May 2021

Freddie Mac Releases New Non-Standard Dataset

Freddie Mac continues to demonstrate a commitment to data transparency through the release of a new Non-Standard Dataset (NSD). This dataset is composed of loans that have previously been excluded from the Single-Family Loan-Level Dataset (Standard Dataset or SD) for having features that do not align with Single-Family credit risk transfer (CRT) eligibility criteria, such as adjustable-rate mortgages (ARM), interest-only, credit enhancements other than primary mortgage insurance, and limited documentation.

NSD Historical Performance

Historical performance of the loans in the NSD differs significantly from the SD as seen in Figure 1.

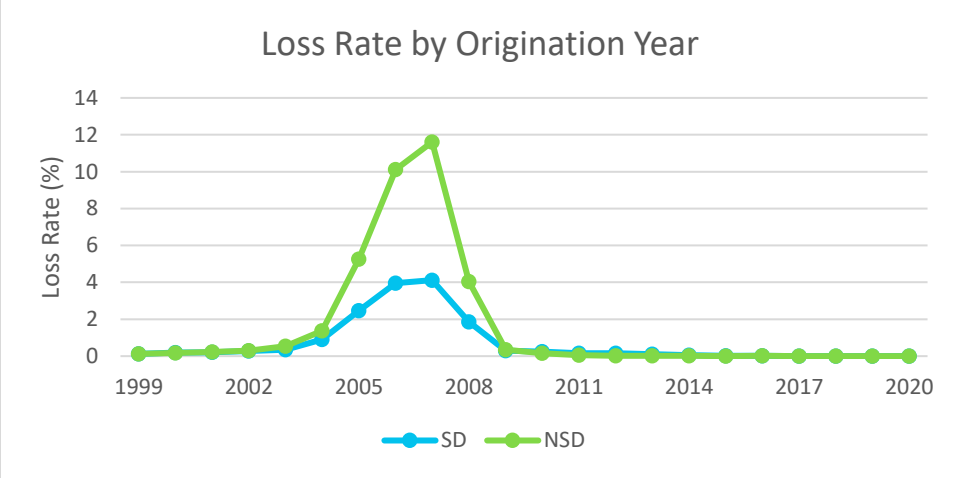

Figure 1. Loss Rate by Dataset and Vintage[1]

Key Takeaways

1. Product type (i.e. ARM and interest-only) is the biggest driver of the performance difference. These loans do not perform as well as fixed-rate, fully amortizing mortgages, even when controlling for credit attributes. Please note that interest-only mortgages have not been acquired by Freddie Mac since 2010, and the ARM population has decreased dramatically since 2007.
2. The loans in the NSD have less favorable credit attributes, and due to the nature of the product types (adjustable rate, interest-only/non-amortizing), the loss experience was magnified during the financial crisis.
3. Severity is mostly comparable between the NSD and SD. The large difference in historical losses in the NSD is primarily driven by significantly higher defaults, as severity is only a minor contributor.

[1] Loss Rate for an origination year is defined as realized actual loss over original unpaid principal balance (UPB).

Observations from the New Non-Standard Dataset

Background

To continue to increase transparency under the direction of senior management and FHFA, Freddie Mac Single-Family published a new Non-Standard Dataset (NSD) in April 2021 to include loans that fall outside of the current eligibility criteria of the Single-Family Loan-Level Dataset (Standard Dataset or SD). This supplemental dataset provides a holistic view into Freddie Mac's portfolio of loans originated from 1999 onward, as well as the associated performance records. The NSD is a standalone file and has the same format as the SD.

What's Included

The NSD includes approximately 6.6 million loans in the following categories:

1. Adjustable-rate mortgages (ARM)
2. Interest-only mortgages
3. Other miscellaneous categories, such as certain affordable loans, loans that may not have fully verified documentation, loans with credit enhancements other than primary mortgage insurance, and loans delivered under alternate agreements.

The following graph (Figure 2) shows Freddie Mac's total portfolio originated since 1999 including data from both the NSD and SD. To understand the NSD in more detail, this paper contains an evaluation of the origination attributes and historical performance across six different samples.

1. **Total Standard Dataset (SD)**: Fixed, CRT-like loans
2. **Total Non-Standard Dataset (NSD)**: A mix of fixed and ARM loans that are not typically eligible for CRT
3. **ARM, non-interest-only (NSD-ARM)**: Adjustable-rate, amortizing mortgages
4. **ARM, interest-only (NSD-AIO)**: Adjustable-rate, interest-only mortgages
5. **Fixed, interest-only (NSD-FIO)**: Fixed rate, interest-only mortgages
6. **All Others (NSD-OTH)**: Loans that do not fall into the above categories

Groups three through six are subsets of the total NSD population. Each of these groups represents a distinct risk class that contributes to the overall NSD risk profile and performance.

