

This chapter tracks the rise and fall of securitization markets, and evaluates the various initiatives aimed at restarting them on a sounder footing, focusing on the markets for securities not backed by governments or government-sponsored enterprises. The analysis attempts to discern how securitization can positively contribute to financial stability and sustainable economic growth. While most of the current proposals are unambiguously positive for securitization markets and financial stability, some proposals—such as those designed to improve the alignment of securitizer and investor interests and accounting changes that will result in more securitized assets remaining on balance sheets—may be combined in ways that could halt, not restart, securitization, by inadvertently making it too costly for securitizers. While recent regulatory proposals are aimed in the right direction, a careful look at their interactions is warranted before they are finalized.

The opening chapter of this *Global Financial Stability Report* makes the case that restarting private-label securitization markets, especially in the United States, is critical to limiting the real sector fallout from the credit crisis amid financial sector deleveraging pressures (see Box 2.1).¹ Mobilizing illiquid assets and transferring credit risk away from the banking system to a more diversified set of holders continues to be an important objective of securitization, and the structuring technology in which different tranches are sold to various investors is meant to help to more finely tailor the distribution of risks and returns to potential end investors. However, this “originate-and-distribute” secu-

Note: This chapter was written by a team headed by John Kiff, and comprised of Andy Jobst, Michael Kisser, and Jodi Scarlata, with research support from Yoon Sook Kim.

¹Private-label securitization products comprise those not issued or backed by governments and their agencies, that is, excluding those of government-sponsored enterprises (e.g., Fannie Mae and Freddie Mac in the United States), and public sector entities (such as Canada Mortgage and Housing Corporation in Canada).

ritization model failed to adequately redistribute credit risks, in part due to misdirected incentives. Hence, it is important in restarting securitization to strike the right balance between allowing financial intermediaries to benefit from securitization and protecting the financial system from instability that may arise if the origination and monitoring of loans is not based on sound principles. Ultimately, the value of securitized products relies on the quality of underlying assets.

Meanwhile, with most of these markets effectively shut down, some central banks and governments have taken up the slack, with various asset purchase and liquidity support programs effectively becoming investors of last resort of securitized instruments. Smaller nonbank lenders have been particularly hard hit, as they do not have central bank support or low-cost deposit funding to fill the void left by the securitization market shutdown.

While central bank and government support alleviated private-label securitization market funding pressures, anecdotal evidence suggests that they may have also slowed the market's

Box 2.1. The Case for Restarting Securitization

Although recent public opinion has focused on what went wrong with securitization, it is important to recognize the many benefits associated with sound securitization.¹ Given the pivotal role of securitization as an alternative and flexible funding channel, failure to restart securitization would come at the cost of prolonging funding pressures on banks and a diminution of credit.

Current reservations about securitization do not invalidate its economic rationale, arguing instead for repairing the flaws exposed by the recent crisis. Securitization alleviates credit constraints and places asset exposures with entities that are more willing to accept and are able to manage them. Thus, issuers can mitigate disparities in the availability and cost of credit in primary lending markets while conserving capital by more efficiently dispersing risks. Besides improved access to funds, issuers benefit particularly from the market-based valuation of securitized assets, better asset-liability management (as cash flows from securitized credits can be perfectly matched to the repayment of investors until redemption), and the active man-

agement of securitized assets. Goswami, Jobst, and Long (2009) show that financial market deepening tends to increase the use of securitization, as the availability of reference assets increases in response to greater capital market maturity. Amid greater pervasiveness of securitization, liability constraints become less binding on bank balance sheets and asset growth, resulting in greater efficiency of loan origination. Furthermore, structuring allows end-investors to obtain a more efficient market portfolio and thereby better diversify their idiosyncratic risks.

Securitization has been a key funding source for consumer and mortgage lending in many mature market economies. Before the collapse of the securitization market, asset-backed securities and covered bonds provided between 20 and 60 percent of the funding for new residential mortgage loans originated in the United States, Western Europe, Japan, and Australia. As of end-June 2009, in the United States, nearly 19 percent of the outstanding stock of the more than \$18 trillion worth of real-estate-related loans and consumer credit was funded by private-label securitization. Private-label mortgage-backed securities issued by primary lenders amounted to 26 and 16 percent of all commercial and residential mortgage lending, respectively. Outside the United States, for the

Note: This box was prepared by Andy Jobst and Michael Kisser.

¹See Shin (2009) and the references therein for such post-mortems.

recovery by substituting for traditional buyers of securitization products.² U.S. authorities are experiencing some success with solutions that involve public-private-sector partnering (e.g., the U.S. Federal Reserve's Term Asset-Backed Securities Loan Facility – TALF).³ The U.K.

²Chapter 3 includes an overview of various crisis intervention measures and analyzes their effectiveness. See Panetta and others (2009) for an assessment of policy measures adopted in mature market countries during the financial crisis.

³Although the European Central Bank (ECB) has been offering long-term secured funding against a broader array of collateral (including many securitization products), unlike the U.S. TALF, which provides nonrecourse

Asset-Backed Securities Guarantee Scheme introduced in April 2009 has yet to be tapped. The Bank of England's and European Central Bank's (ECB) acceptance of asset-backed securities (ABS) and mortgage-backed securities (MBS) as collateral, and the ECB's recent covered bond purchase program, have provided support to those markets.⁴ At the same time, even these

funding, the ECB's funding is full-recourse funding that leaves users fully exposed to losses.

⁴Covered bonds differ from securitization products in that the risks associated with the underlying assets are retained by the issuer, whereas securitization transfers them to capital markets. See below for more details.

same period, more than \$1 trillion of assets were funded by securitization.

Securitization technologies have also been instrumental in supporting a stable supply of housing funding and consumer credit in many emerging market countries. Several governments have pursued and continue to pursue securitization as a way to fund agency programs aimed at overcoming credit constraints for housing and consumer finance. In particular, mortgage securitization has removed constraints on domestic fixed-income markets by accommodating a growing investor base, particularly pension and insurance fund investors with the need for long-term, highly-rated local currency bond investments priced to a more liquid yield curve.

There is little empirical research on the impact of securitization on the general economy. That said, Sabry and Okongwu (2009) demonstrate that in the U.S. context, securitization has increased the availability of credit and decreased its cost. More specifically, they show that a 10 percent increase in securitization activity implies a decrease of between 4 and 64 basis points on yield spreads, depending on the specific type of the loan. They also demonstrate that securitization increases the availability of credit per capita. Focusing on mortgage loans,

their results imply that a 10 percent increase in secondary market purchases (of loans) increases mortgage loans per capita by 6.43 percent for a given treasury rate of 4.5 percent. Given that securitization has had such a positive impact in the past on increasing the availability and lowering the cost of credit, and in light of the current constraints on lending capacity, restarting securitization could help get credit growth moving again.

While many incentive problems in securitization remain to be resolved, without the replacement of maturing securitized products, banks face a contraction of their funding sources, which may exacerbate already tight credit conditions. Alternatives to securitization, such as increased covered bond issuance,² are not an option for nondeposit-taking primary lenders because they do not have the capital base to retain the loans. At the same time, as banks continue to repair their balance sheets in the current environment, the absence of a risk transfer mechanism is likely to perpetuate deleveraging pressures rather than alleviate them.

²See Box 2.4 for a detailed description of the covered bond market and its different national variations. Figure 2.1 categorizes securitization into three main types, which include covered bonds, pass-through securities, and structured finance.

“successful” programs are creating dilemmas for central bank exit strategies, so authorities should strive to move private-label securitization toward a sounder footing.

This chapter starts by briefly reviewing recent market developments leading up to the peak activity levels of 2006, and then to the effective shutdown of much of the market in 2008 and 2009 in order to highlight some of the flaws that need to be addressed. It then evaluates the main initiatives for restarting private-label securitization markets. These assessments are made with a vision of a securitization market that reliably permits lenders to redistribute risk to others in

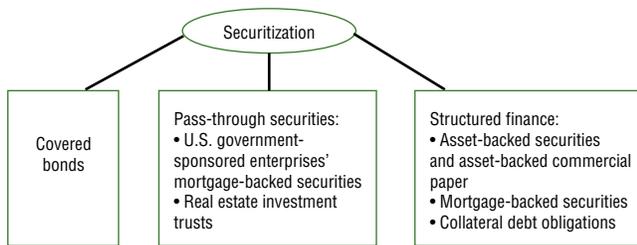
the economy without the undue use of leverage and complexity, removing the impetus to return to the “high octane” markets of 2005–07. This requires improving accounting, disclosure, and transparency requirements all along the intermediation chain, and reducing investors’ blind reliance on credit rating agencies.

Several initiatives aimed at providing securitizer incentives for diligent loan underwriting and monitoring are also examined. For example, proposals in the United States and Europe have been floated to force securitizers to retain some of their credit risk exposures so that they have more “skin in the game” to better align

their interests with investors. However, it will be shown that, as these proposals currently stand and possibly in conjunction with other measures, they may be so blunt that they will either be ineffective at providing incentives for better securitizer behavior, or alternatively may further slow the market recovery, effectively closing it under some configurations of portfolio characteristics and economic conditions.

The chapter concludes by comparing features of securitization with covered bonds, which have been providing cost-efficient capital markets-based funding in Europe for more than 200 years, examining whether their use should be more broadly encouraged. Because covered bond issuers retain full exposure to the credit risks associated with the underlying assets, rather than passing them on to investors, incentives between issuers and investors for screening and monitoring the underlying assets are aligned, which is frequently not the case in securitization. Yet, loan originators that can transfer the credit risk via securitization can use their capital more efficiently by securitizing loans on which their informational advantages are small relative to those they retain. In principle, this encourages more economic activity, potentially placing the economy on a higher growth path.

Figure 2.1. The Securitization Landscape



Note: Government-sponsored enterprises include Fannie Mae, Freddie Mac, and Ginnie Mae.

The Rise, Decline, and Fall of Securitization

Securitization is a process that involves repackaging portfolios of cash-flow-producing financial instruments into securities for transfer to third parties (Jobst, 2008a) (Figure 2.1).⁵ However, this chapter focuses mostly on structured finance techniques that entail dividing the cash flows into “tranches,” or slices. Tranche holders are paid in a specific order, starting with the “senior” tranches (least risky) working down

⁵Besides the funding purpose of securitization, in emerging market countries, it can also support local capital market development, facilitate investments in largely unexplored areas of economic activity, and expand the spectrum of financing options to fund housing and consumer credit outside the banking sector (Jobst, 2006).

through various levels to the “equity” tranche (most risky). If some of the expected cash flows are not forthcoming (e.g., some loans default), then, after any cash flow buffers are depleted, the payments to the equity tranche are reduced. If the equity tranche is depleted, then payments to the “mezzanine” tranche holders are reduced, and so on up to the senior tranches.

