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Abstract

We explore the capital structure and governance of a mortgage-insuring securitization utility operating with government reinsurance for systemic or "tail" risk. The structure we propose for the replacement of the GSEs focuses on aligning incentives for appropriate pricing and transfer of mortgage risks across the private sector and between the private sector and the government. We present the justification and mechanics of a vintage-based capital structure, and assess the components of the mortgage guarantee fee, whose size we find is most sensitive to the required capital ratio and the expected return on that capital. We discuss the implications of selling off some of the utility's mortgage credit risk to the capital markets and how the informational value of such transactions may vary with the level of risk transfer. Finally, we explore how mutualization could address incentive misalignments arising out of securitization and government insurance, as well as how the governance structure for such a financial market utility could be designed.

Key words: GSE, MBS, mortgage finance, cooperatives, financial market utility

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In a previous paper, we proposed a utility structure for the securitization of high-quality, standardized residential mortgages as a replacement for the securitization infrastructure currently run by the housing GSEs, Fannie Mae and Freddie Mac.[1] Using the approach of "keep what worked and change what didn't," the design of the utility was driven by several broad principles for reforming the residential mortgage finance system: more robust and sustainable credit access throughout the cycle, appropriate pricing of risk across the participants in the financing chain (borrowers, lenders, securitizers, investors, and the government), and clear separation of affordable housing programs. Three elements important for appropriate pricing are: explicit and priced government reinsurance for tail risks, greater alignment of incentives to prevent deterioration in underwriting *ex ante,* and more capital to absorb losses *ex post*. We preserve three beneficial aspects of the current system, which are "skin in the game" for originators and securitizers, standardization to exploit economies of scale, and the liquidity benefits of the TBA market for agency mortgage-backed securities (MBS).

Applying these principles led us to propose a utility that both securitizes and guarantees standardized mortgage products – that is, a securitization platform with an in-house insurance function. To support robustness and availability of securitization through the cycle, the utility is required to purchase government reinsurance against systemic credit events for whole vintages of mortgage securities. The structure of the proposed utility better aligns incentives in a variety of ways, notably by decreasing incentives for excessive risk taking. Moreover, the ownership structure and business model of the utility are designed to minimize mortgage rates faced by homeowners while still protecting taxpayers. Central to our approach is the notion that the system's source of capital goes hand in hand not only with its cost of capital, but also with its incentive structure and the nature of the market discipline it engenders.

In this paper, we explore in more detail the utility's capital structure, governance model, and regulation. This discussion also raises numerous other questions of broader interest in the debate on mortgage finance reform. Specifically, this paper is organized as follows.

- Section I ("Systemic Risk and Government Reinsurance") reviews the central debate in mortgage finance reform regarding the nature and extent of the government's role in addressing systemic risk. We argue that the government cannot credibly claim that it will not intervene in housing finance in the future and therefore must focus on managing its risk in the most effective way possible.

[1] See Dechario *et al.* (2011).

- Section II ("Vintage-Based Capital Structure") provides a more detailed description of how a vintage-based capital structure could mitigate the procyclicality of mortgage credit. In contrast to institution-level reinsurance, vintage-level reinsurance would provide greater clarity about the timing and terms of a government intervention, which would help maintain investors' and issuers' incentives to continue participating in the utility, thereby facilitating business continuity through a crisis and subsequent recovery. In addition, government reinsurance that is vintage – rather than security-based focuses more narrowly on truly systemic risk.
- Section III ("Pricing the Guarantee Fee and Building Capital") analyzes the relationships among the utility's guarantee fee charged to lenders, the government reinsurance fee charged to the utility, and various key assumptions, including the capital necessary to adequately cover unexpected mortgage credit losses, the attachment point of the government tail risk reinsurance, and potential sales of a junior bond. We find that the guarantee fee – and therefore the mortgage rate faced by borrowers – is most sensitive to the required capital ratio and the expected return on equity capital. Finally, we lay out a simple model of a transition period to build capital for the utility's inaugural set of vintages.
- Section IV ("Ownership and Governance") discusses at some length the incentive structure that mutualized ownership of the utility would provide to lenders and why it would be useful in the context of mortgage securitization. This includes a discussion of both internal governance mechanisms and a regulatory framework.
    - We explore how a mutualized ownership structure could better align the private incentives with the public interest to help maintain underwriting standards. Rather than relying solely on regulation, the utility's vertically integrated structure helps address the conflicts of interest along the chain of production (as well as loss mitigation) in securitization.
    - The weaker incentives for innovation found in cooperatives go hand-in-hand with a reduced tendency to take risk. Much as with a centralized counterparty or clearinghouse, low risk and less focus on innovation and market share are actually virtues for such critical infrastructure.
    - We discuss how a mortgage securitization utility would meet many of the criteria for success laid out in the academic literature on cooperatives.

The economics of housing finance are sufficiently complex that there may be no ideal model. In several cases, key objectives for the system, such as market discipline and systemic robustness, stand in tension with each other. Mortgage finance reform is likely a process of identifying the most workable, not the first-best, design – even on the economic merits, before considering the notoriously challenging political dimensions.

I. SYSTEMIC RISK AND GOVERNMENT REINSURANCE

The debate on the extent and nature of governmental involvement in the mortgage markets has been long running, but it received new urgency and fresh perspective as the housing crisis evolved into a financial crisis over the course of 2007-2009. Since then, observations and proposals have been published by a wide array of academics, industry trade groups, market analysts and policy makers. Notable among the early discussants were Federal Reserve Chairman Ben Bernanke and former Treasury Secretary Henry Paulson, who each laid out a spectrum of options for the housing GSEs, from full privatization to full nationalization.

More recently, the U.S. Department of the Treasury and the Department of Housing and Urban Development (HUD) released a report on options for reforming the U.S. housing finance system, pursuant to Section 1074 of the Dodd-Frank Act.[2] The Treasury/HUD white paper laid out three options for long-term reform of the U.S. mortgage market: privatization (outside of the Federal Housing Administration and Veterans Administration programs), a counter-cyclical government backstop mechanism, and a government role through the provision of a reinsurance program for systemic risk. The white paper said little about the institutional design or ownership structure under any of these options. Instead, the options were presented in broad enough terms that a number of structures could be compatible with them.

On one end of the Treasury/HUD spectrum of choices is a fully private model with no government involvement, at least not for the core of the mortgage market.[3] Advocates for this approach typically suggest a phased transition involving some combination of successively lowering

[2] "Reforming America's Housing Finance Market: a Report to Congress" (2011).
[3] Some proponents of the fully private approach would retain the FHA/VA for lending to low and moderate income households. See Jaffee (2010).

the conforming loan limit over time and raising guarantee fees.[4] The aim is to crowd back in private capital over time. A fundamental question with this approach is whether the federal government can credibly commit to not intervene in housing finance markets in the future. History suggests that the answer is no. If pressures become serious enough, housing is too important – in terms of its effects on both household wealth and financial stability – for the government not to step in during a crisis.[5] If this is the case, then we argue that it is preferable for the government to be transparent and to make its backstop role explicit, define the terms on which it would intervene, and charge a price for the systemic risk reinsurance it provides. The alternative is a *de facto* implicit guarantee that is not priced and lacks transparency with respect to when and how the government would intervene.

Critics of government reinsurance raise concerns about the ability of governments to set appropriate prices for their insurance programs.[6] While we acknowledge that governments have a history of mispricing guarantees, the degree of mispricing of an explicit guarantee is likely be substantially smaller than that of an implicit guarantee. That is, a positive price for the government guarantee is preferable to a zero price. In addition, defining *ex ante* the terms upon which the government will intervene (the "attachment point" of the reinsurance in a tail event) will likely lead to greater clarity and less uncertainty around the government's intervention as markets come under stress. This, in turn, would support asset prices and market functioning, both of which would support financial stability. Note, however, that the government reinsurance's attachment point must be credible, in that the government would not intervene ahead of this point, even as markets come under stress and political pressures mount.

Concerns over the ability of the government to properly price its reinsurance motivated a team of New York University researchers to propose a vertical risk-sharing role for the government.[7] In this model, the guarantee is fully priced in the market and the government receives a *pro rata* share of the guarantee fees. Note, however that with a vertical strip there is no effective

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[4] The charters of Fannie Mae and Freddie Mac restrict the types of loans that may be securitized; these limits include a set of loan size restrictions known as "conforming loan limits." For a discussion of how these limits have been adjusted in recent years, see Vickery and Wright (2013).

[5] Note that the same argument does not apply to other credit markets, where boom and bust cycles also occur but where government intervention is not typical, likely because the impact of credit "busts" in other markets are not systemic with respect to the rest of the financial system and the macroeconomy.

[6] See, for example, Lucas & McDonald (2007). For other discussions of mispricing government insurance, see Dwight Jaffee (2010) and Acharya *et al.* (2011). Note that in the case of the National Flood Insurance Program, the mispricing took the form of grandfathering existing properties, which would not be relevant for the government reinsurance of new mortgage originations if the legacy agency guarantees were not covered by the new utility.

[7] See Acharya *et al.* (2011).

government backstop, so that mortgage guarantors can go out of business. While in theory this should provide market discipline, in practice it might not; moreover, it raises the question of whether lending will remain robust in times of market stress. The NYU researchers rely on there being many guarantors in the market so that the failure of any one guarantor will not have a large impact on overall lending. However, the experience from the 2007-2009 financial crisis raises questions about this approach, since all guarantors would likely be adversely impacted at the same time by any truly systemic shock. As guarantors begin to fail, contagion could spread, resulting in a sharper contraction of lending.[8] Any market discipline from the vertical risk-sharing is eroded if guarantors then anticipate that the government would in fact support them to prevent this credit contraction.

In evaluating the degree of concern over the pricing of the government back-stop guarantee, it is important to keep in mind that in our utility, the guarantee is designed to be triggered only by a systemic shock – an event that is expected to happen only infrequently over time. The guarantee fee paid by a borrower consists of an annual fee with a component to compensate the private capital that takes a first-loss position ahead of the government, and another component to cover the government reinsurance for tail-event losses. As we will show, the vast majority of this overall guarantee fee, then, is determined by the market and not by the government.[9] In addition, the degree to which the overall guarantee fee varies with the changing risks in the lending environment is entirely reflected by changes in the privately priced component of the guarantee fee. That is, the price for the government's reinsurance would not vary over the credit cycle, but rather would be priced to recoup the government's expected losses associated with very infrequent payouts – for example once every 30 to 50 years. Because the terms of compensation for the government are laid out *ex ante*, there would be no need to "repay" the government by raising fees after a payout of the reinsurance. Changes in the government's reinsurance fee would only occur infrequently, based on new information accumulated over time about the nature of long-cycle systemic risks, not based on fluctuations in market conditions. Consequently, the variation in the guarantee fee over the credit cycle would be entirely driven by repricing of the private capital.

[8] Similarly, Seidman *et al.* (2013) provide a government wrap for MBS securities. The government guarantee would pay investors only in the event that the lender's capital is fully depleted. That is, the guarantee kicks in only when the lender is no longer a going concern.

[9] For example, in our baseline case to be discussed later, the government fee comprises about 15 percent of the overall fee.

Numerous commentators have questioned whether a combination of private capital and a government backstop guarantee is more cost effective than a pure private capital approach. Scharfstein and Sunderam (2011), for instance, argue that the combination approach is more cost effective only if the government does not charge a risk-premium for its guarantee. As pointed out by Arrow & Lind (1970), a risk premium for government insurance is appropriate if taxpayers are required to cover any shortfalls in the government insurance fund at the same time as there has been an adverse shock to their income (and the marginal utility of their income is therefore high). This occurs if the government is required to have a balanced budget each year and to meet any shortfall between the available insurance funds and the claims on the fund by some combination of cutting current government expenditures and raising current taxes. However, the associated risk premium is limited by the fact that the federal government can borrow against future guarantee fees from an international investor base to cover any shortfall. Experience also suggests that in such an event, the U.S. government's borrowing costs would likely not be elevated, due to flight-to-quality dynamics supporting demand for U.S. Treasury securities. As a result, the federal government can provide this reinsurance at a lower cost than private firms would through self-insurance.[10]

A related question is whether government reinsurance is important for maintaining a liquid secondary market in MBS. Following the second option contemplated by the Treasury/HUD 2011 white paper, several proposals incorporate some mechanism for expanding the government's role in the mortgage market during times of crisis.[11] Some have argued that a government backstop guarantee is not necessary in a normally functioning market. That is, the guarantee would only have value during periods of market stress. If this is the case, then a better alternative to government reinsurance might be to have the government expand its role in periods of market stress in order to support liquidity. However, this argument applies to all forms of insurance: the consumer of the insurance only receives a payout under specified scenarios, but it does not follow that the insurance only has value at those times.

An important aspect of government reinsurance is that it would support mortgage market liquidity across all market environments. Throughout the cycle, liquidity in the secondary market is enhanced by investors knowing that they do not face any credit risk regardless of current and future

[10] It is also important to be careful in defining the alternative to the government guarantee that is being used to make this efficiency comparison. If there is no explicit government guarantee and private firms do not completely insure against systemic shocks as you move further out in the tail of the risk distribution, then we are back to an implicit, un-priced government guarantee.

