United States Government Accountability Office

Report to the Chairman, Committee on Banking, Housing, and Urban Affairs, U.S. Senate

December 2016

MORTGAGE-RELATED ASSETS

Capital Requirements Vary Depending on Type of Asset

GAO-17-93

December 2016

MORTGAGE-RELATED ASSETS

Capital Requirements Vary Depending on Type of Asset

GAO Highlights

Highlights of GAO-17-93, a report to the Chairman, Committee on Banking, Housing, and Urban Affairs, U.S. Senate

Why GAO Did This Study

During the 2007–2009 financial crisis, many banking organizations lacked capital of sufficient quality and quantity to absorb substantial losses on mortgages and mortgage-related assets, revealing these assets to be riskier than previously thought. In response to the crisis, banking regulators around the world moved to strengthen requirements for capital adequacy. In the United States, the Dodd-Frank Wall Street Reform and Consumer Protection Act introduced, among other things, new capital requirements for bank holding companies and savings and loan holding companies. Internationally, in December 2010 the Basel Committee on Banking Supervision (which had issued the Basel I and Basel II frameworks) issued the Basel III framework—a comprehensive set of reforms to strengthen global capital and liquidity standards—with the goal of promoting a more resilient banking sector. Under this framework, banks apply risk weights to different assets to determine the amount of capital they need to meet regulatory requirements.

GAO was asked to explain how capital requirements for a mortgage depend upon how it is financed and how the requirements have changed since the crisis. This report examines the risk weights for residential mortgages and certain other mortgage-related assets under the U.S. Basel III-based rule and how they compare to those in effect under prior capital regimes and for nonbank entities. GAO examined information on capital requirements from current and past rules.

GAO received technical comments from the banking regulators, which were incorporated as appropriate.

View GAO-17-93. For more information, contact Lawrance L. Evans, Jr. at (202) 512-8678 or evansl@gao.gov.

What GAO Found

Rules for capital adequacy require banks to hold a percentage of their assets as capital to act as a financial cushion to absorb unexpected losses. Under current rules, banks must hold capital equal to at least 8 percent of risk-weighted assets. Since the early 1990s, U.S. federal banking regulators have used a risk-weighting system under which banks multiply asset amounts by factors, known as risk weights, to calculate risk-weighted assets. Different types of assets have different risk weights that attempt to capture the assets' relative risk. The Basel III-based final rule adopted in 2013 by the U.S. federal banking regulators incorporates higher risk weights for certain mortgage-related assets while leaving others unchanged from prior capital regimes (Basel I and Basel II). Most banks use the standardized approach for calculating risk-weighted assets, but large internationally active banks use an advanced approach that relies on formulas established by the regulators and inputs from their internal systems.

- Under the standardized approach, the risk weights for single-family residential mortgages are largely unchanged by the final rule. Similarly, the risk weights under this approach for residential mortgage-backed securities (MBS) guaranteed by Ginnie Mae, Fannie Mae, and Freddie Mac have not changed since Basel I.
- Under the advanced approach, large internationally active banks use a formula defined in regulation to determine the capital requirements for residential mortgage exposures, which include whole loans as well as MBS guaranteed by Ginnie Mae, Fannie Mae, and Freddie Mac. This formula has not changed since it went into effect in 2008 under the Basel II-based rule.
- For both approaches, the ways for determining risk weights for securitization exposures and mortgage servicing assets have changed under the final rule, which may increase these risk weights. As required by the Dodd-Frank Wall Street Reform and Consumer Protection Act, the final rule eliminates the use of credit ratings for determining risk weights for securitization exposures, instead relying on regulator-established formulas. Also, the final rule reduces the cap on mortgage servicing assets that can be included in capital calculations and will raise the risk weight from 100 percent to 250 percent.

The Basel III-based final rule largely left in place the historically lower risk weights of MBS guaranteed by Fannie Mae and Freddie Mac vis-à-vis other mortgage-related assets, which can influence the demand for these securities relative to whole loans and privately issued MBS. However, the full impact of changes in risk weights for holdings of mortgage-related assets remains uncertain because insufficient time has passed since these changes took effect, and for some assets the changes have not yet been fully phased in. GAO's recent work suggested that many lenders generally appeared to be participating in residential mortgage lending much as they had before capital requirements changed. Also, data on mortgage debt outstanding and on banks' holdings of different assets indicate that trends in holdings of mortgage debt and mortgage-related assets that predate the changes in risk weights have continued. But increased risk weights for some mortgage-related assets may lead to changes in banks' decisions about securitizing and servicing mortgages.

Contents

Abbreviations

Basel Committee	Basel Committee on Banking Supervision
bps	basis points
Dodd-Frank Act	Dodd-Frank Wall Street Reform and Consumer Protection Act
EAD	exposure at default
FDIC	Federal Deposit Insurance Corporation
Federal Reserve	Board of Governors of the Federal Reserve System
LGD	loss given default
MBS	mortgage-backed securities
NPL	nonperforming loans
NRSRO	nationally recognized statistical rating organizations
OCC	Office of the Comptroller of the Currency
PD	probability of default
SFA	supervisory formula approach
SSFA	simplified supervisory formula approach
UPB	unpaid principal balance

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
441 G St. N.W.
Washington, DC 20548

December 15, 2016

The Honorable Richard Shelby
Chairman
Committee on Banking, Housing, and Urban Affairs
United States Senate

Dear Mr. Chairman:

During the 2007–2009 financial crisis, many banking organizations lacked capital of sufficient quality and quantity to absorb substantial losses, specifically on mortgages and mortgage-related assets, revealing these assets to be riskier than previously thought. In response to the crisis, banking regulators around the world moved to strengthen requirements for capital adequacy. In the United States, the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) required, among other things, that the U.S. federal banking regulators develop new capital requirements for bank holding companies, savings and loan holding companies, and banks.[1] At about the same time, at the international level, in December 2010 the Basel Committee on Banking Supervision (Basel Committee) issued the Basel III framework—a comprehensive set of reforms to strengthen global capital and liquidity standards—with the goal of promoting a more resilient banking sector.[2] In 2013 and 2014, the U.S. federal banking regulators adopted rules to implement many aspects of the Basel III capital framework that apply to banks, savings associations, and top-tier U.S. bank and savings and loan holding companies (with certain exceptions). These rules, commonly

[1]Pub. L. No. 111-203, § 171, 124 Stat. 1376, 1435.

[2]Basel Committee on Banking Supervision, *Basel III: A Global Regulatory Framework for More Resilient Bank and Banking Systems* (Basel, Switzerland: December 2010, revised June 2011). The Basel Committee is an international standard-setting body that comprises representatives of central banks and banking regulators from 27 countries and deals with various aspects of bank supervision.

referred to as the Basel III capital requirements, are generally being phased in by 2019.[3]

You asked us to explain how the capital requirements for a typical mortgage depend upon how the loan is financed (i.e., whole loan, lender recourse, single-class MBS, credit risk transfer, PLS, FHA, REMIC, etc.) and compare these capital requirements to those in place before the financial crisis. This report examines the risk weights—that is, the weights (or factors) used to calculate the amount of capital needed to meet regulatory requirements—for mortgages and other mortgage-related assets under the U.S. Basel III capital requirements and how they compare to those in effect under prior capital regimes and for nonbank entities holding mortgage-related assets.

