GSE Mortgage Insurance Pricing

Kris Gerardi
with (significant) help from Scott Frame and Daniel Sexton

FRB Atlanta

FRB NY
April 27, 2017

These views expressed are those of the author and do not necessarily reflect those of any entities within the Federal Reserve System.

Road Map

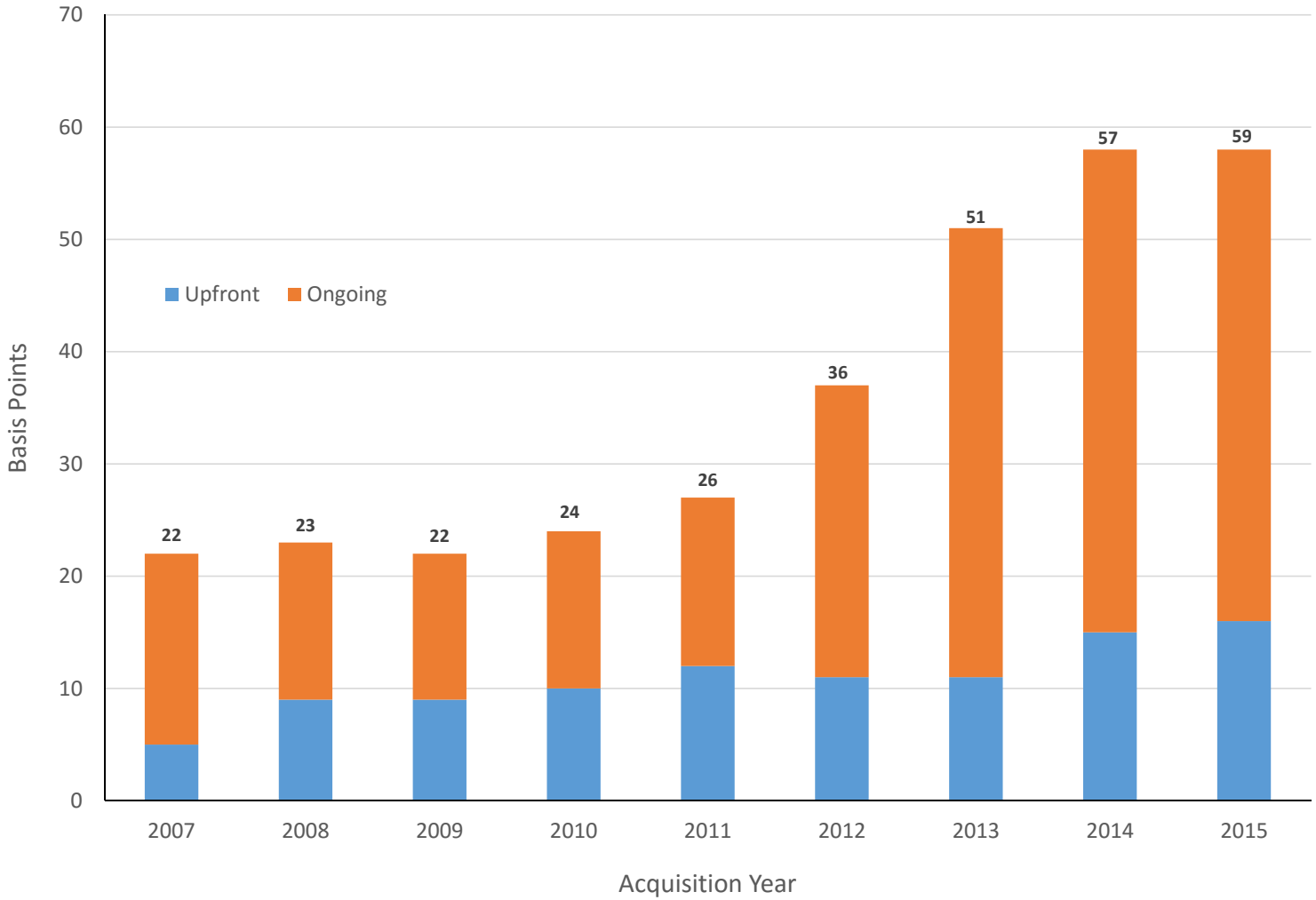
- Explore how Fannie Mae and Freddie Mac (GSEs) set their mortgage insurance prices.
- Document trends toward greater degree of risk-based pricing in the aftermath of the crisis.
- Cross subsidization.
  - Qualitative information on cross-subsidization of 30-year FRMS, high LTV, and low credit score borrowers from FHFA.
  - New *quantitative* evidence of cross-subsidization in FICO-LTV space.
- Policy relevance:
  - G-fees are an important determinant of the cost of mortgage credit for many U.S. households.
  - Pre-requisite to an informed policy debate is transparency about which market segments are currently receiving subsidies and the quantitative magnitudes of those subsidies.