[11] For examples, see Scharfstein and Sunderam (2011), the CAP Mortgage Finance Working Group, and Hancock and Passmore (2010).

(foreseen or unforeseen) market conditions. Investors do not have the same faith in the credit protection provided by structured securities lacking government support. A widely-cited goal of mortgage finance reform is to provide a robust system of finance even during periods of market stress. Absent a backstop guarantee, following a sufficiently adverse shock, a fully private lending market is prone to experiencing a severe contraction in credit availability with adverse consequences for the real economy. The government can intervene to support liquidity for new securities during such a crisis, but this leaves investors in existing securities exposed to potential credit losses if the private guarantees default. Importantly, since financial markets are forward-looking, expectations for such scenarios will affect market liquidity in normal times as well.

Note that the liquidity benefits of the agency MBS market arise not only from the government backstop, but also from the standardization of the products themselves, as detailed by Vickery and Wright (2013).[12] Even in normal times, a private securitization market will not produce liquid standardized securities, because the security issuers have incentives to create differentiated products, not standardized ones. This is demonstrated by the long history of high product diversity and low liquidity in private-label mortgage securities, consumer credit securitizations, and corporate bonds. In part because of these features, in times of market stress, nonstandard financial instruments demonstrate much less liquidity, greater price volatility, and a larger drop in issuance and credit formation.[13]

Scharfstein and Sunderam (2011) propose to deal with the problem of cyclicality in credit availability by establishing a government guarantor that would significantly increase its lending during periods when private lenders were reducing their credit exposure. In normal market conditions, the government guarantor would define its credit box and price its guarantee fee so as to maintain a modest market share of new originations. The expectation is that this would allow the government guarantor to be able to retain the expertise and systems necessary to perform its lending backstop role when required. The balance sheet of the government guarantor, consequently, would be very elastic over the credit cycle.

This alternative approach raises the question of whether it is more efficient and effective to support robust credit availability through a government reinsurer for private lending or through a government agency that provides backstop lending. Assuming that both approaches could be

[12] Vickery and Wright estimate the liquidity benefit of the TBA market, separate from any credit guarantees, is probably about 10-25 basis points under normal market conditions and significantly higher during periods of market stress.

[13] For a discussion of illiquidity of corporate bonds and associated liquidity risks, see Chen *et al.* (2013).

designed to maintain credit availability during periods of market stress, the question is which approach exposes the taxpayer to less risk. With the government reinsurer, the risk to the taxpayer takes the form of underpriced government guarantee fees. With the government backstop lender, the risks to the taxpayer take the form of a more direct exposure to credit and operational losses at the government lender that are not covered by its guarantee fee – that is, another form of underpricing.

In thinking about this comparison, it is instructive to look at the recent case of the Federal Housing Administration (FHA). The FHA has essentially been performing the role of a countercyclically-scalable government securitization mechanism through the most recent housing cycle. At the height of the non-prime lending boom, the FHA's market share of originations fell below 5 percent. As house prices began to decline and non-prime lending collapsed, the FHA's market share more than tripled to over 15 percent, with the size of the FHA's insurance in force exceeding a trillion dollars. The last audit review estimates that the FHA's current books of business have a negative present value of $13.5 billion.[14] Recent analysis indicates that the resulting credit risk to the FHA insurance fund from increasing its lending has been significantly underestimated over the past several years and that the FHA may require taxpayer support for the first time in its history.[15]

This experience of the FHA offers a caution to the countercyclically-scalable government backstop approach. As noted earlier, changes to the overall guarantee fee charged to borrowers over the credit cycle by the government-reinsured securitization utility would be market-based. This contrasts with the guarantee fees charged by a government lender which, as in the case of the FHA, are likely to be relatively insensitive to changes in credit risk, due to political constraints. This is exacerbated by the pressure on the government lender to define a much wider credit box than would be the case for a private utility. These factors all suggest that the risks to taxpayers may well be much higher from a backstop government lender than from an explicit and priced backstop government reinsurer for private lending.

An equally important issue in managing the systemic risk of housing finance channels is inherent tensions across agents in a securitization chain, tensions that are multiplied when securitization has access to even remote government reinsurance. The potential misalignments in

[14] This puts the FHA $36 billion below its 2 percent capital level that it is required to maintain. See Integrated Financial Engineering, Inc (2012).
[15] See Aragon *et al.* (2010), Gyourko (2011), and Caplin *et al.* (2012).

incentives inherent in all securitizations are discussed in detail in Ashcraft and Schuermann (2008) and Adrian and Ashcraft (2012). The history of private-label securitization in the mid-2000s is a case study in how the breakdown of mechanisms to align incentives across mortgage lenders, securities issuers, and investors can contribute to housing bubbles and subsequent systemic crises in housing finance. Similarly, Fannie Mae's and Freddie Mac's contributions to the financial crisis highlight the moral hazard associated with misaligned incentives between the government and the private sector, as well as their implications for systemic risk.

Addressing both types of incentive misalignments is the core argument for a mutualized securitization utility. The mutualization of ownership and risk would align incentives across private members to set and enforce high credit standards and reduce incentives to compete by lowering credit standards during boom times. This reduction in incentives for a "race to the bottom" during good times can mitigate the procyclicality of mortgage credit availability. In addition, having securitization and credit standards set by the same entity that holds significant credit risk aligns members' incentives to monitor and manage risk over time. Compared to shareholder-owned financial firms, mutualized utilities have lower risk profiles, lower required profits, and much lower incentives to expand into new business areas, all of which are aligned with the policy imperative to manage tail risk in a careful way.

Most recent proposals, including our own, to reform the housing finance system in general and GSE-type securitization in particular, emphasize the sharply differentiated roles of private sector participants and the government.[16] However, most alternative proposals are largely silent on how these roles intersect and the associated incentive alignment issues in securitized mortgage markets. Rather, there is a reliance on regulatory oversight with limited or no discussion of how government and regulators will address the information asymmetries and avoid being "gamed" over time by the private sector. In addition, other proposals provide little guidance on how they will limit a "race to the bottom" in credit standards during upswings in housing activity, when mortgage lending can degenerate into a volume-focused business model. In other words, a strong regulator may not be sufficient to make up for a poor mechanism design.

In order to avoid repeating the pitfalls of the recent crisis, housing finance reform, and securitization reform in particular, should directly address, in detail, the mechanisms to align incentives across all participants – private and public. However, the economics of housing finance are sufficiently complex that there likely is no ideal model. Rather, GSE reform realistically is an

[16] For example see Seidman *et al.* (2013), and the Bipartisan Policy Center Housing Commission (2013a).

effort to identify the most workable options, not the first-best option – even on the economic merits, before considering the notoriously challenging political dimensions. Policymakers and analysts must therefore weigh the benefits and risks associated with each proposed model and focus on their trade-offs in both preventing and responding to systemic risk events.

II. VINTAGE-BASED CAPITAL STRUCTURE

In this section we discuss a vintage-based capital structure for a mortgage-insuring securitization utility, including equity capital provided up front by the private sector. This builds off our initial description of vintage-based capital in Dechario *et al.* (2011).

Capital Structure

Like Freddie and Fannie, the utility would receive guarantee fees on a flow basis from the loans underlying its mortgage-backed securities (MBS). In addition to compensating the government for the reinsurance of systemic risk, these fees would cover operating costs, generate a return on capital, and build loss absorption capacity within the utility. In our previous paper, we argued that the government tail risk reinsurance would be optimally applied at the level of a "vintage," or a set of MBS pooled across issuers within the utility and originated over a particular time period – for example, the six-month period used for the ABX index, or a year.

A vintage approach has several attractive features. For instance, it is consistent with the insurance only being triggered by a systemic shock. Loan-level guarantees would be triggered by idiosyncratic factors that impact a borrower's ability to pay (such as unemployment, health shocks, and divorce), while security-level guarantees would be susceptible to regional shocks (as opposed to macroeconomics shocks). In either case, these are not systemic events, and so are not appropriate for government reinsurance.

The alternative of institution-level guarantees such as in Seidman *et al.* (2013) raises questions about continued credit availability amid concerns about the solvency of the institutions issuing or guaranteeing the MBS. In a systemic event, all institutions taking mortgage credit risk ahead of the government would likely face increasing credit losses simultaneously, especially those with a monoline business model. As noted above, uncertainty about institutions' solvency, the point at which the government intervenes, or the terms of any reorganization can impair the institutions' ability to obtain and provide private capital to mortgage securitization. In addition to adding

downward pressure to asset prices, this would likely impair market functioning. Various solutions have been proposed to address these concerns about recovery and resolution planning, including minimum average debt maturity levels and contingent capital. However, these approaches generally require some impairment of the firm itself – apparently in an attempt to address concerns about "too big to fail" issues and to punish bad actors – which would still raise questions about market confidence and hence, systemic risk and financial stability.

In contrast, a vintage-level guarantee would provide not only clarity about business continuity but also the lighter operational burden and more appropriate risk profile of a guarantee narrowly focused on systemic risk. Note that the vintage-level attachment would not fall neatly into either of the "issuer-based" and "security-based" categories laid out by the Federal Housing Finance Agency (FHFA).[17] A vintage is neither an individual security nor an issuer, in the sense of a perpetual corporation. Rather, a vintage would be a limited-duration legal trust, a non-replenishing aggregation of mortgage securities and their underlying loans.

Note that a vintage-level guarantee would help to limit the procyclicality of the provision of residential mortgage credit by promoting confidence among MBS investors, lenders, and equity holders alike. Because they would have confidence that the institutional framework or "rules of the game" are not about to change, market participants need not speculate on whether or when the government will intervene, who will bear what proportion of the losses, or how newly-originated mortgages will reach the secondary market. The government tail risk reinsurance would provide a "fire break" between losses on existing vintages and new lending, which implies that market participants would never question the viability of the utility and the market it supports. The "fire break" further implies that losses from an existing vintage would not eat into the capital or fees supporting a new vintage and there would be no uncertainty over the maximum vintage losses that lenders selling to the utility may incur. The lenders would therefore still have an incentive to continue participating in the utility, knowing that their return from selling mortgages into a new vintage is not impacted by the performance of earlier vintages, and that the guarantee fee on new mortgages reflects the expected loss rate in the current lending environment, not a prior one.[18]

Historical data covering the recent financial crisis on cumulative default rates for prime conforming mortgages broken out by year of origination (see Figure 1) indicate that the

[17] See Demarco (2013).

[18] The importance of this dynamic is underscored by reports that relatively subdued refinancing activity in recent years has been attributable in part to lenders' reluctance to gain exposure to other firms' underwriting over previous years.

performance of vintages of loans underlying the mortgage-backed securities issued in the same year appears stratified. This stratification is typically apparent within 3 years of origination, suggesting that each vintage need adhere to a conservative capital ratio for only an initial few years, after which capital in excess of expected losses could begin to be released for distribution as dividends to participants in the vintage (or, as explained below, rolled over into start-up capital for new vintages). This stratification is also relevant for setting the attachment point of the government tail insurance, as discussed in Section III.

Going beyond the conceptual basis, how might a vintage-based program be operationalized? Members would be eligible to sell mortgages to the securitization utility after paying in some equity capital up front. Non-members could gain access to the securitization markets either on less preferable terms, or by selling loans to members via what the industry calls "correspondent relationships" with aggregator banks. Participants in each vintage would contribute loss-absorbing capital to vintage-specific loss pools – again, separate legal trusts – in proportion to the volume of mortgage balances they securitized into each vintage.[19] As we discuss in more detail in Section IV, providing non-members multiple points of access to the securitization markets would help ensure equitable pricing for all lenders.

An example of a capital waterfall for the utility is shown in Figure 2, while the vintage-level guarantee is illustrated in Figure 3.[20] After an initial transition period described at the end of Section III, the utility would be expected to fully capitalize each new vintage once it has securitized the last of the constituent securities. As we discuss below, for each vintage the utility would be expected to hold a specified amount of loss-absorbing capital – for example 3 percent – against the total origination balance. This could be sourced from new contributions, excess capital released from prior vintages, and income accruing to each vintage. The utility might also issue a limited amount of debt, exclusively for the purpose of buying non-performing loans out of securitization trusts and for funding the loss-mitigation process – although this would raise governance questions, which we highlight Section IV.

The utility would be required to hold the full amount of loss-absorbing capital for an initial period of, for instance, three years. At that point, a vintage-specific delinquency test would be

[19] Charging fees proportional to the volume of balances they securitize would be analogous to the approach used within the Federal Home Loan Bank (FHLB) system.

[20] One potential refinement of this model would be to allow for "representations and warranties" clauses to allow the utility to exclude some types of losses from being mutualized. Much of the content and use of such clauses are issues that apply across proposals for institutional reform, but we note a few implications for a mutual structure in Section IV's discussion of governance.

performed, and if the vintage's performance at its three-year anniversary indicated that the vintage would be unlikely to trigger the government reinsurance, then the regulator could allow the utility to begin to release capital and require that, going forward, capital be held against only the remaining (as opposed to the original) balance in the vintage.

