



Assessment of the Home Affordable Modification Program (HAMP) Re-Default Table

Conducted for the U.S. Department of Treasury - Office of Financial Stability

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Executive Summary

Assessment Scope and Purpose

As the government's Financial Agent for the Home Affordable Modification Program (HAMP), Fannie Mae provides various reports and metrics to the Treasury Department. This information includes a table entitled "Performance of Permanent Modifications", which reports delinquency and default information for permanent modifications under the program, and is referred to throughout this report as the "Re-Default Table"¹. The Re-Default Table is a new data table that was added to the June 2010 Making Home Affordable public report published by Treasury. After the June 2010 Re-Default Table was published, it was found to have significant errors which were subsequently attributed to logic errors in the Fannie Mae code used to create the Re-Default Table.

The Treasury Department's Office of Financial Stability requested MITRE² to review the corrected June 2010 Re-Default Table data prior to republication and to provide a level of confidence assessment as to its accuracy. Parallel validation efforts were undertaken by an independent third party consultant contracted by Fannie Mae's Internal Audit group.

Summary Assessment

Based on our assessment, MITRE has a high level of confidence that the Fannie Mae revised 2010 Re-Default Table is an accurate representation of the loan source data³ when processed in accordance with the Re-Default Table Requirements.⁴ (The "Re-Default Table Requirements" specify how the loan data is transformed and aggregated to create the Re-Default Table.)

MITRE recommends that Treasury consider the combined findings of the independent third party consultant contracted by Fannie Mae's Internal Audit group and MITRE in determining whether the revised table is accurate and ready to be published.

Assessment Approach

Treasury asked MITRE to provide a confidence assessment that the revised June 2010 Re-Default Table accurately reflected the source data when processed according to the Re-Default Table Requirements⁵. The quality of the source data, which is primarily from the Official

¹ Specifically, the Re-Default Table shows the number of delinquent permanent modifications at 3, 6 and 9 months after conversion, including the percentage that are 60+ days delinquent, and 90+ days delinquent (that is, in re-default), for each of the quarterly cohorts (i.e. quarters in which the modification became permanent.)

² The MITRE Corporation is a non-profit operator of four Federally Funded Research and Development Centers (FFRDC's).

³ ORDB and TTS-Copy databases

⁴ The Re-Default Table requirements used for this assessment are documented in Re-Default Report Requirements Version 1.0 dated July 29, 2010.

⁵ Re-Default Report Requirements Version 1.0, dated July 29, 2010. Treasury approved this version of the Re-Default Table Requirements in conjunction with the MITRE assessment on August 2, 2010, after the publication of the original erroneous Re-Default Table.

Monthly Reports (OMR's) submitted by the various loan servicing institutions, was not in the scope of the assessment.

The MITRE approach included two steps: fact finding and analysis. During the fact finding step, MITRE started to identify opportunities to make improvements in the overall process. For example, we (and other reviewers) identified the need for more detailed and clear requirements specifying how the source data should be transformed to create the Re-Default Table. Fannie Mae had provided MITRE with a document entitled Redefault Report Logic on July 28, 2010, that was deemed by MITRE to be insufficient for the analysis. (Fannie Mae indicated that this document was developed after the reporting error was discovered.) . On June 30, 2010, Fannie Mae provided MITRE with a document entitled Re-Default Report Requirements Version 1.0, dated July 29, 2010. The latter document was used as the basis of this assessment.

During the analysis step, MITRE used a variety of methods to assess various segments of the Re-Default Table generation work flow, including comparison of loan type counts, manual calculations to verify specific data transformations, and manual application of the Re-Default Table Requirements to selected records in a group walkthrough setting.

The most rigorous analytic method, and the one on which this assessment primarily depends, was the development of SQL and SAS validation code that extracted source data⁶, applied the Re-Default Table Requirements, and generated data that could be compared to the Fannie Mae revised June 2010 Re-Default Table. This was not an attempt to reprogram the code developed by Fannie Mae to create the Re-Default Table, and it did not use their code design. Rather, MITRE developed linear code that facilitated comparison of the code logic to the approved Re-Default Table Requirements. The MITRE code mirrored the structure of the Re-Default Report Requirements V1.0, and each segment of the code was annotated to provide full traceability to the Re-Default Report Requirements V1.0.⁷ The MITRE code was walked through by a 10 person team that included MITRE, Fannie Mae BA&D, and the independent third party consultant contracted by Fannie Mae's Internal Audit group.

It was subsequently independently reviewed by three MITRE individuals. All of these reviews confirmed that the MITRE code appeared to accurately reflect the Re-Default Report Requirements V1.0. Application of the MITRE validation code to the source data resulted in a 100% match to the values in the Fannie Mae revised June 2010 Re-Default Table.

Other Observations

This initial assessment did not include an analysis of the process-related or systemic causes of the original errors in the June 2010 Re-Default Table. However, MITRE made several observations that may inform subsequent causal analyses and recommendations. These observations pertain only to the Re-Default Table in the public report:

1. The original Re-Default Table requirements⁸ provided to MITRE by Fannie Mae were not sufficient to inform a thorough validation of the resultant table. (It is not clear what written documentation existed during Fannie Mae's initial development effort.) This

⁶Source data refers to the ORDB and TTS-Copy databases.