G-fee Basics

- Fannie Mae and Freddie Mac (GSEs)
  - Charge guarantee fee or "G-fee" for insuring the timely payment of principal and interest on MBS.
  - Meant to cover projected credit losses from mortgage defaults, administrative costs, and return on capital.
  - Two components to G-fee:
    1. Ongoing monthly payment stream from interest paid on loan.
    2. Upfront payment at time of loan acquisition $\Rightarrow$ can convert to ongoing fee using PVM $\sim$ 4–5.
  - Large increases in average G-fees over past decade.
    - To correct for "underpricing" of credit risk in pre-crisis period.

G-fee Levels 2007–2015

Figure: Average Guarantee Fee 2007–2015



Source: Federal Housing Finance Agency

Determinants of G-fees

- Numerous factors involved in determining G-fee:
  - Estimated cost:
    - Expected credit losses: Derived from internal models that simulate cash flows based on loan attributes and projected house price and interest rate paths.
    - Risk premium (cost of capital) determined by target rate of return and capital requirements.
    - Administrative expenses.
    - Net float income.
  - Competitive factors (e.g. private market, FHA, etc.)
  - Lender size – discounts for larger institutions.
  - Public policy factors: affordable housing goals, public mission of facilitating steady flow of low-cost mortgage credit.

Determinants of G-fees

- Risk-based pricing:
  - Prices set as a function of estimated credit risk.
- G-fees are function of following loan/borrower characteristics:
  - LTV ratios.
  - Credit scores.
  - Product type (i.e. FRM, ARM, 15 vs. 30 year term, etc.).
  - Property type (# units).
  - Occupancy status.
  - Loan purpose (purchase, rate-refi, or cash-out refi).
  - Level of documentation.
- The exact variables on this list and the sensitivity of G-fees to each variable has changed over time.

Pricing Changes

- Significant changes in G-fees after mortgage crisis.
- Series of level increases:
  - 25 bps "adverse market fee" in 2008.
  - 10 bps increase in April 2012 mandated by the Temporary Payroll Tax Cut Continuation Act of 2011.
  - 10 bps increase in December 2012 to encourage more private sector participation.
- Introduction of LLPAs/Delivery fees in early 2008 that were based specifically on LTV ratios and credit scores.
  - Increased relative prices for higher risk borrowers – high LTV and low credit scores.

LLPAs

- Fannie Mae LLPAs for Single Family Conforming 30-year FRMs: June 1, 2008 (issued March 6, 2008):

FICO Score	LTV Ratio								
	$\leq$ 60%	60-70%	70-75%	75-80%	80-85%	85-90%	90-95%	95-97%	97-100%
$\geq$ 740	-0.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
720-739	-0.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
700-719	-0.25%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
680-699	0.00%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
660-679	0.00%	0.50%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%
640-659	0.00%	0.50%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%	1.75%
620-639	0.00%	0.75%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
$<$ 620	0.00%	0.75%	2.75%	2.75%	2.75%	2.75%	2.75%	2.75%	2.75%

- Fannie Mae LLPAs for Single Family Conforming 30-year FRMs: September 1, 2015 (issued April 17, 2015):