In order to accelerate the accumulation of capital in each vintage, the utility could – subject to regulatory approval – transfer excess capital from existing vintages into start-up capital for new vintages. Likewise, to satisfy its stipulated loss absorption ahead of the government, the utility could suspend or "lock down" distributions of excess capital from prior vintages and transfer them to supplement capital in vintages that have already distributed some of their capital but subsequently have come under stress. In order to preserve the "firebreak," this lock down would only apply to capital from participants in the vintages with the higher-than-expected losses. In addition to providing supplemental loss absorption capacity, this would further align member incentives with a long-term view of mortgage credit risk.

Note that the countercyclical "fire break" between existing vintages and new lending implies an important asymmetry: although excess capital from maturing old vintages could be rolled over to support new vintages, capital from new vintages cannot be used to absorb losses from older vintages. This asymmetry would be critical for maintaining confidence and preventing something akin to a bank run. Otherwise, lenders might decline to participate in a new vintage if they fear paying for previous vintages' losses.

While the vintage structure would mitigate some procyclical pressures in residential mortgage lending, it cannot eliminate them all. For instance, there would be certain start-up costs to capitalizing the first few vintages after losses from a systemic event wipe out the capital of one or more vintages and reduce the excess capital from previous vintages. Therefore, a transition period similar to that for the inaugural set of vintages (again, described more fully at the end of Section III) might be required to mitigate any procyclical dynamic in restarting the vintage capitalization cycle. Nevertheless, the key point remains that once a vintage triggers the reinsurance, any uncertainty over the ultimate magnitude of losses for that vintage would not hinder starting a new vintage.

III. PRICING THE GUARANTEE FEE & BUILDING CAPITAL

A key question for any mortgage market reform model is what level of guarantee fees (g-fees) a government-reinsured securitization utility would require and the resulting impact on fixed-rate mortgage rates. In this section, we present calculations that illustrate the relationships among capital and other factors that affect the utility's guarantee fees and the government reinsurance fee. Our intention here is not to present a full capital model, but rather to illustrate the dynamics and sensitivities of capital and guarantee fees to several key variables. A comprehensive, risk-based capital modeling exercise is beyond the scope of this paper.[21]

We assume that the utility initially will securitize mortgages that adhere to credit and most of the other standards currently in use by the GSEs. This is advantageous from a transition standpoint, because it will not require changes to MBS characteristics or TBA trading conventions, and it will facilitate the continued flow of mortgage credit across all types of lenders who have underwriting systems geared to current GSE standards. In addition, using current GSE standards will simplify the regulator's job of setting initial capital standards, risk management standards, and the pricing of the government reinsurance, since it can rely on a large quantity of historical information on the performance of mortgages securitized by the agencies.

Over time and with regulatory approval, the characteristics of the mortgages securitized by the utility may be adjusted, but the utility should retain a focus on securitizing core, standardized mortgage products: loans to high-quality prime credit borrowers with substantial downpayment requirements (for instance, 20% of the loan balance). To that end, it would be helpful if the utility's maximum combined loan-to value ratio (LTV) could be enforced by the lender over the life of the mortgage by restricting borrowers' ability to place second liens on their mortgage properties.[22] Note that this would still leave the lender exposed to the risk that declines in housing prices could push LTVs above the utility's maximum level.

While the utility would restrict its lending to prime borrowers, the mortgage products it securitizes may differ from traditional conforming loans in at least one respect. With appropriate pricing of the government guarantee, neither the utility nor the borrowers of the mortgage loans securitized by the utility would receive a government subsidy. This has important implications for

[21] For examples of more formal modeling of capital and credit risk, see Smith and Weiher (2012) and the Bipartisan Policy Center Housing Commission (2013b). For a more formal modeling of mortgage rates, see Andrew Davidson & Co. (2013)

[22] This would require systems for lenders to keep track of outstanding liens.

thinking about whether the utility should impose the current GSE conforming loan limits. There are two rationales for the conforming loan limits. The first is that the mortgage pricing is subsidized and the limits are designed to target the subsidy. However, without a subsidy, this constraint does not apply. The second rationale is that large-balance mortgage loans are not ideal for including in securities, due to their distinctive prepayment behavior and the discrete shifts in security-level outstanding principal balances that occur as individual large loans refinance or default. With appropriate pricing of the government guarantee, the loan limit should reflect the second rationale. Yet fully appropriate pricing would include pricing these differences in prepayment characteristics, in which case a higher loan limit than the current conforming limit would be justified.

To simplify our discussion of the guarantee fee needed to cover all costs and provide an expected return, we use a simple model based on the Basel framework for bank capital. Under the Basel requirements, a regulated financial institution must hold loss-absorbing capital in proportion to the aggregate risk exposure of its assets.[23] To account for variation in riskiness across assets – and therefore the amount of loss absorption capacity a regulated institution needs – the Basel standards apply "risk weightings" to different asset classes. The required capital ratio is thus a simple metric for the institution's aggregate ability to absorb losses relative to the assets it holds. This relationship can be expressed in a simple equation:

$$\textit{Capital Ratio} = \textit{Capital} \,/\, \textit{Risk-Weighted Assets}$$

As a definitional matter, it is important to note that the capital calculations below refer to loss-absorbing capital that is held in each vintage's mutualized loss pool. Under this model, the main two drivers of the guarantee fee are the utility's required capital ratio and its assumed return on equity. Other significant drivers of pricing are the assumptions about the frequency of reinsurance payouts and the total cumulative loss associated with a tail event, while a marginal contributing factor is the administrative costs (later we will discuss the impact of risk syndication or junior bond scenarios). In other words, the guarantee fee consists of the following components:

$$\textit{Guarantee Fee} = \textit{Capital Charge} + \textit{Administrative Cost} + \textit{Expected Losses} + \textit{Reinsurance Fee}$$

The specifications for the capital charge and the reinsurance fee are:

[23] See Elliot (2010) and the Basel Committee on Banking Supervision (2008).

*Capital Charge = (Capital Ratio * (Expected Return – After-Tax Interest Income on Capital)) / (1 – Tax Rate)*

*Reinsurance Fee = (Expected Tail Loss – Expected Loss – Capital) / (Total Notional * Years)*

As a point of comparison, prior to the Housing and Economic Recovery Act of 2008, the GSEs were subject to a regulatory regime completely separate from depository institutions. They were required to hold capital against off-balance sheet assets sufficient to meet an idiosyncratic minimum leverage ratio of 45 basis points.[24] To translate this into a bank-like Basel-based capital ratio, we assume a Basel I risk weighting of 50% for prime residential mortgage loans. This represents the "floor" on Basel III risk weights for U.S. banks and so is a useful comparator for the capital cost to originators of holding mortgages on their own balance sheets, rather than securitizing them.[25] Applying this risk weighting to a balance sheet composed entirely of mortgage assets, the minimum leverage requirement for the GSEs of 45 basis points would correspond to an effective capital ratio of only 0.9%.[26] Like other commentators, we believe recent history has proved that this level was insufficient and therefore use a higher capital ratio as a starting point.

Required Capital Ratios

Below we walk through some calculations to discuss the sensitivity of the derived guarantee fee to assumptions about capital, losses, and other variables. We assume a required capital ratio of 3% as a base case, and later consider the impact of higher capital standards on guarantee fees. At the 3% capital ratio level, the GSE's $4.4 trillion book of business would have required $132 billion of capital. Note that a 3% capital ratio would be consistent with Freddie Mac's recent Structured

[24] The GSEs were also subject to a cash flow stress test, but in practice, the minimum leverage ratio was binding.

[25] The Dodd-Frank Act introduced the concept of a capital floor, which provides that the net aggregate effect of subsequent Basel standards may not produce capital requirements less than those under Basel I. However, since we are considering a monoline mortgage securitization utility, it is not possible to counterbalance adjustments to risk weightings across different asset classes (0% for U.S. Treasury securities, 20% for agency MBS, and 100% or more for high-yield corporate bonds).

[26] That is, since 0.45% = capital / assets, then 0.9% = capital / (0.5*assets).

Agency Credit Risk (STACR) deal[27] and equivalent to a 6% capital ratio for a bank using Basel I risk weighting of 50% for residential mortgages.

Whether a vintage exhausts the utility's loss-absorbing capital depends on the vintage's cumulative default rate and the average loss severity. Assuming a 40% loss severity,[28] an effective capital ratio of 3% would imply a government tail reinsurance trigger at a 7.5% cumulative default rate for a vintage. Turning again to Figure 1, if vintages were defined by calendar year, the 2006 and 2007 vintages would have breached this trigger, but not the 2005 or the 2008 vintages. The 2006 and 2007 vintages of GSE-guaranteed mortgage loans reflected a significant deterioration in underwriting standards, but since their cumulative default rates have exceeded the 7.5% threshold by several percentage points, it is possible that even if their underwriting quality had been maintained, they would have still breached this trigger – albeit somewhat later – if they went through the recent housing price cycle. Although we anticipate that proper governance and pricing could prevent or reduce deterioration in underwriting, this is far from guaranteed.[29] The larger point is that this 3% attachment point is conservative in that it would make triggering the government reinsurance relatively unlikely.

Other Assumptions

We assume that the fee would continue to be collected as a spread over secondary mortgage rates and would be used to fund operating expenses, expected losses, and a required return on capital for the owners of the mortgage-insuring securitization utility. Given the conservative underwriting standards mentioned above, we assume expected credit losses of 10 basis points per year, although given the historical performance of prime conforming mortgages that the GSEs traditionally guaranteed, the expected loss rate could be lower.[30] In addition, we assume administrative costs of 10 basis points per year, a 35% tax rate, and a 2% after-tax interest income on capital reserves (a very conservative assumption given that the June 2013 Blue Chip Survey forecasted a long-term average on the 3-month Treasury note of 3.7%).

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[27] See "Freddie Mac Sells $500 Million of Mortgage Securities," by Al Yoon and Nick Timiraos in the *Wall Street Journal*, July 23, 2013.

[28] The maximum average loss severity during the financial crisis reported by Fannie Mae was 37.2% in 2009, according to its annual Form 10-K filings. For earlier estimates of loss severity, see Qi and Yang (2007).

[29] Weakening of underwriting standards need not take the form of lower credit scores, higher measured loan-to-value ratios, or higher debt-to-income ratios. Rather, it may be more subtle, showing up as bias in assessing appraisals or income levels.

[30] Fannie Mae's 2004 Annual Report describes a loss rate over the previous several years of nearly 0.5 basis points. This may be net of the positive effect of reinsurance so the gross rate may have been higher.

In our base case, we also assume a 10% return on the utility's equity capital and tail events occurring every 30 years. For guidance on an appropriate expected return on equity capital (in terms of earnings from securitization and insurance fees, not interest income), we looked at several industries. While data from Bloomberg indicate that the historical average return on equity for financial companies in the S&P500 that have stayed in business over 1993-2011 has been 15%, calculations by Damodaran indicate that insurance companies and physical utilities (*i.e.*, power and water companies) tend to provide returns in the range of 8% to 10%.[31] In their model for catastrophe insurance, Harrington and Niehaus (2003) have also used 10% as a hurdle rate.[32] However, some financial mutuals have historically provided returns well below 10%,[33] and financial market utilities have occasionally operated on a profitless, breakeven basis.

Indeed, in the following section, we argue that members of a mutualized securitization utility may have reason to accept lower returns on their paid-in capital if they view the utility as a mechanism for lowering funding costs and increasing the volume of origination fees, rather than a profit center in its own right. Furthermore, calculations for financial market utilities' returns are sometimes based not on the entire loss absorption capacity of the firm, but on the much smaller equity capital contributed only by the members of the utility,. In the calculations below, the assumed returns are calculated as the return on the entire loss-absorbing capital base. In light of the comparative evidence, it seems likely that a mortgage securitization utility would not need to provide the 15% return on equity capital often cited for financial companies, but it seems prudent to assume it would need to earn more than other types of cooperatively owned financial utilities.

Access to Government Tail Insurance

In the table below, we calculate the guarantee fee for several scenarios, changing assumptions regarding the presence of priced government reinsurance, the capital requirement, the return on equity, and the frequency of tail events (later, we provide sensitivity analyses for several variables, then explore risk syndication or junior bond scenarios). In each of these cases, we assume that in a tail event, the maximum loss for a vintage is 6% – twice the loss level that triggers the government reinsurance – and that this occurs at regular intervals specified in the model. Assuming

[31] See: http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/roe.html.
[32] Harrington and Niehaus (2003).
[33] Data from SNL indicates that over the period 2002-2012, four mutual insurance companies (MassMutual, Northwestern, NY Life, and TIAA-CREF) provided returns of about 5% to 7%. We thank Julia Gouny for research assistance on this point.

a loss given default of 40%, a 6% maximum tail loss implies a 15% cumulative default ratio, which is well above the approximately 11% cumulative default ratio that Fannie Mae's 2007 vintage has reached so far. These are very conservative assumptions, especially since we are also assuming substantially higher-quality underwriting than Fannie Mae's 2007 vintage and since the government will require compensation for taking on the risk of a 6% cumulative loss in a tail event.

