

LLMA, LLPA & Securitization

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Contents

1 LLMA Loans Originated in 2013 through 2020	2
1.1 Interest Rates on Normalized GSE Mortgage Limit	2
1.1.1 By Securitizer	2
1.2 Unique-Loan Count on Normalized GSE Mortgage Limit	3
1.2.1 By Securitizer	3
1.3 90-Day Probability of Delinquency on Normalized GSE Mortgage Limit	3
1.3.1 By Securitizer	3
1.4 Interest Rates and Count on Normalized FHA Mortgage Limit	4
1.5 90-Day Probability of Delinquency on Normalized FHA Mortgage Limit	4
1.6 Interest Rates on Normalized FHA Limit	5
1.6.1 By Credit Bracket	5
1.6.2 By Securitizer	5
1.7 Pr(90-Day Delinq) on Normalized FHA Limit	6
1.7.1 By Credit Bracket	6
1.7.2 By Securitizer	6
1.8 Unique Loan Counts on Normalized FHA Limit	7
1.8.1 By Credit Bracket	7
1.8.2 By Securitizer	7
2 LLMA Loans Originated in 2014 -OR- 2015 -OR- 2016	8
2.1 Loan Count by Credit Score, Securitizer, and Purpose	8
2.2 Initial Interest Rate by Credit Score, Securitizer, and Purpose	8
2.3 90-Day Delinquency by Credit Score, Securitizer, and Purpose	9
2.4 LTV by Credit Score, Securitizer, and Purpose	9
2.5 Appraised Value by Credit Score, Securitizer, and Purpose	10
2.6 Premiums by Credit Score, Securitizer, and Purpose	10
3 LLMA Loans Originated in 2014	11
3.1 GSE and Ginnie Mae Prob. by Credit Score, Purchase Loans	11
3.2 GSE and GNMA Prob. by Credit Score, Cashout Refi	12
3.3 LLPA by Credit Score	13
3.4 Original LTV by Credit Score	14
3.5 90-Day Probability of Delinquency by Credit Score	15
3.6 ECDF of Credit Scores by Securitizer	16
4 Appendix	17

Abstract

This ongoing research aims to investigate the relationship between LLMA (Loan-Level Market Analytics) loans originated in 2014, LLPA (Loan-Level Price Adjustments), and securitization. The study focuses on analyzing the probabilities of securitization by credit score for purchase loans and cashout refinance loans. The preliminary findings suggest that credit score may play a significant role in determining the likelihood of securitization by different entities such as GSE (Government-Sponsored Enterprise), Ginnie Mae, and portfolio investors. Furthermore, the research examines LLPA rates, original loan-to-value ratios (LTV), and the 90-day probability of delinquency by credit score. These initial insights shed light on the potential relationship between loan characteristics, credit scores, and securitization.

