



STRENGTHENING FINANCIAL INSTITUTIONS

Mortgage Servicing Rights Valuation - Input Assumptions & Shocks

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Introduction

This white paper is intended to provide insight into the value of mortgage servicing rights (“MSR”) and the key assumptions used to value them. We also show the relative effect each key assumption has on the overall value by providing sensitivity analyses for each individual assumption.

A mortgage servicing right is the right to service a loan on behalf of an investor and collect a servicing fee. Loan servicing consists of collecting and processing loan payments throughout the life of a loan. Servicing activities also include billing the borrower; collecting principal and interest payments as well as taxes and insurance payments; disbursing property taxes and insurance premiums; accounting for these activities at the loan and investor level; and forwarding funds to an investor in the secondary market.

MSRs are a modified interest-only strip. The expected life of the loan is calculated based on its expected prepayment rate and is a key valuation variable. The servicing fee is paid monthly based on the outstanding principal balance of the loan and is another significant determinant of value. Other important components include the expected ancillary income, the current and future servicing costs, the current and expected delinquency rate and related incremental servicing costs, interest income from float, as well as whether the servicing is non-recourse, recourse, or has a limited form of credit risk exposure. The final key element in valuing the MSR is the interest rate used to discount the future cash flows to present value.

KEY TAKEAWAY

This white paper discusses the relevant assumptions used when valuing MSRs, along with identifying the impact that shocking assumptions have on the overall fair value of a mortgage servicing right.

CLIENT-FOCUSED SOLUTIONS

Since 2003, Wilary Winn has provided independent, objective, fee-based advice to financial institutions and now serves more than 600 clients across the country.

Our main service lines include:

- > ASSET LIABILITY MANAGEMENT (ALM)
- > CURRENT EXPECTED CREDIT LOSS (CECL)
- > MERGERS & ACQUISITIONS (M&A)
- > VALUATION OF LOAN SERVICING
- > FAIR VALUE DETERMINATIONS

Major Valuation Components

SERVICING FEE

The servicing fee is paid monthly based on the outstanding principal balance of the loan. Servicing fees vary by type of investor. Standard fees are 25 basis points for conventional fixed rate (Fannie Mae/Freddie Mac) loans, 37.5 for conventional adjustable-rate mortgage (“ARM”) loans, 44 basis points for Ginnie Mae I loans and between 19 and 56.5 basis points for Ginnie Mae II loans. We note that some institutions that sell conventional loans into MBS securitizations may earn servicing fees in excess of the 25-basis point standard fee and Wilary Winn will value the excess servicing as an interest only (I/O) strip.

ANCILLARY INCOME

Ancillary income includes late fees, insurance income and other fees earned from soliciting the portfolio. It varies by an institution’s ability to cross-sell its mortgagors. Wilary Winn’s ancillary income assumption is based primarily on forecasted late fees, which are in turn based on the payment amount. The payment amount in turn is based on loan size and the loan’s interest rate.

There are a number of firms that survey the marketplace quarterly to obtain information regarding servicing input assumptions. The two most recent surveys we obtained were performed in Q4 2025 and are the surveys that will be referenced throughout this white paper. Wilary Winn benchmarks our ancillary input assumption, as well as other input assumptions to the surveys. We also benchmark our assumptions to the work of other valuation firms obtained through our work as auditor engaged specialists as described in “AS 1210” of the PCOAB auditing standards. We detail our comparisons by input assumption later in this white paper.

SERVICING COSTS

Servicing costs are best expressed in dollars per loan per year, as they are more closely related to units versus loan size. Valuations based on servicing costs expressed in basis points imply that the cost to service a \$300,000 loan is three times that of a \$100,000 loan, which is decidedly untrue. The input assumption should consider current and future base costs. Our future costs are based on the long-term forecasted rate of inflation as of the valuation date.

The base servicing cost input assumption is generally based on the marketplace’s assumption of the marginal cost to service a loan. The assumption varies slightly by investor. For example, according to the assumption surveys, the median base cost to service a current conforming conventional fixed rate loan is \$69.60 in the first survey and \$72.50 in the second survey while the assumption for a GNMA FHA fixed rate loan is \$81.29 in the first survey and \$85.00 in the second survey.

DELINQUENCY RATE AND FORECLOSURE LOSSES

The existing and projected delinquency rate of the portfolio can be an important assumption. A valuation should include the projected incremental costs to service delinquent loans. The valuation should also include foreclosure losses which vary by type of investor. For example, a foreclosure on an

FHA-insured loan could result in a loss from costs denied by the FHA as well as interest lost from servicing advances. We note the servicer is required to advance at the note rate while the FHA reimburses the servicer at the FHA debenture rate which is nearly always lower than the note rate.

Some of the programs offered by the FHLBanks include sales with limited recourse. The servicing valuation should consider the credit risk arising from such sales, as appropriate.

Wilary Winn derives our delinquency assumptions from information provided by the Mortgage Bankers Association, which is released quarterly. We benchmark our cost assumptions to information contained in the MSR assumption surveys and to inputs used by other valuation firms.

FLOAT EARNINGS

Interest income from float arises from two sources. The larger component comes from loans that are escrowed (impounded) for property taxes and hazard insurance. The servicer collects the escrow payment monthly, disburses the insurance annually, and disburses the property taxes quarterly, semi-annually, or annually depending on the jurisdiction. A minor source of float comes from the principal and interest payments. Most payments are received from the borrower before or near the first of the month due date. Under certain investor programs, the servicer remits these payments later. For example, a servicer remits the actual principal it has received along with the interest it was scheduled to receive to Freddie Mac on the 18th of the month under Freddie Mac's standard remittance methodology. This remittance method is called scheduled/actual. Another common remittance methodology, especially for Fannie Mae loans, is actual/actual where the servicer remits only the funds it has received. Servicers are required to remit scheduled principal and interest to holders of Ginnie Mae MBS.

Some jurisdictions require servicers to pay interest on the mortgagor's escrow account resulting in less benefit or, in some cases, at a detriment. For example, the state of California requires servicers to pay the mortgagor 2 percent on escrow accounts.

