Heterogeneity in Effect of COVID-19 Mortgage Forbearance: Evidence from U.S. Large Bank Servicers

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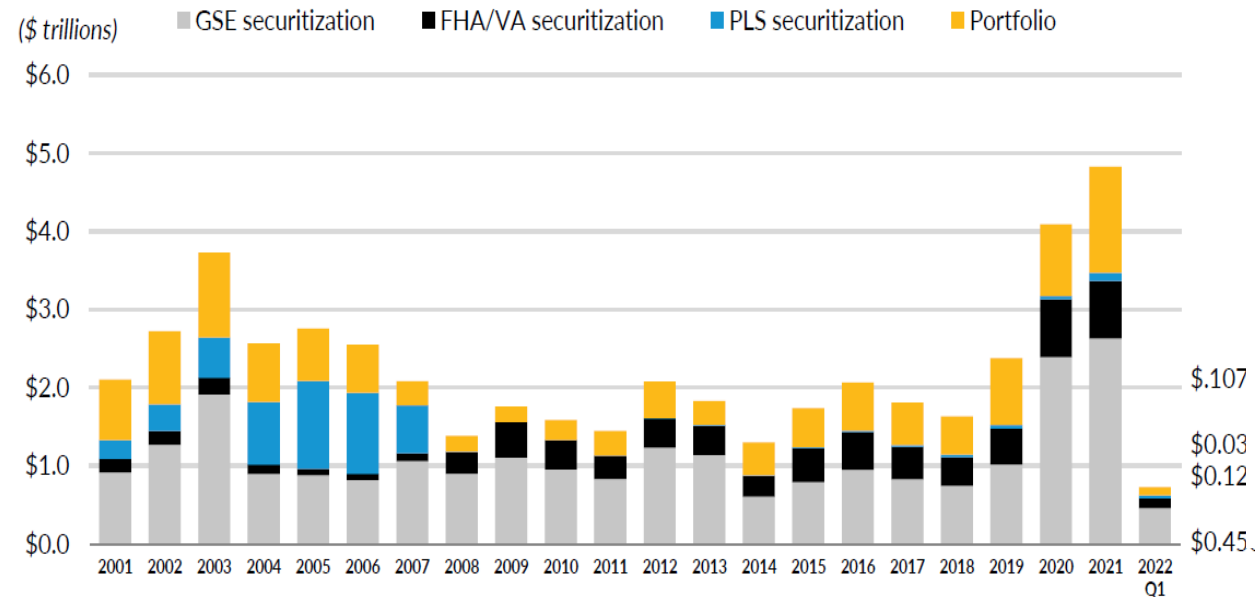
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U.S. Mortgage Lending Strong in 2020-21 amid Accommodative Monetary Polices of Low Rates and Fed MBS Purchases

Refinance shot up in 2020-21 due to historically low rates; purchase loans rose amid strong housing demand.

March and April of 2020 were the largest two months of MBS purchases by Fed ever. MBS on the Fed balance sheet totaled $2.7 trillion in March 2022, the highest level ever.

Sources: Inside Mortgage Finance and Urban Institute. *Last updated April 2022.*
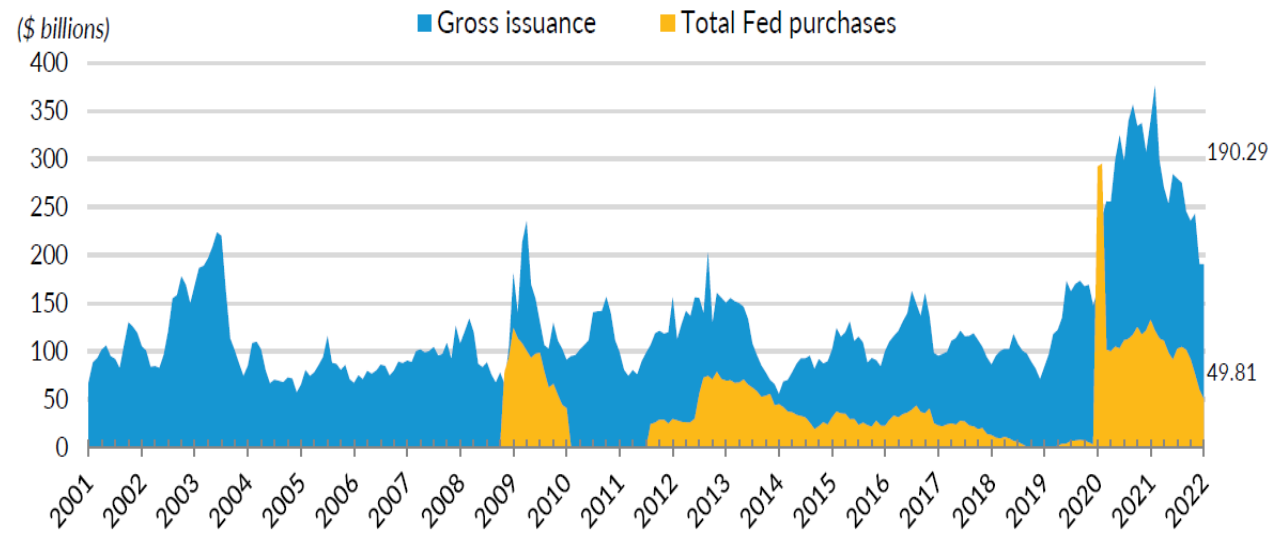
Source: eMBS, Federal Reserve Bank of New York, Urban Institute

So were fiscal polices (enhanced unemployment benefits, direct payments, and others):

- CARES Act: Signed into law on March 27, 2020; the largest single relief package in U.S. history; appropriated $2.3 trillion for many different stimulus and relief efforts. In Dec 2020, a $0.9 trillion stimulus and relief bill was passed.
- American Rescue Plan: Signed into law on March 11, 2021, implementing a $1.9 trillion of stimulus and relief.

This paper focuses on the **regulatory responses,** especially mortgage forbearance (pause in monthly payments).

Examining Mortgage Forbearance, Focusing on Heterogeneity

- An examination of the effect of COVID-19 forbearance
  - With a particular focus on heterogeneity in effects
    - Across borrowers by credit scores
    - Across neighborhoods: percent of lower income, education level
- Differs from existing studies
  - Examine entry, payment, exits, performance post exits
  - A unique data set: (largest 18) bank servicers
    - Bank-serviced residential mortgages
    - Mortgages held on banks' book
- Add value in understanding
  - Lender loss allowance and lending
  - Servicer loss mitigation
  - Policy making: heterogeneity in effects

Existing Literature on Covid-19 Impact on Mortgage Market

- Effect of mortgage forbearance
  - Diana et al (2020): Used Chase data; linked with borrower checking account
  - Cherry et al (2021): Used credit bureau data; examined both government and private debt relief (auto too)
- Inequality in Covid-19 event
  - Agarwal et al. (2020):
    - Used GSE data; focused on refinance inequality across borrowers
  - An et al. (2021):
    - Used BlackKnight loan-level data, credit bureau data, HMDA (race); focused on payment heterogeneity under forbearance across borrowers by race etc.
  - Gerardi et al. (2021):
    - BlackKnight loan-level data, credit bureau data, HMDA (race); focused on refinance inequality across borrowers
- Credit provision: Fuster et al. (2021)
  - Fed quantitative easing: purchase of MBS

Data & Variable Constructs

- Federal Reserve Y-14 data
  - 18 largest national bank servicers
  - February 2020 through December 2020 (with extension to July 2021 for performance)
- Identify Covid-19 mortgage forbearance
  - In variable "loss_mit_perf_status"
  - Remove those that takes the value of 1 in February 2020
- A 10% random sample
  - 10% of February 2020 outstanding loans
  - 10% of originations for each following month
- Merged with macro data
  - County unemployment rates from U.S. Department of Labor
  - Percent of high-income households from American Community Survey
  - Merged with Y-14 data at zip-code level.

Number of Borrowers under Covid-19 Mortgage Forbearance Has Been Declining

First Lien Mortgages under Covid Forbearance

CARES ACT Mar 27, '20

Legend: Percentage Under Covid Forbearance — Loan Counts (in Mil)
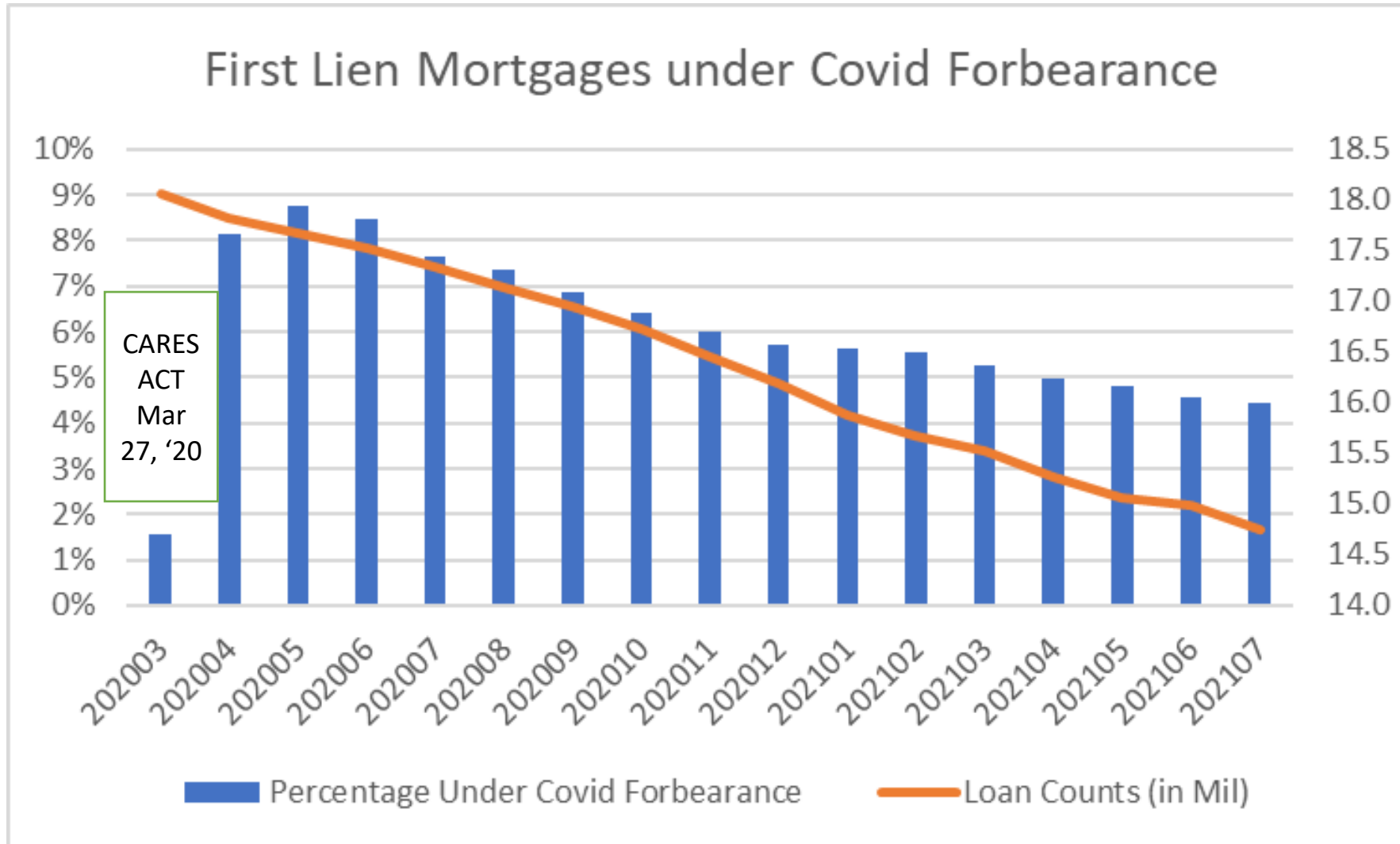
Data source: FRB Y-14, 18 largest national bank servicers.