FICO Score	LTV Ratio								
	$\leq$ 60%	60-70%	70-75%	75-80%	80-85%	85-90%	90-95%	95-97%	97-100%
$\geq$ 740	0.00%	0.25%	0.25%	0.50%	0.25%	0.25%	0.25%	0.75%	-
720-739	0.00%	0.25%	0.50%	0.75%	0.50%	0.50%	0.50%	1.00%	-
700-719	0.00%	0.50%	1.00%	1.25%	1.00%	1.00%	1.00%	1.50%	-
680-699	0.00%	0.50%	1.25%	1.75%	1.50%	1.25%	1.25%	1.50%	-
660-679	0.00%	1.00%	2.25%	2.75%	2.75%	2.25%	2.25%	2.25%	-
640-659	0.50%	1.25%	2.75%	3.00%	3.25%	2.75%	2.75%	2.75%	-
620-639	0.50%	1.50%	3.00%	3.00%	3.25%	3.25%	3.25%	3.50%	-
$<$ 620	0.50%	1.50%	3.00%	3.00%	3.25%	3.25%	3.25%	3.75%	-

Cross Subsidization - Qualitative Evidence

- GSEs' pricing schedule is characterized by significant cross subsidization on numerous dimensions.
  - Practice of setting higher prices for one group of borrowers to subsidize lower prices for another group.
- FHFA provides some *qualitative* evidence of cross-subsidies.
- Calculate "gap" $\Rightarrow$ difference between average estimated revenue generated by G-fee and average estimated cost.
- Negative (positive) gap $\Rightarrow$ category generates less (more) than target rate of return.
  1. Product type: 30-year FRMs subsidized by ARMs and 15-year FRMs.
  2. Leverage: High LTV mortgages subsidized by low LTV loans.
  3. Credit score: Borrowers with low credit scores subsidized by those with high scores.

Cross Subsidization - Quantitative Evidence

- Question: What are the *quantitative* magnitudes of the cross-subsidies in LTV-FICO space?
- Need to construct estimates of expected losses.
  - Use information from Fannie Mae and Freddie Mac public data.
  - Focus on single-family, owner-occupied, 30-year FRMs.
  - Focus on 2000–2011 originations.
    - Sample covers pre-boom, boom, and crisis periods.
- Compare ratios of expected losses for each LTV-FICO cell to G-fee ratios.
  - Use the lowest risk cell as the base group $\Rightarrow$ FICO $\geq$ 740, LTV $\leq$ 60%.

Cross Subsidization - Quantitative Evidence

- 5-year cumulative default rate ratios:

FICO Score	LTV Ratio								
	≤ 60%	60-70%	70-75%	75-80%	80-85%	85-90%	90-95%	95-97%	97-100%
≥ 740	1.0 (0.41%)	2.3	2.8	3.5	5.5	6.2	5.9	8.7	17.9
720-739	2.9	5.7	6.0	7.0	9.2	10.3	8.4	8.8	21.3
700-719	4.2	8.3	8.8	9.8	12.1	13.5	11.2	11.4	30.7
680-699	6.2	10.9	11.6	12.8	16.6	18.0	15.0	15.0	37.1
660-679	9.1	15.2	15.4	16.7	20.8	22.6	19.0	18.1	53.5
640-659	13.7	21.0	19.9	20.9	26.2	28.4	24.4	23.6	63.2
620-639	18.8	26.9	24.7	25.2	30.2	33.1	29.9	31.1	73.1
< 620	28.7	35.7	31.1	28.7	33.1	35.5	37.0	45.0	83.7

- Loss given default (LGD) ratios:

FICO Score	LTV Ratio								
	≤ 60%	60-70%	70-75%	75-80%	80-85%	85-90%	90-95%	95-97%	97-100%
≥ 740	1.0 (39.1%)	1.2	1.2	1.2	0.9	0.7	0.5	0.5	0.8
720-739	1.0	1.2	1.3	1.3	1.0	0.8	0.6	0.4	0.8
700-719	1.1	1.3	1.3	1.3	1.0	0.8	0.6	0.5	0.9
680-699	1.1	1.3	1.3	1.3	1.0	0.8	0.6	0.5	0.9
660-679	1.1	1.4	1.3	1.3	1.1	0.8	0.6	0.5	0.8
640-659	1.2	1.4	1.4	1.4	1.1	0.8	0.6	0.5	0.9
620-639	1.3	1.4	1.4	1.4	1.1	0.8	0.6	0.6	0.9
< 620	1.4	1.5	1.4	1.4	1.0	0.8	0.6	0.6	1.0

