INDUSTRY PERSPECTIVES

Demystifying GSE Credit Risk Transfer

Part II – How, and How Well, Does It Work?

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Introduction

Credit risk transfer (CRT) has become, in relatively quick order, a core component of the business model of the two Government-Sponsored Enterprises (GSEs), Freddie Mac and Fannie Mae, and very substantially improves that business model. Part I of this series listed the five key ways in which it does so, of which two have major public policy significance. This Part II is designed to address three overlapping topics:

- How CRT works, at a level of detail appropriate for the housing finance policy community.
- How *well* CRT works – that is, how such transactions need to be designed very specifically and carefully in order to be truly effective (as defined below) from both a GSE perspective and a policy perspective.
    - At the GSE level, the two companies need to have the credit risk transferred without unacceptably disturbing how the existing mortgage industry – especially the market for mortgage-backed securities (MBS) – currently operates; they also need to do it at an efficient cost and with the risk *truly* being transferred (i.e., with little to no possibility of it boomeranging back).
    - At the policy level,[1] credit risk needs to be widely dispersed, rather than stay concentrated; for CRT to support the lowest cost of financing homeownership that is responsibly possible; and for it to contribute to a financial system that absorbs rather than amplifies the inevitable stresses placed upon it every so often.
- How there is a very great need for policy-level transparency, complementing the information investors get for specific investment decisions, that is designed to reach the broader public – the mortgage industry, Congress, Treasury and many others – and not just the GSEs' regulator, the Federal Housing Finance Agency (FHFA). The unfortunate reality is that, given the well-known politicization of the housing finance system, and given that there has not yet been enough of such transparency, economic and ideological interest groups have already attempted (and will continue to attempt) to take advantage of the partial vacuum to disrupt and distort CRT in pursuit of their agendas. (Part III, which will focus on the politicized controversies surrounding CRT, will address examples of such attempts.) And without such a high level of policy-oriented

[1] The policy level can best be understood by imagining one were a member of the Financial Stability Oversight Council (FSOC), which is chaired by the secretary of the Treasury. According to the Treasury website: "The Council is charged with identifying risks to the financial stability of the United States; promoting market discipline; and responding to emerging risks to the stability of the United States' financial system."

transparency, even groups looking to support a well-designed CRT program will simply not have enough information to properly do so. The bulk of the burden of ensuring such transparency falls to the FHFA.

When I arrived at Freddie Mac as the new CEO in May 2012, CRT was an idea that had been kicking around the GSEs since before conservatorship was initiated in 2008, and a few stabs at it had apparently been made in those earlier years. However, none of them had become a permanent part of either Freddie Mac's or Fannie Mae's business model in single-family mortgages.[2] Nevertheless, the idea had such power to improve the housing finance system – as the description of the five benefits from CRT in Part I reveals – that it was rightly still of interest to policymakers. It was therefore listed as an objective in the first-ever "Conservatorship Scorecard" issued to the GSEs by the FHFA, also the conservator of the two companies, just prior to my arrival in 2012.[3] The scorecard was comprised of a list of activities and goals that, in the view of the FHFA, the GSEs should undertake as part of a constructive, forward-looking policy agenda.[4] Such a formalized agenda apparently became practical only beginning in 2012 as the two companies (1) began to earn profits for the first time since conservatorship started and (2) only then seemingly had the institutional capacity to focus on policy issues beyond their dealing with the foreclosure tsunami that had swamped the entire mortgage system five years earlier.

As background, US fixed-income markets in the two decades post-World War II were very much old-school in comparison to today: mostly government bonds (federal, state, and local), relatively plain-vanilla corporate bonds and commercial paper, and not much more. Material innovation to those markets began slowly around 1970 with the introduction of the pass-through mortgage-backed security, and then began to accelerate. One theme of that innovation was transferring or hedging a range of risks. The derivatives[5] markets are considered to have gotten started with exchange-traded interest rate

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[2] This lack of success relates, at its core, to the "cost of capital" issue, explained later in this article. Note, however, that the multifamily financing activities of the two GSEs did have such risk transfer as a permanent part of the business model as of when I arrived in 2012 – at a high level for Freddie Mac, at a modest level for Fannie Mae.

[3] See the FHFA's "2012 Conservatorship Scorecard," https://www.fhfa.gov/Media/PublicAffairs/PublicAffairsDocuments/ExecComp3912F.pdf. Interestingly, the scorecard was totally policy-focused, and did not include business objectives such as "be efficient" or "manage risk well."

[4] The FHFA, as the conservator of the two GSEs, had the power to direct the affairs of the companies as if it were the shareholders and the Board of Directors. The scope of its authority as conservator is therefore far broader than that of a traditional regulator.

[5] "Derivative" is a term of art developed in the 1990s to refer to a whole class of similarly structured financial risk-transfer contracts such as swaps, options, futures and forwards. For a further description, see *Investopedia*, "Derivative," https://www.investopedia.com/terms/d/derivative.asp.

futures in the 1970s, which then were followed by interest rate swaps and options; over time came equity derivatives and then, in the 1990s, credit derivatives. Utilizing a very different approach, securitization spread beyond mortgages into credit cards and auto loans (and more) as a method to transfer risk (and the accompanying assets) off the books of banks and other financial intermediaries. Meanwhile, in the property and casualty insurance industry, "cat bonds" (short for "catastrophe bonds," now formally called "insurance-linked securities") were developed starting in the mid-1990s to enable individual insurers to lay off to the bond markets portions of their risk exposure to hurricanes and other natural disasters; previously, they could do such risk sharing only through re-insurance contracts to other insurance companies.[6]

So, as the two GSEs (and the FHFA behind them) looked to develop credit risk transfer circa 2012, as specified in that first Conservatorship Scorecard, there was a wide range of approaches and legal constructs to look to as precedent. But fundamentally there was a fork in the road in choosing which precedent to build upon: pick one that preserves the existing GSE mechanics of being the owner of the mortgages and the guarantor of their credit to the MBS investors, or pick one that requires those mechanics be changed (as many do).

But there really was no choice – for any CRT structure chosen had to be compatible with the TBA (to-be-announced) market, which accounts for over 90% of MBS issuance by the two GSEs. The TBA market is the linchpin to the high liquidity that delivers trillion-dollar volumes of mortgage financing for up to thirty years at a fixed rate at relatively low cost, allowing prepayment at any time, and even allowing a rate to be locked in several months ahead of time by homebuyers. (A mortgage with all these features is sometimes called "the American mortgage.") The TBA market's rules[7] – set by an industry

[6] On a personal note, I had a ringside seat at all of this innovation, and directly participated in much of it, as I had started in banking in the mid-1970s and moved in the early 1980s into the "markets" area, where most of the relevant innovation was centered. Aided by my quantitatively-oriented education (which was very unusual in those days), by 1988 I had become head of all markets activities at one of the predecessors to JPMorgan Chase, after having led the tremendous growth of its derivatives business (which initially was mostly interest rate swaps). With the purchase of JPMorgan by Chase in 2000 to create JPMorgan Chase, I became co-head of its investment bank, responsible for all markets activities, one of which was the largest derivatives business in the world.

[7] The market for GSE- (and other government agency-) guaranteed MBS developed to provide the greatest liquidity to produce the lowest possible mortgage rate to support homeownership and benefit homeowners. One aspect of this development is the TBA market, where GSE MBS pools meeting certain criteria (as established by the Securities Industry and Financial Markets Association [SIFMA], an association which includes MBS investors and dealers) for the same coupon and maturity are traded interchangeably, even up to several months before the pools are finalized and sold into the marketplace. This market supports two features of the classic 30-year mortgage, where the scale and standardization of the two GSEs is the foundation that delivers two benefits: (1) mortgage financing, with free prepayment, is available in extremely large amounts at low cost because the interchangeable trading dramatically increases liquidity, and (2) the rates on mortgages can be locked up several months forward, which is of particular value to consumers when committing to purchase a house. (TBA trading

organization representing MBS investors and dealers – had strict requirements to support that liquidity, which in practical terms required that the GSEs continue to own the mortgages and guarantee their credit.