Borrowers with Lower Credit Scores Had Higher Forbearance Entry Rate

Monthly Forbearance Entry Rate by FICO Bands
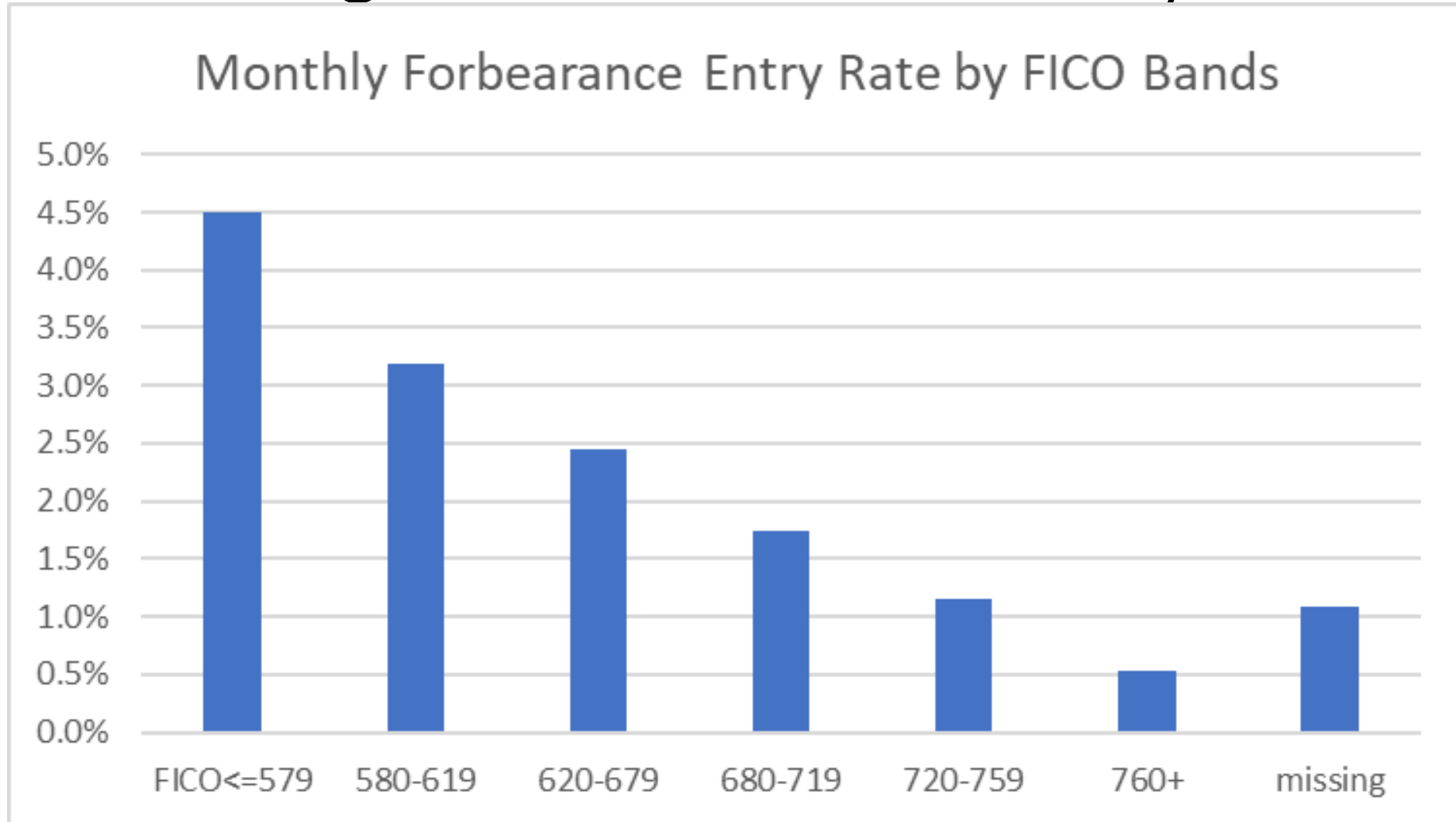
Data source: FRB Y-14 as of Dec 2020, 18 largest national bank servicers. Current FICO (lagged 1 month) is used.

Borrowers Facing Higher Unemployment Rate Had Higher Forbearance Entry Rate
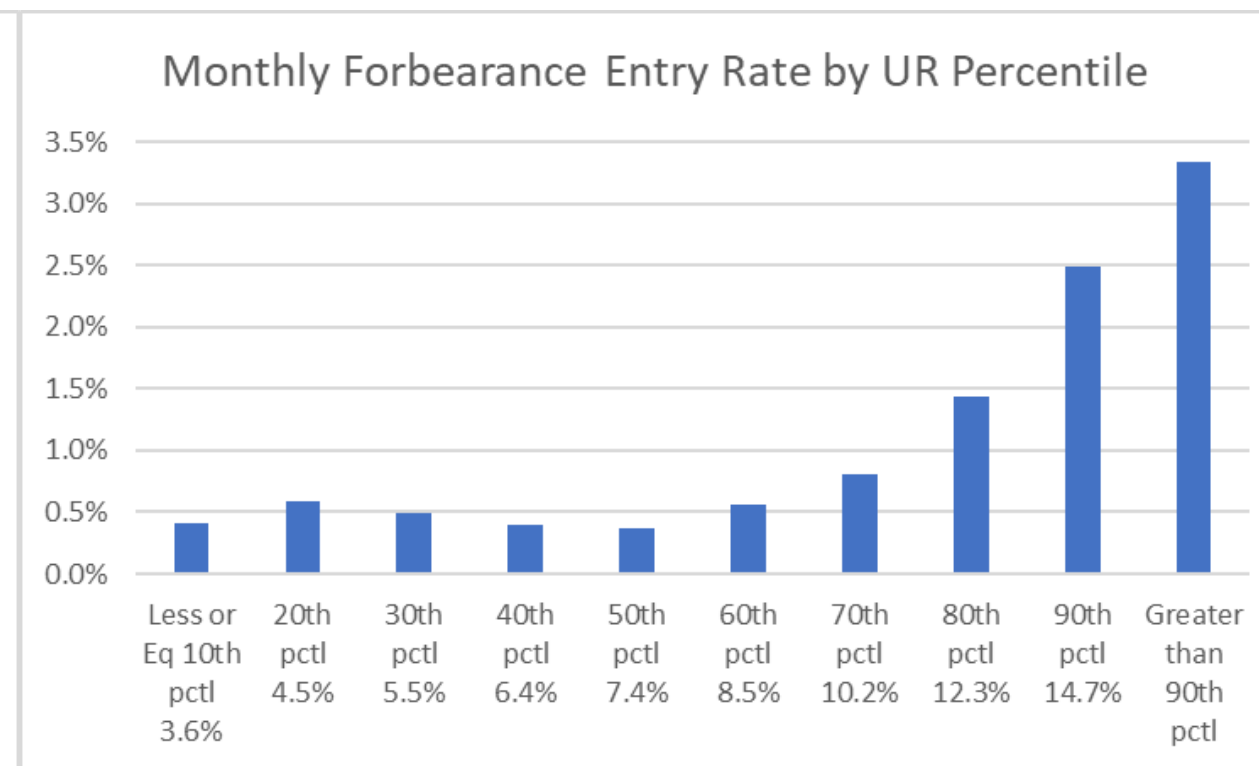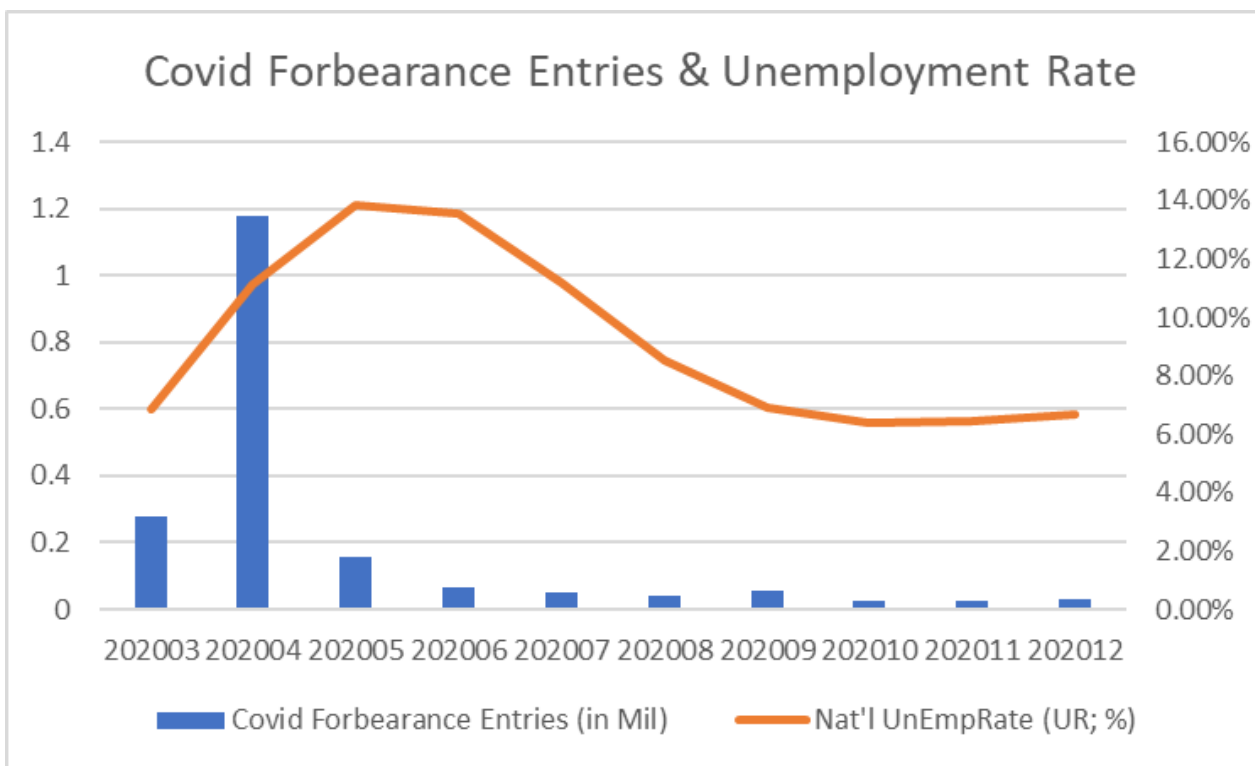
Data source: FRB Y-14M as of Dec 2020, 18 largest national bank servicers.