⁷ Appendix A.6 shows the source validation code.

⁸ Refers to the Re-Default Report Logic document provided to MITRE on July 28, 2010.

suggests that Fannie Mae's initial development of the Re-Default Table generation software may not have had the level of detail and clarity necessary to assure accurate coding. This needs to be verified in a formal cause analysis.

2. This assessment evidenced that the source OMR data (which includes numerous anomalies, such as missing, corrected and inconsistent reports), and the fairly complex Re-Default Table Requirements necessary to deal with those anomalies, make the Re-Default Table generation process non-trivial. Because of this complexity, the fact that errors were introduced into the original June 2010 Re-Default Table, and the highly visible nature of the information, it is clear that a more rigorous test/validation process for Re-Default Table generation should be implemented by Fannie Mae going forward.

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Revision History:

Revision 1 dated August 6, 2010 provides clarifications and editorial changes.

1 Introduction

1.1 Background

The U.S. Department of Treasury has engaged Fannie Mae to administer the Home Affordable Modification Program (HAMP) on behalf of a government priority to provide mortgage relief to U.S. qualifying homeowners. In keeping with Administration emphasis on public transparency, Treasury recently published the original June 2010 Re-Default Table on the number of borrowers facing foreclosure after having their loans converted from trial modifications to permanent status. This Re-Default Table depicts the number of delinquent permanent modifications at 3, 6, and 9 months after conversion from an initial trial state. The Re-Default Table identifies those loan percentages that are 60+ days delinquent, and 90+ days (i.e., in re-default state) for each of the quarterly cohorts. A cohort defines the calendar quarter in which the modification became permanent.

The original June 2010 Re-Default Table was supplied by Fannie Mae, and included default rate data for the first 9 months of the program. Analysts at Barclays Capital subsequently challenged the information reported in the original June 2010 Re-Default Table, which led to a review of the data by Treasury and Fannie Mae. This review determined that the default rate Fannie Mae provided in the original June 2010 Re-Default Table appears to be significantly lower than the actual default rate as indicated by the source data. Fannie Mae has prepared a revised June 2010 Re-Default Table, which is the subject of this assessment.

Treasury has engaged MITRE to provide an independent view of the revised 2010 Re-Default Table with an initial focus on determining the confidence level as to whether the table accurately reflects the source data when processed according to the Treasury-approved Re-Default Table Requirements.

1.2 Assessment Charter

This assessment was conducted by The MITRE Corporation pursuant to a specific request from the U.S. Department of Treasury's Office of Financial Stability. The MITRE Corporation is a not-for-profit organization that operates four Federally Funded Research and Development Centers.

Treasury asked MITRE to provide a confidence assessment that the revised June 2010 Re-Default Table accurately reflected the source data when processed according to the Re-Default Table requirements. The quality of the source data, which is primarily from the Official Monthly Reports (OMR's) submitted by the various loan servicing institutions, was not in the scope of the assessment.

2 Assessment Approach and Activities

2.1 Fact Finding

2.1.1 Initial Knowledge Transfer

The MITRE assessment started with a series of fact finding sessions that included Fannie Mae, Treasury and the independent third party consultant contracted by Fannie Mae's Internal Audit group. These sessions included informal briefings, question and answer sessions and

demonstrations, and served the purpose of facilitating knowledge transfer from Fannie Mae subject matter experts to the assessment teams. Topics included:

- In-depth discussion of operation cycles and business cycles that drove the Re-Default Table generation processes.
- Content of the servicer-submitted loan transactions and data captured on the primary source database (IR2)
- The transaction data correction process.
- HAMP product terminology and key data variables that capture the status of each HAMP loan. Fannie Mae provided a detailed accounting of the data elements they collect from the institutions who are participating in HAMP, the frequency of data collection, and the storage and management of the data in IR2
- The requirements used to generate the original June 2010 Re-Default Table. This was described by a document entitled “Redefault Report Logic” which Fannie Mae indicated had been created subsequent to the initial publication of the July 2010 Re-Default Table, but which was believed to reflect the code logic used to develop that table.

Fannie Mae also briefed their assessment of the logic error that generated the erroneous Re-Default Table and their remediation code logic changes. This discussion included the logic error itself, the steps that had been undertaken to identify errors, explanations of the logic that triggered the error, contributing factors, and correction/validation activities underway.

Following a day-long series of discussions on the business and operational aspects, day two shifted the exposition to the technical production environment in which HAMP modifications are processed and data is stored for analysis and table generation. This included system architecture, infrastructure, operational controls, data structures, error-handling, and manual intervention processes. These briefings were intended to develop sufficient understanding of the technology used to implement the data base and to perform Re-Default Table generation, which subsequently informed MITRE’s approach to further analyzing the source data, validation, and Re-Default Table generation.

The Fannie Mae IT team also walked through database structures and provided a technical walkthrough of the monthly data processing cycle. The detailed review of the DBMS, data applications and tools, and the data itself helped all participants understand from a technology perspective the places in the data flow where data is transformed (manually or automatically). This review included data schema, data dictionaries, and application logic/code sets to validate Re-Default Table generation against the Re-Default Table Requirements. Their presentation also covered data quality controls and details around processing exception transactions.

