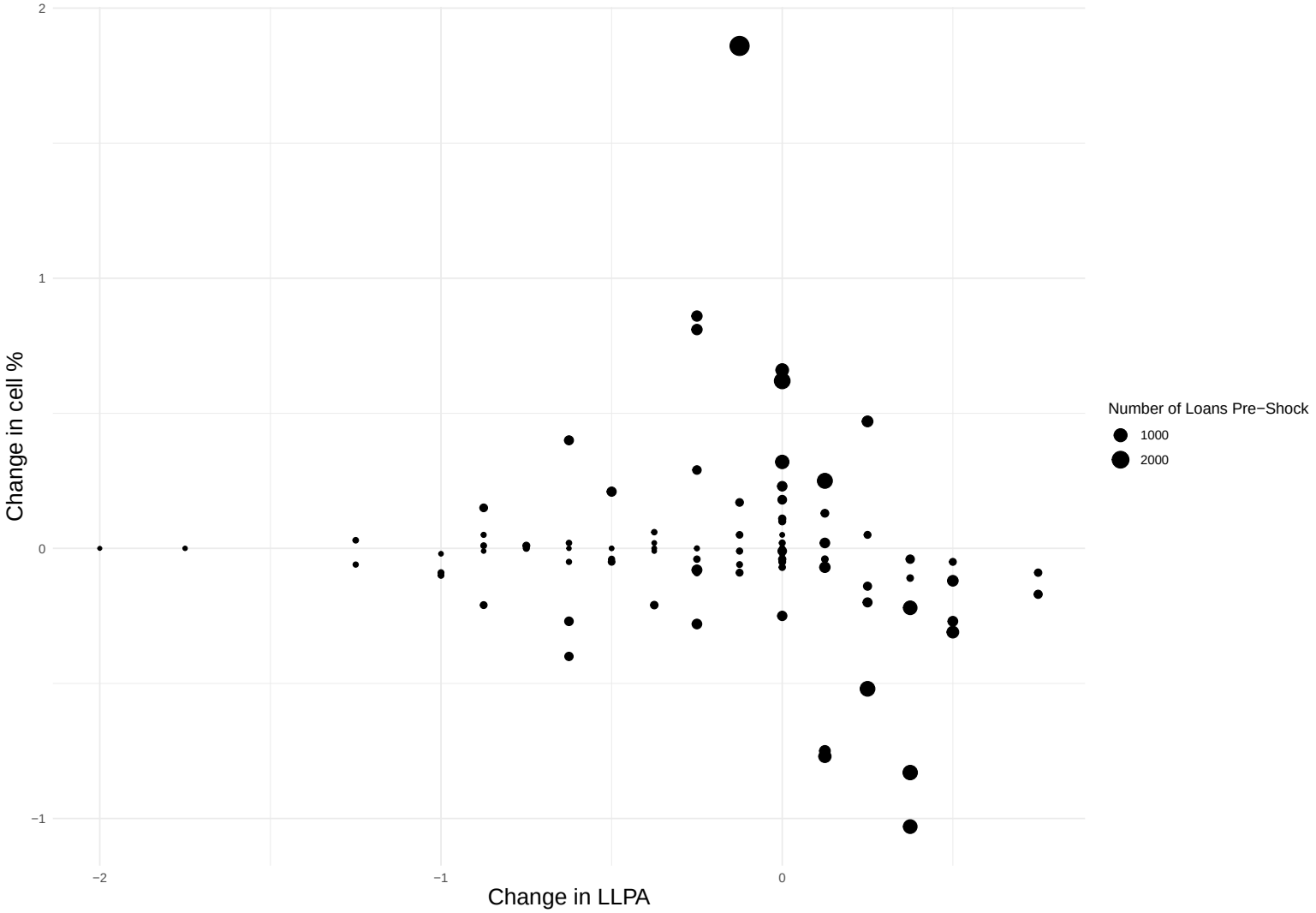
$$P_{i,c,d} = \alpha + \rho L_{c,d} + \delta_c + \delta_d + \varepsilon_{i,c,d}$$

	Total Loan Price		Interest Rate		Net Upfront Fees	
	(1)	(2)	(3)	(4)	(5)	(6)
Flow LLPA	0.99***	0.97***	0.68***	0.65***	0.31***	0.32***
	(0.09)	(0.07)	(0.07)	(0.06)	(0.02)	(0.02)
Cell FE	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender × Month FE		Yes		Yes		Yes
DTI × Month FE		Yes		Yes		Yes
Loan Amount × Month FE		Yes		Yes		Yes
N	84,685	84,685	84,685	84,685	84,685	84,685
R^2	0.50	0.69	0.46	0.59	0.06	0.31

Identification: Is This a Reaction to the Cost Shock?