UR: Zip-code level Unemployment rate.

Entry Response to Unemployment Shock Greater for Higher FICO Borrowers in Proportion

Forbearance Response to Unemployment Shock, by FICO
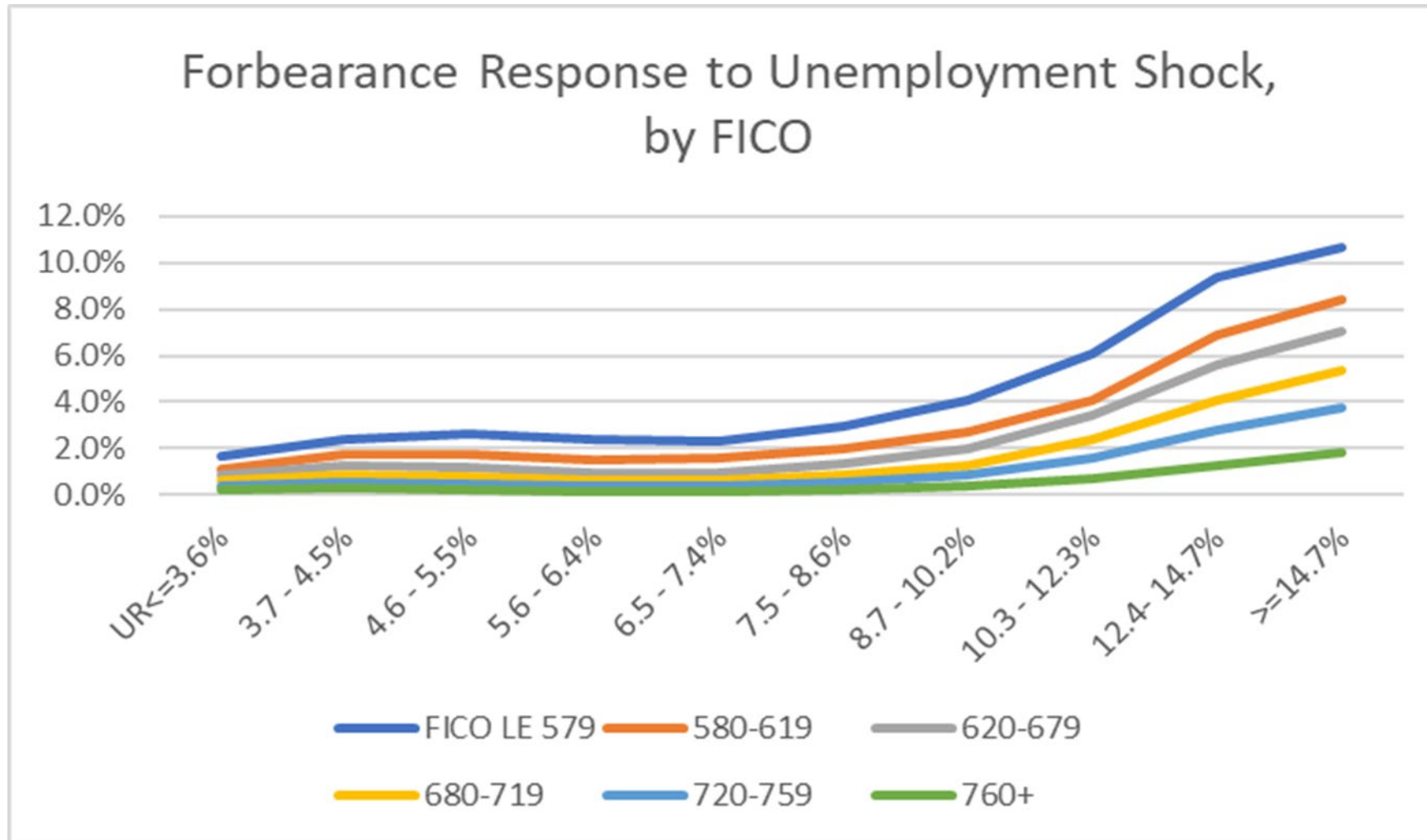
Data source: FRB Y-14, 18 largest national bank servicers.

But in terms of magnitude, the entry response to unemployment shock is greater for lower FICO borrowers.

Summary Statistics for Forbearance Entry Sample

Variable	Total	GSE	GNM	PLS	Portfolio	GNM Buyout
Under forbearance	1.1%	0.9%	1.8%	2.2%	1.0%	4.8%
Investor	100%	64.0%	14.2%	2.8%	16.1%	0.7%
FICO_Current Less than 579	3.6%	1.7%	6.9%	16.0%	3.0%	48.9%
580-619	2.5%	1.3%	5.7%	9.1%	2.0%	13.5%
620-679	7.0%	4.9%	14.7%	17.1%	5.6%	14.6%
680-719	9.1%	8.0%	14.4%	13.3%	7.4%	5.0%
720-759	13.9%	13.7%	16.5%	13.6%	13.1%	22.7%
760+	60.9%	68.3%	38.8%	27.6%	62.6%	1.7%
Missing	3.0%	2.0%	2.9%	3.2%	6.4%	13.7%
Refreshed LTV less than 30%	24.6%	28.4%	9.3%	21.0%	24.5%	11.7%
30% - 40%	13.3%	14.8%	8.5%	14.7%	11.7%	8.2%
40% - 50%	14.9%	15.3%	14.4%	16.9%	13.7%	13.2%
50% - 60%	15.1%	14.1%	19.8%	15.9%	14.8%	18.5%
60% - 70%	13.4%	11.6%	19.8%	12.9%	14.6%	20.4%
70% - 80%	10.8%	9.4%	13.7%	8.7%	14.2%	14.7%
80% - 90%	4.7%	4.2%	7.9%	4.7%	3.6%	7.8%
90% - 100%	2.4%	1.8%	5.2%	2.2%	1.9%	3.0%
>100%	0.3%	0.1%	0.4%	2.3%	0.3%	1.8%
Missing	0.4%	0.2%	1.0%	0.7%	0.6%	0.6%

Data source: FRB Y-14, 18 largest national bank servicers. Observations after forbearance entry are dropped.

Summary Statistics for Forbearance Entry Sample (Cont'd)

Debt to income less than 0.15	22.2%	23.1%	13.5%	37.2%	25.7%	8.0%
0.15 - 0.21	19.3%	21.1%	16.3%	7.9%	18.3%	11.2%
0.21 - 0.29	20.7%	21.4%	20.3%	12.1%	20.3%	20.6%
0.29 - 0.41	14.7%	14.5%	14.5%	12.9%	15.4%	18.1%
> 0.41	3.4%	3.8%	2.7%	3.6%	2.4%	3.5%
Missing	19.6%	16.0%	32.8%	26.3%	17.9%	38.6%
Loan type: Conventional w/o PMI	69.2%	81.1%	0.0%	78.5%	85.9%	0.1%
FHA	11.7%	0.1%	69.8%	8.6%	2.6%	80.6%
VA	3.7%	0.0%	23.7%	1.3%	0.5%	12.9%
Conventional w/ PMI	12.9%	18.7%	0.0%	5.5%	3.3%	0.4%
Other	2.5%	0.2%	6.4%	6.1%	7.6%	6.0%
Loan Purpose: Purchase	41.2%	35.8%	63.2%	43.0%	39.9%	74.5%
Refi: rate	35.4%	39.9%	23.8%	17.2%	33.0%	17.7%
Refi: cash-out	19.0%	20.0%	7.3%	37.3%	22.7%	6.8%
Refi: home improvement	1.7%	1.8%	0.9%	1.2%	2.0%	0.1%
Other	2.7%	2.4%	4.7%	1.1%	2.4%	0.9%
Loan Product: FRM 30 year	69.0%	69.0%	92.4%	61.5%	48.0%	80.2%
FRM 15 year	21.9%	27.6%	5.0%	3.0%	19.5%	2.1%
FRM 40 year	1.9%	1.1%	1.3%	7.6%	3.7%	15.0%
ARM	5.5%	2.0%	1.3%	18.0%	20.8%	2.2%
Other	1.8%	0.3%	0.0%	9.8%	7.9%	0.5%

Data source: FRB Y-14, 18 largest national bank servicers. Observations after forbearance entry are dropped.