To address this objective, we reviewed and analyzed the banking agencies' final rules implementing various regulatory capital regimes and relevant literature on bank capital regulation, including academic studies and research by industry organizations, federal agencies, and others with a focus on bank regulatory capital and the assignment of risk weights to mortgages and mortgage-related exposures. Additionally, we analyzed sections of the Dodd-Frank Act that restricted the use of external credit ratings in setting regulatory capital in the United States. We also reviewed financial accounting standards to understand impacts of capital requirements on banks' willingness to engage in securitization of mortgage assets. Furthermore, we reviewed our prior reports and reports by the Basel Committee and the Congressional Research Service on capital requirements, including those for the housing government-sponsored enterprises Fannie Mae and Freddie Mac (the enterprises) and nonbank financial institutions, to better understand differences in capital requirements that may affect institutions' decisions related to

[3]For rules issued by the Department of the Treasury's Office of the Comptroller of the Currency (OCC) and the Board of Governors of the Federal Reserve System (Federal Reserve), see 78 Fed. Reg. 62,018 (Oct. 11, 2013) (final rule). For rules issued by the Federal Deposit Insurance Corporation (FDIC), see 78 Fed. Reg. 55,340 (Sept. 10, 2013) (interim final rule) and 79 Fed. Reg. 20,754 (Apr. 14, 2014) (final rule).

mortgage-related assets.[4] We also reviewed data from the Board of Governors of the Federal Reserve System (Federal Reserve) on mortgage debt outstanding and from SNL Financial, which provides comprehensive regulatory financial data on financial institutions, on banks' holdings of mortgage-related assets to observe trends in holdings of mortgage-related assets. We assessed the reliability of both data sources by reviewing information about the data and systems that produced them, comparing the data to other published sources, and by reviewing assessments we did for previous studies. We determined that the data we used remains sufficiently reliable for the purposes of our reporting objectives. Finally, we interviewed market participants, including officials at the Mortgage Bankers Association, to obtain additional insights into changes in capital requirements.

We conducted this performance audit from May 2016 to December 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Bank capital performs several important functions. Among other things, capital acts as a financial cushion to absorb unexpected losses, promotes public confidence in the solvency of the institution and the stability of the banking sector, and provides protection to depositors and deposit insurance funds. Because of capital's role in absorbing losses, promoting confidence, and protecting depositors, federal banking regulations require banking organizations to maintain adequate capital, and regulators set

[4]See, for example, GAO, *Mortgage Servicing: Community Lenders Remain Active under New Rules, but CFPB Needs More Complete Plans for Reviewing Rules,* GAO-16-448 (Washington, D.C.: June 23, 2016) and *Bank Capital Reforms: Initial Effects of Basel III on Capital, Credit, and International Competitiveness,* GAO-15-67 (Washington, D.C.: Nov. 20, 2014); Basel Committee on Banking Supervision, *Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework* (Basel, Switzerland: June 2004) and *International Convergence of Capital Measurement and Capital Standards* (Basel, Switzerland: July 1988); and Congressional Research Service, *Overview of the Prudential Regulatory Framework for U.S. Banks: Basel III and the Dodd-Frank Act*, R44573 (Washington, D.C.: July 27, 2016).

minimum capital levels to help ensure that institutions do so, including a target total minimum risk-based capital ratio—that is, the ratio of capital to risk-weighted assets. Federal law authorizes banking regulators to take a variety of actions to ensure capital adequacy, including informal and formal enforcement actions. Federal banking regulators generally expect institutions to hold capital at levels higher than regulatory minimums.

Capital rules in the United States generally follow a framework of measures adopted by the Basel Committee. U.S. federal banking regulators have adopted various risk-based capital regimes over the past decades. Under these frameworks, assets and off-balance-sheet exposures are assigned to one of several broad risk categories according to the obligor (for example, the person or legal entity contractually obligated on an exposure), or if relevant, the guarantor or the nature of the collateral.[5] Banking organizations multiply the aggregate dollar amount or exposure amount in each risk category by the risk weight associated with that category. The resulting risk-weighted amounts from each of the risk categories are added together, and generally this sum is the banking organization's total risk-weighted assets, which comprises the denominator of the risk-based capital ratio. For example, a $1,000 on-balance-sheet asset at a 20 percent risk weight would equal $200 in risk-weighted assets. An additional $1,000 on-balance-sheet asset at a 50 percent risk weight would equal $500 in risk-weighted assets, for a total of $700 in risk-weighted assets (compared to the $2,000 in total assets). The risk weights enable one to calculate the amount of capital a banking organization would need to hold for a given asset—its "capital charge"—in order to meet the minimum risk-based capital ratio requirements. To meet an 8 percent minimum total capital ratio requirement, the organization with the $700 in risk-weighted assets in the previous example would need to hold $56 in capital ($700×0.08). The minimum total capital charge for

[5]Off-balance-sheet exposures are activities that are not recognized on the banks' balance sheet but are effectively assets or liabilities of the bank. These exposures can include commitments (which are legally binding arrangements that obligate a banking organization to extend credit or purchase assets), guarantees (which are financial instruments that allow one party to transfer credit risk of one or more specific exposures to another party), and repurchase agreements, among others. Banks must apply credit conversion factors specified by the banking regulators to off-balance-sheet exposures in order to convert the exposure amounts to on-balance-sheet equivalent amounts. The risk weights are then applied to the on-balance-sheet equivalent amounts to calculate risk-weighted assets and minimum capital requirements.

the $1,000 on-balance-sheet asset that was risk-weighted at 20 percent would be $16 ($1,000×0.2×0.08), while the minimum capital charge for the $1,000 on-balance-sheet asset that was risk-weighted at 50 percent would be $40 ($1,000×0.5×0.08).

Risk weights for mortgages and other mortgage-related assets have been included in a number of these regulatory capital frameworks over the years, including the following:

- The Basel Capital Accord (Basel I), which was adopted in 1988 and implemented in the United States in the early 1990s, established a system of generally applicable risk weights for specific assets (including mortgage-related assets) to calculate total risk-weighted assets and defined a minimum total risk-based capital ratio (the ratio of regulatory capital to risk-weighted assets) of 8 percent with limited exceptions. Under this system, all assets of a certain category—for example, commercial loans—were assigned a flat risk weight without regard for differences in credit quality among the assets in that category (simple risk-bucket approach). Asset categories were classified into one of four risk-weight buckets—0 percent, 20 percent, 50 percent, or 100 percent.
- Amendments to the U.S. federal banking regulators' rules adopted in 2001 implemented a multilevel, ratings-based approach to assess capital requirements on asset securitizations— including mortgage-backed securities (MBS)—based on their relative exposure to credit risk.[6] The approach used credit ratings from nationally recognized statistical rating organizations (NRSRO) to measure relative exposure to credit risk and determine the associated risk-based capital requirement.[7]
- In 2007, U.S. federal banking regulators adopted capital rules for large internationally active banking organizations that were based on a revised framework published by the Basel Committee in 2006

[6]When assets (such as mortgages) are securitized, they are pooled together into a security, and the payment streams associated with the assets are sold to investors.

[7]A credit rating is an assessment of the creditworthiness of an obligor as an entity or in relation to specific securities or money market instruments. 15 U.S.C. § 78c(a)(60). The Securities and Exchange Commission first used the term "Nationally Recognized Statistical Rating Organization" in 1975 to describe those rating agencies whose ratings could be relied upon to determine capital charges for different types of debt securities.

(Basel II).[8] Only large, internationally active banks—banks with consolidated total assets (excluding assets held by an insurance underwriting subsidiary of a bank holding company) of $250 billion or more or with consolidated total on-balance-sheet foreign exposure of $10 billion or more—were required to adopt the advanced approaches for measuring risk (including mortgage-related credit risk) established in the Basel II-based rules. Under these rules, the advanced internal ratings-based approach used risk parameters determined by a bank's internal systems as inputs into a formula developed by supervisors for calculating minimum regulatory capital and expanded the use of credit ratings to measure credit risk.[9]

- U.S. federal banking regulators promulgated a final rule in 2013 to incorporate many of the changes included in the Basel III framework.[10] Among other changes, the final rule includes a new standardized approach for credit risk to replace the Basel I generally applicable risk-based capital rule. The final rule also removed references to credit ratings that were in the Basel I generally applicable rule and the advanced internal ratings-based approach, consistent with requirements in Section 939A of the Dodd-Frank Act.[11]

Other entities that hold mortgages and mortgage-related assets have different capital requirements. For example, in 1992 the Office of Federal Housing Enterprise Oversight, which at the time was the regulator for the enterprises, adopted minimum capital requirements based on the enterprises' on-balance-sheet assets and off-balance-sheet obligations. Nonbank financial institutions that service mortgages for the enterprises and Ginnie Mae must comply with minimum capital and net worth requirements those entities have issued.