The amount of loss absorption (or “credit enhancement”) provided by the equity and mezzanine tranches is structured so that it should be very unlikely that the senior tranches do not receive their promised payments. For example, it had been thought that a credit enhancement of 20 percent (e.g., if the equity and mezzanine tranches comprise 20 percent of the MBS issue) would make it almost impossible to “break” a senior tranche of a subprime MBS. Although the individual loans were understood not to be of prime quality, they were supposed to be diversified enough to make it extremely unlikely that total losses would exceed 20 percent. However, this turned out not to be the case, as investors and rating agencies underestimated the riskiness and default correlations of the loans.

Securitization allowed banks to more actively manage their credit, funding, and liquidity risk, and leverage up their lending activity, because they were no longer required to warehouse the credit risk permanently. In addition, the demand for more tailored instruments, and the need for securitizers to sell the lower-rated “leftovers,” became important motivations during the years leading up to the market collapse. In the United States, private securitizers were at a competitive disadvantage next to the large government-sponsored enterprises, Freddie Mac and Fannie Mae, which were able to acquire standardized prime mortgages with low-cost funding to bundle into securities. All of this was fed by a glut of investable funds, and the search for higher-yielding, safe-rated, fixed-income investments. One of the reasons that securitization grew so quickly and became such a large market was the willingness of credit rating agencies to give their highest ratings (AAA or Aaa) to these senior tranches (see Box 2.2). Another

factor was the arbitraging of Basel I regulatory capital requirements, whereby capital adequacy risk weights were absent on securitized products that were held in off-balance-sheet entities (OBSEs).⁶ Even the contingent liquidity facilities that some OBSEs used as backup financing drew very low risk weights. Overcoming legal and other institutional frictions was yet another securitization driver.

As a result, global private-label securitization gross issuance soared from almost nothing in the early 1990s to peak at almost \$5 trillion in 2006 (Figure 2.2).⁷ Since then, volumes have dropped off sharply, particularly for collateralized debt obligations (CDOs) and CDOs backed by other securitization products (CDO²). Although it would appear that MBS issuance is holding up well, in fact, U.S. private-label MBS markets have collapsed almost completely (Figure 2.3). This collapse has been offset by surging European MBS issuance comprised almost solely of securities retained by issuers as collateral for central bank liquidity facilities (Figure 2.4). Similarly, the small amount of 2008 CDO² issuance is also related to these European “structure-to-repo” transactions. More recently, U.S. private-label MBS issuance has bounced back somewhat, although almost all of these relate to “Re-Remics,” which effectively resecuritize downgraded formerly AAA-rated senior securities into new AAA-rated securitization products (see Box 2.3).

The issuance of ABS not collateralized by real estate has remained fairly steady, more recently with the support of the U.S. Federal Reserve’s TALF (Figure 2.5). Although the volume of newly-originated TALF eligible securities has been modest, the program’s implementation has coincided with a significant narrowing of ABS credit spreads (Figure 2.6). Also, in general, although the performance of loans that underlie most ABS

⁶Off-balance-sheet entities will be used in the chapter as a general term that encompasses such terms as “variable-interest entities” and “special-purpose entities” that are more commonly found in accounting and banking.

⁷Private-label transactions exclude issuance of securities backed by the U.S. government-sponsored enterprises.

Box 2.2. Credit Rating Agency Regulatory Developments

Credit rating agencies (CRAs) have played a key role in the origins of the current crisis, prompting calls to rely less on self-regulation. Earlier efforts to regulate CRAs have typically focused on micro-prudential issues, such as reducing conflicts of interest and increasing transparency and competition. Hence, more recent moves by European and U.S. authorities to bring CRAs under more rigorous oversight are welcome developments.

Rating crises—unanticipated and abrupt credit rating downgrades—have occurred about once every three years over the past 22 years (Moody’s, 2008). However, the current crisis is striking in the sheer breadth and depth of the downgrades with respect to those on structured credit products and debt instruments issued by financial institutions. Also, thanks to a proliferation of ratings-based regulations and triggers, the impact of these downgrades spread quickly through the financial system with devastating effects.

Previous crises have led to calls for regulation of CRAs, but regulatory action has tended to be reactive and slow. For example, the *Credit Rating Agency Reform Act of 2006* ended a century of industry self-regulation and gave the U.S. Securities and Exchange Commission (SEC) limited oversight authority over CRAs. The act’s overriding purpose was to improve the quality of ratings for the protection of investors by fostering accountability, transparency, and competition in the credit rating industry through the establishment of a transparent and rational registration system and oversight regime for “nationally recognized statistical rating organizations” (NRSROs).

Prior to the crisis, the Committee of European Securities Regulators (CESR) was tasked with monitoring CRAs’ implementation of the 2004 International Organization of Securities Commissions (IOSCO) Code of Conduct Fundamentals for Credit Rating Agencies. The code set more than 60 high-level objectives for CRAs, regula-

tors, and market participants to (1) improve the quality and integrity of the rating process; (2) maintain CRA independence and avoid conflicts of interest; and (3) enhance CRA responsibilities to the investing public and issuers.¹

However, since 2007, both U.S. and European authorities have introduced new measures aimed at reforming CRA transparency and disclosure standards, and reducing potential conflicts of interest. Conflicts of interest are inherent in the rating business because the only parties likely to pay for credit ratings—whether issuers or investors—are parties directly interested in the outcomes.

The SEC now requires NRSROs to publish a description of their rating methodologies and procedures, plus certain rating performance analytics.² In addition, if the SEC’s current rule proposal is implemented, issuers will have to share with the other NRSROs all information they provide to any NRSRO with respect to structured credit product ratings. The European Union also will require CRAs to publicly disclose their methodologies, procedures, and assumptions, as well as information about potential conflicts of interest, including compensation policies.

The European authorities have now also taken a more hands-on approach to their CRA policies, requiring CRAs to register with and be supervised by national authorities, with coordination

¹The first set of rules adopted by the SEC in 2007 required CRAs to include certain rating performance statistics (e.g., historical downgrade and default rates within each major rating category). These rules were refined in 2009. In addition, CRAs now have to make publicly available, in machine-readable form on a six-month delay, rating action histories for a randomly selected 10 percent of issuer-paid ratings for each class of credit rating for which they have issued 500 or more issuer-paid ratings. Furthermore, all such data must be made publicly available on a 12-month lag.

²For example, the IOSCO Code of Conduct calls for CRAs to exclude rating analysts from fee discussions and to separate their analytic work from other activities that could present conflicts of interest.

Note: This box was prepared by John Kiff drawing on Sy (2009).

and oversight by the CESR. In a similar vein, the U.S. government has proposed legislation that will give the SEC more authority to oversee CRA activities and their governance structures.

In addition, the U.S. Treasury is proposing to force CRAs to rate structured credit products on differentiated rating scales. The IMF and other authorities have been calling for this for some time in order to alert rating users to potential rating downgrade “cliff effects.”³ Furthermore, the U.S. authorities will undertake a study of the appropriateness of relying on ratings for use in securities and banking regulations.⁴

The proposal also would require CRAs to disclose preliminary ratings to reduce “rating shopping” whereby an issuer solicits ratings from multiple CRAs but only pays for and discloses the highest rating(s).⁵ This, and other schemes

³When structured credit product downgrades do occur, they tend to be more severe than on traditional corporate and sovereign fixed-income instruments (IMF, 2008). European regulations now require that CRAs use a differentiated scale to highlight the differential risk characteristics, which the Treasury’s proposed legislation also calls for.

⁴In 2008, the SEC proposed the differentiated rating scale, and the removal of credit rating references in federal securities laws, but they were not included in the final adopted version of the rules.

⁵Fender and Kiff (2005) identified rating shopping based on methodological differences as a potential problem, and Morkötter and Westerfeld (2009) found strong evidence of rating shopping in the collateralized debt obligation market.

meant to identify under- and over-raters, may discourage rating shopping in the short run, but once a CRA has been identified as too conservative, issuers will likely shun it.⁶

Authorities should also continue to seek ways to measure and manage the impact of credit rating usage on financial markets (Sy, 2009). Not only is there the potential procyclicality of ratings, but rating triggers and thresholds, some of which are embedded in regulations, can generate channels for contagion.

Some commentators have called for the abolishment of the major rating agencies’ issuer-pay revenue model as a way of eliminating potential incentive conflicts. However, as pointed out in Zelmer (2007), an investor-pay model may result in lower-quality ratings and likely reduced revenues. Also, investor-pay revenue models are not immune to their own incentive issues, as many investors are incentivized by their overseers to seek out high-yielding, highly-rated securities. Furthermore, pushing for more competition in the rating agency business is not a panacea, since it could trigger a “race to the bottom” in rating standards.

⁶FitchRatings, Standard & Poor’s, and Moody’s agreed with the New York Attorney General to adopt a fee-for-service compensation structure for residential mortgage-backed securities under which they will be compensated for preliminary ratings regardless of whether the rating is ultimately selected.

(e.g., credit card receivables and auto loans and leases) is expected to deteriorate, investors still seem to be comfortable with these securities. This comfort level is largely due to their well-understood structures and performance dynamics, and the fact that issuers are seen to have substantial skin in the game.

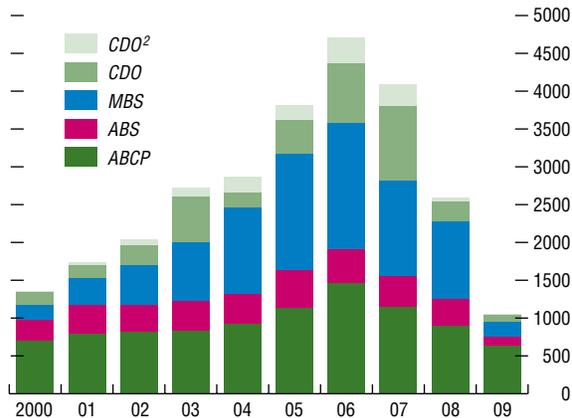
Outstanding asset-backed commercial paper (ABCP) continues to fade from its 2006 peak, but, in general, global ABCP markets have

been holding their own since returning to their roots—that is, issuance programs backed by granular pools of consumer and trade receivables.⁸ However, the banks that issue ABCP and/or provide credit enhancement and liquidity

⁸Until 2007, it was common for ABCP programs to boost their returns with securitization (and resecuritization) products. These programs have either collapsed or been phased out.