Maintaining compatibility with the TBA market thus became a driving force behind choosing the path along which to develop CRT. In particular, the GSE, as guarantor[8] of the credit of the mortgages to MBS investors, was legally responsible for credit losses, no ifs, ands, or buts. *Therefore, TBA-compatible CRT could only take the form of a legal structure in which the CRT provider agreed to reimburse the GSE for those losses*. In other words, the GSE took the credit loss first, and the CRT provider took it second through a reimbursement mechanism.[9] The need for this reimbursement requirement to be rock-solid cannot be overstated – it drove much of the choice of what CRT structures were developed; ensuring it worked properly, in all market conditions, became a major challenge in transferring the risk in a truly effective and transparent manner.[10]

As a result, the Freddie Mac team developed a specialized, TBA-compatible fixed-income instrument which it called a STACR (Structured Agency Credit Risk) bond, which debuted in July 2013 as the first modern CRT structure.[11] Fannie Mae later that year issued a duplicate structure it called CAS (Connecticut Avenue Securities). But given the range of methods the markets had historically developed to transfer or hedge risk, the vision emerged early on that there would also likely be a few additional TBA-compatible structures developed and employed that the GSEs would use to transfer single-family mortgage credit risk. (I referred to this in meetings at the time as the "several arrows in the quiver" approach.) As things turned out, that is exactly what happened: here are the four fundamental structures, using the FHFA's taxonomy from their semi-annual report on GSE CRT, by which credit risk is

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also exists for the much smaller volume of mortgages with 15- and 20-year maturities.) The Treasury had made it clear to me in a meeting in 2012 that it regarded the TBA market as virtually sacrosanct, and that we should not do anything to disturb it.

[8] That guarantee, of course, has government support indirectly behind it, so there is nil risk of the GSE not making good on its guarantee even up to 30 years late (i.e., at the maturity of the underlying mortgages).

[9] The actual credit loss is known only at some point well after the loan goes into default (default being defined as being 120 days delinquent in receiving monthly payments of interest and principal), which is when it is bought back by the GSE at full value from the MBS investors – the usual method by which the GSEs make good on their guarantee. This policy removes the credit risk from the investors, and then the GSE will realize the loss over time (possibly a very extended period of years) as that loss fully crystallizes after whatever loss mitigation (e.g., modification) steps the GSE takes.

[10] "Truly effective and transparent" will be defined specifically below.

[11] When I arrived at Freddie Mac in 2012, the FHFA was very enthusiastic about the "senior-subordinate" structure used in credit card, auto, and PLS (i.e., private label securitization of mortgages, where there is no government-affiliated entity guaranteeing the credit of the mortgages to investors) markets. However, this structure would require changes in the mechanics of a GSE MBS that would, in practical terms, be incompatible with the TBA market; to this day, therefore, such a senior-subordinate structure plays an extremely small role in CRT.

transferred, followed by the percentage of risk transferred accounted for by each structure as of the first half of 2019, the latest data available:

- "Securities Issuances" – 56%. This refers to the publicly traded STACR and CAS bonds.
- "Insurance/Reinsurance" – 26%. This is CRT where the risk is transferred to such companies via an insurance contract.
- "Lender Risk Sharing" – 18%. This is where a seller of loans to the GSEs takes back, through a bilateral contract, some portion of the associated credit risk for some period of time.
- "Senior/Subordinate" – 0%. This is used very rarely and there were no transactions during this particular six-month period; it is, to date, used only for certain non-TBA mortgages.

All of these structures have evolved over the years to be more mature and to transfer risk better (some specifics of this evolution are described below). But the original STACR-type structure was clearly well chosen, given that six years later it still accounts for over half of all risk being transferred.

This Part II essay will take the form of analyzing that STACR bond structure in significant detail as a vehicle to describe how CRT works and what key design objectives it must deliver for any CRT to be considered truly effective and transparent. It will also describe, at a more summary level, the two other major forms of CRT, analyzing how well those design objectives are delivered by each.[12] I will end by discussing Private Mortgage Insurance, which has been used for decades, and which turns out to be just a specialty form of CRT with its own strengths and weaknesses.

STACR and Meeting the "Truly Effective & Transparent" Test

The STACR bond structure, at its heart, is patterned after catastrophe bonds from the insurance industry. Such bonds have proven effective in risk transfer, having been in existence now for over two decades, and having worked properly after facing the stress of large losses from actual disasters (mainly hurricanes and earthquakes). Currently, about $10 billion of such bonds are issued annually, double the amount of a decade ago. Applying such a catastrophe bond structure to GSE specifics means that STACR investors get paid a high return, in the range of what below-investment-grade (i.e., "junk") corporate bonds pay; in exchange, they take the risk, depending upon how large GSE mortgage credit losses prove to be on a specific pool of mortgages, that they will not receive the full principal amount of the bond back upon maturity.

[12] Because the senior-subordinate structure is so rarely used, I will not analyze it.

I have identified six major requirements for CRT of GSE TBA-eligible mortgages to be truly effective from both the GSE and policy perspectives.[13] The primary objective of those requirements is to *deliver a risk transfer that operates both efficiently and effectively, with no loopholes, caveats or surprise exceptions such that the credit risk somehow boomerangs back to the GSE, and in a manner supportive of financial market stability*. It must also work properly both during and after conservatorship. A seventh major requirement is the need for a very high degree of public policy-level transparency about the program, making it truly effective and transparent.

#1 – Non-Disturbance Requirement

As described above, a key requirement of a truly effective CRT transaction is that it leave undisturbed the existing TBA market for the MBS issued by the GSEs: there must be no change in how the MBS is issued, no change in how it is traded, no change in the nature of the credit guarantee given to MBS investors by the GSEs, and so on.

This requirement can be satisfied by having the STACR bond use a "reference pool" approach. Basically, the documentation for each STACR bond requires the investors to reimburse the GSEs for the credit losses, as defined in the documentation, on a list of specified underlying loans (the "reference pool"). In other words, STACR bonds are stand-alone contracts that exist separately from and in parallel with all the other mortgage-related functions going on inside a GSE for the same underlying loans. Unlike in senior-subordinate or certain other possible structures, there is no change in the legal entity that owns the underlying mortgages – that is, in STACR, the mortgage loans are still owned by the GSEs themselves, with no change.

Therefore, there is no disturbance to the entire chain of mortgage processing and money flows, including what a lender does when making a new mortgage, what a servicer does to receive monthly payments from homeowners and forward them onto the GSEs, and what the GSEs do in terms of sending funds onto MBS investors. None. While CRT might still be effective with some limited disturbance to mortgage market operations, it is still a highly desirable and pragmatic design goal to avoid any such disturbance because it means no group of industry players – not lenders, not servicers, not MBS investors – has to change their systems and processes (and incur the expense of doing so); such

[13] There are definitely additional second-tier requirements, and it is a judgment call which are major (i.e., first-tier) versus second-tier. Part III will discuss certain requirements I deem second-tier because they are desirable but not necessary.

disturbances could have delayed implementation for a considerable time, maybe for so long that the program would never have been undertaken at all.[14]

#2 - Nil Reimbursement Risk[15] Requirement

Probably the most crucial requirement for CRT to be truly effective is the certainty that the providers of CRT to the GSEs, when there are losses in the future to be reimbursed, will actually send in the money owed for loss reimbursement in full and on time. Recall that those credit losses, per the requirement to not disturb the existing TBA market, must be absorbed by the GSEs first, with the two companies fulfilling their guarantees to MBS investors in the same way as always, with no contingency tied to whether they themselves have been or will be reimbursed or not. That reimbursement risk is quite high, as such payments due could be owed many years later, even possibly in the midst of a major financial crisis that would dramatically harm a CRT provider's balance sheet and ability to make the payments due.

In Freddie Mac's laying off credit risk to the bond markets, the resulting STACR bonds are tradeable, and their ownership will change over time as bonds are bought and sold. It is obviously impossible for a GSE, upon absorbing a credit loss when it is called upon to exercise its guarantee to MBS investors some years later, to chase down at that point the owners of each and every bond. Even if this were possible, how could Freddie Mac be sure the required reimbursement payments would be made?

For CRT to be truly effective, then, with little risk that potential credit losses thought to have been transferred will instead boomerang back onto the GSE because reimbursement is not received in full and on time, that reimbursement must have nil – almost zero – risk of not being made. This is a very tough design requirement for CRT. It's a primary reason why the catastrophe bond model forms the core of the STACR design.