Among other things, this conservatism is meant to address the concern that the risk-neutral fair value of government-provided reinsurance could be much higher than the expected tail-event loss, since the reinsurance is paid out in the worst states of the world. As noted above, we would argue that the risk premium faced by strong-credit sovereigns is lower than that of private firms, particularly in times of market stress. Nevertheless, our use across scenarios of a single high-stress tail-event loss assumption is meant to account for this discrepancy between the reinsurance's risk-neutral expected value and its actual (or assumed) fair value. That is, we implicitly build a risk premium into the reinsurance fee by assuming that if cumulative losses exceed 3 percent, they will always reach a 6 percent cumulative loss, rather than any cumulative loss between 3 percent and 6 percent.

In our first scenario, a fully privatized structure, the utility would be required to hold capital sufficient to absorb entirely on its own the full 6 percent maximum tail-scenario losses for any vintage. This would be consistent with a pledge by the government never to intervene. With these assumptions, we estimate that the total guarantee fee would then need to be 94 basis points. This is at least four to five times the size of the pre-conservatorship guarantee fee charged by the GSEs.

In the next scenario, the utility has access to government reinsurance. In that case, the government absorbs any losses on a specific vintage beyond the utility's required 3 percent capital, and receives a fee as compensation. In our base case, the fee is calculated to compensate the government for absorbing the residual 300 basis points of losses in the tail-event loss of 6 percent occurring once over a 30-year horizon, and our model produces a guarantee fee of 67 basis points. Stepping back from the particular point estimates, the key takeaway is that even though the government would be expected to pay out on this reinsurance only rarely, the government backstop reduces the annual guarantee fee for mortgages by almost 29 percent. This reflects the efficiency gain from moving from private to public provision of the tail insurance.

The access to government reinsurance significantly lowers the overall guarantee fee, since the reinsurance fee paid to the government as compensation for tail-event losses is only assumed to break even over the entire credit cycle, and its losses need not be covered up front. In contrast, the

owners of a private firm pay in capital up front, although subsequently it may be supplemented by retained earnings. This pricing differential implies that if the government guarantee fee is inadvertently set somewhat too high, then the utility still would likely not lose significant market share, unless private funding of mortgages outside of the utility were not required to hold adequate capital to cover the expected tail loss.[34]

Pricing under several scenarios, without and with government tail-risk reinsurance, are summarized below. Note that the reinsurance fee only varies with assumptions that affect the government's risk exposure: the tail-event loss rate, the tail-event frequency, and the level of private capital. Note also that if the utility securitized more risky, nonstandardized mortgage products – for example low-downpayment mortgages – higher guarantee fees would result from both a higher required capital ratio and a higher tail loss assumption.

Assumptions					
	No Reinsur.	**3% Capital**	4% Capital	15% ROE	50 Years
Total loss in tail event	6%	**6%**	6%	6%	6%
Required private capital	6%	**3%**	4%	3%	3%
Expected return on capital	10%	**10%**	10%	15%	10%
Period between tail events	30 years	**30 years**	30 years	30 years	50 years
After-tax interest income	2%				
Tax rate	35%				

Fee Breakdown (basis points / year)					
	No Reinsur.	**3% Capital**	4% Capital	15% ROE	50 Years
Expected Losses	10				
Admin. Cost	10				
Reinsurance Fee	0	**10**	6	10	16
Net Income	75	**37**	50	60	37
Guarantee Fee	**94**	**67**	**76**	**90**	**63**

Sensitivity analysis

As the specifications listed above imply, the guarantee fee is a linear function of most of the variables. For example, if the expected loss rate on a vintage increases from 10 to 15 basis points due

[34] See Frame *et al.* (2012), page 27.

to weaker economic fundamentals, the guarantee fee would increase by 5 basis points.[35] Consequently, forecasted cyclical fluctuations in credit risk would be fully priced. Since this repricing would be done by the private sector participants and not by the government (although changes to the guarantee fee, particularly reductions, would require regulatory approval, as discussed below), credit risk should not be shifted to the government guarantee – in contrast to a concern raised by Frame *et al.* (2012).

Below we highlight the sensitivities of guarantee fees to other key inputs, by varying one input at a time (in each table, a baseline, corresponding to the scenario labeled "3% Capital" above, is highlighted).[36] These examples demonstrate that the fee is most sensitive to the required capital ratio, followed by the required return on capital. Thus, as the required capital ratio varies from 2% to 5%, the guarantee fee rises by 18 basis points, whereas varying the expected return on capital from 8% to 15% has a more modest effect, with the implied guarantee fee rising 23 basis points. Raising the capital requirement (while holding tail-event frequency and tail-loss rate constant) involves competing dynamics, as the decline in the government's required compensation partially offsets the rise in the private sector's.

Sensitivity to Capital Ratio

Capital Requirement	2%	3%	4%	5%
Guarantee Fee (bps)	58	67	76	85

Sensitivity to Expected Return on Equity Capital

Expected Return	8%	10%	12%	15%
Guarantee Fee (bps)	57	67	76	90

The guarantee fee is less sensitive to the expected tail-event loss rate and time horizon assumptions. As the assumed expected tail-event loss rate over a 30 year horizon rises from 4% to 8%, the implied guarantee fee rises 13 basis points. Holding all other variables constant from the base case, as the assumed horizon for the maximal tail loss extends from 10 years to 30 years and

[35] If the utility did not increase the guarantee fee in the face of this increase in expected credit losses, then these losses would come out of their capital backing the vintage. As such, these participants have the incentive to adjust the guarantee fee in response to changes in expected loss rates.

[36] This is a simplification since the inputs likely co-vary together. For example, raising the capital ratio should lower the required return on capital everything else held constant.

then beyond, the reductions in the guarantee fee become smaller – a fortunate dynamic since longer-dated credit cycles are more difficult to price.

Sensitivity to Tail-Event Expected Loss Rate

Tail-Event Loss Rate	4%	6%	8%
Guarantee Fee (bps)	60	67	73

Sensitivity to Frequency of Tail Events

Years between Events	10	30	50
Guarantee Fee (bps)	86	67	63

Junior Bonds: Outside Capital and Market Discipline

A number of proposals and commentators have called for other channels to attract more private capital to stand in front of any government reinsurance of mortgage risk. In the utility described above, private capital comes from borrowers through downpayments, from lenders and originators through paid-in capital, and from the utility's retained earnings (that is, accumulated guarantee fees). However, as the FHFA and many commentators have noted, there may be several advantages to attracting supplemental sources of private capital and providing a variety of structures for sharing credit risk in a new system.

One way to do this within the proposed utility would be to allow for the sale of junior bonds with direct credit risk exposure to specific vintages securitized by the utility and subordinated to the utility's equity capital. Such junior bonds could allow for diversification of credit risk to investors beyond the utility, reducing the concentration of risk. If junior bonds attracted investors who would otherwise not be willing to invest in mortgage risk indirectly (that is, by investing in the lenders themselves), then these bonds could replace a portion of the private capital, broadening the capital base available for mortgage credit and potentially reducing the cost of mortgage credit. In addition, sales of junior bonds to a broader marketplace could provide both the utility and its regulator with a market assessment of the credit risk in each vintage.

However, if not structured properly, there are also potential disadvantages to diversifying the utility's capital structure. We review four potential pitfalls, and then explain how junior bonds can be designed to mitigate them.

First, it is important not to rely on facile assertions about market discipline. A major problem in private-label mortgage securitization prior to the crisis was the spectacular failure of

credit investors to impose market discipline on issuers.[37] Many private mortgage securitizations relied on bond structures whose sole purpose was to achieve particular credit ratings (often related to risk weightings for regulatory capital standards). These targeted credit ratings were typically investment grade – high enough that many investors felt overconfident that their credit risk exposure was low.[38] Such investors relied excessively on the ratings agencies' opinions, rather than conducting independent due diligence on the credit risk. Investment patterns in risky bonds – both structured credit bonds and corporate bonds – suggest that investors who conduct appropriate due diligence are those who invest in instruments with expected losses, loss distributions, and yields consistent with speculative or "high-yield" credit ratings. A junior bond with an *investment grade* rating, therefore, is unlikely to provide significant market discipline or independent credit evaluation. Indeed, it could invite the kinds of regulatory and ratings arbitrage that contributed to the excesses and subsequent downfall of the private-label securitization market.

In addition, because investment in risky bonds tends to be highly procyclical, an overreliance on junior bonds as a source of credit protection could reduce the utility's robustness during a market downturn. If the utility has over time been regularly selling off a significant amount of bonds, then it will have less internal capital from prior vintages to pass forward to a new vintage if investors withdraw their support. While there is an inherent cyclicality to the lender community's behavior as well, during a period of tight credit availability, lenders will likely be willing to undertake some lending for securitization at some price, whereas many credit investors may withdraw from the housing sector altogether, just as we have seen in recent years. During downturns, the utility may be able to obtain capital more consistently from the lender community (via share purchases and retained or capitalized guarantee fees) than from the credit markets.

A third consideration involves leverage and diversification of capital sources. Junior bonds could be used by levered mortgage-lending or -insuring institutions to increase their earnings by "doubling down" on their exposure to credit risks. Not only would this fail to diversify sources of mortgage funding, but it could increase aggregate leverage in the mortgage system. Leverage and concentration risks are particular concerns if the credit risk is distributed through insurance or derivatives, since these mechanisms would add additional long-term counterparty risks and are likely to be particularly attractive instruments to levered financial institutions who may already hold

[37] For more details see Ashcraft and Schuermann (2009).
[38] For certain institutions, demand for these securities was further supported by favorable risk weights for regulatory capital requirements.

significant amounts of mortgage credit risk. Importantly, in a housing downturn, the ability of insurance and derivatives counterparties to perform on their obligations and provide loss absorption capacity is likely to be impaired, as it was in the recent housing crisis. All of this would make the supply of residential mortgage credit more fragile and exacerbate concerns about procyclicality.

Finally, it is important to bear in mind that syndicating risk through the capital markets has implications for the incentive alignment in the securitization chain. The more credit risk that is sold into the market, the less "skin in the game" retained by the utility and participating lenders. At some point, increasing the issuance of junior bonds could erode incentives for robust underwriting. This would increase the risk to the government even with the same attachment point for the tail reinsurance.

These risks imply at least four design features for junior bonds. First, if market discipline is an important goal for the junior bonds, then they need to be sufficiently risky – preferably speculative-grade or high-yield bonds – such that investors with the appropriate skill sets will have the incentive to conduct independent due diligence on the credit risk in the bonds. If we continue to assume relatively conservative underwriting standards, then the notional size of the speculative-grade junior bond would be relatively small, or the underlying pool's few credit losses would not be able to generate a loss rate high enough to incent rigorous credit evaluation. Sales of less risky (*i.e.*, investment-grade) junior bonds may provide the utility with some funding advantages during good times, but are less likely to provide the utility and its regulator with independent assessment of credit risks and may be a funding source that is unavailable in periods of market stress.

Small-scale syndication of risky bonds would have two additional benefits. Ensuring that the junior bonds bear sufficient risk is a mechanism for diversifying demand away from the regulated, levered financial firms that may already have substantial exposure to the residential mortgage credit risk. Also, reducing the system's reliance on syndications could reduce the overall cyclicality of the system, given the cyclical nature of credit bond investing. Note that this also implies that the utility should not be expected to sell off junior bonds at all points in the credit cycle.

Second, in order to preserve incentives to robustly monitor and enforce its securitization credit standards, the utility should be required to retain significant credit risk in the underlying pools it securitizes. This is important to address the incentive alignment issues we emphasize throughout this paper. As noted above, completely separating those who hold credit risk from those who set the credit risk standards can lead to a breakdown in incentives to monitor and control risk. This is what occurred in the private-label securitization market in the mid-2000s, and to some forms of subprime

lending during prior housing cycles. The addition of government reinsurance makes it particularly important to align incentives across the private sector participants in securitization, because the government will bear the risk of failure by the private sector to appropriately manage and monitor credit risk. In addition, if the utility is allowed to sell off investment-grade junior bonds, even greater risk retention by the utility is called for, since investor discipline is likely to be weaker. That is, the level of risk retention could be modulated throughout the risk syndication process, such that the proportion of each junior bond that the utility retains could be calibrated to the overall riskiness of the bond in question. Risk retention of higher risk bond tranches might be smaller, but larger risk retention (e.g. 40-50%) would be required for less risky junior bonds.

Third, to address the concerns about leverage and counterparty risks, any external capital raised by the utility to support mortgage credit risk should come in the form of cash paid up front. The utility should be prohibited from selling off credit risk to the private sector in the form of either insurance or derivatives.

Finally, the fourth consideration for junior bonds concerns structure and issuance patterns. If the utility and its regulator wish to use junior bond pricing as an independent market assessment of credit risk, then the bonds need to be structured and issued in a way that promotes market liquidity and transparency in pricing by relying on actual transactions, not just indicative marks by dealers. Because high-risk credit products are typically not liquid instruments, the utility's junior bonds should be highly standardized and feature relatively simple structures. Moreover, fixed-income products generally tend to have highest liquidity and price transparency immediately after they are issued. Market discipline will therefore be greater if the utility issues such bonds at regular intervals (assuming that demand for risky bonds exists). As with the underwriting standards for the securitization-eligible loans themselves, standardization and simplicity of junior bonds will facilitate risk management and market discipline.