Identification: Are Borrowers Shifting Cells?



Is Fee Pass-Through Along Non-Salient Margins?

$$P_{i,c,d} = \alpha + \rho L_{c,d} + \delta_c + \delta_d + \varepsilon_{i,c,d}$$

	Net Upfront Fees		Discount Points		Non-Point Loan Fees		Lender Credits	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Flow LLPA	0.31***	0.32***	0.24***	0.24***	0.06***	0.07***	-0.01	-0.00
	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Cell FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender × Month FE		Yes		Yes		Yes		Yes
DTI × Month FE		Yes		Yes		Yes		Yes
Loan Amount × Month FE		Yes		Yes		Yes		Yes
N	84,685	84,685	84,685	84,685	84,685	84,685	84,685	84,685
R^2	0.06	0.31	0.04	0.25	0.01	0.26	0.00	0.19

Asymmetry of Pass-Through

$$P_{i,c,d} = \alpha + \rho L_{c,d} + \beta L_{c,d} \times \text{LLPA Decreased}_c + \delta_c + \delta_d + \varepsilon_{i,c,d}$$

	Total Loan Price (1)	Interest Rate (2)	Net Upfront Fees (3)	Discount Points (4)	Non-Point Loan Fees (5)	Lender Credits (6)
LLPA Flow	1.29***	0.94***	0.35***	0.23***	0.11**	-0.01
	(0.09)	(0.09)	(0.04)	(0.04)	(0.04)	(0.01)
LLPA Flow × LLPA Decreased	-0.59***	-0.51***	-0.08	0.01	-0.09	0.00
	(0.18)	(0.17)	(0.07)	(0.06)	(0.06)	(0.01)
Cell FE	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
N	84,685	84,685	84,685	84,685	84,685	84,685
R^2	0.50	0.47	0.06	0.04	0.01	0.00

Potential Impact of Asymmetry

Suppose we incorrectly calculated the average cost per loan using the average pass-through rate and the average change in LLPAs:

$$N^{-1} \sum_i \rho \cdot \Delta \text{LLPA}_i = \$183$$

Doing so would result in a cost estimate approximately one-fourth as large as an estimate that correctly accounts for asymmetry:

$$N^{-1} \sum_i \rho_i \cdot \Delta \text{LLPA}_i = \$591$$

What Explains Asymmetry?

1. Asymmetric information about the cost shock
2. Technical features of cost pass-through related to market structure, such as level of competition
3. Differences in borrower constraints and characteristics
4. Shape of the demand curve

We will analyze each in turn

Heterogeneity Across Information Environment

	Total Loan Price			
	LLPA Decrease		LLPA Increase	
	(1)	(2)	(3)	(4)
LLPA Flow	0.65***	0.66***	1.28***	1.33***
	(0.18)	(0.18)	(0.12)	(0.12)
LLPA Flow × Broker Loan	0.15***		0.14***	
	(0.04)		(0.04)	
LLPA Flow × First Home		0.01		-0.03
		(0.02)		(0.02)
Cell FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Broker Loan × Month FE	Yes		Yes	
First Home × Month FE		Yes		Yes
N	46,332	46,332	58,273	58,273
R^2	0.51	0.51	0.48	0.48

Competition and Borrower Characteristics

	Total Loan Price			
	(1)	(2)	(3)	(4)
LLPA Flow	1.00***	1.01***	0.98***	1.00***
	(0.09)	(0.08)	(0.09)	(0.09)
LLPA Flow × Low Competition	-0.11			
	(0.15)			
LLPA Flow × High DTI		-0.05**		
		(0.02)		
LLPA Flow × Non-White			0.01	
			(0.02)	
LLPA Flow × Female				-0.03
				(0.03)
Cell FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Low Competition × Month FE	Yes			
High DTI × Month FE		Yes		
Non-White × Month FE			Yes	
Below Age 45 × Month FE				Yes
N	84,644	84,685	84,685	84,685
R^2	0.50	0.50	0.50	0.50

Heterogeneity across Credit Score and LTV

	Total Loan Price			
	(1)	(2)	(3)	(4)
LLPA Flow	1.28**	1.43***	1.01***	1.40***
	(0.11)	(0.22)	(0.11)	(0.09)
LLPA Flow × LLPA Decreased	-0.60***	-0.68*	-0.21	-0.73***
	(0.11)	(0.34)	(0.20)	(0.22)
Subsample	Low Score	High Score	Low LTV	High LTV
Cell FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
N	42,343	42,342	42,342	42,343
R^2	0.49	0.46	0.50	0.49