Figure 2.2. Global Private-Label Securitization Issuance by Type

(In billions of U.S. dollars)

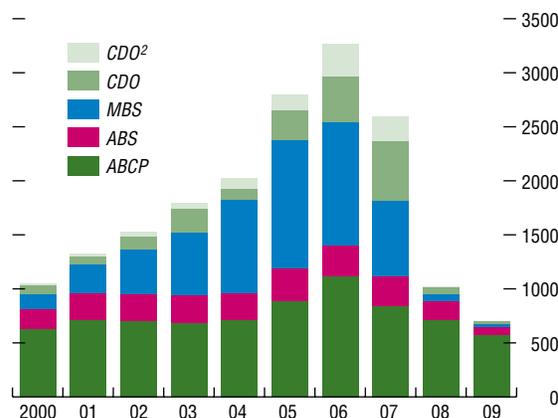


Sources: IMF staff estimates based on data from Dealogic; JPMorgan Chase & Co.; Board of Governors of the Federal Reserve System; Moody's; Mizuho Securities; DBRS; Standard & Poor's; European Securitization Forum; and *Inside Mortgage Finance*.

Note: ABCP = asset-backed commercial paper; ABS = asset-backed security; CDO = collateralized debt obligation; CDO² = CDOs backed by CDO, ABS, and MBS; MBS = mortgage-backed security. Data for 2009 cover only U.S. and European issuance through end-June. For European ABCP, 2009 data through end-May. ABCP data represent period-end outstandings.

Figure 2.3. U.S. Private-Label Securitization Issuance by Type

(In billions of U.S. dollars)



Sources: IMF staff estimates based on data from JPMorgan Chase & Co.; Board of Governors of the Federal Reserve System; and *Inside Mortgage Finance*.

Note: ABCP = asset-backed commercial paper; ABS = asset-backed security; CDO = collateralized debt obligation; CDO² = CDOs backed by CDO, ABS, and MBS; MBS = mortgage-backed security. Data for 2009 through end-June. ABCP data represent period-end outstandings.

support are reconsidering their operations in this market, in light of stringent Basel II capital requirements for these activities.

MBS issuance by the U.S. government-sponsored enterprises has also held up well, on the strength of the government guarantees (Figure 2.7). Furthermore, the more stringent quality-control requirements for the underlying loans have preserved the attractiveness of these structured credit securities to investors.

Private-label securitization volumes in non-U.S. and non-European markets have tapered off, albeit from already fairly low levels (Figure 2.8). Recent Australian issuance volumes are well off pre-crisis levels, and the Australian Office of Financial Management (the government's debt management agency) has become the dominant buyer. However, the Canadian ABCP market, like its European and U.S. counterparts, is still functioning well without a great deal of official sector support. Japanese securitization markets continue to trundle along at low levels (relative to the size of the economy), also with steady ABCP issuance at its core. Elsewhere, what little activity there was has dwindled to near zero.

Covered bonds are not securitization products in the purest sense, because lenders retain the default risk such that investors have recourse to both lenders and the underlying loans (see Box 2.4). Nevertheless, as mentioned earlier, they have provided European banks with cost-efficient funding for a long period of history, and later will be examined as a potential alternative to securitization. Yet, even these bonds have been severely tested during the current crisis, squeezed out by state-guaranteed bonds and investor concerns about covered-bond underlying mortgage collateral originated in countries suffering from housing market busts (Figures 2.9 and 2.10). The 100 percent risk retention of covered bonds did not save this market from the broader fears generated by other securitized products and questionable assets—regardless of retention levels. The value of the product ultimately depends on the quality of the underlying assets and, as the market recovers, the ability of

transparent performance reporting and valuation to ensure fair market pricing.

The Decline and Fall

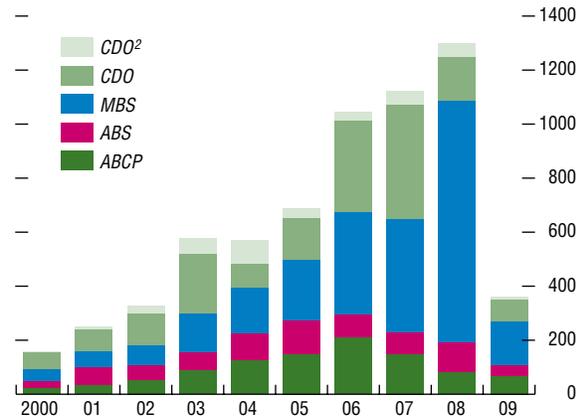
Prior to the crisis, securitization was almost universally hailed as a financial system stabilizer. It supposedly was a key part of a more efficient credit allocation process, dispersing credit risk to a broader and more diverse group of investors rather than concentrating it on bank balance sheets. Hence, the banking and overall financial system would be more resilient, mass bank failures would be a thing of the past, and credit cycles would be smoother. Despite this broad approval, authorities did express concerns about over-reliance on credit rating agencies, and the liquidity and opacity of these markets. For example, IMF (2006) warned that there “was a paucity of data available for public authorities to more quantitatively assess the degree of risk reduction among banks and to monitor where the credit risk had gone.”

Securitization Increased Risk Concentration and Interconnectedness

Indeed, it turned out that the degree of risk dispersion fell far short of ideal. Instead, banks themselves remained big holders of these risks, either directly or indirectly. For example, at their peak at end-2006, banks comprised about 51 percent of total financial institutions’ exposure to the subprime market.⁹ In some cases, they retained what they thought were the least risky (senior) tranches based on the performance of highly-diversified loan pools. In other cases, they bought securitization products originated by other banks. Banks also became indirectly exposed to the loans they securitized via their support of the ABCP conduits and structured investment vehicles (SIVs) to which the risks associated with the loans had been transferred. In the SIVs, banks held these

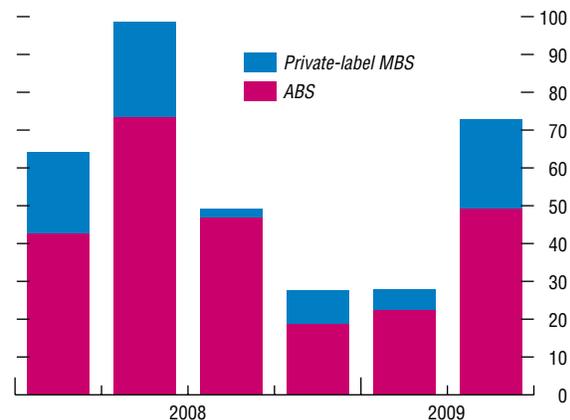
⁹Financial institutions included banks, hedge funds, insurance companies, finance companies, mutual funds, and pension funds (IMF, 2008).

Figure 2.4. European Private-Label Securitization Issuance by Type
(In billions of U.S. dollars)



Sources: IMF staff estimates based on data from European Securitization Forum; JPMorgan Chase & Co.; and Moody’s.
Note: ABCP = asset-backed commercial paper; ABS = asset-backed security; CDO = collateralized debt obligation; CDO² = CDOs backed by CDO, ABS, and MBS; MBS = mortgage-backed security. Data for 2009 through end-June. For ABCP, 2009 data through end-May. ABCP data represent period-end outstandings.

Figure 2.5. U.S. Asset-Backed Security (ABS) and Private-Label Mortgage-Backed Security (MBS) Issuance
(In billions of U.S. dollars)



Source: Inside Mortgage Finance.

Box 2.3. Re-Remics and the Revival of Resecuritization

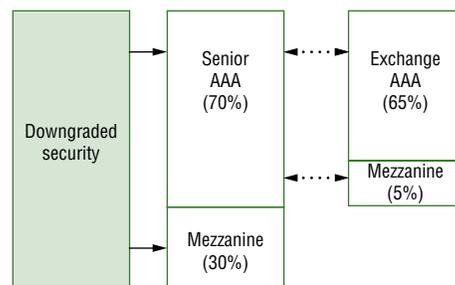
Re-Remics are being used to resecuritize senior private-label mortgage-backed security (MBS) tranches that have been downgraded from their initial AAA levels. In a typical Re-Remic, a downgraded tranche is subdivided into a new AAA-rated senior tranche and a lower-rated mezzanine tranche (see figure). About \$25 billion were issued during the first half of 2009, mostly against MBSs backed by prime mortgages. Given that most of the AAA private-label MBS tranches issued between 2005 and 2007 have been downgraded, the potential for this market to grow is substantial. However, although these transactions are playing a useful role in dealing with the overhang of legacy assets, they are partly driven by rating/regulatory arbitrage.

Re-Remic issuance is being driven by a number of factors, including the need to maintain the AAA ratings that many investors require to hold these securities. Maintaining AAA status can result in substantial capital requirement reductions. For example, the new Basel II risk weight on a BB-rated tranche is 350 percent under the standardized approach, whereas it is 40 percent on an AAA-rated resecuritization. Also, for banks and insurers, big rating downgrades can trigger “other-than-temporary-impairments,” which have to be recognized immediately through the income statement. These consequences can be avoided by replacing the downgraded securities with new AAA-rated Re-Remics. In the figure, the new AAA-rated senior tranche comprises 70 percent of the structure, with a mezzanine tranche that absorbs the first 30 percent of losses. Additional credit enhancement is provided by an option for the new senior tranche to be resubdivided into two “exchange classes” should it lose its AAA rating. Also, there is a hedge fund demand for the mezzanine tranches as a means to take a leveraged credit bet.

The holder of the senior tranche that was downgraded to BB could then hold the new AAA tranche, and sell the mezzanine tranche to an investor desiring distressed securities. Hence, only 30 percent of the original holding is sold at

Note: This box was prepared by John Kiff.

Typical Re-Remic Transaction Structure



distress prices, and the risk-weighted par value of the holding goes from 350 to 28 percent (70 percent of 40 percent). Even if the bank were to retain the mezzanine tranche, the risk-weighted par value could still be less than the original 350 percent.