EXPECTED LOAN LIFE - PREPAYMENTS

The expected life of loan is based on the attributes of the loan, including term and expected prepayments. Wilary Winn models at the loan level and we derive expected cash flows by adjusting the contractual cash flows for:

- Voluntary prepayments – the conditional repayment rate (“CRR”)
- Involuntary prepayments – the conditional default rate (“CDR”)
- Loss severity or loss given default – the loss that will be incurred on a default which is generally relatively small because the loans are sold without recourse or with limited recourse

The expected loan life is derived from the resulting expected cash flows. The prepayment assumption is the most sensitive input in the model and varies greatly based on an individual loan's note rate and the current mortgage rate environment. The secondary market for mortgage loans is enormous and, as a result, there are several prepayment models available in the marketplace. Wilary Winn utilizes the MIAC model and incorporates major mortgage-backed securities (“MBS”) dealers' forecasts for

prepayments of MBS where available. We also benchmark the MIAC prepayment model to forecasted prepayments of MBS securities reported by Bloomberg. Prepayments are primarily driven by changes in market interest rates. Other factors affecting prepayments are the original term, the remaining term, the type of mortgage-backed security (FNMA/FHLMC vs. GNMA) and, in some cases, the balance of the loan. (The incentive to refinance a loan with a small balance is less as the interest savings might not be significant relative to the costs of refinancing.) As a result, the MIAC inputs in 2026 are quite granular with 90 tranches for conventional 30-year loans and 72 tranches for conventional 15-year loans. See the attached Appendix A for a sampling of the MIAC prepayment speeds as of April 1, 2026.

Because the MIAC forecast is based on MBS and not the interest rate on the loan, we need to map the loan to the appropriate MBS. The note rate is higher because it includes the servicing fee and the guarantee fee paid to the guarantor – e.g., Freddie Mac, Fannie Mae, Ginnie Mae.

Wilary Winn has reviewed FNMA and FHLMC securitization data from Bloomberg and compared the weighted average coupon (“WAC”) to the MBS security rate to calculate the spread between mortgage interest rates and MBS security rates. For FNMA and FHLMC 30-year and 15-year loans, we calculated the weighted average spreads for 2019 – 2025 MBS securities and the results were as follows.

MBS Spreads - WAC less MBS Coupon				
Orig. Year	30 Year Spreads		15 Year Spreads	
	FNMA	FHLMC	FNMA	FHLMC
2025	0.933%	0.930%	0.790%	0.868%
2024	0.984%	0.978%	0.818%	0.857%
2023	0.924%	0.934%	0.747%	0.818%
2022	0.799%	0.817%	0.623%	0.675%
2021	0.804%	0.821%	0.553%	0.644%
2020	0.881%	0.908%	0.636%	0.747%
2019	0.848%	0.850%	0.595%	0.692%

Based on the above analysis, Wilary Winn lowers the interest rate of a 30-year loan by 1.000% and a 15-year loan by 0.750% to estimate the appropriate MBS coupon to use when applying a prepayment speed, e.g., a 30-year loan with a 6.500% interest rate equates to a 5.500% MBS.

DISCOUNT RATE

The final key element in valuing the MSR is the interest rate used to discount the future cash flows to present value. Wilary Winn uses a build-up method to derive the discount rate. We begin with the average of the 5-year and 10-year Treasury rates and add a spread for prepayment and default risk. As of December 31, 2025, we added 5.5 percent to the underlying risk-free rate to determine our base discount rate which will be applied to FNMA / FHLMC conventional fixed rate loans. The discount rate is the least transparent input because the parties to bulk servicing trades are bound by confidentiality.

Therefore, we benchmark our discount rate to the MSR surveys and to the rates we see used by other valuation firms.

As an additional step, we calculate the IRR of flow servicing released premiums. Purchasers of flow servicing will often underprice the value of the loan while overpricing the value of the servicing in their rate sheets. Due to this, Wilary Winn has performed an analysis to calculate the implied servicing value that the purchasers are paying for servicing. We have done this by comparing the all-in price (loan price plus service released premium) to a Fannie Mae loan price using five different institutions that purchase loans on a flow basis. The sample loan we used in this analysis was a \$275,000 30-year conventional fixed rate loan with a 6.125% interest rate. Once we calculated the implied servicing values, we used our servicing model to solve for the required yield to obtain the implied servicing price. Below are the results of this analysis.

Required Yield on Implied Servicing Value			
Investor	Price	Implied Servicing	Required Yield
FNMA Loan Price	101.729		
Mr. Cooper All-in Price	102.845	1.116%	11.239%
PennyMac All-in Price	102.922	1.193%	9.521%
PHL All-in Price	103.071	1.342%	6.716%
Amerihome All-in Price	103.046	1.317%	7.145%
West Gate Bank All-in Price	103.090	1.361%	6.398%

We note that each purchaser will have a different opinion regarding prepayment speeds, servicing cost, ancillary income, etc. Additionally, each purchaser will have a different appetite for certain types of loans at different times (30-year vs. 15-year, conventional vs. government, etc.) and they may price aggressively or conservatively based on the types of loans they would like to acquire at any given time. We note that these yields are quite wide and indicate that Mr. Cooper is bidding very conservatively, while West Gate Bank and PHL are pricing more aggressively. The median and average discount rates in the MSR assumption surveys for conforming conventional loans are 9.17% and 8.90% in the first survey, respectively, and 9.25% and 9.87% in the second survey, respectively, which lie near the midpoint of the high and low implied servicing yields.

Sensitivity Analysis

Certain input assumptions have a larger effect on value than others. To show the relative impact of changes to the input assumptions on the overall MSR value, we have modeled seven different hypothetical loans. In each case, we are using an estimated current market note rate for a 30-year loan (Freddie Mac Primary Mortgage Market Summary December 31, 2025 – investor rate sheets at December 31, 2025, for the FHA & VA). We are using 30-year loans because they have the longest duration and will therefore show the largest change in value. We have included the most significant secondary market outlets to account for differences in remittance methods. We have also included a

Fannie Mae and a Freddie Mac loan with escrows and another that is non-escrowed for taxes and insurance. We note our Ginnie Mae examples are based on an FHA-insured loan and a VA guaranteed loan. We have also included a Fannie Mae ARM. We note that we are assuming the loans are located in Minnesota, which affects our delinquency and float input assumptions.