Loan Demand Convexity

	log Loan Amount	
	(1)	(2)
Flow LLPA	-0.06	-0.29**
	(0.06)	(0.09)
Flow LLPA^2		0.35**
		(0.10)
Cell FE	Yes	Yes
Month FE	Yes	Yes
$\%\Delta\bar{L} = \Delta\bar{L}/\bar{L}_{\text{Pre-period}}$	5.5%	5.5%
$\widehat{\%\Delta A} = \widehat{\beta}_1\Delta\bar{L} + \widehat{\beta}_2\Delta\bar{L}^2$	-0.06%	-0.29%
Implied Elasticity ($= \widehat{\%\Delta A}/\%\Delta\bar{L}$)	-0.01	-0.05
N	84,685	84,685
R^2	0.12	0.12

Conclusion

- In May 2023 the FHFA required the GSEs to make significant adjustments to the LLPAs they charge borrowers
- We use this event to analyze how mortgage lenders pass through cost shocks to borrowers via multiple dimensions of pricing
- Pass-through is high on average, but is asymmetric and a highly nonlinear function of the shock
- This asymmetry is important for policy evaluation, because it influences cost estimates

Thank you!

LLPAs are a production cost and should influence prices

Consider a hypothetical mortgage with zero upfront fees. We can deconstruct the interest rate on this mortgage as follows:

$$R_0 = \text{Ongoing Fee} + \text{Flow LLPA} + \text{Agency MBS Coupon} + \text{Other Costs} + \text{Servicing Income} + \text{Lender Margins}.$$

If the LLPA rises (falls), then the interest rate must rise (fall) an equivalent amount or lender margins will decline (rise).

Theory suggests that numerous factors such as market structure and price elasticities should affect the pass-through rate.

LLPA changes were controversial

"This is the socialization of credit risk, and it flies against every rational economic model while encouraging housing market dysfunction..."

– The Wall Street Journal

"Thanks to Joe Biden, starting May 1...Buyers with good credit scores will pay even more to cover those with bad credit."

– Nikki Haley on Twitter

Statements from the FHFA about the LLPA changes

Regarding their desire to update stale pricing:

> *"...[opponents] mistakenly assume that the prior pricing framework was somehow perfectly calibrated to risk..."*

Regarding the expected effects of the program:

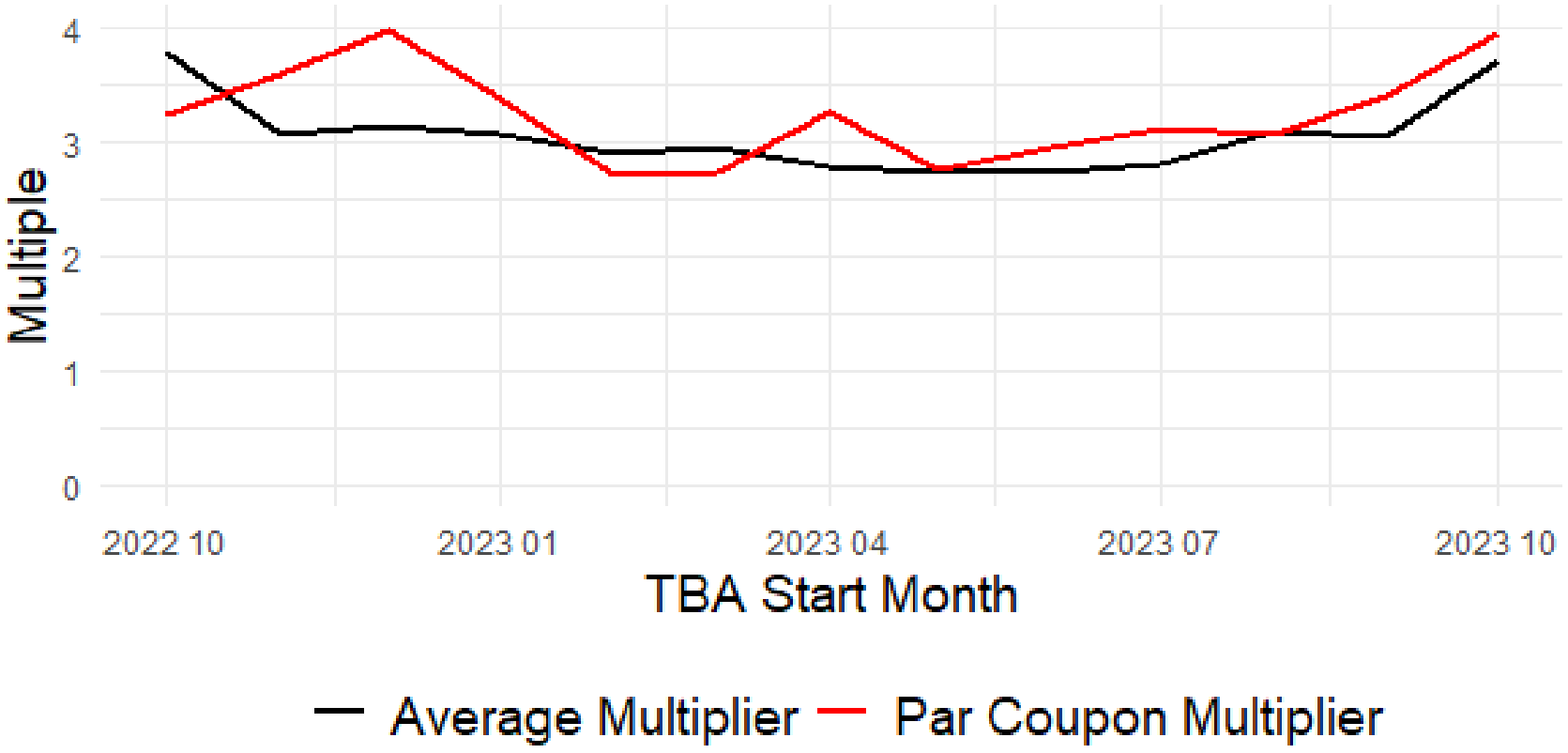
> *"...[the changes will] further the safety and soundness of [the GSEs], which will help them better achieve their mission."*