For example, for single security-backed Re-Remics, the default probability-based rating methodologies used by DBRS, Fitch, and S&P will typically pass the underlying bond’s rating through to the new mezzanine tranche. Hence, in the example transaction, the total risk-weighted par value would decline from 350 to 223 percent (70 percent of 40 percent on the AAA-rated tranche plus 30 percent of 650 percent on the BB-rated tranche).¹ In this regard, it is notable that Moody’s has been virtually shut out of the Re-Remic rating business, possibly because it rates on the basis of expected loss, which is tougher on mezzanine tranches than the default probability basis (Fender and

¹The new risk weights would be even lower if they were calculated with the securitization exposure weights (20 and 350 percent, respectively, on the AAA and BB tranches), rather than the resecuritization exposure weights (40 and 650 percent). The Basel Committee has defined a resecuritization as a securitization where “at least one of the underlying exposures is a securitization exposure” (BCBS, 2009), but some market participants are hopeful that single-security repacks may not be considered resecuritizations (Mayer Brown, 2009).

Kiff, 2005), and thus issuers prefer not to have Moody's rate their potential securitization.²

²Another way of looking at the differential rating treatment is that under the expected loss rating basis, a weighted average of the ratings on the two new tranches cannot exceed the old rating, so it cannot create new AAA-rated and BB-rated tranches from a BB-rated legacy tranche. However, because the probability of default on the new mezzanine tranche is the same as that on the BB-rated legacy tranche, it also gets a BB rating.

Although Re-Remics and similar repackaging transactions are playing useful roles in dealing with the legacy asset overhang, they also serve to illustrate the vulnerability of ratings-based regulations to gaming and shopping. Also, these new securities remain exposed to further downgrades if economic and housing market conditions worsen. However, the information underpinning these securitizations and the methodologies applied to their ratings are likely more robust than before and thus pricing is likely to reflect risks more appropriately.

vehicles at arms' length and with little due diligence in some cases, under the assumption that risk was widely dispersed. However, it was not a formal retention policy but reputational concerns that caused these off-balance-sheet exposures to revert to the banks.¹⁰ Tranquil market conditions and low interest rates made it seem profitable and safe for these conduits and vehicles to fund their long-term assets in short-term wholesale money markets. However, when this funding source dried up, sponsoring banks had to step in with backup funding, often at high cost, to bridge the maturity mismatch.

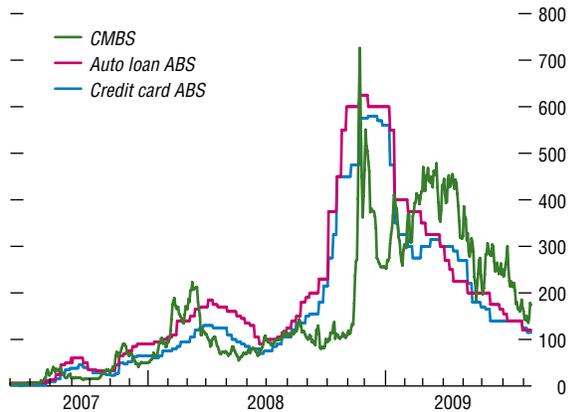
Securitization also led to a lengthening of intermediation chains that increased the complexity and interconnectedness of the financial system (Figure 2.11; and Shin, 2009), increasing the potential for disruptions to spread swiftly across markets and borders. The longer intermediation chain also gave rise to severe principal/agent problems (Ashcraft and Schuermann, 2008). As risks were passed along the chain, those best placed to maintain prudent loan underwriting and monitoring standards were more focused on fee maximization (Bhatia, 2007; Kiff and Mills, 2007). Also, incentive conflicts within the chain may be currently undermining distressed loan workout efforts.

For example, the management of delinquent securitized U.S. mortgages has been outsourced to third-party servicers whose incentives may not be perfectly aligned with the interests of all of the bondholders, possibly resulting in unnecessary foreclosures (Kiff and Klyuev, 2009).

Furthermore, many of the investors at the end of the chain failed to exercise appropriate due diligence, and relied too heavily on credit rating agencies for their risk assessments. Some of this over-reliance on credit ratings stemmed from the increasing complexity of the products, some of which was aimed at gaming credit rating models, and at finding investors for the harder-to-sell tranches. For example, ABS CDOs and CDO² were spawned by a need to bundle mezzanine tranches of other securitization products for which there were no natural buyers. Leveraged super-senior products used leverage to enhance the potential returns on CDO senior tranches that were trading at extraordinarily narrow spreads. In addition, some of this "economic catastrophe risk" was transferred to monoline insurers such as American International Group (AIG). Similarly, constant-proportion portfolio insurance products were developed for the CDO, ABS CDO, and CDO² equity tranches for which there were no natural buyers. Demand for these and other ingredients in the structured credit "alphabet soup" was facilitated by the

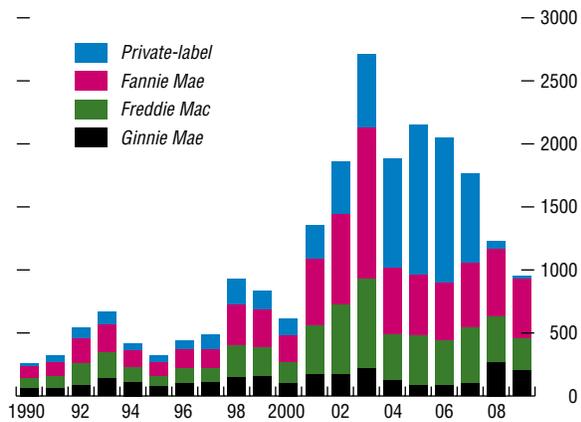
¹⁰ For further discussion, see IMF (2008).

Figure 2.6. Credit Spreads on U.S. AAA Securitization Instruments
(In basis points)



Sources: JPMorgan Chase & Co.; and Markit.
Note: ABS = asset-backed security; CMBS = commercial mortgage-backed security. Auto loans are three-year spread to swap curve; credit cards are five-year spread to swap curve; and CMBS is Markit CMBX NA-AAA-1 Index.

Figure 2.7. U.S. Government-Sponsored Enterprise versus Private-Label Mortgage-Backed Security Issuance
(In billions of U.S. dollars)



Source: *Inside Mortgage Finance*.
Note: Government-sponsored enterprises include Fannie Mae, Freddie Mac, and Ginnie Mae. Data for 2009 through end-June.

rating agencies' willingness to give them their highest ratings, and the outsourcing of appropriate due diligence by many end-investors. Most of these products existed only to generate fee income and are unlikely to return.

Credit Rating Agency Conflicts of Interest and Methodological Flaws

Rating agencies faced their own incentive conflicts, as an increasing share of their total income came from the narrow set of issuers that dominated the securitization business (CGFS, 2005).¹¹ The issuers figured out how to game the rating agency criteria, and were perceived to be receiving structuring advice from the rating agencies themselves. In any case, flawed methodologies and data inputs were often used to assign ratings, and the investors who relied on them did not always have access to sufficient information to question and assess them.

The methodologies and inputs used to rate nonprime residential MBS (and CDOs backed by MBS) were particularly flawed, overestimating the quality of the underlying loans and underestimating the correlation of their performance (see IMF, 2006, Boxes 2.2 to 2.4). As a result, most of the senior tranches of such products have either been downgraded, or are soon expected to be. The flaws were particularly evident in the rating of ABS CDOs. For example, Figure 2.12 shows that of all the ABS CDO tranches issued from 2005 to 2007 that were originally rated AAA, only 10 percent are still rated AAA by Standard & Poor's, and almost 60 percent are rated single-B or less, well below the BBB-investment-grade threshold.¹² This serves as an illustration of the long-known fact that, during credit downturns, structured credit ratings are more prone to

¹¹See Box 2.2 for a discussion of the conflicts of interest inherent in the major rating agencies' issuer-pay revenue models, and why an investor-pay model may be no better.

¹²Straight private-label residential mortgage-backed securities issued from 2005 to 2007 have not fared much better—63 percent of those rated AAA by S&P had been downgraded by August 7, 2009, 52 percent to BB and lower.

severe downgrades than ratings on corporates and sovereigns (IMF, 2008). Consequently, many investors were apparently shocked by the depth and breadth of these downgrades, as reflected in the extreme spread widening on top-rated securitization products (see Figure 2.6). Even though the rating agencies seemingly made it clear that credit ratings were meant to measure only default risk, and not market and liquidity risk, this point was apparently lost on many investors.

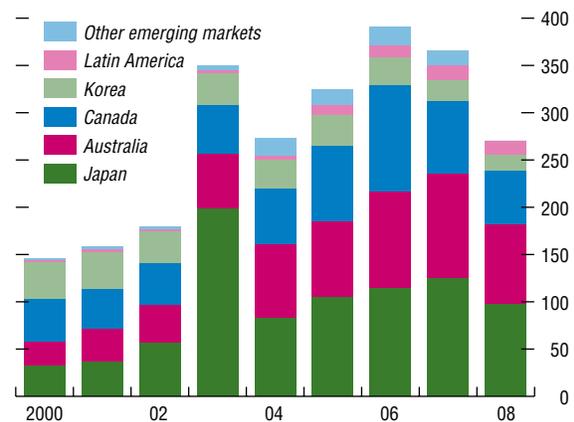
Accounting Standards Fell Behind Securitization Market Developments

Uncertainties regarding accounting rules for consolidation on balance sheet, financial statement disclosure, and the valuation of complex securitization products also played a role in the market collapse by creating doubts about counterparties' creditworthiness. Disclosure standards allowed institutions to be less than transparent about their exposures to securitization products. Furthermore, accounting rules allowed securitization risk exposures to be hidden from investors and regulators in OBSEs such as SIVs and ABCP conduits.¹³ While the rules required risk disclosures for on-balance-sheet financial instruments, the bespoke (tailor-made) nature of many securitized products and the total-balance-sheet-risk focus of accounting standards meant that much of the information on instrument-specific risk needed by investors was not disclosed. (Box 2.5 discusses the relevant accounting standards in more detail.)

Also, products held for trading purposes ("intended for sale before maturity") were subject to fair market valuation, but as markets became illiquid, valuations became difficult and nontransparent models were often used. The use of model-based valuations was viewed with suspicion by market participants, even when neces-

Figure 2.8. Non-U.S. and Non-European Private-Label Securitization Issuance

(In billions of U.S. dollars)



Sources: IMF staff estimates based on data from JPMorgan Chase & Co.; Merrill Lynch; Mizuho Securities; DBRS; Standard & Poor's; and Dealogic.

¹³Institutions could avoid on-balance-sheet consolidation by demonstrating that no one institution held the majority of the risks and rewards.