Multi-variate Analyses of Forbearance Entry

We estimate the following equation to examine factors that affect forbearance entry:

$$Ln(\frac{p_{ict}}{1-p_{ict}}) = \beta_x X_{i,t} + \beta_u UR_{c,t} + \gamma UR_{c,t} * X_{i,t} + \alpha_s + \alpha_{sv} + \varepsilon_{ict} \qquad (1)$$

where

p=probability(Enter=1) where Enter changes from 0 to 1 when a borrower enters Covid-19 forbearance;

i is loan; c is county; t is month;

X: borrower-, loan-, or community- level characteristics as detailed in Table 1;

UR: county-level unemployment rate (merged to zip-level in Y14);

s: state; *sv*: servicer

Regression Analyses: Forbearance Entry

| Variable	Class	(1) Baseline			(2) Interact UR with FICO			(3) Interact UR with pct_inc_>75k		
		Estimate	StdErr	p value	Estimate	StdErr	p value	Estimate	StdErr	p value
Intercept		-4.72	0.19	0.00	-4.68	0.19	0.00	-4.63	0.20	0.00
FICO_Current (lag)	580-619	0.53	0.01	0.00	0.65	0.02	0.00	0.53	0.01	0.00
(omitted: <580)	620-679	0.40	0.01	0.00	0.39	0.01	0.00	0.40	0.01	0.00
	680-719	0.10	0.01	0.00	-0.01	0.01	0.46	0.10	0.01	0.00
	720-759	-0.26	0.01	0.00	-0.43	0.01	0.00	-0.26	0.01	0.00
	760+	-0.97	0.01	0.00	-1.18	0.01	0.00	-0.98	0.01	0.00
	missing	-0.40	0.01	0.00	-0.28	0.03	0.00	-0.40	0.01	0.00
Unemployment Rate (UR)		0.15	0.00	0.00	0.14	0.00	0.00	0.12	0.00	0.00
UR*FICO_Curr (lag)	580-619				-0.01	0.00	0.00			
	620-679				0.00	0.00	0.28			
	680-719				0.01	0.00	0.00			
	720-759				0.01	0.00	0.00			
	760+				0.02	0.00	0.00			
	missing				-0.01	0.00	0.00			
Pct_abv_75k (zip)								-0.19	0.04	0.00
UR*pct_abv_75k								0.06	0.00	0.00

Forbearance entry response to unemployment shock is greater for borrowers with higher credit scores and in zip-codes with greater proportion of high-income households.

Data source: FRB Y-14, 18 largest national bank servicers. Observations after forbearance entry are dropped.

The Greater Entry Response by Higher FICO Borrowers Holds Across Investor Type

Variable	Class	GSE Estimate	StdErr	ProbChiSq	FHA Estimate	StdErr	ProbChiSq	Portfolio Estimate	StdErr	ProbChiSq	PLS Estimate	StdErr	ProbChiSq
Intercept		-4.36	1.09	0.00	-6.96	59.09	0.91	-6.29	41.05	0.88	-32.83	14.13	0.02
FICO_Current (lag)	580-619	0.78	0.03	0.00	0.61	0.03	0.00	0.52	0.06	0.00	0.30	0.07	0.00
(omitted: <580)	620-679	0.46	0.02	0.00	0.34	0.02	0.00	0.29	0.04	0.00	0.17	0.05	0.00
	680-719	0.06	0.02	0.00	-0.14	0.03	0.00	0.13	0.04	0.00	-0.01	0.06	0.88
	720-759	-0.38	0.02	0.00	-0.51	0.03	0.00	-0.36	0.04	0.00	-0.36	0.07	0.00
	760+	-1.15	0.02	0.00	-1.23	0.03	0.00	-1.06	0.03	0.00	-0.78	0.06	0.00
Unemployment Rate (UR)		0.15	0.00	0.00	0.14	0.00	0.00	0.14	0.00	0.17	0.15	0.00	0.00
UR*FICO_Curr (lag)	580-619	-0.02	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.86
	620-679	0.00	0.00	0.85	0.00	0.00	0.53	0.01	0.00	0.34	0.01	0.00	0.15
	680-719	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
	720-759	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00
	760+	0.02	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
Servier fixed effects		Yes			Yes			Yes			Yes		
State fixed effects		Yes			Yes			Yes			Yes		
AUC		0.812			0.794			0.82			0.77		
N obs		10.1M			2.40M			2.45M			0.44M		

Data source: FRB Y-14, 18 largest national bank servicers. Observations after forbearance entry are dropped.

A Sizable Proportion Continued to Pay under Forbearance

"NonCurrent" Rate of Loans under Forbearance, by Investor Type

Legend: EBO, GNM, GSE, PLS, PTF
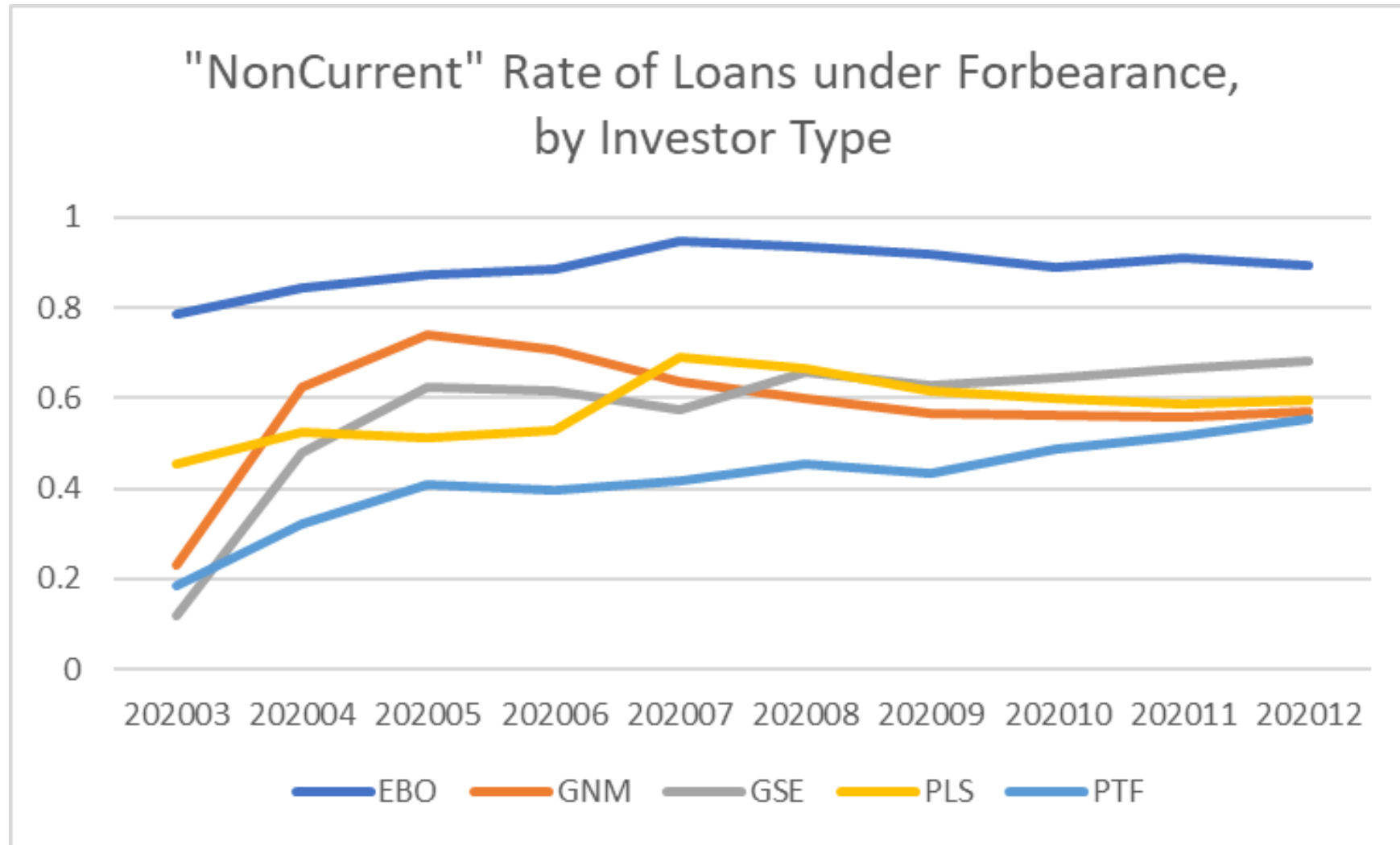
Data source: FRB Y-14, 18 largest national bank servicers.

GSE and Portfolio Loans had Highest Exit Rates

Forbearance Exit Rate by Investor
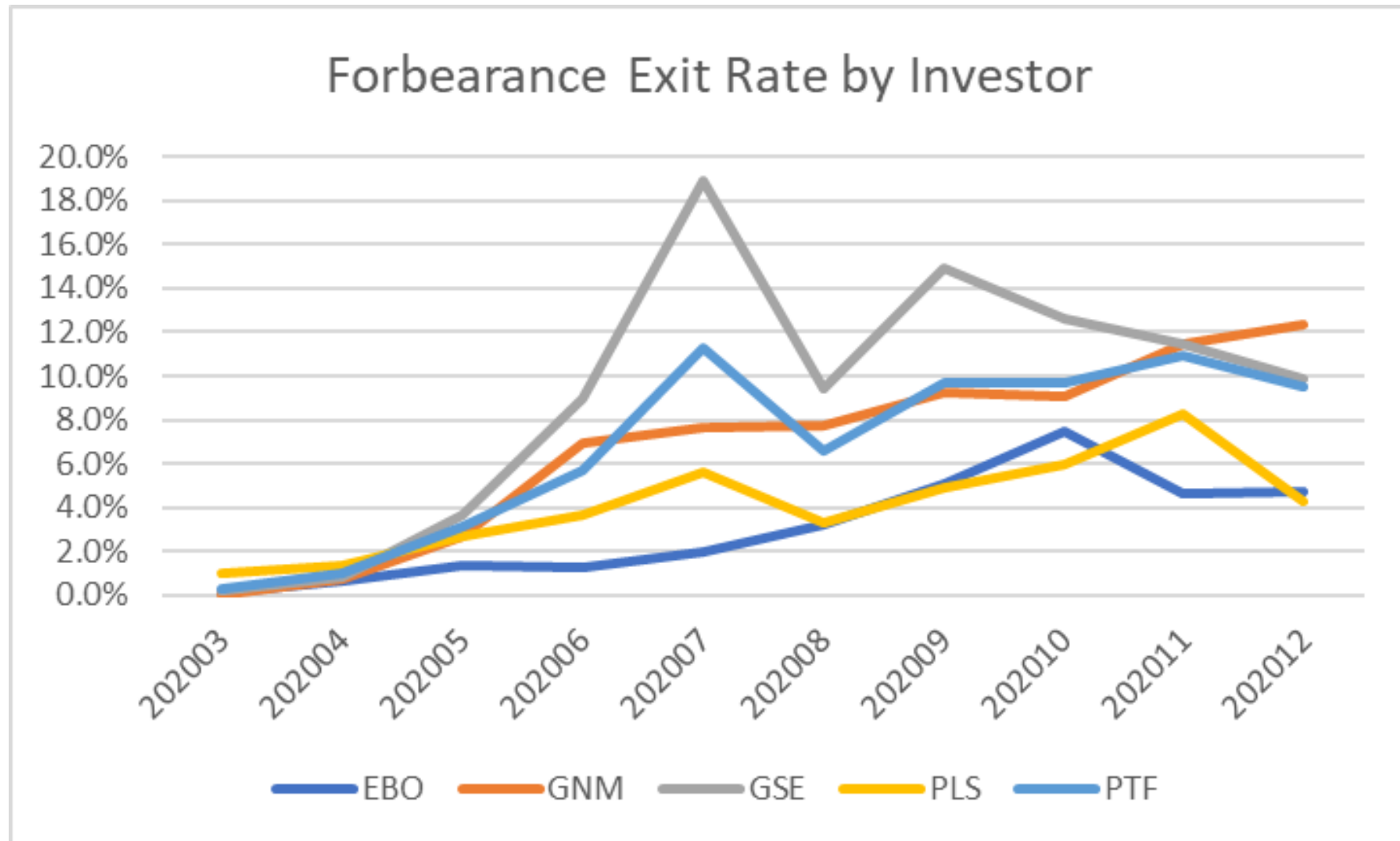
Data source: FRB Y-14, 18 largest national bank servicers.