MITRE requested and received a "data lineage" report that walked through the data transformation logic that was applied to data used in the original June 2010 Re-Default Table.

It is important to note that the review did not explore upstream processing beyond the bounds of the IR2 / TTS-copy database extracts as that was out of scope for this assessment. If there are any issues or conditions introduced prior to the extracts, their impacts are not considered in this assessment.

2.1.2 Re-Default Table Requirements Capture, Documentation, and Approval

On July 28, 2010, the first day of the assessment, Fannie Mae provided MITRE with a document entitled Redefault Report Logic as a help to understanding the requirements for generating the

Re-Default Table. Fannie Mae indicated that this document was created after the initial June 2010 Re-Default Table was published, but reflected the logic of the code that generated the initial Re-Default Table. MITRE and other reviewers concluded that the success of the assessments required an improved description of the requirements for generating the Re-Default Report, clearly and explicitly defined assumptions, business rules, and specific data elements to be manipulated / transformed.

A new Re-Default Table Requirements document⁹ was created and provided to the assessment team on July 30th, 2010. Treasury reviewed the new Re-Default Table Requirements document in order to confirm that these requirements would result in the Re-Default Table format and content that they desired. Treasury approved the Re-Default Table Requirements on August 2, 2010.

MITRE’s team also reviewed the SAS code that was selected as the “official” code for the Re-Default Table going forward to determine traceability to the final Re-Default Table Requirements. While this was not a formal code walkthrough, the Fannie Mae code appeared to address the Re-Default Table Requirements, except for the final transformations that are implemented using Excel.

2.2 Table Accuracy Assessment

The initial assessment work was focused on validating key data transformations throughout the Re-Default Table generation life cycle. The schematic below (based on views supplied by Treasury’s Office of Financial Stability) depicts at a conceptual/logical level, the primary data transformation path from the point of origination (Fannie Mae’s IR2 system) through end delivery of the June 2010 Re-Default Table.

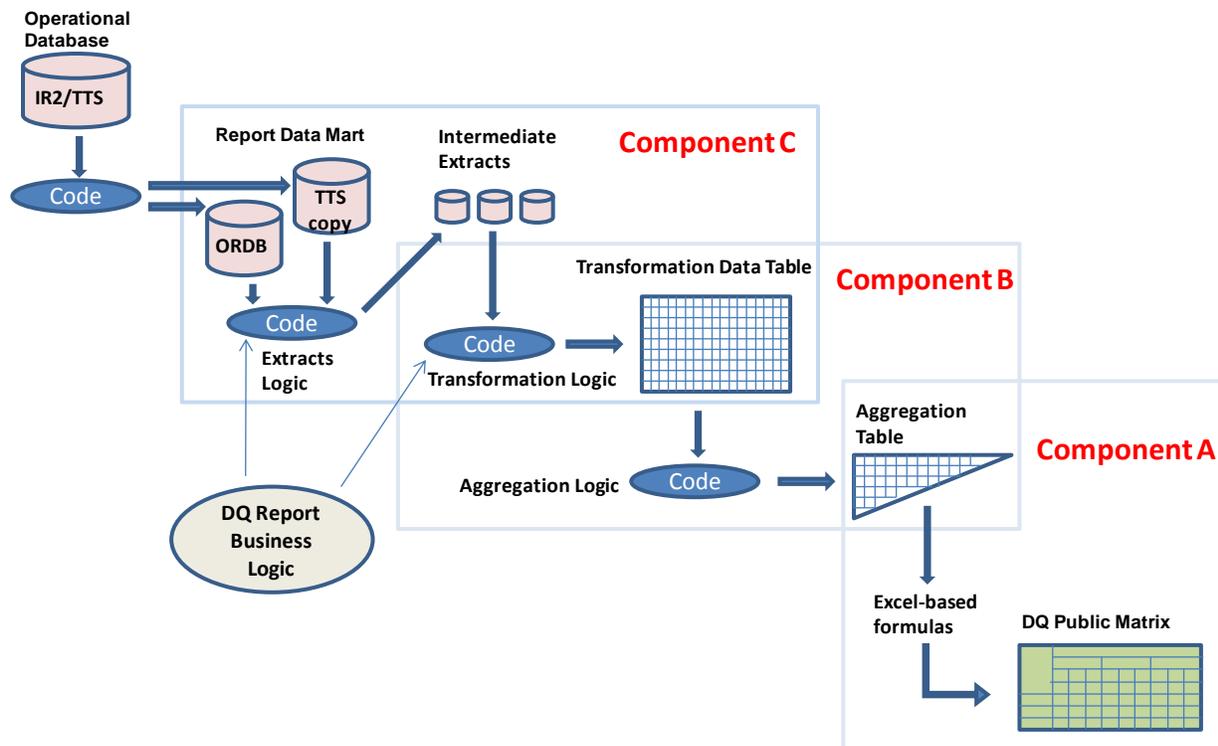


Figure 1: Re-Default Table data transformation path

⁹ Re-Default Report Requirements Version 1.0 dated July 29, 2010

Noted on this schematic are 3 major segments of the data transformation path, depicted in reverse order from the end state (published on the website), back to the source data (IR2 system's data repository). This segmentation was used to partition validation efforts so they could proceed in parallel from known and agreed upon interim transition points.

