



PERFORMANCE OF FANNIE MAE'S AND FREDDIE MAC'S SINGLE-FAMILY CREDIT RISK TRANSFER

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Acronyms

ACIS	Credit Insurance Structure
CAS	Connecticut Avenue Securities
CE	Credit Enhancement
CECL	Current Expected Credit Loss
CIRT	Credit Insurance Risk Transfer
CRT	Credit Risk Transfer
FHFA	Federal Housing Finance Agency
HERA	Housing and Economic Recovery Act of 2008
LIBOR	London Inter-Bank Offered Rate
LTV	Loan-to-Value
MBS	Mortgage-Backed Securities
MI	Mortgage Insurer
M-PIRe	Milliman's Mortgage Platform for Investments and Reinsurance
PMI	Private Mortgage Insurance
REMIC	Real Estate Mortgage Investment Conduit
RIF	Risk in Force
SOFR	Secured Overnight Financing Rate
SSRA	Supplemental Subordinate Reduction Amount
STACR	Structured Agency Credit Risk
UPB	Unpaid Principal Balance



Executive Summary

In 2013, Fannie Mae and Freddie Mac (the Enterprises) launched their credit risk transfer (CRT) programs. Under the CRT programs, and under the oversight of the Federal Housing Finance Agency (FHFA) as conservator, the Enterprises have brought to market various credit risk sharing vehicles, including securities issuances, insurance/reinsurance transactions, senior/subordinate securities, and lender risk transfer transactions.¹ Across the different types of CRTs the basic transaction is the same: the Enterprises pay private market participants to assume a portion of the credit risk on particular pools of mortgages that the Enterprises guarantee. This report focuses on the performance of the two key single-family CRT vehicles – securities issuances (also called capital markets CRTs) and insurance/reinsurance transactions – which together account for about 90 percent of all CRT issuance. FHFA continues to assess the CRT programs, including their costs and benefits as well as the benefits and risks to the safety and soundness of the Enterprises, the Enterprises' ability to perform their statutory mission, and the liquidity, efficiency, competitiveness, and resiliency of the national housing finance markets.

The main findings of this report are as follows:

- *Enterprise Securities Issuance and Insurance/Reinsurance CRTs to Date*

Between July 2013 and February 2021, about \$126 billion of risk in force (RIF), or the Enterprises' maximum credit risk coverage, had been placed through securities issuance and insurance/reinsurance CRTs. Securities issuances' share was 74 percent of the combined RIF at issuance. As of February 2021, \$72 billion of the \$126 billion combined RIF at issuance remained in force.² The reference pools of mortgages underlying CRT transactions ("reference pools") as of February 2021 represented \$1.7 trillion in unpaid principal balance (UPB) or about 31 percent of the Enterprises' combined single-family UPB.

At issuance, the notional amount of the RIF of securities issuance CRTs is collateralized by cash proceeds from the sale of the securities, and the proceeds' balance declines as principal is returned to the CRT investors and as the Enterprises recover covered credit losses. By contrast, insurance/reinsurance transactions are underwritten primarily to the financial strength of the counterparties, and as a result these transactions are not fully collateralized. As of February 2021, only about 26 percent of the notional amount of the RIF of insurance/reinsurance transactions at issuance was secured by collateral (cash and non-cash assets). The Enterprises recover covered credit losses via reimbursements from insurance/reinsurance counterparties

¹ After evaluation by FHFA of the Lender Risk Sharing CRT programs, the Enterprises gradually wound down these programs by the end of 2020.

² For a more detailed explanation of RIF and how it can decline over time, see "History, Purpose, and Typical Structural Design of CRTs."



and, if needed, from posted collateral. There are costs associated with the management of both collateral and counterparty risk in insurance/reinsurance transactions that are not present in securities issuances.

- *Net Cost of the Enterprises' Securities Issuance and Insurance/Reinsurance CRTs*

As of February 2021, the Enterprises had paid approximately \$15.0 billion in interest and premiums to CRT investors and counterparties and the Enterprises had received approximately \$0.05 billion via investor write downs and counterparty reimbursements, covering about 5 percent of historic losses on the reference pools. To date, the only CRT tranches or layers that have incurred write downs or counterparty reimbursements (i.e., benefits to the Enterprises) have been in a few transactions issued in 2015, 2017, and 2018 in which the Enterprises sold first-loss tranches or layers. No other tranches or layers sold to investors or counterparties have resulted in benefits for the Enterprises to date.

From securities issuance and insurance/reinsurance CRTs, the Enterprises' net cost³ – defined as CRT benefits (investor write downs and counterparty reimbursements) minus CRT costs (interest and premiums) – is as follows:

- **Through February 2021:** \$15.0 billion.
- **Projected Lifetime⁴** (i.e., the sum of \$15.0 billion in net cost through February 2021 plus projected net cost over the remaining lifetime of active CRTs):
 - **Baseline Scenario:** \$32.6 billion under a baseline scenario in which CRTs are forecast to cover about 16 percent of ultimate losses on reference pools.
 - **2007 Replay:** \$20.6 billion under a severely stressed scenario that includes housing prices and market conditions, beginning in May 2021, similar to those of the 2008 financial crisis and in which CRTs are forecast to cover about 24 percent of ultimate losses on reference pools.

³ The net cost does not account for relief from capital requirements, imputed capital constraints, imputed or actual costs of capital, syndicate fees or other upfront and ongoing fees that are paid by the Enterprises, or potential excess interest that may be earned on the proceeds of the sale of securities issuance CRTs.

⁴ Scenario analysis using Milliman's residential mortgage model M-PIRe is as of end-April 2021, and therefore this report's estimate of the Enterprises' historic and projected CRT net cost will differ from an estimate of the Enterprises' expected CRT net cost conducted at issuance of each transaction. The estimates are based on Milliman's assumptions, including an average probability of default and loss-given default of approximately 1.5 percent and 12 percent, respectively, under the baseline scenario and 3.4 percent and 25 percent, respectively, under the 2007 Replay. Assumptions of the probability of default and loss-given default are subject to model risk, and losses (and the Enterprises' net costs) would be lower (higher) if the probability of default and/or the loss-given default were higher (lower).



- *Loss-timing and Other Risks Exposed by the COVID-19 Stress*

In March 2020, financial markets experienced a serious liquidity disruption, investor uncertainty around mortgage performance was high, and the Enterprises paused new CRT issuance.⁵ Although mortgages acquired by the Enterprises have performed better (as of end-February 2021) than many predicted at the onset of the COVID-19 pandemic, the increase in delinquencies in mid-2020 after a period of fast prepayments that reduced the coverage for credit losses illustrated that the amount of credit risk coverage available in a stressed environment may be less than the amount needed to redress the risk remaining in the reference pool. The COVID-19 stress also highlighted that the performance of CRT structures remains untested by a widespread serious loss event.

- Concerns have been raised that CRT markets may be easily disrupted during periods of market stress, requiring the Enterprises to retain credit risk they had planned to transfer. The experience during and after the COVID-19 stress offers some support to these concerns. Following the immediate onset of COVID-19 in the United States, financial markets, including CRT markets, experienced a liquidity shock, and spreads widened significantly. There were no CRT issuances in the second quarter of 2020. However, as housing markets rebounded from the COVID-19 stress in the second half of 2020, Freddie Mac resumed CRT issuance at an accelerated pace in July. By the end of 2020, Freddie Mac's CRT RIF relative to its single-family UPB was higher than it was in December 2019. Fannie Mae had not resumed its CRT issuance as of end-February 2021.⁶
- The extent of CRT coverage over time depends on the rate of prepayment and delinquencies of mortgages in reference pools. Loss-timing risk is the risk that reference pool losses occur after a CRT's credit risk protection for the Enterprises has been reduced – for example, when increased delinquencies follow a period of high prepayments.

Many securities issuance and some insurance/reinsurance CRTs have triggers that suspend prepayments to investors and counterparties when delinquencies exceed certain thresholds. These triggers are intended to preserve the CRT coverage for the future realization of losses. Starting in mid-2019 and accelerating between March and June 2020, CRT structures were rapidly paying down as the low interest rate environment drove increased prepayments of the mortgages in the reference pools.

⁵ In March 2020, Fannie Mae issued two front-end CIRT transactions with reference pools of approximately \$40 billion in unpaid principal balance and a 12-month fill-up period covering acquisitions between February 2020 and January 2021.

⁶ A complicating factor in understanding CRT issuance in the middle and latter half of 2020 is that, on May 20, 2020, FHFA issued a notice of proposed rulemaking to establish a new Enterprise Regulatory Capital Framework for the Enterprises.



