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# Optimizing the Disposition of Distressed Single-Family Properties

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# I. Executive Summary

During long periods of economic growth, mortgage portfolio managers do not prioritize single-family distressed loan disposition. Rising house prices allow lenders to sell delinquent loans and foreclosed properties while rarely experiencing significant losses. In 2004, during a period of economic growth, Fannie Mae managed a $2.2 trillion book of business but experienced only $172 million in credit losses due to single-family mortgages.[1] However, during periods of slow or no economic growth, credit losses can grow substantially. In 2010, immediately following the end of the Great Recession, Fannie Mae experienced $23.6 billion in credit losses because of single-family mortgages on a $3.1 trillion book of business.[2]

In the wake of the Great Recession, many mortgage lenders and insurers are still experiencing a backlog of seriously delinquent and foreclosed mortgages. Settling the increased number of delinquent assets demands a shift from traditional mortgage disposition strategies to a more dynamic and flexible framework.

Summit's Mortgage Finance Directorate provides a comprehensive and integrated solution to valuation and disposition of distressed single-family assets. This solution supports clients' goals of mitigating financial risk and maximizing return on assets. Summit's solution enables clients to evaluate mortgage assets and determine the most profitable disposition strategy while eliminating inefficiencies in the disposition process.

# II. When Is Single-Family Distressed-Asset Disposition Needed?

Single-family distressed-asset disposition becomes relevant when a borrower is no longer making full monthly mortgage payments. Borrowers who are ultimately unable or unwilling to meet their mortgage obligations will likely be sent to foreclosure after exhausting options for retention-based assistance. After completing foreclosure, the borrower leaves the property and the mortgagee assumes the property; that property is now referred to as *real estate owned* (REO).

Mortgagees often try to avoid taking many properties into REO due to the high cost and administrative burdens associated with managing REO properties. Alternative disposition channels allow mortgagees to dispose of loans more quickly while allowing the borrower a dignified exit from the property.

**Property disposition** occurs when the mortgagee liquidates the asset through sale or release of note.

There are multiple disposition channels that government-sponsored enterprises (GSEs), the Federal Housing Administration (FHA), and private-label securities (PLS) entities can use to sell distressed assets. Choosing the channel that maximizes net returns to the mortgagee is complex because each channel has distinct timelines and characteristics, and each property has unique geographic and economic attributes.

## Using Loss Mitigation to Avoid the Need for Disposition

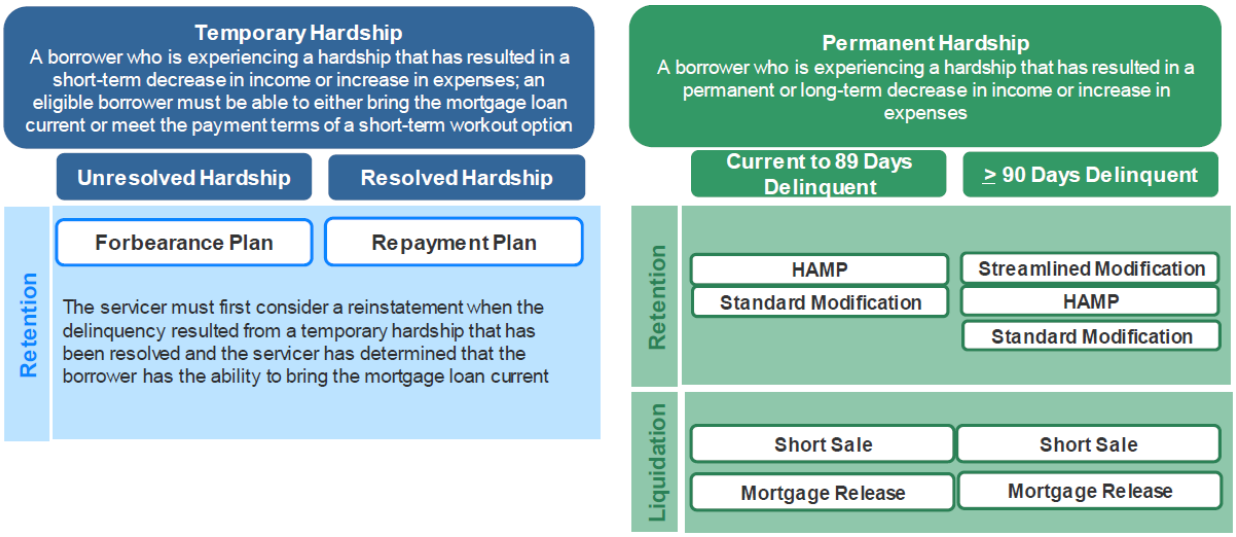
When a borrower becomes delinquent, the loan servicer first needs to work with the borrower to understand if the hardship is temporary or permanent in nature. The loan service should use investor

[1] http://www.fanniemae.com/resources/file/ir/pdf/quarterly-annual-results/2004/2004_form10K.pdf.
[2] http://www.fanniemae.com/resources/file/ir/pdf/quarterly-annual-results/2010/10k_2010.pdf.

guidelines to mitigate potential losses, if possible. As shown in Figure 1 below, temporary hardships generally result in retention-based solutions. Permanent hardships include retention- and liquidation-based options. For example, loan modifications that restructure the mortgage terms can help borrowers regain the ability to make full monthly contractual payments and stay in their homes. Modifications are a popular retention tool and include the Home Affordable Modification Program (HAMP), designed to help financially struggling homeowners make their payments more affordable.[3]

If the borrower (a) declines loss mitigation programs, (b) is not eligible for loss mitigation programs, or (c) tried but failed at previous loss mitigation, then further action must be taken to choose the best disposition alternative (as depicted in the lower right-hand panel of Figure 1).