1 LLMA Loans Originated in 2013 through 2020

1.1 Interest Rates on Normalized GSE Mortgage Limit

1.1.1 By Securitizer

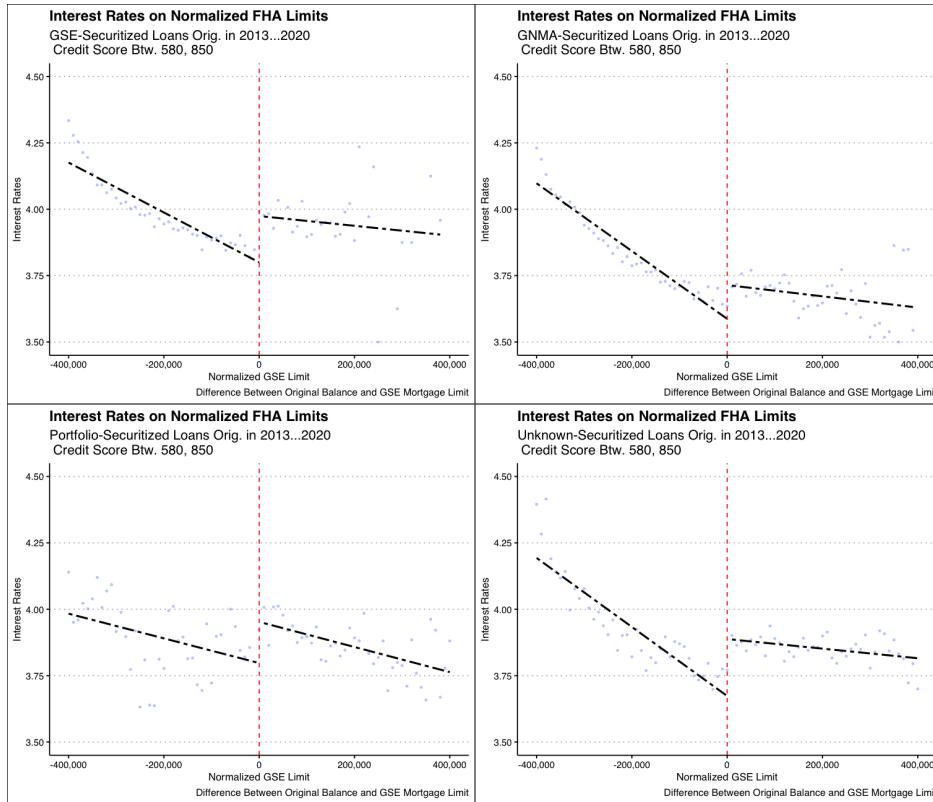


Figure 1: Interest on Normalized GSE Mortgage Limit

1.2 Unique-Loan Count on Normalized GSE Mortgage Limit

1.2.1 By Securitizer

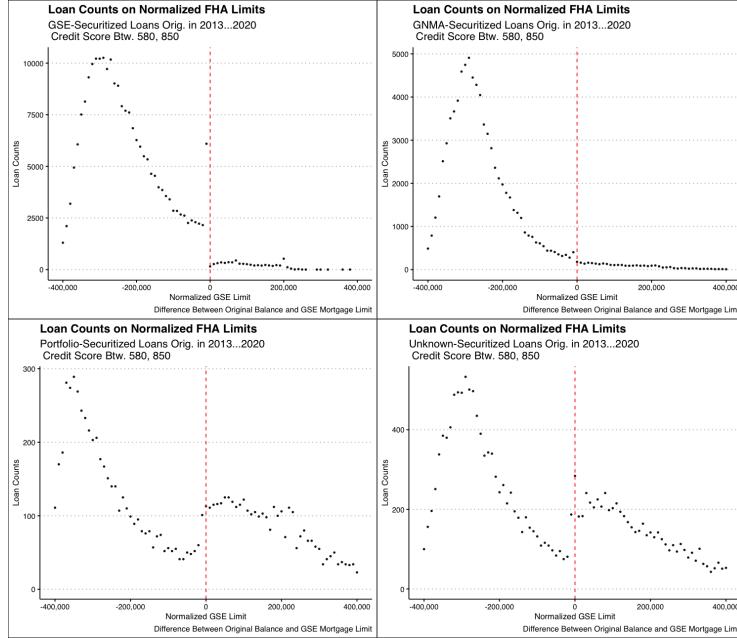


Figure 2: Loan Count on Normalized GSE Mortgage Limit

1.3 90-Day Probability of Delinquency on Normalized GSE Mortgage Limit

1.3.1 By Securitizer

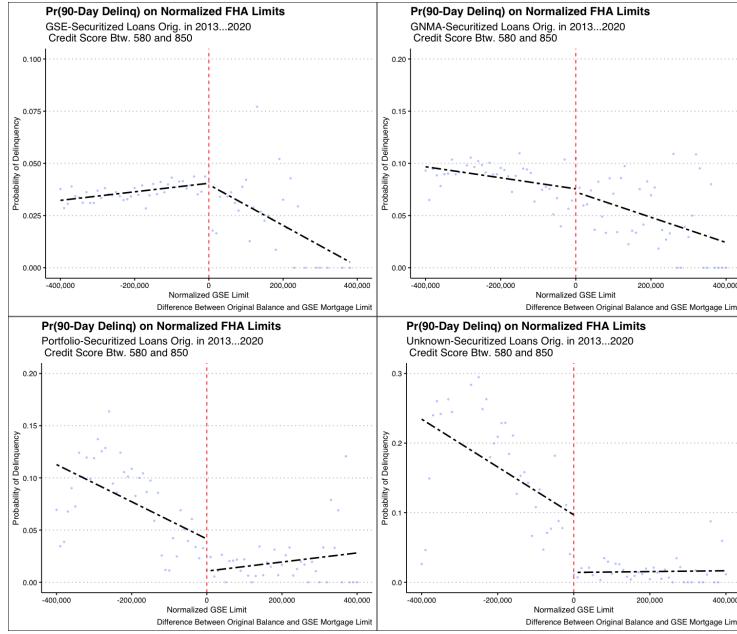


Figure 3: Delinquency on Normalized GSE Mortgage Limit

1.4 Interest Rates and Count on Normalized FHA Mortgage Limit

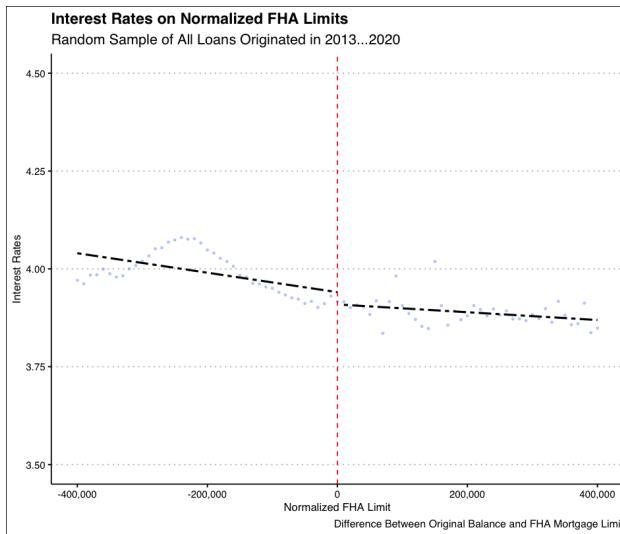


Figure 4: Interest on Normalized FHA Mortgage Limit

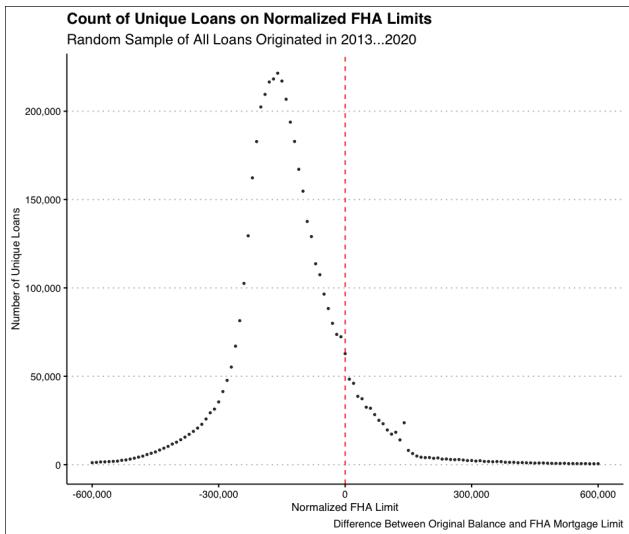


Figure 5: Loan Count on Normalized FHA Mortgage Limit

1.5 90-Day Probability of Delinquency on Normalized FHA Mortgage Limit