Population Distribution and Default Rate

The volume of loans included in the NSD increased leading up to the global financial crisis but dropped off dramatically following the crisis. The decrease in volume is partially attributed to some products no longer being acquired by Freddie Mac (e.g. interest-only).

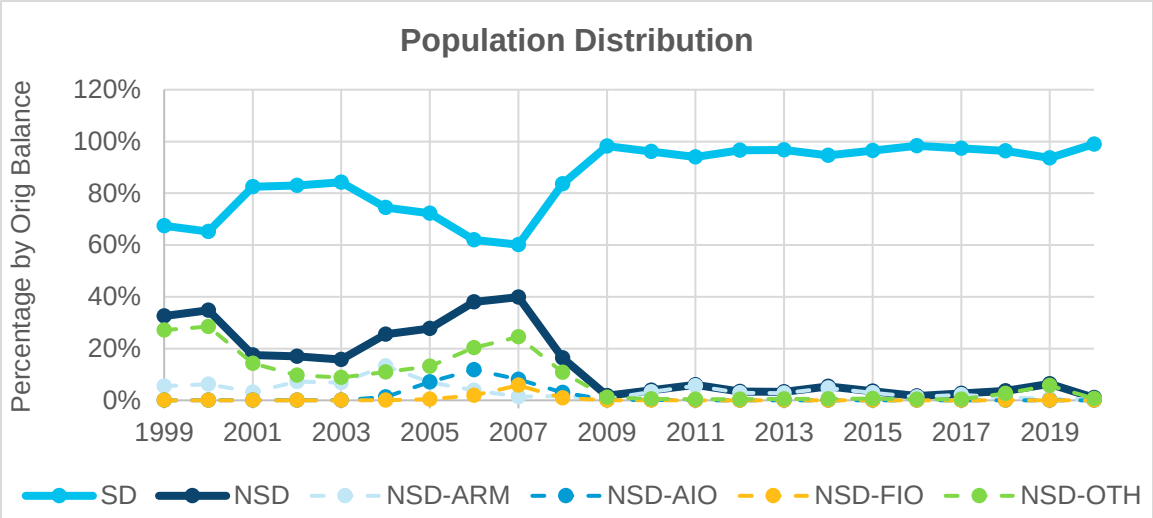

Figure 2. Population Distribution by Sample

As one would expect, given the types of mortgages in the NSD, the default rate is considerably higher. Figure 3 illustrates the historical default rate in each sample. The NSD-AIO population experienced the highest historical default rate, roughly four times higher than the loans in the SD at the peak of the crisis.

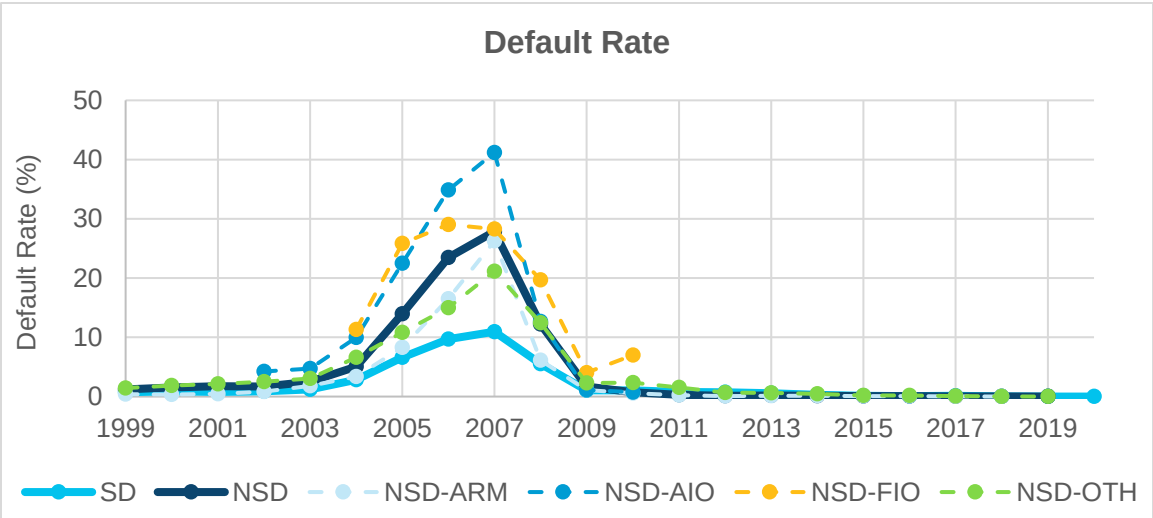

Figure 3. Default Rate by Sample[2]

[2] Default rate for a vintage is defined as the total UPB at the time the loans is recognized as a Credit Event over the total origination UPB.

Credit Attributes

To understand the drivers behind the higher default rate, we took a closer look at the **2004** (pre-crisis) and **2007** (crisis) vintages and compared credit attributes across the six samples. 2004 is used as a proxy for pre-crisis performance. Figure 4 shows a high-level comparison across the six samples.