However, delinquency rates did not exceed the delinquency thresholds until mid-summer of 2020, or delinquency thresholds were not binding, and therefore the allocation of prepayments to CRT investors and counterparties continued to rapidly pay down the level of credit risk coverage. As a result, by September 2020, just after COVID-related delinquencies had begun to increase, almost all of the most senior investor tranches/layers in CRTs issued before 2020 had been fully paid off. The risk is that, as a structure's credit risk coverage is being paid down, the riskiest mortgages are most likely to remain in the reference pool because they are generally the least likely to prepay.

- CRTs remain untested by a serious loss event. However, the prospect of potential future losses at the onset of COVID-19 raised questions from certain investors. Some of these CRT investors suggested that their willingness to continue to invest in CRTs was contingent on the Enterprises' amending or suspending certain contractual provisions of early fixed-severity securities issuance CRTs. The Enterprises affirmed that COVID-related forbearance mortgages would be treated as specified in the contracts and disclosures.

- *Areas for Research and Analysis*

There are several areas of the Enterprises' CRT programs, the full treatment of which is beyond the scope of this report, that deserve research and analysis:

- **Measurement Issues:** There are several challenges to accurately measuring the amount of credit risk that is transferred via CRTs and how that amount changes over time. Also, there is a lack of clarity regarding CRT-related costs and benefits beyond the costs (interest and premiums) and benefits (investor write downs and counterparty reimbursements) considered in this report, including upfront costs (e.g., syndicate fees), ongoing costs (e.g., asset management fees), and potential excess interest that may be earned on the cash raised from securities issuance CRT investors.
- **Counterparty Risk:** Insurance/reinsurance CRTs pose counterparty risk to the Enterprises because the transactions are not fully collateralized. Additionally, the Enterprises' exposure to non-diversified counterparties creates wrong-way risk for the Enterprises, which is the risk that arises when an exposure to a counterparty is positively correlated with the probability of default of that counterparty. The Enterprises engage in a variety of approaches to mitigate counterparty risk posed by insurance/reinsurance CRTs. Research and analysis are needed to better understand related costs and benefits and potential risks to the Enterprises.
- **Structuring Issues:** The amount of CRT coverage and the length of time that coverage should persist are areas for continued research and analysis. Such research and analysis should consider lessons from the COVID-19 stress, including that triggers used to protect any given level of credit risk coverage may not adequately reduce loss-timing



risk under certain prepayment scenarios. Also, research is warranted to consider whether changing the size of the first-loss tranche/layer could be valuable.

- **Pricing:** An expected benefit of the CRT market was that transactions would reveal pricing information about credit risk, recognizing that CRT pricing should reflect both credit and prepayment risks. However, several facts suggest that the information about credit risk derived from CRT pricing to date may be of limited value. First, the results of the syndication process by which securities issuance CRTs are priced suggest that prices may not be equilibrating supply and demand. Second, some senior investor tranches have such short duration that prices may reflect more information about prepayment risks than credit risks. Third, transferring some of the expected loss risk, as the Enterprises have done in a few CRT transactions between 2015 and 2018, may provide valuable pricing information, yet in most CRT structures, the Enterprises have retained the entirety of the most subordinate tranche/layer.



Introduction

Pursuant to the Federal Housing Enterprises Financial Safety and Soundness Act of 1992⁷ (Safety and Soundness Act), as amended by the Housing and Economic Recovery Act of 2008⁸ (HERA), the FHFA Director's principal duties include, among others, ensuring that each Enterprise operates in a safe and sound manner, that the operations and activities of each Enterprise foster liquid, efficient, competitive, and resilient national housing finance markets, and that each Enterprise carries out its statutory mission only through activities that are authorized under and consistent with the Safety and Soundness Act and its charter.⁹ Pursuant to their charters, the statutory purposes of the Enterprises are, among others, to provide stability in, and ongoing assistance to, the secondary market for residential mortgages across the economic cycle.¹⁰

Consistent with these statutory duties, and given the growth, size, and complexity of the CRT market, in 2019, FHFA called for a comprehensive review of the Enterprises' CRT programs.¹¹ As an initial step toward a comprehensive review, this report:

1. Provides an overview of the history and purpose of the Enterprises' CRT programs and the basic features of the most common CRT vehicles;
2. Describes CRT activity to date, including estimates of the net costs of the Enterprises' CRT programs;
3. Discusses the performance of CRT structures during and following the initial COVID-19 stress; and
4. Identifies areas for research and analysis to assess potential risks to the ability of each Enterprise to operate in a safe and sound manner and perform its statutory mission or to the liquidity, efficiency, competitiveness, or resiliency of the national housing finance markets.

⁷ Pub. L. No. 102-550, 106 Stat. 3941 (1992).

⁸ Pub. L. No. 110-289, 122 Stat. 2654 (2008).

⁹ 12 U.S.C. § 4513(a)(1).

¹⁰ *Id.* 12 U.S.C. §§ 1451 (note), 1716.

¹¹ See The 2019 Strategic Plan for the Conservatorships of Fannie Mae and Freddie Mac *available at*: <https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/2019-Strategic-Plan.pdf>; 2020 Scorecard for Fannie Mae, Freddie Mac, and Common Securitization Solutions *available at*: <https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/2020-Scorecard-10282019.pdf>; FHFA's 2019 Report to Congress *available at*: https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/FHFA_2019_Report-to-Congress.pdf.



This report is timely and important for several reasons. First, the market created by the Enterprises' CRT programs has existed for nearly 8 years, providing data, some of which is presented in this report, from which to begin to assess the CRT programs' performance. Second, the market disruptions in 2020 caused by the impacts of COVID-19 tested the CRT structures in a globally stressed environment, raising important issues that deserve attention and analysis. Third, there will likely be opportunities to optimize the design of future CRT structures' attachment and detachment points, triggers, collateralization, and other terms in light of several developments in the regulatory environment – including the recently finalized Enterprise Regulatory Capital Framework for the Enterprises (capital rule) and the adoption of the Current Expected Credit Loss (CECL) accounting methodology – and changes in the financial condition of the Enterprises (e.g., the retention of earnings and the prospect of raising private capital). Fourth, reviewing the performance of the CRT programs is essential to inform the policies and standards that FHFA establishes to guide the development of these programs.

History, Purpose, and Typical Structural Design of CRTs

I. History and Purpose of the CRT Programs

The Enterprises acquire single-family mortgages from mortgage companies, commercial banks, credit unions, and other financial institutions. The Enterprises transform bundles of those mortgages into collateral for mortgage-backed securities (MBS) and sell to investors a portion of the cash flows that come, via mortgage servicers, from the mortgages underlying the MBS. The Enterprises guarantee the principal and interest payments to investors and collect a guarantee fee from sellers.

Any financial institution that holds mortgages on its balance sheet is subject to both credit risk and interest rate risk. For mortgages that are securitized, interest rate risk is transferred to MBS investors through the sale of Enterprise-backed MBS, while the guarantee insulates these investors from credit risk. The intent of guaranteeing credit risk is to increase investor participation in MBS. Historically, there were two principal mechanisms the Enterprises used to manage their credit risk. First, the Enterprises' charter acts require any mortgage with a loan-to-value (LTV) ratio greater than 80 percent – i.e., the mortgage's outstanding principal balance exceeds 80 percent of the value of the property – to have one of three charter-eligible forms of loan-level credit enhancement: (i) private mortgage insurance (PMI), (ii) a Seller agreement to repurchase or replace the mortgage upon default, or (iii) a Seller-retained participation in the mortgage. PMI is the form of loan-level credit enhancement used most often.



Second, a portion of the guarantee fee that the Enterprises collect is intended to cover expected credit losses from borrower defaults over the life of the mortgages that exceed the credit protection provided by borrower equity and PMI (or one of the other two forms of charter-eligible loan-level credit enhancement). The remainder of the guarantee fee collected by the Enterprises covers administrative costs and the cost of holding the capital required to protect against credit losses anticipated during stressful macroeconomic conditions.¹²

In February 2012, FHFA released a Strategic Plan for Enterprise Conservatorships that identified several steps that FHFA and the Enterprises would pursue to “[shift] mortgage credit risk from the Enterprises (and, thereby, taxpayers) to private investors.”¹³ Some of these steps built on the two principal credit risk management mechanisms discussed above. For instance, FHFA reiterated its intention to continue a path of gradual increases of guarantee fee pricing “based on risk and the cost of capital” as a means to “move [the Enterprises’] pricing structure closer to the level one might expect to see if mortgage credit risk was borne solely by private capital.” FHFA also contemplated different ways to expand the Enterprises’ “reliance on mortgage insurance.” Other steps, however, sought to establish new mechanisms for the Enterprises to manage credit risk, including “loss-sharing agreements” and “pool-level insurance policies.”