So, as found in the catastrophe bond structure, the principal amount of the bond functions as a pool of cash, paid up-front by the initial investors purchasing the bonds at the inception of the STACR transaction, *equal to 100% of the maximum reimbursement the GSEs might be owed for losses*. The CRT

[14] At that time STACR was being developed, loan originators and services were feeling inundated by systems change requirements, stemming from new and expanded government regulations, updated and increased GSE requirements, the availability of new technology in general, and the need to stay competitive. The delay for implementing changes related to STACR – from which the lenders and services do not obviously directly benefit – would likely have been very substantial.

[15] Reimbursement risk is a specific type of "counterparty risk," a more general term that covers several types of situations where money can be owed but where there is no classic borrowing of funds upon which interest is due.

investors get some portion of their original principal amount back years later, at the maturity of the bond, after reduction by the defined cumulative losses they have reimbursed to the GSEs.[16] At the extremes, the STACR investors can get back 100% of their principal – or zero.

A simplified example will help. Assume there is a pool of $1 billion of mortgages and a CRT bond has been issued that is designed to cover cumulative lose from 0.10% of principal to 4.00% of principal of that pool. (In this case, 0.10% is known as the "attachment point" and 4.00% as the "detachment point.) That means the principal amount of the STACR bond to be issued will be $39 million:[17] 3.9% (i.e. the 4.00% less the 0.10%) of the $1 billion principal amount of the mortgages in the pool. This amount is paid upfront by CRT investors and deposited with a trustee.[18] As losses are incurred by the GSE on the specific $1 billion worth of mortgage loans in the reference pool, the trustee sends the GSE the funds to reimburse those losses. Then, when the STACR bond matures, the bondholders get back the original $39 million *less* the cumulative total of the losses reimbursed, which still will be sitting with the trustee. If losses above the attachment point have been very low (e.g., $4 million), the investors will get back $35 million or so; if losses have been very high, the investors may even get back nothing.[19]

In practical terms, then, the two GSEs get the cash for the maximum possible loss deposited up front; investors get back what is left over at the end. This catastrophe bond reimbursement mechanism, which has stood the test of time through hurricane and earthquake losses, ensures that the GSEs have nil risk of reimbursement payments not being paid on time and in full.

#3 – Certainty of Coverage Requirement

A typical STACR bond will have an underlying reference pool of thousands of loans. Each has documentation that has passed through the hands of a lender (and sometimes more than one). Is the documentation of each loan up to the needed legal standards to be a proper mortgage, and, additionally, does it meet specific requirements making it eligible to be purchased by the GSEs? (The latter requirements go beyond the actual mortgage loan legal documentation, in particular giving

[16] The calculation of cumulative losses is very complex, and beyond the scope of this document. It includes all losses and expenses associated with default, including partial losses that may come from loan modifications, and will likely manifest themselves only over several years.
[17] This $39 million is also called the "risk in force" in some FHFA materials.
[18] The trustee will invest the $39 million in short-term Treasury securities so it earns some interest instead of sitting totally idle. This interest will supplement the amount of funds held by the trustee.
[19] A STACR bond on a specific reference pool actually has several tranches (i.e., different sub-categories with different maturity dates and coupons). I view that complexity as beyond the scope of this paper and so have simplified the discussion to ignore such "tranching."

evidence that the underwriting process was properly handled. This would include that there is a proper appraisal, proper income verification, and so on. For simplicity, I will refer to the entire obligation as "documentation.") While this may sound dull, it is a key item in the process of mortgages being made and then funded through a GSE-linked securitization. In the 2008 Financial Crisis, it was found that the documentation was often defective, sometimes quite materially so.

Prior to conservatorship, reviews of the documentation by the GSEs, and generally throughout the mortgage system, were very modest and spotty; with so many years of low credit losses as housing prices had risen so steadily over the decades, such reviews apparently were considered virtually unnecessary. In practical terms, it was almost as if there were none done at all – until a mortgage went into default, usually years later, when the documentation was then, finally, examined. And the remedy for such a defect, if found, was that the loan would then be sent back to the original lender to be bought back – at full value. This transferred the embedded loss on that defaulted loan to the original lender, and was the cause of major industry distress after 2008, as lenders had to take billions of dollars of losses on buying back those defaulted, documentation-defective loans for full value (often many years after they had been made). Many lawsuits resulted from this process, with settlements sometimes splitting losses between various parties.

So, from 2012 through 2014, the FHFA orchestrated a major upgrade of this "only check upon default, probably many years later" approach. Today, loans are statistically sampled up front by the GSEs for documentation and other defects, and lenders are thereby either given the loans back right then[20] (generally within three months, though increasingly various aspects of the loan underwriting documentation are now even verified via automated systems the very day of receipt by the GSEs) or released from their liability to buy them back later for a documentation defect. It's a much more effective, fair and stable system; also, documentation completeness and accuracy have soared (at least for the loans sold to Freddie Mac) as a result of the short feedback cycle allowing lenders to fine-tune their internal systems and processes to reduce their "defect" rate.

This improved documentation system establishes "certainty of coverage," to use the insurance industry phrase. In the case of CRT, it means that each loan underlying the STACR bond, which is represented to have had its risk transferred, does not have some "gotcha" exception that somehow the reimbursement promise can retroactively be made null and void – probably years later, maybe many years later – because of a documentation or other claimed defect.

[20] Many such defects can be cured relatively quickly by the lender, so loans are often then promptly re-submitted and accepted.

To ensure this certainty of coverage, the CRT provider – in STACR, that's the owners of the bonds – gives up rights to review the documentation for errors or problems separately from what Freddie Mac does on its own behalf (which is very extensive). In short, they agree to fully piggyback on the Freddie Mac documentation review process and support the resulting decisions about what mortgages do or do not get returned to lenders.[21]

As a result, there is full certainty of coverage – all the loans deemed to be in the risk transfer pool stay there, no exceptions.[22] Or, in more informal language, there is no boomeranging back.

#4 – Accounting Symmetry Requirement

This series of CRT articles has so far addressed the *economics* of risk transfer – that the loss on the underlying mortgages gets reimbursed to a specified degree by the STACR bond investors. That's all well and good, but the *accounting* of the transaction is also important, especially the issue of timing.

Simply put, the GSEs have to ask themselves a question: is the *timing* of the accounting loss on the underlying mortgages – which is based upon *loan* loss accounting, as the mortgages are of course loans – the same as that of the accounting recognition of the reimbursement owed by the STACR bond investors?

In earlier versions of STACR bonds, this was not the case. Mortgage loan losses get recognized based on traditional "loan loss provision" accounting – that is, based on a forward-looking forecast of losses that are expected in a loan portfolio, which is well before losses are actually realized (e.g., when a house is foreclosed upon and sold).[23] Because the STACR bond is a bond, not a loan, it had until recently different accounting, in which the reimbursement of the loss was recognized for accounting only when an actual loss was taken on the underlying property (e.g., when a foreclosure and sale would take place), which could be years later.

Freddie Mac could then have suffered, at an extreme, massive and potentially life-threatening accounting losses in between those two timeframes, when the loss and its matching reimbursement – respectively front-ended (the loans) and back-ended (the STACR bonds) in terms of when accounting

[21] To give investors the confidence that Freddie Mac is diligent in its documentation reviews, Freddie Mac keeps a minimum 5% slice of the credit risk for itself – to promote what is called "alignment of interests" between itself and investors. In some non-STACR forms of CRT, investors similarly give up the right to separately make decisions about the documentation. There are also a very few special exceptions where individual providers get the right to examine Freddie Mac's documentation review process to ensure it is acceptable to them.

[22] Fraud is an allowed exception, but it is a different legal issue than documentation defects, and is very rare.

[23] The exact calculation is being changed in 2020 by the accounting industry but the concept is still the same – in fact, it is even more forward-looking than previously.

recognizes them – can have a difference of years, possibly many years. So, a truly effective CRT must get not just the economics but also the accounting timing right – meaning that gains and losses are recognized at the same time, down to the specific quarter of the year, on both sides of the transaction.

The STACR structure achieved this accounting timing match-up only relatively recently, in mid-2018, when its structure was modified to introduce a trustee to hold the proceeds of the bond sale, rather than Freddie Mac directly taking in the money itself.