Cross Subsidization - Quantitative Evidence

- Expected loss ratios:

FICO Score	LTV Ratio								
	≤ 60%	60-70%	70-75%	75-80%	80-85%	85-90%	90-95%	95-97%	97-100%
≥ 740	1.0 (0.16%)	2.7	3.2	4.3	5.2	4.5	3.1	4.0	15.0
720-739	2.9	7.1	7.5	8.8	8.9	7.9	4.7	3.9	16.8
700-719	4.5	10.4	11.2	12.6	12.2	10.3	6.2	5.3	27.6
680-699	7.0	14.0	15.3	16.6	17.1	13.9	8.6	7.2	32.9
660-679	10.4	20.5	20.6	22.3	22.0	18.4	10.9	9.2	44.7
640-659	16.9	29.3	27.8	28.6	28.2	23.8	13.8	12.8	57.2
620-639	23.5	38.7	34.9	35.0	32.3	26.8	17.0	17.3	63.2
< 620	39.1	52.6	44.2	38.8	32.7	26.7	20.5	26.0	80.4

- 2015 Fannie G-fee ratios (assuming a base of 42 bps):

FICO Score	LTV Ratio								
	≤ 60%	60-70%	70-75%	75-80%	80-85%	85-90%	90-95%	95-97%	97-100%
≥ 740	1	1.12	1.12	1.24	1.12	1.12	1.12	1.36	∞
720-739	1	1.12	1.24	1.36	1.24	1.24	1.24	1.48	∞
700-719	1	1.24	1.48	1.60	1.48	1.48	1.48	1.71	∞
680-699	1	1.24	1.60	1.83	1.71	1.60	1.60	1.71	∞
660-679	1	1.48	2.07	2.31	2.31	2.07	2.07	2.07	∞
640-659	1.24	1.60	2.31	2.43	2.55	2.31	2.31	2.31	∞
620-639	1.24	1.71	2.43	2.43	2.55	2.55	2.55	2.67	∞
<620	1.24	1.71	2.43	2.43	2.55	2.55	2.55	2.79	∞