Loan Attributes						
Investor	Loan Amount	Interest Rate	Fixed / ARM	Escrow	Guarantor	Remittance Method
FNMA	334,654	6.125%	Fixed	Yes	FNMA	A/A
FNMA	334,654	6.125%	Fixed	No	FNMA	A/A
FNMA	334,654	5.750%	ARM	No	FNMA	A/A
FHLMC	349,000	6.125%	Fixed	Yes	FHLMC	S/A
FHLMC	349,000	6.125%	Fixed	No	FHLMC	S/A
GNMA	339,190	5.875%	Fixed	Yes	FHA	S/S
GNMA	339,190	5.625%	Fixed	Yes	VA	S/S

PREPAYMENT SPEED ASSUMPTION SENSITIVITY ANALYSES

Our assumption for prepayment speed is 11.079% for the Fannie Mae and Freddie Mac fixed rate loans, 23.289% for the Fannie Mae ARM loan, 19.221% for the Ginnie Mae FHA fixed rate loan, and 15.654% for the Ginnie Mae VA loan.

We hold these speeds constant for the input assumption shocks that follow. We show the impact from shocking prepayment speeds as the final input assumption in the “Prepayment shock analyses” section below.

AVERAGE LOAN SIZE AND SERVICING INCOME

The loan sizes for Fannie Mae and Freddie Mac are based on their September 30, 2025, 10-K filings. The average loan size for Ginnie Mae originations is per Ginnie Mae’s Global Markets Analysis Report, December 2025, page 18.

The servicing fee is 25 basis points for Fannie Mae and Freddie Mac fixed rate loans, 37.5 basis points for the Fannie Mae ARM, and 44 basis points for the Ginnie Mae Loans.

The following chart shows the change in the servicing value if we reduce the loan size by 20%.

Loan Size Down 20%				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.166%	-0.019%	-1.628%
FNMA no Escrow	1.069%	1.049%	-0.019%	-1.806%
FNMA ARM	0.853%	0.842%	-0.011%	-1.332%
FHLMC w/Escrow	1.246%	1.227%	-0.019%	-1.486%
FHLMC no Escrow	1.129%	1.111%	-0.019%	-1.639%
GNMA FHA	1.412%	1.387%	-0.025%	-1.782%
GNMA VA	1.610%	1.585%	-0.024%	-1.502%

As one can see, a relatively large change in the size of the loan has a relatively modest effect on the overall MSR value.

ANCILLARY INCOME

Our ancillary income assumptions for these sample loans are \$25 per loan per year for the FNMA and FHLMC loans and \$35 per loan per year for the GNMA loans. The chart below details the change in the servicing value if we reduce the ancillary income assumption by 20%.

Ancillary Income Assumption Down 20%				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.178%	-0.008%	-0.670%
FNMA no Escrow	1.069%	1.061%	-0.008%	-0.743%
FNMA ARM	0.853%	0.849%	-0.004%	-0.454%
FHLMC w/Escrow	1.246%	1.238%	-0.008%	-0.611%
FHLMC no Escrow	1.129%	1.121%	-0.008%	-0.674%
GNMA FHA	1.412%	1.405%	-0.007%	-0.468%
GNMA VA	1.610%	1.602%	-0.008%	-0.483%

The results show that a relatively large change in the ancillary input assumption has a relatively modest effect on the overall MSR value. To put this in additional context, according to the MSR surveys, the median annual ancillary income for a conforming conventional loan is \$23.42 in the first survey and \$25.00 in the second survey. The income input assumption at the 25th percentile of the first survey is \$18.06, which is a difference of \$5.36 or 22.9%. Our base ancillary income assumption for FNMA / FHLMC loans is \$25 per year and our 20% decrease for the shock is \$20, which is a difference of \$5 per year. Our base ancillary income assumption for GNMA loans is \$35 per year and our 20% decrease for the shock is \$28, which is a difference of \$7 per year. This shows that our decrease in ancillary income is relatively consistent with the range of market ancillary income assumptions.

SERVICING COSTS

Our base servicing cost assumptions are \$70 per loan per year for the Fannie Mae and Freddie Mac conventional fixed rate loans, \$75 per loan per year for the Fannie Mae ARM loan, and \$85 per loan per year for the Ginnie Mae loans. The following chart details the change in the servicing value if we increase the servicing cost assumption by 20%.

Servicing Cost Assumption Up 20%				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.163%	-0.022%	-1.893%
FNMA no Escrow	1.069%	1.046%	-0.022%	-2.100%
FNMA ARM	0.853%	0.841%	-0.012%	-1.394%
FHLMC w/Escrow	1.246%	1.224%	-0.022%	-1.727%
FHLMC no Escrow	1.129%	1.108%	-0.022%	-1.906%
GNMA FHA	1.412%	1.395%	-0.016%	-1.157%
GNMA VA	1.610%	1.590%	-0.019%	-1.189%

As detailed above, a relatively large change in the servicing cost input assumption has a relatively modest effect on the overall MSR value.

To put this in additional context, according to the MSR surveys, the median annual cost to service a current conforming conventional fixed rate loan is \$69.60 in the first survey and \$72.50 in the second survey. The cost input assumption at the 75th percentile in the first survey is \$76.80. Our base cost estimate is \$70.00 and our 20% shock input assumption is \$84.00, which is nearly double the size of the dollar size increase in moving from the median to the 75th percentile. This shows that our 20% increase in cost is a relatively large increase compared with the range of market cost input assumptions.

FORECLOSURE RATE

Our foreclosure rates assumptions for the loans are shown below, based on the MBA delinquency study as of September 30, 2025, for loans located in Minnesota.

Foreclosure Rate		
Loan Detail	Base F/C Rate	2X F/C Rate
FNMA / FHLMC Fixed	0.160%	0.320%
FNMA ARM	0.420%	0.840%
GNMA FHA	1.180%	2.360%
GNMA VA	0.480%	0.960%

The following chart details the change in the servicing value resulting from doubling the foreclosure rate assumption.

Foreclosure Rate Assumption 2X				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.176%	-0.009%	-0.785%
FNMA no Escrow	1.069%	1.060%	-0.009%	-0.800%
FNMA ARM	0.853%	0.842%	-0.012%	-1.350%
FHLMC w/Escrow	1.246%	1.237%	-0.009%	-0.735%
FHLMC no Escrow	1.129%	1.121%	-0.008%	-0.743%
GNMA FHA	1.412%	1.340%	-0.072%	-5.119%
GNMA VA	1.610%	1.557%	-0.053%	-3.282%

The foreclosure rate assumption affects the GNMA loans the most because the base foreclosure rate is higher, but also because the required remittance method is scheduled principal and scheduled interest meaning that the servicer must advance funds to the investor regardless of whether the borrower makes their payment. In addition, a loss on foreclosure is larger for GNMA loans based on how the guarantor, the FHA or VA, reimburses the servicer.