Covid Deferral is An Important Path to Exit

Covid Forbearance Exits by Exit Type (M)
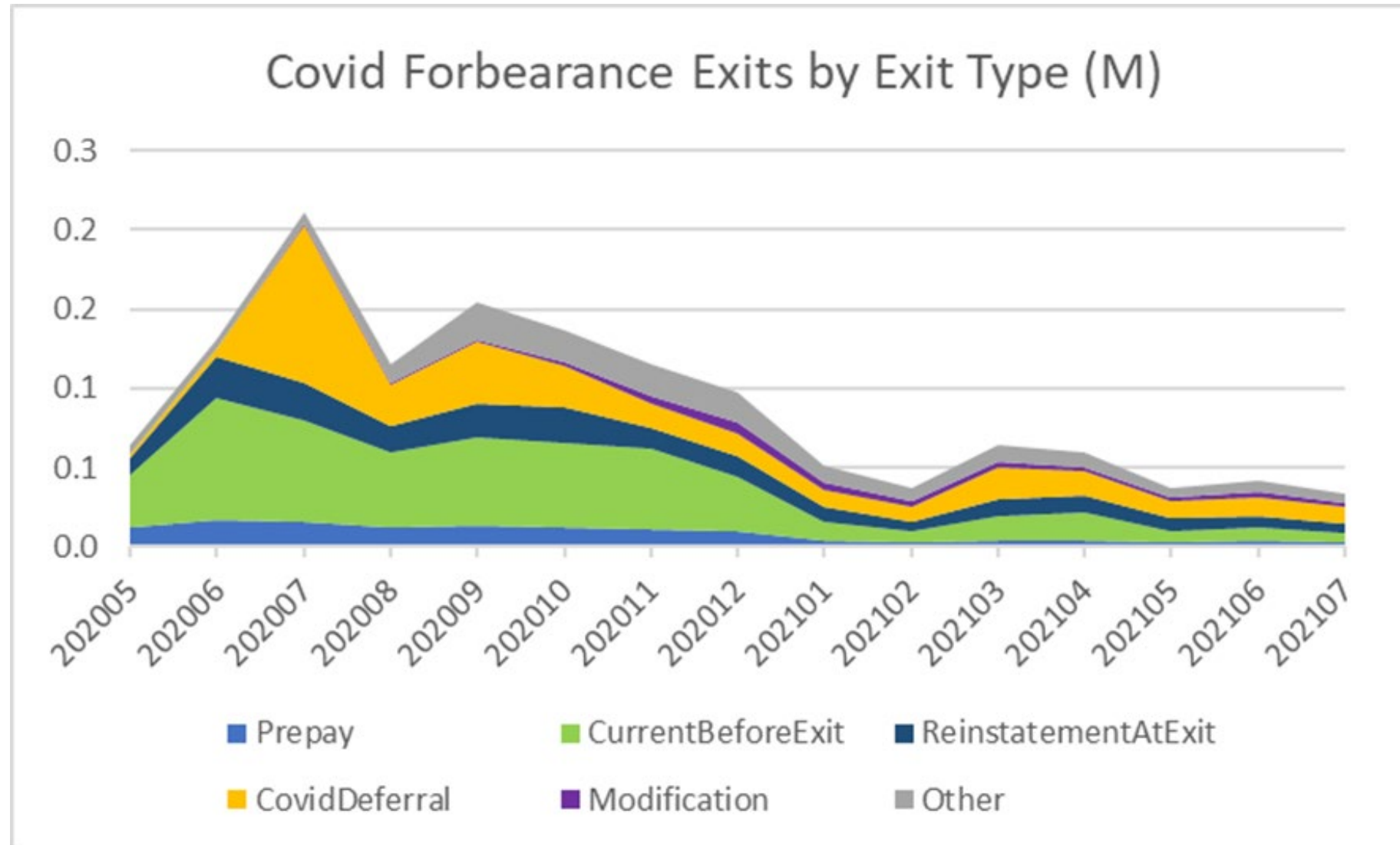
Covid-deferral: forborne monthly payments are deferred to loan maturity, refinance, or sale of the property

Legend: Prepay, CurrentBeforeExit, ReinstatementAtExit, CovidDeferral, Modification, Other

Data source: FRB Y-14, 18 largest national bank servicers.

Borrowers with Greater Credit Scores Had Higher Exit Rates

Forbearance Exit Rate by FICO(Current)
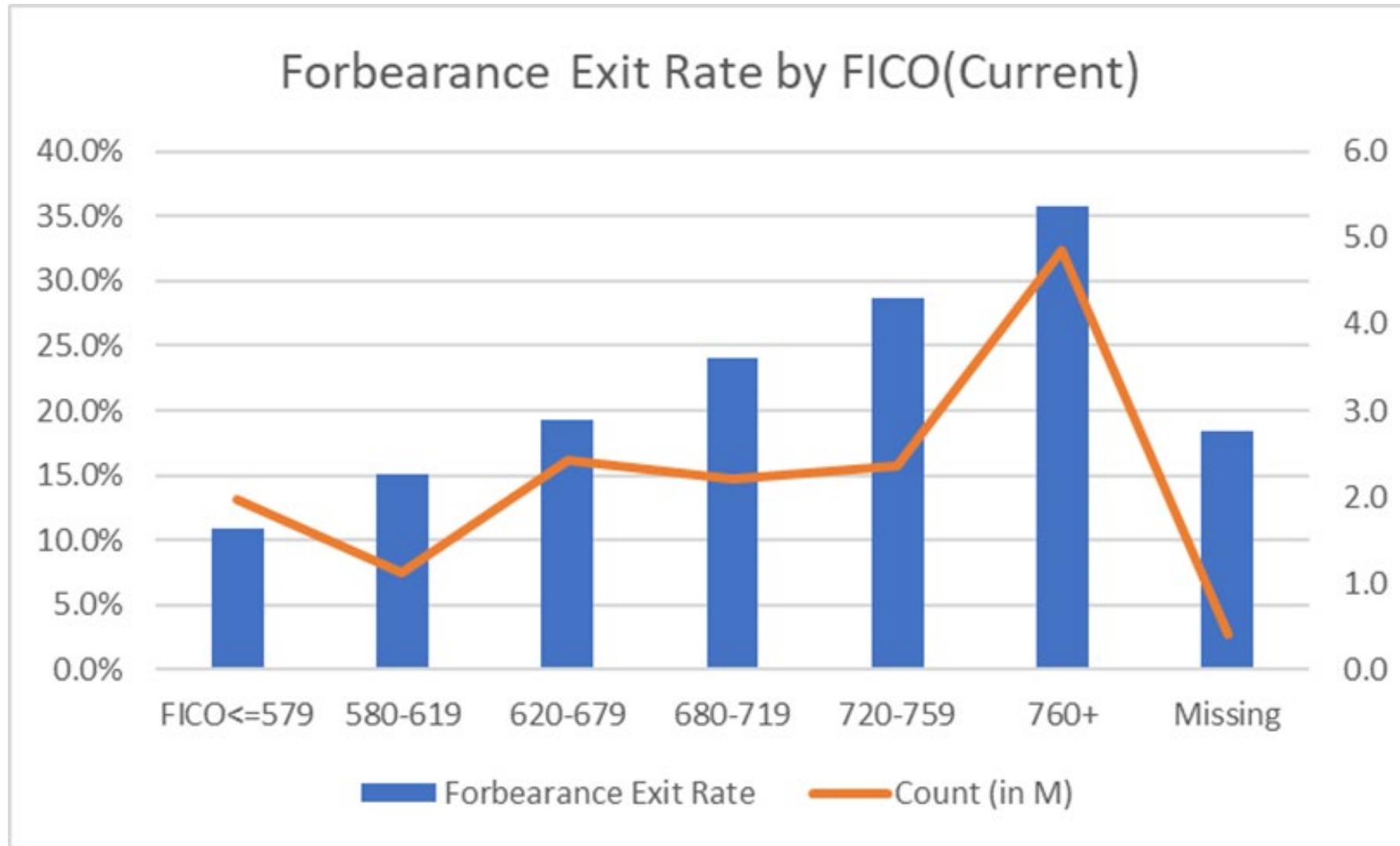
Data source: FRB Y-14, 18 largest national bank servicers.

Borrowers Facing Higher Unemployment Rate had Lower Exit Rates

Forbearance Exit Rate by UR Percentile

Data source: FRB Y-14, 18 largest national bank servicers.