2004	SD	NSD	NSD-ARM	NSD-AIO	NSD-FIO	NSD-OTH
Loan count	**1,677K**	**574K**	299K	29K	0K	246K
Avg Loan balance ($)	**154K**	**177K**	189K	222K	214K	158K
Avg Orig Credit Score	**723**	**719**	724	734	722	708
Avg Orig LTV	**70**	**76**	75	73	73	78
Investor %	**3.0**	**4.5**	4.0	2.3	8.3	5.6
Cash-out %	**29.8**	**21.5**	19.5	24.0	25.2	24.0
DTI > 45 %	**18.4**	**16.6**	15.9	12.6	10.6	18.4
FICO <=680 %	**22.3**	**24.2**	20.4	14.8	17.7	31.3
Avg Orig Note Rate	**5.62**	**5.15**	4.77	5.02	6.18	5.73
Curr Note Rate > 8%	**-**	**0.1**	-	-	-	0.3
Curr Rate > 6% & <= 8%	**22.5**	**13.9**	1.3	3.8	72.8	33.5
Curr Rate > 4.5% & <= 6%	**76.4**	**69.1**	72.1	86.2	27.2	62.0
Curr Rate > 3% & <= 4.5%	**1.1**	**16.6**	26.0	9.9	-	4.2
CA %	**14.1**	**13.6**	14.2	25.0	28.3	10.9
FL %	**6.3**	**6.9**	6.6	8.8	4.9	7.0
IL %	**5.2**	**7.2**	8.2	3.2	1.9	6.3
NV %	**1.2**	**1.7**	1.7	3.0	6.2	1.4
NY %	**5.0**	**3.9**	2.6	1.5	4.1	6.1

2007	SD	NSD	NSD-ARM	NSD-AIO	NSD-FIO	NSD-OTH
Loan count	**1,238K**	**821K**	28K	167K	120K	506K
Avg Loan balance ($)	**183K**	**212K**	227K	273K	261K	180K
Avg Orig Credit Score	**727**	**720**	719	725	730	713
Avg Orig LTV	**73**	**77**	73	74	76	80
Investor %	**5.5**	**6.3**	14.0	9.0	2.8	5.7
Cash-out %	**35.4**	**26.5**	34.1	31.6	29.2	22.5
DTI > 45 %	**26.1**	**25.7**	20.5	18.8	29.6	28.2
FICO <=680 %	**21.9**	**23.9**	25.4	18.0	15.8	29.5
Avg Orig Note Rate	**6.32**	**6.50**	6.41	6.44	6.52	6.53
Curr Note Rate > 8%	**0.1**	**2.0**	5.8	2.9	0.4	1.9
Curr Rate > 6% & <= 8%	**80.8**	**83.3**	63.3	76.0	93.2	84.9
Curr Rate > 4.5% & <= 6%	**19.0**	**14.7**	30.9	21.0	6.4	13.3
Curr Rate > 3% & <= 4.5%	**-**	**-**	-	0.1	-	-
CA %	**10.9**	**20.3**	19.2	39.9	21.3	10.3
FL %	**6.2**	**8.0**	9.0	8.9	9.5	6.9
IL %	**5.5**	**5.5**	10.8	4.4	3.4	6.3
NV %	**1.1**	**2.0**	2.0	3.1	2.4	1.3
NY %	**4.5**	**3.8**	3.3	3.0	3.9	4.1

Figure 4. Credit Attribute Summary

The following trends were observed when comparing across these six samples:

- The proportion of loans originated in the NSD grew as a percentage of the entire portfolio in 2007 to 40%, up from 25% in 2004.
- From 2004 to 2007, the adjustable-rate volume shifted from NSD-ARM to NSD-AIO. NSD-ARM loan count declined by approximately 90% while NSD-AIO increased six-fold.
- NSD-OTH, with a mix of various loans types, differs the most from the other NSD groups with smaller loan sizes, higher note rates, higher loan-to-values (LTVs) and lower FICOs. From 2004 to 2007 there was a large increase in the volume of these loans.
- Comparing the NSD to SD, the NSD has less favorable credit with lower FICO, higher LTV, and higher Investor concentration, which is partially offset by lower debt-to-income (DTI) and lower cash-out concentration. Within the various NSD groups there is variation on these attributes.
- Loan size is typically larger for loans in the NSD, especially within the interest-only population.
- The state distribution between the NSD and SD is similar in 2004; however, the California concentration in the NSD increased in 2007, led by the NSD-AIO loans.

In summary, the credit attributes on the surface are less favorable in the NSD than the SD with some compensating factors. However, the differences in credit do not appear to explain the substantial differences in historical performance. Distribution of credit attributes may play a role not visible from weighted averages and the risk factors defined in Figure 4.