[8]Basel Committee on Banking Supervision, *International Convergence of Capital Measurement and Capital Standards: A Revised Framework* (Basel, Switzerland: June 2006).

[9]Another advanced approach included in the rules is the advanced measurement approach, which is used to measure operational risk and is not discussed in this report.

[10]We described a number of other changes to capital requirements brought about by Basel III and the U.S. banking regulators' final rule in a 2014 report. See GAO-15-67.

[11]For the purposes of this report, we refer to the ratings-based approach as credit ratings-based approach to distinguish between it and the advanced internal ratings-based approach. Regulatory capital frameworks and rules do not use "credit ratings-based approach."

The Basel III-Based Final Rule Changes the Risk Weights for Some Mortgage-Related Assets

The Basel III final rule adopted in 2013 by the U.S. federal banking regulators and generally effective as of January 2015 incorporates higher risk weights for certain mortgage-related exposures while leaving others unchanged (see table 1). For example, the risk weights for most single-family residential mortgages are largely unchanged by the final rule. However, the final rule changed the risk weights for some mortgage-related securitization exposures and for mortgage servicing assets.

Table 1: Risk Weights for Selected Mortgage-Related Assets Held by Banks under Different Capital Regimes

			Basel III-based rule[b]	
	Basel I-based rule[a] (1992–2014)	Basel II-based rule[a] (2008–2014)	Standardized (2015–present)	Advanced (2014–present)
Asset	(percent)	(percent)	(percent)	(percent)
Single-family residential mortgages – not guaranteed by U.S. government agencies	50 or 100[c]	Determined by a formula defined by regulators for retail exposures using, among other considerations, estimates of the probability of default and loss given default derived from banks internal systems[d]	Same as Basel I	Same as Basel II
Ginnie Mae residential mortgage-backed securities (MBS)	0	Same as above	Same as Basel I	Same as Basel II
Fannie Mae and Freddie Mac pass-through residential MBS	20	Same as above	Same as Basel I	Same as Basel II
Securitization exposures[e]	If externally rated, 20 to 200 based on long-term credit ratings one category below investment grade or better[f] For unrated recourse obligations and direct credit substitutes, 20% to 1,250% using the gross-up approach[g] or deducted from capital	If externally rated, 7 to 650 based on long-term credit ratings one category below investment grade or better[f] and other factors If unrated, determined by supervisory formula approach (SFA)[h] or deducted from capital	20 to 1,250 based on simplified supervisory formula approach (SSFA)[i] or gross-up approach[g]	20 to 1,250 based on SFA[h] or SSFA[i]
Mortgage servicing assets	100	Same as Basel I	250[j]	250[j]

Source: GAO analysis of regulations. | GAO-17-93

[a]Only large internationally active banks were subject to the Basel II-based rule. These banking organizations were those that (a) had consolidated assets equal to $250 billion or more, (b) had consolidated total on-balance sheet foreign exposures equal to $10 billion or more, or (c) were subsidiaries of a bank or holding company required to use the Basel II-based rule. All other banks continued to follow the Basel I-based rule until the Basel III-based rule went into effect. From 2008 to 2011, the large internationally active banks had to apply the advanced internal ratings-based approach introduced in the Basel II-based rule for calculating risk weights and capital requirements. In 2011, the U.S. federal banking regulators required these banks to also use the generally applicable risk-based capital framework from the Basel I-based rule as a floor for calculating minimum capital requirements.

[b]Under the Basel III-based rule, the standardized approach replaces the generally applicable risk-based capital framework from the Basel I-based rule for all banks. The Basel III-based rule also continues use of the advanced internal ratings-based approach from the Basel II-based rule (with some changes) for large internationally active banks.

[c]First-lien residential mortgage loans that are secured by a property that is owner-occupied or rented, made in accordance with prudent underwriting standards, not 90 days or more past due or carried in nonaccrual status, and not restructured or modified exempt solely pursuant Treasury's Home Affordable Mortgage Program qualify for the 50 percent risk weight.

[d]Retail exposures include most credit exposures to individuals (including residential mortgages) and small credit exposures to businesses that are managed as part of a segment of exposures with similar risk characteristics and not managed on an individual-exposure basis. The probability of default for a segment of non-defaulted retail exposures is a banking organization's empirically based best estimate of the long-run average one-year default rate for the exposures in the segment. The loss given default for a segment of retail exposures includes a banking organization's empirically based best estimate of the long-run default-weighted average economic loss the banking organization would expect to incur if the exposures in the segment were to default within a 1 year horizon during economic downturn conditions.

[e]The Basel I-based rule specified how to calculate risk weights for a number of different securitization exposures, including direct credit substitutes, recourse obligations, and residual interests. The Basel II-based rule defined securitization exposures as exposures that, among other requirements, arise from transactions in which the credit risk associated with the underlying exposures has been separated into at least two tranches reflecting different levels of seniority. This definition was also included in the Basel III-based rule.

[f]Exposures rated more than one category below investment grade must be deducted from total capital—essentially equivalent to a risk weight of 1,250 percent.

[g]The gross-up approach involves calculating an amount of capital for the bank's exposure as well as for the portion of more senior exposures, if any, for which the bank's exposure provides support.

[h]SFA requires banks to calculate several input parameters on an ongoing basis, including the exposure's credit enhancement level and thickness and the capital requirements for the underlying exposures.

[i]SSFA takes into account the weighted average capital charge for the underlying exposures, delinquency level of the underlying collateral, and the relative size and seniority of the security in the securitization structure.

[j]Effective January 1, 2018.

Overall Risk Weights for Mortgages Remain Largely Unchanged

Risk weights for residential first-lien mortgages on one-to-four family properties that are held in banks' portfolios have remained largely unchanged since the adoption of the Basel I-based rules. Under the standardized approach outlined in the Basel III-based final rule, the portions of mortgages that are conditionally guaranteed by U.S. government agencies, such as the Federal Housing Administration or the Department of Veterans Affairs, are assigned 20 percent risk weights under the standardized approach—essentially unchanged since Basel I. Other mortgages—and the portions of mortgages not guaranteed by U.S. government agencies—secured by one-to-four family residential properties are assigned a 50 percent risk weight, provided that such loans are:

- secured by a property that is either owner-occupied or rented;

- made in accordance with prudent underwriting standards, including standards relating to the loan amount as a percentage of the appraised value of the property;
- not 90 days or more past due or carried in nonaccrual status; and
- not restructured or modified (other than through the Department of the Treasury's Home Affordable Modification Program).

Also, if a banking organization holds the first-lien and junior-lien residential mortgage exposures, and no other party holds an intervening lien, the institution must combine the exposures and treat them as a single loan secured by a first lien to determine the loan-to-value ratio and assign a risk weight.[12] Banking organizations are required to assign a 100 percent risk weight to a first-lien residential mortgage exposure that does not meet the criteria previously listed and to junior-lien residential mortgage exposures if the banking organization does not hold the first lien on the property.

The advanced internal ratings-based approach requires banking organizations to use a formula defined in regulation to determine the capital requirements for residential mortgage exposures, which are grouped into segments that have similar (homogeneous) risk characteristics. The formula for the capital charge for nondefaulted residential mortgage exposures uses values for the probability of default and loss given default that each bank derives from its internal systems (see app. I).[13] For example, applying a probability of default of 3 percent and losses given default of 20 percent to a segment of nondefaulted residential mortgages would result in a risk weight of about 50 percent using this formula. This formula is unchanged since it went into effect in 2008.

[12]A junior lien is a loan that uses the same property as an existing loan (first lien) as collateral and is subordinate to the existing loan. Home equity loans and home equity lines of credit are common examples of junior liens.

[13]The probability of default for a segment of non-defaulted retail exposures is a banking organization's empirically based best estimate of the long-run average one-year default rate for the exposures in the segment. The loss given default for a segment of retail exposures includes a banking organization's empirically based best estimate of the long-run default-weighted average economic loss the banking organization would expect to incur if the exposures in the segment were to default within a 1 year horizon during economic downturn conditions.