**Figure 1: Loss mitigation approach at Fannie Mae**




Source: http://www.fanniemae.com/resources/file/credit-risk/pdf/0915-credit-risk-mgt-deck.pdf (p. 69).

## Why Consider More Than One Disposition Option?

Once home-retention loss-mitigation options are exhausted, the high cost and administrative burdens associated with managing REO properties still motivate mortgagees to avoid taking properties into REO. Borrowers are encouraged and incentivized to avoid the expensive REO process and take an alternative, and more dignified, exit strategy from the property. Mortgagees have a number of alternative disposition options that help both parties avoid REO and dispose of the loan or property more quickly than REO with lower losses.

Mortgagees leverage alternative disposition options to reduce the loss from the disposition while maximizing the net return. Choosing the disposition channel that maximizes net returns is complex—each channel has distinct timelines and characteristics. Furthermore, each property has unique geographic and economic considerations for mortgagees.

[3] HAMP was an important step forward for the mortgage industry in that it provided transparent and uniform modification guidelines and procedures that were applied across the industry. For additional details, see: https://www.hmpadmin.com/portal/programs/hamp.jsp.

## What Are the Available Disposition Options?

There are multiple disposition channels that the GSEs, FHA, and PLS entities can use to sell distressed assets. Short sale, deed-in-lieu, third-party sale, and nonperforming-loan sale are all options to avoid loans going to REO.[4] This section briefly describes each of these available options.[5]

**Available disposition channels include:**

- Short sale (PFS)
- Deed-in-lieu of foreclosure (DIL)
- Third-party sale (TPS)
- Nonperforming-loan sale (NPL)

### *Short Sales/Pre-foreclosure Sales*

Short sales, or pre-foreclosure sales (PFS), occur when borrowers sell their homes for less than the remaining mortgage unpaid principal balance (UPB). During many PFS, mortgagees agree to satisfy the borrower's remaining mortgage balance with the proceeds from the sale. In turn, the borrower must actively market the property to complete a successful sale. PFS are often mutually beneficial to both the mortgagor and mortgagee. Borrowers are relieved of their mortgage obligation and, potentially, a portion of their debt while avoiding foreclosure and associated long-term credit rating penalties. Mortgagees avoid taking the property into REO and incurring the high costs of managing the property.

### *Deed-in-Lieu/Mortgage Release*

In a deed-in-lieu of foreclosure (DIL) arrangement, the borrower grants the deed to the property to the mortgagee in order to satisfy the mortgage debt and avoid foreclosure. DIL, like PFS, releases the borrower from the mortgage obligation; however, with a DIL, the borrower does not have to list and sell the home. Similar to PFS, borrowers may be required to make a financial contribution to have their mortgage debt retired, although in some cases, borrowers will receive "cash for keys" to relinquish their deed to the property.

For example, when completing a DIL with Fannie Mae, the borrower can choose to take an immediate vacancy, a three-month transition, or a twelve-month transition.[6] During a three-month transition, the borrower completes the mortgage release but lives rent-free for the three-month period. During a twelve-month transition, the borrower leases the property for twelve months after mortgage release and pays a monthly rent, which is determined by market conditions and the borrower's financial ability.

### *Third-Party Sale*

In a third-party sale (TPS), someone other than the borrower or the mortgagee buys the property in the brief period before a finalized foreclosure. Generally, the third party buys the property at a public auction. This is often the final disposition option before the foreclosure is completed and the property goes into REO. Recently, online auction facilitators like Auction.com have added liquidity to the third party-sale process by posting upcoming auction dates online and, for some properties, allowing auction participants to bid remotely via an online portal.[7]

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[4] Fannie Mae: www.knowyouroptions.com. FHA: http://portal.hud.gov/hudportal/documents/huddoc?id=2015fhaannualreport.pdf.

[5] Note: This section offers a brief introduction to disposition and only covers some of the main methods used in the industry.

[6] https://www.fanniemae.com/content/guide/servicing/d2/3.3/02.html.

[7] https://www.auction.com/lp/foreclosure/.

## *Nonperforming-Loan Sales*

Some mortgagees and agencies have started selling groups, or pools, of delinquent mortgages in large nonperforming-loan sales. Loans included in the sales would have generally ended in foreclosure (if they were not included in the nonperforming-loan sales), but were delayed due to backlogs and long timelines from states' judicial foreclosure processes. The nonperforming-loan sales reduce management and claim costs for the mortgagee, expediting the disposition process and keeping homeowners in their homes, as delinquent notes are transferred before foreclosure and the borrowers can still occupy the property.