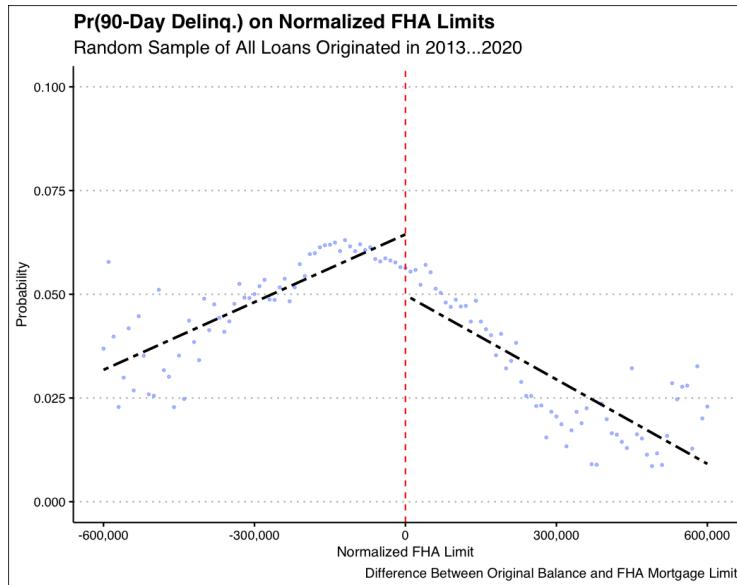


Figure 6: Delinquency on Normalized FHA Mortgage Limit

1.6 Interest Rates on Normalized FHA Limit

1.6.1 By Credit Bracket

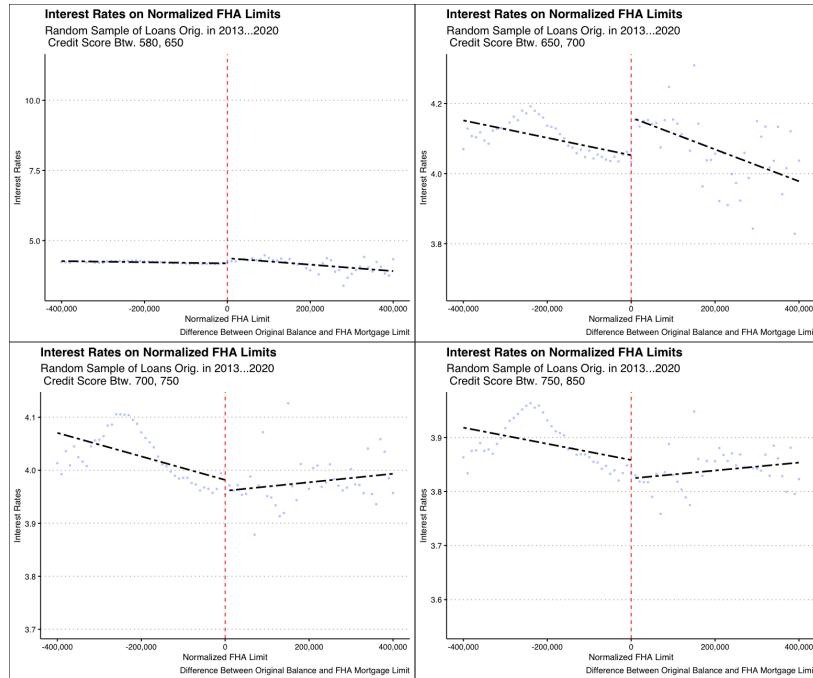


Figure 7: Interest on Normalized FHA Limit

1.6.2 By Securitizer

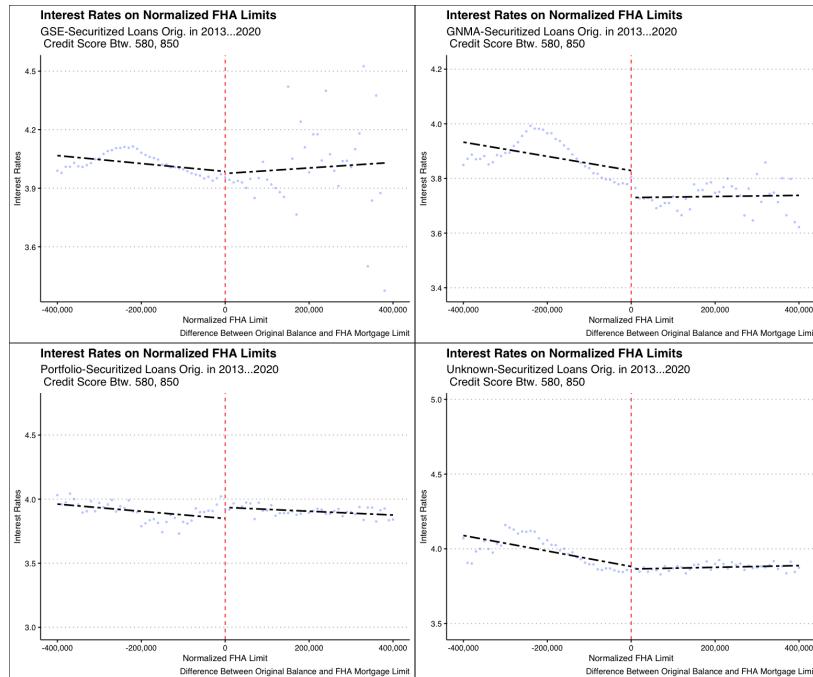


Figure 8: Interest on Normalized FHA Limit

1.7 Pr(90-Day Delinq) on Normalized FHA Limit

1.7.1 By Credit Bracket

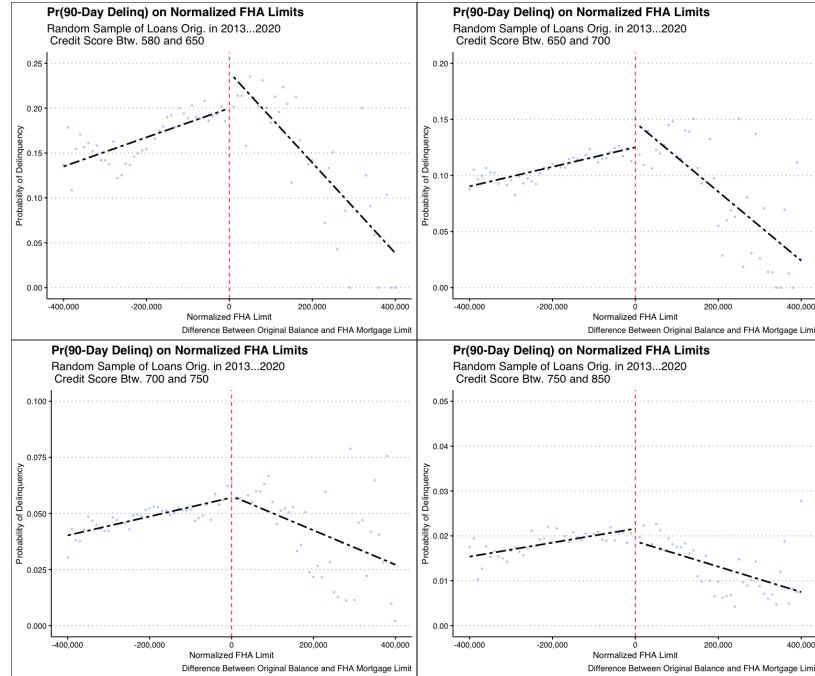


Figure 9: 90-Day Delinquency on Normalized FHA Limit

1.7.2 By Securitizer

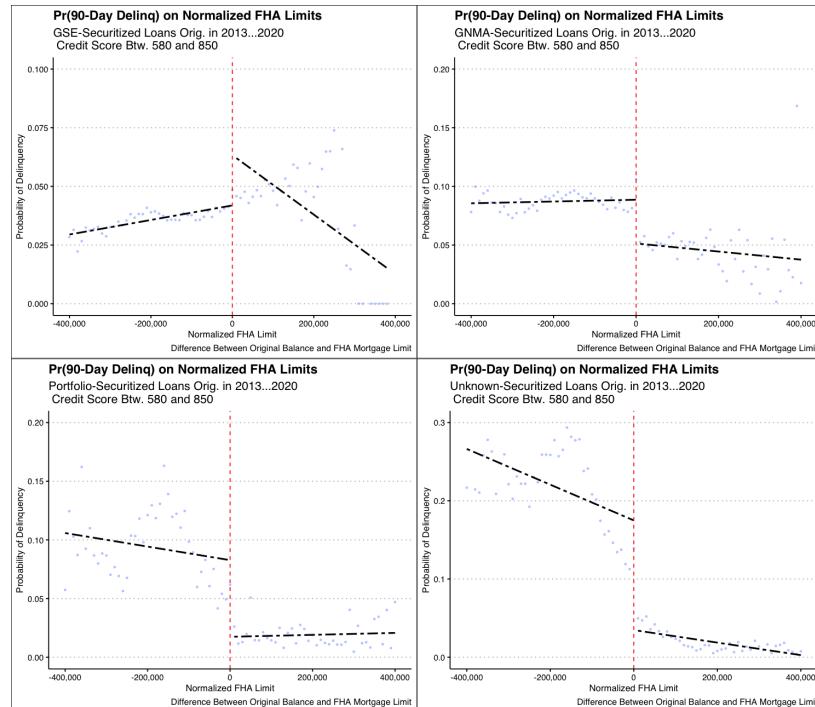


Figure 10: 90-Day Delinquency on Normalized FHA Limit

1.8 Unique Loan Counts on Normalized FHA Limit

1.8.1 By Credit Bracket

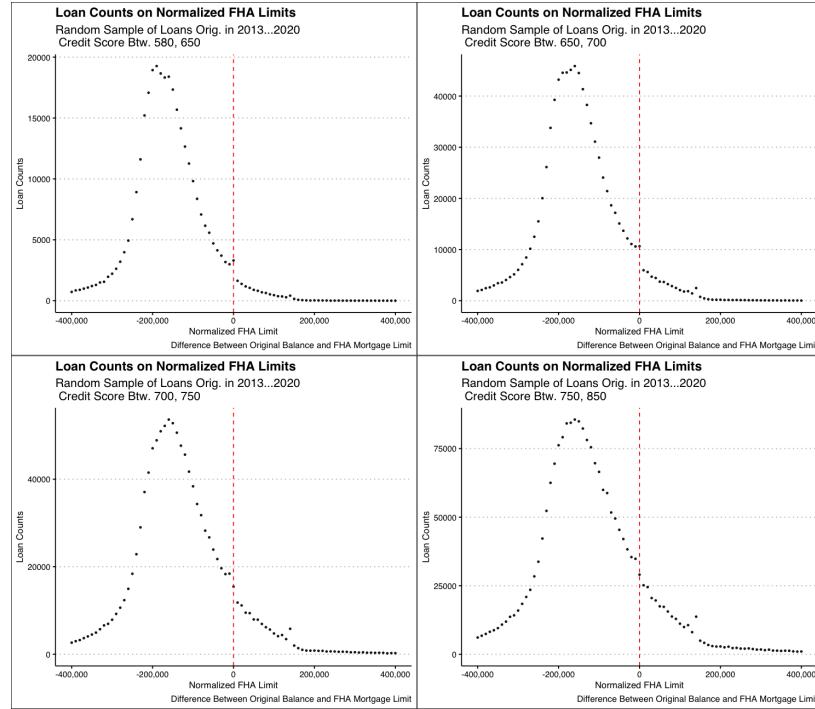


Figure 11: Count of Unique Loans on Normalized FHA Limit

1.8.2 By Securitizer

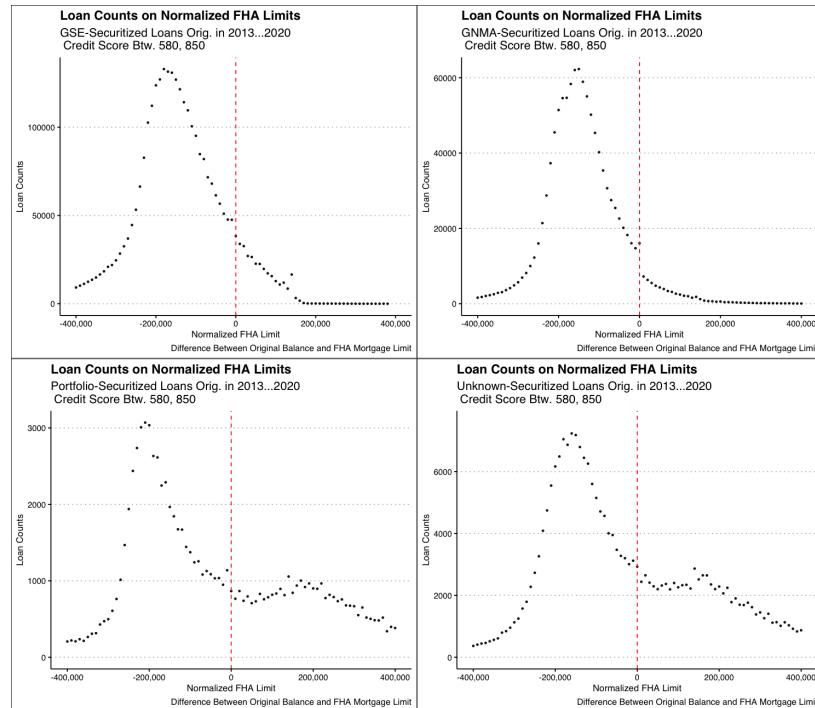