Under this advanced approach, defaulted residential mortgage exposures that are covered by an eligible U.S. government guarantee have a capital charge of 1.6 percent for the portion that is covered by the guarantee—an implicit 20 percent risk weight (0.016 ÷ 0.08 = 0.2).[14] The previous rules did not include a separate provision for defaulted residential mortgage exposures covered by a government guarantee. Defaulted residential mortgage exposures not covered by an eligible U.S. government guarantee have a capital charge of 8 percent, which implies a risk weight of 100 percent.

The standardized approach and the advanced approach both assign a risk weight of 50 percent to pre-sold construction loans with a legally binding sales contract unless the purchase contract is cancelled, in which case a banking organization must assign a 100 percent risk weight.[15]

Some Risk Weights for Mortgage-Related Securitization Exposures Changed under the Final Rule

The Basel III-based final rule keeps the risk weights for government- and enterprise-guaranteed MBS outlined under the previous rules but changes how the risk weights for private-label securities are calculated.[16] Under the standardized approach, residential MBS guaranteed by Ginnie Mae have a risk weight of 0 percent, while residential MBS issued and guaranteed by Fannie Mae and Freddie Mac have a risk weight of 20 percent—unchanged since Basel I.[17] As shown previously in table 1, risk weights for other MBS that qualify as securitization exposures can range

[14]Eligible guarantees are written guarantees that either are unconditional or are contingent obligations of the U.S. government or its agencies, the enforceability of which is dependent upon some affirmative action on the part of the beneficiary of the guarantee or a third party (for example, meeting servicing requirements).

[15]A pre-sold construction loan is a one-to-four family residential construction loan to a builder that, among other requirements, is made in accordance with prudent underwriting standards, where the purchaser is an individual who intends to occupy the residence, has entered into a legally binding written sales contract for the residence, and has made an earnest money deposit of at least 3 percent of the sales price that is being held in escrow. In addition, the builder must incur at least the first 10 percent of the direct costs of construction of the residence before any drawdown is made under the loan, which may not exceed 80 percent of the sales price of the presold residence.

[16]Private-label securities are securities that are not issued or guaranteed by a federal government agency or the enterprises.

[17]Under the advanced approach, these MBS are treated as residential mortgage exposures and included in the formula described previously.

from 20 percent to 1,250 percent under either the standardized or the advanced approaches.[18] Previously, risk weights for securitization exposures could be as low as 7 percent under the advanced approach. Under the current rules, banks using the advanced internal-ratings based approach must also apply the standardized approach. If banks are unable to use the formulas and approaches defined in the final rule for the standardized and advanced approaches—for example, because they do not have data to calculate all the inputs—they must apply the 1,250 percent risk weight to their securitization exposures.

Securitization Exposure Calculations under the Standardized Approach

The Basel III final rule establishes two methods for calculating risk weights for securitization exposures under the standardized approach:

- The simplified supervisory formula approach relies on objective inputs to calculate risk weights for securitization exposures using a formula. To use this approach, a bank needs to know the performance of the underlying assets.
- The "gross-up" approach involves calculating an amount of capital for the bank's exposure as well as for the portion of more senior exposures (that is, the least risky tranches, which are given priority for repayment), if any, for which the bank's exposure provides support. If a bank does not have access to the inputs required to calculate the simplified supervisory formula approach, or prefers a simpler approach, the gross-up approach can be applied.

[18]A securitization exposure is an on-balance-sheet or off-balance-sheet credit exposure that arises from a transaction in which the credit risk associated with the underlying exposures has been separated into at least two tranches reflecting different levels of seniority; performance of the securitization exposures depends upon the performance of the underlying exposures; and all or substantially all of the underlying exposures are financial exposures. Such a transaction can be a traditional securitization, in which the underlying credit risk of one or more underlying exposures is transferred to one or more third parties other than through the use of credit derivatives or guarantees, or a synthetic securitization, in which all or a portion of the credit risk of one or more underlying exposures is retained or transferred to one or more third parties through the use of one or more credit derivatives or guarantees. See 12 C.F.R. § 3.2 (OCC); 12 C.F.R. § 217.2 (Federal Reserve); 12 C.F.R. § 324.2 (FDIC).

Banks that are subject to another rule, the market risk rule, must use the simplified supervisory formula approach.[19] Banks that are not subject to this other rule may choose to use either method but must use the same method across all exposures.

Simplified Supervisory Formula Approach

The simplified supervisory formula approach takes into account the weighted average capital charge for the underlying exposures, delinquency level of the underlying collateral, and the relative size and seniority of the security in the securitization structure (see app. II for the details of the formula). The current balances of all the underlying exposures in the securitization structure are used to calculate the attachment and detachment points for each level, or tranche, of the structure.[20] Losses are first borne by the lowest tranches. Once a tranche experiences a total loss, the next tranche immediately senior to it begins to bear any additional losses.

The following hypothetical securitization structure illustrates the simplified supervisory formula approach for a securitization backed by a pool of residential mortgages that would be risk-weighted at 50 percent. For such a securitization, the typical capital charge of the underlying mortgage pool is 4 percent (50 percent risk weight multiplied by 8 percent minimum risk-based capital ratio). Assuming that 5 percent of the mortgages in the pool are delinquent and have a risk weight of 100 percent (for an 8 percent capital charge), the weighted average capital charge of the mortgage pool would be 4.2 percent.[21] The risk weights for each of the tranches can be

[19]The market risk rule is outlined in subpart F of the banking regulators' Basel III-based final rule and applies to any banking organization with aggregate trading assets and trading liabilities equal to 10 percent or more of quarter-end total assets (as reported on the most recent quarterly report) or $1 billion or more.

[20]A tranche is defined by attachment and detachment points. The attachment point is the position of the tranche in the deal structure where the tranche begins to experience losses. It is the percentage of the total securitization pool subordinated to that tranche. The detachment point is the position of the tranche in the deal structure where credit losses result in a complete loss of principal.

[21]With 95 percent of the pool having a capital charge of 4 percent, and 5 percent of the pool having a capital charge of 8 percent, the weighted average capital charge is (0.95 × 0.04) + (0.05 × 0.08) = 0.042 (4.2 percent).

calculated using the formula outlined in the final rule and described in appendix II. The risk-weight results for a pool that does not involve resecuritizations are shown in table 2.[22] If 10 percent of the underlying mortgage pool is delinquent, the weighted average capital charge would be 4.4 percent, and the tranche risk weights for the lower (more risky) tranches would increase, reflecting the increased likelihood of losses on these tranches.[23] In both scenarios, the most senior tranches would have risk weights of 20 percent.

Table 2: Risk Weights for Hypothetical Securitization Structure Using the Simplified Supervisory Formula Approach

			Risk weights with	
Tranche	**Type**	**Balance (dollars)**	**5 percent of underlying mortgages delinquent (percent)**	**10 percent of underlying mortgages delinquent (percent)**
A1	Senior	50,000,000	20	20
A2	Senior	300,000,000	20	20
B	Mezzanine	50,000,000	20	43
C	Mezzanine	50,000,000	131	396
SUBORD	Junior	49,000,000	1,076	1,236
Overcollateralization/cash reserves		1,000,000	1,250	1,250
Total		**500,000,000**		

Source: GAO analysis using the Federal Deposit Insurance Corporation's Simplified Supervisory Formula Approach Tool. | GAO-17-93

Note: The hypothetical securitization structure does not involve resecuritizations. The mezzanine tranches are subordinated to the senior tranches, but are senior to the junior tranche. The senior tranches are the least risky tranches, whereas the junior tranche is the first loss (after cash reserves) and riskiest tranche.

Risk weights for other securitization exposures, such as real estate mortgage investment conduits, can also be calculated using the simplified supervisory formula approach.[24] Similarly, the credit risk transfer

[22]A resecuritization is defined as a securitization which has more than one underlying exposure and in which one or more of the underlying exposures is a securitization exposure.

[23]The risk weights calculated using the formula would increase for all tranches. However, the regulators established a supervisory floor of 20 percent for securitization exposures, which overrides the risk weights below 20 percent.