Pursuant to FHFA guidelines, Freddie Mac brought to market the first securities issuance CRT in July 2013, which FHFA’s then Acting Director described as “a key step in the process of attracting private capital back to the U.S. housing finance market.”¹⁴ This was followed by Fannie Mae’s first securities issuance CRT offering in October 2013. Freddie Mac and Fannie Mae issued their first insurance/reinsurance CRTs in November 2013 and December 2014, respectively. In January 2014, FHFA discontinued the third step identified in the 2012 Strategic Plan for Enterprise Conservatorships and cancelled the guarantee fee increase that had been scheduled to go into effect in May 2014.

Since 2013, the Enterprises, under the oversight of FHFA as conservator, have brought to market various credit risk sharing vehicles, including securities issuances, insurance/reinsurance

¹² Currently, the guarantee fee also includes a charge of 10 basis points as required by Section 401 of the Temporary Tax Cut Continuation Act of 2011, codified at 12 U.S.C. § 4547. See FHFA’s Fannie Mae and Freddie Mac Single-Family Guarantee Fees in 2019 available at: <https://www.fhfa.gov/AboutUs/Reports/Pages/Fannie-Mac-and-Freddie-Mac-Single-Family-Guarantee-Fees-in-2019.aspx>.

¹³ *A Strategic Plan for Enterprise Conservatorships: The Next Chapter in a Story that Needs an Ending*, Federal Housing Finance Agency, page 15, available at: https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/20120221_StrategicPlanConservatorships_508.pdf

¹⁴ *Statement of FHFA Acting Director, Edward J. DeMarco, on Freddie Mac Risk-Sharing Transaction*, Federal Housing Finance Agency, July 24, 2013, available at: <https://www.fhfa.gov/Media/PublicAffairs/Pages/Statement-of-FHFA-Acting-Director-Edward-J-DeMarco-on-Freddie-Mac-RiskSharing-Transaction.aspx>



transactions, senior/subordinate securities, and lender risk transfer transactions.¹⁵ Across the different types of CRT vehicles the basic transaction is the same: the Enterprises pay private market participants to assume a portion of credit risk on mortgages that the Enterprises guarantee. This report focuses on the performance of the two key single-family CRT vehicles – securities issuances and insurance/reinsurance transactions – which together account for about 90 percent of all CRT issuance.

Below is an overview of the typical structures of both securities issuances and insurance/reinsurance transactions.

II. Basic Features of the Most Common CRT Vehicles

In this report, the private market participants that the Enterprises pay to assume a portion of their mortgage credit risk are referred to as “investors” for securities issuances and “counterparties” for insurance/reinsurance transactions; the payments that the Enterprises make to investors and counterparties to compensate them for the risk they assume are referred to as “interest” and “premiums,” respectively; and the portions of investors’ principal that cover credit losses incurred by the Enterprises and that are not returned to the investors are referred to as “investor write downs,” while the counterparties’ claims payments that cover credit losses incurred by the Enterprises are referred to as “reimbursements.” Within securities issuance and insurance/reinsurance CRTs, investments in portions of notional reference pool UPB are bundled into different priority claims generally referred to as “tranches” for securities issuances and “layers” for insurance/reinsurance transactions.

Finally, covered credit losses refer to credit losses on the reference pool net of (i) losses covered by the PMI on mortgages with LTVs in excess of 80 percent and (ii) losses covered by any tranche/layer (or portion thereof) held by the Enterprises. Typically, CRT investors and counterparties are not obligated to cover losses that are the contractual responsibility of PMI, and losses net of PMI are applied to the structure. Therefore, if the mortgage insurer (MI) does not make the payment necessary to fulfill its credit loss coverage obligations, the Enterprises must cover those losses as CRTs do not provide a “back-up” source of credit loss coverage.

¹⁵ After evaluation by FHFA of the Lender Risk Sharing CRT programs, the Enterprises gradually wound down these programs by the end of 2020.



Two common concepts used to describe the credit risk protection provided by CRT transactions are risk in force (RIF) and credit enhancement (CE).¹⁶ RIF is the maximum coverage amount that a CRT structure provides the Enterprises.¹⁷ From the perspective of investors and counterparties, RIF is a measure of the maximum credit risk *exposure* transferred to them by a CRT structure. CE, also called the subordinate level or percentage, is a measure of the credit risk protection provided to a tranche/layer by all the subordinate tranches/layers of a structure. Generally, and in this report, CE refers to the credit risk protection provided to the Enterprise-held senior-most tranche/layer, which includes the RIF of all tranches/layers sold to investors/counterparties and any others that are held by the Enterprises (together referred to as the subordinate tranches/layers).

The cash flows of securities issuance and insurance/reinsurance CRTs are determined by the repayment and credit performance of a particular reference pool of mortgages that serves as collateral for Enterprise-guaranteed MBS. Any covered credit losses, as determined by the terms of a CRT transaction, reduce the notional amount of UPB remaining in the CRT structure. For both types of CRTs, the Enterprises generally construct the reference pools such that each pool is made up of mortgages that have at issuance an LTV ratio of either 60.01-80 percent (low-LTV) or 80.01-97 percent (high-LTV). Since 2013, the Enterprises have experimented with new CRT structural features (selling the first-loss tranche/layer, changing the attachment and detachment points, introducing new types of triggers, etc.) and reference pool characteristics (seasoned mortgages and high-LTV collateral).

A. Securities Issuances

The Enterprises' securities issuance CRTs are Fannie Mae's Connecticut Avenue Securities (CAS) and Freddie Mac's Structured Agency Credit Risk (STACR) securities. This section provides an overview of the basic structure of securities issuance CRTs, the cash collateral raised from investors, the determination of covered credit losses, the determination of cash flows, and early redemption provisions.

¹⁶ This is not to be confused with the three forms of loan-level credit enhancement, e.g., PMI, that the Enterprises' charter acts require mortgages with an LTV ratio greater than 80 percent to have in order to be eligible for Enterprise acquisition.

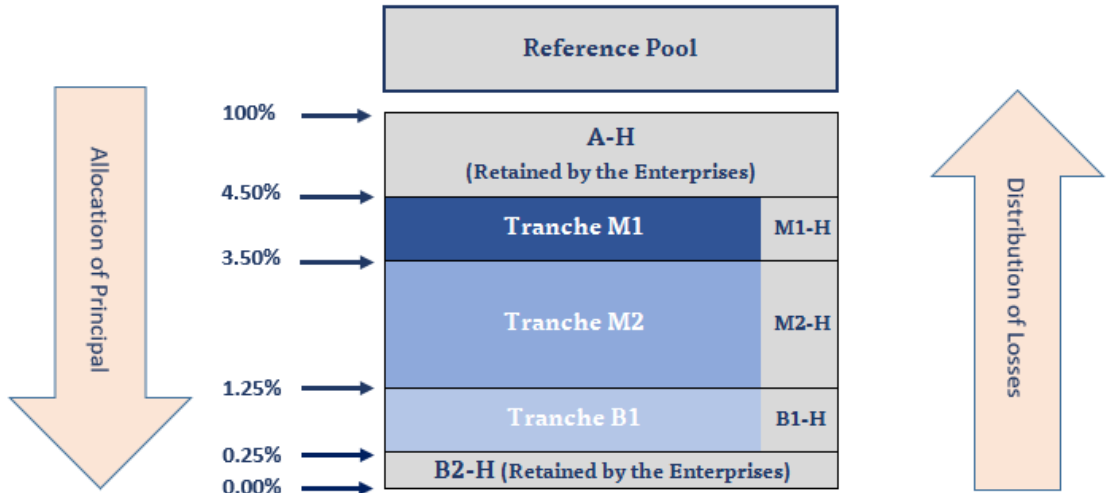
¹⁷ RIF is measured as the sum of the tranches/layers that are sold to investors and counterparties. In securities issuance CRTs, RIF equals the sum of the notional amounts of investor-held tranches. In insurance/reinsurance CRTs, RIF equals the aggregate loss amount less the first-loss layer if that layer is retained by the Enterprises.



Basic Structure

Exhibit 1 depicts the structure of a hypothetical securities issuance CRT. A reference pool of mortgages is divided into portions of notional UPB called “tranches.” Tranches or portions of tranches are either retained by the Enterprises or sold to investors.¹⁸ The amount of risk intended to be borne by a tranche decreases with its seniority in the structure, with the most senior tranche, A-H, bearing the least risk and the subordinate tranches bearing an increasing amount of risk, moving from the top to the bottom of the stack. This is due to the fact that credit losses are distributed to the tranches sequentially starting from the most junior subordinate tranche at the bottom of the structure, while principal is allocated to the tranches starting from the most senior at the top of the structure. The Enterprises hold the senior tranche (A-H), typically the first-loss tranche (B2-H in this example), and vertical slices equal to 5 percent of all tranches that are sold to investors.¹⁹ Generally, the investors invest in the mezzanine M-level tranches and some junior B-level tranches, and to date investors only infrequently obtain part of the first-loss tranche.