To compare the distribution, violin plots were used to evaluate the FICO, DTI, LTV and interest rate distribution (Figure 5). A violin plot is generally used to show the full distribution of a data element. For example, the violin chart for LTV distribution across samples shows that NSD-OTH has population concentrations around both 80 LTV and 97 LTV. Typically, concentration on or above 97 LTV is an indication of loans funded through affordable programs. The key takeaways from the violin plots include:

- The NSD-OTH group stands out from the other populations as it has a mixed credit distribution given the various product types. This is especially apparent in the bottom-heavy FICO distribution and elongated credit tail.
- The FICO distribution moved higher in the SD but distributed downward for the NSD from 2004 to 2007, except in the case of the NSD-FIO where the opposite effect occurred. This may be due to the insignificant volume of NSD-FIO loans in 2004.
- The LTV distribution remained stable from 2004 to 2007, except for increase in higher LTV concentration in the NSD-OTH.
- The DTI distribution moved higher across all sample groups from 2004 to 2007
- There are distinctions in credit distribution that would indicate worse performance of the NSD, but not to the degree observed in the actual historical performance.

Violin Plots

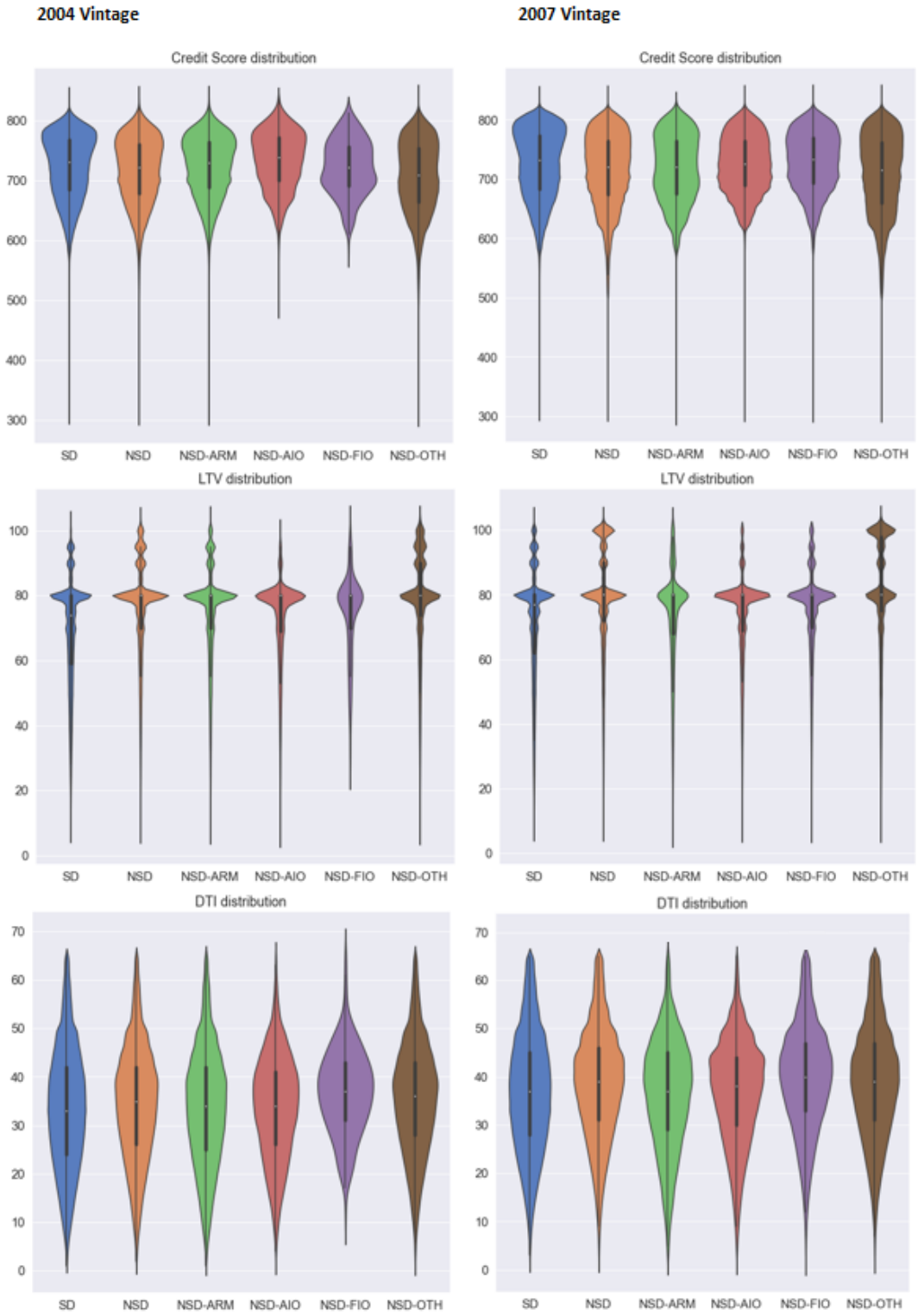

Figure 5. Credit Distribution

Cumulative Performance

To illustrate cummulative performance, D90+ rate[3], default rate, modification rates[4] and prepay rate[5] for both 2004 and 2007 across the samples are plotted in Figure 6. Current note rates by period were also observed (Figure 7).