Cell Shares

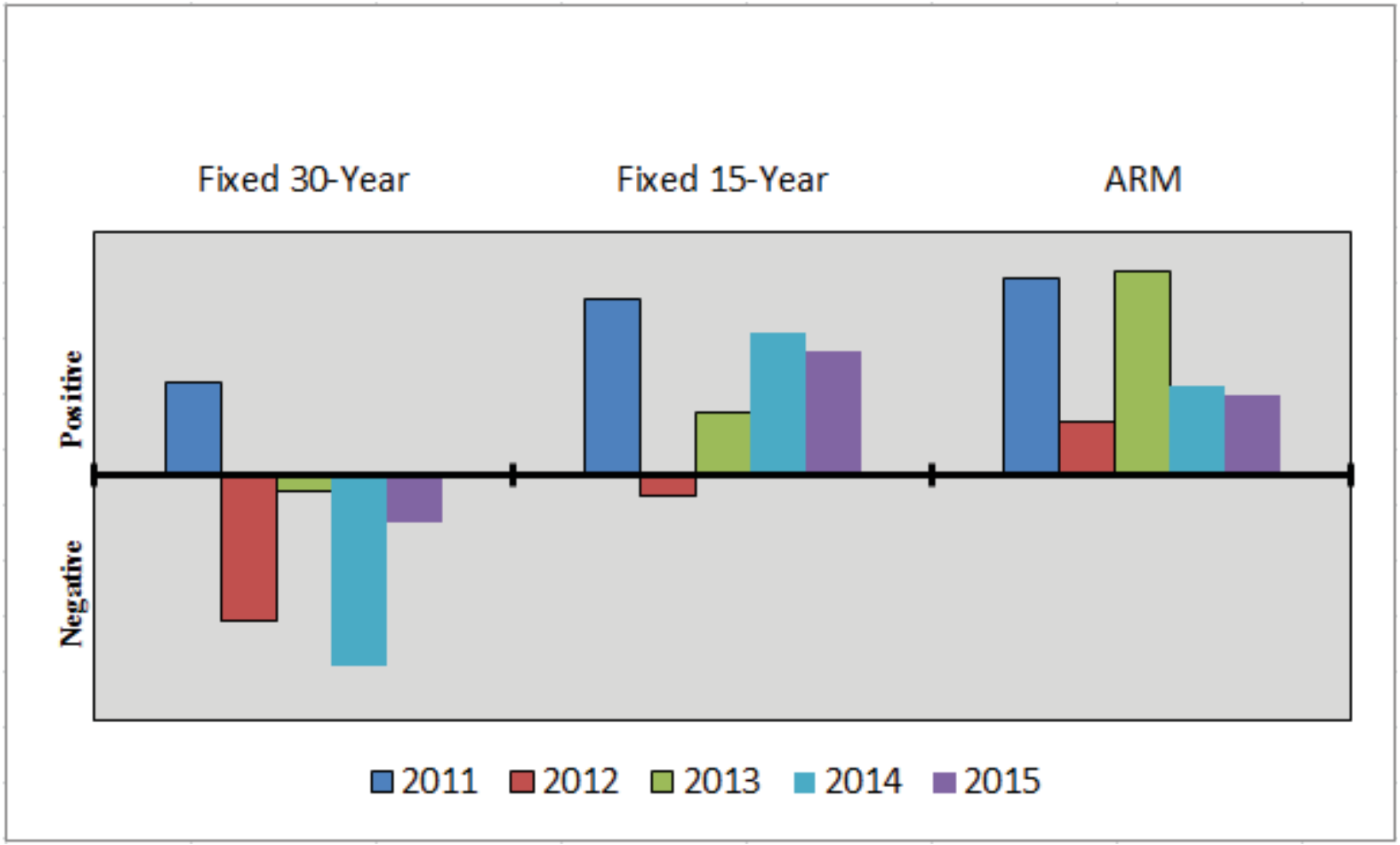
Takeaways

- Introduction of LLPAs/delivery fees have increased the extent of risk-based pricing in GSE space.
- However, large cross-subsidies remain for borrowers with relatively low credit scores.
  - Expected losses are about 7 times larger for borrowers with FICO < 620 compared to those with FICO ≥ 740, while G-fees are about 2 times higher.
  - Is this desirable from policy perspective?
    - Already have a government agency that caters to this market segment $\Rightarrow$ FHA!
- Leverage appears to be a different story.
  - Conditional on FICO, higher LTV loans ($\geq 80\%$) characterized by *lower* losses, but pay higher average G-fees.