- Data component A focuses on the final calculations, formatting, and presentation of the data to satisfy the Re-Default Table Requirements
- Data component B focuses on transformations performed against extracted data to create arrays more easily used by programmers and analysts to determine the existence of specific business conditions. The resulting record sets are then aggregated in a manner specified by the Re-Default Table Requirements and housed in an aggregation table
- Data component C focuses on initial data extracts, table manipulations and modifications performed to prepare the data to be processed in accordance with the Re-Default Table Requirements.

2.2.1 Data Component A

Data component A focuses on the final calculations, formatting, and presentation of the data to satisfy the Re-Default Table Requirements. The MITRE team examined the data in the 60+ day delinquent, and 90+ day delinquent "triangle" aggregation tables. Using Fannie Mae-provided hardcopy data and MITRE-developed Excel spreadsheets, MITRE took the information contained in these "triangle" aggregation tables and calculated the aggregate percentages used in the Re-Default Table. MITRE verified the revised June 2010 Re-Default Table results using an Excel spreadsheet containing tables and formulae as follows:

1. Fannie Mae provided hardcopies of the revised 60-day delinquency and disqualified "triangle" aggregation tables. The table rows provided tallies by modification age (based on modification effective date) in months of 60-day delinquent modifications and disqualified modifications for each program month starting in July, 2009 through March, 2010. Fannie Mae also provided a hardcopy of the revised June 2010 Re-Default Table, including totals of active modifications and percentages of 60+ and disqualified modifications for modification months 3, 6, and 9
2. MITRE created an Excel spreadsheet containing two "triangle" aggregation tables and a Re-Default Table. MITRE's spreadsheet used Excel summations, additions, divisions, and percent formatting reflecting rules Fannie Mae provided for generating the revised June 2010 Re-Default Table from "triangle" aggregation tables
3. The MITRE-developed "triangle" aggregation tables used all cells in the Fannie Mae "triangle" aggregation tables and added rows and columns supporting summations by quarter and aging as needed to calculate cohort tallies for the 60 and disqualified cells in the revised June 2010 Re-Default Table. In addition, MITRE's tables also provided for verification of MITRE's entries against the Fannie Mae-provided tables. MITRE entered the Fannie Mae-provided table data into the appropriate cells in the spreadsheet tables and verified that MITRE's aggregated results corresponded to Fannie Mae aggregated results
4. The MITRE-generated June 2010 Re-Default Table included cells that corresponded to each and every cell in the Fannie Mae-provided revised June 2010 Re-Default Table. MITRE developed formulae in Excel that calculated total numbers of modifications in the "ALL" row of the table and every percentage cell in the table from the appropriate cells

in the revised June 2010 Re-Default Table and MITRE's "triangle" aggregation tables. MITRE entered the Fannie Mae provided quarterly cohort totals for months 3, 6, and 9 from the Fannie Mae-provided revised June 2010 Re-Default Table and verified MITRE's entries against the Fannie Mae table

5. Lastly, MITRE verified that every cell in the "ALL" row and every cell for each cohort/period 60+ and 90+ cell of the Fannie Mae hardcopy revised June 2010 Re-Default Table had the same value as MITRE calculated

This activity validated the results produced by the Fannie Mae team in their version of the revised June 2010 Re-Default Table in terms of Component A transformations. This Component A verification step indicated that the revised June 2010 Re-Default Table is correct under the following conditions:

- Tallies provided by Fannie Mae of 60-day delinquencies by monthly cohort and by age of modification that are output from Data Segment B in the 60-day delinquency "triangle" aggregation table are correct
- Tallies provided by Fannie Mae of disqualified loans by monthly cohort and by age of modification that are output from Data Segment B in the disqualified "triangle" aggregation table are correct
- Tallies provided by Fannie Mae of the total number of permanent modifications by cohort and quarter are correct

Subsequent MITRE activities discussed later in this report verified that the Fannie Mae provided tallies were correct (presuming source data in the ORDB and TTS databases is correct) for all cohorts and monthly/quarterly data that were used in the calculation of the percentages and grand totals in this step in MITRE's evaluation. It should be noted that one tally in the Fannie Mae-provided 60-day delinquency "triangle" aggregation table differed from the MITRE-developed tally by a single modification count. This difference is traceable to Fannie Mae using a new requirement that will be included in a future Re-Default Table Requirements document and code release, but not present in the current release. This tally and new requirement do not affect the calculation of any entry in the current revised June 2010 Re-Default Table, but application of the new requirement could affect the calculation of future tables.

2.2.2 Data Component B

Validation of work flow component B entailed examining transformations performed against extracted data tables to apply the majority of the Re-Default Table Requirements, producing a downstream table containing the detailed data underlying the so-called "triangle table" (see Figure 1). The validation served to verify that the revised Fannie Mae code functioned properly from the process point immediately following the extract of modification data from the primary source database (ORDB) through the aggregation of modification data into the proper "buckets" for determining modification status based on modification effective date and delinquency status.

Given the large number of records involved (over 400,000 transactions extracted) and the short time frame available to attempt validation, the MITRE team requested a list of all the modifications used in the revised June 2010 Re-Default Table along with payment Re-Default Table history, including indicators to capture the payment period in which the modification became delinquent. This abbreviated information set was intended to serve as an informal point of reference (proxy) to determine if the three tables that the Fannie Mae code produced in Data

component segment C from ORDB (Official Loan Detail, All OMRs, and Official Status History) could be manually examined against the Re-Default Table Requirements .