Cumulative Performance (D90+ and Default Rate)

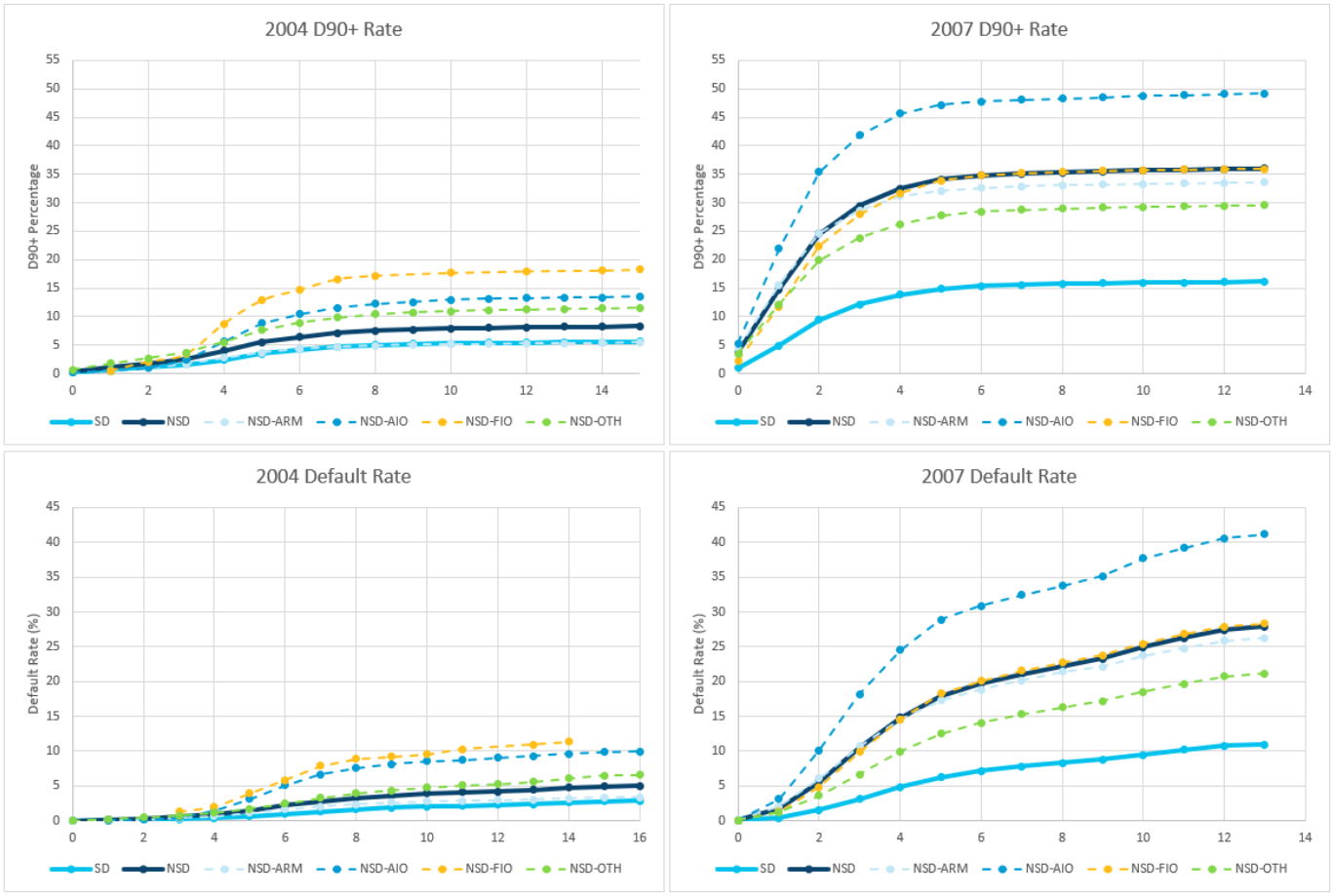

Figure 6. Cumulative Performance Metrics

[3] D90+ rate is defined as the total UPB for loans that have experienced D90 or more delinquency over the total origination UPB.
[4] Modification rate is defined as the total UPB at the time of modification over the total origination UPB.
[5] Payoff rate is defined as the total UPB at the time the loan is fully paid off (i.e., voluntary prepay and repurchase) over total origination UPB.