[24]A real estate mortgage investment conduit is an entity that issues multiple classes (or tranches) of interests in a type of MBS backed by mortgages or MBS that is structured to meet certain criteria for tax purposes.

transactions the enterprises have engaged in with various investors would be treated as securitization exposures for banks that hold these notes. In most cases, these notes would have risk weights at or near 1,250 percent due to the holders of the notes being in or near the first-loss position.

Previously, under the Basel I-based rules that most banks were subject to through 2014, some private-label securitization exposures were assigned general risk weights while others were given risk weights based on credit ratings. For example, privately issued MBS backed by mortgages that would qualify for the 50 percent risk weight would receive a 50 percent risk weight, subject to certain conditions.[25] Mortgage securitization exposures—including direct credit substitutes, recourse, and residual interests—that were externally rated were assigned risk weights between 20 percent (for long-term credit ratings of AAA or AA) and 200 percent (for BB ratings, which indicate higher risk).[26]

[25]MBS had to meet the following conditions to qualify for the 50 percent risk weight: (1) the underlying assets had to be held by an independent trustee that had a first priority, perfected security interest in the underlying assets for the benefit of the holders of the security; (2) the holder of the security had to have an undivided pro rata ownership interest in the underlying assets or the trust that issued the security had to have no liabilities unrelated to the issued securities; (3) the trust that issued the security had to be structured such that the cash flows from the underlying assets fully met the cash flow requirements of the security without undue reliance on any reinvestment income; and (4) there could not be any material reinvestment risk associated with any funds awaiting distribution to the holder of the security. See 12 C.F.R. pt. 3 app. A (2013).

[26]A direct credit substitute is an arrangement in which a bank assumes, in form or in substance, credit risk associated with an on- or off-balance-sheet asset or exposure that was not previously owned by the bank and the risk assumed by the bank exceeds the pro rata share of the bank's interest in the third-party asset. If a bank has no claim on the third-party asset, then the bank's assumption of any credit risk is a direct credit substitute. Recourse obligations from securitizations are a bank's retention, in form or in substance, of any credit risk directly or indirectly associated with an asset it has sold that exceeds a pro rata share of that bank's claim on the asset. If a bank has no claim on a sold asset, then the retention of any credit risk is recourse. A recourse obligation typically arises when a bank transfers assets and retains an explicit obligation to repurchase assets or to absorb losses due to a default on the payment of principal or interest or any other deficiency in the performance of the underlying obligor or some other party. Recourse may also exist implicitly if a bank provides credit enhancement beyond any contractual obligation to support assets it has sold. A residual interest is any on-balance-sheet asset that represents an interest created by a transfer that qualifies as a sale of financial assets, whether through a securitization or otherwise, and that exposes a bank to any credit risk directly or indirectly associated with the transferred asset that exceeds a pro rata share of that bank's claim on the asset, whether through subordination provisions or other credit enhancement techniques. See 12 C.F.R. pt. 3 app. A (2016).

Gross-up Approach

The gross-up approach in the Basel III-based rule is the same as an approach that was available under the previous rules. To calculate risk-weighted assets under the gross-up approach, a banking organization determines three inputs along with the exposure amount: the pro rata share, the enhanced amount, and the applicable risk weight.

- The pro rata share is the par value of the banking organization's exposure as a percentage of the par value of the tranche in which the securitization exposure resides—for example, a $5,000 exposure in a $10,000 junior tranche of one-to-four family residential mortgages would be a 50 percent pro rata share.
- The enhanced amount is the par value of all tranches that are more senior to the tranche in which the exposure resides. These more senior tranches are "enhanced"—that is, their credit profiles are improved by—the subordinated tranches. If the total securitization in the previous example is $100,000, the par value of all tranches that are more senior to the tranche in which the bank has an interest is $90,000.
- The applicable risk weight is the weighted-average risk weight of the underlying exposures in the securitization as calculated under the standardized approach. For mortgages not guaranteed by the federal government (as in the previous example), the underlying exposures can have risk weights of either 50 percent or 100 percent. The weighted-average risk weight would be 75 percent if half of the total amount of underlying mortgages had a risk weight of 50 percent and the remaining underlying exposures had a risk weight of 100 percent.

For the previous example, assume the weighted-average risk weight of the underlying exposures is 50 percent (that is, all the mortgages meet all of the requirements discussed previously, such as not 90 days past due and not restructured or modified). The risk weight would then be applied to the bank's interest—$5,000—plus the pro rata share of the more senior tranches—50 percent of $90,000. In other words, $50,000 ($5,000 plus $45,000) would be multiplied by the 50 percent risk weight. The result, $25,000, is equivalent to a 500 percent risk weight on the bank's $5,000 exposure. The bank would then multiply the $25,000 by the minimum capital requirement of 8 percent to determine that the capital requirement for the $5,000 exposure is $2,000.

Securitization Calculations under the Advanced Internal Ratings-Based Approach

For the advanced internal ratings-based approach, the Basel III-based final rule eliminates the credit ratings-based approach that had been the primary method for determining risk weights for securitization exposures under the previous rules. The credit ratings-based approach assigned risk weights to securitization exposures based on their seniority in the securitization structure and the effective number of exposures (as determined by a formula), as well as their external ratings from one or more NRSROs or inferred ratings.[27] These risk weights ranged from 7–20 percent for the highest investment grade (long-term) securitization exposures (e.g., AAA) to 35–100 percent for the lowest investment grade exposures (e.g., BBB+, BBB, BBB-) to 250–650 percent for exposures one category below investment grade (e.g., BB+, BB, BB-).[28]

The primary method for banks using the advanced internal ratings-based approach to calculate capital requirements for securitization exposures is the supervisory formula approach. The supervisory formula approach was an alternative method banks could use under the Basel II-based rules for securitization exposures for which there was no applicable external or inferred credit rating. It has remained largely unchanged from the Basel II-based rules with one significant exception: a 20 percent risk-weight floor, rather than a 7 percent risk-weight floor, now applies to all securitization exposures. The supervisory formula approach requires banks to calculate several input parameters on an ongoing basis. These include

[27]If a securitization exposure does not have an external rating and another securitization exposure issued by the same issuer and secured by the same underlying exposures (1) has an external rating, (2) is subordinated in all respects to the unrated securitization exposure, (3) does not benefit from any credit enhancement that is not available to the unrated securitization exposure, and (4) has an effective remaining maturity that is equal to or longer than that of the unrated securitization exposure, the unrated securitization exposure has an inferred rating equal to the rated exposure's external rating.

[28]Exposures rated more than one category below investment grade were to be deducted from tier 1 and tier 2 capital. (Tier 1 capital consists primarily of equity capital and retained earnings (the profits a bank has earned but has not paid out to shareholders in the form of dividends); tier 2 capital includes subordinated debt, a portion of loan loss allowances, and certain other instruments.) Separate risk weights were included for short-term credit weightings. These risk weights varied based on the exposures' seniority in the securitization structure and the effective number of exposures (as determined by a formula) and ranged from 7 percent to 75 percent for the three highest investment grades.

- the exposure's credit enhancement level and thickness;[29]
- the exposure-weighted average loss given default for the underlying exposures to the securitization transaction and the effective number of underlying exposures (both determined by formulas specified in the final rule); and
- the capital requirements for the underlying exposures, such as those for residential mortgage exposures described earlier.

If banks using the advanced internal ratings-based approach are unable to calculate the inputs for the supervisory formula approach, they may use the simplified supervisory formula approach described earlier.