Exhibit 1: Typical Structure of Securities Issuance CRTs



¹⁸ Each tranche is defined by its attachment point and detachment point, both of which are expressed as a proportion of the reference pool’s UPB. The attachment point equals the minimum amount of reference pool losses at which the tranche begins to incur losses and the detachment point represents the amount of losses that would completely wipe out the tranche’s principal. For example, in Exhibit 1, Tranche M2 begins to incur losses at 1.25% of covered credit losses and continues to incur losses up to 3.5%, at which point losses start to be allocated to Tranche M1. The “H” designates tranches, or portions of them, that are not issued or sold. The risk corresponding to such portions is retained by the Enterprises

¹⁹ Originally, the first-loss tranche retained by the Enterprises was B-H. Over time transactions have introduced B2-H and B3-H.



Cash Collateral Raised from Investors

The notional amount of the RIF at issuance of securities issuance CRTs are collateralized by cash proceeds from the sale of the securities. The proceeds are retained either in a cash account (in the direct debt structures) or a segregated account (in the real estate mortgage investment conduit (REMIC) or other trust structures) and invested in short-term liquid assets. The proceeds' balance declines as principal is returned to the CRT investors and as the Enterprises recover covered credit losses.

Covered Credit Losses

Beginning in 2013, the Enterprises' securities issuance CRTs used a fixed-severity structure that assigns losses when a mortgage is 180 days or more delinquent. Losses are calculated using pre-determined severity schedules. This structure generally determines the amount of investor write downs as soon as mortgages are 180 days delinquent, and therefore the predetermined investor write downs may result in more or less protection to the Enterprises than the losses that are ultimately incurred. In 2015, the Enterprises shifted to actual loss structures in which losses are determined by actual losses incurred on the mortgages in the reference pool.

Determination of Cash Flows

Initially, both the fixed-severity and actual loss CRTs were issued as direct debt transactions in which the payments to the investors are unsecured Enterprise obligations. In 2018, Freddie Mac achieved insurance accounting treatment of their deal structures that allowed some benefits of CRT to be recognized earlier at the time when credit expenses were recognized under stressful economic conditions, and Fannie Mae achieved the same by shifting to a REMIC structure. In 2019, Freddie Mac also shifted to a REMIC structure. In the REMIC structure a bankruptcy-remote REMIC trust issues the securities and the proceeds from the sale of the securities are invested in short-term liquid assets. Investments are liquidated to return principal to investors, and interest payments to investors (typically tied to London Inter-bank Offered Rate (LIBOR) or Secured Overnight Financing Rate (SOFR)) are paid from the returns on those investments. The Enterprises are responsible for any shortfalls between the interest earned on the investments and the LIBOR/SOFR amounts payable to CRT investors.²⁰

²⁰ The Enterprises are contractually obligated to cover any LIBOR/SOFR interest shortfall. The Enterprises ceased LIBOR-indexed CRT transactions after 2020. Freddie Mac's 2021 transactions are SOFR-indexed CRTs.



While the calculation of losses and legal structure at issuance has varied over time, losses net of MI recoveries are always distributed sequentially starting with the most junior subordinate tranche and then moving up the structure. On a monthly basis, CRT investors receive interest (based on LIBOR/SOFR plus a spread) and a return of principal less any covered credit losses. The allocation of principal payments to investor tranches is based on a set of rules conditional on two to four credit performance thresholds (or triggers) related to actual losses, delinquency levels, and CE (see “Box: CRT Trigger Thresholds” below). The notional UPB of a securities issuance is designed to amortize alongside the reference pool of mortgages. The investors do not receive any principal payments if the mortgage borrower misses their principal payments.

For most securities issuance CRTs, scheduled principal payments are allocated to the senior A-H tranche and the subordinate tranches pro rata according to the current level of CE.²¹ Among the subordinate tranches, scheduled principal payments are allocated sequentially starting with the most senior. As principal on the reference pool is paid down, the CE levels increase since the prepayments are initially directed only to the senior A-H tranche until a pre-specified CE threshold is met and delinquency and/or actual loss levels are below pre-specified thresholds. Once these conditions are satisfied, prepayments are allocated to the senior A-H tranche and the subordinate tranches pro rata according to the current CE level.

Among the subordinate tranches, prepayments are allocated sequentially, with the most senior investor tranche receiving all prepayments until it is fully paid down. In 2018 and 2019, the Enterprises added the Supplemental Subordinate Reduction Amount (SSRA) threshold to the REMIC structure that suspends the delinquency trigger if a pre-specified higher CE threshold is met. This threshold allows subordinate tranches to receive unscheduled principal allocations if the SSRA threshold is reached regardless of the delinquency levels.²²

²¹ The exceptions are STACR issuances starting with 2018-DNA3, in which the subordinate tranches were locked out from scheduled principal allocation if the structure failed any of the three tests.

²² The exceptions are those discussed in footnote 21.



Box: CRT Trigger Thresholds

The scheduled and/or unscheduled principal payments to the subordinate tranches are suspended if one or more of the following key triggers breach pre-specified thresholds:

- Delinquency levels greater than 40 percent (using six-month rolling 90 days past due average) and 50 percent (using six-month rolling 60 days past due average plus any modifications during the last 12-months) of all subordinate tranche UPB for CAS and STACR, respectively;
- CE below pre-specified threshold that varies from 3.75 percent to 6.9 percent; and
- SSRA below pre-specified threshold that varies between 5.25 percent and 6.15 percent.

Note: STACR also has a net loss trigger.

Early Redemption Provisions

In 2013, when the Enterprises introduced fixed-severity CRTs, the structures had a 10-year final legal maturity term. Under this structure, the early redemption provision allowed the Enterprises to redeem the outstanding tranches prior to the maturity date when the UPB of the reference pool is equal to or less than 10 percent of the reference pool UPB at issuance (known as a 10 percent clean-up call). In Q2 2015, when the Enterprises transitioned to actual loss CRTs, the final legal maturity term increased to 12.5 years. In addition, the Enterprises added a 10-year call option to their early redemption provisions, i.e., the Enterprises may redeem the outstanding tranches prior to the maturity date at the earlier of (1) 10 percent clean-up call or (2) the 10-year maturity call. In July 2019, Fannie Mae changed the final legal maturity to 20 years and changed the previous 10-year call option to a 7-year call option to improve the deal economics. As of February 2021, Freddie Mac removed the 10-year call option.²³

²³ FHFA's capital rule provides capital relief only for limited clean-up calls.



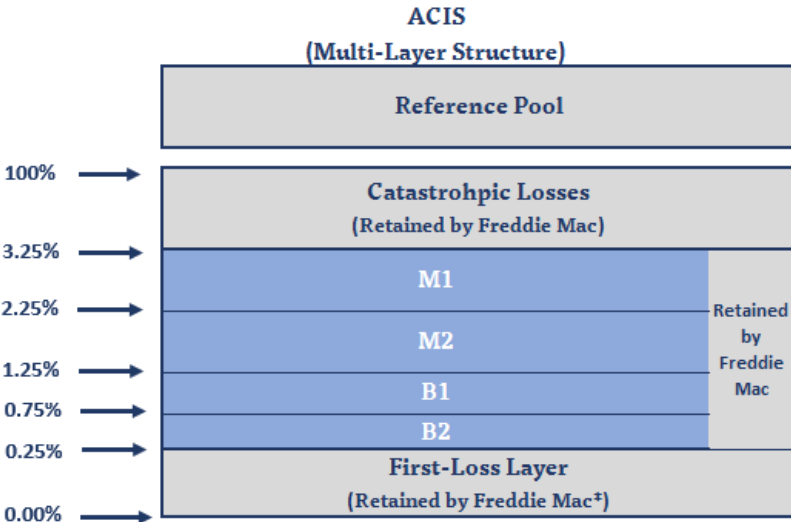
B. Insurance/Reinsurance Transactions

The Enterprises' insurance/reinsurance transactions are Fannie Mae's Credit Insurance Risk Transfer (CIRT) and Freddie Mac's Agency Credit Insurance Structure (ACIS). This section provides an overview of the basic structure of insurance/reinsurance transactions and determination of covered credit losses, the collateral posted by counterparties, the determination of cash flows, and early redemption provisions.

Basic Structure

Freddie Mac's insurance/reinsurance transactions typically follow a structure like that of its securities issuance CRTs (as shown in Exhibit 2a), while Fannie Mae's insurance/reinsurance transactions are structured to sell only one layer to counterparties (as shown in Exhibit 2b). Freddie Mac's insurance/reinsurance CRTs either share a reference pool with a securities issuance CRT or are issued as stand-alone transactions, while Fannie Mae's insurance/reinsurance CRTs are issued as stand-alone transactions. In the typical insurance/reinsurance transaction, the applicable coverage or RIF applies only once credit losses incurred by the Enterprises reach a specified aggregate amount analogous to a first-loss amount in securities issuances. Generally, insurance/reinsurance transactions are issued as back-end transactions where the arrangement of the risk transfer occurs after the acquisition of mortgages by an Enterprise. However, to address pipeline or aggregation risk during the period between mortgage acquisition and back-end execution, the Enterprises introduced forward transactions where the arrangement of the risk transfer occurs prior to, or simultaneous with, the mortgage acquisition.