The FHA's Single Family Loan Sales (SFLS) under the Distressed Asset Stabilization Program is one example of a nonperforming-loan sale intended to aid in the timely disposition of delinquent assets. The SFLS program began on a pilot basis in 2010[8] and provided a method to allow borrowers to stay in their homes while removing distressed assets from the FHA's portfolio. SFLS is a direct sale program that sells pools of mortgages to qualified bidders.[9] Loans included in SFLS must (a) be at least six months delinquent and (b) have exhausted all opportunities for FHA loss mitigation.

Fannie Mae's Non-Performing Loan Sales (NPL) portfolio is part of the Federal Housing Finance Agency's (FHFA) Conservatorship Scorecard. The sales are "intended to reduce the number of seriously-delinquent loans that Fannie Mae owns, to help stabilize neighborhoods and to help meet the portfolio reduction targets required under the Senior Preferred Stock Purchase Agreement with the United States Treasury."[10]

## *Real Estate Owned*

*Real estate owned* (REO) refers to the loans that complete the foreclosure process and the mortgagee assumes the underlying property. Properties generally enter REO after exhausting loss-mitigation and alternative disposition options. Once the property enters REO, the mortgagee must maintain and sell the property in order to recover on the property.

Recently, the FHFA published an "REO to Rental Initiative" for the GSEs that "allows qualified investors to purchase pools of foreclosed properties with the requirement to rent the purchased properties for a specified number of years." The goal of the rental period is to provide relief to housing markets plagued by a large number of foreclosures. The qualified-investor requirement ensures that investors have the financial capacity and expertise to manage the properties efficiently and productively.[11]

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[8] FHA has previously used note-sale programs in 2005 and earlier. FHA completed note sales under the Single Family Accelerated Claim and Asset Disposition Program (ACD). These sales were a public–private joint venture (http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_14516.pdf).

[9] FHA categorizes pools as either "National Sale" or "Neighborhood Stabilizing Outcome" (NSO); national pools include various loans from across the country, while NSO pools include loans from specific geographic areas. NSO pools "encourage investment in communities hardest hit by the foreclosure crisis." The NSO pools have an "additional safeguard in distressed communities [that] requires that 50 percent of the loans within a purchased pool achieve a neighborhood stabilizing outcome." http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2015/HUDNo_15-048.

[10] http://fanniemae.com/portal/funding-the-market/npl/index.html.

[11] http://www.fhfa.gov/PolicyProgramsResearch/Policy/Pages/Real-Estate-Owned-%28REO%29.aspx.

# III. How Does Disposition Currently Work at the GSEs?

This section focuses on Fannie Mae, the largest of the GSEs, to provide a closer look at how disposition works at a large agency with a portfolio of delinquent mortgages.[12] Currently, Fannie Mae relies on five major disposition options: PFS, DIL, TPS, NPL, and REO.[13]

## Disposition Framework at Fannie Mae

Fannie Mae possesses a wide range of distressed real estate capabilities in order to manage its book of business. As of February 2016, Fannie Mae has disposed of over 1.3 million homes since 2009.[14]

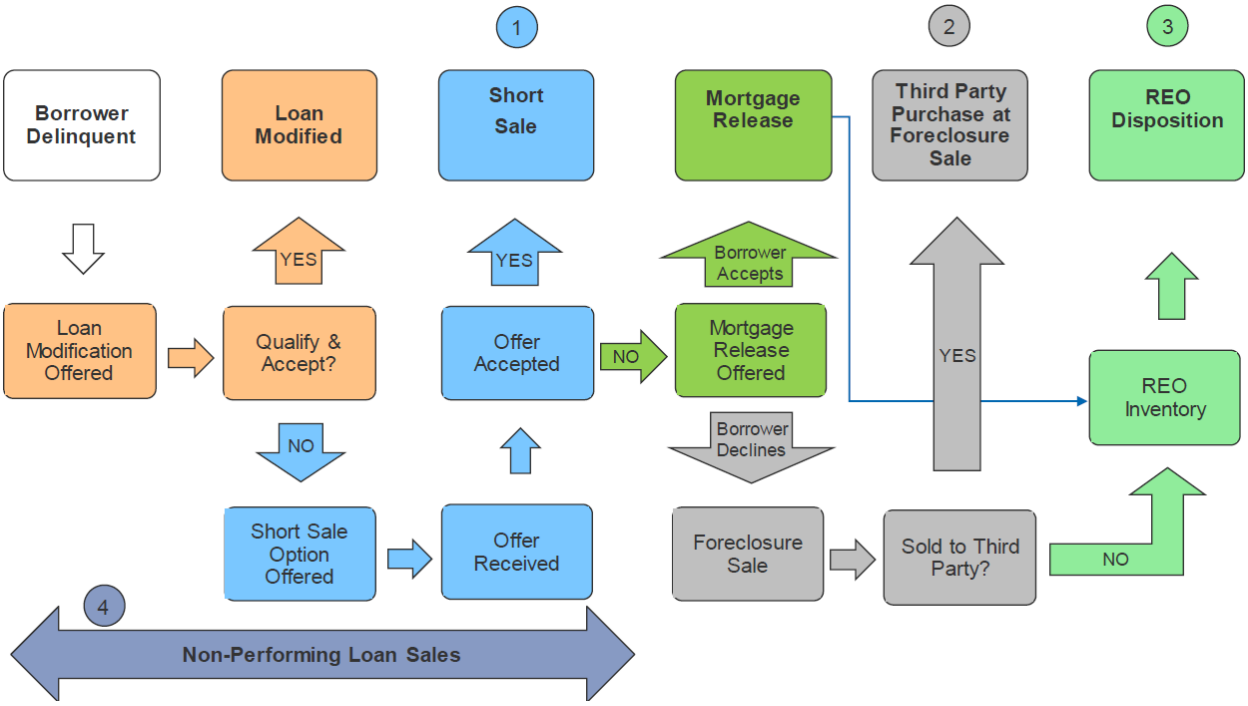
Fannie Mae aims for the "'best-execution' sale of properties at every point in the disposition process based on a net–present value (NPV) comparison to a sale of a move in-ready home sold to an owner-occupant."[15] Fannie Mae uses this profit-maximizing framework to compare all disposition options using common basis: maximizing the present value of the net recovery from disposition.