LOSS ON FORECLOSURE

Our one-time foreclosure cost assumptions are \$1,400 for the Fannie Mae and Freddie Mac loans, \$4,500 for the FHA-insured Ginnie Mae loan, and \$7,500 for the VA guaranteed Ginnie Mae loan. The chart below illustrates the impact of a 20% increase in the foreclosure cost assumption on the servicing value.

Foreclosure Cost Assumption Up 20%				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.185%	-0.001%	-0.058%
FNMA no Escrow	1.069%	1.068%	-0.001%	-0.064%
FNMA ARM	0.853%	0.852%	-0.001%	-0.102%
FHLMC w/Escrow	1.246%	1.245%	-0.001%	-0.052%
FHLMC no Escrow	1.129%	1.128%	-0.001%	-0.058%
GNMA FHA	1.412%	1.402%	-0.009%	-0.669%
GNMA VA	1.610%	1.602%	-0.008%	-0.470%

Not surprisingly, the largest effect is on the GNMA loans given that our base input loss and cost assumptions are both higher than the assumptions for conforming conventional loans. To put this in additional context, according to a Q4 2025 MSR assumption survey, the median cost of a foreclosure on a VA loan is \$7,380. The input assumption at the 75th percentile is \$9,867. We increased our base input of \$7,500 to \$9,000 in our shock. Our 20% increase in foreclosure cost for sensitivity analysis is slightly aggressive as compared to the range of market cost input assumptions; however, increasing the cost by an additional 10% would impact the fair value by less than 1 basis point.

According to the Q4 2025 MSR survey, the median cost of a foreclosure on an FHA-insured loan is \$4,934. The input assumption at the 75th percentile is \$6,171. We increased our base input of \$4,500 to \$5,400 in our shock. Our 20% increase in foreclosure cost is slightly aggressive as compared to the range of market cost input assumptions; however, an additional 10% increase would impact the fair value by less than 1 basis point.

Finally, we note that based on the modest rates of delinquency for loans located in Minnesota, the change in the foreclosure loss input assumption does not significantly affect the overall MSR value. At December 31, 2025, the Minnesota delinquency rates were approximately 62% of the national average delinquency rates for conventional fixed rate loans.

FLOAT EARNINGS

Our assumption for the T&I payment is \$622 for the Fannie Mae escrowed loan, \$618 for the Freddie Mac escrowed loan, and \$569 for the FHA and VA loans. We are assuming the loans are located in Minnesota. The tax payments are therefore due semi-annually and there is no requirement to pay the borrower any interest on their escrow balance. The chart below details the change in the servicing value if we reduce the escrow payment by 20%.

Escrow Payment Assumption Down 20%				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.162%	-0.023%	-1.972%
FNMA no Escrow	1.069%	1.069%	0.000%	0.000%
FNMA ARM	0.853%	0.853%	0.000%	0.000%
FHLMC w/Escrow	1.246%	1.223%	-0.023%	-1.876%
FHLMC no Escrow	1.129%	1.129%	0.000%	0.000%
GNMA FHA	1.412%	1.398%	-0.014%	-0.960%
GNMA VA	1.610%	1.594%	-0.016%	-0.965%

Wilary Winn uses the SOFR forward curve to forecast the interest rate earned from float arising from the P&I payments and escrow payments. With interest rates having risen substantially in 2022 and 2023 to be more in line with historical norms, the impact of float on the value of MSRs has increased since December 31, 2021. The chart below shows the effect of increasing the SOFR forward curve by 2 percent.

SOFR Curve + 2.00% in all periods				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.257%	0.071%	5.989%
FNMA no Escrow	1.069%	1.073%	0.005%	0.439%
FNMA ARM	0.853%	0.858%	0.005%	0.560%
FHLMC w/Escrow	1.246%	1.350%	0.104%	8.320%
FHLMC no Escrow	1.129%	1.166%	0.037%	3.308%
GNMA FHA	1.412%	1.531%	0.119%	8.408%
GNMA VA	1.610%	1.730%	0.120%	7.468%

This change has a relatively large effect on the overall value of the MSR asset for loans that escrow and a much more modest impact for loans that do not escrow. Although SOFR is not perfectly correlated with treasury and mortgage rates, it would be expected that other interest rates would show an increase similar to what we've incorporated in this shock scenario.

DISCOUNT RATE

Our discount rate assumptions at December 31, 2025, are 9.500% for the Fannie Mae and Freddie Mac conventional fixed rate loans, 11.500% for the Fannie Mae ARM loan, and 12.250% for the Ginnie Mae loans. The chart below details the change in the servicing value if we increase the discount rate assumption by 20%.

Discount Rate Assumption Up 20%				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.102%	-0.084%	-7.062%
FNMA no Escrow	1.069%	0.995%	-0.074%	-6.904%
FNMA ARM	0.853%	0.803%	-0.050%	-5.864%
FHLMC w/Escrow	1.246%	1.157%	-0.089%	-7.120%
FHLMC no Escrow	1.129%	1.050%	-0.079%	-6.976%
GNMA FHA	1.412%	1.331%	-0.081%	-5.723%
GNMA VA	1.610%	1.502%	-0.108%	-6.704%

The results show that the discount rate used has a significant effect on the overall value of the MSR asset. To put this in additional context, according to the MSR surveys, the median discount rate (for firms using a static rate vs. OAS) is 9.17% in the first survey and 9.25% in the second survey. The input assumption at the 75th percentile of the first survey is 9.25% and the maximum was 9.76%. Our input assumption is 9.50% and our shock input assumption is 11.40%, which exceeds maximum rate in the first survey by 16.80%.

This shows that our 20% increase in rate is a relatively large increase as compared to the range of market discount rate input assumptions.

PREPAYMENT SHOCK ANALYSES

To demonstrate the effect of the prepayment speed assumption on the overall value, we developed two shock analyses. In the first example, we simply increase our prepayment speed assumption by 20%.

Prepayment Assumptions Up 20%				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	1.091%	-0.094%	-7.953%
FNMA no Escrow	1.069%	0.986%	-0.082%	-7.709%
FNMA ARM	0.853%	0.718%	-0.136%	-15.891%
FHLMC w/Escrow	1.246%	1.149%	-0.097%	-7.749%
FHLMC no Escrow	1.129%	1.044%	-0.085%	-7.497%
GNMA FHA	1.412%	1.305%	-0.107%	-7.571%
GNMA VA	1.610%	1.493%	-0.117%	-7.274%

The results show that the prepayment speed input has a significant effect on the MSR fair value.