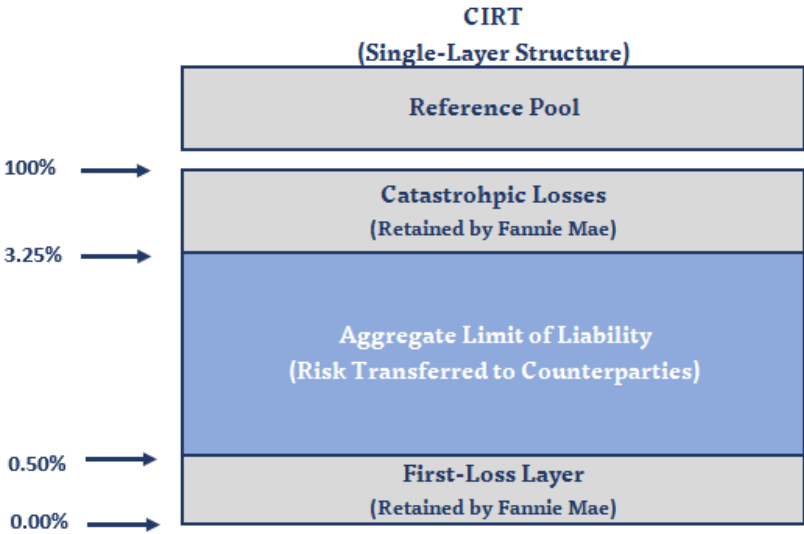
Exhibit 2a: Hypothetical Multi-Layer Insurance/Reinsurance CRT Structure



* Some ACIS issued in 2015 through 2018 transferred the first-loss layer to counterparties.



Exhibit 2b: Hypothetical Single-Layer Insurance/Reinsurance CRT Structure



Collateral Posted by Counterparties

Insurance/reinsurance transactions are underwritten primarily to the financial strength of the counterparties, and as a result these transactions are not fully collateralized. Counterparties post collateral – cash and non-cash assets with a fair market value equal to a portion of the applicable RIF – that is held in trusts for the ultimate benefit of the Enterprises. Table 1 presents the average collateral posted by the 50+ counterparties involved in the insurance/reinsurance transactions grouped by credit rating. Although each Enterprise has its own counterparty credit rating system, most counterparties with a third-party rating of A or higher have posted on average less than 30 percent of RIF as collateral.²⁴

The Enterprises are exposed to counterparty risk since the fair market value of the collateral backing insurance/reinsurance transactions equals only a portion of the transaction’s RIF. While lower-rated counterparties pose higher risk to the Enterprises, they are also subject to higher collateral requirements (see Table 1).²⁵ The idiosyncratic counterparty risk due to a single poor performing pool is mitigated by cross collateralizing the transaction through the use of a central

²⁴ If a counterparty’s rating declines, generally below A- levels, then certain features are triggered to either reduce premium payments (e.g. premium capture features in CIRTs) or require additional collateral.

²⁵ For ACIS, the amount of collateral required of counterparties also increases with the risk of the layer.



“protected cell” counterparty that issues the insurance policy. The reinsurance is acquired on a quota share basis. The quota share contract splits the CRT’s credit risk across multiple reinsurance counterparties, with each reinsurer taking a certain percentage of the risk.

Table 1: Collateral Posted and RIF by Insurance/Reinsurance Counterparty Ratings

AM BEST Rating	Number of Counterparties	At-Issuance Collateral (\$M)	At-Issuance Collateral / At-Issuance RIF (%)	Current Collateral (\$M)	Current Collateral / Current RIF (%)
A++	2	73	9%	77	18%
A+	17	3,611	20%	3,255	22%
A	24	2,317	25%	2,032	29%
A-	7	630	33%	448	46%
NR	2	272	58%	250	67%
Total	52	6,903	22%	6,063	26%

Determination of Cash Flows

On a monthly basis, CRT counterparties receive premium. In CIRT transactions, after a lock-out period as specified in the insurance policy, the aggregate limit of liability (or RIF) is designed to be reduced (or to step down) monthly subject to triggers related to the balance of delinquent mortgages in the reference pools. In contrast to CIRT’s step down provisions, the reduction of the limit of liability for ACIS transactions is governed by the same triggers that are in STACR transactions.

Early Redemption Provisions

All insurance/reinsurance transactions also include a 10 percent clean-up call similar to early redemption provisions in securities issuance CRTs. However, the maturity-based call in CIRT transactions ranged from 48 months to 66 months increasing with the maturity term from 7.5 to 13 years. ACIS had a 10-year maturity call until 2017, and then it shifted to a 5-year maturity call until 2021. Starting in 2021, all ACIS transactions adopted a maturity term of 12.5 years with no voluntary call option.²⁶

²⁶ Terms vary for 15-20-year stand-alone ACIS deals.

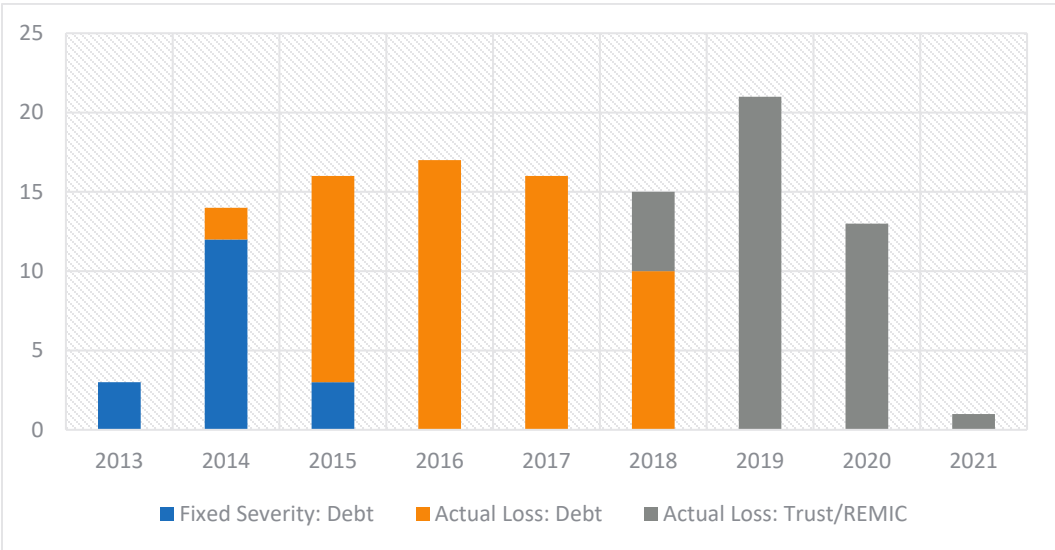


CRT Activity and Performance

Between the CRT programs' inception in 2013 and end-February 2021, the Enterprises issued the following CRTs on about 170 independent reference pools comprised of fixed-rate mortgages with LTV ratios greater than 60 percent and less than or equal to 97 percent and original terms of more than 20 years:²⁷

- 116 securities issuances:²⁸ 18 fixed-severity debt security issuances between 2013 and 2015, 58 actual loss debt transactions between 2015 and 2018, and 40 actual loss Trust/REMIC transactions since 2018. See Figure 1.
- 117 insurance/reinsurance transactions:
 - 59 stand-alone transactions and 58 shared transactions and
 - 104 back-end transactions and 13 front-end or forward transactions.
- 84 low-LTV and 91 high-LTV CRT transactions.²⁹
- LIBOR-indexed CRTs until September 2020 and SOFR-indexed CRTs thereafter (with six SOFR-indexed single-family CRTs issued since October 2020).