Starting with the modifications captured in the interim tables (the extract datasets from the ORDB), MITRE manually traced the handling of a representative sampling of modification records that represented different modification status conditions. This examination manually walked them through the Re-De Fault Table Requirements to determine their disposition, and then compared the manually determined result against the automated result contained in the abbreviated information set for compatibility and to verify that the modification ended up in the correct “bucket” in the aggregation table.

By manually applying the May 2010 HAMP modification transaction records according to a logical understanding of the Re-default Report Requirements, an expected result was developed for each modification's expected data profile, which would determine where the modification was placed in the revised June 2010 Re-Default Table. MITRE results agreed with Fannie Mae results for each modification in the sample. Several dozen records/business conditions were successfully validated in this manner until it was determined that there was a more effective manner for MITRE to independently validate all the records by coding the Re-Default Table Requirements and automating the validation process. At this juncture the manual “walkthrough” approach was suspended pending the results of the automated approach (which validated all records, not simply a sampling).

2.2.3 Data Component C

Data component segment C focuses on initial data extracts, table manipulations and modifications performed to prepare the data to be processed against the requirements. At the onset of this validation activity the MITRE approach was to execute the current Oracle SQL queries that extract the needed data and analyze the output records. There were three extracts:

1. Current record for all official modifications – those extracts exclude all current cancelled or transferred records. In addition, the extract forced the use of the most recent reported official modification should multiple records exist for a modification with a changed effective date
2. Active Official Monthly Report (OMR) records for the population described in (1) above.
3. Status history for the population described in (1) above

This initial validation was performed prior to the issuance of the improved Re-Default Table Requirements. A completely new approach based on the original data was later chosen that validated the end-to-end processing, including Component C (See Section 2.4).

2.3 End-to-End Data Validation

2.3.1 Development of Validation Code

As a parallel effort to the approaches described above, MITRE independently developed a new SQL/SAS code set to implement the Re-Default Table Requirements, and confirm whether execution of that code set could replicate the revised June 2010 Re-Default Table results produced by the Fannie Mae team. This approach focused on demonstrating adherence to requirements, in addition to visibly producing data output at each step of processing in a format suitable for inspection. The MITRE code was written with the intent to make the Re-Default Table Requirements easily traceable, so the code was heavily annotated and the logic followed a linear design. This feature facilitated verification of data transformations at each literal step in

the process while simultaneously isolating the effect of each variable from one another. In that fashion, MITRE was able to determine the exact state of the data sets as they existed in each step of the transformation process. The MITRE approach enabled more explicit understanding and testing of data transformations and manipulations that production code sets accomplished in aggregated execution steps. Note: a copy of the developed code set is contained in the Appendix along with several charts depicting specific query results produced. Below is a diagram depicting the re-default data component mapping processes and high-level requirements trace.