SUPPLEMENTARY SLIDES

FHFA Evidence of Cross Subsidization

Chart 4: Gap by Product Type

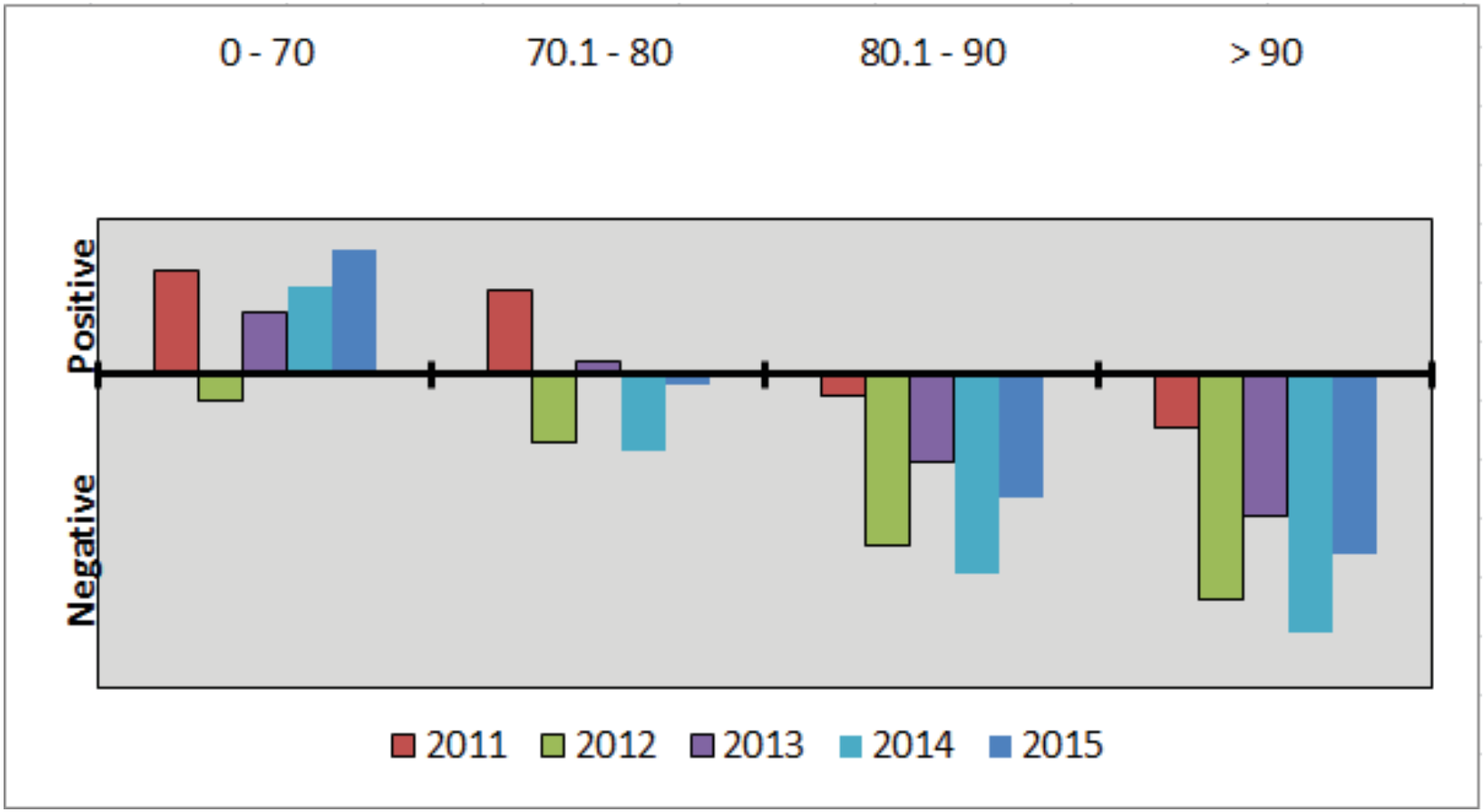


Source: Federal Housing Finance Agency

Back

FHFA Evidence of Cross Subsidization

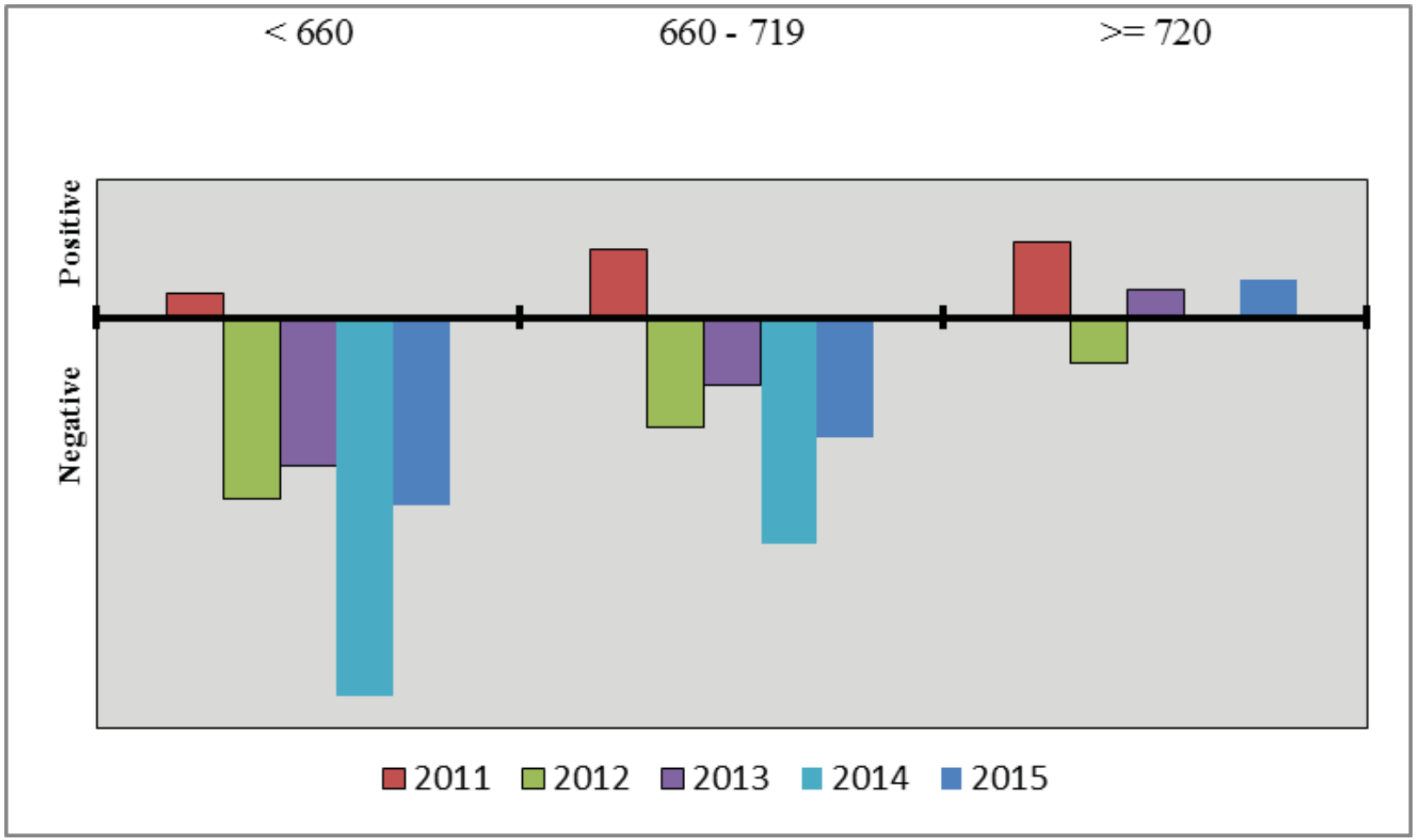
Chart 8: Gap by Loan-to-Value Ratio



Source: Federal Housing Finance Agency

Back

Chart 10: Gap by Credit Score



Source: Federal Housing Finance Agency

Back

LTV-FICO Cell Shares

- Loan shares by LTV-FICO bin:
- Total # loans in sample = 22,0161,258

FICO Score	LTV Ratio									
	60%	60-70%	70-75%	75-80%	80-85%	85-90%	90-95%	95-97%	97-100%	
$\geq$ 740	12.67%	7.43%	5.02%	15.99%	0.99%	2.68%	2.64%	0.33%	0.09%	47.84%
720-739	1.88%	1.53%	1.20%	4.12%	0.33%	0.91%	0.95%	0.15%	0.04%	11.11%
700-719	1.70%	1.38%	1.09%	3.73%	0.32%	0.88%	0.92%	0.16%	0.05%	10.23%
680-699	1.36%	1.23%	0.98%	3.29%	0.32%	0.87%	0.92%	0.16%	0.04%	9.19%
660-679	1.05%	1.04%	0.82%	2.66%	0.30%	0.78%	0.86%	0.11%	0.04%	7.67%
640-659	0.78%	0.83%	0.65%	1.88%	0.25%	0.62%	0.74%	0.09%	0.04%	5.89%
620-639	0.57%	0.61%	0.46%	1.16%	0.17%	0.41%	0.53%	0.06%	0.03%	4.01%
$<$620	0.74%	0.75%	0.53%	1.02%	0.16%	0.35%	0.46%	0.05%	0.02%	4.08%
	20.76%	14.81%	10.75%	33.84%	2.84%	7.51%	8.02%	1.11%	0.36%	100.00%

Back