Figure 12: Count of Unique Loans on Normalized FHA Limit

2 LLMA Loans Originated in 2014 -OR- 2015 -OR- 2016

2.1 Loan Count by Credit Score, Securitizer, and Purpose

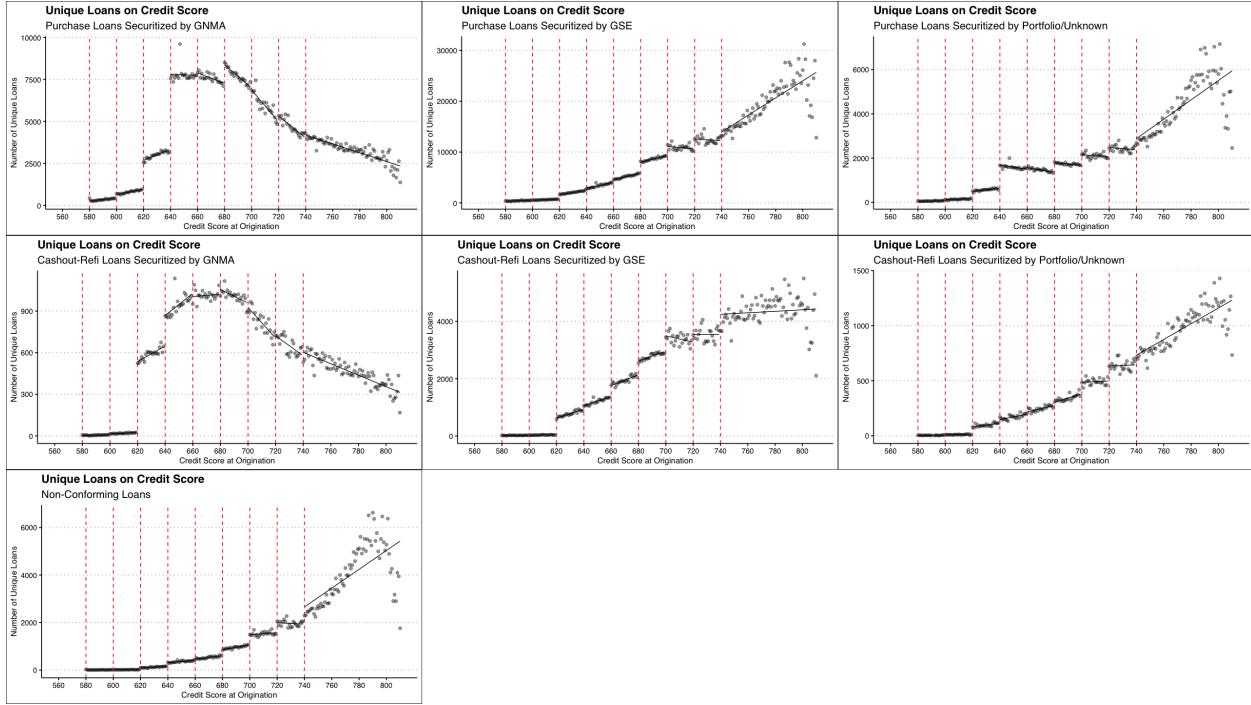


Figure 13: Loan Count by Credit Score

2.2 Initial Interest Rate by Credit Score, Securitizer, and Purpose

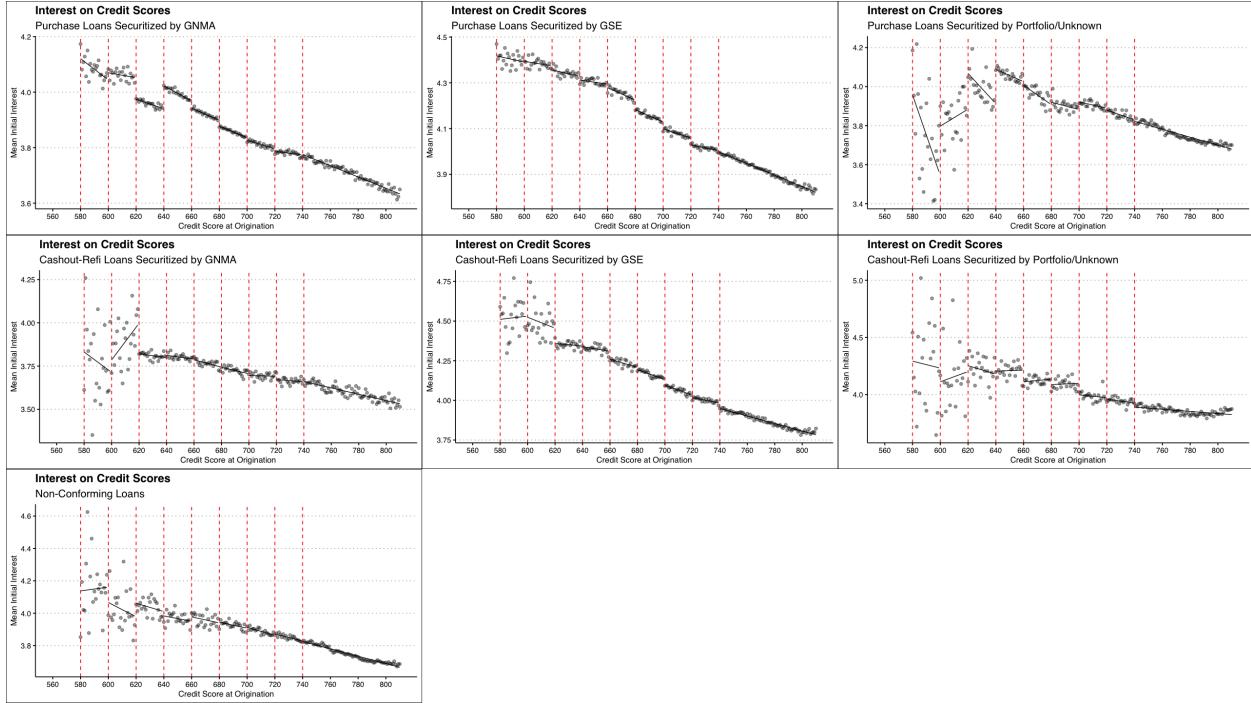


Figure 14: Initial Interest on Credit Scores

2.3 90-Day Delinquency by Credit Score, Securitizer, and Purpose

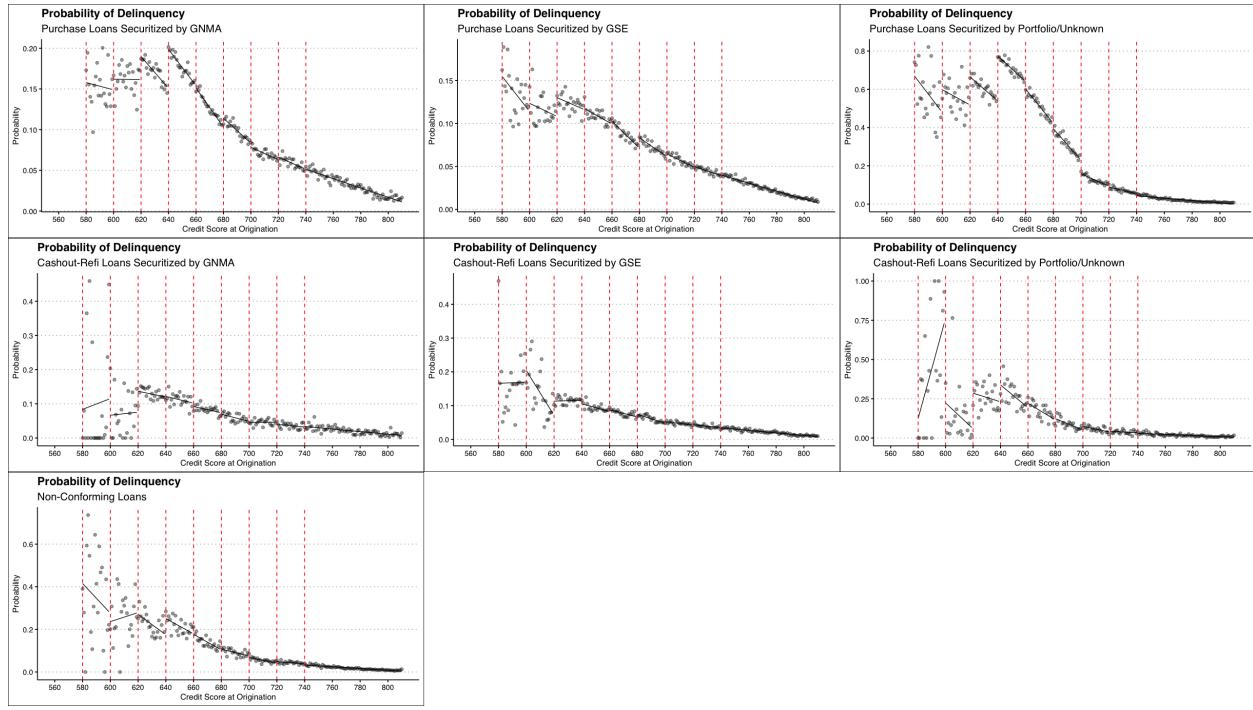


Figure 15: Delinquency on Credit Scores

2.4 LTV by Credit Score, Securitizer, and Purpose

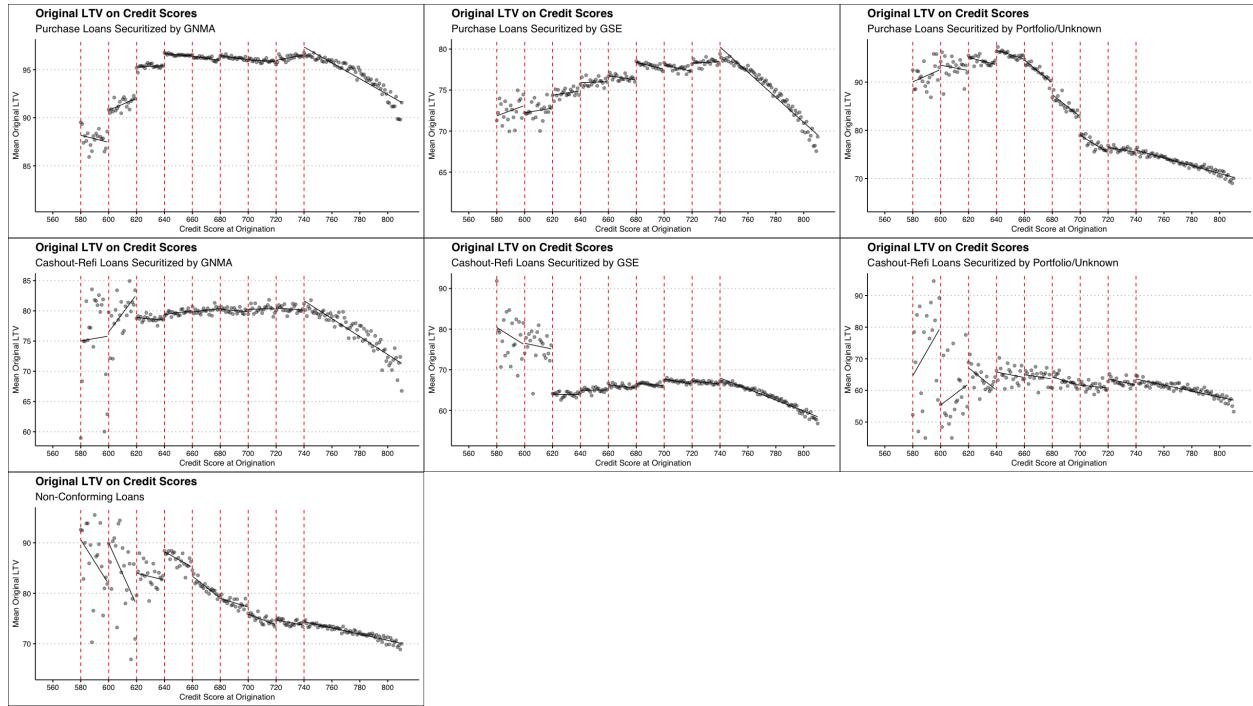


Figure 16: LTV by Credit Score

2.5 Appraised Value by Credit Score, Securitizer, and Purpose

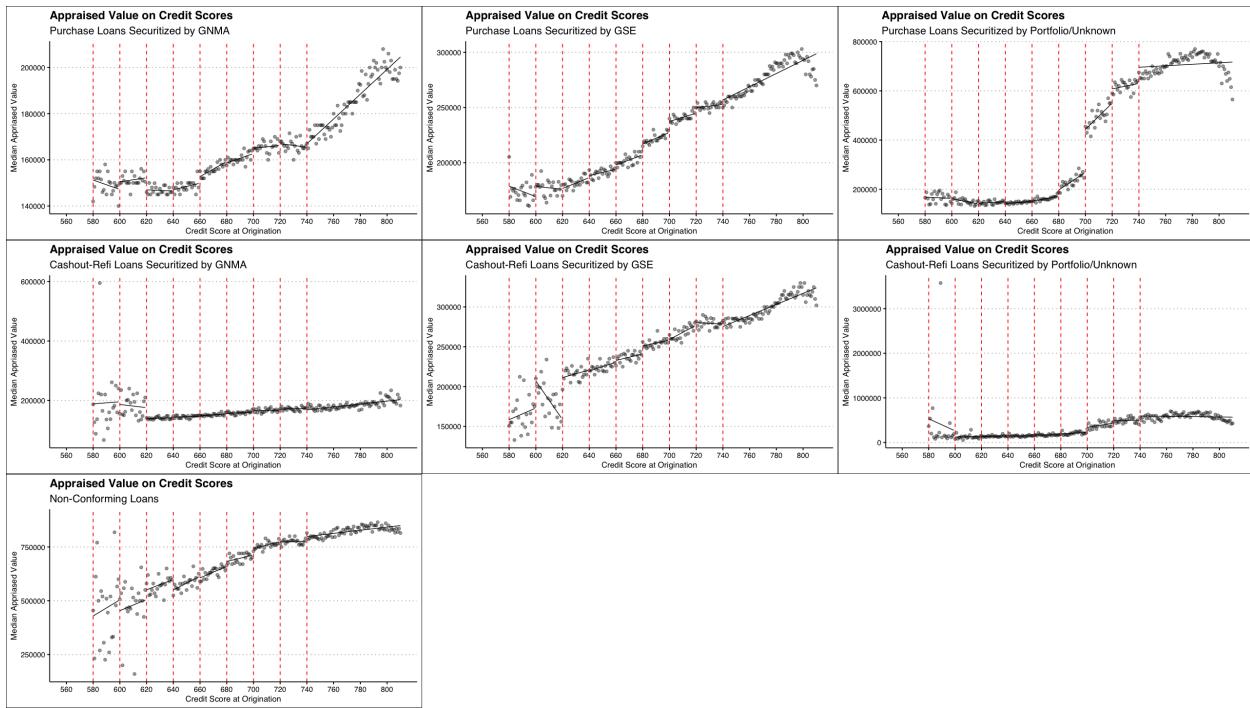


Figure 17: Value by Credit Score

2.6 Premiums by Credit Score, Securitizer, and Purpose