Fannie Mae leverages the internet to inform both mortgagors and investors about its disposition process. Two of its major resources are Knowyouroptions.com, which includes information and resources for mortgagors on the various home-retention and loan-disposition programs offered by Fannie Mae, and HomePath.com, which acts as a short-sale portal for real estate agents.

Figure 2 shows the typical flow of the disposition process at Fannie Mae.

[12] The FHFA, the conservator of both Fannie Mae and Freddie Mac since 2008, has worked with the GSEs to harmonize their activities. As such, the disposition landscape at Freddie Mac follows, to a large degree, the same processes as at Fannie Mae.
[13] http://www.fanniemae.com/resources/file/credit-risk/pdf/0915-credit-risk-mgt-deck.pdf.
[14] Ibid.
[15] Ibid.

**Figure 2: Fannie Mae property-disposition paths**




Source: http://www.fanniemae.com/resources/file/credit-risk/pdf/0915-credit-risk-mgt-deck.pdf (p. 76).

To facilitate successful and optimal dispositions, there are other crucial operations taking place in the background. All distressed loans headed to disposition need a property valuation, a structured framework to minimize losses, and reserve prices for the alternative disposition options. The next subsection describes these.

## Property Valuation

All disposition methods involve an aspect of collateral, or property valuation. In order for the mortgagees to assess the reasonableness of given disposition strategies, they must compare the expected recovery or bid amount to an independent valuation. Several types of valuations are used for single-family properties: broker price opinions (BPO), comparative market analyses (CMA), automated valuation models (AVM), and appraisals.

The following sections discuss the various types of property valuations.

### *Broker Price Opinion*

A BPO is a valuation method in which a real estate agent, broker, or other industry professional uses his or her expertise to estimate the value, or potential selling price, of a property. BPOs are widespread due to the quick turnaround and low cost compared to a full appraisal. A real estate agent hired on behalf of the mortgagee or mortgage insurer completes the BPO.

A BPO can be either an interior BPO or an exterior BPO, known as a drive-by. Drive-by BPOs are necessary when the mortgagee does not have the ability to enter the property. During drive-by BPOs, brokers must assess value based on the property's exterior appearance, house characteristics (square footage, number of bedrooms, number of bathrooms, etc.), and neighborhood quality (safety, accessibility of amenities). Interior BPOs are preferred due to the increased amount of information the

broker can obtain about the property. An interior BPO allows the broker to evaluate the condition of the interior of the home and identify hidden concerns about the house.

BPOs are risky due to the large degree of subjectivity involved in the valuation process. The reliance on an individual broker to assess the property's value can lead to variations in BPO results. Furthermore, due to the human element involved in BPOs, it is possible for an unscrupulous broker to manipulate the property's value.

Properties that go through a Fannie Mae PFS or DIL require a BPO property valuation before sale. If the borrower expresses an interest in one of these disposition options, the servicer must request a BPO in advance of the sale or release execution. Fannie Mae or the mortgage insurance (MI) company may also request a BPO prior to a foreclosure sale. A Fannie Mae-approved vendor completes the BPO and sends the electronic results to Fannie Mae. Once the BPO is completed, Fannie Mae uses that information to provide a "suggested List Price Guidance Amount, Net Proceeds Amount, Calculated Reserve Price for foreclosure auction, or other information applicable to the order reason."[16]

### *Automated Valuation Model*

An AVM is a model that estimates property value using data inputs and statistical techniques. AVMs can employ individual or multiple methods to determine property value: "hedonic" property characteristics (e.g. square footage, number of bathrooms, property age, etc.), recent comparable property sales in the area, repeat-transaction indices, and tax-assessed value. Because an AVM is an analytical model, it is important to have rich underlying data sources that provide enough information to form statistically significant relationships.

An AVM is an attractive valuation method due to its low cost, speed, and efficiency. Unlike BPOs and full appraisals, AVMs do not rely on a potentially subjective appraiser to produce a valuation. Thus, AVMs are less likely to produce a fraudulent valuation due to collusion or nefarious activity. An AVM eliminates human biases that could affect appraisals.

Despite AVMs' efficiency and ease of use, results accuracy often varies wildly across geography and time. In locations with sparse data on comparable properties and recent sales, it is possible that the AVM will not yield a result within the necessary level of accuracy. Often the mortgagee will need to rely on appraisals or BPOs when AVMs fail.