Figure 1: Counts of Securities Issuance CRTs: Fixed-Severity – Debt, Actual Loss – Debt, Actual Loss – Trust/REMICs

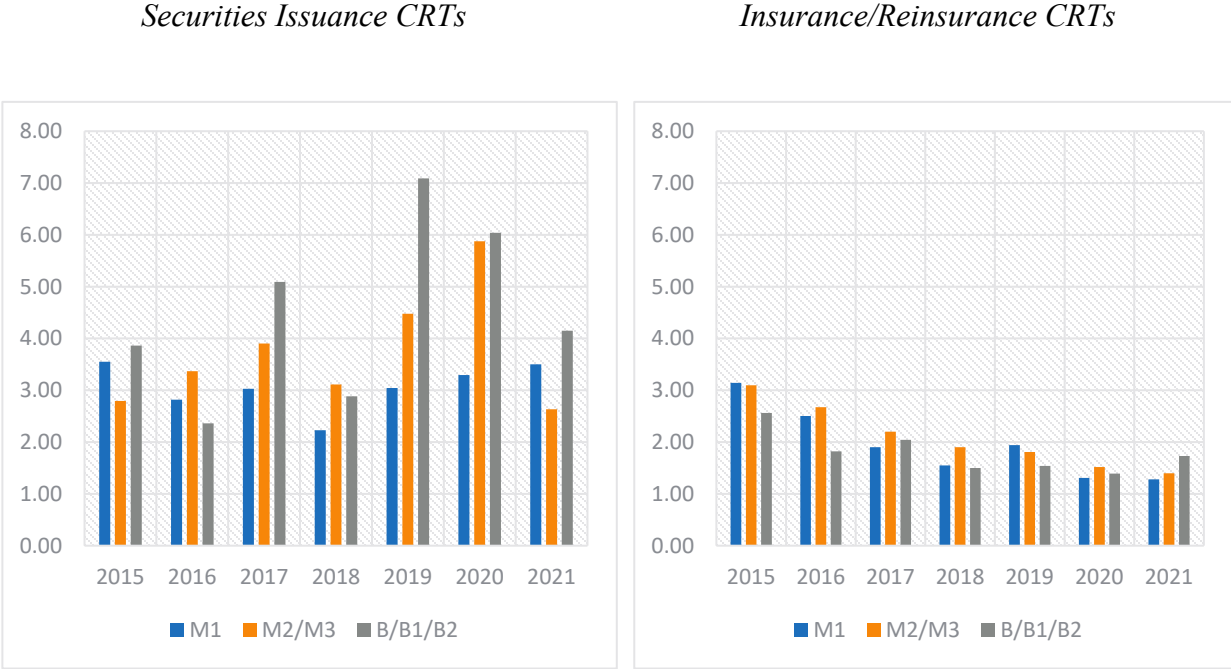


²⁷ Other minor exclusions apply, including Home Affordable Refinance Program and other special refinance programs.
²⁸ This report does not account for two CRT deals: one for which some data were missing and another that was issued end of February 2021.
²⁹ High-LTV includes some deals with 70 – 97.0 percent LTV mortgages.



Investor participation in CRT markets has been robust. The subscription levels of investor tranches of securities issuance CRTs – measured as total orders divided by total transaction size – have been consistently high. As shown in Figure 2, insurance/reinsurance transactions have subscription levels around two times the transaction size, whereas the subscription levels of securities issuance CRTs have mainly varied between two- and six-times transaction size over time.

Figure 2: Subscription Levels



At issuance, securities issuance and insurance/reinsurance CRTs transferred a total of \$125.9 billion of RIF on reference pools with a total UPB of \$3.8 trillion (see Table 2). On average, about 3.3 percent of UPB at issuance was transferred to CRT investors and counterparties to cover credit risk losses. The M2 investor tranche accounts for the largest slice (50 or more percent) of the total RIF.



Table 2: The Enterprises' Securities Issuance and Insurance/Reinsurance CRTs

	Reference Pool UPB (\$B)	Securities RIF (\$B)	Insurance/ Reinsurance RIF (\$B)	Total RIF (\$B)	Enterprise Retained First-Loss & Vertical Pieces (\$B)
At Issuance	\$ 3,801	\$ 93.22	\$ 32.66	\$ 125.88	\$ 15.8
As of Feb. 2021	\$ 1,683	\$ 49.20	\$ 22.72	\$ 71.92	\$ 13.6

The amount of credit risk protection that CRTs provide the Enterprises decreases as the principal balances of the reference pool mortgages are paid down. The Enterprises' credit risk protection decreases more quickly in fast prepayment environments provided that the delinquency and/or actual loss triggers that suspend prepayments to investors and counterparties are not met (see "Box: CRT Trigger Thresholds" above). As of the beginning of 2021, due to disruptions in the CRT market in mid-2020 (a slowdown in new CRT issuance) and unprecedented prepayment speeds, the reference pool UPB of active CRTs had declined from \$3.8 trillion to \$1.7 trillion and RIF had eroded from \$126 billion to \$72 billion (see Table 2).

I. Historic and Projected CRT Net Costs

As of the beginning of 2021, the Enterprises had made \$12.0 billion in interest payments to CRT investors and \$3.0 billion in premium payments to CRT counterparties, as illustrated in Table 3. As of the beginning of 2021, the Enterprises had received approximately \$0.03 billion via investor write downs and \$0.02 billion via counterparty reimbursements. To date, as shown in Table 3, the only CRT tranches or layers that have incurred investor write downs or counterparty reimbursements have been in a few transactions issued in 2015, 2017, and 2018 in which the Enterprises sold first-loss tranches (B-level tranches) or layers. The Enterprises' net cost from securities issuance and insurance/reinsurance CRTs was \$15 billion as of February 2021.³⁰ This represents nearly 7.5 percent of the Enterprises' combined net income since August 2013 and 8.6 percent of historic losses on reference pools.

³⁰ The net cost does not account for capital requirements, imputed capital constraints, imputed or actual costs of capital, syndicate fees or other upfront and ongoing fees that are paid by the Enterprises, or potential excess interest that may be earned on the proceeds of the sale of securities issuance CRTs.



Table 3: The Enterprises' Historic Net Cost (\$ billions) as of February 2021

<i>Tranche</i>	<i>Securities Issuances</i>		<i>Insurance/Reinsurance³¹</i>	
	<i>Interest Payments</i>	<i>Write downs</i>	<i>Premiums</i>	<i>Reimbursements</i>
M-level	\$ 9.42	\$ 0.00	\$ 2.44	\$ 0.00
B-level	\$ 2.56	\$ 0.03	\$ 0.60	\$ 0.02
Total	\$ 12.0	\$ 0.03	\$ 3.03	\$ 0.02

Incorporating historic performance with forward projections³² as of February 2021 using baseline and severely stressed (2007 Replay) scenarios in Milliman's residential mortgage model M-PIRe,³³ the projected net cost over the lifetime of all securities issuance and insurance/reinsurance CRTs is an estimated \$32.6 billion in the baseline scenario (Table 4a) and \$20.6 billion in the 2007 Replay scenario (Table 4b). The 2007 Replay models severely stressed housing prices and market conditions, beginning in May 2021, similar to those experienced in the 2008 financial crisis.

³¹ Freddie Mac's ACIS has multiple M-level layers, whereas Fannie Mae's CIRT has only one layer. In this report and in Tables 3, 4a, and 4b, the single layer of Fannie Mae's CIRT is included in M-level because the layer's attachment point is close to the attachment point of Freddie's M-level. B-level reflects only Freddie Mac's ACIS.

³² In Tables 4a and 4b, ultimate cost and ultimate benefit are the sum of (1) historic CRT costs and benefits through February 2021 plus (2) projected CRT costs and benefits over the expected remaining lifetime of active securities issuance and insurance/reinsurance CRTs as of end-April 2021.

³³ Scenario analysis is as of end-April 2021, and therefore this report's estimate of the Enterprises' historic and projected CRT net cost will differ from an estimate of the Enterprises' expected CRT net cost conducted at issuance of each transaction. The estimates are based on Milliman's assumptions, including an average probability of default and loss-given default of approximately 1.5 percent and 12 percent, respectively, under the baseline scenario and 3.4 percent and 25 percent, respectively, under the 2007 Replay. Assumptions of the probability of default and loss-given default are subject to model risk, and losses (and the Enterprises' net costs) would be lower (higher) if the probability of default and/or the loss-given default were higher (lower).



Table 4a: The Enterprises' Net Cost (\$ billions) under the Baseline Scenario

	<i>Ultimate Cost</i>	<i>Ultimate Benefit</i>	<i>Net Cost</i>
M-level	\$ 19.92	\$ 0.00	\$ 19.92
B-level	\$ 13.68	\$ 1.06	\$ 12.62
Total	\$ 33.60	\$ 1.06	\$ 32.55

Table 4b: The Enterprises' Net Cost (\$ billions) under the 2007 Replay

	<i>Ultimate Cost</i>	<i>Ultimate Benefit</i>	<i>Net Cost</i>
M-level	\$ 18.83	\$ 1.43	\$ 17.40
B-level	\$ 11.89	\$ 8.67	\$ 3.22
Total	\$ 30.72	\$ 10.10	\$ 20.63

In the baseline scenario:

- There are no M-level tranches/layers in securities issuance and insurance/reinsurance CRTs that experience any write down or loss;
- About 26 percent of ultimate losses are projected to be covered by mortgage insurance (ultimate losses are losses on reference pool mortgages that incorporate historic losses and projected losses over a CRT's expected remaining life as of end-April 2021); and
- CRT investor write downs and counterparty reimbursements are projected to cover about 16 percent of ultimate losses.