In the second example, we assume that market interest rates fall by one-half of one percent. The table below shows the base prepayment assumption and the assumption if rates fall 50 basis points using the market prepayment speeds from the MIAC model. In the example below, if interest rates decreased 50 basis points, the prepayment rate for the sample FNMA and FHLMC fixed rate loans would increase from 11.079% to 19.111% (an increase of 8.032% or 72.5%).

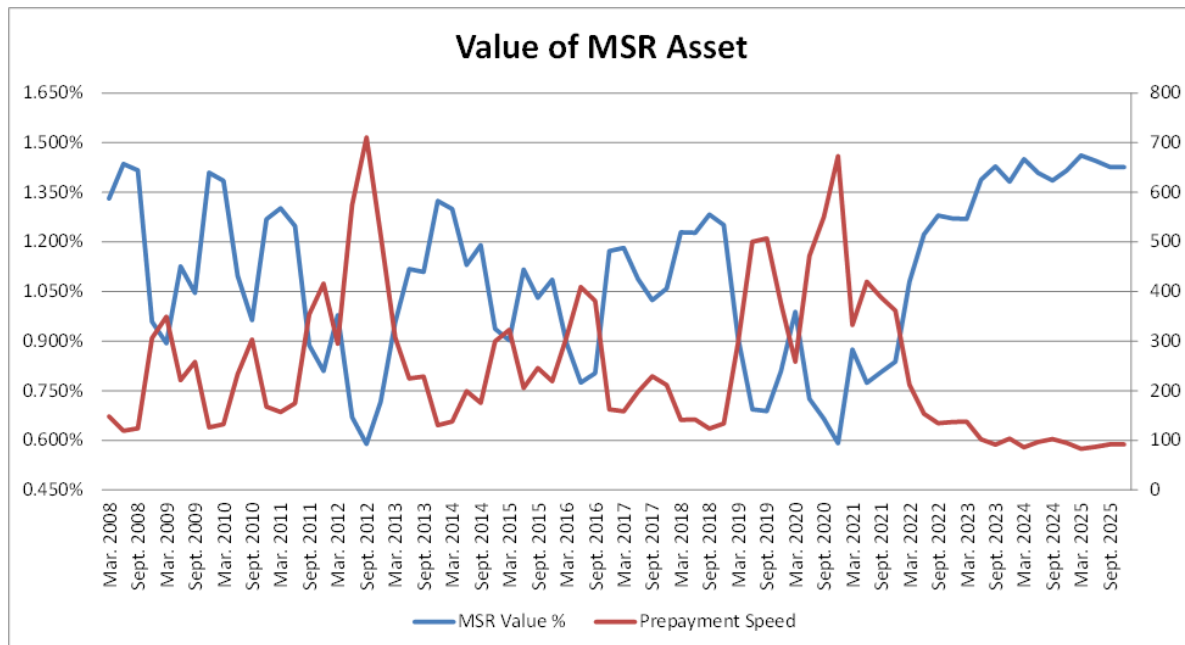
Prepayment Assumptions -50 Basis Point Shock				
Loan Detail	Base CPR %	-50 Bps CPR %	CPR % Increase	% Change
FNMA w/Escrow	11.079%	19.111%	8.032%	72.500%
FNMA no Escrow	11.079%	19.111%	8.032%	72.500%
FNMA ARM	23.289%	N/A	N/A	N/A
FHLMC w/Escrow	11.079%	19.111%	8.032%	72.500%
FHLMC no Escrow	11.079%	19.111%	8.032%	72.500%
GNMA FHA	19.221%	25.400%	6.178%	32.142%
GNMA VA	15.654%	22.638%	6.984%	44.612%

The interest rate shocks are assumed to be an instantaneous, parallel and sustained shift in the yield curve. The assumed decrease in interest rates and the corresponding increase in prepayment speeds has the following effect on MSR values.

Prepayment Assumptions -50 Basis Point Shock				
Loan Detail	Base Value	Shocked Value	Bps Variance	% Change
FNMA w/Escrow	1.186%	0.848%	-0.338%	-28.478%
FNMA no Escrow	1.069%	0.781%	-0.288%	-26.916%
FNMA ARM	0.853%	N/A	N/A	N/A
FHLMC w/Escrow	1.246%	0.894%	-0.352%	-28.248%
FHLMC no Escrow	1.129%	0.827%	-0.302%	-26.746%
GNMA FHA	1.412%	1.165%	-0.247%	-17.503%
GNMA VA	1.610%	1.285%	-0.324%	-20.155%

The results show that even a modest decrease in market interest rates has a significant effect on the prepayment speed assumption, increasing the speeds by significantly more than our 20% shock assumption and dramatically impacting the overall value of the MSR asset. We also note that the impact under the second example is related to newly originated loans and the impact on most existing MSR portfolios with weighted average interest rates less than or near 4.00% would not be impacted nearly as much by a 50-basis point decline in mortgage rates.

We further note that market interest changes can regularly change by more than 50 basis points. The table below shows the effect of changes in the prepayment speed on the value of the MSR asset from March of 2008 to December of 2025.



Because the prepayment speed assumption is such a critical input assumption, we routinely include prepayment shock analyses in our valuation reports.

Loan Attributes

In our data requests, we ask for numerous loan attributes. An example data request is attached as Appendix B.

Certain attributes are more important than others because the attribute is related to an important valuation input assumption. The most important attributes are related to the prepayment speed assumption and include:

- Loan amount
- Note rate
- Original loan term
- Year of origination
- Investor
- Given the increase in interest rates in 2022, whether the loan is escrowed or not and the state where the loan is located, if it is escrowed.

While we did not shock the servicing fee, it is also an important loan attribute.

Loan attributes with relatively less importance include:

- The investor remittance method

Conclusion

Given the volatility that regularly occurs with mortgage interest rates, it is important for mortgage servicers to understand the impact that these changes have on their mortgage servicing rights assets and the related impact to their financial statements.

Wilary Winn Directors Eric Nokken, Anneliese Ramin, and their team provide servicing rights valuations to more than 400 financial institution clients across the United States. We are one of the top providers of MSR valuations to community financial institutions and are nationally recognized experts in residential MSRs and have led seminars on the subject for the AICPA, CUNA, the FFIEC, the Federal Home Loan Banks and many of the nation's largest accounting firms.