Risk Weights for Mortgage Servicing Assets Will Increase

The Basel III-based final rule changes the treatment of mortgage servicing assets by (1) lowering the cap on the amount of mortgage servicing assets that can be included in capital calculations, which reflects, in part, the uncertainty regarding the ability of banking institutions to realize value from these assets, especially under adverse financial conditions, and (2) increasing the risk weights. Mortgage servicing assets are the contractual rights owned by a banking organization to service (for a fee) mortgage loans that are owned by others. Under previous rules, banks included up to 90 percent of fair value or 100 percent of book value of mortgage servicing assets in their capital calculations, whichever was lower, and mortgage servicing assets were subject to 100 percent risk weight. In contrast, the final rule caps the recognition of mortgage servicing assets at 10 percent of the common equity component of tier 1 capital.[30] Mortgage servicing assets exceeding the 10 percent threshold must be deducted from common equity. Deductions from common equity reduce the numerator in banks' calculations of their risk-based capital ratios. Mortgage servicing asset amounts that are not deducted from common equity are currently subject to a 100 percent risk weight, and that risk weight will increase to 250 percent beginning January 1, 2018,

[29]The credit enhancement level is the ratio of the amount of all securitization exposures subordinated to the tranche that contains the banking organization's securitization exposure and the amount of the underlying exposures. The tranche thickness is measured by subtracting the attachment point from the detachment point and represents the maximum loss that can be sustained if the entire tranche were held.

[30]Common equity includes in part common shares that meet specified criteria and retained earnings.

when the phase-in period ends.[31] The future increase in the risk weight will increase risk-weighted assets, the denominator for banks' risk-based capital ratios. As a result, both the stricter cap and higher risk weight on mortgage servicing assets will reduce banks' risk-based capital ratios, making the required minimum level more difficult to maintain.

The Enterprises and Nonbank Financial Institutions Are Not Subject to the Final Rule or Capital Requirements That Involve Risk Weights

The final rule does not apply to the enterprises or nonbank financial institutions. The enterprises' previous regulator, the Office of Federal Housing Enterprise Oversight, established risk-based capital requirements that were defined by stress test scenarios rather than fixed risk weights. A simulated stress test was used to project the enterprises' financial performance over a 10 year period and measure capital adequacy, or the amount of capital required to survive a prolonged period of economic stress without new business or active risk management action. When the enterprises were placed in conservatorship in 2008, their new regulator, the Federal Housing Finance Agency, suspended the enterprises' capital requirements.

Nonbank financial institutions such as nonbank mortgage servicers follow capital requirements established by Ginnie Mae and the enterprises in order to service loans these entities guaranteed, but these requirements do not involve risk weights. The minimum capital requirements that are currently in place or that have been proposed are shown in table 3.

Table 3: Nonbank Mortgage Servicer Capital and Liquidity Requirements

	Fannie Mae/Freddie Mac Seller servicers	Ginnie Mae issuers	Conference of State Bank Supervisors' proposal
Minimum net worth (dollars)	2.5 million plus 25 bps of servicing UPB	2.5 million plus 35 bps of servicing UPB	2.5 million plus 25 bps of servicing UPB
Minimum capital ratio (percent)	Net worth/total assets>=6	Net worth/total assets>=6	None

[31]In addition, the combined balance of mortgage servicing assets, deferred tax assets, and investments in the common stock of unconsolidated financial institutions is limited to 15 percent of a bank's common equity tier 1 capital. These combined assets must be deducted from common equity to the extent that they exceed the 15 percent threshold.

	Fannie Mae/Freddie Mac Seller servicers	Ginnie Mae issuers	Conference of State Bank Supervisors' proposal
Minimum liquidity ratio	3.5 bps of agency servicing UPB plus incremental 200 bps of NPL servicing over 6 percent agency UPB	Greater of 1 million dollars or 10 bps of MBS outstanding	3.5 bps of all servicing UPB; no incremental charge
Effective date	December 31, 2015	January 1, 2015 (new issuers); December 31, 2015 (prior issuers)	Proposed

Legend:
bps = basis points
UPB = unpaid principal balance
MBS = mortgage-backed securities
NPL = nonperforming loans

Source: The Urban Institute. | GAO-17-93

Note: The Conference of State Bank Supervisors' proposal also includes enhanced prudential standards for large, complex nonbank mortgage servicing companies. The proposed enhanced prudential standards expand upon the baseline standards, and would be applied based on factors such as the number or dollar amount of loans serviced, the composition of the servicing portfolio, and the entity's primary business (e.g., subservicing, master servicer). The state regulators noted a need for these larger entities to have in place advanced risk management and management information systems to mitigate risk. The proposal recommends that the more complex entities deploy enhanced planning, modeling, metrics, and audit in four areas: (1) capital, (2) liquidity, (3) stress testing, and (4) living will and recovery resolution plans.

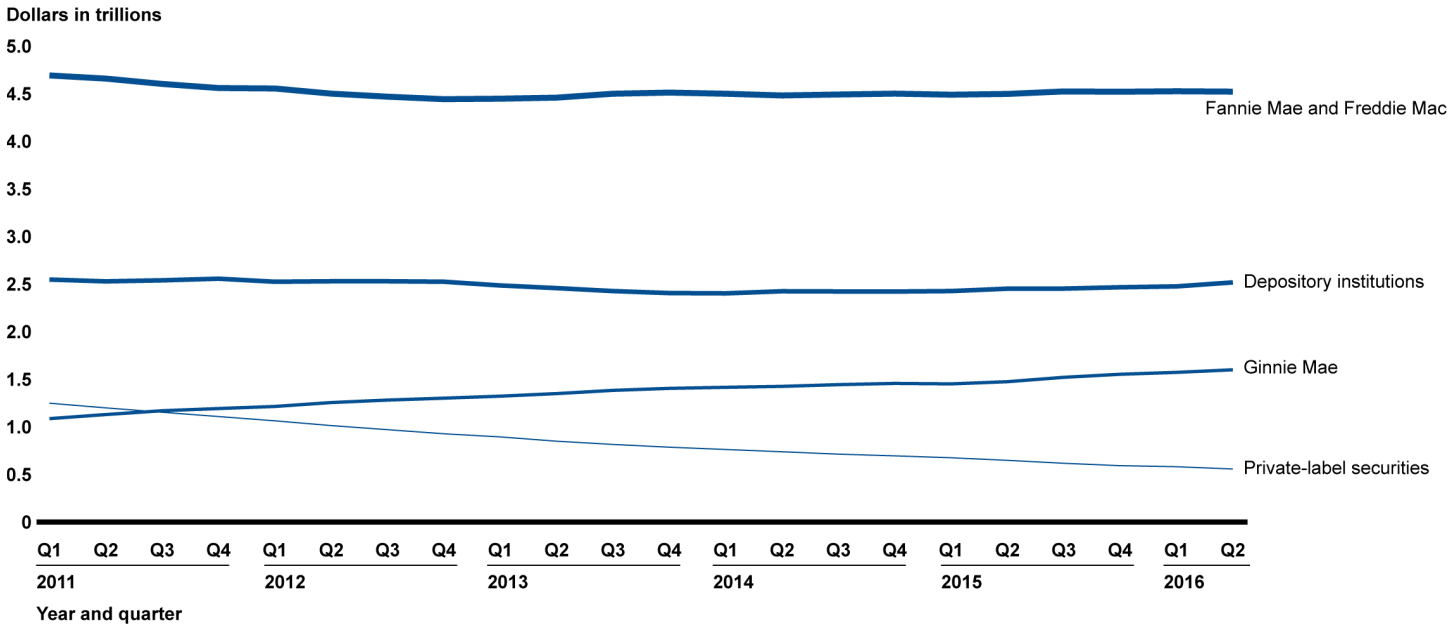
Effects of Changes to Capital Requirements on Holdings of Mortgage-Related Assets Are Uncertain

The full impact of the changes to capital requirements for holdings of mortgage-related assets remains uncertain because insufficient time has passed since these changes took effect for both banks and nonbank mortgage servicers, and for some assets the changes have not yet been fully phased in. However, our past work suggested that—based on analysis of data included in banks' Consolidated Reports of Condition and Income (commonly referred to as Call Reports) and Credit Union 5300 Call Reports—many lenders generally appeared to be participating in residential mortgage lending much as they had in the past.[32] In addition, data on mortgage debt outstanding published by the Federal Reserve indicate that holdings of mortgage debt for one-to-four family properties have remained consistent with trends that predate the 2014–2015 changes in risk weights (see fig. 1): (1) mortgage debt held or guaranteed by the enterprises holding steady, (2) mortgage debt held by depository institutions also holding steady, (3) mortgage debt held or guaranteed by

[32]GAO, *Mortgage Servicing: Community Lenders Remain Active under New Rules, but CFPB Needs More Complete Plans for Reviewing Rules*, GAO-16-448 (Washington, D.C.: June 23, 2016).