Junior Bonds: Impact on Capital and Pricing

How would junior bonds fit into the utility's capital structure? For a given expected loss rate, a set of bonds could be sold that absorbs all expected losses greater than a stipulated amount. That is, the bonds would lie between the expected losses to the utility (traditionally, the residual or "equity" portion of a private-label securitization) and the utility's capital. For example, suppose the utility retains its 10 basis points of expected annual losses, which over the typical 5- to 7-year duration for a vintage amounts to 50 to 70 basis points of first-loss equity. Some estimates suggest

that as much as 1 to 1½ percent of the subsequent loss on a vintage could be sold via a sufficiently risky (speculative or high-yield) junior bond,[39] a range that appears roughly consistent with the structure and pricing of Freddie Mac's recent unrated STACR notes.[40] Consistent with the discussion above, to align incentives to appropriately monitor and manage credit risk for each vintage, the utility could be required to retain a significant proportion of the junior bond. That is, to address the moral hazard associated with government reinsurance, the utility could retain as much as 40% to 50% of investment grade junior bond tranches (and perhaps somewhat less for speculative grade tranches), rather than the 5% minimum required by the Dodd-Frank Act for private securitizations.

However, as long as the junior bond provides a high yield or comprises a small fraction of the overall capital structure, its impact on the pricing of the guarantee fee would be limited. The speculative-grade yields required to induce true market discipline would probably be only modestly lower than the utility's expected return on equity – for example, 8% compared to 10%.[41] In that case, even issuing as much par value of junior bonds as to cover a full 1 percent of a vintage's outstanding notional would result in limited reduction of the guarantee fee. Issuing a more senior investment grade risk-bearing bond, as Freddie Mac did, would lower the guarantee fee more, but again, it would provide less market discipline than the riskier bond, still contribute to procyclicality, further erode the alignment of the utility's incentives for effective risk management and sound underwriting, and thus increase the risk to the government.

The logic of the junior bond's impact is straightforward enough, but we can demonstrate it quantitatively as well. To include the return on the bonds in the fee, we can elaborate on our previous pricing formulation:

$$\textit{Guarantee Fee} = \textit{Capital Charge} + \textit{Administrative Cost} + \textit{Expected Losses} \; \mathbf{+ Bond\ Return} + \textit{Reinsurance Fee}$$

[39] Bipartisan Policy Center Housing Commission (2013b).
[40] See "Freddie Mac Sells $500 Million of Mortgage Securities," by Al Yoon and Nick Timiraos in the *Wall Street Journal*, July 23, 2013.
[41] An 8% return is roughly consistent with recent returns on Freddie Mac's STACR bond's M1 tranche which yielded 715 basis points over Libor, as well as historical data from high-yield corporate bonds. Data from Bank of America indicate that the average option-adjusted spread on corporate bonds over 1997-2013 rated BB (the highest speculative-grade rating) has been about 400 basis points. Adding that spread to the June 2013 Blue Chip Survey's long-term predicted averaged 10-year Treasury rate of 4.9% produces a yield of about 8.9%.

Reinsurance Fee = (Assumed Tail Loss – Expected Loss – Capital ***– Bond Notional****)*
*/ (Total Notional * Years)*

In the table below, we assume a junior bond sized to 1 percent of the utility's total credit exposure, of which the utility retains 20%, selling 80 basis points of its total credit exposure to the capital markets. The table assumes a tail-event loss rate of 6% and a government reinsurance attachment point after private-sector capital of 3% has been wiped out, while we allow the return on equity to vary from 10% to 15%. The first column in each set of scenarios shows a base case and the latter one shows the impact of adding a junior bond. Note that as the junior bond reduces the capital requirement for the utility, that portion of the guarantee fee that funds the utility's net income declines, and this is only partially offset by the addition of a fee to fund the junior bond's interest coupon payments.[42] The small size of the bond and its relatively high yield imply a limited impact on the overall guarantee fee. This provides further demonstration of how the ownership of the utility affects the total cost of capital and hence, both guarantee fees and mortgage rates.

Sensitivity to High-Yield Risk Bond

Tail-Event Loss	6%			
ROE	10%		15%	
Utility Capital	3%	2.2%	3%	2.2%
Net Income (bps)	37	27	60	44
Junior Bond	0%	0.8%	0%	0.8%
Bond Yield	-	8%	-	8%
Bond Fee (bps)	-	6	-	6
Reinsur. Fee (bps)	10	10	10	10
Guarantee Fee (bps)	67	63	90	80

Capital Accumulation

Our description of vintage-based capital has so far focused on how the structure would function in a steady state. Reaching that steady state would first require a credible transition plan. To simplify the discussion, we will assume that any new utility would start off *de novo*, completely

[42] Because interest on debt is a tax-deductible expense, the impact of the junior bond yield on the overall guarantee fee depends on the assumed tax rate. The lower the assumed tax rate, the smaller the incremental difference between the utility's expected return and the bond yield, and therefore the smaller the impact of the junior bond on the overall guarantee fee.

segregated from Fannie's and Freddie's legacy book of business.[43] This will facilitate the clearest assessment of the entity's business model. We also assume that as a start-up, the utility would build securitization activity slowly, in order to allow the business model, regulatory structure and most importantly, operational infrastructure, to be tested and adjusted.[44] Once again, our intention here is simply to illustrate some fundamental considerations for transitioning to a utility, not to present a definitive blueprint.

There are several approaches that could be taken to provide sufficient loss-absorbing capital for a new vintage of mortgages during the transition phase. The most conservative approach is to require all of the capital backing up the vintage to be paid in up-front. That is, each vintage starts out fully capitalized to absorb up to a 3 percent loss. To implement such a conservative approach would require that the members provide larger up-front equity capital to the utility, that a significant share of the utility's capital structure is financed by junior bonds in capital markets, that originators capitalize some portion of expected guarantee fees up front to the utility, or some up-front capital is provided from past GSE securitization profits (*i.e.*, from the government), to be repaid in subsequent years. The alternative approach would be for the regulatory authority to allow the utility to build up the capital for each vintage over time.[45] Given that losses typically occur over time, this approach could be designed in such a way as to ensure that sufficient capital is in place in time to absorb required losses ahead of the government reinsurance.

To illustrate the first approach, we developed a simple quantitative model for the capital-building phase for the vintages of a *de novo* mortgage securitization utility which slowly builds up its securitization business over several years.[46] We assume that the utility begins by securitizing only a fraction of the new-purchase mortgages that meet its underwriting standards, in this case $100 billion in the first year, rising to $400 billion over 3 years. Assuming the parameters of the baseline

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[43] That is, the losses from existing guarantees would only be offset by guarantee fees from existing books of mortgages – not from a tax on the utility.

[44] A staged transition to new platform, structures and products is long-standing best practice for financial utilities. Such a transition path suggests that the utility will likely begin securitization activities before the existing GSEs are completely phased out. Thus as a transitional issue, the utility will likely need to begin by adopting credit and conforming loan standards consistent with current GSE securitization to guarantee continued access to mortgage credit, and a smooth adjustment in market access and liquidity.

[45] This is an approach that the new municipal insurer Build America Mutual seems to have successfully employed. See "Build America's First Deal Saves Schools $1.25 million," Bloomberg News, by Brian Chappatta, September 28, 2012.

[46] Again, we have not attempted to show here how this capital accumulation model or the question of capital transfer across vintages could be combined with our sensitivity analysis of guarantee fee pricing components, which would require a much lengthier discussion.

scenario labeled "3% Capital" above,[47] our model predicts that it would take 7 years before the utility could distribute profits as dividends. For the exercise, we assumed a constant prepayment rate of 6% a year – a conservative assumption that reduces the interest payments that provide the utility's profits.[48] Assuming that capital equal to 3% of original principal balances must be held for 3 years, the utility would require $3 billion rising to $12 billion in loss-absorbing capital over the first four vintages. Taking into account profits and released capital from previous vintages, net contributions of capital increase over the first four years before beginning to decline. After eight years, the net contribution of new capital turns negative, indicating that the utility can begin to distribute excess capital as dividends. This progression is illustrated below.

Example: Loss Absorption Capital Needs ($ bn)

Year	Initial capital	Internal funds	Net contributions
1	3	0.37	2.63
2	6	1.09	4.91
3	9	2.64	6.36
4	12	4.65	7.35
5	12	6.72	5.28
6	12	8.84	3.16
7	12	10.51	1.49
8	12	12.08	-0.08
9	12	13.56	-1.56
10	12	14.94	-2.94

Assumptions

Capital ratio	3%
Minimum period for full capital	3 years
Fee income	37 basis points
Origination (annual growth)	$100 billion
Origination (steady state, annual)	$400 billion
Prepayment rate (annual)	6%

[47] That is, the presence of government reinsurance, a private capital requirement of 300 basis points, and a guarantee fees of 67 basis points, of which 37 basis points would be free cash flow for retention as capital or distribution as dividends.

[48] Typically, prime conforming agency-backed 30-year fixed-rate mortgages initially prepay slowly, but begin prepaying steadily faster over the first few years in which a vintage is outstanding. The industry standard assumption – set in 1987 by the predecessor of the Securities Industry and Financial Markets Association (SIFMA) – is that, based on housing turnover alone, this acceleration occurs over the pool's first 30 months, before reaching a steady rate of 6%. See Fabozzi (2006), page 557.

Certainly, this model could be refined further. For instance, one could employ a more sophisticated prepayment model or layer in the effects of investing cash after it has accumulated, although in the current interest rate environment the impact would be minimal. Prepaid or curtailed mortgage principal would cease to contribute to a vintage's exposure to credit risk, but only after having contributed guarantee fee revenues that accrued to the loss-absorbing capital pool maintained against a vintage's remaining credit risk exposures. Thus, the faster a vintage's mortgage loans prepaid, the more quickly its capital could be reallocated to help fund the capitalization of new vintages or provide dividends to the members.

IV. OWNERSHIP AND GOVERNANCE

In this section, we explain the advantages of a mutualized ownership structure for a mortgage-insuring securitization utility, before delving into regulatory and other governance issues that apply across ownership models. This builds off our initial description of a lender-owned cooperative in Dechario *et al.* (2011).

Ownership Structure and Incentives

If the government cannot avoid providing a backstop to mortgage credit to address systemic crises of sufficient magnitude, then the future institutional structure should be designed to reduce both the likelihood and the consequences of an intervention. Thus, we have discussed how a securitization utility bearing mortgage credit risk could price its exposure and attract private capital ahead of the taxpayer's loss position, as well as how the use of a vintage-level attachment point for government tail insurance could clarify the path to reducing government involvement following an intervention. However, it is equally important to structure the utility's governance and regulation to address the incentive alignment problems laid out in the first section of this paper, and thereby reduce the deterioration in underwriting that leads to systemic tail events. Prevention requires a careful analysis of the incentive structure embedded in the institutional framework.

A cooperative or mutualized ownership structure is one way of addressing the incentive misalignments inherent in both government insurance and securitization itself. The misalignments arising from government reinsurance are classic "moral hazard" externalities, where government

interventions shield private citizens from the full impact of their actions, such as in deposit insurance, pension benefit insurance, flood insurance, terrorism insurance, and bailouts of "too big to fail" financial institutions.[49] Additionally, the misalignments in all types of securitization consist of a series of conflicts of interest generated by the parceling out of the various steps of the lending process, as documented by Ashcraft and Schuermann (2008) and Adrian and Ashcraft (2012).

The solution in both types of misalignments involves improved regulation, but it should not rely solely on regulation. Any external regulatory regime, no matter how well designed and implemented, faces daunting challenges in terms of both technical difficulty and political vulnerability. It therefore behooves policymakers to seek other mechanisms to augment the regulatory regime.

For instance, the risk-bearing institutions themselves could be redesigned to have incentives for better risk management. One institutional feature that would align lenders' incentives with prudent underwriting is risk retention. Having the lenders mutually own the securitization utility would be consistent with this approach, by vertically reintegrating the lending process and mitigating the conflicts of interest that are inherent across the chain of production in securitization. Note that this applies to both the origination process and the loss mitigation process, where the breakdown in securitization governance has arguably been even more severe.[50] However, the virtues of mutualization extend well beyond the much-rehearsed arguments about risk retention. The literature suggests that a mortgage securitization utility would match both the theoretical criteria for the appropriateness of mutualization and the empirical characteristics of certain well-known financial cooperatives and mutuals.