Cumulative Performance (Modification and Prepay Rate)

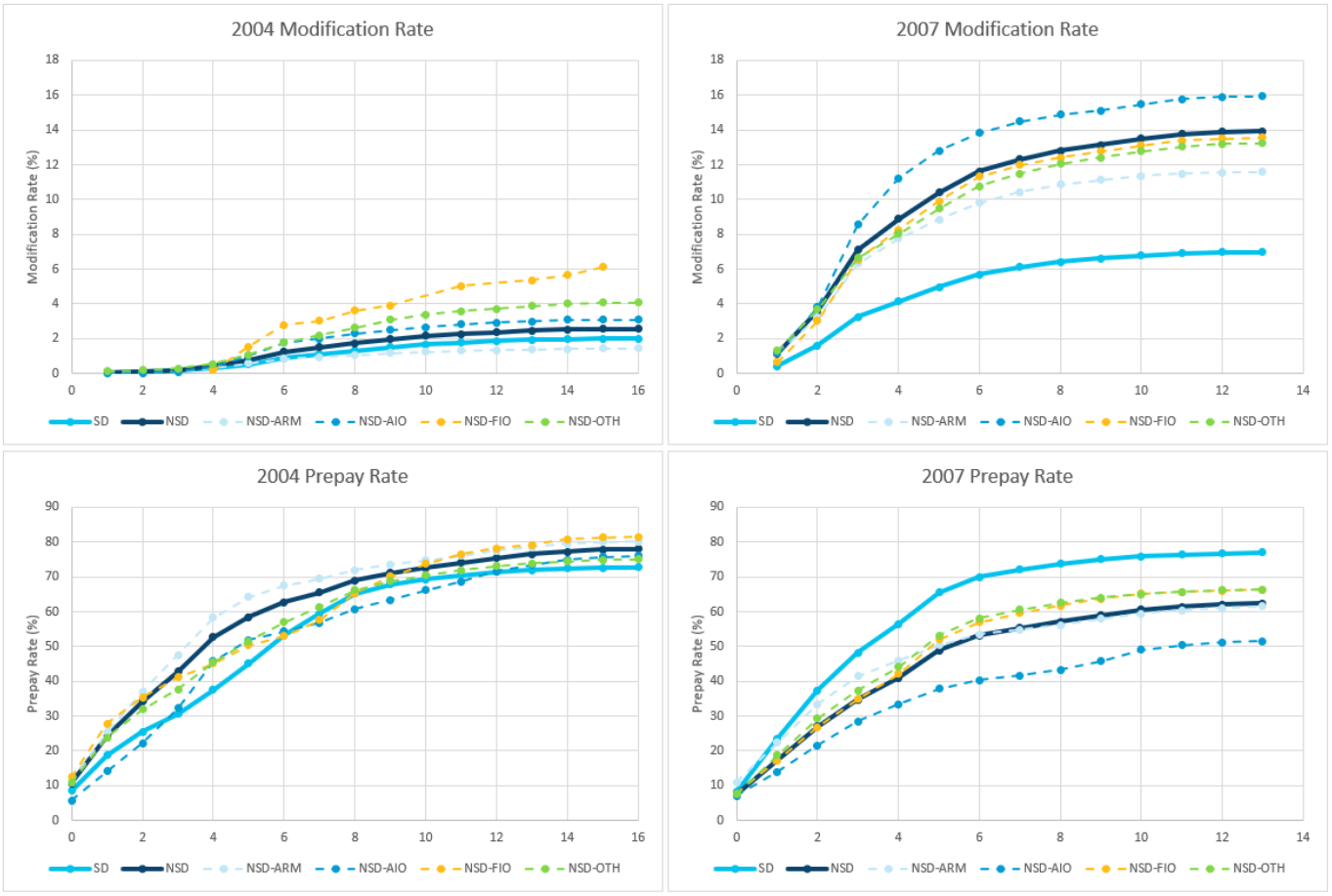

Figure 6. Cumulative Performance Metrics (cont.)