#5 – Cost Effectiveness Requirement

In conservatorship, with virtually no capital on the books of Freddie Mac so that the taxpayers supporting it were directly exposed to almost 100% of its risks, we asked the question: Is it cost-effective to lay off mortgage credit risk to the private capital markets via CRT, or are the taxpayers in fact economically better off keeping it because it simply costs too much to transfer? There is an old and snarky Wall Street phrase from years ago to describe when the government would pay too much to get rid of some risk or be paid too little when it sold some asset: "a wealth transfer to the private sector." I told the Treasury back in 2013 that we would *not* do such wealth transfer transactions, that we would show in Freddie Mac's CRT activities that we were treating taxpayers with respect, laying off risk only when it was economically efficient (i.e., cost-effective) on their behalf to do so.

There are standard (although complicated) financial analytics to make this type of cost comparison, based upon a calculation of the return earned on each of the two alternative ways of dealing with the credit risk on a pool of mortgages that could be transferred: (1) hold onto it with no transfer, or (2) sell a portion of it off via a CRT transaction. In the former case (known as 'buy-and-hold'), the shareholders of the company (in practical terms, that was the American taxpayer at that time) deserve to earn a reasonable and appropriate return on the capital it had invested to support the credit risk of the specific pool, which was determined to be between 9% and 10% after tax.[24] Then we compare this return to the alternative using CRT, where we need to adjust all the calculations to reflect that (1) the profit on the transaction is reduced by how much Freddie Mac has to pay away to CRT investors to

[24] In finance, a company with publicly traded shares can relatively tightly estimate this required return by statistically analyzing how its common stock trades versus its earnings, the per share book value, etc. For Freddie Mac, being in conservatorship, we could not observe this comparison directly; instead, we calculated the 9% to 10% figure by benchmarking a mix of other large financial institutions (primarily but not exclusively banks) as proxies. One could argue that a GSE should be required to have a premium return requirement because of how much it is a monoline, but the exact calculation of this premium would be highly speculative, so we did not include it quantitatively; it was, however, a background factor we kept in mind on a qualitative basis. The FHFA eventually calculated its own required rate-of-return, and similarly came up with a result between 9% and 10%.

take on the risk being transferred, and (2) the capital that is required to carry the risk of the loans in the reference pool is also reduced, given that some of the risk has been transferred away.[25] The result is also return-on-capital calculation, which we compare to the 9% to 10% range of the "buy-and-hold" alternative. If the CRT-based return is higher, it means the CRT transaction is a good transaction to do – the taxpayer's return has increased. If the CRT-based return is lower, the opposite conclusion holds, i.e. it is not a good transaction to do.

To summarize all this mathematics, there is a standard shorthand: was the "implied cost of capital" of the CRT lower than the 9% to 10% cost of capital of the buy-and-hold alternative?[26] We found that, once the program got going, the implied cost of capital on the CRT was averaging in the 7% range, clearly less than the 9% to 10% range. "CRT-based capital" was proving less expensive than "shareholder-based capital." It was therefore good to do the CRT: it was treating the taxpayer with respect. And it was the exact opposite of a "wealth transfer to the private sector."[27]

If CRT were being done at an implied cost of capital higher than 9% to 10%, it would be bad for the taxpayer while the GSEs are in conservatorship (too expensive to offload the risk), bad for the company itself (ditto), and bad for the cost of mortgage credit to homeowners (trending higher, not lower). Hence, knowing that the cost is "efficient" (no more than 9% to 10%) really is a requirement for a truly effective system of CRT.

#6 - Risk Dispersion Requirement

One of the two major public policy objectives of CRT by the GSEs is to reduce the amazingly large concentration of mortgage credit risk in just those two companies. But the risk of concentration will be critically reduced only if the providers of the CRT – in the case of STACR, the bond owners – are dispersed, and the more broadly dispersed the better. Because a STACR bond is tradeable and sold in

[25] Freddie Mac, from 2017 on, used FHFA formulas to determine how much capital is reduced because of a particular CRT transaction; prior to that time, Freddie Mac used its own, which were generally compatible with what the FHFA later developed.

[26] For a financial intermediary, capital is required to absorb risk of loss. Since CRT also absorbs losses, it provides a type of capital, and, as it has a cost (the amount paid to investors to take the risk), a "cost of capital" is calculable and makes sense as a reference point for the economic comparison of the two alternatives.

[27] One can legitimately argue with the specifics of the above calculations of capital cost, both shareholder-based and CRT-based, and there are certainly refinements one can decide, or not, to utilize in the future. (In other words, there is some art amidst the science.) And someday the GSEs might have their own common shares to look at in terms of the calculation, rather than using a other firms as a proxy. My best estimate is that the results might be modestly different but are unlikely to be materially different. During the years 2013 to 2019, the government accepted the approach described above as certainly "good enough."

such large size,[28] it is by definition dispersed, and it is not obvious how it could end up being re-concentrated into the hands of just a few institutions. And as each STACR bond represents a specific pool of mortgages, re-concentration that would materially diminish the STACR's very strong risk dispersal would require that a very limited number of investors end up owning large shares of many different STACR bonds, which would require an almost inconceivably large balance sheet in the $5 trillion market for GSE MBS.[29]

So, for STACR, the dispersal of risk is believed to be quite high.[30] As will be described below, other types of CRT do indeed have a real risk of re-concentration inherent in their structure.

#7 - Risk Transfer Transparency Requirement

In any type of CRT transaction, potential investors will demand lots of detailed information about the risk characteristics of the individual loans in the pool behind the transaction, as well as detailed history of loan losses. That demand is a given. But because the two GSEs are not just "any old company" but systemic-risk-sized and government-created linchpins of the US mortgage system, it is important for a broad array of parties to understand how CRT transactions operate at a policy level as well. These include the GSEs' regulator, the FHFA; other parts of the government, especially Treasury and its Financial Stability Oversight Council (FSOC); policymakers broadly, including Congress; credit rating agencies; MBS and CRT investors; and, of course, the mortgage industry itself.

The politicization of housing finance, which I have noted before is extremely high, makes it still more urgent that the entire program of CRT be transparent. Without comprehensive policy-level transparency, interest groups – economic and ideological – will likely fill the information vacuum with self-serving half-truths and cherry-picked observations and data in the pursuit of their agendas. Even people without agendas won't know enough to properly analyze and address well-constructed CRT programs unless there is also strong policy-level transparency. (Examples of interest exploiting the lack of transparency around CRT will be discussed in Part III.) As a result, to me it is not a close call at all to include such policy-level transparency as the seventh and last major requirement.

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[28] The typical STACR bond is usually at least hundreds of millions of dollars in size, taking on the risk of a "reference pool" of mortgages many billions of dollars in size.

[29] Well-run investors would normally be watching their concentration of risk, even looking to diversify their GSE-related mortgage credit exposure among many different CRT transactions. Of course, not all investors are necessarily well-run, so one cannot be sure this will always happen.

[30] The FHFA can monitor bond ownership to some degree if it chooses to as part of validating that dispersal.

Transparency has been a challenge for the CRT program. At first, starting in 2015 when the program was completing its second year, the FHFA – as conservator – issued a semi-annual report that, at its heart, gave only the principal amount of mortgages upon which "some risk" had been transferred (as well as detail on attachment and detachment points for each STACR bond, which was already publicly available but probably hard to find for the average policy analyst).[31] As one congressman said about the type of measurement at a 2019 hearing of the House Financial Services Committee where I was testifying, "But what does that really mean?" The information in those early reports was in fact vague and didn't transmit at all clearly information as to how much risk had been transferred (although the detail on attachment and detachment points was certainly helpful).

This vagueness reflected that there was no standard or agreed calculation upon which to base a statement that "X% of the credit risk has been transferred." To do that type of calculation required a capital system that showed what capital was needed to support the credit risk of the mortgages in question both *before* and *after* CRT. At the beginning of the program in 2013, Freddie Mac utilized its own post-Financial Crisis formulas for its internal calculations;[32] the FHFA itself developed and then officially blessed a set of formulas for this purpose starting in 2017. So, at that time, the FHFA began to report the percentage reduction of the credit risk capital due to CRT, but chose to base that figure on the subset of loans that were "targeted" for CRT by the annual Conservatorship Scorecard (which excluded about one-fourth of all single-family flows).[33] They also began to show the dollars of capital required both before and after CRT.

For example, on the targeted mortgages purchased by Freddie Mac during 2018 for which CRT transactions had been completed by the end of June 2019, the FHFA reported a reduction in the requirement for capital at Freddie Mac from $7.2 billion to $0.9 billion, or 89%; the reduction was 84% for Fannie Mae.[34] (The FHFA made this disclosure only in aggregate; there was no detail by type of CRT structure or type of loan.)