In the 2007 Replay scenario:

- While some M-tranches/layers experience some loss, there are no M1 tranches/layers in CRTs that experience any write down or loss,
- About 24 percent of ultimate losses are projected to be covered by mortgage insurance; and
- CRT investor write downs and counterparty reimbursements are projected to cover about 36 percent of ultimate losses.

CRT investors and counterparties are projected to receive a simple return of about 26 percent on the original reference pool UPB in the baseline scenario and 16 percent in the 2007 Replay. Simple return is defined as interest and premiums received less write downs and reimbursements divided by RIF at issuance.



Performance of CRT Structures During the COVID-19 Stress

The market disruptions in 2020 caused by the impacts of COVID-19 tested the single-family CRT structures in a globally stressed environment. Several issues emerge from observing CRT performance before, during, and after the COVID-19 stress. Many mortgages in reference pools were refinanced in 2019 and 2020 but were less likely to receive new CRT coverage or are receiving it with a lag. Mortgages remaining in CRT reference pools faced higher rates of delinquency in 2020 even as RIF was rapidly falling for these pools. The early uncertainty about housing market responses to COVID-19 impacts represented the first widespread stress of CRTs, though the housing market proved to be more resilient than first feared.

I. Disruption of CRT Market

Concerns have been raised that CRT markets may be easily disrupted during periods of market stress requiring the Enterprises to retain credit risk they planned to transfer. This is an even greater concern if mortgages are rapidly prepaying in a low interest rate environment since CRT coverage is being reduced by prepayments and not replaced on newly refinanced mortgages. Both Enterprises paused new CRT issuance in the second quarter of 2020 after the onset of COVID-19 in the United States as financial markets, including CRT markets, experienced a liquidity shock and spreads widened significantly.

A complicating factor in understanding CRT issuance in the middle and latter half of 2020 is that, on May 20, 2020, FHFA issued a new notice of proposed rulemaking to establish a new capital rule for the Enterprises, which caused the Enterprises to review their respective CRT strategies. After a few months of disruption following the onset of COVID-19, as housing markets rebounded in the second half of 2020, Freddie Mac resumed CRT issuance in July 2020, while Fannie Mae had not as of end-February 2021.³⁴ Reviewing 2020-2021 CRT issuances provides insights into the resiliency of the market. By July 2020, RIF from new Freddie Mac CRT issuances was higher than the prior year in a period when acquisitions were increasing rapidly due to high refinancing volumes and recovering purchase money mortgage originations. Despite the fast prepayment environment, Freddie Mac's CRT RIF relative to its single-family UPB was higher by the end of 2020 than in December 2019.

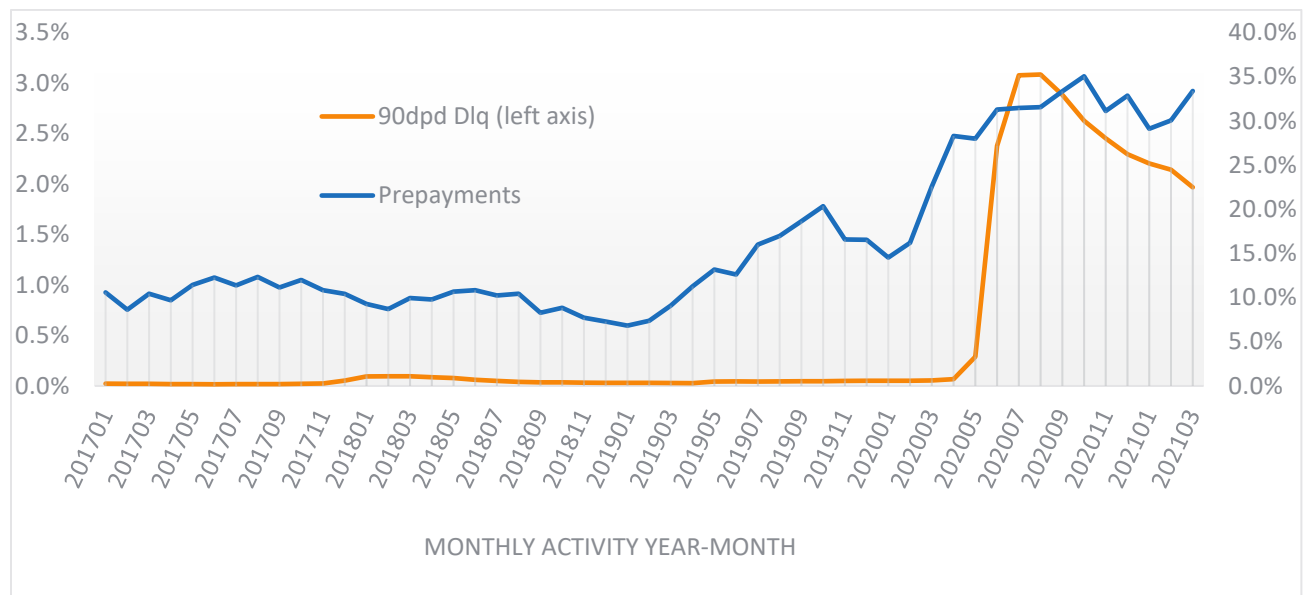
³⁴ In December 2020, Fannie Mae issued one lender risk share transaction, which was structured as a REMIC.



II. Efficacy of CRT Triggers

Starting in mid-2019 and accelerating between March and June 2020, CRT structures were rapidly paying down driven by the low interest rate environment. The concern is that a CRT's credit risk protection for the Enterprises is reduced in an untimely manner when increased delinquencies follow a period of high prepayments. Loss-timing risk is that, as a structure's credit risk coverage is being paid down, the riskiest mortgages are most likely to remain in the reference pool because they are generally the least likely to prepay. Delinquency rates from the pandemic-induced employment shock did not exceed the delinquency thresholds regulating the allocation of CRT prepayments until mid-summer of 2020 or delinquency thresholds were not binding and therefore prepayments to CRT investors and some counterparties continued to rapidly pay down the level of credit risk coverage. Due to the recovery of income for some households, the spike in 90-day or more delinquencies has moderated significantly as of the beginning of 2021 (see Figure 4).

Figure 4: Prepayments and Enterprise Delinquencies on MBS Pools



Within the subordinate tranches, prepayments are allocated sequentially such that the most senior mezzanine tranche (M1) initially receives all unscheduled payments allocated to the subordinate tranches. The prepayment of principal paid down almost all of the M1 tranches of active securities issuance CRTs as of February 2021 (see Figure 5a). Since the tranche is usually thin, the duration of the M1 tranche in securities issuance CRTs has been as short as six months under these fast prepayment conditions. Once the M1 tranche is paid off and if delinquency triggers remain unbreached, prepayments allocated to the subordinate tranches flow to the M2 tranche. As a result, the coverage provided by M2 has also been significantly reduced.

Similarly, the fast prepayment conditions resulted in a rapid decline in the RIF on insurance/reinsurance transactions. The current RIF is only around 35 percent of the RIF at issuance on insurance/reinsurance transactions issued prior to 2015 and at about 50 percent for insurance/reinsurance issued in 2016. See Figure 5b below. The current RIF on nearly one third of all insurance/reinsurance transactions issued to date is zero.

Figure 5a: RIF on Securities Issuance CRT Tranches as of February 2021

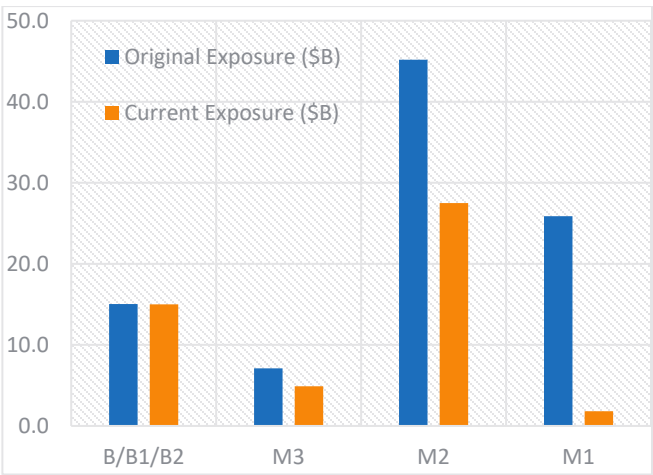
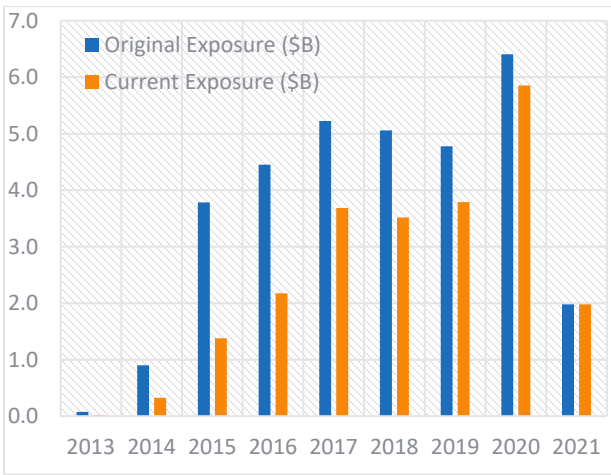