For its loss-mitigation process, Fannie Mae requires the servicer to obtain an AVM valuation using Fannie Mae's Automated Property Service™ (APS for NPV), Freddie Mac's automated valuation model (AVM), or a third-party AVM. If the AVM does not achieve the necessary statistical confidence or if the law requires an in-person valuation, the servicer must obtain a BPO or full appraisal. In addition, a BPO may be required by Fannie Mae or the MI in advance of a foreclosure sale.[17] This requirement ensures that an erroneous AVM valuation does not influence the disposition process and that there are backup property valuations.

### *Comparative Market Analysis*

A CMA is a valuation method where a real estate agent or broker estimates the property value using comparable sales and industry knowledge. CMAs are similar to BPOs because real estate agents must

[16] https://www.fanniemae.com/content/job_aid/bpo-valuation-process.pdf.
[17] https://www.fanniemae.com/content/announcement/ntce010814.pdf.

make a subjective estimate about property value. Unlike BPOs, CMAs do not leverage granular sources of data like interior property walk-throughs.

Many of the advantages and disadvantages of BPOs also apply to CMAs. A comparative market analysis can be a relatively quick and inexpensive process; however, the lack of detail in the estimate can lead to large sources of error.

### *Appraisal*

An appraisal is the most thorough valuation method. During an appraisal, a licensed real estate appraiser evaluates all characteristics of the property that are pertinent to the property's value. Professional appraisal standards require the study of all aspects that influence value. Furthermore, the appraiser evaluates social, economic, governmental, and environmental forces that can provide a deeper understanding of the dynamics of change and helps identify value trends. Principles of supply and demand, substitution, balance, and externalities help the appraiser estimate shifts in valuations.[18]

The appraiser holistically considers the real estate market, comparable properties, and individual property characteristics when forming a valuation. Appraisers judge real estate value in three ways:

- Current cost of reproducing or replacing a building, minus an estimate for depreciation, plus the value of the land (and entrepreneurial incentive, if applicable)
- Value indicated by recent sales of comparable properties in the market
- Value that the property's net earning power will support[19]

Appraisals provide Fannie Mae with the best assessment of a delinquent asset's value.[20]

In 2011, the FHFA directed Fannie Mae and Freddie Mac to work together and develop the Uniform Appraisal Dataset (UAD), which "defines all fields required for an appraisal submission for specific appraisal forms and standardizes definitions and responses for a key subset of fields."[21] This project's goal was to improve the "quality and consistency of appraisal data for loans delivered to the GSEs." The UAD defines all the necessary fields required for an appraisal submission to the GSEs and standardizes data submitted on the appraisal form. This allows for easier appraisal analysis and tracking.[22]

## Loss Minimization

Fannie Mae formulates an approach to minimize losses on the delinquent asset after estimating the property's value using information. After calculating NPV estimates for the property under all feasible disposition options, Fannie Mae chooses the option with the highest net recovery, consistent with a best-execution mind-set.

In general, the disposition process is consistent with the diagram in Figure 2. The waterfall approach to property disposition favors the shortest-timeline options over lengthier options. This approach of choosing the quickest disposition path often leads to the most profitable outcomes due to the lower relative expenses associated with quick dispositions. As a delinquent loan sits in delinquency, accruals

[18] http://www.appraisalinstitute.org/assets/1/7/understand_appraisal_1109_%281%29.pdf.
[19] Ibid.
[20] http://www.fanniemae.com/resources/file/credit-risk/pdf/0915-credit-risk-mgt-deck.pdf.
[21] http://www.freddiemac.com/singlefamily/sell/uniform_appraisal.html.
[22] https://www.fanniemae.com/content/fact_sheet/uad-overview.pdf.

on the loan balance increase, deterioration of the house occurs, and stigmas associated with the home's defaulted status rise.

### Reserve Pricing

After formulating a loss-minimization approach, Fannie Mae must set reserve prices for each option. Reserve prices are most important for auction- or bidding-based disposition methods like PFS, NPL, and TPS.

Fannie Mae generally bases reserve prices on the value of the property, as determined by one of the valuation methods mentioned above. PFS uses the property value as the basis for the minimum net required (MNR), the amount at which a servicer can approve a short sale. The MNR is a confidential figure, kept secret from prospective bidders in order to protect the integrity of the auction. If the buyer, the seller, or the respective agents know the reserve price, it creates an opportunity for collusion.[23]

A **reserve price** is the price stipulated as the lowest acceptable by the mortgagee.

During Fannie Mae TPS, reserve prices are also required. Reserve prices on third-party sales ensure that properties meet a minimum price that reflects an expected benefit over REO. The reserve price prevents unscrupulous auction participants from arranging an artificially low property price.

Individual market dynamics and expert judgment are the primary factors used when creating reserve prices. REO operations representatives have the ability to alter reserve prices to maximize sales and returns.[24]

## IV. Summit's Mortgage Finance Experience and Analytics Capabilities

Summit's Mortgage Finance Directorate empowers clients to make informed decisions about risks to their mortgage loan portfolios and provides the quantitative tools needed to manage those risks and guide business, policy, and legal decisions. Summit's Mortgage Finance Directorate is comprised of economists, data scientists, and statisticians with specializations in quantitative risk assessment, mortgage financial analysis, loss forecast modeling, stochastic simulation and stress testing, and mortgage-servicing analytics.