Base LLPA Grid Pre-Shock

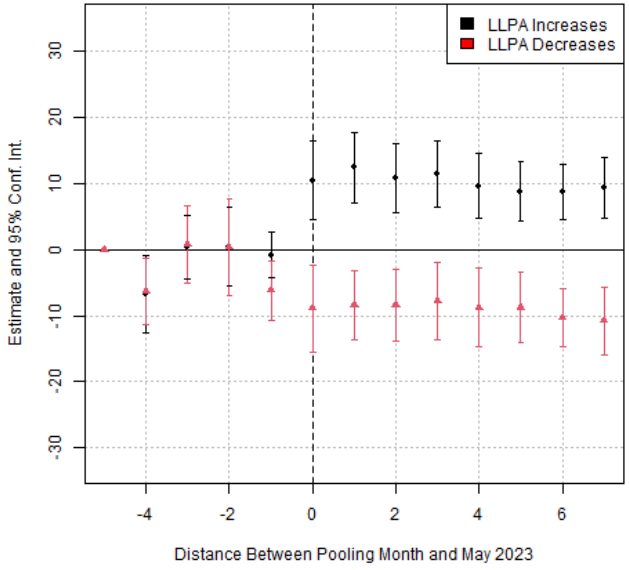
Table 1: All Eligible Loans – LLPA by Credit Score/LTV Ratio

Representative Credit Score	LTV Range									
	Applicable for all loans with terms greater than 15 years									
	≤ 60.00%	60.01 – 70.00%	70.01 – 75.00%	75.01 – 80.00%	80.01 – 85.00%	85.01 – 90.00%	90.01 – 95.00%	95.01 – 97.00%	>97.00%	SFC
≥ 740	0.000%	0.250%	0.250%	0.500%	0.250%	0.250%	0.250%	0.750%	0.750%	N/A
720 – 739	0.000%	0.250%	0.500%	0.750%	0.500%	0.500%	0.500%	1.000%	1.000%	N/A
700 – 719	0.000%	0.500%	1.000%	1.250%	1.000%	1.000%	1.000%	1.500%	1.500%	N/A
680 – 699	0.000%	0.500%	1.250%	1.750%	1.500%	1.250%	1.250%	1.500%	1.500%	N/A
660 – 679	0.000%	1.000%	2.250%	2.750%	2.750%	2.250%	2.250%	2.250%	2.250%	N/A
640 – 659	0.500%	1.250%	2.750%	3.000%	3.250%	2.750%	2.750%	2.750%	2.750%	N/A
620 – 639	0.500%	1.500%	3.000%	3.000%	3.250%	3.250%	3.250%	3.500%	3.500%	N/A
< 620[1]	0.500%	1.500%	3.000%	3.000%	3.250%	3.250%	3.250%	3.750%	3.750%	N/A