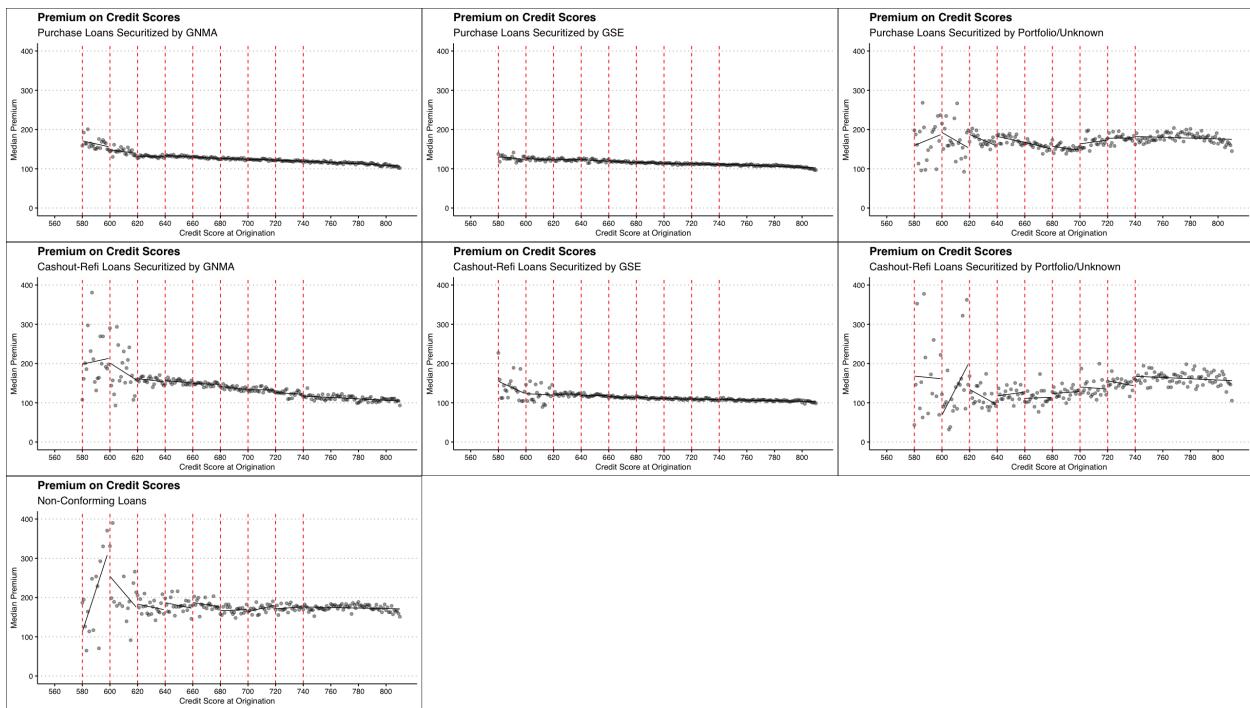


Figure 18: Premiums on Credit Scores

3 LLMA Loans Originated in 2014

3.1 GSE and Ginnie Mae Prob. by Credit Score, Purchase Loans

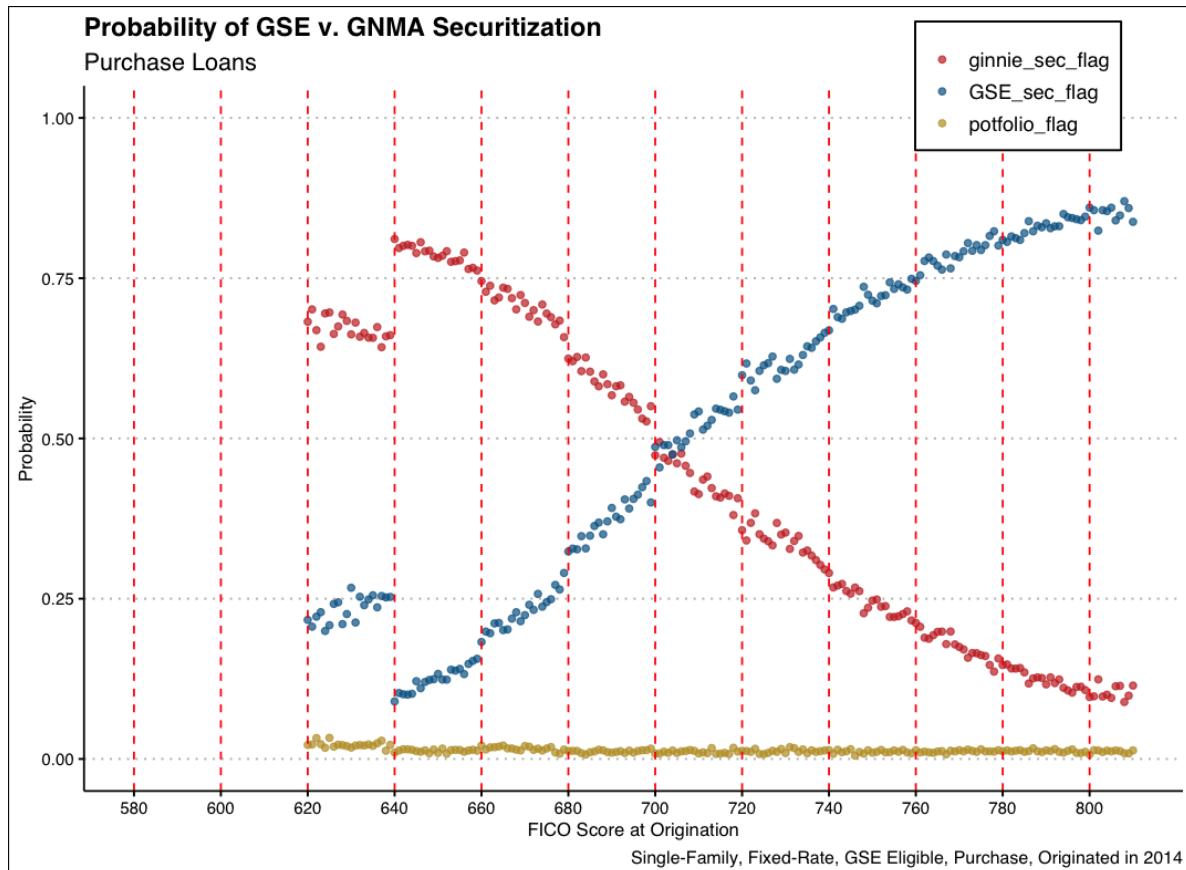


Figure 19: Sec. Prob. by Credit Score, Purchase Loans

STEPS:

- Select loans for which `gse_eligible_flag == 1`
- For each of these loans:
 - Get current investor code three months out
 - Get important variables, such as `loan_purpose`, `property_type`, `original_ltv`, `initial_interest_rate`, `fico_score_at_origination`, `ever_delinq`, `GSE_sec_flag`
- Subset data to observations where
 - `loan_purpose == 1` (Purchase);
 - `current_investor_code` is in ["Unknown", "Portfolio", "GSE", "Ginnie Mae"]; and
 - `fico_score_at_origination >= 620`
- For each FICO SCORE,
 - Plot the mean of the `GSE_sec_flag`
 - Plot the mean of the `ginnie_mae_sec_flag`
 - Plot the mean of the `portfolio_flag`