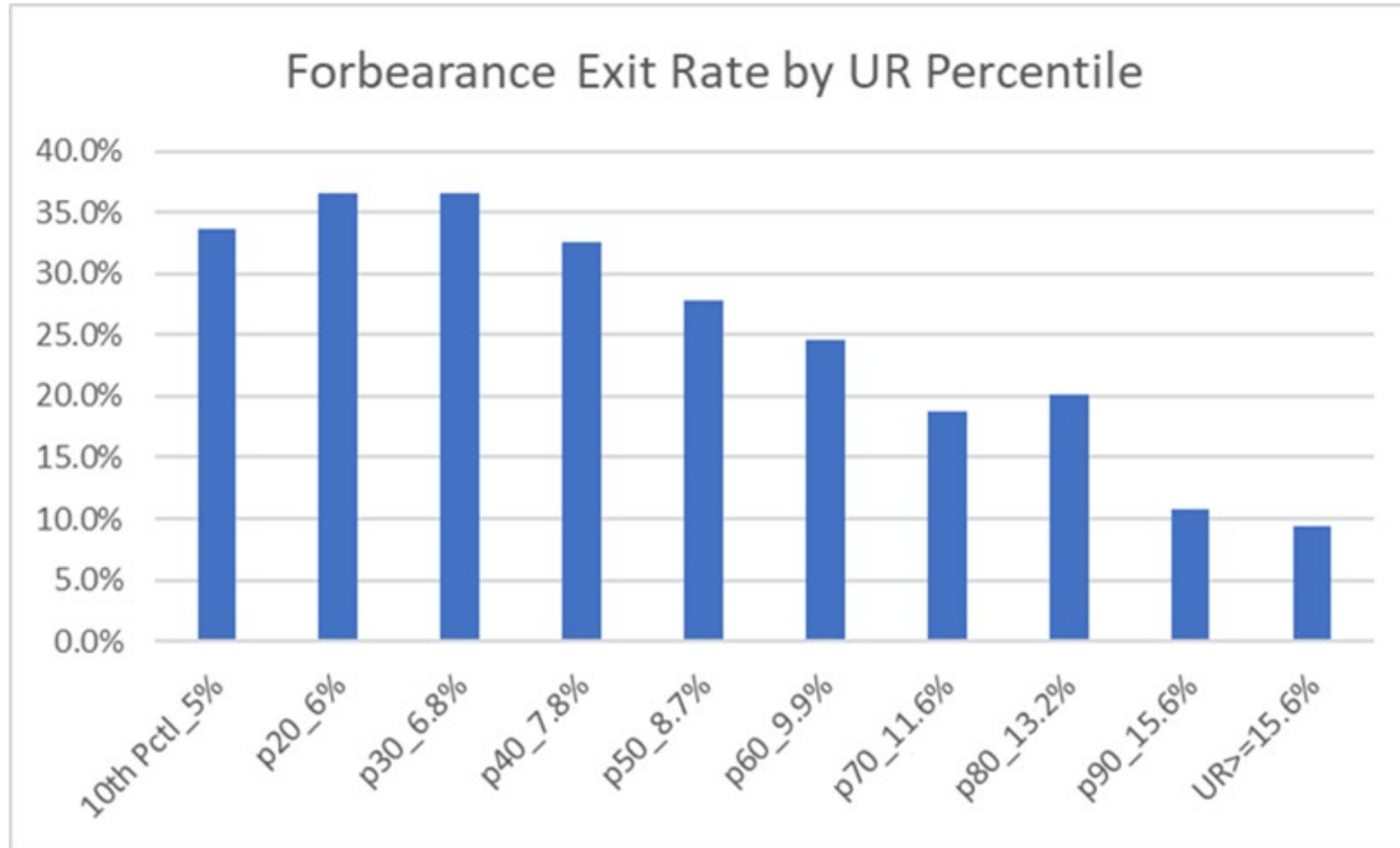| Dependent variable		Forbearance exit (except prepay)			Forbearance exit (except prepay)			Forbearance exit (except prepay)		
Variable	Class value	Estimate	StdErr	ProbChiSq	Estimate	StdErr	ProbChiSq	Estimate	StdErr	ProbChiSq
Intercept		-1.62	3.24	0.62	-1.89	5.34	0.72	-1.81	5.34	0.74
FICO Current, lag	580-619	-0.12	0.01	0.00	-0.13	0.04	0.00	-0.15	0.01	0.00
	620-679	0.03	0.01	0.00	0.09	0.03	0.00	0.00	0.01	0.72
	680-719	0.17	0.01	0.00	0.16	0.02	0.00	0.14	0.01	0.00
	720-759	0.28	0.01	0.00	0.20	0.02	0.00	0.24	0.01	0.00
	760+	0.44	0.01	0.00	0.33	0.02	0.00	0.40	0.01	0.00
	missing	-0.49	0.02	0.00	-0.34	0.05	0.00	-0.32	0.02	0.00
Month in forbearance	2				-0.09	0.01	0.00	-0.09	0.01	0.00
(omitted is 0-1 month)	3				0.49	0.01	0.00	0.49	0.01	0.00
	4				0.04	0.01	0.00	0.04	0.01	0.01
	5				0.54	0.01	0.00	0.54	0.01	0.00
	6				0.62	0.01	0.00	0.62	0.01	0.00
	7				0.31	0.02	0.00	0.31	0.02	0.00
	8				0.35	0.02	0.00	0.35	0.02	0.00
	9				0.27	0.03	0.00	0.27	0.03	0.00
Delinquency status, lag	30-59 dpd	-1.20	0.01	0.00	-1.12	0.01	0.00	-1.12	0.01	0.00
(omitted is Current)	60-89dpd	-0.90	0.01	0.00	-1.18	0.01	0.00	-1.18	0.01	0.00
	90-119	-0.44	0.01	0.00	-0.76	0.01	0.00	-0.76	0.01	0.00
	120+	-1.11	0.01	0.00	-1.41	0.01	0.00	-1.41	0.01	0.00
	Foreclosure	0.40	0.06	0.00	0.41	0.06	0.00	0.41	0.06	0.00
	REO	-2.54	0.99	0.01	-2.77	1.01	0.01	-2.77	1.01	0.01
Unemployemnt Rate		**-0.09**	0.00	0.00	**-0.03**	0.00	0.00	**-0.04**	0.00	0.00
UR*FICO_Curr in	580-619				0.00	0.00	0.55			
	620-679				-0.01	0.00	0.00			
	680-719				0.00	0.00	0.26			
	720-759				0.00	0.00	0.08			
	760+				0.01	0.00	0.00			
	missing				0.00	0.01	0.66			
pct_HH_inc>75k								-0.16	0.07	0.02
UR*pct_HH_inc>75								0.01	0.01	0.22
Borrower/loan controls			Yes			Yes			Yes	
AUC			0.73			0.76			0.76	

Exit Response to Employment Improvement Smaller for High FICO Borrowers

Data source: FRB Y-14, 18 largest national bank servicers. Kept are observations after forbearance entry.

This Finding Holds Mainly for GSE Loans

Variable	Class	GSE Estimate	GSE StdErr	GSE p-value	FHA Estimate	FHA StdErr	FHA p-value	Portfolio Estimate	Portfolio StdErr	Portfolio p-value	PLS Estimate	PLS StdErr	PLS p-value
Intercept		-3.38	1.80	0.06	-4.11	10.70	0.70	-3.34	25.43	0.90	-1.81	1094.66	1.00
FICO_Current (lag)	580-619	-0.09	0.06	0.10	-0.27	0.06	0.00	-0.06	0.10	0.51	-0.26	0.14	0.06
(omitted: <580)	620-679	0.00	0.04	0.92	0.12	0.04	0.01	0.17	0.07	0.01	0.20	0.11	0.08
	680-719	0.13	0.03	0.00	0.26	0.05	0.00	0.21	0.07	0.00	-0.02	0.13	0.87
	720-759	0.19	0.03	0.00	0.34	0.05	0.00	0.22	0.07	0.00	0.06	0.13	0.67
	760+	0.34	0.03	0.00	0.55	0.04	0.00	0.35	0.05	0.00	0.36	0.12	0.00
Delinquency status, lag	30-59 dpd	-1.10	0.02	0.00	-1.30	0.03	0.00	-1.14	0.04	0.00	-1.00	0.07	0.00
(omitted is Current)	60-89dpd	-0.64	0.01	0.00	-1.66	0.03	0.00	-1.15	0.04	0.00	-1.14	0.07	0.00
	90-119	-0.33	0.01	0.00	-1.22	0.03	0.00	-0.67	0.04	0.00	-0.92	0.07	0.00
	120+	-1.51	0.02	0.00	-1.67	0.03	0.00	-1.29	0.03	0.00	-1.47	0.06	0.00
	Foreclosure	-0.23	0.15	0.13	0.35	0.10	0.00	0.52	0.14	0.00	0.49	0.19	0.01
	REO	-11.79	137.92	0.93	-10.93	81.92	0.89	-1.60	1.02	0.12	-8.51	86.10	0.92
Month in forbearance		0.17	0.00	0.00	0.22	0.00	0.00	0.16	0.01	0.00	0.04	0.01	0.00
Unemployment Rate (UR)		-0.05	0.00	0.00	-0.04	0.00	0.00	-0.04	0.00	0.00	-0.07	0.01	0.00
UR*FICO_Curr (lag)	580-619	0.00	0.01	0.88	0.00	0.01	0.56	-0.01	0.01	0.59	0.03	0.01	0.05
	620-679	0.00	0.00	0.41	-0.01	0.00	0.12	-0.02	0.01	0.02	-0.02	0.01	0.07
	680-719	0.00	0.00	0.50	0.00	0.01	0.41	-0.02	0.01	0.03	0.01	0.01	0.67
	720-759	0.01	0.00	0.09	0.00	0.01	0.93	0.00	0.01	0.67	0.01	0.01	0.47
	760+	0.01	0.00	0.00	0.00	0.00	0.77	0.00	0.00	0.69	0.00	0.01	0.92
Servier fixed effects		Yes			Yes			Yes			Yes		
State fixed effects		Yes			Yes			Yes			Yes		
AUC		0.72			0.77			0.77			0.72		
No of obs		508,617			310,516			155,155			62,453		

Not all loan and borrower attributes are shown.