Cooperatives and Financial Market Utilities

Both cooperatives and mutuals have a long history among U.S. firms. Outside of the financial sector, cooperatives have been common in agriculture, housing, and utilities for physical infrastructure (such as electricity or water). Among financial institutions, savings mutuals, credit unions, thrifts, and mutual funds are all well represented. Most pertinent to our discussion, though, are clearinghouses and central counterparties. These are institutions through which other financial firms have advanced their shared private interests – as well as broader public ones – by providing

[49] For discussion of "too big to fail" and moral hazard in government insurance, see Feldman and Stern (2009), McCoy (2008), Bohn and Hall (1999).
[50] For an empirical investigation of securitization's effect on loss mitigation, see Piskorski *et al.* (2010).

the infrastructure that enables other, more narrowly private enterprise. Notable examples of current or former mutually-owned utilities include clearing and settlement institutions such as the Chicago Mercantile Exchange, the London Clearing House, the Depository Trust & Clearing Corporation (DTCC), and the CLS Group (originally Continuous Linked Settlement). These financial market utilities (FMUs) centralize settlement and manage multilateral counterparty risk for transactions that are fundamental to the financial system, simultaneously reducing systemic risk – that is, risk to taxpayers – and enabling innovation and risk-taking among non-systemic private firms.[51]

A mortgage securitization utility would in some respects resemble other FMUs: without relying on the much-criticized hybrid business model of Fannie Mae and Freddie Mac, it would provide a public good (a low-cost channel for mortgage funding) that has economies of scale. If structured as a cooperative, it could manage its risks through a mutualized loss pool or capital account funded by fees from its members, consistent with the structure laid out in Sections II and III. However, the nature of the goods provided and the risks incurred would differ from typical FMUs.

Most FMUs assume the credit or operational risk associated with clearing and settling trades, and the duration of these exposures often extends no more than a few days (although recent regulatory requirements to centrally clear long-term OTC derivatives contracts such as credit default swaps and interest rate swaps may significantly extend the duration of risk taken by some FMUs). Securitization, of course, entails long-term exposures. While a purely mechanical securitization platform that executes the pooling of loans and issuance of securities might entail exposures of just a few weeks or a few months, a mortgage security guarantor assumes risk exposures that last years. As such, a mortgage-insuring securitization utility would have a *sui generis* credit risk profile closer to that of a bank or financial guarantor, with the latter's monoline risk profile but the former's exposure to the majority portion of each loan.

Criteria for Cooperatives and Mutuals

Despite their long and respectable history, cooperatives have in recent years become less prevalent among U.S. companies, particularly financial companies. A number of financial institutions with mutual ownership, including insurance companies, exchanges, and savings banks, have been demutualized, or transformed into shareholder corporations. While the causes of this shift have

[51] For a description of how central counterparties and clearinghouses concentrate and manage risks, see Duffie *et al.* (2010).

been a matter of some debate, it coincides with a decline in academic attention to the organizational form. Cooperative and mutual structures have not enjoyed a strong following in academic circles in recent decades, having been criticized as providing lower returns, less innovation, less efficient decision making, and more limited access to capital markets.[52] In our previous paper, we surveyed some representative literature that addresses both the advantages and disadvantages of cooperative ownership structures in general.[53]

However, Murphy (2012) has argued that in the unique context of a utility for mortgage securitization, many of the common criticisms of cooperatives and mutuals either would not apply or may actually be virtues. In particular, he notes that some critics have pointed to governance challenges in agricultural and workers' cooperatives in rural communities, despite the fact that a mortgage securitization cooperative would differ in numerous important ways, perhaps most notably by drawing from a fundamentally different membership, one which would have crucial advantages in governance. Moreover, there is nothing in a mutualized structure that would prevent it from adopting the best practices of corporate America to address some of the criticisms, and Murphy provides a useful overview of some of these, as well as some of the best practices specific to cooperatives, particularly with regard to their legal form.

Furthermore, a mortgage securitization utility seems to meet criteria laid out by Hansmann (1996 and 1999) for an effective cooperative. Hansmann argues that the entire range of organization types – from non-profits to shareholder-owned firms – can be understood as expressing the same underlying principle about how to optimize a firm's efficiency. Hansmann articulates this principle as the minimization of the sum total of all transaction costs across the stakeholders in a firm's business activities, including both the aggregate costs of ownership itself (such as monitoring, risk bearing, and collective decision-making) and the aggregate social costs of market contracting (such as information asymmetries and market power relationships). Given the same underlying principles, differences in ownership are then attributable to differences in a firm's objectives, its business process, or its industry's market structure.

Hansmann notes that an ownership structure can be selected to reduce or eliminate the conflict of interest between buyer and seller – precisely one of the concerns policymakers have

[52] For further discussion of these trends in the academy or in industry, see Zanjani (2007), Viswanathan and Cummins (2003), Coughenour *et al.* (2002), and Damodaran *et al.* (1997).
[53] Dechario *et al.* (2011).

enunciated with respect to securitization and shadow banking.[54] More generally, Hansmann argues that cooperatives are most appropriate when the members satisfy the following criteria: they are a relatively homogenous group; are in close proximity; possess sufficient sophistication, frequency of transaction, and economic interest at stake to exert effective monitoring power over their cooperative; and would otherwise be vulnerable to the exertion of market power by the institution if it were owned by outside third parties. A mortgage-insuring securitization utility would seem to satisfy most of these criteria, and for those that it does not, remedial mechanisms are readily available.

Certainly, lenders participating in the mortgage cooperative would be a relatively knowledgeable and sophisticated set of owners and would participate in frequent transactions that would comprise a large proportion of the owners' businesses. These two characteristics would facilitate monitoring and internal oversight of the cooperative, which would also provide a forum for lenders to monitor one another's contributions. Effective monitoring would in turn reduce the risk that mutualization would give rise to free riders – a risk due to the costs of risk-taking being diffused across individual members of the cooperative. Here the literature on cooperatives agrees with the literature on industrial organization, which finds that repeated interaction and mutual observation increase the likelihood of long-term cooperation among firms.[55]

In these respects, participants in a mortgage securitization cooperative resemble the participants in other common cooperatives, such as housing, where the owners' detailed knowledge and frequent observation of the cooperative's operations facilitate monitoring. At the same time, the greater managerial sophistication of mortgage-lending firms would provide an added advantage in monitoring commensurate with what would clearly be a more complex business model. Unlike many other financial mutuals, such as savings mutuals – which are among those that have been held up as examples of less efficient governance[56] – mortgage lenders would be both expert and actively engaged in the securitization cooperative's business, since they would supply its raw materials of residential mortgage loans. They would also have powerful incentives to see the cooperative run

[54] See Hansmann (1999), pages 389, 391-392.
[55] See "Industrial Organization and Systemic Risk: an Agenda for Further Research", speech by Federal Reserve Governor Tarullo, September 15, 2011.
[56] See Henehan and Anderson (2001) and Frederick (1997).

well, due to the crucial service and large business exposure it would provide by lowering capital costs and supporting their origination-based fee income.[57]

Note that lenders differ importantly from shareholders of large, often opaque, publicly-traded companies. Most shareholders are likely to lack detailed knowledge of mortgage lending and securitization. Furthermore, shareholders typically do not face as concentrated an exposure to the company as lenders. Thus, shareholders are likely to have weaker capacity and incentives for oversight, as evidenced by their track record with Fannie Mae and Freddie Mac.

Lenders, both large and small, participating in the mortgage cooperative would also be a relatively homogenous group with respect to their interests in two objectives: maintaining access to a common low-cost funding channel and avoiding exploitation by monopolistc or oligopolistic securitizers and credit enhancers. This homogeneity is important primarily because it would reduce the challenges of collective decision-making, which some commentators have considered one of the primary weaknesses of cooperatives.[58] Larger members' interests may diverge from smaller members' to the extent that their greater use of the cooperative would leave them with more capital at risk and likely provide them with more voting rights. While this raises important questions about market structure, competition, and market access that we will discuss below, it does not change the shared interest of lenders of numerous types – small community banks, large commercial banks, medium-sized regional banks, mortgage brokers, and others – in mortgage securitization and credit enhancement, which may leave them homogenous enough for the purposes of Hansmann's criteria. In this sense, the monoline nature of the securitization utility supports its mutualization.

Mutualizing Mortgage Securitization

In addition to these traditional criteria for cooperatives, there are a number of other ways mutualization may be particularly well suited to the peculiarities of a mortgage securitization utility and to address common perceptions of what went wrong in the GSEs' institutional arrangement. A broader point is that cooperative and mutual structures provide a *different set of trade-offs* relative to a shareholder-owned corporation, and it is critical to evaluate those trade-offs in the context of the utility's mission.

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[57] For the role of members' expertise in cooperative governance, see Autry and Hall (2009), pages 42-49. See also Gould Ellen and Willis (2011), Green and Schnare (2009), and Flannery and Frame (2006). For the importance of members' proportion of exposure to a cooperative, see Hansmann (1999), page 398.
[58] For a brief discussion of some of these dynamics, see Hansmann (1999), pages 393-395.

Some studies note, for instance, that the historically lower rate of return provided by cooperatives relative to shareholder corporations indicates weaknesses in governance.[59] However, as Murphy (2012) notes, there is a trade-off here in that cooperatives also tend to take less risk and as a consequence fail less frequently. The reason is simple – by diffusing the profits across members, cooperatives also diffuse the returns to risk-taking.[60] In fact, this dynamic highlights a fundamental difference between the incentives faced by shareholder corporations and cooperatives. Third-party shareholders invest in a company primarily to obtain a rate of return or diversify the risk profile of their investment portfolios, whereas the members of a cooperative may have other goals in addition to or instead of using the mutual as a profit center unto itself.

For instance, a cooperative may be seen as a service provider for its members, helping them to gain access to higher-quality or lower-cost products or services, which they then use as inputs to their more explicitly revenue-generating business lines.[61] In the case of mortgage securitization, the service provided to members consists of access to the low-cost funding channel of securitization markets, particularly via the TBA market, and lower capital costs associated with holding mortgage-related assets. The return to the members may take the form of efficiency gains from stable funding and cost minimization, in addition to or instead of dividends, capital appreciation, or the expansion of products and market share. Given these supplementary value propositions, the modest historical returns on equity cited in Section III may actually overestimate the return on equity lenders would require to participate in such a cooperative structure. And, as noted in a previous section, the mortgage utility's return on equity is among the most important determinants of guarantee fees, and thus, the primary mortgage rate faced by borrowers.

In fact, critical infrastructure can benefit from a cooperative's conservative approach. In the case of physical infrastructure, utilities' business models are characterized by low risk and even outside shareholders accept a correspondingly lower return, since the determinants of both supply (for example, water or electricity) and demand (generally revolving around demographics) are slow-moving and reasonably predictable. To a lesser extent, that applies to FMUs, and still less to an FMU taking long-term credit risk, since both supply of and demand for credit can fluctuate widely

[59] See Cole and Mehran (1998).
[60] See Esty (1997), Lamm-Tennanat and Starks (2001) and Lee *et al.* (1997).
[61] See Hansmann (1999), page 398, for a discussion of members' multidimensional relationship to a cooperative.

with broader economic, demographic, and financial conditions[62]. Nevertheless, if the securitization utility maintains relatively conservative underwriting standards, both the risk it assumes and the return demanded by its investors will be moderated.

From a governance perspective, one of the values of external shareholders is in driving change. Indeed, shareholders push their corporations to build market share on a continuous, open-ended basis, in order to maximize the profits that the corporation can dividend out to them. This is, in fact, the heart of most formal models of the fundamental value of a firm, as well as the engine for undertaking new risks. Indeed, lack of innovation is a frequently-cited criticism of cooperatives, with critics noting that large, diffuse memberships can lead to coordination problems and slow, inefficient management.

However, innovation, expansion, and risk-taking would not be among the mortgage utility's primary goals and would, in fact, stand in tension with the objective of providing a narrow but critical infrastructure.[63] While innovation may remain a vital activity in mortgage markets, the point is that it should occur outside of the central infrastructure, which should take on new duties only after careful deliberation. Innovation could still take place among lenders with mortgages that they intend to hold on their balance sheets. For an FMU, though, financial stability – the ability to avoid failure – is more crucial than the ability to innovate, especially where the product offering is mature.

Indeed, an over-emphasis on profit-making and innovation likely contributed to the GSEs' excessive size, risk, and ultimately, their failure. Many analysts have reached the conclusion that one of the most significant factors contributing to the GSEs' failure was their decision to guarantee lower-quality mortgages in 2005-2007 in a bid to regain market share that they had lost to the private-label securitization market.[64] Many have likewise suggested that the broader proliferation of mortgage loan types and mortgage-related securities in the 2004-2007 period constituted a socially inefficient substitution of product differentiation for price competition.[65] To the extent that the deterioration in underwriting may be obscured by innovative but opaque security structures, then placing less emphasis on the introduction of new mortgage products could in the long run be an advantage of a cooperative structure.

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[62] Over shorter time frames, the situation is somewhat more complex, as electric utilities face the challenge of their peak-load management amid sharp and unpredictable fluctuations in demand. Nevertheless, the generalization applies over the larger periods of time relevant for mortgage credit risk cycles.

[63] Holmstrom (1999), pages 411-414.

[64] See Thomas and Van Order (2010) and Jaffee (2010).

[65] Tarullo, *ibid.*, cites Anderson *et al.* (1992) in commenting on this substitution, although he does not himself specify whether he considers mortgage lending in the previous cycle to have displayed this dynamic.