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[31] See "Overview of Fannie Mae and Freddie Mac Credit Risk Transfer Transactions," Federal Housing Finance Agency, August 2015, https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/CRT-Overview-8-21-2015.pdf.

[32] These formulas were based upon a combination of the Federal Reserve's annual stress testing of large banks and the Basel risk-weighting regime also applicable to large banks. The eventual FHFA formulas were similar in most respects to what Freddie Mac had developed on its own.

[33] The excluded loans included non-mainstream situations. One example was loans with short maturities (e.g., 15 years); a second was loans with a loan-to-value ratio below 60%; a third was floating-rate loans. All the typical 30-year fixed rate loans were included, of course. Interestingly, the excluded categories of loans are all known to be low-risk ones, so the FHFA-targeted categories are of average or higher-than-average riskiness.

[34] This calculation is based upon the capital required to carry credit risk but does not include the "going-concern buffer" requirement. For further discussion, see my prior article: "Four Big Things the FHFA Needs to Get Right in Its Capital Rule,"

At the same time, Freddie Mac – in its quarterly public financial reporting as of June 30, 2019, done to meet Securities and Exchange Commission (SEC) disclosure requirements – took a mostly similar approach. It reported the same type of calculation but focused on the flow of mortgages done in the year ending 12 months prior[35] (i.e., the flow of mortgages purchased from July 1, 2017 through June 30, 2018), including *all* mortgages, not just the conservatorship scorecard's "targeted" ones. Freddie Mac disclosed a percentage reduction in credit capital requirement of over 70%.[36]

Unfortunately, Fannie Mae currently does not seem to do similar quarterly reporting, continuing to report only the principal amount upon which "some" risk has been transferred. Thus, the only quantitative information on the degree of their risk transfer is via the FHFA's semi-annual reports.

Adding it all up, there is today a decent base of policy-level reporting to the broad marketplace (i.e., beyond what FHFA gets as regulator) on CRT and its impact on risk transferred. However, this reporting should be a lot better. The FHFA, at some point, can focus on either reporting directly, or mandating that the GSEs do so individually, more complete information in the name of good public policy. Below, in reviewing CRT structures other than STACR, I will specify some of the topics that should be included in this additional reporting.

Other Considerations

While I have identified seven standard requirements for each type of CRT structure, there are always one-off issues related to a particular structure. In the case of STACR, the most common is the concern about whether, when markets go into severe stress as they did in the Financial Crisis, CRT will be available to take some of the risk of those new mortgages. In other words, is CRT reliably available, or is it just hit and miss?[37] I will address this in Part III, as the issue became so politicized. I just note that the CRT program to date is almost seven years old and no such major disruption has yet occurred.

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https://www.jchs.harvard.edu/sites/default/files/harvard_jchs_FHFA_GSE_capital_rule_layton_2019.pdf. The "going-concern buffer" was not reduced by CRT according to the FHFA formulas, which take a conservative, and perhaps too conservative, approach (i.e., they tend to underestimate the capital reduction).

[35] Because most CRT is done in the months after loans are purchased, there is a pipeline period during which the risk transferred starts out low and builds up to its final level. It became standard practice to define one year as the allowed pipeline period (although most loans went through in 6 to 9 months), and thus the percentage of risk transferred was disclosed as of that point. Some small further risk reduction can occur after the 12 months.

[36] For the Third Quarter of 2018, see the cover page of the quarterly earnings press release, which cites 75% for the single-family mortgage business: "Freddie Mac Reports Net Income of $1.7 Billion and Comprehensive Income of $1.8 Billion for Third Quarter 2019," Freddie Mac, http://www.freddiemac.com/investors/financials/pdf/2019er-3q19_release.pdf.

[37] There is also a highly technical concern about the specifics of STACR tranche structures in that they may have maturities that prove too short, so that the detachment point is effectively reduced in out-years, when riskier

Another major one-off issue worth mentioning concerns the time period between the GSEs' acquisition of loans and their selling off the credit risk via STACR bonds. That period is currently six to nine months (although I understand plans are in place to reduce it to under six months soon). During this period, the GSEs are exposed to the full credit risk of those loans and the market's valuation of that risk. Because this issue is so politicized, I will address it in Part III. To date, during the seven years of the CRT program, this risk has proven negligible.

Summary Chart

It will be useful, in reviewing the various methods to transfer credit risk, to have this risk framework in summary chart form to show how the seven requirements are addressed by each type of CRT. For STACR bonds (and their Fannie Mae equivalent, CAS bonds), this summary chart is shown directly below.

Requirement	For STACR Bonds
Non-Disturbance	Yes - via reference pool structure.
Nil Reimbursement Risk	Yes – via 100% cash collateral provided up front for maximum possible reimbursement due.
Certainty of Coverage	Yes – via no independent ability of CRT provider to reject loans due to documentation inadequacy or other defects.
Accounting Symmetry	Yes – given the structure revision adopted mid-2018.
Cost Effectiveness	Highly likely - cost comparisons are calculable by each GSE given FHFA-approved formulas, but results are not publicly disclosed.
Risk Dispersion	High – by the nature of a widely traded bond.
Risk Transfer Transparency	Medium-to-high - STACR bonds have attachment and detachment points disclosed by FHFA; amount of risk-transfer disclosed only for aggregated CRT activities, also by FHFA; many details found in publicly available bond transaction documentation.

ACIS Reinsurance Contract

The second-largest form of CRT reported by the FHFA is the category of reinsurance contracts (called "insurance/reinsurance" in formal FHFA materials, but informally almost always referred to as "reinsurance"). For Freddie Mac, it consists overwhelmingly of what is called an ACIS (Agency Credit Insurance Structure) transaction. This is a bilateral contract developed for reinsurers to take on mortgage credit risk in order to diversify their existing book of risks (e.g., hurricane, corporate directors'

loans may throw off losses. This concern is beyond the scope of this paper to address, but if the FHFA judges it a legitimate, they can address it by putting out requirements for certain maturity minimums in those tranche structures.

liability, and many more).[38] Freddie Mac developed this approach to diversify its providers of CRT beyond the bond markets (already served by its STACR structure).

In developing ACIS, Freddie Mac specifically tried to mimic STACR in all the ways it could, but because a reinsurance contract differs in key ways from a bond, differences remain in two of the six major requirements for a truly effective CRT program: #2 (nil reimbursement risk) and #6 (risk dispersion). In addition, #7 (policy-level transparency) is weaker than for STACR as the transaction is a private bilateral one, not a public one with information available to the broad capital markets.

#2 - Nil Reimbursement Risk Requirement

It is not possible, given how insurance companies (including reinsurance companies) are themselves operated and regulated, for them to routinely provide 100% cash collateral up front to secure the maximum reimbursement for losses under a CRT reinsurance contract. For ACIS reinsurance contracts, the reimbursement risk issue therefore loomed larger than for STACR bonds, which address the issue so efficiently by means of their catastrophe bond structure.

In pioneering the reinsurance approach to CRT, Freddie Mac aimed at a very, very low risk of not receiving reimbursement, even if it was undeniably higher than the nil level for STACR. Freddie Mac reduced this risk by dealing individually with each reinsurer, negotiating a level of up-front cash collateral that, considering the credit rating of that particular reinsurer (and adjusted for the riskiness of the particular pool of mortgages behind the CRT), gave us comfort that the reinsurer's promise to reimburse losses many years out had a very, very low risk of not being fulfilled at that time.[39]

Reinsurance companies generally have credit ratings in the middle and upper range of investment grade, from A- to AA. The cash collateral mostly ranged from 25% to 35%, a substantial level. This gave management – and the FHFA, which had to approve all such things in conservatorship – confidence enough to go ahead with the ACIS product.

I note that this reimbursement risk is not transparent to policymakers. Whereas in STACR it is obvious to all that 100% of maximum loss has been covered by cash up front, in reinsurance contracts like ACIS the mix of cash collateral and credit rating for any particular reinsurer is totally non-

[38] The contract is "bilateral" in that it is between Freddie Mac and a specific reinsurance company (for insurance regulatory reasons, it usually passes through a third legal entity which leaves the bilateral relationship economically undisturbed). Unlike a STACR bond, it is not readily tradeable, nor does it have documentation available to the public.