3.2 GSE and GNMA Prob. by Credit Score, Cashout Refi

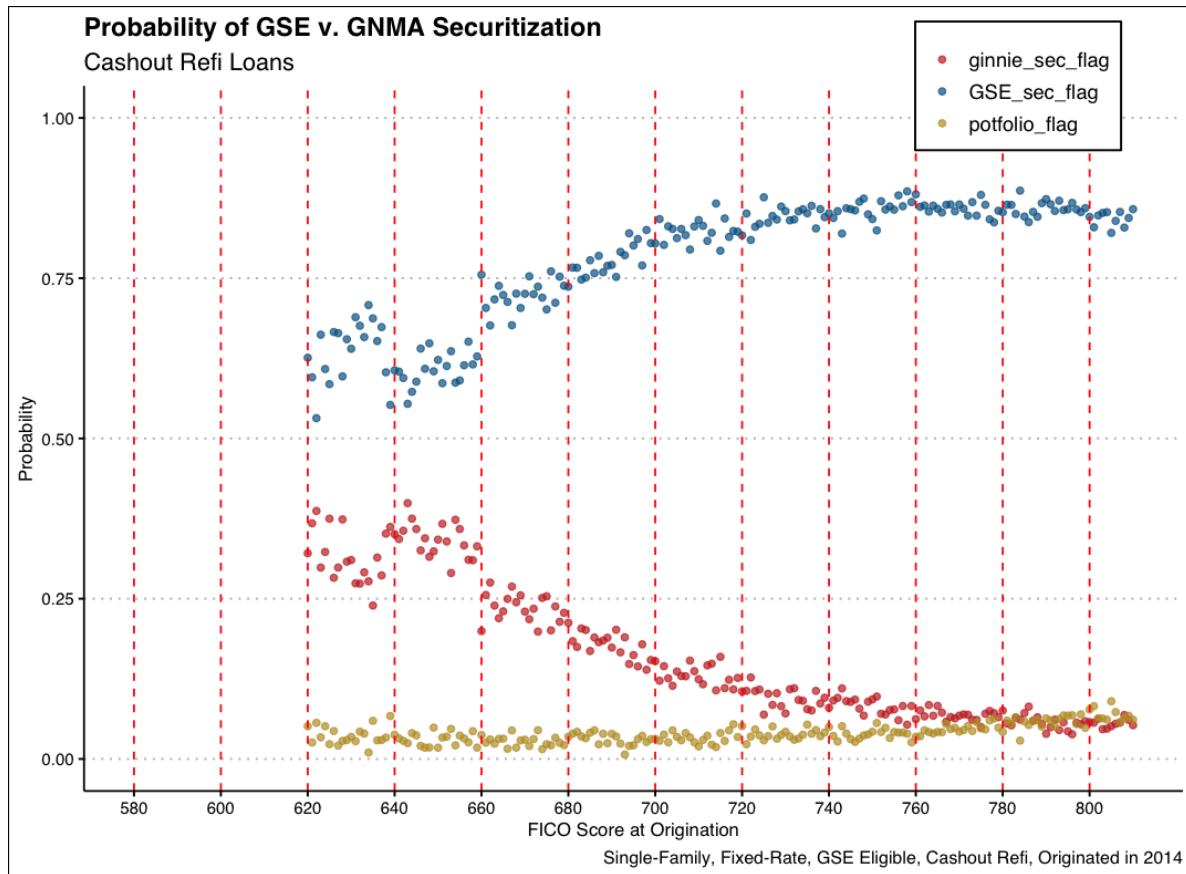


Figure 20: Sec. Prob. by Credit Score, Purchase Loans

STEPS:

- Select loans for which gse_eligible_flag == 1
- For each of these loans:
 - Get current investor code three months out
 - Get important variables, such as loan_purpose, property_type, original_ltv, initial_interest_rate, fico_score_at_origination, ever_delinq, GSE_sec_flag
- Subset data to observations where
 - loan_purpose == 2 (Cashout Refi);
 - current_investor_code is in ["Unknown", "Portfolio", "GSE", "Ginnie Mae"]; and
 - fico_score_at_origination >= 620
- For each FICO SCORE,
 - Plot the mean of the GSE_sec_flag
 - Plot the mean of the ginnie_mae_sec_flag
 - Plot the mean of the portfolio_flag

3.3 LLPA by Credit Score

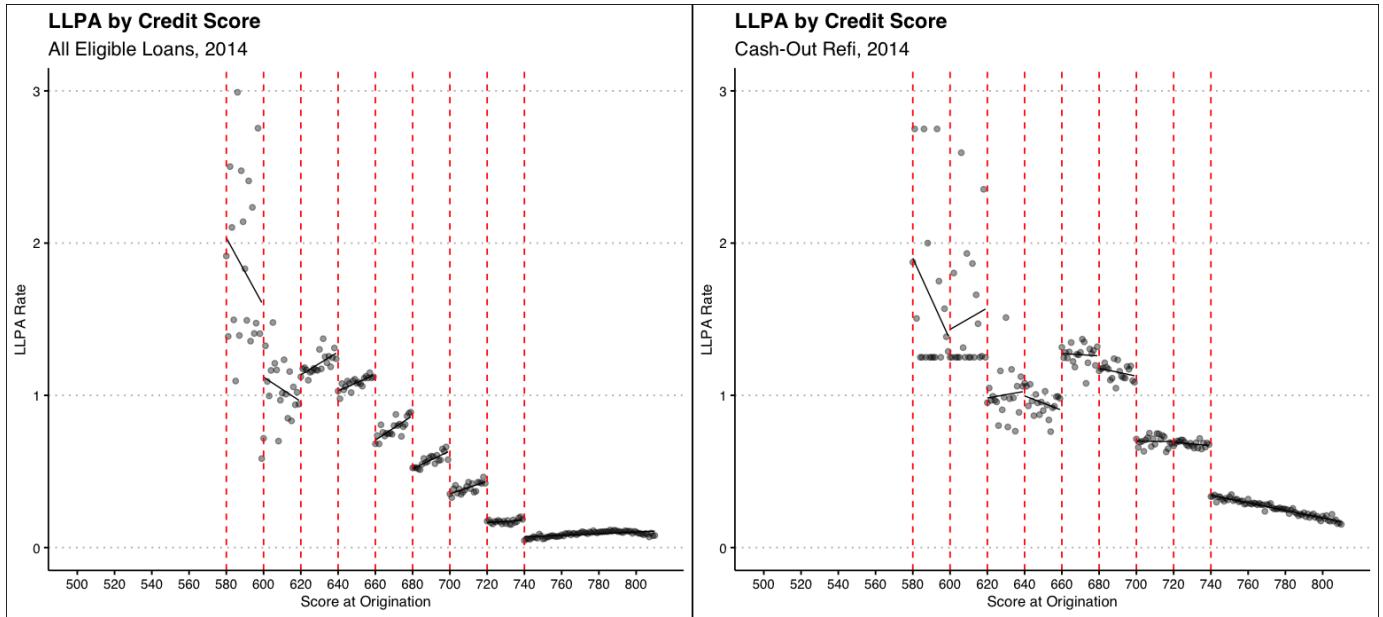


Figure 21: LLPA by Credit Score

STEPS:

- Merge LLPA with LLMA by YEAR, CREDIT SCORE, LTV
- For purchase loans:
 - Subset data to LLPA's all_elig == 1 and LLMA's loan_purpose == 1
 - Subset data to fico > 580
- For cashout-refi loans:
 - Subset data to LLPA's cashout_refin == 1 and LLMA's loan_purpose == 2
 - Subset data to fico > 580
- plot the mean of the LLPA RATE variable for each credit score

Note: Since we are only using loans originated in 2014 for this, we are necessarily only merging in LLPAs from 2014.

3.4 Original LTV by Credit Score

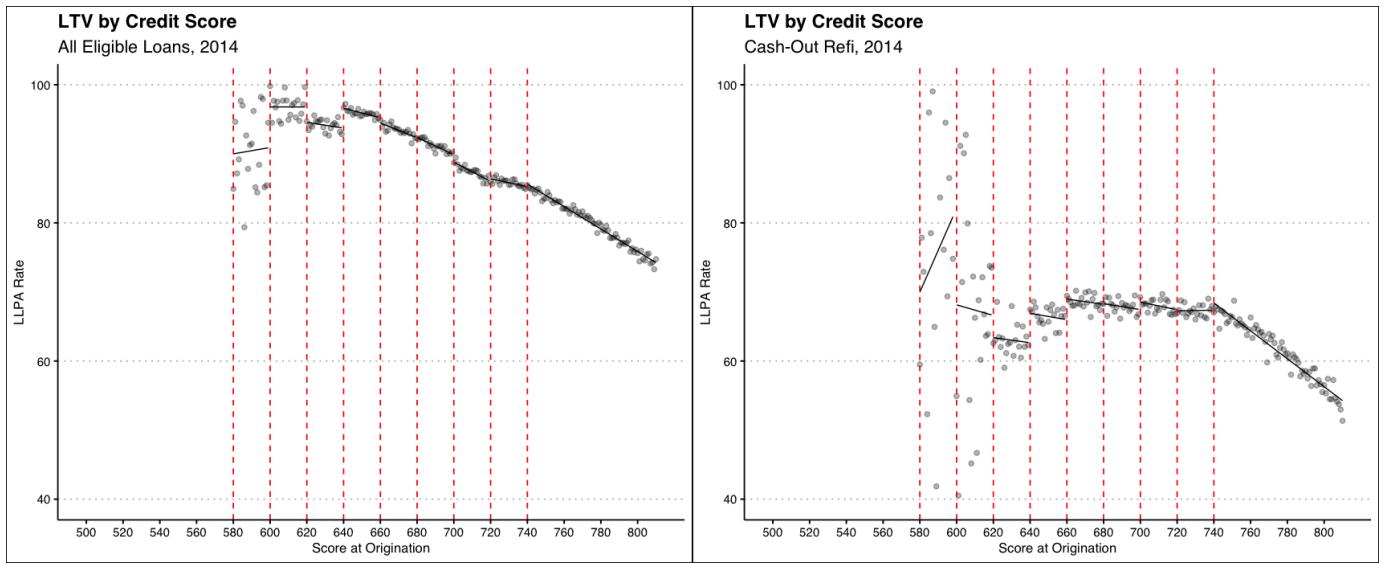


Figure 22: Original LTV by Credit Score

STEPS:

- Merge LLPA with LLMA by YEAR, CREDIT SCORE, LTV
- For purchase loans:
 - Subset data to LLPA's all_elig == 1 and LLMA's loan_purpose == 1
 - Subset data to fico > 580
- For cashout-refi loans:
 - Subset data to LLPA's cashout_refin == 1 and LLMA's loan_purpose == 2
 - Subset data to fico > 580
- plot the mean of the Original LTV variable for each credit score