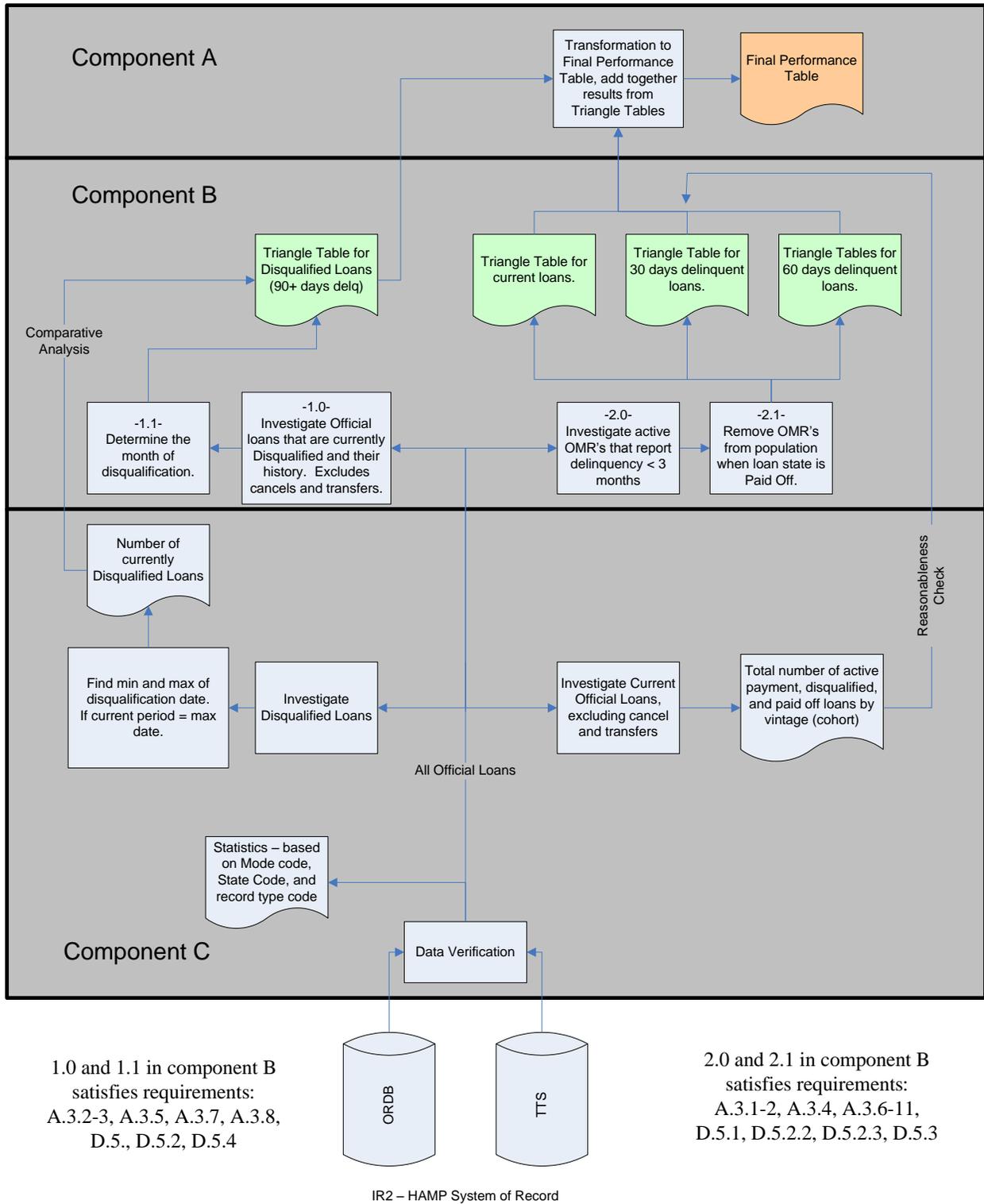


Figure 2: Re-default Data Component Mapping

The primary execution steps are described below:

1. Data was pulled successfully from the IR2 HAMP system of record via the ORDB data repository and the TTS-copy transaction tables using SQL embedded in SAS (same environment as production code).
2. Data verification was performed on pulled data which consisted of
 - a. Record counts based upon modification status dimension which included the modification record type code, modification status code, and modification code. This provided high level record counts to verify subsequent analysis and an initial understanding of the nature of the pulled data
 - b. Verification of disqualified modifications was conducted. This identified if modification transactions were currently disqualified or if the disqualification was reversed and modification is currently active. This enabled a comparative analysis of the triangle table of 90+ day modifications
 - c. Verification of current official permanent HAMP modifications was performed. This tested proper exclusion of cancellation and transfer transactions. This also enabled MITRE to perform a comparative analysis of the triangle tables for current, 30 day, and 60 day delinquent modifications.
3. The application of the Re-Default Table Requirements were performed on the data to create the final triangle tables
 - a. Tested for official modifications that are currently disqualified. Applied each assumption and data requirement from the Re-Default Table Requirements, on a step-by-step basis. The result of this activity produced the “triangle” aggregation table for disqualified modifications (90+ days delinquent)
 - b. Investigated active OMRs that report a delinquency of less than three months through application of each assumption and data requirements from the Re-Default Table Requirements, on a step-by-step basis. The result of this activity produced additional “triangle” aggregation tables for current, 30 day delinquent, and 60 day delinquent modifications.
4. Tested the transformation processing which aggregated from the four triangle tables from activity 3(a) and 3(b) above to the revised June 2010 Re-Default Table. This step was performed manually to allow for inspection of each specific calculation performed. The calculations performed followed the Re-Default Table Requirements, specifically, sections six and nine of the “Re-Default Report Requirements Version 1.0”.
5. A final comparison was performed of the results produced by activity 4 against the results contained in the revised June 2010 Re-Default Table created by Fannie Mae.

The results of this activity, conclusively replicated the results produced by Fannie Mae – the records produced by MITRE testing matched 100% exactly. The conclusion to be drawn from this is that a high confidence exists that the revised June 2010 Re-Default Table is an accurate representation of the source data when processed in accordance with the Re-Default Table requirements. The source data in this instance refers to data pulled from the ORDB data repository and the TTS-copy transaction tables.

2.3.2 Verification of Validation Code Against Re-Default Table Requirements

The MITRE validation code was walked through by a 10 person team that included MITRE, Fannie Mae BA&D, and the independent third party consultant contracted by Fannie Mae’s Internal Audit group. The team walked through each data extract, each statistical query, each

data transformation performed, and the results generated, with reviewers observing and asking questions. For example, the purpose of query “X” was discussed, the code executing query “X” was then reviewed, next the results output tables for query “X” were displayed and discussed, etc. – all before the next step in the process was executed. In this fashion, each element was looked in a step-by-step fashion to ensure correctness of software design approach.

At the end of this initial walkthrough, it was determined that the results (at that point in time) indicated a very close match in Fannie Mae generated results (less than 0.001% variance). The difference was attributed to the known exclusion of two specific business rules in the Re-Default Table Requirements dealing with relatively rare exception conditions, which at that time remained to be coded. When the missing Re-Default Table Requirements were coded, validation code set produced an exact match as described in section 2.3.1 above.