Appendix A - MIAC Conventional 30 Year Prepayment Speed Sample



Agency	PSA_Coupon	PSA_IssueYear	PSA -200	PSA -100	PSA -50	PSA Base	PSA +50	PSA +100	PSA +200
CONV 30	1	2021	138	96	90	83	76	72	72
CONV 30	1.5	2017	215	185	172	160	147	134	124
CONV 30	1.5	2020	148	111	95	85	78	74	72
CONV 30	1.5	2021	143	107	91	82	75	72	70
CONV 30	1.5	2022	144	102	87	81	75	70	66
CONV 30	2	2017	244	200	178	162	150	138	120
CONV 30	2	2018	213	190	179	168	157	146	124
CONV 30	2	2019	174	148	135	123	114	105	89
CONV 30	2	2020	169	134	115	100	90	83	77
CONV 30	2	2021	160	127	108	94	85	79	74
CONV 30	2	2022	165	123	101	88	82	76	67
CONV 30	2	2023	87	76	69	64	59	54	48
CONV 30	2.5	2017	231	194	177	160	148	136	113
CONV 30	2.5	2018	211	180	169	159	148	138	117
CONV 30	2.5	2019	191	150	137	123	111	103	86
CONV 30	2.5	2020	200	164	146	125	109	99	87
CONV 30	2.5	2021	181	151	133	113	101	91	83
CONV 30	2.5	2022	169	138	120	103	90	81	73
CONV 30	2.5	2023	111	97	88	78	71	65	59
CONV 30	2.5	2024	109	100	95	89	83	77	64
CONV 30	3	2017	260	209	193	176	160	149	126
CONV 30	3	2018	186	147	139	129	118	105	87
CONV 30	3	2019	223	171	158	146	133	122	104
CONV 30	3	2020	225	184	168	148	127	113	95
CONV 30	3	2021	245	193	171	149	126	118	103
CONV 30	3	2022	190	152	137	120	102	91	78
CONV 30	3	2023	125	104	99	94	90	83	70
CONV 30	3	2024	126	108	100	91	81	73	63
CONV 30	3.5	2017	226	190	179	167	152	136	111
CONV 30	3.5	2018	197	154	145	136	125	113	93
CONV 30	3.5	2019	263	201	182	169	155	141	121
CONV 30	3.5	2020	304	250	225	200	175	148	126
CONV 30	3.5	2021	298	228	204	183	162	139	118
CONV 30	3.5	2022	209	158	145	131	115	97	79
CONV 30	3.5	2023	193	103	96	91	86	78	65
CONV 30	3.5	2024	216	105	96	92	91	84	68
CONV 30	4	2017	301	265	236	220	204	188	161
CONV 30	4	2018	293	179	162	153	143	132	108
CONV 30	4	2019	299	235	205	189	175	161	136
CONV 30	4	2020	332	286	253	229	204	178	140
CONV 30	4	2021	358	261	232	209	188	166	132
CONV 30	4	2022	443	188	160	144	131	115	87
CONV 30	4	2023	428	141	109	99	96	86	68
CONV 30	4	2024	501	147	111	101	100	99	71
CONV 30	4.5	2017	302	280	260	236	223	210	187
CONV 30	4.5	2018	329	210	190	174	166	156	130
CONV 30	4.5	2019	354	247	237	206	193	179	152
CONV 30	4.5	2020	424	306	293	260	236	211	158
CONV 30	4.5	2021	407	285	268	241	219	196	149
CONV 30	4.5	2022	616	247	173	146	133	124	100
CONV 30	4.5	2023	761	296	167	133	127	121	93
CONV 30	4.5	2024	1084	338	173	132	126	119	90
CONV 30	5	2017	349	277	274	271	258	245	223
CONV 30	5	2018	353	228	226	219	197	187	168
CONV 30	5	2019	442	252	250	246	215	201	174
CONV 30	5	2020	495	309	303	292	261	237	189
CONV 30	5	2021	542	336	265	237	208	188	147
CONV 30	5	2022	671	401	243	180	155	142	117
CONV 30	5	2023	875	575	293	172	152	134	109
CONV 30	5	2024	1284	765	344	181	156	135	107
CONV 30	5.5	2017	290	265	262	259	258	247	236
CONV 30	5.5	2018	405	283	235	232	230	208	187
CONV 30	5.5	2019	470	337	254	251	249	231	201
CONV 30	5.5	2020	478	332	287	284	273	245	204
CONV 30	5.5	2022	777	583	397	269	210	174	136
CONV 30	5.5	2023	840	715	514	273	175	144	120
CONV 30	5.5	2024	1201	1013	697	341	212	168	131
CONV 30	6	2017	297	268	227	219	217	215	211
CONV 30	6	2018	578	448	331	273	247	222	190
CONV 30	6	2019	604	464	340	271	263	245	205
CONV 30	6	2022	818	720	607	436	311	229	164
CONV 30	6	2023	832	767	669	458	257	175	132
CONV 30	6	2024	1111	1028	893	592	318	215	153
CONV 30	6.5	2017	281	260	238	199	199	197	193
CONV 30	6.5	2022	816	766	716	610	477	317	197
CONV 30	6.5	2023	804	774	724	602	413	251	150
CONV 30	6.5	2024	984	948	878	725	489	302	174
CONV 30	7	2017	258	241	239	232	198	182	178
CONV 30	7	2022	728	714	681	650	614	460	254
CONV 30	7	2023	923	920	878	821	707	506	270
CONV 30	7	2024	935	917	876	822	723	546	260
CONV 30	7.5	2017	275	270	255	251	250	217	213
CONV 30	7.5	2022	557	547	541	515	499	432	255
CONV 30	7.5	2023	869	852	844	814	766	686	346
CONV 30	7.5	2024	935	917	907	879	827	740	361
CONV 30	8	2017	302	296	292	278	271	267	216
CONV 30	8	2023	709	695	689	682	646	618	386
CONV 30	8	2024	660	647	641	634	632	588	358
CONV 30	8.5	2017	235	231	229	226	221	205	199
CONV 30	9	2017	298	292	289	286	284	281	267