3.5 90-Day Probability of Delinquency by Credit Score

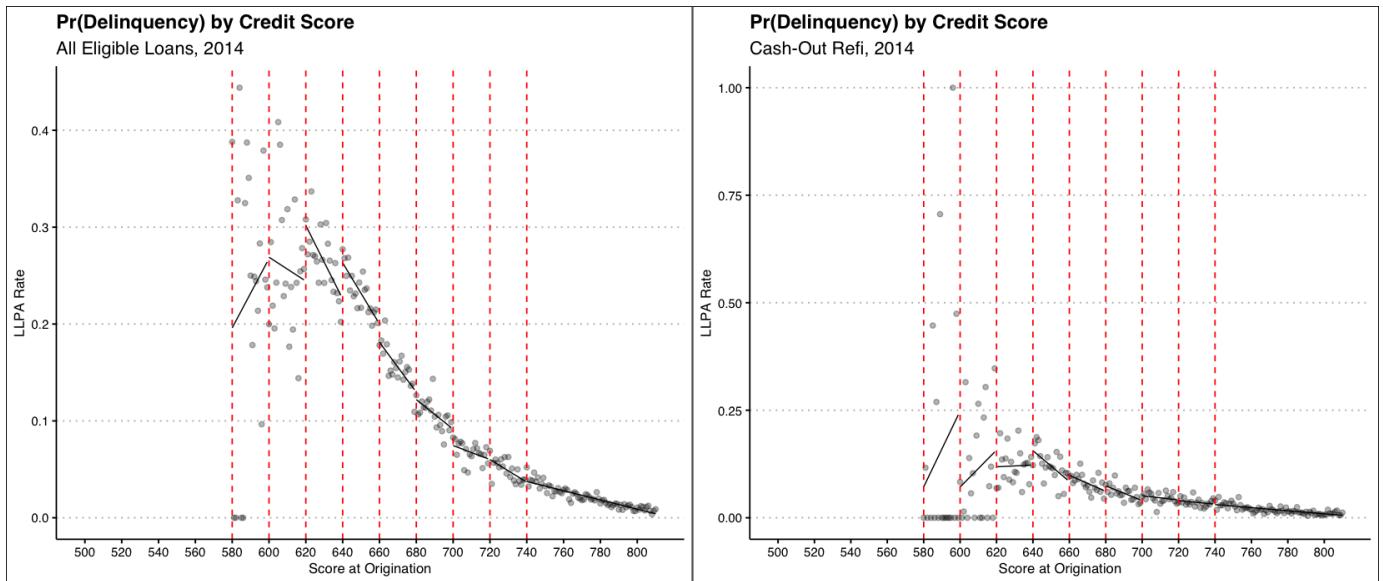


Figure 23: 90-Day Probability of Delinquency by Credit Score

STEPS:

- Merge LLPA with LLMA by YEAR, CREDIT SCORE, LTV
- For purchase loans:
 - Subset data to LLPA's all_elig == 1 and LLMA's loan_purpose == 1
 - Subset data to fico > 580
- For cashout-refi loans:
 - Subset data to LLPA's cashout_refin == 1 and LLMA's loan_purpose == 2
 - Subset data to fico > 580
- plot the mean of the Ever Delinquent variable for each credit score

3.6 ECDF of Credit Scores by Securitizer

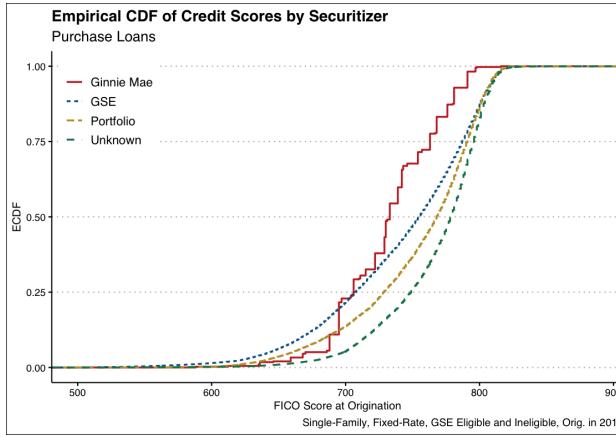


Figure 24: Caption for Figure 1

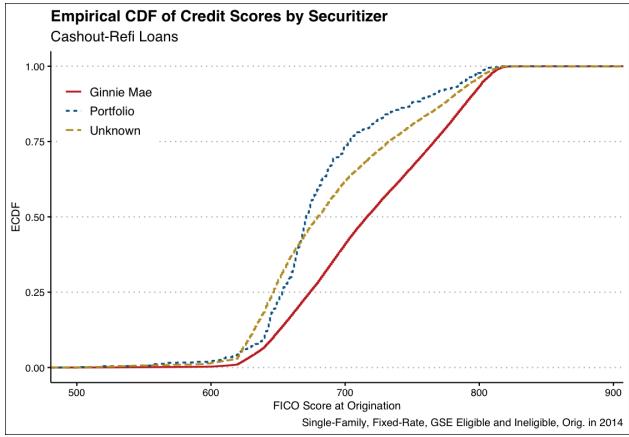


Figure 25: Caption for Figure 2

Note: What I find so interesting about these is that:

- (1) The distribution of Portfolio and Unknowns are very similar, which reinforces the idea that a large portion of Unknowns are Portfolio
- (2) For cashout refis, there seems to be no loans securitized by a GSE... Are cashout refis not eligible for GSE-Securitization?
- (3) The distribution of credit scores for GNMA-Securitized cashout-refi loans is quite uniform. Is this by design? Ie, do their model not price in credit scores at all?
- (4) The distribution of credit scores for GNMA-Securitized purchase loans is quite noisy... Small sample size? Why would that be though?
- (5) It is interesting that, for purchase loans, the median of credit scores of GNMA > GSE > Portfolio > Unknown

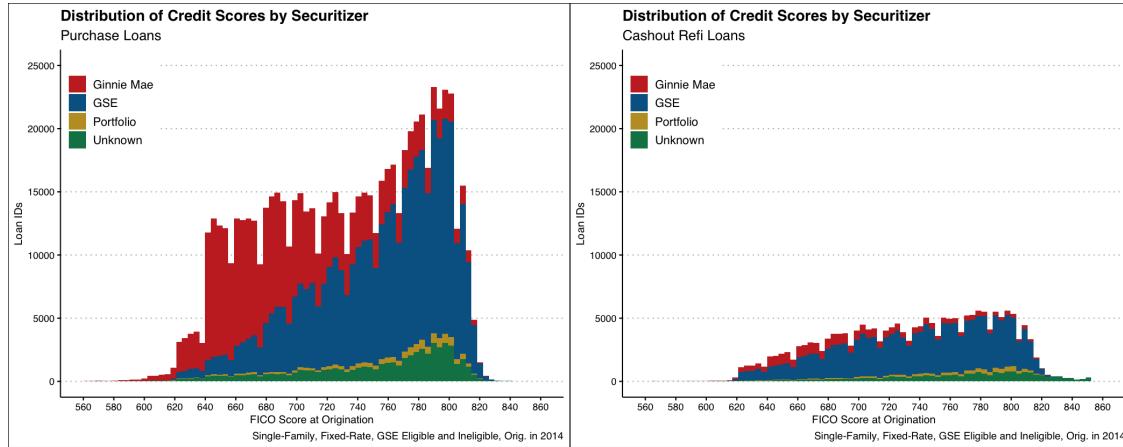


Figure 26: Histogram of Credit Scores by Purpose and Securitizer

4 Appendix

Loan-Level Market Analytics for primary mortgages – Data Dictionary						
#	Name in Output File	Type	Length/ Decimal	C/I	Field Name	Description
Valid Values (where applicable)						
14	product_type	C	2	C	Product Type	Product type for the loan.
		10 = Fixed Rate Loan	53 = Balloon 10			62 = Two Step Other
		11 = IO 10/25 Fixed	54 = Balloon 15/30			70 = GPARM
		20 = ARM	55 = Balloon 15/40			80 = Hybrid 2/1
		21 = IO 10/25 ARM	5A = ARM Balloon			81 = Hybrid 3/1
		22 = IO 5/30 ARM	52 = Balloon Other			82 = Hybrid 5/1
		30 = GPM (Graduated Payment)	60 = Two Step Unknown			83 = Hybrid 7/1
		40 = GEM	61 = Two Step 5/25			84 = Hybrid 10/1
		50 = Balloon Unknown	62 = Two Step 7/23			
		51 = Balloon 5	63 = Two Step 10/20			8Z = Hybrid Other
		52 = Balloon 7	64 = Two Step IO 5/25			U = No Info
15	original_term	N	3	C	Original Term	Term of the loan at origination. Number of months the borrower needs to pay back the loan.
16	initial_interest_rate	D	5,3	C	Initial Interest Rate	Initial interest rate at origination. If valid, the reported initial interest rate may only be updated within 6 months after the origination date.
17	back_end_ratio	D	6,3	C	Back End Ratio	Total of all debt payments including the new mortgage payment (principal, interest, insurance and taxes, (PITI)) divided by the gross monthly income of the borrower(s).
18	loan_type	C	1	C	Loan Type	Identifies whether the loan was originated under a government program.
		1 = Conventional Loan	4 = Other Government Loan			P = Pledged Asset Loan
		2 = VA Loan	5 = Affordable Housing Loan			U = No Info
		3 = FHA Loan	6 = Construction Loan			
		^ Includes state or local housing programs.				
19	loan_purpose	C	1	C	Loan Purpose	Borrower's stated purpose for the loan.
		1 = Purchase	6 = Construction Loan			A = Medical Loan
		2 = Refinance Cash-Out	7 = Debt Consolidation Loan			B = Vehicle Purchase Loan
		3 = Refinance No Cash Out	8 = Home Improvement			U = No Info
		5 = Refinance Cash Out Unknown	9 = Education Loan			

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Page 5

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Figure 27: Corelogic Documentation