Figure 5b: RIF on Insurance/Reinsurance CRTs by Issuance Year as of February 2021



III. Fixed-Severity Transactions

CRT transactions have not been tested by a widespread serious loss event since the programs' inception in 2013. However, following the outbreak of COVID-19 in the United States, investors in some fixed-severity securities issuance CRTs feared that a serious loss event was imminent and requested that the Enterprises and FHFA provide relief from certain contractual provisions.³⁵

Each Enterprise's first four fixed-severity securities issuance CRTs issued in 2013 and 2014 stipulate that a certain level of accumulated credit events, as defined in the contracts and disclosures, would result in investor write downs of predetermined loss severity amounts. Specifically, the contracts and disclosures of the fixed-severity CRTs in question stated, as

³⁵ See "Fannie-Freddie Risk Bonds Threaten Big Losses for Fund Managers," available at <https://www.bloomberg.com/news/articles/2020-07-23/fannie-freddie-risk-bonds-threaten-big-losses-for-fund-managers>.



expressed in the prospectus of one of the transactions, that a reference pool mortgage that is 180 days or more delinquent will qualify as a credit event “regardless of any grant of forbearance, including in connection with any relief or deferral granted in connection with natural disasters.”³⁶

Following Hurricane Harvey in 2017, in some of its fixed-severity deals Fannie Mae delayed the timing of credit event recognition in the event the delinquency subsequently cured. In 2020, investors wanted the Enterprises to do the same with respect to COVID-related forbearance mortgages. The Enterprises affirmed that COVID-related forbearance mortgages would be treated as specified in the contracts and disclosures.

Areas for Research and Analysis

This section discusses several areas of the Enterprises' CRT programs that deserve research and analysis: (i) the challenges to accurately measuring the amount of credit risk that is transferred via CRTs and how it changes over time; (ii) the Enterprises' exposure to counterparty risk and wrong-way risk when transactions are not fully collateralized; (iii) optimizing the design of future CRT structures' credit risk coverage, attachment and detachment points, collateralization, and other features, and (iv) CRT pricing. Gaining a deeper and more robust understanding of these areas is critical to guiding the future direction of the CRT programs and to ensuring that they do not pose undue risk to the Enterprises' safety and soundness or mission or the national housing finance markets. Research and analysis in these areas will help FHFA and the Enterprises make informed decisions about how best to utilize CRT as the Enterprises continue building capital and implementing the capital rule.

I. Measurement Issues

Measurements of the amount of credit risk transferred through CRT transactions are limited in their ability to assess the efficacy of CRTs in reducing the Enterprises' credit risk. Simple, static measures of risk transferred through CRTs at issuance can be misleading and either overstate or understate the coverage available over time. However, more elaborate metrics may suffer from model risk.

In addition to the need to develop more dynamic measurements of CRTs' credit risk protection over time, clarity is needed on CRT-related costs and benefits beyond the costs (interest and

³⁶ See “Prospectus, Fannie Mae Connecticut Avenue Securities, Series 2014-C03,” available at <https://capitalmarkets.fanniemae.com/media/8471/display>



premiums) and benefits (investor write downs and counterparty reimbursements) considered in this report. CRT transactions can incur upfront costs, including fees paid to the syndicate, underwriters, legal firms, the indenture trustee, the owner trustee, accounting firms, rating agencies, and other service providers. In a normal security, these are considered costs of raising debt. But in CRTs, omitting such costs may overstate the efficacy of the credit risk coverage provided. For securities issuance CRTs, these upfront costs amount to approximately 44 bps of RIF at issuance. Additionally, each Enterprise incurs 1-2 bps of outstanding RIF in asset management fees per month on securities issuance CRTs. Also, the Enterprises may earn excess interest on the cash collateral that is raised from securities issuance CRT investors. A comprehensive assessment of the Enterprises' CRT programs requires research and analysis of these and any other indirect CRT costs and benefits.

II. Counterparty Risk

Insurance/reinsurance transactions are underwritten primarily to the financial strength of the counterparties, and as a result these transactions are not fully collateralized. Therefore, insurance/reinsurance CRTs pose counterparty risk to the Enterprises. Large, highly diversified counterparties may pose relatively lower risk to the Enterprises, while counterparties that are smaller or whose primary business lines are relatively concentrated in mortgage credit risk could pose greater risk to the Enterprises. The Enterprises' exposure to non-diversified counterparties creates wrong-way risk for the Enterprises, which is the risk that arises when an exposure to a counterparty is positively correlated with the probability of default of that counterparty. In the case of the Enterprises and non-diversified counterparties, wrong-way risk means that the ability of some counterparties to pay their full contractual obligations on Enterprise-guaranteed mortgages decreases as losses on Enterprise-guaranteed mortgages increase, i.e., in severely stressed environments.

The Enterprises' approaches to mitigating the counterparty risk posed by insurance/reinsurance CRTs include counterparty eligibility restrictions, counterparty ratings, counterparty limits, collateral requirements and adequacy under stress, cross collateralization, and conducting transactions with large, diversified counterparties. However, these approaches introduce costs and complexities that are largely minimized in securities issuance CRTs. Research and analysis are needed to better understand related costs and benefits and potential risks of the Enterprises.

III. Structuring Issues

The amount of CRT coverage and the length of time that coverage should persist remain areas for research and analysis. In addition, stress from COVID-19 revealed that triggers used to protect any



given level of credit risk coverage may not have adequately reduced loss-timing risk under certain prepayment scenarios. Beyond the structure of triggers, including recent SSRA triggers, research is warranted to consider whether more CRT coverage of expected losses could be valuable.

The Enterprises generally hold the first-loss tranche or layer in CRT transactions, which has historically corresponded to at least expected loss.³⁷ In early structures, the first-loss tranche/layer was about 50 – 100 bps of the reference pool's UPB. Although the exact amount has differed across deals, over time the trend has been towards a smaller first-loss tranche/layer (i.e., a detachment point lower than 50 bps). Holding the first-loss tranche/layer may help align the incentives of the Enterprises, which acquire the mortgages that make up the reference pools, and of CRT investors and counterparties, which take on a portion of those mortgages' credit risk. But it is also the case that, in recent years, the capital relief that the Enterprises received for CRT transactions applied only to transferred credit risk that is greater than expected losses. While selling the credit risk of expected losses does not provide any capital relief to the Enterprises, it could provide alternative benefits. For example, the Enterprises' implementation of the CECL accounting methodology in 2020 may create scenarios in which selling a portion of the first-loss tranche/layer could help buffer variability in the loan loss reserving.

IV. Pricing

An expected benefit of the CRT market was that transactions would reveal pricing information about credit risk, recognizing that CRT pricing should reflect both credit and prepayment risks. However, it is unclear whether and to what extent CRTs have provided this benefit to market participants. Several facts suggest that the information about credit risk derived from CRT pricing to date may be of limited value. First, the results of the syndication process by which securities issuance CRTs are priced suggest that prices may not be equilibrating supply and demand. Second, some senior investor tranches have such short duration that prices may reflect more information about prepayment risks than credit risks. Third, transferring some of the expected loss risk, as the Enterprises have done in a few CRT transactions between 2015 and 2018, may provide valuable

³⁷ Mortgage credit risk or losses can be segmented into three categories: 1) expected loss; 2) unexpected loss; and 3) catastrophic loss. Expected loss, or "baseline loss," is credit loss projected to be incurred on average under various housing market conditions, particularly house price levels, that proceed according to a stable, long-term trend. Unexpected loss represents the lifetime credit losses incurred over and above expected losses should there be a stressful but plausible macroeconomic shock, such as a severe downturn in house price levels similar to that observed during the 2008 financial crisis. The term "stress losses" represents the sum of expected and unexpected losses. Catastrophic losses are the losses incurred beyond unexpected losses that are estimated to be highly unlikely. While there is no bright line between unexpected credit losses and catastrophic credit losses, both are associated with so-called "tail risk." The Enterprises calculate these projected loss amounts after accounting for any credit enhancements (such as PMI), whereas other financial institutions may do so before credit enhancements.



pricing information, yet in most CRT structures, the Enterprises have retained the entirety of the most subordinate tranche/layer. These facts raise questions about the utility of price discovery to date and point to CRT pricing as an important area for research and analysis.