Indeed, the members of a lender-owned cooperative could see aggressive innovation in securitizing new mortgage products as cannibalizing their own proprietary business lines conducted outside the cooperative. While the cooperative would remit the profits to its owners, that diffuses the profits (as well as the control of the product line), reducing a member's ability to gain competitive advantage. Thus, cooperative owners would be significantly less likely than outside shareholders to encourage expansion of business lines. Instead, the owners would likely seek to keep this cooperative focused on a narrow mission of providing securitization services for standardized mortgage products. As a new mortgage product becomes standardized, and the associated lender profit margins are competed down, the utility's economies of scale and liquidity advantages could incent members to support moving the product into the cooperative (subject to regulatory approval). In that case, innovation could occur outside the cooperative and over time lead to a lagged adoption within the cooperative.

Note that having a common purpose with a relatively narrow scope is one form of the homogeneity that appears to be crucial to the success of a cooperative or a mutual. Indeed, innovation tends to expose divergences in the interests of members of a cooperative and make governance more difficult.[66] Maintaining focus on a narrow mission of efficiently providing a specific service, rather than aggressive profit growth, would also yield several benefits from a public policy perspective. First, it would be consistent with prioritizing financial stability over innovation at a funding utility. Second, it would allow for more accurate modeling and pricing of the government reinsurance on vintages. Finally, it would also facilitate the effective oversight and monitoring of the cooperative by both the owners and regulatory authorities.

In addition to realigning the incentives for lenders, mutualization of ownership would help consolidate external supervision and reduce an entire layer of profit margining, by lowering the total transaction costs and displacing securitizer's focus from purely monetary profits. Of course, pass-through of these savings to individual household borrowers is not guaranteed. It is closely linked to the issues of competition and the relative market access of larger and smaller lenders.

Access to the Cooperative and Market Structure

Some commentators have raised concerns about the risk of a few large lenders dominating a cooperative and controlling access to the TBA market, which some consider to be *prima facie*

[66] See Holmstrom (1999) and Hansmann (1999), page 394.

grounds for rejecting a cooperative structure.[67] The risk of the larger lenders using the cooperative to amplify their market power could put both smaller lenders and borrowers at a disadvantage. The underlying dynamic is that even if a cooperative removed or reduced a margin of profit from the mortgage-security production pipeline, that value still might be captured by a large stakeholder or group of stakeholders exercising market power. For evidence from another market, Genesove and Mullin (2001) provide a cautionary tale of how communication through a trade association facilitated collusion in the sugar industry.

However, while a cooperative might reflect the pre-existing market concentration among mortgage lenders, it need not exacerbate this concentration. As long as there is robust competition among the largest, most influential members of the cooperative, they will have strong incentives to monitor one another, and both the governance structure and the regulatory structure could be set to minimize collusion among the larger members. As Murphy (2012) and Hansmann (1999) explain, there are several best practices in standard corporate governance that could be readily adapted for a mortgage cooperative. The objective of these practices would be to facilitate not only fair and open access, but broad participation in the cooperative, including by smaller lenders. Arguably, with such practices in place, the potential market power derived from control over a major funding channel would be better distributed across even an imperfectly competitive landscape than under the previous GSE duopoly. Indeed, diffusing such market power is what Hansmann means by lowering the aggregate costs of contracting and reducing economic actors' vulnerability to market power.

The most intuitive guiding principle would be to keep barriers to entry low. For example, policies regarding volume-based discounts on guarantee fees could be set to encourage small lender participation.[68] For a cooperative, this principle could also apply to the membership fees (including the paid-in capital). In practice, both smaller lenders and the cooperative itself may prefer for smaller lenders to pass their mortgages to the cooperative via correspondent relationships with larger, aggregator banks, for several reasons (operational/logistical, relationship management, *etc.*). That is, the larger banks would buy the loans from the smaller lenders before selling them on to the cooperative.

To supplement the external force of regulation, structural incentives could also be incorporated in the institutional design. The literature on industrial organization indicates that, in

[67] Woodward and Hall (2009), page 6. See also Letter of William B. Shear (November 15, 2010) to various Congressional Committees regarding (Government Accountability Office 2010).
[68] See Murphy (2012), page 8, and Morgenson and Rosner (2011), page 55.

order to obtain good pricing on these correspondent transactions, smaller lenders could exercise influence in the utility either by direct participation and voting or by leaving the cooperative and using an outside funding mechanisms. Drawing on Hirschman (1970), Hansmann (1999) characterizes this dynamic as the difference between the power of "voice" and the power of "exit," and notes that cooperatives provide owners more of the former than the latter, in contrast to shareholder-owned corporations. In this respect, homogeneity of membership is important for the cooperative to lower the costs of "voice" or collective decision making through voting.

What would be the smaller lenders' outside option for leaving the cooperative? Multiple utilities could be established, potentially even individually designed to accommodate different segments of lenders. Alternatively, smaller lenders might establish a conduit of their own, or obtain funding from an existing institution where they already enjoy influence, such as the Federal Home Loan Bank System (FHLBs).[69] In designing the remedy, two of the key questions are precisely how much larger and smaller lenders' interests are aligned with respect to a utility for mortgage securitization and insurance, and how the relative costs of voice and exit for each of these sets of institutions may shift over time.[70]

Aside from price regulation and sound outside options, there are a number of other mechanisms that can increase the responsiveness of cooperatives to the full breadth of their membership. One is a federated structure or multi-level mutualization, with governance mutualized among specific classes of constituents. [71] This may be particularly useful in light of the challenges presented by a large number of members, which can lead to the coordination difficulties some critics of cooperatives have attributed to diffuse ownership.[72]

In addition, to strengthen the bargaining position of smaller institutions, board structure, regulatory remedies, and voting structures, such as cumulative voting could be employed. Under cumulative voting, shareholders can multiply their shares by the number of vacancies on the board of directors and cast all their votes for only some or one of the candidates.[73] Other alternatives

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[69] This is an area for further research. The Treasury white paper on housing finance reform in February 2011 implied that policymakers should focus the Federal Home Loan Bank System – a well-known lender-owned cooperative – on supporting primarily smaller financial institutions by limiting the participation of larger institutions.

[70] See Holmstrom (1999) for a discussion of the influence on corporate form of shifting costs of voice and exit in various industries.

[71] See Hansmann (1999), page 397.

[72] See Hansmann (1999).

[73] Murphy (2012) draws on a variety of sources to describe and explain the value of cumulative voting. In contrast, under the alternative of "straight voting", shareholders vote separately on each vacancy, allowing the

include reserving seats on the cooperative's board of directors, as well as its membership and risk committees, such that smaller members could ensure that their views on access are incorporated and that risk management is not used as an oblique way of limiting their access.

Finally, membership stakes may be monitored and updated. Some retained earnings may be earmarked for individual members before the periods in which they are distributed as dividends. Because they reflect previous years' activity, over time, these capital accounts may diverge from current patterns of usage if dividends are not distributed frequently enough. This would be an acute concern if members' voting rights were linked to their capital accounts.[74]

Secondary Market Access and TBA Trading

As we noted in our earlier paper, scale economies in securitization of standardized products and scale economies in banking suggest the proposed securitization utility may be a natural monopoly.[75] Moreover, access to the TBA market where liquidity, fungibility, and homogeneity of securities is paramount would be the primary attraction for lenders to participate in a mortgage securitization cooperative.[76] Both imply the optimal number of utilities is likely to be quite small.

Some commentators have raised concerns about the risk of a limited number of large mortgage securitization utilities being too big to fail.[77] However, nearly all types of financial market infrastructures – including the clearing and settlement utilities noted earlier – are highly concentrated, with exceptionally large market shares.[78] The large size and concentrated market share of FMUs – including the structure proposed in this paper – reflect large economies of scale or "natural monopolies" in their industries. In addition, for the securitization utility proposed here, the vintage structure for managing credit risk and for the provision of explicit government tail risk insurance is designed to address the too big to fail concern by insuring that the cooperative is still viable even when the tail insurance triggers.

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larger shareholders to block smaller ones on each vote. See Murphy (2012) for a discussion of the literature on cumulative voting in general and as applied to cooperatives, notably Packel (1970).

[74] See Autry and Hall (2009).

[75] See Financial Stability Oversight Council (2011) and Mester (2010).

[76] See Vickery and Wright (2013).

[77] See Swagel (2010), Terris and Hochstein (2010), Gould Ellen and Willis (2011) pages 323-324, and Acharya *et al.* (2011), page 158. See also Woodward and Hall (2009).

[78] For this reason, all of the financial market utilities referenced in this paper have been designated systemically important financial market utilities and are subject to enhanced prudential oversight under Title VIII of Dodd-Frank.

There are drawbacks to the alternative of having a large number of mortgage security issuers. As noted earlier, a large number of securitization issuers would encourage product differentiation and likely fragment the TBA market, reducing the liquidity benefit in secondary MBS trading and thus raising primary mortgage rates. Not only would fewer utilities reduce the risk of such fragmentation, but they would have incentives to create larger and more diversified pools of mortgages across regions and across lenders. This would likely reduce the degree of adverse selection in the current TBA market, enhance liquidity, and potentially reduce mortgage costs to households.

Also, as we argued in section I, a large number of national mortgage security issuers would be unlikely to reduce systemic risk or protect the taxpayer, since the correlations of their financial conditions would likely be very high for a systemic event that triggered the government-backed reinsurance. All of the mortgage security issuers would have similar risk profiles. In short, there would be few if any systemic risk benefits to a large number of similar monoline securitization firms, while there might be a cost to borrowers in the form of higher primary mortgage rates.

Mutualizing Credit Risk: Capital versus Representations and Warranties

Mortgage securitization entails a system of repeated transfers of credit risk over extended periods of time. While mutualization would provide members with incentives to enforce a set of credit standards, it also would run the risk of free rider problems. One solution to mitigate this risk would be to limit the degree of mutualization, such that members are forced to internalize more of the consequences of their behavior. Member-specific reserve accounts are a possible solution, although those could pose a challenge for true-sale accounting, which is needed to make securitization viable.

Other mechanisms are available. For example, representations and warranties ("reps and warrants" in market parlance) in the loan sale agreements are a traditional mechanism for enforcing credit standards and allocating losses. In a securitization utility, such clauses would have the effect of partially demutualizing the credit risk. While this could mitigate free rider dynamics and protect the broader membership from the bad actions of a single lender, it would be important to redesign the reps and warrants to avoid costly *ex post* negotiations. This favors limited duration reps and warrants with *ex ante* quality testing of underwriting standards. Members would have to pass the quality control tests for each new vintage and would also agree to repurchase at par any mortgages that

experience early delinquency problems. An important objective would be to promote a clear transfer of the credit risk to the cooperative and avoid litigation of losses after the fact.

This proposed approach is informed by the controversies in 2010-2012 over the GSEs' and mortgage investors' demand for lenders to repurchases loans they had sold into securitizations. That experience underlines the fact that open-ended reps and warrants based on procedure, not credit performance, now appear to be an inefficient – if not ineffective – means of aligning incentives of lenders and securitizers.[79] Open-ended reps and warrants may also undermine the benefits from mutualization of losses in terms of promoting internal monitoring and aligning members' incentives.

Board Oversight

One of the fundamental governance questions regarding the governance of any mortgage securitization utility would be how to structure the board of directors and its committees. Drawing on best practices in corporate governance as laid out by several industry groups, Murphy (2012) has several recommendations for the board of directors that would help ensure that the interests of smaller lenders would be effectively represented in a cooperative, although some also apply to other corporate structures.[80] This includes a requirement that the chairman and at least 1/3 of the cooperative board members be independent (in the sense that they are not employed by any of the lenders), as well as that an independent board member hold the swing vote on the committee for selecting new board members. As an empirical matter, cooperatives frequently require that a majority of their board members be drawn from institutions that are members of the cooperative, apparently to reduce principal-agent problems. Cooperatives also frequently prohibit or limit participation on the board by the cooperative's managers – which differs markedly from shareholder-owned firms. Members could also be given the ability to remove appointed Board members.

In addition to addressing the market access issues discussed above, board members could also be required to include representatives from community advocates and the academic community. Murphy proposes an audit committee to which an internal audit function directly reports, a risk management committee to which a risk manager directly reports, as well as a compensation committee, a governance committee, and an executive committee. To encourage coalition building,

[79] For a discussion of the weaknesses of representations and warranties as a model for aligning incentives in the "originate to distribute" model of securitization, see Raskin (2011).
[80] See also Business Roundtable (2010), American Law Institute (2001), and Brancato and Plath (2005).

no single group of members should comprise more than half of board votes. The board should be able to audit individual members to ensure compliance with membership criteria and suspend or expel them based on evidence of fraud or insufficient capital.

Regulatory Oversight

Another of the fundamental governance questions regarding this regime would be how to structure regulatory oversight. This includes both the operations of the securitization utility and the pricing of the government systemic reinsurance, and in each case, where to allow regulators discretion and where to lock standards into statute. There is an inherent tension between providing the regulator flexibility to make decisions in light of changes in the market conditions versus reducing scope for regulatory capture or erosion of credit standards.[81] Given the importance of such an institution to the financial system, and the susceptibility of housing credit to political forces, an inspector general may be desirable to help avoid regulatory capture.