Ginnie Mae continuing to increase slightly, and (4) mortgage debt backing private-label securities continuing its steady decline.

Figure 1: Volume of Mortgage Debt Outstanding by Holder or Guarantor, 2011 through Second Quarter 2016



Source: GAO analysis of Board of Governors of the Federal Reserve System data. | GAO-17-93

But increased risk weights for some mortgage-related assets, among other factors, can have potential implications for banks' decisions about securitizing and servicing mortgages and investing in MBS. Securitizing mortgages creates exposures that may carry increased risk weights for banks. These exposures can include mortgage servicing assets, recourse obligations, and residual interests.

- As discussed previously, the cap on the amount of mortgage servicing assets that can be included in capital calculations is now lower than it previously was—10 percent of common equity rather than either 90 percent of fair value or 100 percent of book value. Banks that exceed the cap may need to hold more capital for these assets. In addition, mortgage servicing assets will have a higher risk weight under the final rule beginning in 2018, which will also increase the capital required for these assets. Fewer banks may want to retain these servicing rights and instead may seek to sell them to nonbank financial institutions that are not subject to the final rule. The total amount of mortgage servicing assets held by banks peaked in 2009

and generally has been decreasing in subsequent years, according to data compiled by SNL Financial. In 2016 reports on mortgage servicing and nonbank servicers, we found that the share of U.S. residential mortgages serviced by nonbank servicers increased from approximately 6.8 percent in the first quarter of 2012 to approximately 24.2 percent in the second quarter of 2015, while the share serviced by the largest nationwide, regional, and other banks decreased from about 75.4 percent to about 58.6 percent over the same period.[33]

- Banking organizations may face recourse obligations (for example, to repurchase mortgages they have sold to others) when loans default within a certain period after the sale. Banks reported a decreasing amount of residential mortgages serviced for others with recourse, according to data compiled by SNL Financial, but this trend predates the Basel III-based final rule.
- Under current credit risk retention rules, banks must retain an interest equal to at least 5 percent of the credit risk for mortgage-backed securities they sponsor unless the security qualifies for an applicable exemption, including being exclusively backed by mortgages that meet the definition of a "qualified mortgage."[34] These residual interests are included in risk-weighted assets and may carry higher risk weights under the Basel III-based rules than under the previous rules, depending on how they are structured. Residual interests that are structured as a vertical slice of the securitization structure (meaning the sponsor retains a 5 percent interest in each tranche) would have a lower risk weight than residual interests that are structured as a horizontal slice of the securitization (meaning the sponsor retains the most junior 5 percent interest in the securitization structure). Few transactions involving the securitization of mortgages that do not meet the qualified mortgage definition have been completed since the rule went into effect. Instead, banks may be electing to hold these mortgages in their portfolios or to originate loans that meet the qualified mortgage definition, including those that

[33]GAO-16-448 and GAO, *Nonbank Mortgage Servicers: Existing Regulatory Oversight Could Be Strengthened*, GAO-16-278 (Washington, D.C.: Mar. 10, 2016). The remaining 17.2 percent of mortgages are serviced by other bank servicers, such as community banks and credit unions.

[34]For a more complete discussion of these regulations and other recent mortgage reforms, see GAO, *Mortgage Reforms: Actions Needed to Assess Effects of New Regulations*, GAO-15-185 (Washington D.C.: June 25, 2015).

can be sold to the enterprises. The increase in banks' holdings of securities backed by the enterprises could be evidence of this latter scenario, as banks often deliver loans to the enterprises in exchange for enterprise MBS. Holdings of enterprise MBS would have lower risk weights than holding whole loans in portfolio (whether or not they meet the qualified mortgage definition).

Finally, the Basel III-based final rule largely left unchanged the historically lower risk weights of MBS guaranteed by the enterprises vis-à-vis other mortgage-related assets, which can influence the demand for these securities relative to whole loans and privately issued MBS. While holdings of MBS guaranteed by Ginnie Mae retain a 0 percent risk weight and holdings of MBS guaranteed by the enterprises retain a 20 percent risk weight under the standardized approach (and their treatment under the advanced approach has not changed), holdings of privately issued MBS may face higher risk weights than under the prior rules. For privately issued MBS that have an external credit rating, the minimum weight increased from 7 percent to 20 percent for banks subject to the advanced approach, and the junior tranches of these MBS are likely subject to higher risk weights in part because credit ratings can no longer be used to calculate risk weights. According to data compiled by SNL Financial, banks' holdings of MBS guaranteed by Ginnie Mae and the enterprises have been increasing while their holdings of other residential MBS have been decreasing, but these trends predate the changes to risk weights for privately issued MBS.

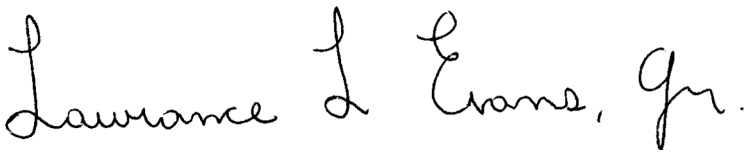
Agency Comments

We sought and received technical comments on a draft of this report from the Board of Governors of the Federal Reserve System, Office of the Comptroller of the Currency, and Federal Deposit Insurance Corporation and incorporated their comments and feedback into the final report.

We are sending copies of this report to the appropriate congressional committees and other interested parties. In addition, the report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-8678 or evansl@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix III.

Sincerely yours,



Lawrance L. Evans, Jr.
Director, Financial Markets and
Community Investment

Appendix I: Calculation of Risk-Weighted Assets for Retail Exposures under the Advanced Internal Ratings-Based Approach

Under the advanced internal ratings-based approach, residential mortgages are included in retail exposures. Generally, a banking organization must calculate retail risk-weighted asset amounts in four distinct phases:

1. Phase 1 – Categorization of exposures

During this phase, the banking organization determines which of its exposures are wholesale exposures, retail exposures, securitization exposures, or equity exposures.[1] Retail exposures are further categorized as residential mortgage exposures, qualifying revolving exposures, or other retail exposures.[2]

2. Phase 2 – Segmentation of retail exposures

During the second phase, a banking organization must group the retail exposures in each retail subcategory into segments that have homogeneous risk characteristics. A banking organization must also segment defaulted retail exposures separately from nondefaulted retail exposures.

3. Phase 3 – Assignment of risk parameters to segments of retail exposures

[1]Wholesale exposures include most credit exposures to companies, sovereigns, and other governmental entities. Retail exposures include most credit exposures to individuals and small credit exposures to businesses that are managed as part of a segment of exposures with similar risk characteristics and not managed on an individual-exposure basis.

[2]A residential mortgage exposure is an exposure that is primarily secured by a first or subsequent lien on a one-to-four family residential property or an exposure with an original and outstanding amount of $1 million or less that is primarily secured by a first or subsequent lien on residential property that is not one-to-four family that is managed as part of a segment of exposures with homogeneous risk characteristics and not on an individual-exposure basis. Qualifying revolving exposures are exposures to individuals that are revolving, unsecured, and unconditionally cancelable by the bank; have a maximum exposure amount (drawn plus undrawn) of up to $100,000, or with respect to a product with an outstanding amount that the borrower is required to pay in full every month, the total outstanding amount does not in practice exceed $ 100,000; and are managed as part of a segment of exposures with homogeneous risk characteristics. These would include most credit card exposures to individuals and overdraft lines on individual checking accounts.

During phase 3, the banking organization must associate a probability of default (PD), a loss given default (LGD), and an exposure at default (EAD) to each segment of retail exposures such as residential mortgages.