Summit has a variety of custom and off-the-shelf mortgage analytics solutions that assist clients with all aspects of mortgage finance, including loan valuation and disposition. Summit's Mortgage Analytics Engine (the Engine) is a loan-level mortgage performance and cash flow forecast model. The Engine efficiently calculates and aggregates expected cash flows from mortgage portfolios. Summit leverages the Engine and layers other tools to provide clients with solutions regarding their mortgage portfolios and policy analyses.

[23] https://www.fanniemae.com/content/announcement/svc1219.pdf.
[24] http://www.fanniemae.com/resources/file/credit-risk/pdf/0915-credit-risk-mgt-deck.pdf.

## Implementing a Mortgage Analytics Engine

The Engine integrates modules and processes to forecast loan-level cash flows and generate all the reporting required by clients. This modular framework allows the Engine to produce both a summary and a detailed analysis. Based on this analysis, Summit can provide a diversity of actuarial, budget, reporting, and policy studies to meet current and future client needs.

**Summit's Mortgage Analytics Engine consists of three major modules:**

- Mortgage performance
- Loss mitigation
- Loan disposition and severity

Three major modules—mortgage performance, loss mitigation, and loan disposition and severity—make up Summit's Engine. Each module uses loan-level data to estimate asset value.

### *Mortgage-Performance Module*

The mortgage-performance module is composed of a set of regression models that estimate the probabilities of prepayment, delinquency, re-performance, and claims through a transition-probability framework. The foundation of transition probabilities are loan history, underwriting characteristics, and economic conditions. Summit developed this multistage transition methodology to capture the difference in risk profiles between loans at different delinquency levels, and to estimate borrower behavior more precisely. The multistate model also allows Summit to analyze and incorporate specific loss-mitigation and loss-disposition methods for loans at specific times in their life.

### *Loss-Mitigation Module*

Summit evaluates several types of loss mitigation to model borrowers' options to cure a default episode and avoid foreclosure. Summit incorporates both HAMP modifications and proprietary modifications into the Engine to cover the products most used by the industry.

### *Loan Disposition and Severity Module*

The loan disposition and severity module estimates the likelihood of a defaulted loan being disposed of via a given disposition option, and subsequently estimates loss given default while recognizing the differences in severity for different types of claims.

The first stage in the disposition modeling uses regression methods to estimate the conditional probability of a claim being PFS, DIL, TPS, NPL, or REO. The drivers of the outcomes include loan-specific characteristics, geographical considerations, and macroeconomic variables.

In the second stage, Summit estimates loss severity for each predicted disposition strategy. The severity component of the module estimates net loss as a percentage of the estimated property value.

This framework allows for easy transparency in the predicted disposition strategy. The percentage of loans going through each channel, as well as their corresponding severities, is independently disaggregated and analyzed.

For more information on Summit's disposition and severity capabilities, see section "How Does Summit Improve the Disposition Process?" on page 12.

## Conducting Stochastic Simulation and Stress Testing

Summit has developed a series of simulations that incorporate changing external factors into the Engine. In this way, Summit can use the Engine to conduct sensitivity analyses, assess alternative economic scenarios, and execute stress tests for a range of macroeconomic scenarios and other external shocks.

An important feature of Summit's simulation framework is that it acts uniformly and consistently on all parts of the Engine. This is critical because the upside of a strong economy is limited—borrowers not only have low delinquency rates, but many also refinance away from high loan-to-value (LTV) loans. As a result, rosy scenarios will have a muted impact due to elevated prepayment rates. On the other hand, in a very weak economy, losses will accumulate precipitously with increased default rates and increased loss severities compounding negative scenarios. This will lead to asymmetric effects on the value of most single-family mortgage portfolios.

## Building, Vetting, and Running AVMs

Summit has significant experience building, vetting, and running automated valuation models (AVMs). As described above, AVMs are mathematical models that estimate real estate valuations by running an algorithm against a database of past property sales data.

Summit has extensive practical knowledge vetting AVM data inputs and performing rigorous reviews of the statistical techniques driving AVMs. Summit's subject matter experts (SMEs) have experience building AVMs at industry-leading mortgage analytics shops and use their deep knowledge to assist clients with model and process review.

Summit also leverages Amazon Web Services (AWS) to improve the speed and efficiency of existing client AVMs. The power of AWS's computing nodes allows the AVM to quickly reference a rich underlying data source and compute estimated property valuations in real time.

Many AVMs claim a certain level of coverage and accuracy, while in reality they often vary wildly across geography and time. Summit has expertise in verifying the accuracy of AVM results. Summit leverages statistical techniques to analyze AVM results post hoc to determine the veracity of the AVM owner's claims regarding performance.

## Ensuring Compliance with Rules and Regulations

Summit routinely reviews regulatory rules and guidance regarding all facets of the single-family mortgage process, drawing on its wealth of mortgage finance experience to perform a qualitative review of all pertinent regulatory guidance. Once Summit reviews the applicable guidance, the Team formulates a plan to revise the current procedure and bring all operations in line with the regulations.