The core mission for the regulator of a securitization utility would be to administer the tail risk reinsurance fee and provide supervision of the guarantee fee. As discussed above, regulation of capital reserves would be a particularly crucial component of the supervisory regime. Drawing from bank supervisory practices, the regulator should have powers to set standards, ensure the utility operates in a safe and sound manner, and pursue enforcement with a "prompt corrective action" framework. As discussed earlier, the regulator should oversee selling of credit risk externally through junior bonds to generate external market validation of the cooperative's underwriting standards.

In addition to taxpayer protection and the pricing of government reinsurance, the regulator would have the following responsibilities:

- Approve the risk-based pricing and capital framework for guaranteeing mortgage loans – in market parlance, the guarantee fee and the "credit box" for the trade-offs among credit characteristics of loans eligible for the utility's securitization and insurance;
- Oversee the utility's risk management framework, including the utility's measurement and control of credit risk, operational risk, and market risk;
- Approve any new mortgage products or lines of businesses;

[81] For instance, many other countries restrict certain basic credit standards such as maximum allowed LTV ratios via statute.

- Review the representations and warranties stipulated in the utility's agreements to purchase mortgage loans, with the twin goals of enhancing both underwriting and loss mitigation programs;
- Conduct exams of the utility and require periodic stress tests to ensure capital adequacy using a range of economic scenarios impacting homeowners (including unemployment, house price paths, and loss severity rates) and ensuring the bankruptcy remoteness of vintages' legal trusts;
- Approve distributions of capital to members or transfer of capital across vintages;
- Ensure that membership access is fair and open with broad representation either through direct membership or a correspondent bank;
- Set investment guidelines for any liquidity portfolio held by the utility.

Finally, the regulatory should supervise any portfolios or loans or securities held by the utility. Some balance sheet capacity might be needed for providing warehousing for loans awaiting securitization, or for loans in foreclosure, being modified, or undergoing other loss mitigation activities. A carefully supervised repository for troubled loans could promote greater standardization in foreclosure and loss mitigation practices, as well as facilitate customized modification programs targeted at specific market segments. Because of the unique performance characteristics of troubled loans, such a repository could also support the homogeneity and liquidity of the TBA market, which would otherwise price the risk of these loans being delivered into TBA contracts. However, the regulator would have to enforce strict rules to prevent recreation of the GSE-style retained portfolios and there may be value in a more thorough analysis of the potential impacts on the TBA market.

V. CONCLUSION

In this paper, we have explored in detail the capital structure and governance of a financial market utility for mortgage securitization, and how they interact with the question of government reinsurance for systemic risk. We have argued that the government is ineluctably exposed to the full depth of true tail losses, and there are only four ways to improve its risk profile: (1) charge a price

for bearing that risk, (2) attract and maintain the participation of private capital in sharing risk, (3) establish a clear mechanism for reducing government involvement following intervention, and (4) prevent systemic tail events by addressing the conflicts of interest inherent in government reinsurance and in securitization itself. These constraints have led us to explore the unique features of a vintage-based guarantee and a mortgage securitization utility that would itself have a unique function. A vintage-based capital structure could mitigate the procyclicality of mortgage credit, providing greater clarity about the timing and terms of intervention than institution-level reinsurance, and thereby give investors and issuers robust incentives to continue participating in the utility. In addition, vintages would also help focus the government reinsurance more narrowly on truly systemic risk than a security-based attachment point would.

To frame the question of capitalization, we presented several examples to analyze the relationships among guarantee fees and various key assumptions. We demonstrated how selling off an appropriately risky junior bond to the capital markets would have only a modest impact on the guarantee fee, and how the informational and market discipline value of such transactions may vary with the level of risk transfer. In contrast, in exploring the sensitivity of the guarantee fee to other key parameters, we found that the guarantee fee – and therefore the mortgage rate faced by borrowers – is most sensitive to the required capital ratio and the expected return on equity capital. The importance of the return on equity underlines the importance of ownership structure. The system's source of capital goes hand in hand not only with its cost of capital, but also with its incentive structure and the nature of the market discipline it engenders. In that context, we noted that mutuals feature lower risk and lower returns on equity.

We explored the appropriateness of a mutualized ownership structure to align the private incentives with the public interest, to employ more than just external regulation to address the incentive misalignments inherent in government reinsurance and in securitization itself. The vertical integration of the utility would help address the conflicts of interest along the chain of production (as well as loss mitigation) in securitization. As for moral hazard, if the government provides a backstop to mortgage credit on the downside of a systemic event, then the future institutional structure must both mitigate the consequences of intervention and decrease the likelihood (or frequency) of intervention. Thus, the utility's governance and regulation should be designed to align incentives and prevent deterioration in underwriting in advance.

We discuss a number of ways mutualization may be particularly well suited for the peculiarities of a mortgage securitization utility. Notably, such an institution would meet some of the

criteria for successful cooperatives as laid out in the academic literature. In addition, the weaker incentives for innovation found in cooperatives go hand-in-hand with a reduced tendency to take risk. Much as with a centralized counterparty or clearinghouse, low risk and less focus on innovation are actually virtues for this critical infrastructure. More practically speaking, cooperatives' reduced emphasis on earnings and market share seem to respond to many observers' diagnosis of what went wrong in the previous institutional arrangement. We suggest that a mutual utility, with incentive alignment and appropriate governance controls, could allow robust competition among lenders for mortgage origination, although a full assessment of the competitive dynamics in the market for mortgage lending is beyond the scope of this paper. We further explored how the governance structure for the cooperative could be designed to address the typical concerns raised in the literature. While certainly not riskless, our proposed utility structure is less risky than most alternatives.

The economics of housing finance are sufficiently complex that there may be no ideal model. Indeed, in several cases, key objectives for the system, such as market discipline and systemic robustness, stand in tension with each other. GSE reform is likely a question of identifying the most workable, not the first-best, design – even on the economic merits, before considering the notoriously challenging political dimensions. If that's so, policymakers will have to weigh the benefits and risks associated with each proposed model and focus on their preferred tradeoffs. We hope that our diagnosis of the most urgent policy risks and our formulation of potential remedies will stimulate and inform precisely such reflection and debate.

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Figure 1. Agency Vintage Cumulative Default Rates

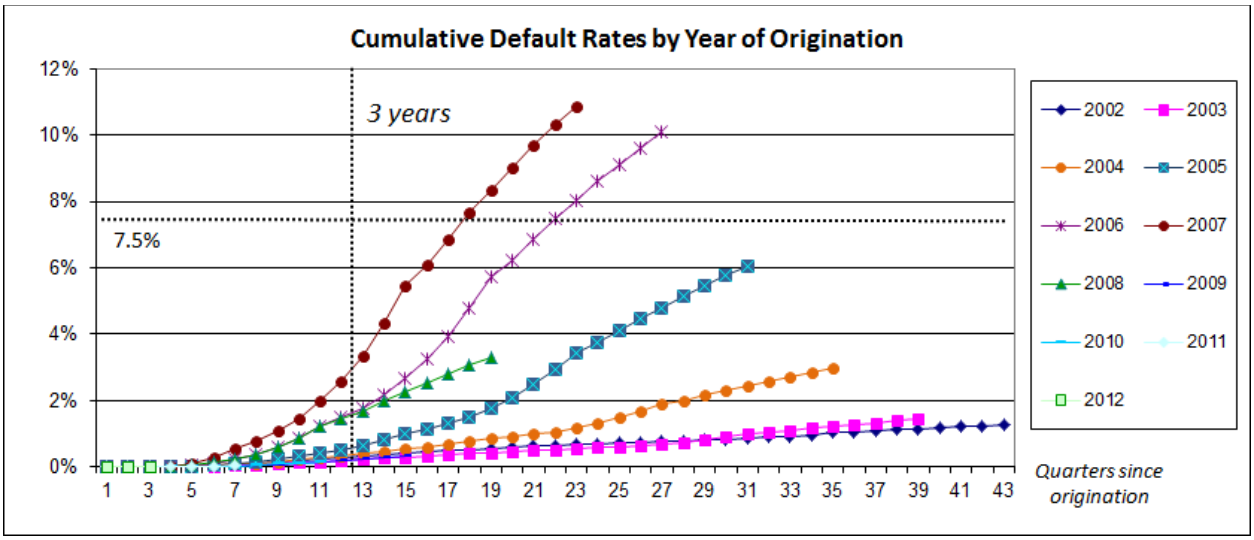

Figure 2. Utility's Capital Waterfall

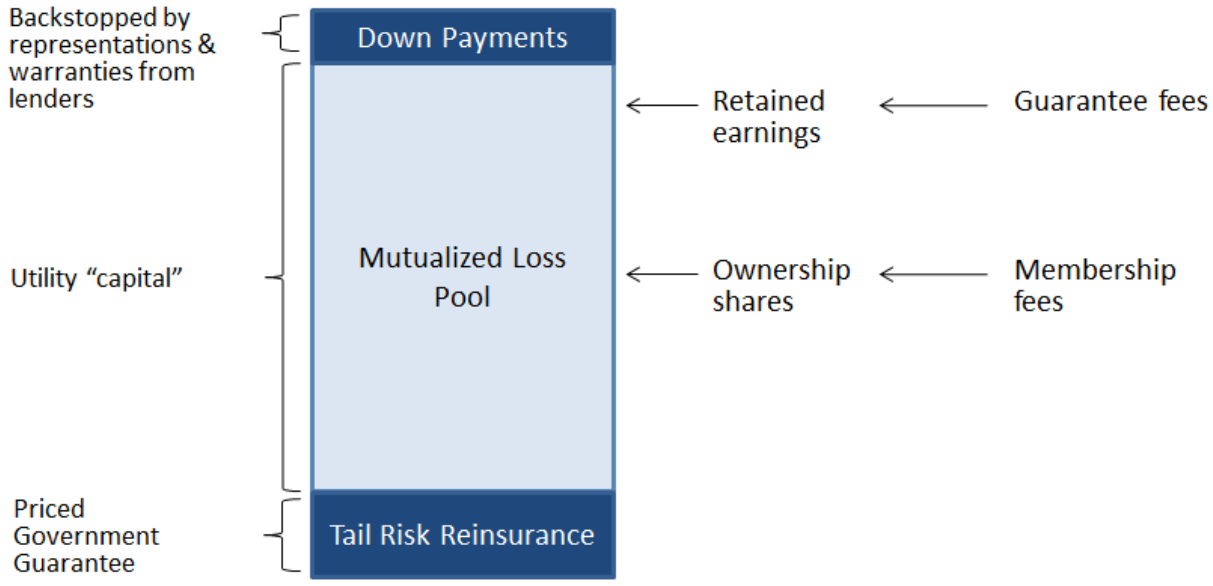

Figure 3. Utility's Vintage-Based Capital Waterfall

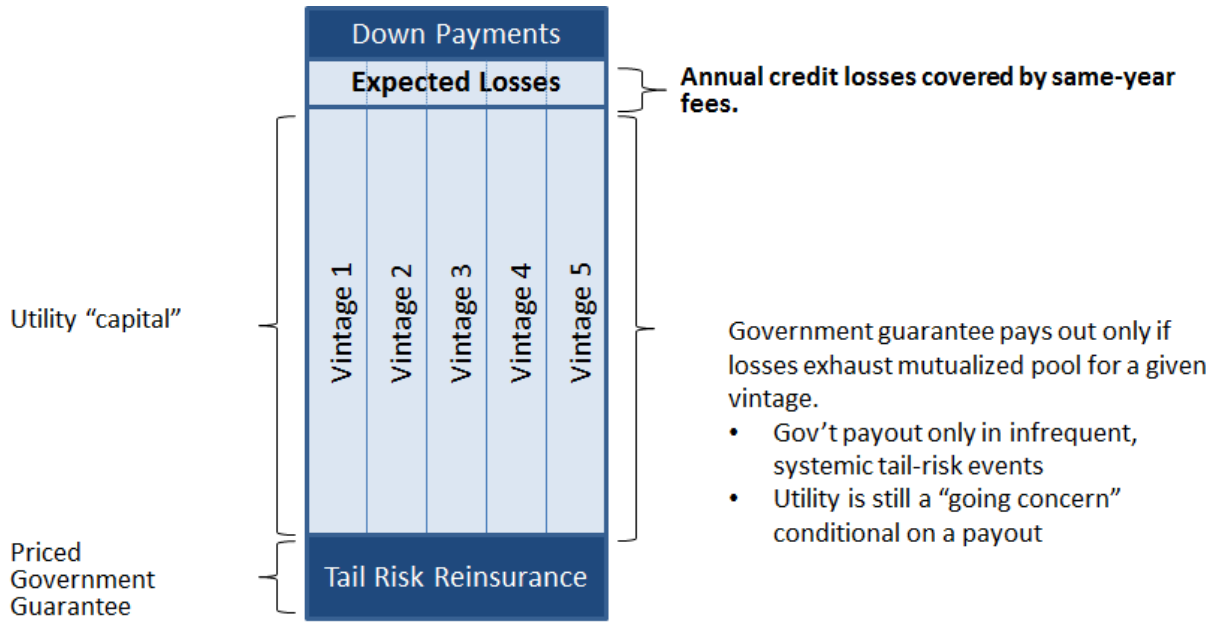

Figure 3. Utility's Vintage-Based Capital Waterfall with Junior Bond