The PD for each retail segment may not be less than 0.03 percent, except for exposures to or directly guaranteed by a sovereign entity. Also, the LGD for each segment of residential mortgage exposures may not be less than 10 percent, with two exceptions. One exception is for segments of residential mortgage exposures for which all or substantially all of the principal of each exposure is guaranteed by the full faith and credit of a sovereign or other qualified entity. The other exception is for segments of residential mortgage exposures for which all or substantially all of the principal of each exposure is guaranteed by a contingent obligation of the U.S. government or its agencies, the enforceability of which is dependent upon some affirmative action on the part of the beneficiary of the guarantee or a third party (for example, meeting servicing requirements). Banking organizations may take into account the risk-reducing effects of eligible guarantees and credit derivatives in support of retail exposures in a segment when quantifying the PD and LGD of the segment. Similarly, banking organizations may also take into account the risk-reducing effects of collateral in support of retail exposures when quantifying PD and LGD of the segment, provided the banking organization has established operational procedures and risk-management processes that ensure that all documentation used in collateralizing or guaranteeing a transaction is legal, valid, binding, and enforceable.

4. Phase 4 – Calculation of risk-weighted assets

A banking organization must calculate the dollar risk-based capital requirement for segments of nondefaulted retail exposures by inserting the assigned risk parameters for the retail segment into the appropriate risk-based capital formula specified in the following formula, and multiply the output of the formula (K) by the EAD of the segment:

$$K = LGD \times N\left(\frac{N^{-1}(PD) + \sqrt{\mathrm{R}} \times N^{-1}(0.999)}{\sqrt{1-\mathrm{R}}}\right) - (LGD \times PD)$$

where K represents the capital charge; N(.) means the cumulative distribution function for a standard normal random variable; N-1(.) means the inverse cumulative distribution function for a standard normal random variable; and R is the non-defaulted exposures correlation factor. For residential mortgage exposures, R is set equal to 0.15 in the Basel III-based final rule.

Assuming LGD equals 20 percent and PD equals 3 percent, the capital calculation would be as follows for a non-defaulted residential mortgage exposure:

$$K = 0.2 \times N\left(\frac{N^{-1}(0.03) + \sqrt{0.15} \times N^{-1}(0.999)}{\sqrt{0.85}}\right) - (0.2 \times 0.03)$$

$$N^{-1}(0.03) = -1.88079$$

$$N^{-1}(0.999) = 3.09023$$

$$K = 0.2 \times N\left(\frac{-1.88079 + 0.3873 \times 3.09023}{0.92195}\right) - (0.006)$$

$$K = 0.2 \times N(-0.74185) - (0.006)$$

$$N(-0.74185) = 0.22909$$

$$K = 0.2 \times 0.22909 - (0.006)$$

$$K = .03982, \text{or approximately } 4\%$$

The capital charge, K, reflects the risk weight multiplied by the minimum capital requirement. Therefore, dividing the capital charge of approximately 4 percent by the minimum capital requirement of 8 percent produces a risk weight of about 50 percent.

Appendix II: Specification of the Simplified Supervisory Formula Approach

The Basel III-based final rule promulgated by the U.S. federal banking regulators specifies the following calculations and parameters for determining risk weights using the simplified supervisory formula approach:

$K_G =$ the weighted average capital charge for exposures underlying the securitization

$W =$ the proportion of the underlying exposures that are delinquent

$A =$ attachment point, the threshold at which credit losses will first be allocated to the exposure

$D =$ detachment point, the threshold at which credit losses allocated to the exposure would result in a total loss of principal

The starting point is calculating K_G for the exposures underlying the securitization exposure. For example, if the underlying exposures are residential mortgages that are not guaranteed by a U.S. government agency, they would have risk weights of 50 percent or 100 percent (depending on whether they meet certain criteria), which is multiplied by the minimum capital requirement of 8 percent. Assuming 90 percent of the mortgages have a 50 percent risk weight and 10 percent have a 100 percent risk weight because they are delinquent, K_G would equal 0.9 × 0.5 × 0.08 plus 0.1× 1.0 × 0.08, or 0.044.

Next, the following formula is used to calculate K_A, which is the augmented capital charge that reflects the observed credit quality of the underlying exposures:

$$K_A = (1 - W) \times K_G + (0.5 \times W)$$

To continue the example, substituting 0.1 for W (for the 10 percent of mortgages that are delinquent) and 0.044 for K_G, results in a value for K_A of 0.0896.

The next step is to compare K_A with parameters D and A. If parameter D for a securitization exposure is less than or equal to K_A (in other words, if the tranche is junior to K_A), the exposure must be assigned a risk weight of 1,250 percent (i.e., bank must hold “dollar for dollar” capital against that tranche). If D is 0.07, which is less than the value of K_A in the example just discussed, then the risk weight on the exposure is 1,250 percent.

However, if parameter A for a securitization exposure is greater than or equal to K_A (in other words, if the tranche is senior to K_A), the risk weight of the exposure, expressed as a percent, would equal the greater of K_{SSFA} × 1,250 percent and the supervisory floor of 20 percent. So if A is 0.10 (which is greater than 0.0896, the value of K_A in this example), then K_{SSFA} needs to be calculated. K_{SSFA} is the capital charge for the securitization exposure using the simplified supervisory formula approach. The following formulas and parameters are specified in the final rule:

$$K_{SSFA} = \frac{e^{au} - e^{al}}{a(u-l)}$$

$$e = 2.71828$$

$$a = \frac{-1}{p \times K_A}$$

$$u = D - K_A$$

$$l = \max(A - K_A, 0)$$

$p = 1.5$ for resecuritizations and 0.5 otherwise

In this example, the exposure does not contain any resecuritizations, so p (a supervisory calibration parameter) is 0.5. Assume A equals 0.10 and D equals 0.15 for this securitization exposure. Then:

$$a = \frac{-1}{0.5 \times 0.0896} = -22.3214$$

$$u = 0.15 - 0.0896 = 0.0604$$

$$l = \max(0.10 - 0.0896, 0) = .0104$$

And:

$$K_{SSFA} = \frac{2.71828^{(-22.3214 \times 0.0604)} - 2.71828^{(-22.3214 \times 0.0104)}}{-22.3214(0.0604 - 0.0104)} = 0.4777$$

Multiplying K_{SSFA} by 1,250 percent results in a risk weight of approximately 597 percent.

But if parameter A is less than K_A and D is greater than K_A (in other words, if the tranche straddles K_A), the applicable risk weight (RW) is the greater of the 20 percent supervisory floor and the weighted average of 1,250 percent and 1,250 percent × K_{SSFA} as determined according to the following:

$$RW = \left[\left(\frac{K_A - A}{D - A}\right) \times 1{,}250\%\right] + \left[\left(\frac{D - K_A}{D - A}\right) \times 1{,}250\% \times K_{SSFA}\right]$$

For the example discussed in this appendix, this would be the case if A equals 0.08 and D equals 0.12, with K_A still equal to 0.0896. Then:

$$a = \frac{-1}{0.5 \times 0.0896} = -22.3214$$

$$u = 0.12 - 0.0896 = 0.0304$$

$$l = \max(0.08 - 0.0896, 0) = 0$$

And:

$$K_{SSFA} = \frac{2.71828^{(-22.3214 \times 0.0304)} - 2.71828^{(-22.3214 \times 0)}}{-22.3214(0.0304 - 0)} = 0.726$$

Then, applying the formula for RW above results in a risk weight of about 989 percent:

$$RW = \left[\left(\frac{0.0896 - 0.08}{0.12 - 0.08}\right) \times 1{,}250\%\right] + \left[\left(\frac{0.12 - 0.0896}{0.12 - 0.08}\right) \times 1{,}250\% \times 0.726\right]$$
$$= 9.8919 \text{ or } 989\%$$

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Lawrance L. Evans, Jr., (202) 512-8678 or evansl@gao.gov

Staff Acknowledgments

In addition to the contact named above, Karen Tremba (Assistant Director), Don Brown (Analyst-in-Charge), M'Baye Diagne, Rachel DeMarcus, Marc Molino, Jennifer Schwartz, and Tyler Spunaugle made significant contributions to this report.