Box 2.4. Covered Bond Primer

On the heels of industry initiatives to revitalize the securitization market, covered bonds have come to the fore as alternative sources of capital market funding. Covered bonds are debt obligations that are secured by a dedicated reference (or “cover”) portfolio of assets. Issuers are fully liable for all interest and principal payments, so investors benefit from double protection against default, and rating agencies have given most covered bonds AAA/Aaa ratings. However, covered bonds do not allow the asset to move off the balance sheet of the issuer and thus do not provide any of the risk transfer benefits and regulatory capital relief normally associated with securitization.

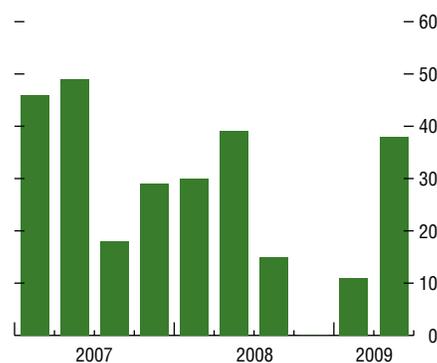
In Europe, covered bonds have long been the preferred method of capital market-based mortgage funding, with the German *Pfandbriefe* (“letter of pledge”) being the leading example (Jobst, 2008b). The creation of the single currency (euro) improved liquidity and gave the market added momentum, and covered mortgage bonds now constitute a \$3 trillion market (equivalent to around 40 percent of European GDP). Another important development was the enhanced liquidity brought to the market with the introduction of “jumbo” covered bonds in 1995.¹

The classic covered bond is a bond collateralized by a “cover pool” of loans that are legally ring-fenced on the issuer’s balance sheet. Bondholders have a priority claim on the collateral, and they rank at or above all the issuer’s other creditors. Because covered bonds are both obligations of the issuing lender and collateralized by the underlying cover portfolio, they are viewed as less risky than both. Hence, for example, rating agencies reward covered bonds

Note: This box was prepared by Andy Jobst, John Kiff, and Jodi Scarlata.

¹Jumbo covered bonds are typically large (at least €1,000 million outstanding) and meet certain minimum liquidity criteria (e.g., a minimum number of market makers have committed to quote continuous two-way prices).

Global Jumbo Covered Bond Issuance
(In billions of euros)



Sources: Barclays Capital; and Société Générale.

with a rating “uplift” beyond the stand-alone rating of the issuer.²

The vast majority of covered bonds are issued under “special law” frameworks that ensure that the dual recourse works properly, and that set uniform standards for product structures and cover pool credit quality.³ These include French *obligations foncières*, German *Pfandbriefe*, Danish *særligt dækkede realkreditobligationer*, and Spanish *cédulas*. However, banks in countries that do not have special covered bond laws have been issuing “structured” covered bonds in which all of the terms and conditions are defined in the issue-specific legal documentation.

In fact, some structured covered bonds diverge from the classic on-balance-sheet model and use securitization technology to achieve the same economic effect. For example, Bank of America’s and Washington Mutual’s recent covered bond issues were actually issued by securitization vehicles that hold mortgage-backed securities issued by the

²As an example of the covered bond rating uplift, FitchRatings has assigned an A- rating to Germany’s Aareal Bank AG, but its mortgage-backed covered bonds get an AAA rating.

³More than 90 percent of currently outstanding covered bonds were issued under special law frameworks (ECBC, 2008).

banks. Also, Kookmin Bank recently issued structured covered bonds that achieved dual recourse via a guarantee from a securitization vehicle into which the cover pool loans had been transferred.⁴

As a result of dual recourse, covered bond spreads historically have been little affected by deteriorating issuer creditworthiness or cover pool credit quality. Even through most of the current crisis until September 2008, covered bond credit spreads, particularly on those issued under special law frameworks, had remained relatively narrow (see Figure 2.10). The same cannot be said of structured covered bonds.⁵

However, spread widening since September 2008 suggests that covered bonds are not immune to the troubles of their issuing banks and the underlying collateral (especially in countries suffering housing busts). In addition, covered bond AAA ratings may be vulnerable to downgrades as rating agencies tighten their liquidity risk management criteria. In particular, the rating agencies are focusing on the impact of issuer default on timely payment of

⁴The European Covered Bond Council's covered bond comparative framework database (available at www.ecbc.eu) describes the key features of different covered bond frameworks across Europe.

⁵The underperforming U.K. structured covered bonds would be those issued prior to the introduction of special law in the United Kingdom in 2008.

principal, given that the underlying loans typically mature later than the bonds.

The primary market for jumbo issues also languished from September 2008 to March 2009, as state-guaranteed bank bonds, which are eligible for a zero risk weight under Basel II and the European Capital Requirements Directive, may have been crowding out new issuance.⁶ Nevertheless, the issuance of non-jumbo and privately-placed covered bonds held in quite well, as they found their place as niche products between government-guaranteed and nongovernment-guaranteed senior unsecured bank debt.⁷ In addition, the European Central Bank's (ECB) €60 billion covered bond purchase program (announced in May 2009) has been helpful, as new European issuance has perked up and spreads narrowed (see Figure 2.10 in the main text for spreads and the figure in this box for monthly issuance).⁸

⁶However, even when jumbo primary markets have been languishing, private placement transactions have continued to get done in fairly substantial volumes.

⁷Some investors also remained attracted to private-placement covered bonds because they are not required to be marked-to-market as are typically jumbo bonds.

⁸The ECB will buy €60 billion euro-denominated covered bonds from July 2009 to June 2010. The bonds must be issued by a euro-area incorporated issuer (which would exclude Canadian, Danish, Norwegian, Swedish, and U.S. bonds), and be governed by the laws of a euro area member state (effectively excluding U.K. covered bonds).

sary, because market prices and valuation inputs were unavailable or not considered reliable.¹⁴

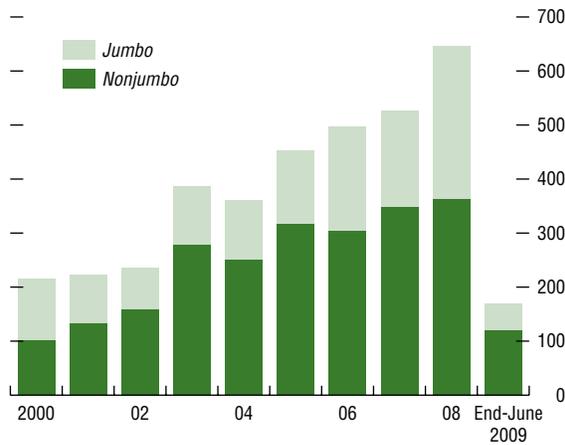
¹⁴When observable market prices are unavailable for the valuation date, valuations are based on prices on nearby dates, or the use of arbitrage-type valuation models that use the observable prices of other financial instruments. If such valuation inputs are unavailable, valuations can be based on theoretical valuation models that use as inputs various relevant fundamental parameters (IMF, 2008).

Flawed Prudential Regulation

Opportunities for regulatory arbitrage in the Basel I framework were thought to be one of the drivers of securitization, and Basel II addresses many of these gaps.¹⁵ Nevertheless, the financial crisis exposed shortcomings in the Basel II framework in regulation, enforcement, and disclosure. Earlier assumptions of

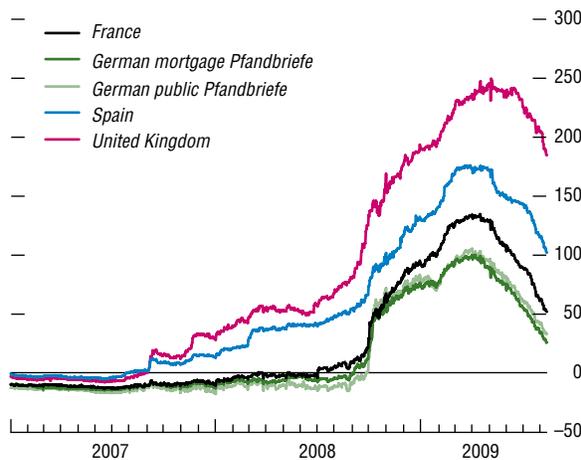
¹⁵See IMF (2008) for additional background discussion.

Figure 2.9. Global Covered Bond Issuance
(In billions of euros)



Sources: European Covered Bond Council; European Securitization Forum; Barclays Capital; Société Générale; and Dealogic.

Figure 2.10. Selected Covered Bond Spreads
(In basis points)



Sources: iBoxx; and Deutsche Bank.

the risks—credit, liquidity, and counterparty—did not fully account for the complexity of the structured products and the interconnectedness of risks that developed. By hiving off sufficient credit risk, securitized products could be moved off the balance sheet of the originator. This was exacerbated by the fact that some of these entities exposed the originators to continuing contingent credit and funding risks, both explicit and implicit, that remained undisclosed to regulators and investors.

Breakdown of the U.S. Subprime Mortgage Market Triggered the Collapse

All of this pushed the financial system and private-label securitization markets toward the cliff edge, and the breakdown of the U.S. nonprime mortgage market provided the tipping point. Strong growth of highly-leveraged nonprime lending was driven by a combination of low interest rates and rapidly rising house prices. The rising home prices masked the plummeting lending standards, since the overstretched borrowers found it easy to refinance or sell the house at a profit.

As the impact of rising interest rates kicked in and house prices flattened, stretched borrowers were left with no choice but to default as prepayment and refinancing options were not feasible with little or no housing equity. As defaults mounted, the feedback loop that had amplified home price growth dragged prices down, which in turn made it impossible for many overstretched borrowers to refinance to avoid default.

Since the vast majority of these troubled mortgages had been securitized, the impact of the rising tide of foreclosures quickly spread to the broader financial markets. The impact on securitization markets was amplified by the effect of the aforementioned interconnectedness and poor risk management practices of major financial institutions. In particular, investors, and the rating agencies they had come to overly rely on, paid a heavy price for their underestimation of the risks and poor understanding of the impact of the valuation of the increasingly complex structures.