[39] Freddie Mac did its own credit analysis of the reinsurers, rather than just use their existing public ratings. But there was no material difference between the two, so I just reference public ratings in this paper.

transparent, known only to the management of each GSE (and the FHFA).[40] This lack of transparency leaves the housing finance policy community unsure of exactly what the reimbursement risk is, and even undermines the notion that it is such a crucial issue in CRT design. It would therefore be good for the FHFA to develop better reporting to make clear to policymakers why it believes that reinsurance is a viable product which will not leave the GSEs with large unreimbursed losses in some stress event of the future (the previously defined "boomerang" problem).

#6 - Risk Dispersion Requirement

As a bilateral contract between Freddie Mac and one of a list of specific reinsurance companies, ACIS disperses risk somewhat, but it is unclear how much. If all of the credit risk exposure transferred via ACIS went to, as an example, just five reinsurance companies, each of which had a high percentage of its insurance risks in mortgage credit risk, then the resulting risk dispersion would be modest (and losses in a stress environment might be easily transmitted and amplified rather than absorbed). While this modest dispersion would probably be better for the financial system than the GSEs' keeping all the risk to themselves, it should be a design objective to do better than "modest" – especially as STACR does risk dispersion so very well. To address this issue, Freddie Mac established its own policy, when it did its first ACIS contract, that reinsurers could participate in the program only if, after completion of the bilateral transaction, they had no more than 10% of their insured risk portfolio in mortgage credit risk.[41]

It is unclear if Fannie Mae has such a policy, and it is unclear to the public if this policy has been maintained or will be maintained by either or both firms. There is also room here for the FHFA to set a standard and publicly disclose it. Such a standard might limit how much risk in aggregate could be transferred through reinsurance contracts like ACIS, but that is a reasonable trade-off given the highly desirable objective of broadly dispersing mortgage credit risk and not having it be re-concentrated in a limited number of reinsurers.

#7 - Risk Transfer Transparency Requirement

As already indicated above, transparency for reinsurance contracts is not high. The FHFA does, in its semi-annual reporting, indicate the attachment and detachment points. But there are no specifics beyond that – not who the reinsurers are or how much exposure they are insuring (needed to gauge

[40] The same issue applies equally to Fannie Mae in its versions of STACR and ACIS.
[41] There are exceptions to this policy, related to affiliates of Private Mortgage Insurance companies. As this exception reflects the politics of CRT, see Part III for more on its background.

how much risk has been dispersed versus re-concentrated); not their ratings and cash collateral requirements (needed to gauge how much reimbursement risk there is); not whether they have agreed to waive a separate process of reviewing the adequacy of documentation (needed to understand certainty of coverage); and so on.

Given that this method of CRT most recently accounted for 26% of risk transferred, the FHFA should make it a high priority to address these missing policy-level disclosures in its next semi-annual report.

Other Considerations

ACIS usually has the same issue as STACR in that the GSE usually owns loans for six to nine months before laying off the risk to the reinsurers. Again, this will be addressed in Part III. Also, ACIS, in concept, could also be unavailable in highly stressed market disruption periods. However, a limited number of ACIS transactions have in fact been done on a "forward" basis – that is, the reinsurer has committed to do transactions at a set price for a period of time into the future, without regard to market conditions possibly being bad during that period, eliminating both concerns.[42]

Summary Chart

Requirement	For ACIS Reinsurance Contract
Non-Disturbance	Yes - *same as STACR.*
Nil Reimbursement Risk	Yes-minus – believed to be very low risk via partial upfront collateralization combined with average-to-high investment grade credit ratings.
Certainty of Coverage	Yes – *same as STACR.*
Accounting Symmetry	Yes – *same as STACR* (it got to a mature state earlier than STACR).
Cost Effectiveness	Highly likely - *same as STACR.*
Risk Dispersion	Medium-to-high (estimated) - dependent upon non-transparent policies of the GSEs and FHFA.
Risk Transfer Transparency	Medium - ACIS contracts have attachment and detachment points disclosed via FHFA; amount of risk transfer included in aggregated totals of all structures, as disclosed by FHFA. No reporting on risk dispersal, who providers are, or information about reimbursement risk (e.g., percent collateralization).

[42] The number of such forward transactions was limited because market capacity for them was not high, and they did generate additional cost as well.

Lender Risk Sharing

The third material category of risk sharing, according to the FHFA taxonomy, is lender risk sharing. Lender risk sharing means that a seller of mortgage loans to Freddie Mac and Fannie Mae takes back some of the credit risk on those loans for a period of time (not necessarily the entire life of the loans). As is always true for TBA-eligible loans, this consists of a promise to reimburse the GSEs for losses they incur in making good on their guarantees to MBS investors.

Since modern CRT began in 2013, lender risk sharing has accounted for about 6% of CRT transactions, as reported by the FHFA.[43] More recently, the mix has shifted somewhat away from securities issuance and towards insurance/reinsurance and lender risk sharing, with the latter accounting for 18% of volume during the first half of 2019.

A problem is that lender risk sharing has almost no transparency, including what the FHFA discloses in the semi-annual CRT progress report. There is no disclosure of attachment/detachment points, of collateral to reduce reimbursement risk, of credit ratings of the lender to stand behind the promise to pay, and so on. This non-transparency is clearly becoming less appropriate as the market share of CRT executed via this category gets larger.

In terms of the seven requirements for truly effective and transparent CRT, then, lender risk sharing has, compared to other mechanisms, some significant gaps, most obviously in transparency.[44] More specifically, there is very limited, if any, transparency about the following requirements:

- #2 - Reimbursement Risk. It is simply unclear if it is close to nil or not.
- #3 - Certainty of Coverage. Do lenders agree to piggyback on the documentation review processes run by the GSEs, or not? (They certainly should, as lenders originate the loans in the first place. But with no transparency, it is unclear they do.)
- #4 - Accounting Symmetry. Does it exist or not? We just do not know.

One should be able to reasonably presume that all three of these issues have been negotiated to an acceptable position by the GSEs (and the FHFA behind them) to ensure that the risk transfer is truly effective – that is, roughly no worse than in either STACR or ACIS contracts. But it is inappropriate for the public and policymakers to have to presume via extrapolation in this manner. The FHFA should

[43] See the latest FHFA semi-annual Credit Risk Transfer Progress Report: https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/CRT-Progress-Report-2Q19.pdf.

[44] A benefit of well-structured lender risk sharing can be the alignment of interests of the lender and the GSE which has purchased its loans – helping to ensure lenders are diligent in "manufacturing" loans of acceptable credit quality.

upgrade its requirement of disclosures by the GSEs, or via its own semi-annual CRT disclosures, to appropriately address these three criteria needed for truly effective and transparent risk transfer.

In addition, transparency about #5 - Cost Effectiveness trips across a very politically sensitive issue with the pricing of CRT via lender risk sharing. One would presume that the GSE involved in a potential lender risk sharing transaction would do the usual "cost of capital" mathematics (as discussed previously) and conclude the transaction only if it was, in fact, cost effective. However, some industry associations that represent smaller lenders have expressed concern that lender risk sharing can be a channel to, in secret, deliver a guarantee fee cut (usually referred to as a volume discount[45]) to larger lenders in order for the GSE to gain a higher market share of loan purchases.[46] This concern is not unreasonable given the history of such volume discounting. Thus, transparency about the cost effectiveness of lender risk sharing transactions seems to be a worthy objective; without it, small lenders will continue to potentially accuse the GSEs of disguising volume discounts.

#6 - Risk Dispersion Requirement

This requirement is clearly problematic for lender risk sharing. There are no disclosures but, by definition, the credit risk is modestly re-concentrated: since mortgage lending itself is a reasonably concentrated business, lender risk sharing will automatically tend to mimic that origination concentration. So, one firm, which could have 5% or more of mortgage origination volume, would be taking back some share of that same 5% or more of the credit risk of GSE mortgage flows. Such risk dispersion is far worse than what is achieved through STACR bonds (although obviously still better than if the GSEs, as was their pre-CRT modus operandi, retained 100% of the credit risk 100% of the time). The risk of re-concentration provides one more argument for greater transparency about where the credit risk has been transferred, even by name of the GSE customer.[47] And it also provides one more

[45] Prior to conservatorship, such guarantee fee volume discounts for larger lenders were common and became a major political issue in the industry. In conservatorship, the FHFA has eliminated them.