Loan Performance Post Forbearance Exits Have Little Relation with Unemployment Rates

Dep. Var.:		(1) Re-enter			(2) PrePay			(3) Serious Delinquency		
Variable	ClassValue	Estimate	StdErr	ProbChiSq	Estimate	StdErr	ProbChiSq	Estimate	StdErr	ProbChiSq
Intercept		-2.81	6.16	0.65	-15.97	37.40	0.67	-4.88	39.80	0.90
FICO_Current_Lag	580-619	0.33	0.03	0.00	-0.45	0.12	0.00	0.40	0.03	0.00
	620-679	0.06	0.02	0.00	0.14	0.08	0.06	-0.15	0.03	0.00
	680-719	-0.15	0.02	0.00	0.36	0.07	0.00	-0.50	0.03	0.00
	720-759	-0.43	0.02	0.00	0.66	0.07	0.00	-0.80	0.03	0.00
	760+	-0.67	0.02	0.00	0.51	0.05	0.00	-1.09	0.02	0.00
	missing	0.22	0.05	0.00	-0.42	0.14	0.00	1.03	0.05	0.00
Refreshed LTV	missing	-0.07	0.11	0.49	5.15	1.05	0.00	-0.44	0.14	0.00
	30 - 40	-0.27	0.03	0.00	-1.40	1.50	0.35	-0.45	0.04	0.00
	40 - 50	-0.17	0.03	0.00	-1.36	1.49	0.36	-0.35	0.03	0.00
	50 - 60	-0.11	0.03	0.00	-1.61	1.47	0.27	-0.21	0.03	0.00
	60 - 70	-0.05	0.03	0.07	-1.29	1.28	0.31	-0.15	0.03	0.00
	70 - 80	0.06	0.03	0.03	-2.03	1.66	0.22	0.20	0.04	0.00
	80 - 90	0.21	0.04	0.00	-1.06	2.07	0.61	0.44	0.05	0.00
	90 - 100	0.47	0.05	0.00	0.05	3.77	0.99	0.67	0.07	0.00
	101+	0.25	0.08	0.00	-2.22	7.78	0.78	0.93	0.08	0.00
DTI Ratio	0.21	-0.11	0.02	0.00	0.16	0.06	0.01	-0.05	0.03	0.10
	0.29	0.04	0.02	0.02	0.16	0.06	0.01	-0.02	0.02	0.30
	0.41	0.06	0.02	0.00	0.22	0.06	0.00	0.03	0.02	0.18
	0,41+	0.17	0.03	0.00	0.06	0.12	0.61	0.18	0.04	0.00
	missing	0.01	0.02	0.50	-0.32	0.06	0.00	0.05	0.02	0.04
Month in forbearance	2	-0.20	0.03	0.00	-0.09	0.08	0.30	-0.16	0.04	0.00
	3	-0.12	0.03	0.00	0.09	0.08	0.28	-0.32	0.04	0.00
	4	-0.15	0.03	0.00	-0.08	0.09	0.39	-0.33	0.04	0.00
	5	0.32	0.03	0.00	-0.14	0.10	0.15	0.48	0.04	0.00
	6	-0.12	0.04	0.00	-0.13	0.12	0.24	0.14	0.04	0.00
	7	-0.98	0.06	0.00	0.33	0.17	0.05	-1.02	0.08	0.00
	8	-0.85	0.18	0.00	0.84	0.50	0.09	-0.61	0.22	0.01
Unemployment Rate		0.00	0.00	0.79	0.00	0.01	0.78	-0.04	0.00	0.00
Servicer & State FE			Yes			Yes			Yes	
AUC			0.78						0.87	

A Significant Proportion under Forbearance are Refi-eligible

Percent of First-lien Mortgages Refi-Eligible

Percent of 1st-lien Mortgages Refi-Eligible, by Covid-19 Forbeaance Status
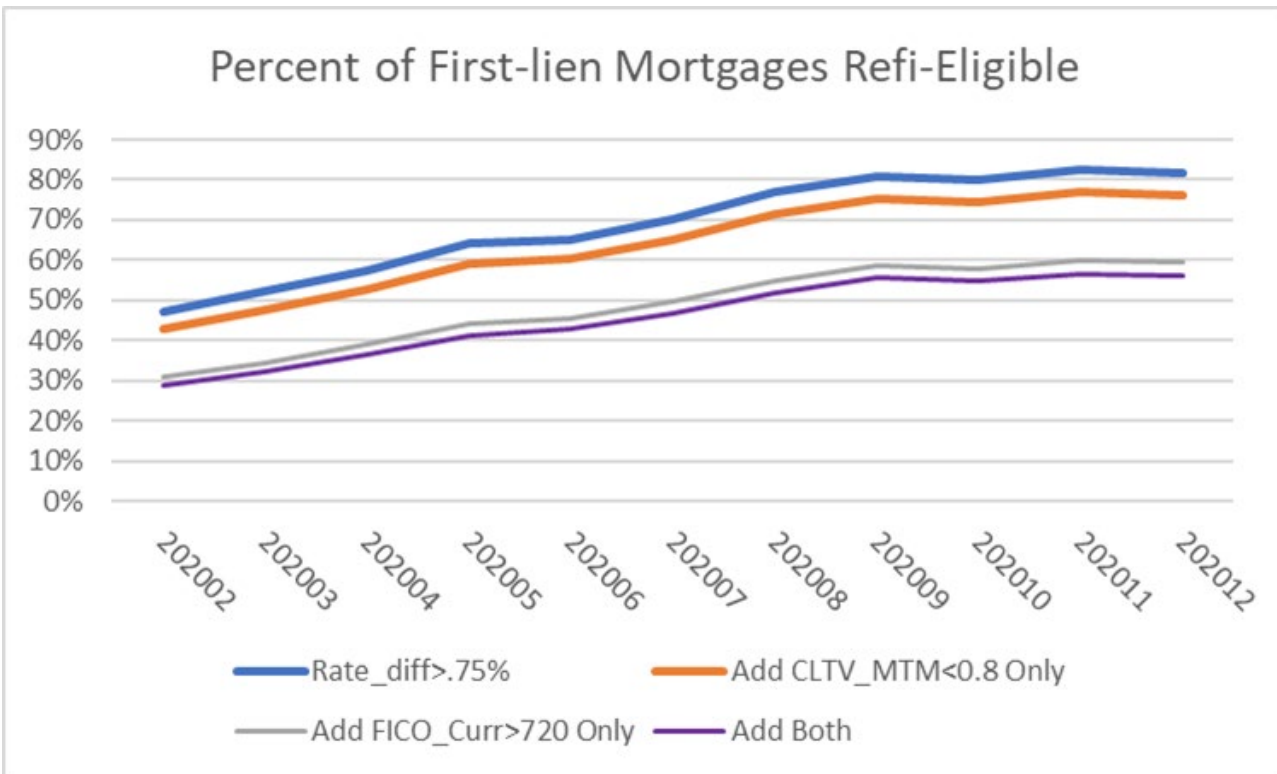
FICO is the major constraining factor reducing refi eligibility.
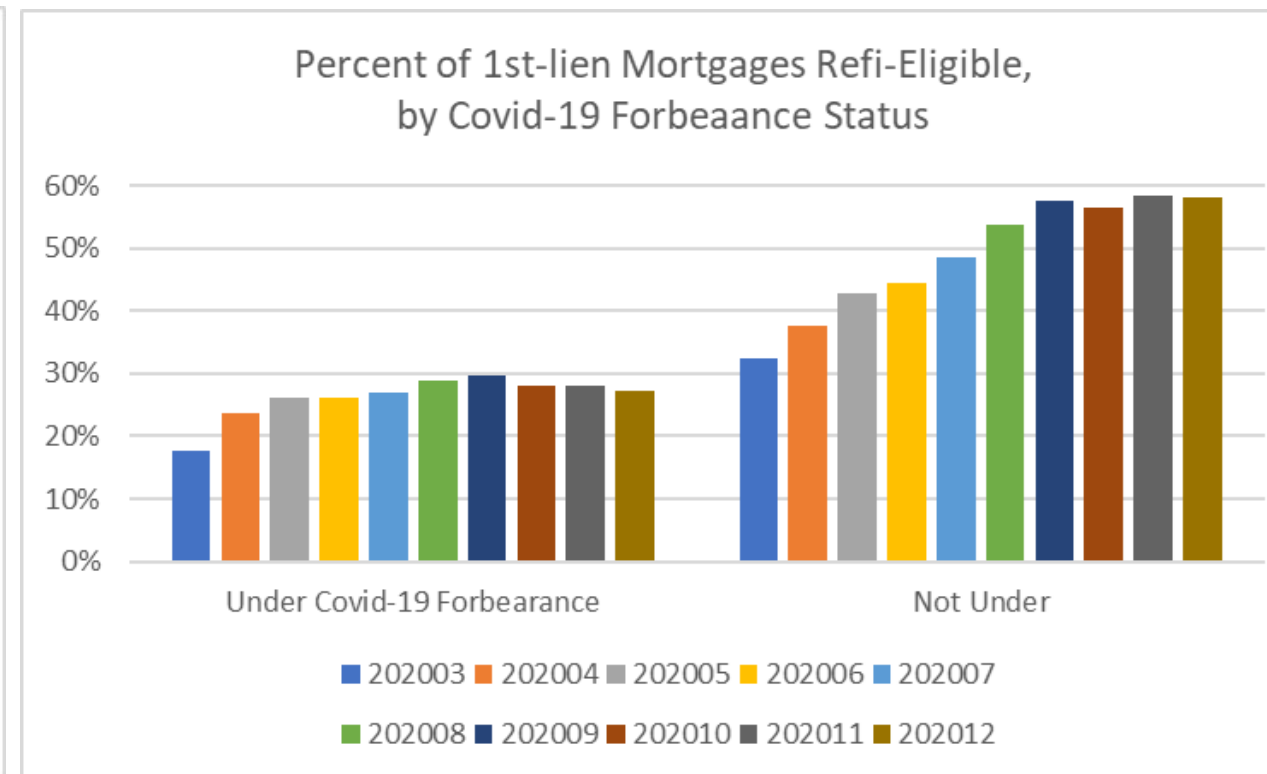
Data source: FRB Y-14, 18 largest national bank servicers.