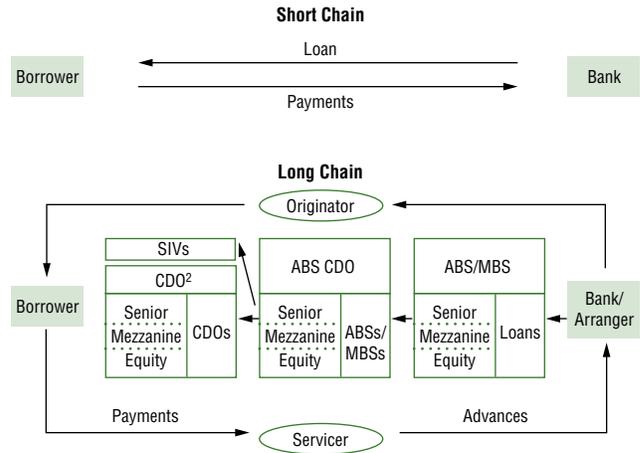
Policy Initiatives Aimed at Restarting Sustainable Securitization

A number of policy initiatives have been proposed that are designed to restart private-label securitization on a sounder footing. In this regard, it is important to ensure that there is less reliance on the use of highly-leveraged and term-mismatched funding structures so that the high-octane type of securitization does not return. In fact, if incentive problems are adequately addressed, some types of securitized products (e.g., CDO²) will not and should not reemerge. Hence, it is essential to get “real money” investors (insurance companies, mutual funds, and pension funds) back into private-label securitization markets to establish a broader and more stable investor base to support credit risk transfer outside the banking sector. But, it will also be important to ensure that such investors reenter these markets on a sounder footing—for example, with better access to essential information and less reliance on rating agencies. Hence, the vision for revamped securitization will require better incentive alignments all along the intermediation chain.

However, it would clearly help restart primary (new issuance) markets if some of the impaired “legacy securities” could be cleared away, as they require additional supportive capital and funding. In that regard, programs such as the U.S. Federal Reserve’s Legacy TALF and the U.S. government’s Public-Private Investment Program (PPIP) should be helpful by offering combinations of leveraged funding and (effective) guarantees on legacy asset purchases. There are also private sector solutions such as the previously mentioned Re-Remics.

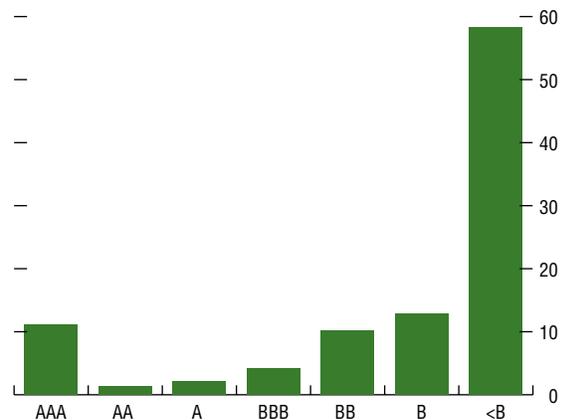
On the other hand, the use of leveraged funding techniques in public sector programs seems to fly in the face of the idea of building toward a more robust market with more long-term institutional investors. Nevertheless, their use may be necessary to repackage legacy assets and temporarily sustain funding, particularly for nonbank

Figure 2.11. Illustrative Intermediation Chain



Note: ABS = asset-backed security; CDO = collateralized debt obligation; CDO² = collateralized debt obligation-squared; MBS = mortgage-backed security; SIV = structured investment vehicle.

Figure 2.12. Where Did All the AAAs Go? (In percent, as of June 30, 2009)



Source: Standard & Poor’s.
Note: S&P rating distribution of 2005–07 issued U.S. AAA-rated asset-backed security collateralized debt obligations.

Box 2.5. Accounting for Securitization Exposures

This box discusses two accounting issues relevant to securitization—derecognition and consolidation. Recent and prospective accounting changes within International Financial Reporting Standards (IFRS) and U.S. Generally Accepted Accounting Principles (GAAP) strengthen the separation of off-balance-sheet entities and make it more difficult to move securitized products off balance sheet, but the impact on future securitizations is, as yet, unclear.

Fundamental to securitization growth were the incentives in accounting standards that enabled originators to hive off the risks and rewards, and distance themselves from the control associated with these financial products, thereby moving them off balance sheet and undisclosed to regulators and investors. Two interrelated elements were the derecognition criteria for financial assets and the requirements for consolidation of financial entities, both of which have come under the scrutiny of accounting standard setters.^{1,2}

Derecognition

Both major accounting bodies are reconsidering their derecognition standards with the objective of tightening the criteria for moving securitizations off balance sheet. The International Accounting Standards Board (IASB) is reviewing its derecognition criteria both because of the difficulty of determining derecognition for increasingly complex structured products, and to better enable users of financial statements to understand the risks related to off-balance-sheet assets. The current proposal, *Exposure Draft: Derecognition*, calls for reducing the number of derecognition criteria—namely, risks and rewards, control, and continuing involve-

ment—to a simpler, single approach based on control, supplemented by enhanced disclosures for both transferred assets and those that remain on balance sheet.³ Likewise, the U.S. Financial Accounting Standards Board (FASB) undertook a similar reassessment in Financial Accounting Standard (FAS) 166, *Accounting for Transfers of Financial Assets*, addressing concerns that many derecognized financial assets should actually remain on balance sheet.⁴

Consolidation

With an intent similar to derecognition, changes to U.S. GAAP and proposals for IFRS provide enhanced guidance on the consolidation of entities on balance sheet. Consolidation of off-balance-sheet entities received particular attention in 2007 as major international financial institutions were forced—for both reputational and regulatory reasons—to consolidate on balance sheet various structured investment vehicles and commercial paper conduits requiring support.⁵ FAS 167, *Amendments to FASB Interpretation No. 46(R) Consolidation of Variable Interest Entities*, addresses whether an originator has a controlling financial interest in a variable interest entity (VIE) and must be held on balance sheet, where the criteria are, broadly—the ability to control the VIE, and to receive risks and rewards.⁶ Similarly, IASB's *Exposure Draft (10): Consolidation* modifies consolidation criteria to one of control, but subsumes that risk and reward are intrinsic to the criteria for

Note: This box was prepared by Jodi Scarlata.

¹Derecognition of a financial asset or liability is ceasing to recognize that asset or liability in an entity's financial statement of financial position (IASB, 2009b).

²Consolidation is assessed at the entity level and a reporting entity prepares a financial statement that "consolidates the assets, liabilities, equity, income, expenses and cash flows with those of the entities that it controls (i.e., its subsidiaries)" (IASB, 2009a).

³First, it must be shown that contractual rights have been transferred or the rights to the cash flow have expired. Second, the derecognizing entity has to prove that there is no continuing involvement in the asset portfolio, or third, that the entity transferring the asset retains a continuing involvement in it, but the buyer of the financial asset has the practical ability to transfer assets for its own benefit (IASB, 2009b).

⁴FAS 166 eliminates the concept of a qualified special-purpose entity, which has permitted U.S. securitizations to be housed in off-balance-sheet entities, and could move many securitizations on balance sheet.

⁵See IMF (2008) for additional discussion.

⁶If an enterprise has a controlling interest in a VIE, then the entity must be consolidated (FASB, 2009).

control.⁷ Thus, the FASB's changes to consolidation bring it more in line with those of the IASB.

Effects of Standards Changes

An important modification to *Interpretation 46(R)* is that the determination of control and risks and rewards is no longer a quantitative standard, but a qualitative evaluation by the reporting enterprise. The elimination of a quantitative rule might seem a step backward in loss of clarity. However, a quantitative standard makes it easier to structure a securitization such that it does not formally violate accounting standards and can be moved off balance sheet, evading the standard's intent.

Conversely, the decision of whether or not to securitize—its profitability, accounting legality, and regulatory retention requirements—becomes more difficult with qualitative criteria. Originators will spend more time in structuring a securitization—making it costlier to the originator and eventually the investor—but also hopefully ensuring that greater care is taken in assessing potential explicit and implicit risk exposures of the securitization. For auditors and regulators, a qualitative standard can strengthen their hand by permitting judgment and experience in determining whether these criteria have been satisfied, but may also make it more difficult for them to dispute securitizers' activities.

Overall, these standards attempt to enhance the criteria for keeping risk exposures on the balance

sheet. The U.S. Federal Reserve's Supervisory Capital Assessment Program estimated that the consolidation on balance sheet resulting from FAS 166 and 167 would increase risk-weighted assets by about \$700 billion for the top 19 U.S. financial institutions, or about 9 percent of total risk-weighted assets for these banks (FitchRatings, 2009). In isolation, these changes should also strengthen the bankruptcy remoteness of remaining off-balance-sheet entities. However, when tighter criteria for moving assets off balance sheet are combined with proposed regulatory retention requirements, it may make achieving bankruptcy remoteness more difficult. Nevertheless, this transfer on balance sheet could effectively result in more "skin in the game" and more closely align originators' and investors' interests.

Potential Loopholes

There may yet be opportunities for maneuver. For example, FAS 167 pertains only to VIEs—a U.S. vehicle—while the IASB's ED (10) would apply to all entities. If under U.S. GAAP an originator can share control among multiple parties—without a single controlling interest—then a securitization can be structured among various parties, none of whom has a controlling interest and therefore does not have the product on balance sheet. While the intent for consolidation under the two standards is similar, divergences in the application may introduce opportunities for regulatory arbitrage and adverse incentives for origination.

Although these accounting changes move in the right direction, it is uncertain if they will introduce sufficient incentives to provide a sound basis for securitizations while also ensuring they do not eliminate the legitimate use of such vehicles.

⁷Specifically, "a reporting entity controls another entity when the reporting entity has the power to direct the activities of that other entity to generate returns for the reporting entity" (IASB Foundation, 2009).

lenders that depend on securitization markets, until the more robust markets can be achieved. In addition, although the volume of business done through the TALF has been light, it seems to have calmed markets and tightened credit spreads on U.S. ABSs (see Figure 2.6).

Reforms for a More Robust Securitization Market

Even before the crisis, the IMF and other authorities had been calling for a number of the securitization market reforms that are now in the process of being implemented. Table 2.1 provides a summary of these and other recent policy

Table 2.1. Securitization Policy Progress Report

Issue	Status
Credit rating agencies	
Incentive conflicts	All major agencies compliant with internal governance controls called for in the IOSCO Code of Conduct.
Rating over-reliance/shopping	Agencies agree with New York State Attorney General to implement a fee-for-service revenue model for residential mortgage-backed securities. U.S. government calling for publication of preliminary ratings.
Transparency and disclosure	European and U.S. legislation to force rating agencies to disclose rating performance metrics, and differentiate their structured credit ratings. U.S. Securities and Exchange Commission to require rating agencies to make available details behind rating actions in machine-readable form.
Rating differentiation	
Disclosure and transparency	
At transaction level	American Securitization Forum (Project RESTART) working on introducing enhanced transaction reporting (loan pool composition and ongoing performance detail).
Accounting standards	Accounting standards to require improved disclosure of off-balance-sheet entities and tighten requirements for moving assets off balance sheet.
Regulations	
Capital requirements	Basel II amendments to increase capital requirements where necessary, and to minimize loophole gaming and incentives for regulatory arbitrage.
Compensation policy	FASB ends gain-on-sale accounting for certain securitizations, eliminating upfront revenue recognition.
Securitizer incentives	European Parliament and U.S. government call for securitizer risk retention, and accounting standards make it harder to remove assets from securitizer balance sheets.
Product standardization	No progress on product standardization, although the American Securitization Forum is working on legal documentation standardization.

recommendations and the progress made toward meeting them. Some of them will be described below, and the next subsection will focus on efforts to improve the alignment of securitizer and investor interests (“skin in the game”).