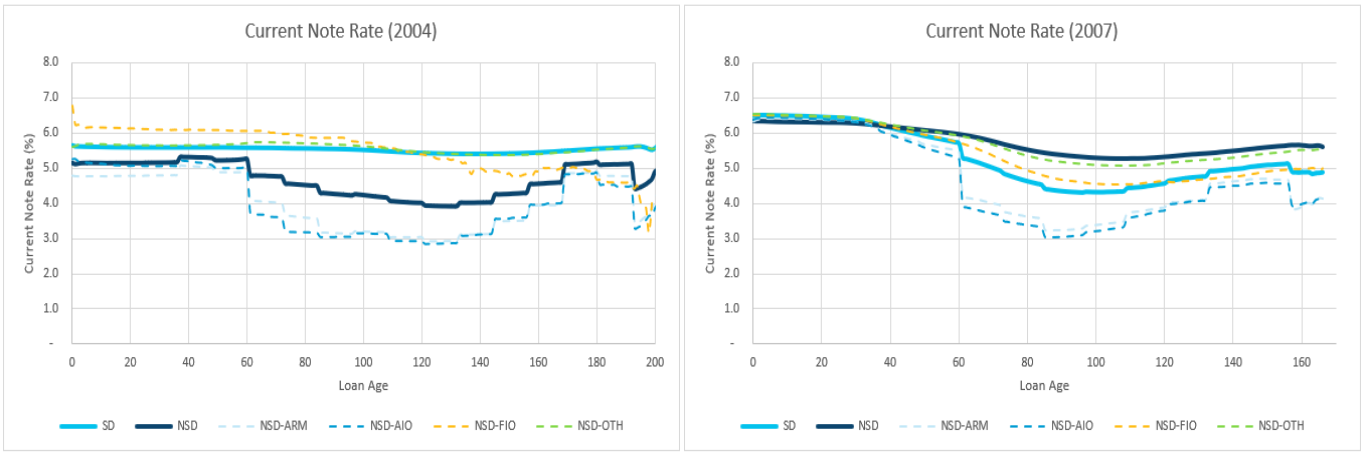

Figure 7. Note Rate over Time

Cumulative Performance Trends

The key observation from these performance metrics is that the interest-only population has by far the highest default and D90+ rate in both the 2004 and 2007 vintages.

In 2004, the prepay curves are tighter among the control groups. Speeds began to diverge in 2007, with SD prepaying much faster and NSD-AIO prepaying much slower than the other groups. The current interest rate drops across all groups, more noticeably for ARM products. The change in interest rate may be explained by the declining market rates observed in the ARM indices and rate modifications. In addition, the non-amortizing nature of the NSD-AIO loans may have accelerated borrowers becoming underwater; therefore, making refinancing more difficult in the negative HPA environment.

In 2004, the default and D90+ rates are approximately 3% higher for the NSD compared to SD. This is amplified in the stressed environment of 2007, where default and D90+ rate differential increased to 16%. One interesting note is that NSD-AIO has the highest modification rate among the samples.

Severity

In addition to the performance metrics reviewed in this paper, loss severity is explored in Figure 8, which shows the loss components that contribute to overall severity.

2004	Collateral Loss (%)	Delinquent Interest (%)	Expenses (%)	MI Recovery (%)	Other Recovery (%)	Severity (%)
SD	23.0	8.6	10.5	-4.8	-2.6	31.8
NSD	26.7	7.4	9.6	-7.5	-7.1	27.2
NSD-ARM	25.8	5.5	8.9	-7.5	-3.7	27.5
NSD-AIO	26.2	4.8	5.9	-1.9	-3.3	30.9
NSD-FIO	35.7	9.1	5.9	-2.0	-15.6	31.3
NSD-OTH	27.4	9.5	11.0	-8.9	-10.6	26.0

2007	Collateral Loss (%)	Delinquent Interest (%)	Expenses (%)	MI Recovery (%)	Other Recovery (%)	Severity (%)
SD	34.9	9.2	7.3	-6.4	-4.6	37.6
NSD	39.1	9.1	6.3	-5.2	-5.4	41.7
NSD-ARM	40.4	9.3	7.0	-3.5	-5.2	46.0
NSD-AIO	39.9	8.2	4.9	-1.8	-3.6	45.9
NSD-FIO	36.4	8.9	5.1	-4.2	-5.2	38.7
NSD-OTH	39.4	10.2	8.2	-9.1	-7.3	38.5

Figure 8. Severity

In 2007, the severity increased for every group by an average of eight to ten percentage points. Collateral loss is the primary driver for the increase in severity. In a stressed environment, net sale recoveries on liquidated loans are reduced, resulting in higher losses on every default. In 2007, NSD-AIO and NSD-ARM loans have a higher loss severity (five points higher) than the rest of the group. This may be explained by higher loan balances and lower amortization. Mortgage insurance (MI) recoveries continue to be on the lower side for ARM-IO loans. Overall, the severity is comparable across the control groups.

Proxy Cohort Analysis

The above section evaluated loan performance for several aggregate loan categories. To control for differences in the mix of credit characteristics, the distributions of FICO, LTV, loan purpose and DTI from CRT issuances STACR 2020-DNA3 and STACR 2020-HQA3 were applied to weight the historical losses of the sample groups. This analysis is similar to the proxy cohort analysis performed for CRT transactions, but in this case, controlling for two additional variables (loan purpose and DTI).