Appendix A - MIAC Conventional 15 Year Prepayment Speed Sample

Agency	PSA_Coupon	PSA_IssueYear	PSA -200	PSA -100	PSA -50	PSA Base	PSA +50	PSA +100	PSA +200
CONV 15	1	2020	157	127	115	112	108	105	102
CONV 15	1	2021	138	112	102	99	95	92	90
CONV 15	1	2022	110	88	82	79	77	74	72
CONV 15	1.5	2017	366	355	353	346	338	330	317
CONV 15	1.5	2018	253	245	244	237	231	224	216
CONV 15	1.5	2020	185	159	142	127	117	107	100
CONV 15	1.5	2021	158	134	118	107	98	92	86
CONV 15	1.5	2022	123	100	89	84	81	79	75
CONV 15	2	2017	351	325	322	319	312	305	290
CONV 15	2	2018	169	148	143	138	134	130	122
CONV 15	2	2019	193	150	142	135	130	126	118
CONV 15	2	2020	213	187	167	149	135	125	109
CONV 15	2	2021	186	166	147	130	120	111	99
CONV 15	2	2022	151	121	110	99	94	92	86
CONV 15	2	2023	76	65	62	60	59	59	59
CONV 15	2.5	2017	396	331	324	322	318	311	296
CONV 15	2.5	2018	281	216	212	193	179	165	142
CONV 15	2.5	2019	246	171	164	157	150	145	136
CONV 15	2.5	2020	264	217	203	182	161	150	129
CONV 15	2.5	2021	224	195	182	163	147	136	118
CONV 15	2.5	2022	208	162	155	137	122	110	94
CONV 15	2.5	2023	102	72	70	69	68	66	61
CONV 15	2.5	2024	167	133	127	115	101	92	76
CONV 15	3	2017	451	366	356	345	345	342	327
CONV 15	3	2018	332	236	224	221	204	189	162
CONV 15	3	2019	304	231	218	213	194	179	154
CONV 15	3	2020	317	254	239	224	202	181	153
CONV 15	3	2021	299	239	222	207	195	180	168
CONV 15	3	2022	270	174	161	156	138	123	101
CONV 15	3	2023	148	96	84	82	81	79	72
CONV 15	3	2024	705	177	141	135	129	114	90
CONV 15	3.5	2017	474	472	425	414	404	402	394
CONV 15	3.5	2018	356	280	243	235	228	215	185
CONV 15	3.5	2019	331	269	245	234	228	211	182
CONV 15	3.5	2020	343	336	295	273	254	238	210
CONV 15	3.5	2021	290	290	258	241	226	213	191
CONV 15	3.5	2022	407	216	175	160	155	137	109
CONV 15	3.5	2023	225	133	96	79	77	72	63
CONV 15	3.5	2024	1157	328	170	132	127	115	86
CONV 15	4	2017	548	537	513	456	449	442	442
CONV 15	4	2018	335	328	321	278	259	250	247
CONV 15	4	2019	343	337	333	294	268	261	254
CONV 15	4	2020	394	386	353	309	295	280	256
CONV 15	4	2021	375	367	340	304	278	262	231
CONV 15	4	2022	255	175	155	119	99	94	84
CONV 15	4	2023	361	198	157	114	97	89	72
CONV 15	4	2024	625	244	182	141	115	98	71
CONV 15	4.5	2017	517	507	505	500	494	487	476
CONV 15	4.5	2018	354	347	344	340	297	275	266
CONV 15	4.5	2019	403	353	350	348	308	284	272
CONV 15	4.5	2020	400	331	328	324	287	263	247
CONV 15	4.5	2022	288	187	177	152	118	106	94
CONV 15	4.5	2023	459	266	204	167	134	105	86
CONV 15	4.5	2024	803	382	242	194	160	120	89
CONV 15	5	2017	447	447	447	447	447	447	447
CONV 15	5	2018	387	380	376	372	368	345	314
CONV 15	5	2019	432	344	340	337	335	296	265
CONV 15	5	2022	374	263	242	239	205	163	130
CONV 15	5	2023	634	537	409	263	184	150	131
CONV 15	5	2024	1095	910	644	368	235	176	143
CONV 15	5.5	2017	320	320	320	320	320	320	320
CONV 15	5.5	2022	421	365	291	235	233	218	153
CONV 15	5.5	2023	384	328	263	205	173	155	106
CONV 15	5.5	2024	627	559	435	301	259	225	146
CONV 15	6	2022	387	379	369	320	275	258	204
CONV 15	6	2023	374	357	321	263	209	178	132
CONV 15	6	2024	430	421	396	326	235	201	164
CONV 15	6.5	2023	514	504	499	453	370	277	228
CONV 15	6.5	2024	469	459	455	436	370	268	216
CONV 15	7	2023	615	603	597	591	523	410	293
CONV 15	7	2024	271	266	263	261	258	239	192