[46] The first lender risk sharing transactions were very much customized, and thus done with just a small number of larger lenders. Standardized programs were just being contemplated as I retired from Freddie Mac. Regardless, because the pricing and terms of the transactions are confidential between the GSE and the lender, rather than public, small lenders will still be suspicious – in the absence of better transparency – that larger lenders are being given an advantage by disguised volume-based guarantee fee price discounting.

[47] Banks that retain lots of mortgage credit risk are considered less problematic than non-banks that do so. Banks have stable deposit funding in most cases, and robust regulatory supervising of their risks and risk concentration; non-banks have less stable funding and much less robust regulatory supervision.

argument that the FHFA should be potentially limiting the concentration of lender risk sharing in order to keep a high level of risk dispersion.[48]

#7 - Risk Transfer Transparency Requirement

Obviously, the transparency of lender risk sharing is poor: very poor in comparison to STACR, modestly poor in comparison to ACIS. There is simply very little disclosure – no listing of lenders with whom the sharing is done, no attachment or detachment points, no information on how reimbursement risk is addressed, etc. Lender risk sharing is thus, to an uncomfortable degree, a black box. When lender risk sharing accounted for 3% or 5% of risk transfer (as it did in earlier years), the lack of transparency was arguably acceptable. But now that its market share has grown to 18% in 2019, non-transparency is manifestly substandard from a public policy perspective. The FHFA needs to step in here, doing much more itself or mandating that the GSEs do it instead.

Other Considerations

Lender risk sharing, as a general matter, can be done without a period of time between the loan being purchased by the GSE and the credit risk transferred away, because both can occur simultaneously when the loan is purchased. (In other words, there is no "pipeline" period between the two dates). They can also, like some ACIS transactions, be transacted on a forward basis so that they are less subject to potential market disruption. See Part III for more on this.

[48] Because lender risk sharing transactions can overlap with private mortgage insurance (which, as described below, is also relatively weak when it comes to risk dispersion) or STACR/ACIS transactions (which much more strongly disperse risk), the GSEs and the FHFA should be looking at the total risk dispersion related to a pool of mortgages, and not just one single component of it. Detailed discussion of this issue falls beyond the scope of this document.

Summary Chart

Requirement	For Lender Risk Sharing
Non-Disturbance	Yes - *same as STACR.*
Nil Reimbursement Risk	Unknown, depends upon non-transparent CRT contracts between the GSEs and certain lenders.
Certainty of Coverage	Unknown. Same as STACR and CAS?
Accounting Symmetry	Unknown. Same as STACR and CAS?
Cost Effectiveness	Unknown – but may not be as low cost as STACR or ACIS; may be a channel for disguised volume discount on guarantee fees.
Risk Dispersion	Medium (estimated) – some tendency to natural re-concentration.
Risk Transfer Transparency	Low, almost no transparency of any type. Amount of risk transfer is included in aggregated totals of all structures, as disclosed by the FHFA.

A Short, Fresh Look at Private Mortgage Insurance

As I stated above, the derivatives business is considered to have gotten started with interest rate futures and then interest rate swaps in the years around 1980. As the business grew, at one point everyone realized that foreign exchange forwards – which had been traded not just for decades but for centuries – were in fact a type of derivative. The rigorous analytics developed in the modern era to measure and manage risk for derivatives was then applied retroactively to foreign exchange forwards, where the industry had previously used old-fashioned approaches from earlier eras. This led to better risk management.

In the same fashion, modern CRT for the GSEs stems from the original Freddie Mac STACR bond issued in 2013, and has expanded into other structures, with modern-day requirements (e.g., the six discussed above). But then it dawned on everyone that in fact the GSEs had been doing CRT on single-family mortgages for decades in the form of private mortgage insurance (PMI), which was in fact just a specific structure for CRT.[49] As one result, the FHFA began to include information on PMI activities with the GSEs in its semi-annual CRT updates. But PMI was from a much earlier era, developed well before the 2008 Financial Crisis had awakened regulators and the industry to the need for more comprehensive and rigorous management of risks of many types, especially in stress situations. And so, looking at PMI using modern, post-2008 regulatory and risk management concepts, it quickly became clear that it was

[49] The charters of the GSEs, as Congress wished to keep their risks constrained, requires that all mortgages with a loan-to-value ratio greater than 80% have one of three forms of "risk enhancement" for the over-80% exposure. Two of them had largely been abandoned by the time of the Financial Crisis, leaving the third, PMI, with a not-quite 100% market share. Innovation in CRT – in particular, lender risk sharing – indirectly represents a resurrection of one of the previously abandoned forms.

problematic in quite a few ways and would need revision to meet modern CRT standards, especially the need to avoid transfers that would likely boomerang back to the GSEs.

In the case of PMI, this boomeranging is not merely theoretical. In the 2008 Financial Crisis, the historic system of PMI did not operate well (although that was hardly unique among mortgage-related companies). Of the seven PMI firms that Freddie Mac then accepted, three failed; consequently, their state-based insurance regulators took control and then put them into "run-off," prohibiting them from taking on new policies while they paid out existing claims as they came due – but only partially.[50] When I arrived at Freddie Mac, three of the four remaining PMI firms had credit ratings in the B/B- range, just a bit above bankruptcy level.[51] Given that a PMI firm is, by nature, a monoline with higher than average mortgage risk, this severe deterioration should not be a surprise; it was true for all mortgage monolines to a greater or lesser degree.

In addition, under the stress of the Financial Crisis, the "certainty of coverage" in PMI contracts turned out to be very poor. The PMI companies retroactively removed coverage from a very substantial portion of their insured mortgages, leaving billions of dollars of losses to be shared by lenders and, to some extent, by the GSEs (which meant the taxpayer, as the two companies were in conservatorship). While the legality of this lack of certainty of coverage was never tested in the courts (as will be discussed in Part III), the lack of certainty nevertheless represents a failure to design a strong financial system: *large liabilities appearing years later, and subject to disputes as to who is responsible for them, simply erode financial stability*. (A stable financial system has clear ownership of risk, with the responsible institution having the capital to support that risk.)

In response to the weaknesses in PMI made apparent by the Financial Crisis, the FHFA took over the construction of new "eligibility" criteria that a PMI needed to satisfy before a GSE could accept it as an insurer. These eligibility criteria were, prior to conservatorship, determined separately by Freddie Mac and Fannie Mae, with one common requirement being a credit rating of at least AA-. (That requirement was quickly lost in the Financial Crisis, and rating agencies now realize how those credit ratings, plus many others related to mortgages, were in hindsight way too generous. No one is today planning for a mortgage insurance monoline, high-risk by nature, to ever attain such a high credit rating

[50] Along with the partial cash came a piece of paper called a deferred payment obligation (DPO), which meant that the rest of the claim might be paid off in the future but only if and when cash became available to do so.
[51] One firm was supported by its parent to keep an investment grade rating; interestingly, that parent was AIG, which had been bailed out by the US Government – so arguably that investment grade rating reflected a government bailout as well. Subsequently, three new firms entered the business. After some consolidation, there are now six such firms.

again.) The FHFA, as conservator, thus developed a single updated set of eligibility criteria which allowed PMI firms to deal with the GSEs. It was called PMIERs (Private Mortgage Insurance Eligibility Requirements), issued in 2014 to become effective in 2015; it was followed by PMIERs 2.0 in 2018, effective in 2019. This revision primarily tightened up on two key requirements:

- Financial strength. The PMI requirement to be at least AA- rated, which existed going into the Financial Crisis, had been waived soon after to keep high LTV lending going as a public policy matter (this is reasonably considered a hidden bail-out of the PMIs). PMIERs put in new capital requirements for the PMIs that were noticeably higher than what they had at the time and higher than what was required by their insurance commissioners even post-Crisis. Part III will go into this issue in more detail.
- Certainty of coverage. As discussed above, the PMI firms retroactively rescinded their insurance contracts very heavily. Since this rescission constitutes poor financial system design, the FHFA tightened up the wording of the relevant contracts so that the risk of rescission was reduced; it is unclear how much it has been reduced since it has not yet been tested under stress.

The result of the FHFA's new set of requirements was certainly an improvement of the traditional system of mortgage insurance. But it did not fundamentally reform that traditional system enough to meet the higher and more modern standards according to which the post-Crisis CRT program was designed; to my mind, it just made the traditional system less poor.