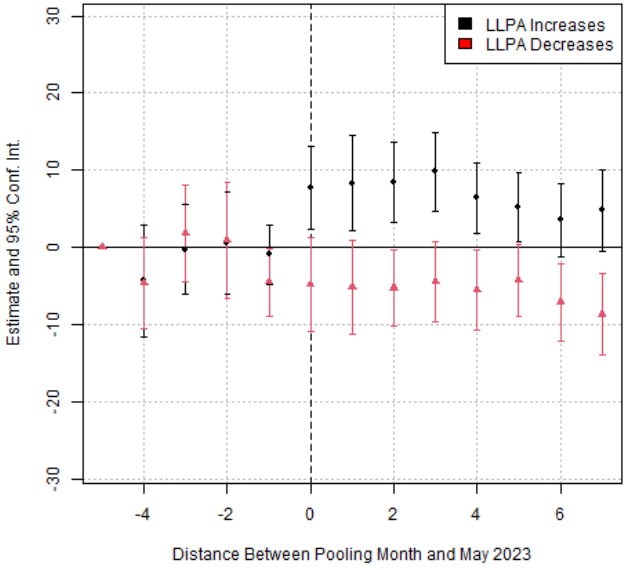
Average and Par Coupon Multiple Estimate Over Sample Period



Level Effects on Prices, Rates, and Net Upfront Fees I

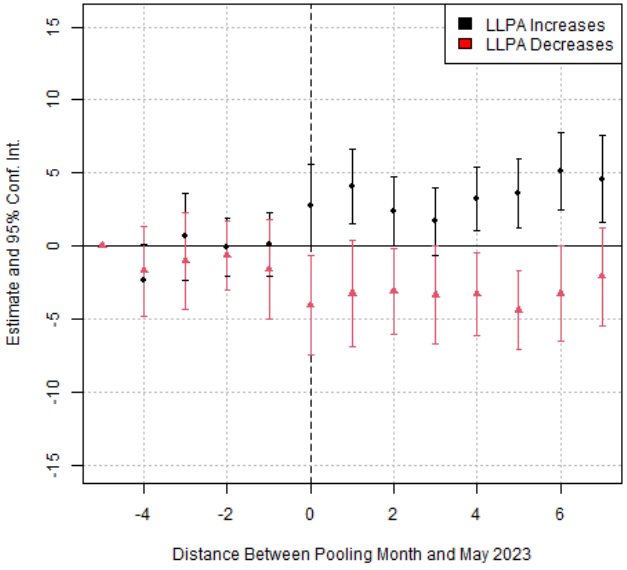


(a) Total Loan Price (%)

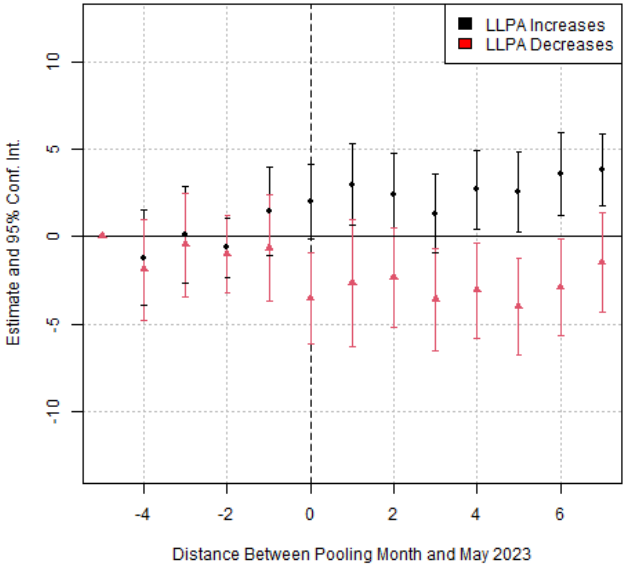


(b) Interest Rate (%)

Level Effects on Prices, Rates, and Net Upfront Fees II



(c) Net Upfront Fees (%)



(d) Discount Points (%)

LLPA changes did not encourage sorting

Did the changes encourage higher LTVs?

> *"...[the changes] do not provide incentives for borrowers to make lower down payments to benefit from lower fees."*

Were the changes intended to boost mortgage demand?

> *"...[the changes] were not designed to stimulate mortgage demand...[would help those] limited by income or wealth."*