Credit Rating Agency Reforms

Investor over-reliance on credit ratings for securitizations and other structured credit products has been long recognized as undesirable, although by embedding ratings in various regulations some authorities have inadvertently encouraged their overuse. However, it seems inevitable that credit rating agencies will continue to play a key role in these markets, so most of the authorities’ actions to date have been designed to encourage rating agencies to continue to tighten internal governance and improve their transparency and disclosure standards (see Box 2.2). European regulations will also require rating agencies to differentiate their securitization product ratings from those on regular corporate and sovereign debt. The U.S. Treasury is also advocat-

ing differential rating scales in its *Financial Regulatory Reform* white paper released in August 2009. Further requirements have also been introduced regarding the publication of rating performance metrics to facilitate cross-product and cross-rating comparisons.

However, it has to be admitted that poor investor due diligence cannot all be blamed on a lack of necessary information. In most cases, buyers of U.S. private-label MBS could access detailed underlying loan-level information from services such as LoanPerformance (www.loan-performance.com) and Intex Solutions (www.intex.com). Going forward, industry initiatives such as the American Securitization Forum (ASF) Project RESTART may go even further toward making the data more widely available in standardized machine-readable formats, and more reliable through tighter pre-origination due diligence and quality assurance processes, if industry participants adhere to the voluntary standards. In addition, the International Organization of Securities Commissions has introduced

strict new due diligence guidelines for institutional investment managers.

These initiatives are all moving in the right direction, but work remains to reduce the reliance on credit ratings by the authorities, especially with some forces moving in the opposite direction. For example, the longstanding use of credit ratings to screen eligible collateral for various central bank liquidity backstop facilities is viewed as encouraging “rating shopping.”¹⁶ Regulations relating to pension fund holdings, for example, typically restrict fixed-income investments to those with investment-grade ratings (i.e., BBB- and higher). That said, the recent U.S. government proposal asks all U.S. regulators to report where ratings are embedded in their regulation with an objective to remove them.

Furthermore, although the differentiation of structured credit ratings is welcome, the ratings remain based on one-dimensional metrics (default probabilities or expected losses) that fail to capture all of the risk dimensions peculiar to tranching products (IMF, 2008). Exploitation of this particular aspect of the methodologies may have played a role in Moody’s being “shopped out” of the Re-Remic rating market by DBRS, Fitch, and S&P (see Box 2.3).

Improved Disclosure and Transparency Standards

Standard prescriptions for fixing securitization markets include improving disclosure and transparency standards so that all participants along the intermediation chain can exercise appropriate due diligence. Improving disclosure standards and making detailed information about the assets underlying structured finance products publicly available also could help reduce rating shopping by making it possible

¹⁶Rating shopping involves securitizer selection (i.e., “cherry picking”) of the rating agencies that will assign the highest rating to their particular issues or tranches. It has been identified as a potential problem as far back as 2002 (see Peretyatkin and Perraudin, 2002), but it has been difficult to prove that it was actually happening. However, evidence is accumulating that rating shopping was rampant during the period leading up to the crisis (see Benmelech and Dlugosz, 2009).

for entities other than the credit rating agency hired by the originator to develop and disseminate opinions about the securities. Authorities are introducing legislation that will incentivize securitizers to disclose more information on the underlying portfolios, and on securitizer compensation and risk retention.¹⁷ In addition, industry bodies, such as the ASF and the European Securitization Forum, are leading initiatives that will broaden data availability and standardize data delivery formats.¹⁸ Authorities are also applying moral suasion on securitizers to simplify and standardize securitization products to facilitate risk assessments and valuations.

While the standard setters and financial regulators have long provided supplementary guidance for accounting for financial instruments, this activity surged following the onset of the crisis. An increasing amount of guidance has been produced on the standards for off-balance-sheet treatment of financial assets (“consolidation” and “derecognition”), as well as on the disclosure of the methods used for the valuation of complex financial products. Much of the work has proceeded distinctly in the separate standards of the International Accounting Standards Board and the U.S. Financial Accounting Standards Board (FASB), but the two standard setters have tried to ensure consistent approaches, as over the

¹⁷IOSCO has made a number of recommendations for a regulatory response to the issues raised in the securitization and the CDS markets, including enhanced due diligence and disclosure standards, standardized products to the extent possible, and clearing through a central counterparty (IOSCO, 2009a). It has also issued a report detailing recommendations for enhanced disclosure standards for listed ABS (IOSCO, 2009b).

¹⁸The ASF’s Residential Securitization Transparency and Reporting Project (“Project RESTART”) is initially focusing on developing pool- and loan-level standardized RMBS disclosure packages, after which it aims to standardize the various legal contracts that set out the responsibilities along the intermediation chain. In these efforts, the ASF has been joined by the European Securitization Forum and the Australian Securitization Forum under the umbrella of the Global Joint Initiative to Restore Confidence in Securitization Markets. The Japan Securities Dealers Association is leading a similar effort. However, it seems that these other efforts are not as advanced as those in the United States.

Box 2.6. Basel II Securitization- and Resecuritization-Related Enhancements

This box discusses enhancements to Basel II risk weights and credit conversion factors attached to securitizations and resecuritizations that are intended to better reflect the associated risks of these products.¹ However, the interaction of these changes with new accounting standards and proposed retention regimes makes their impact on securitizations uncertain.

Resecuritizations

Risk weights for resecuritization exposures are now significantly increased for both the standardized approach and the internal-ratings based approach.² Resecuritizations under the standard-

Note: This box was prepared by Jodi Scarlata.

¹While there are other revisions to Basel II, this box focuses on the July 2009 BCBS enhancements (BCBS, 2009).

²A resecuritization is defined as “a securitization exposure in which the risk associated with an underlying pool of exposures is tranching and at least one of the underlying exposures is a securitization exposure. In addition, an exposure to one or more resecuritization exposures is a resecuritization exposure” (BCBS, 2009). This would capture collateralized debt obligations of asset-backed securities (ABS), a securitization with a single underlying ABS, or a liquidity facility to an asset-backed commercial paper program containing a securitization exposure, for example.

ized approach, for example, are now double that of securitization exposures, having increased to 40 percent for the highest ratings (AAA to AA-) relative to 20 percent for securitizations. Thus, many of the structured financial products prevalent before the crisis will now be substantially more expensive to hold on balance sheet in terms of regulatory capital, and these considerations will need to be factored into an originator’s retention decisions, especially in light of the new potential minimum retention requirements (5 percent of par value or higher). Further, any resecuritization exposure containing an underlying resecuritization would be precluded from qualifying as a senior resecuritization and thus benefiting from a lower risk weight. The tighter capital charges may open the door for more of the origination of securitized and resecuritized products to move to nonregulated entities outside supervisory oversight, such as hedge funds.

Ratings Based on Self-Guarantees

The Basel Committee’s regulation to disallow a bank from recognizing external credit ratings when those ratings are based on guarantees or support provided by the bank itself will also have an impact on securitization. For

medium run a unified international accounting standard remains the goal. Consequently, the objective has been twofold: to introduce the necessary enhancements to accounting standards as rapidly as is feasible, while concurrently aiming for the eventual adoption of a single standard.

Realigning Regulatory Capital Requirements

The Basel Committee on Banking Supervision (BCBS) has responded to shortcomings in the Basel II framework with various enhancements (see Box 2.6).¹⁹ These changes have

multiple goals and aim to better reflect the risks of securitized and resecuritized products by increasing the risk weights attached to these exposures as necessary, and to eliminate opportunities for regulatory arbitrage across the trading and banking books between liquidity facilities with short- versus long-term maturities, and across on- and off-balance-sheet entities. Moreover, the BCBS has not only addressed shortcomings in Pillar I standards, but also observed weaknesses in public disclosure in order to provide a more accurate representation of risk exposures. Revisions to Pillar 3 aim to enhance market discipline across all aspects of securitization—exposures in the trading book, off-balance-sheet entities, liquid-

¹⁹This discussion focuses on BCBS (2009), which has particular relevance to securitization and resecuritizations.

example, if a bank has purchased asset-backed commercial paper (ABCP) from a liquidity facility that it itself supports (and on whose support its rating depends), then the bank must treat the ABCP as if it were not rated. This change in treatment eliminates a circularity in the securitization process whereby the originator benefits from its relationship with its own liquidity facility and liquidity risk is not spread but is, paradoxically, dependent again on the originator. The revision thus addresses concerns about adverse incentives between originators and the guarantees they provide. Further, “a bank’s capital requirement for such exposures held in the trading book can be no less than the amount required under the banking book treatment.”³ While this removes an incentive to operate through the trading book and hold less capital against securitizations, comparable treatment between the banking and trading book may reduce the incentive to use the trading book where assets can be bought and sold more easily, potentially resulting in less liquid markets.

³BCBS (2009, page 4, paragraph 565 (g) (ii)).

Liquidity Facilities

Similarly, under the standardized approach, higher credit conversion factors (CCF) will also be associated with eligible liquidity facilities attached to securitizations.⁴ Specifically, there will be no distinction between short- and long-term liquidity facilities, as there had been before, and liquidity facilities will have a 50 percent CCF regardless of maturity. Externally-rated facilities will receive a 100 percent credit conversion factor, and the preferential treatment formerly given to liquidity facilities accessed only for general market disruption has been eliminated. All in all, liquidity facilities will be more costly and complex to manage, but should be more transparently reflected in an originator’s risk management decisions.

Going forward, these enhancements should improve the incentives for originators of securitizations to appropriately account for the funding risks associated with the on- and off-balance-sheet risk exposures.