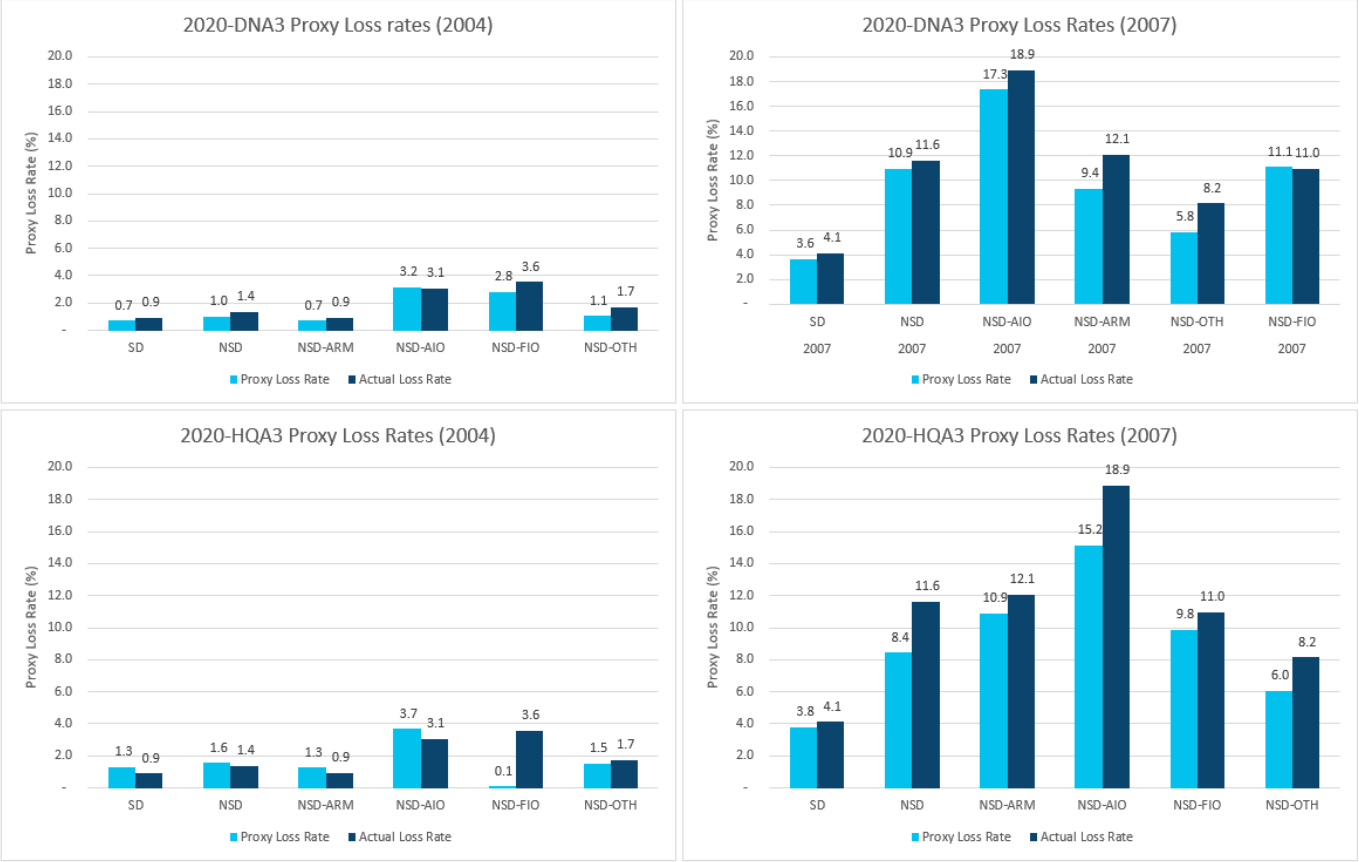

Figure 9. Proxy Loss Rate Based on STACR 2021-DNA3 and STACR 2021-HQA3 Credit Distribution

Using the credit distributions of STACR 2021-DNA3 and STACR 2021-HQA3 in this analysis results in a decrease in the proxy loss for nearly all the sample groups. This is due to the better credit profile of recent CRT reference pools relative to the historical loan populations. However, even when credit profile is controlled in the proxy analysis, the overall finding is consistent with previous observations. The NSD experiences significantly higher losses than the SD with interest-only loans experiencing the highest loss. Note that because there were so few loans in the 2004 NSD-FIO population, the proxy loss produces unreliable results.

Conclusion

Based on preliminary analysis, key findings include:

- Product type (i.e. ARM and interest-only) is the biggest driver of the performance difference. These loans do not perform as well fixed-rate, fully amortizing loans, even when controlling for credit attributes. Please note that interest-only mortgages have not been acquired by Freddie Mac since 2010, and the ARM population has decreased dramatically since 2007.
- The loans in the NSD generally have less favorable credit attributes, and due to the nature of the product types (adjustable rate, interest-only/non-amortizing), the loss experience was magnified during the financial crisis.
- Severity is mostly comparable between the NSD and SD. The large difference in historical losses in the NSD is primarily driven by significantly higher defaults, as severity is only a minor contributor.