2.3.3 Final Validation Requirements and Assumptions Traceability

A final validation check of the validation code was made by three individuals operating independently to assure that it reflected the requirements document¹⁰. The intent of this validation activity was to determine if 100% traceability could be established between the requirements document, the code set, and supporting output and audit trail logs. This effort also examined whether or not if the mapping accurately captured all the Re-Default Table Requirements. The results of this analytical review concluded:

- All section 5.x requirements (as contained in the Re-Default Table Requirements) are appropriately accounted for in the code set / output results / audit log documents
- All but two assumptions are appropriately accounted for in the code set / output results / audit log documents
- For those assumptions not accounted for, further analysis suggested that the conditions addressed in the assumptions could possibly be addressed further upstream in IR2 processing (i.e., before data produced by IR2 is populated into the ORDB and TTS data repositories). Fannie Mae personnel reported that these assumptions are addressed as part of initial validation processing that occurs in the capture and initial population of IR2 data. Thus the revised June 2010 Re-Default Table software code does not need to perform these tests. Fannie Mae explained that the assumptions were captured simply to establish their relevancy to Re-Default Table generation requirements should some future change occur in IR2 systems that would change the pre-processing screening. Given the scope of this investigation was limited to downstream processing. MITRE did not pursue any additional validation of upstream IR2 processing to conclusively verify the assertions made.

¹⁰ Redefault Report Requirements Version 1.0 dated July 29, 2010

3 Observations, Findings, and Recommendations

3.1 Confidence of Corrected Re-Default Table

MITRE conducted statistical, analytical, manual, and automated validation activities, described in Section 2, to assess the accuracy of the Fannie Mae revised 2010 Re-Default Table. Based on our assessment, MITRE has a high level of confidence that the Fannie Mae revised 2010 Re-Default Table is an accurate representation of the source data¹¹ when processed in accordance with the Re-Default Table Requirements.¹² MITRE recommends that Treasury consider the combined findings of the independent third party consultant contracted by Fannie Mae's Internal Audit group and MITRE in determining whether the revised table is accurate and ready to be published.

This assessment is primarily based on the finding that the source data produced data that matched the revised 2010 Re-Default Table when processed through independently produced, SQL and SAS code that was carefully reviewed to assure its consistency with the Re-Default Table Requirements.

The following summarizes the steps of this comparative analysis:

1. MITRE developed SQL and SAS validation code that extracted source data¹³, applied the Re-Default Table Requirements, and generated data that could be compared to the Fannie Mae revised June 2010 Re-Default Table. This was not an attempt to reprogram the Re-Default Table generation code developed by Fannie Mae, and it did not use their code design. Rather, MITRE developed linear code that facilitated comparison of the code logic to the Re-Default Table Requirements. The MITRE code mirrored the structure of the Re-Default Table Requirements, and each segment of the code was annotated to provide full traceability to the rules in the requirements.
2. The MITRE code was walked through by a 10 person team that included MITRE, Fannie Mae BA&D, and the independent third party consultant contracted by Fannie Mae's Internal Audit group.
3. The MITRE code was subsequently independently reviewed by three MITRE individuals. All of these reviews confirmed that the MITRE code appeared to accurately reflect the Re-Default Table Requirements.
4. Application of the MITRE validation code to the source data resulted in a 100% match to the values in the Fannie Mae revised June 2010 Re-Default Table.

¹¹ ORDB and TTS-Copy databases

¹² Redefault Report Requirements Version 1.0 dated July 29, 2010.

¹³Source data refers to the ORDB and TTS-Copy databases

3.2 Additional Observations

3.2.1 Confidence of Future Re-Default Tables

This initial assessment did not include an analysis of the process-related or systemic causes of the original errors in the June 2010 Re-Default Table. However, MITRE made several observations that may inform subsequent causal analyses and recommendations. These observations pertain only to the Re-Default Table in the public report:

1. The original Re-Default Table Requirements¹⁴ provided to MITRE by Fannie Mae was not sufficient to inform a thorough validation of the resultant table. It is not clear what written documentation existed during the initial development effort. This suggests that the initial development of the Re-Default Table generation software may not have had the level of detail and clarity necessary to assure accurate coding. This needs to be verified in a formal cause analysis.
2. This assessment evidenced that the source OMR data (which includes numerous anomalies, such as missing, corrected and inconsistent reports,) and the fairly complex Re-Default Table Requirements necessary to deal with those anomalies, make the Re-Default Table generation process non-trivial. Because of this complexity, the fact that errors were introduced into the original June 2010 Re-Default Table, and the highly visible nature of the information, it is clear that a more rigorous test/validation process for Re-Default Table generation should be implemented by Fannie Mae going forward.