# NonPayment under Forbearance Reduced Refinance Post Exits, but Effect is Short-lived

| Variable	ClassVal0	(1) Lag 1 Month All			(2) Lag 1 Month Federally Backed			(3) Lag 1 Month Private			(4) Lag 3 Months Federally Backed			(5) Lag 3 Months Private		
		Estimate	StdErr	p-value	Estimate	StdErr	p-value	Estimate	StdErr	p-value	Estimate	StdErr	p-value	Estimate	StdErr	p-value
Intercept		-4.58	0.17	0.00	-5.39	4.01	0.18	-4.71	0.20	0.00	-5.65	5.16	0.27	-4.94	0.20	0.00
FICO_Current (lag)	580-619	-0.49	0.01	0.00	-0.52	0.02	0.00	-0.41	0.03	0.00	-0.55	0.02	0.00	-0.38	0.03	0.00
(omitted: <580)	620-679	-0.09	0.01	0.00	-0.09	0.01	0.00	-0.10	0.02	0.00	-0.14	0.01	0.00	-0.13	0.02	0.00
	680-719	0.24	0.01	0.00	0.26	0.01	0.00	0.17	0.02	0.00	0.21	0.01	0.00	0.11	0.02	0.00
	720-759	0.42	0.01	0.00	0.44	0.01	0.00	0.35	0.01	0.00	0.40	0.01	0.00	0.31	0.01	0.00
	760+	0.57	0.01	0.00	0.60	0.01	0.00	0.52	0.01	0.00	0.56	0.01	0.00	0.47	0.01	0.00
	missing	0.05	0.01	0.00	0.03	0.02	0.04	0.10	0.03	0.00	0.20	0.02	0.00	0.18	0.03	0.00
Forbearance, lag		-0.85	0.02	0.00	-0.92	0.02	0.00	-0.66	0.04	0.00	-0.25	0.03	0.00	-0.08	0.05	0.11
FB_lag*Current_lag		0.49	0.02	0.00	0.58	0.03	0.00	0.24	0.05	0.00	0.14	0.03	0.00	-0.19	0.06	0.00
Current_lag		-0.25	0.02	0.00	-0.31	0.02	0.00	-0.11	0.03	0.00	0.30	0.03	0.00	0.41	0.04	0.00
Unemployment		-0.02	0.00	0.00	-0.02	0.00	0.00	-0.02	0.00	0.00	-0.04	0.00	0.00	-0.03	0.00	0.00
LTV	Missing	0.16	0.03	0.00	0.24	0.03	0.00	-0.02	0.07	0.83	0.23	0.03	0.00	-0.06	0.08	0.43
(omitted: <=30%)	30 - 40	-0.18	0.01	0.00	-0.22	0.01	0.00	-0.05	0.02	0.02	-0.22	0.01	0.00	-0.04	0.02	0.05
	40 - 50	-0.12	0.01	0.00	-0.15	0.01	0.00	-0.05	0.02	0.00	-0.15	0.01	0.00	-0.04	0.02	0.02
	50 - 60	-0.05	0.01	0.00	-0.09	0.01	0.00	0.05	0.02	0.00	-0.09	0.01	0.00	0.06	0.02	0.00
	60 - 70	0.03	0.01	0.00	-0.01	0.01	0.21	0.13	0.01	0.00	0.00	0.01	0.63	0.13	0.01	0.00
	70 - 80	0.13	0.01	0.00	0.10	0.01	0.00	0.20	0.01	0.00	0.11	0.01	0.00	0.21	0.01	0.00
	80 - 90	0.11	0.01	0.00	0.12	0.01	0.00	0.17	0.02	0.00	0.12	0.01	0.00	0.17	0.02	0.00
	90 - 100	0.07	0.01	0.00	0.08	0.01	0.00	-0.16	0.02	0.00	0.08	0.01	0.00	-0.15	0.02	0.00
	>100	0.06	0.01	0.00	0.18	0.01	0.00	-0.18	0.04	0.00	0.18	0.01	0.00	-0.17	0.04	0.00
Loan Purpose	Cashout	-0.10	0.02	0.00	-0.10	0.02	0.00	-0.09	0.04	0.02	-0.10	0.02	0.00	-0.09	0.04	0.02
(omitted: Purchase)	Home Improve	-0.06	0.02	0.00	-0.10	0.02	0.00	0.01	0.05	0.89	-0.10	0.02	0.00	-0.02	0.05	0.74
	Missing	0.14	0.08	0.09	0.20	0.09	0.02	0.03	0.20	0.89	0.18	0.10	0.07	0.07	0.20	0.73
	Other	0.15	0.02	0.00	0.14	0.02	0.00	0.08	0.05	0.07	0.15	0.02	0.00	0.06	0.05	0.22
	Rate/term	-0.05	0.02	0.00	-0.07	0.02	0.00	-0.01	0.04	0.88	-0.05	0.02	0.01	0.00	0.04	0.93
AUC		0.65			0.64			0.67			0.65			0.67		
N obs		16.5M			13.6M			3.3M			10.6M			2.6M		

There exist various programs that facilitate refinance post forbearance if borrowers start to make payments. Include all observations.

Serious Delinquency Rate Continued to Decline Amid Rising Housing Price and Housing Shortages

Data source: FRB Y14.
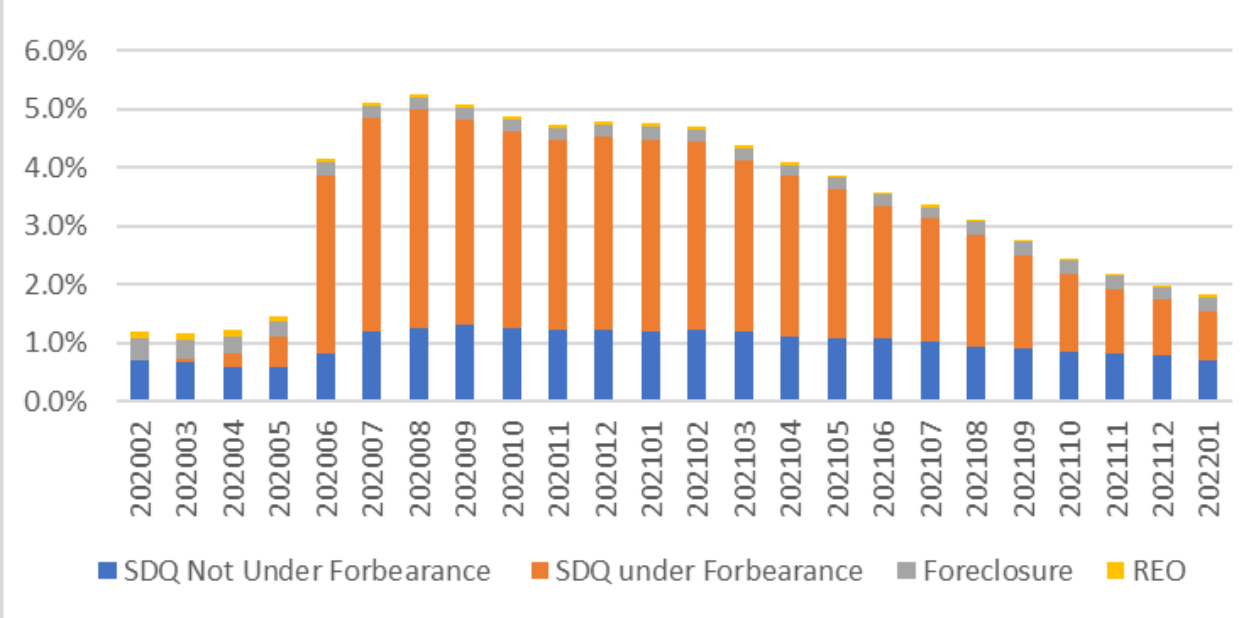
According to Black Knight's updated repeat sales index, year-over-year home price appreciation increased to 20.61 percent in February 2022, Year-over-year home price appreciation as measured by Zillow's hedonic index was 19.95% in Feb 2021
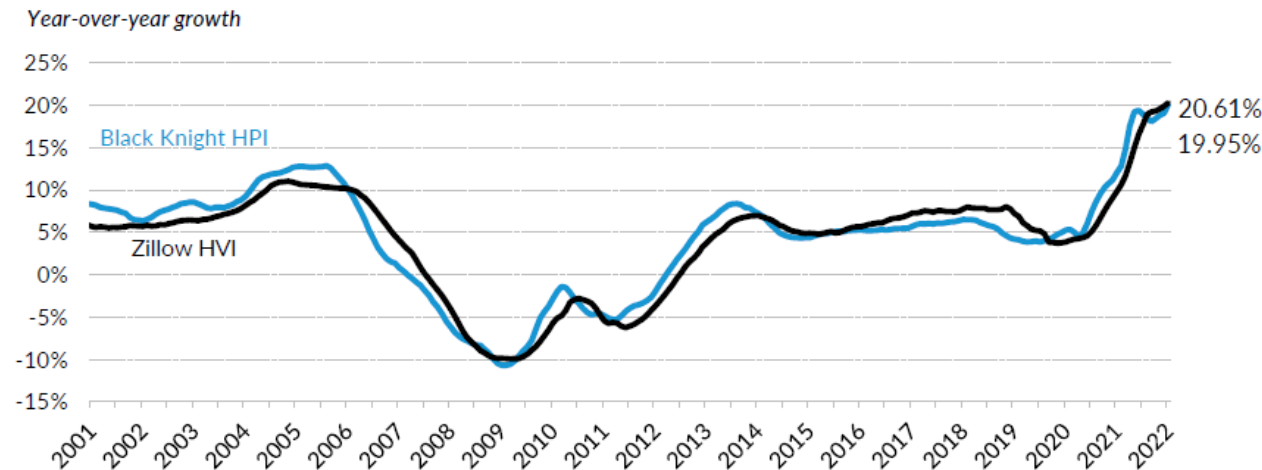
Sources: Black Knight, Zillow, and Urban Institute.

Findings; Concluding Remarks

- Covid-19 forbearance reached mortgage borrowers affected by the economic fallout:
  - Entry by lower credit score borrowers.
  - Exits responded to employment improvements.
  - Delinquency post exit continued to be low.
  - Remaining exits with the availability of assistance from Covid-19 deferral/modifications.
- There exists large heterogeneity in the effect of forbearance program:
  - Borrowers throughout FICO spectrum responded to unemployment shock by entering.
    - In terms of percentage change, higher FICO borrowers were the highest.
    - Exit response to employment improvement by higher FICO borrowers is smaller.
  - The forbearance entry response to unemployment shock is larger for borrowers in zip-codes with a higher proportion of higher-income ones.
  - => Allowed some to take precautionary actions or accumulate liquidity.
- Potential un-intended consequence
  - Not paying under forbearance reduced refinance; but salvaged by policies.
  - Strategic non-paying (to qualify for pay reductions via loss mitigation/modification)?

Further Questions to Examine

- How did borrower credit scores evolve with forbearance and payment behavior?
  - How is credit scores' predictive power impacted?
  - How did borrowers use their forborne amounts (including student loan forbearance) - pay down debts, savings, or others?
- Any ways to be more targeted in providing reliefs and providing proper economic incentives?
  - Three-fold support besides monetary policy: fiscal (direct pays), unemployment benefits, and debt payment reliefs?
    - Forbearance programs: Are they targeting the most impacted groups in Covid-19 event?
  - How many are strategic (slower) forbearance exits (anticipating assistance)?
  - Would different private forbearance designs make a difference?