In particular, Summit tailors its disposition research and consulting around pertinent regulations. The Consumer Financial Protection Bureau (CFPB) recently issued "Foreclosure Avoidance Procedures," which may alter the practices of some mortgagees.[25] The procedures specifically reference policies on foreclosure avoidance, foreclosure process, servicers required to contact borrowers, and foreclosure restrictions. It is crucial that mortgagors comply with these rules and regulations to ensure that all solutions are permissible under current guidance.

[25] http://files.consumerfinance.gov/f/201312_cfpb_foreclosure-avoidance-procedures.pdf.

### Leveraging Industry Data

To build accurate models and fully understand the entire disposition landscape, Summit finds, obtains, and incorporates the most appropriate and current sources of mortgage data. The mortgage industry is undergoing a large-scale change in the amount and quality of reported and recorded data. These high-frequency datasets help customers leverage more real-time analytics when evaluating their portfolios. Instead of waiting for loans in a portfolio to become delinquent, Summit assists firms with integrating better, more frequent data into their businesses and taking a proactive approach to portfolio monitoring and analytics.

## V. How Does Summit Improve the Disposition Process?

Summit has developed a state-of-the-art valuation and disposition tool: The Distressed Asset Disposition Calculator (the Calculator). The Calculator leverages the Mortgage Analytics Engine to optimize client returns during the disposition process and improve process efficiency. It also informs clients of the best execution decision for all their distressed assets on a monthly basis and ranks disposition strategies for seriously delinquent loans from best (i.e. maximum net recovery) to worst.

The Calculator also includes a proprietary reserve-pricing framework that mathematically links all disposition options and reserve prices. Summit's reserve-pricing framework allows clients to calculate the reserve price at which they are indifferent to selling an asset using a given disposition channel rather than other subsequent channels. Summit built the Calculator as a user-friendly business-intelligence platform to facilitate business and policy decisions and report production.

### Developing an Integrated Disposition Approach

Summit's Distressed Asset Disposition Calculator allows clients to compute the following values:

- Reserve prices
- Expected sales prices
- Probabilities of sale
- Expected sales costs under customizable reserve-pricing schemes

The Calculator ranks disposition options using a series of recursive binary-option equations to relate sequential disposition options.[26]

Four modules support Summit's Calculator:

- Inputs Module: Multiple sources of data are required to run the Calculator. These include loan-servicing data, origination data, economic forecasts, national housing-market data, and AVMs. A modular approach to the input architecture makes it straightforward to adjust inputs and perform sensitivity analyses.
- Analytics Module: Summit tailors this module to a specific client's portfolio and disposition framework to determine the return-maximizing disposition strategy for individual distressed loans by solving a series of recursive binary-option equations.
    - Many of the existing disposition methods involve some type of cascading, exhausting one option before exploring the next. The Calculator leverages the estimated payoff of

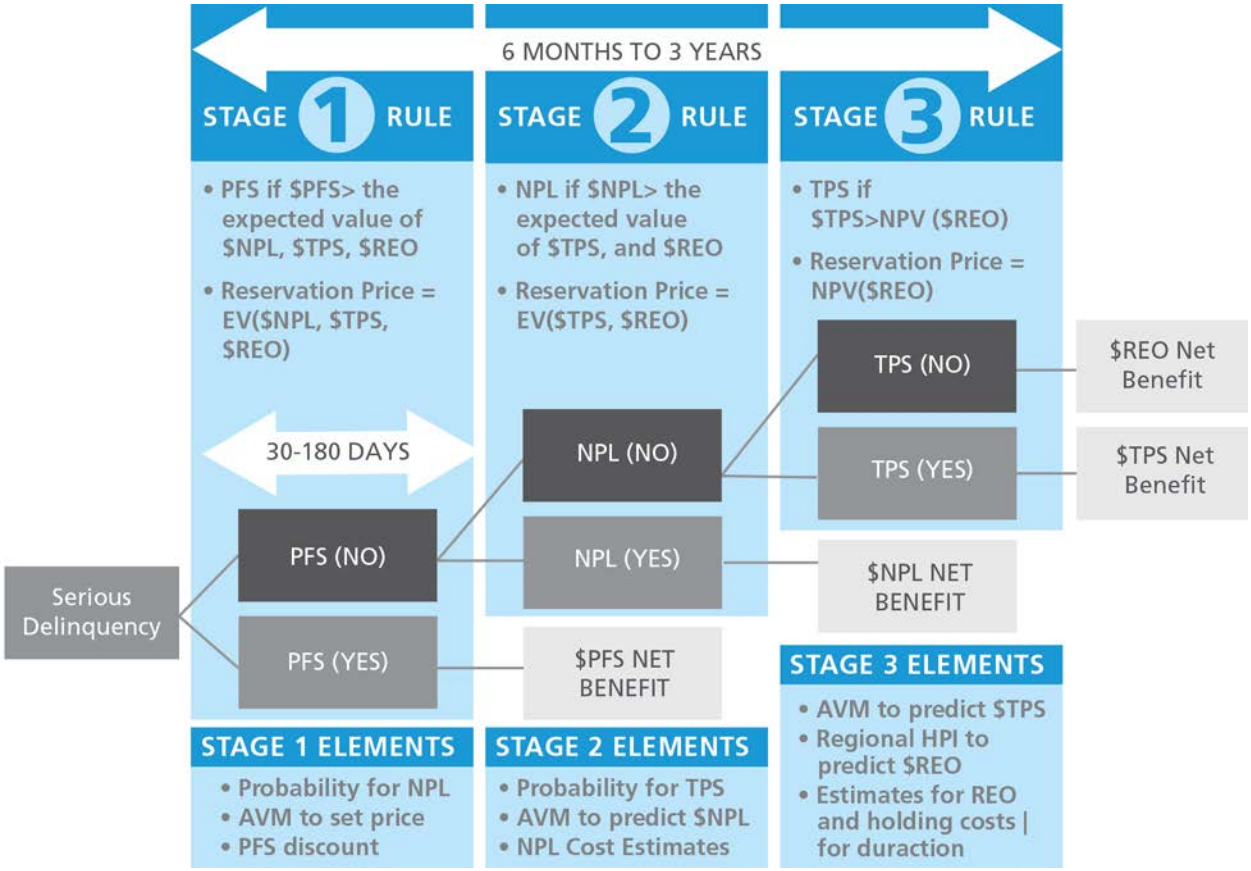
[26] *Recursive binary option* refers to the process of repetitively comparing a disposition option with all other available in the structure of a given agency's sequential disposition programs and choosing the best option.