Appendix A - MIAC GNMA 30 Year Prepayment Speed Sample

Agency	PSA_Coupon	PSA_IssueYear	PSA -200	PSA -100	PSA -50	PSA Base	PSA +50	PSA +100	PSA +200
GNMII 30	1.5	2017	218	195	177	158	139	125	114
GNMII 30	1.5	2020	227	196	177	157	136	119	103
GNMII 30	1.5	2021	195	173	157	140	123	110	99
GNMII 30	1.5	2022	166	143	130	117	103	92	83
GNMII 30	2	2017	244	214	192	172	151	130	99
GNMII 30	2	2020	184	155	142	122	113	104	93
GNMII 30	2	2021	183	153	140	120	111	102	92
GNMII 30	2	2022	198	176	163	148	132	116	97
GNMII 30	2	2023	169	150	139	126	115	101	86
GNMII 30	2.5	2017	232	217	203	186	168	149	114
GNMII 30	2.5	2018	216	207	194	179	161	141	104
GNMII 30	2.5	2019	232	206	192	177	160	143	109
GNMII 30	2.5	2020	216	169	153	140	127	111	93
GNMII 30	2.5	2021	214	164	150	136	124	111	90
GNMII 30	2.5	2022	212	169	154	142	130	118	95
GNMII 30	3	2017	242	202	192	178	162	145	109
GNMII 30	3	2018	266	208	200	187	173	156	119
GNMII 30	3	2019	265	196	184	170	156	140	108
GNMII 30	3	2020	305	193	175	158	143	129	100
GNMII 30	3	2021	300	192	174	157	142	130	101
GNMII 30	3	2022	298	186	168	154	141	130	103
GNMII 30	3	2023	218	162	149	135	121	109	84
GNMII 30	3.5	2017	329	192	179	165	148	133	108
GNMII 30	3.5	2018	293	194	191	183	171	157	123
GNMII 30	3.5	2019	308	195	187	176	162	147	118
GNMII 30	3.5	2020	310	213	206	193	178	162	130
GNMII 30	3.5	2021	303	211	195	182	169	156	127
GNMII 30	3.5	2022	431	210	184	165	151	138	115
GNMII 30	3.5	2024	304	178	168	167	149	133	106
GNMII 30	4	2017	308	226	193	192	181	164	132
GNMII 30	4	2018	303	224	178	176	169	157	129
GNMII 30	4	2019	353	248	193	188	178	163	134
GNMII 30	4	2020	338	250	212	205	193	177	146
GNMII 30	4	2021	360	254	210	194	180	168	142
GNMII 30	4	2022	570	316	213	183	163	148	124
GNMII 30	4	2023	336	226	179	170	159	145	120
GNMII 30	4	2024	398	243	186	184	165	147	119
GNMII 30	4.5	2017	338	308	238	205	205	192	155
GNMII 30	4.5	2018	287	256	210	172	171	165	141
GNMII 30	4.5	2019	365	273	233	187	183	174	147
GNMII 30	4.5	2020	379	280	240	197	192	181	150
GNMII 30	4.5	2021	465	303	260	213	195	180	157
GNMII 30	4.5	2022	641	481	327	212	178	158	130
GNMII 30	4.5	2023	575	392	258	181	164	145	118
GNMII 30	4.5	2024	807	456	260	172	156	138	111
GNMII 30	5	2017	260	255	252	199	172	171	158
GNMII 30	5	2018	316	263	254	219	175	174	156
GNMII 30	5	2019	381	294	270	241	186	183	160
GNMII 30	5	2020	453	335	317	275	235	224	201
GNMII 30	5	2021	518	356	310	269	227	212	188
GNMII 30	5	2022	719	619	514	352	221	184	149
GNMII 30	5	2023	658	540	418	272	183	160	127
GNMII 30	5	2024	934	722	496	283	181	155	121
GNMII 30	5.5	2017	200	196	195	193	182	164	161
GNMII 30	5.5	2018	351	298	263	253	220	179	168
GNMII 30	5.5	2019	421	335	288	267	222	181	166
GNMII 30	5.5	2020	477	385	335	313	273	232	213
GNMII 30	5.5	2021	531	411	300	275	216	191	168
GNMII 30	5.5	2022	634	517	422	344	272	209	175
GNMII 30	5.5	2023	688	619	546	424	282	192	148
GNMII 30	5.5	2024	960	847	711	492	292	189	141
GNMII 30	6	2017	165	161	160	158	157	155	152
GNMII 30	6	2018	396	337	298	263	251	196	167
GNMII 30	6	2019	440	380	332	281	261	205	172
GNMII 30	6	2020	597	498	419	298	269	207	172
GNMII 30	6	2021	550	508	442	346	278	244	190
GNMII 30	6	2022	678	611	544	444	345	276	189
GNMII 30	6	2023	676	637	591	518	395	275	172
GNMII 30	6	2024	929	863	785	653	451	293	173
GNMII 30	6.5	2017	120	118	115	114	113	112	110
GNMII 30	6.5	2022	660	624	589	532	432	331	215
GNMII 30	6.5	2023	653	629	600	549	460	354	201
GNMII 30	6.5	2024	813	776	733	663	526	391	215
GNMII 30	7	2017	129	122	119	111	103	102	100
GNMII 30	7	2022	631	612	595	565	514	394	259
GNMII 30	7	2023	670	645	626	594	542	448	274
GNMII 30	7	2024	703	684	667	640	581	445	278
GNMII 30	7.5	2017	91	87	85	84	83	82	80
GNMII 30	7.5	2022	564	562	559	550	526	461	311
GNMII 30	7.5	2023	648	636	625	612	587	539	330
GNMII 30	7.5	2024	686	672	670	665	640	553	332
GNMII 30	8	2017	86	83	82	79	79	78	76
GNMII 30	8	2023	599	594	591	586	579	559	367
GNMII 30	8	2024	710	696	689	682	680	640	436
GNMII 30	8.5	2017	75	72	71	69	68	67	66
GNMII 30	8.5	2024	792	777	769	761	756	714	533

Appendix B – Data Request Sample



**Standard Data Requests - if a requested item is unavailable or not applicable, the column can remain blank
DO NOT PROVIDE ANY PERSONAL IDENTIFIABLE INFORMATION (CUSTOMER NAME, STREET ADDRESS,
PHONE, E-MAIL ADDRESS, SOCIAL SECURITY NUMBER, ETC.)**

1. Loan # or a unique identifier for each loan that will remain consistent throughout time
2. Current Unpaid Principal Balance
3. Original Unpaid Principal Balance
4. Property Location State
5. Interest Rate
6. Servicing Fee - net of guarantee fee if applicable
7. Principal and Interest Monthly Payment Amount
8. Tax and Insurance Monthly Payment Amount
9. Do you pay interest on the mortgagor's escrow balances and, if so, at what rate of interest? Does it differ based on the state where the properties are located, is it a static rate across all mortgages with escrow, etc.?
10. Type of Loan (30 Year fixed, 5/1 ARM, VA, FHA, Balloon etc.)
11. Origination Date
12. 1st Payment Date
13. Maturity Date
14. Term
15. Weighted Average Maturity (Number of months remaining) *we can calculate as long as we have maturity dates
16. Age of the Loan in months *we can calculate as long as we have 1st payment dates
17. Investor (FHLB, FNMA, FHLMC, Private, CHFA, etc.)
18. If FHLB - which MPF Program (or Master Commitment # if available) does each loan belong in (MPF 35, MPF 100, MPF 125, MPF Original, MPF Government, MPF Xtra, etc.)
19. Investor Remittance Method (Interest & Principal - Scheduled versus Actual)
*Scheduled/Scheduled, Scheduled/Actual, Actual/Actual, Actual/Actual Daily, Actual/Actual Single, Actual/Actual Multiple, Actual every 15th of the month, Scheduled every 1st of the month, etc.
20. What specific day(s)/date(s) of the month are P & I and payoffs remitted to the investor(s)?
21. Identify loans originated under the revised version of HARP

We need the following information related to non-performing loans:

22. Delinquency Status (Days DQ - 30, 60, 90, Foreclosure, etc.) or Next Payment Due Date
23. Any mortgagors in bankruptcy

We need the following information for any balloon loans:

24. Time period for amortization
25. Date of balloon payment

We need the following additional items needed if any of the loans are ARM's:

26. Margin
27. Index (Prime, 1 Yr T-bill, COFI, etc.)
28. Date of First Interest Rate Adjustment
29. Interest Rate Adjustment Frequency
30. Initial Interest Rate Cap
31. Subsequent Interest Rate Cap
32. Maximum interest rate or Maximum total adjustment