Loan-Level Market Analytics for primary mortgages – Data Dictionary						
#	Name in Output File	Type	Length/ Decimal	C/I	Field Name	Description
Valid Values (where applicable)						
24	pmi_company_code	C	3	C	PMI Company Code	The name of the company providing the lender's mortgage insurance (aka private mortgage insurance).
		1 = General Electric (GE) Insurance Co.				28 = Cavalier
		2 = Verex Assurance				29 = TICOR Indemnity Co.
		3 = GE Residential Mortgage Insurance Corp. of North Carolina				30 = NYC Rehabilitation Mortgage Ins. Corp.
		4 = Insured Credit Services				31 = Connecticut Housing Finance Authority
		5 = Investors Mortgage Insurance Co.				32 = Union Bank
		6 = Liberty Mutual Insurance Co.				33 = Chase for Willow Lakes
		7 = Mortgage Guaranty Insurance Co. (MGIC)				34 = Council Ridge Corporation
		8 = Integon Mortgage Insurance Co.				35 = SONYMA
		9 = Foremost Guaranty Corporation				36 = Triad Guaranty Insurance
		10 = TMIC Insurance Co. Inc. (aka TICor)				37 = General Electric of California
		11 = PMI Mortgage Insurance Co.				38 = General Electric of Florida
		12 = United Guaranty Residential Insurance				39 = Republic Mortgage Insurance of North Carolina
		13 = Republic Mortgage Insurance Co.				40 = WISC MTG
		14 = Maryland Housing Fund				41 = United Guaranty
		15 = Commercial Credit Mortgage Insurance Co.				42 = Excel Mortgage
		16 = Home Guaranty Insurance Corporation				43 = United Guaranty Res. Insurance of IO
		17 = Commonwealth Mortgage Assurance Co.				44 = Comm Mortgage
		18 = Tennessee Housing Authority				47 = United of North Carolina
		19 = Pennsylvania Mortgage Insurance Co.				48 = Amerin Guaranty Corp.
		20 = Continental Mortgage Assurance Co.				50 = DuPont
		21 = United States Mortgage Insurance Co.				57 = Radian
		22 = United Guaranty Commercial Insurance Co.				58 = California Housing Insurance Fund
		23 = U.S. Fire Insurance Co.				59 = CMG Mortgage Insurance Co.
		24 = Vermont Home Mortgage Guaranty				60 = Freeform Vendor
		25 = Alaska Housing Finance Corporation				61 = Genworth Mortgage Insurance Corporation
		26 = Wisconsin Mortgage Insurance Co.				63 = Republican Mortgage Inc.
		27 = Policyholders Benefit Corporation				255 = PMI Company Unknown
						U = No Info

Figure 28: Corelogic Documentation

#	Name in Output File	Type	Length/ Decimal	C/I	Field Name	Description
Valid Values (where applicable)						
53	loan_purpose_category	C	1	C	Loan Purpose Category	Summarized purpose of the loan based on aggregation of the primary <i>Loan Purpose</i> field.
		R = Refinance		P = Purchase		U = No Info
54	mortgage_insurance_flag	C	1	C	Mortgage Insurance	Indicates the presence of mortgage insurance at origination. If <i>PMI Company Code</i> = '0' then Mortgage Insurance Flag = Reported with no MI Else if $1 \geq PMI\ Company\ Code \geq 999$ then Mortgage Insurance = Reported with MI Else Mortgage Insurance = No Info ¹ <i>PMI Company Code</i> = 0 would only come from legacy LLMA records. No new LLMA records can have this value.
		Y = Yes		N = No		U = No Info
55	gse_eligible_flag	C	1	I	GSE eligible at origination	Indicates whether the loan is conforming to the Government Sponsored Entity (GSE) standard eligible requirements criteria.
		0 = Non-Conforming		2 = Jumbo Conforming (expanded GSE policy starting in 2008)		U = No Info
		1 = Conforming (standard GSE policy)				

Figure 29: Corelogic Documentation

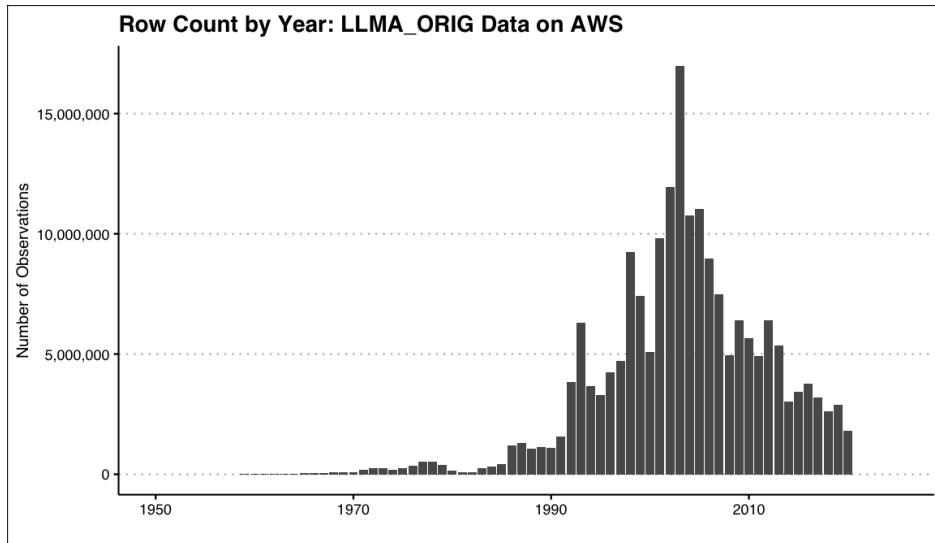


Figure 30: Number of Observations by Score

• LLMA_ORIG
◦ Number of Rows: 191,429,337
◦ <code>loan_id, add_date, property_zip, state, property_type, number_of_units, occupancy_type, origination_date, maturity_date, first_payment_date, original_balance, sole_price, appraised_value, product_type, original_term, initial_interest_rate, back_end_ratio, loan_type, loan_purpose, payment_frequency, channel, buydown_flag, documentation_type, pml_company_code, convertible_flag, pool_insurance_flag, original_ltv, negative_amortization_flag, arm_index_id, margin, periodic_rate_cap, periodic_rate_floor, lifetime_rate_cap, lifetime_rate_floor, rate_reset_frequency, pay_reset_frequency, first_rate_reset_period, fico_score_at_origination, lien, prepay_penalty_flag, prepay_penalty_term, combined_ltv_at_origination, cbxa, io_term, io_flag, msd, paid_off_flag, inferred_collateral_type, collateral_type, orig_active_status, period, product_type_category, loan_purpose_category, mortgage_insurance_flag, gse_eligible_flag</code>
• LLMA_EVENTS
◦ Number of Rows: 191,429,814
◦ <code>loan_id, active_status, epd_fha, epd_gse, foreclosure_start_date, foreclosure_end_date, bankruptcy_start_date, bankruptcy_end_date, bankruptcy_chapter, payoff_period, payoff_date, first_period_30_days_delinquent, first_period_60_days_delinquent, first_period_90_days_delinquent</code>
• LLMA_PERF
◦ Number of Rows: 8,128,527,998
◦ <code>loan_id, last_paid_interest_date, current_balance, current_interest_rate, total_payment_due, scheduled_principal, scheduled_monthly_pmt, mba_delinquency_status, ots_delinquency_status, mba_dys_delinquent, ots_dys_delinquent, delinquency_history_string, active_status, period_of_payment, current_investor_code, current_product_type, loan_age, mba_worst_over, ots_worst_over, bk_flag</code>
• LLMA_SLA
◦ Number of Rows: 5,517,884,820
◦ <code>LOAN_ID, PROP_LIST, PROP_DOM, PROP_CLTV, PROP_EQUIITY, PROSP_AVM, PROSP_FSD, PROSP_CONF_LVL, OPEN_LIEN_CNT, OPEN_LIEN_AMT, HPVIE_VALUE, LIEN1_ORIG_DT, LIEN1_ORIG_AMT, LIEN1_CLOSE_INT_TYPE, LIEN2_ORIG_DT, LIEN2_ORIG_AMT, LIEN2_CLOSE_INT_TYPE, LIEN3_ORIG_DT, LIEN3_ORIG_AMT, LIEN3_CLOSE_INT_TYPE, LIEN4_ORIG_DT, LIEN4_ORIG_AMT, LIEN4_CLOSE_INT_TYPE, OCC_INDICATOR, TAX_EXEMPT, AVM_SOURCE, AVM, AVM_FSD, AVM_CONF_LVL, TAX_AMT, TAX_YR, LAND_SQ_FT, LIVING_SQ_FT, EFF_YR_BUILT, BEDRM_CNT, RM_CNT, BATRM_CNT, BASEMENT, GARAGE, POOL, STORIES, PURPOSE, PURCHASE_PRICE, FHA_REFI_FLAG, LENDER_REFI_FLAG, PP_EXP_DT, RT_TYPE, INIT_RT, IO_FLAG, NEGAM_FLAG, INIT_RT_RESET_DT, RT_RESET, RT_RESET_FREQUENCY, MARGIN, INDEX_TYPE, LBACK_PERIOD, L_RT_CAP, P_RT_CAP, INIT_RT_RESET_CAP, PBACK_ORIG_DT, PBACK_ORIG_AMT, PBACK_RT_TYPE, PBACK_TERM_AMT, PBACK_TERM_CD, PBACK_RELEASE_DT, PBACK_RELEASE_TYPE, PBACK_LOAN_ID, DFLT_DT, DFLT_DOC_TYPE, REQ_DAYS, MOD_RECORD_DT, MOD_AMT, MOD_DUE_DT, MOD_INIT_RT, HAMP_FLAG, PAYOFF_DT_RELEASE_DOC, PAYOFF_DT_INF, PAYOFF_TYPE, PAYOFF_REFI_TYPE, PAYOFF_REFI_INT_RT_TYPE, PAYOFF_REFI_TERM, SALE_TYPE, FIRST_SALE_DT, FIRST_SALE_PRICE, FIRST_SALE_PRICE_TYPE, SECONDO_SUB_SALE_DT, SECOND_SUB_SALE_PRICE, SECOND_SUB_SALE_PRICE_TYPE, PERIOD_NO</code>

Figure 31: Number of Observations by Score