the remaining options to formulate the reserve price of a given option. That is, each choice is binary. Comparing payoffs from various disposition channels ensures no channel selection if subsequent channels would yield a higher payoff. Figure 3 illustrates the binary-choice methodology for a potential mortgagee's disposition alternatives.

- Processes Module: Summit enables the Calculator to collaborate with other mortgage-analytics applications to form a truly integrated system.
- Output Module: This module uses the outputs of the Calculator to achieve the optimal valuation and disposition services.

Figure 3 demonstrates the logic of the Calculator's series of recursive binary-option equations to relate the sequential disposition options. The Calculator uses the expected value (EV) of the subsequent disposition options to choose the optimal disposition path and set reserve prices.

**Figure 3: Distressed Asset Disposition Calculator logic and process flow [27]**




[27] $PFS, $NPL, $TPS, and $REO represent the net benefit (defined as the net present value [NPV] of recoveries) for PFS, NPL, TPS, and REO disposition options respectively. Expected-value (EV) calculations compute the probability-weighted average of the NPVs from the specified disposition options.

## Implementing a Forward-Looking Disposition Strategy

One of the major benefits of the Summit valuation and disposition solution is its forward-looking approach. Going beyond the historically based approach of relying on past trends, Summit created a new solution to leverage econometric and actuarial models, macroeconomic forecasts, and real-time data and market outlooks. This strategy provides Summit's clients with a dynamic approach that allows quick adaptation in a rapidly changing environment.

## Creating a Business Intelligence (BI) Tool to Inform Disposition Decisions

Summit has built a user-friendly business intelligence (BI) tool to communicate the Calculator's valuation and disposition decisions to key stakeholders.

Summit's BI is an interactive web application that allows users to select and evaluate loans for best execution decisions in real time through a web browser. The BI leverages R, a statistical computing programming language.[28] The BI's outputs change instantly as users select different loans, modify inputs, and change tool settings. Its user-friendly interface visually displays analytical results through a combination of tables, charts, and graphics.

The BI sits on top of clients' loan-portfolio databases to enable quick access and processing on all assets. Users can view portfolio assets in a dynamic table then filter and select loans based on loan characteristics. The tool also displays user inputs and allows for custom run parameters. The BI interface references these data elements and user inputs before computing reserve prices and valuations.

Overall, the BI computes the expected recovery and the net benefit from each disposition option to determine the return-maximizing disposition strategy and option ranking. The application graphically displays expected sales price, projected claim expenses, and calculated-net benefit metrics, then highlights the best disposition execution strategy. The BI tool also allows the user to download the output offline into Microsoft Excel forms on a local machine.

## Distilling Disposition Decisions into Actionable Rules

Summit's economists, financial analysts, and mortgage SMEs help analyze the outputs of the Distressed Asset Disposition Calculator to provide the client with an optimal method to dispose of assets. After the analytic results are calculated, Summit focuses on accurate, clear, and concise dissemination of results using the same online-hosting platform as the BI.

The Calculator is the foundation for Summit's disposition approach. It supports client goals of maximizing recovery, minimizing cost, following optimal timelines, and improving processes and oversight.

[28] R is a statistical package that does not require complex licensing, and it thus enables Summit to make the BI interface available to clients for use in a straightforward manner.

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## About Summit

Summit Consulting, LLC, is a certified small business headquartered in Washington, DC, that specializes in applying cutting-edge quantitative techniques to the real-world challenges facing private-sector enterprises and Federal agencies.

Summit's Mortgage Finance Directorate consists of professionals with advanced degrees in economics and mathematics who specialize in quantitative risk assessment, mortgage financial analysis, loss-forecast modeling, stochastic simulation and stress testing, and budgeting and loss reservation. Our staff members have the technical and programming skills to meet client needs on a variety of platforms and languages. Together, the Directorate has more than thirty years of collective experience working directly in the mortgage finance industry, along with experience working in litigation consulting and banking.

For more information, visit Summit's website (http://www.summitllc.us/) and the Mortgage Finance Directorate page (http://www.summitllc.us/services/mortgage-finance).