I will write, at a future time, a paper on the Private Mortgage Insurance industry to dig into many of these issues more comprehensively. For now, I will just quickly highlight four of the six requirements for a truly effective CRT to demonstrate how, in comparison to modern CRT, traditional PMI – admittedly developed in a different and less sophisticated era – compares unfavorably.

#2 - Nil Reimbursement Risk. STACR has 100% cash collateral provided up front, providing the gold standard for nil reimbursement risk. ACIS has a combination of partial but substantial cash collateral plus reinsurers that have credit ratings from the middle to the high end of investment grade. By comparison, the PMIs – even though PMIERs 1.0 and 2.0 required higher levels of capital – have credit ratings from the middle of investment grade *down* to the top of below-investment grade, and they have zero requirement for cash collateral. Clearly, there is a big disconnect between modern CRT (meaning STACR and ACIS and their Fannie Mae equivalents) and traditional PMI in terms of reimbursement risk. Such risk for the PMI firms is nowhere near nil. (Furthermore, the PMI firms are

monolines in the same "line" as the GSEs, which exacerbates this weakness – as the 2008 Financial Crisis amply demonstrated.)

#3 - Certainty of Coverage. As indicated above, STACR and ACIS allow no daylight between what the CRT provider agrees is covered and what Freddie Mac agrees is covered. (It is unclear if the same is true for lender risk sharing.) But for PMI, there is daylight: the PMI firms have the ability (and incentive) to retroactively remove coverage in a stress environment; their ability to do so has conceptually been significantly reduced from its historically high level by PMIERs, but it is unclear by how much. We could thus still see credit losses boomerang back to the GSEs, which is just plain poor design of a financial system. Clearly, we have here a second disconnect between modern CRT and traditional PMI.

#4 - Cost Effectiveness. The cost of PMI does not run through a process where it is compared to a buy-and-hold alternative or other forms of CRT; because of the GSEs' charters, the decision to use PMI or not simply bypasses them. Instead, homeowners pay for PMI directly. This arrangement does not seem to be good public policy: traditional PMI incurs major expenses both for its marketing and sales to hundreds of individual lenders and for doing transactions on a "retail" basis (i.e., borrower by borrower) with millions of borrowers. PMI is thus likely to be considerably more costly than modern CRT alternatives, which have no such marketing and sales costs and are processed on a high-volume wholesale basis. And there is no transparency as to the comparison of modern CRT pricing versus traditional PMI pricing.

#5 - Risk Dispersal. Since there are currently only six PMI firms, the dispersal of the credit risk, while better than if just two GSEs retained it, is not done anywhere near as well as by STACR or ACIS or probably even lender risk sharing. And PMI firms are monolines, and do not have the strongest ratings, which exacerbates the situation.

Given the above description, can traditional PMI – very embedded in the mortgage industry – be considered to be truly effective as defined by modern CRT? The answer is clearly "no." PMI was designed in an earlier era, and even the upgrades in PMIERs 1.0 and 2.0 have not changed it enough to get to "truly effective" status; it has just shrunk the difference down.

Again, I will write a stand-alone essay on PMI at a future date.

Summary Chart

Requirement	For Private Mortgage Insurance
Non-Disturbance	Yes.
Nil Reimbursement Risk	No – zero collateral combined with credit ratings from middle of investment grade down to below-investment grade; FHFA-driven revision has improved financial strength requirements since pre-2008.
Certainty of Coverage	No – has ability to independently rescind coverage, but since the FHFA-driven revision this has been reduced.
Accounting Symmetry	Yes - matches loan loss provision accounting.
Cost Effectiveness	Unlikely – not subject to cost comparison; must compensate for large marketing and sales expenditures.
Risk Dispersion	Low - Better than two GSEs, but there are only six PMIs, which are monolines.
Risk Transfer Transparency	Medium - significant amount of information, but it does not cover certain strategic issues (e.g., cost, rescission track record, etc.)

Conclusion

As shown above, the range of structures by which credit risk is transferred has grown and continues to grow. Overall, the program has been a systemically important success. But it does have a high requirement for supervision, both by the managements of the GSEs and by the FHFA – and maybe even by the FSOC. Despite all that has been done, there is more to do.

First, CRT is a classic case in which the devil is in the details. One form of CRT can be highly effective, and another can be quite ineffective (transferring little risk and/or doing so poorly). And it's hard for anyone outside of the two GSEs and the FHFA to tell the difference. This situation calls for a major program of transparency – and education – by the FHFA and the two companies; it should focus on the design requirements described above and how each CRT mechanism satisfies all seven of them, so that the public can indeed tell the difference. The FHFA has done a lot so far, but needs to do more given how the program has grown in size and complexity.

The greatest threat to credit risk transfer's truly effective functioning lies, in my judgment, in the reimbursement risk challenge. As a reminder, preserving the existing MBS market, especially the TBA aspect of it, means in practical terms that the GSEs take on all credit losses from their guarantees to MBS investors first, with CRT providers reimbursing them afterwards, probably many years later and maybe in the midst of great economic distress. Thus, there can then be a giant disconnect between a program of truly effective risk transfer and one that is more a "Potemkin Village" program of CRT, looking good but in reality being ineffective and, when the time inevitably comes, destabilizing the

financial system as the losses boomerang back to the GSEs in large amounts; such a program would be a major public policy failure. Much more education is needed on this issue, in my view, because it is so central to CRT effectiveness.

Second, the STACR/CAS bond structure to transfer GSE credit risk is very strong – almost the gold standard against which all CRT should be measured. In particular, there is nil risk of a surprise where risk that was thought to be transferred somehow ends up boomeranging back onto the books of the GSEs, or where legitimate losses somehow don't get covered. In addition, its cost is low. However, because it does require access to the capital markets, a severe disturbance in those markets, theoretically, could make its cost or availability unacceptable – a topic I will explore in Part III. As a result, the FHFA encouraged the GSEs to develop other types of CRT, with reinsurance and lender risk sharing representing that diversification to date.

Third, ACIS (and the Fannie Mae equivalent,) should be carefully watched by the FHFA. While it has non-nil but very restrained reimbursement risk, there is a very clear risk of re-concentration that the FHFA should set a policy to guard against (e.g., by requiring each insurance company provider to have no more than a set percentage – perhaps the 10% Freddie Mac established back in 2014 – of its risk in mortgage credit risk). The FHFA should also set some guidelines to ensure that the custom-negotiated cash collateral agreements, combined with credit ratings, are sufficiently strong to keep reimbursement risk appropriately very low.

Fourth, lender risk sharing needs a very substantial revamp of its almost non-existent transparency. This task again falls to the FHFA to engineer, either via its semi-annual progress report or by mandating that the GSEs do it themselves. Lender risk sharing is simply too large a category now – almost one of every five dollars of CRT – to have almost no disclosure. After this transparency has been established, it will be possible to see if the various arrangements are indeed designed well enough to be considered truly effective, or if they need revision.

And fifth, the FHFA needs to go further in its re-think about private mortgage insurance as practiced today. The existing improvements via the "eligibility standards" have helped significantly, but there is more to do because traditional PMI is still far from meeting the modern requirement for truly effective credit risk transfer, and it seems high cost (to the least affluent homeowners) to boot. From an FSOC point of view – i.e., looking at how the financial system works to keep stability during stresses – PMI is also a comparatively weak design, as demonstrated in the Financial Crisis. Given how deeply it is embedded in the current mortgage system, such further steps by the FHFA will be a heavy lift. I will explore all of this in more depth in a future paper on PMI.

With Parts I and II, I have described what a well-designed program of CRT can deliver in terms of benefits to the mortgage system, how it works, and what design features are required to make it truly effective and transparent. Part III will go into what happened when the highly-politicized system of housing finance took notice of CRT, providing a case study of how hard it is to implement reform in modern-day Washington.

APPENDIX

Summary of Effectiveness & Transparency Characteristics

	For STACR Bonds	For ACIS Reinsurance Contract	For Lender Risk Sharing	For Private Mortgage Insurance
Non-Disturbance	Yes	Yes	Yes	Yes
Nil Reimbursement Risk	Yes	Yes- minus	Unknown	No
Certainty of Coverage	Yes	Yes	Unknown	No
Accounting Symmetry	Yes	Yes	Unknown	Yes
Cost Effectiveness	Highly likely	Highly likely	Unknown	Unlikely
Risk Dispersion	High	Medium-to-high (estimated)	Medium (estimated).	Low
Risk Transfer Transparency	Medium-to-high	Medium	Low	Medium