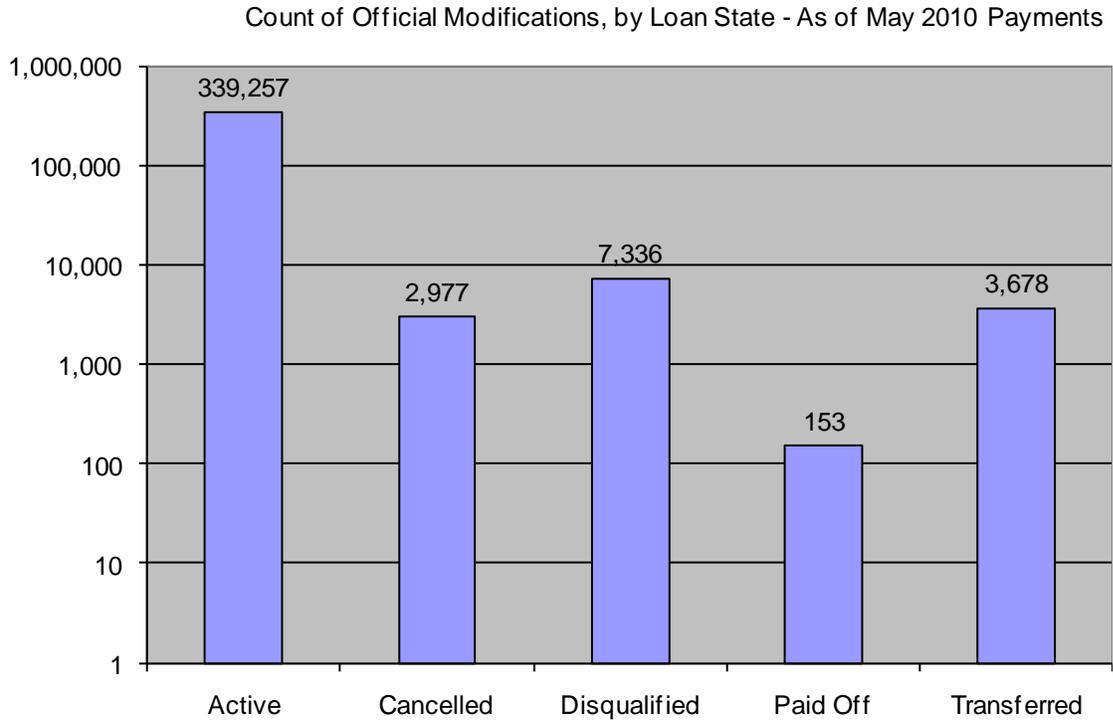
3.2.2 External Interpretation of Re-Default Table Data

MITRE believes the nature of the information being published in the Re-Default Table is inherently complex, and thus subject to misinterpretation by external users or reviewers. This assessment did not include a review of other published data within the June Public Report beyond the Re-Default Table, and it did not assess the thoroughness of the footnotes regarding this table. We recommend Treasury look at ways to simplify the presentation and annotation of the information for future iterations of the table, once the corrected June 2010 Re-Default Table has been republished.

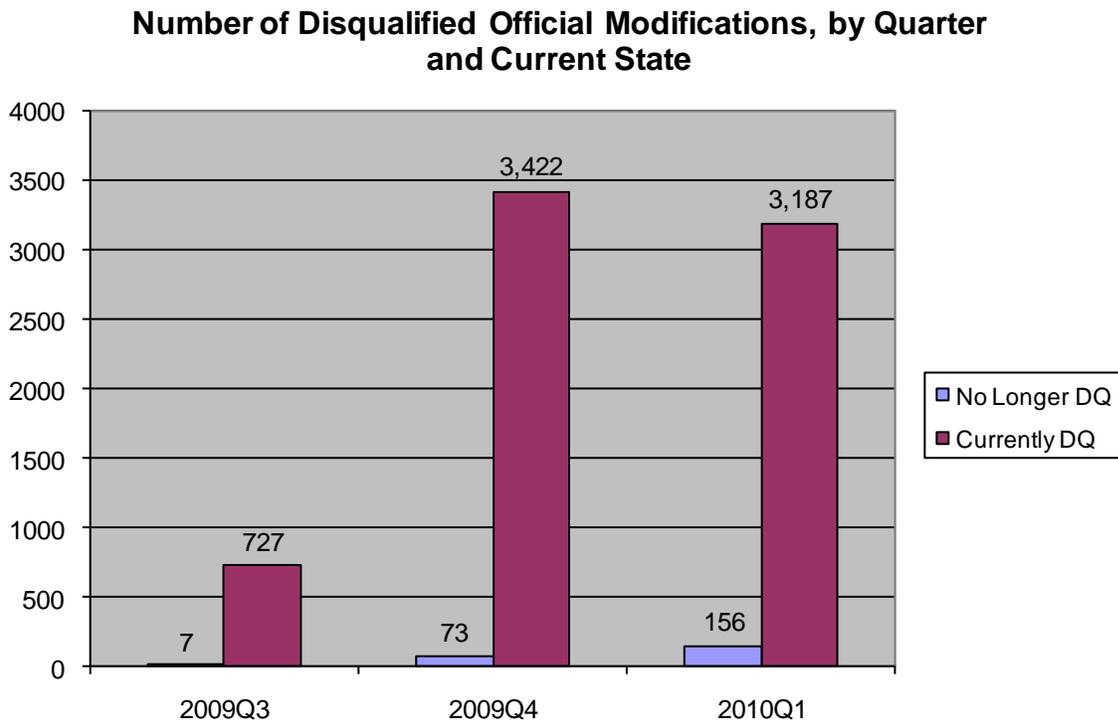
¹⁴ Refers to the Redefault Report Logic document provided to MITRE on July 28, 2010

Appendix A – Exhibits

A.1 Automated Code Set Calculations – Count of Official Modifications



A.2 Automated Code Set Calculations – Number of Disqualifications



A.3 Automated Code Set Calculations – Number of Modifications

Number of Official Modifications, by Quarter and Current Loan State