⁴To determine capital requirements for off-balance-sheet exposures, a bank must first apply a credit conversion factor to the exposure, and then risk weight the resulting credit equivalent amount (BCBS, 2006, paragraph 567).

ity facilities, and resecuritizations. All in all, these changes aim to minimize Basel II loopholes and eliminate incentives for regulatory arbitrage. However, while eliminating adverse incentives is desirable in order to mitigate problems with the old securitization business model, the new regulatory structure may make some securitizations too costly.

Basing Compensation on Long-Term Performance

Compensation systems based on immediately measurable accounting results also played a role in creating the conditions that led to the crisis. Accounting standards that eliminate the upfront recognition of income from securitizations—and thereby the immediate impact on compensa-

tion—could significantly alter compensation schemes, as remuneration will remain tied to the future performance of the securitization. Introducing a longer-term perspective on structuring securitizations should force originators to better account for the risk-return trade-off of the instrument and provide incentives for better underwriting standards. The commissions of those involved at the inception of the securitization, and who would otherwise no longer be engaged after creation, could be disbursed over time in accordance with product performance.

A welcome development in this regard is the FASB’s elimination of the gain on sale accounting treatment that had added to the profitability of certain securitizations. Formerly, U.S. Gener-

ally Accepted Accounting Principles (GAAP) permitted the securitizer to recognize the gain on sale at the initiation of the securitization. For example, for certain mortgage securitizations where a transferor had not surrendered control, the sale of the pooled assets to the off-balance-sheet entity could be accounted for by the securitizer at the time of the transfer. Recording the gain on sale of loans securitized in an MBS would require a securitizer to project the future cash flow of the underlying loans and account for it up front. Gain on sale treatment will no longer be allowed under U.S. GAAP for certain mortgage securitizations where control is not surrendered; instead, securitizers will have to recognize the income over time as payments are received, thereby eliminating the upfront profitability of these securitizations. This would enhance the transparency of income statements and provide incentives to originators to better assess risk exposures of securitizations.

Product Standardization and Simplification

Most products could usefully be standardized at least to some extent. This should increase transparency as well as market participants' understanding of the risks, thus facilitating the development of liquid secondary markets. Although there will always likely be investors that demand bespoke complex products, securitization trade associations and securities regulators should encourage standardized building blocks for securitized products. It would also be useful if some standardization could be imposed on the underlying assets to maintain higher quality pools or at least verifiable pools (see the covered bond discussion below).

Valuation difficulties could also be alleviated if securitization products were simplified. Some of the product complexity was well intentioned, such as excess spread traps and triggers designed to bolster the creditworthiness of the senior tranches.²⁰ Others, such as micro-

tranching, were designed to game rating agency models. In any case, this product complexity has made some securities extremely difficult to value and risk-manage, and to the extent that regulation or market practices encourage such complexity, these components should be eliminated.

More "Skin in the Game"

Several recent policy moves attempt to get more securitizer "skin in the game" to ensure that someone is taking responsibility for diligent loan underwriting and monitoring. It is clear that, in many cases, securitization product issuers were poorly incentivized to conduct the appropriate (continuous) due diligence on loan originators, including the review of financial statements, underwriting guidelines, and background checks. In addition, they relied on originator representations and warranties regarding the quality of the loans and the underwriting process that turned out to be inadequate, in some cases because the originators lacked the capital and liquidity to make good on their warranties.

In order to incentivize stronger issuer due diligence effort, European and U.S. authorities are proposing to amend securitization-related regulations to incentivize issuers to retain an economic interest in the securitization products they issue. The European Union (EU) Parliament has amended the Capital Requirements Directive, which sets out the rules for Basel II implementation in Europe, to provide incentives for securitizers to retain at least 5 percent of the nominal value of originations.²¹ In a June 17, 2009 white paper, the U.S. government called for similar risk retention requirements for U.S.

reserve account to cover defaults and provide additional credit enhancement. However, portions of these reserve accounts can accrue to securitizers if the loan portfolio performance exceeds preset trigger levels.

²¹The Committee of European Banking Supervisors (CEBS) will be adding more specificity to the EU retention scheme by year-end 2009. However, so far the CEBS has not initiated a tractable impact or feasibility analysis.

²⁰Some of the excess spread—the difference between the interest received from the underlying loan portfolio and what is paid out to bondholders—is trapped in a

securitizers.²² Both propose several risk retention options, including retaining the equity tranche and equal amounts of all tranches (“vertical” slices).

However, Fender and Mitchell (forthcoming) and Kiff and Kissler (forthcoming) show that both the size and form of the retention are critical to incentivizing diligence, suggesting that the proposals may be too simplistic. Box 2.7 draws on this work to show that a flexible implementation is required to achieve broad-based incentive alignments and a more flexible implementation would be advisable. It shows that the optimal retention scheme, defined in terms of which tranches are retained and their thickness, depends critically on reasonable assumptions about the quality of the loan pool and the economic conditions expected during the life of the securitization.

The model underlying Box 2.7 verifies that while equity tranche retention is a useful incentive mechanism when the quality of loans is high and the economy is doing well, this is not true for low-quality loan portfolios in a recessionary environment. Recall that equity tranches are the first to absorb losses when the portfolio does not perform well, and if they perform really poorly, the equity tranches are prone to being wiped out. Hence, a securitizer that is forced to retain exposure to an equity tranche backed by a low-quality loan portfolio when an economic downturn is highly probable will have little incentive to diligently screen and monitor the underlying loans, because the chances are high that equity tranche holders will be wiped out irrespective of any screening and monitoring. Thus, securitizers need to be provided with screening and monitoring incentives by holding the next highest tranche, i.e., the mezzanine tranche. Only in a scenario where it is also very likely that the mezzanine tranche gets exhausted will vertical slice retention provide better screening incentives.

²²Additionally, in its *Mortgage Reform and Anti-Predatory Lending Act*, the U.S. House of Representatives is pushing “assignee liability” that ensures that some entity in the securitization chain remains legally liable for securitized loans that do not meet certain ability-to-pay and “net tangible benefit” standards.

The intent of the Box 2.7 analysis is to provide a framework for thinking about different retention policies. The analysis suggests that a matrix of retention policies defined by the type and quality of the underlying assets, the structure of the securities, and expected economic conditions would better align incentives. The box also shows that there are some combinations of loan portfolios and economic conditions in which forced retention does not induce any screening. Furthermore, in other scenarios, the impact of increased regulatory requirements could even make securitization too costly. Even without formal requirements, in many cases, anecdotal evidence suggests that originators already retain some exposure to the assets they securitize, though it may not always be effective for inducing good origination or monitoring. For example, commercial real estate and consumer loan securitizers typically retain at least 5 percent of nominal value in one way or another, e.g., first-loss or equity tranche retention, and excess spread and cash reserve accounts that revert the profits from good performance to securitizers. European prime mortgage securitizers generally retain at least 5 percent. But the senior tranche retention made by many of the securitizers, motivated mainly by difficulties in placing them, was probably not useful, since they perceived them to be virtually riskless.

More formal evidence from the United States suggests that current policy efforts of introducing a minimum retention requirement of 5 percent or higher could be binding in large areas of the securitization market. According to IMF staff calculations of tranche retention (without considering whether it is equity, mezzanine, or a vertical-slice-retention type) in almost 10,000 ABS, MBS, and CDO transactions issued since 2001, retention of securitized exposure has gradually increased over time, but remains very diverse depending on the type of transaction structure and collateral (Figure 2.13). Incentives to retain skin in the game seem to be higher in more sophisticated areas of the market, such as CDOs, where the decision to retain small, highly customized tranches had become part of elaborate hedging strategies. Based on available data,

Box 2.7. Optimal Retention Policies for Loan Securitization

The European Parliament and the U.S. government are pushing to require securitizers to retain economic interests in securitized assets in order to better align their interests with those of investors. Both are proposing that securitizers hold at least 5 percent of the par value of the underlying loan portfolios, but offer various options as to how this retention is configured. This box illustrates that flexible implementation is required to achieve broad-based incentive alignments. While much attention has been devoted to equity tranche retention, and European and U.S. authorities are considering “vertical slice” retention (equal amounts of each tranche in the securitization structure), the box shows that mezzanine tranche retention may be the better option in certain situations.

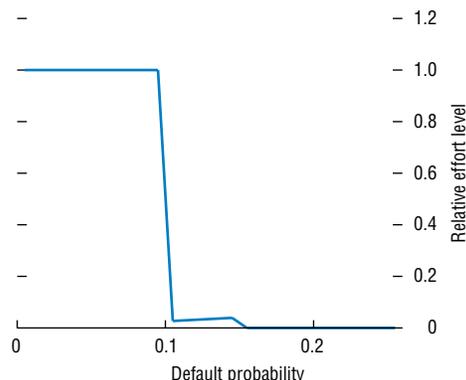
Early discussions on optimal retention schemes for asset securitization focused on the equity tranche, the tranche that takes the first loss (FitchRatings, 2008). The idea of retention is to incentivize securitizers to more effectively screen loans. However, holding just the equity tranche has little impact on screening if it is likely to be exhausted in a downturn and a downturn is likely, because in this case the benefits to screening are nil.

The analysis presented here is based on a model by Fender and Mitchell (forthcoming) that analyzes the optimal effort level of a lender who can screen borrowers and then has the option of securitizing the loan portfolio. By engaging in screening, a lender can increase the probability of making a high-quality loan and thereby increase the expected return of the portfolio. The analysis measures screening effort in relative terms by comparing the amount of effort that would optimally be exerted to maximize profits if only part of the portfolio were retained, compared to that optimally exerted if all of the loan risk were retained.

The Fender and Mitchell (forthcoming) model assumes that there are two classes of loans that differ only in credit quality, and that the economy can either be in a good or a bad

Note: This box was prepared by Michael Kisser and John Kiff.

Figure 1. Optimal Effort Level of Equity Retention: Low-Quality Borrowers and High Odds of Recession



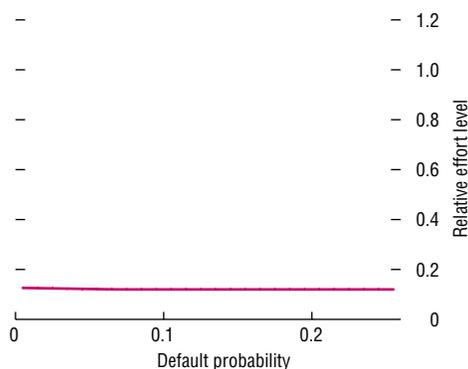
Source: IMF staff estimates.

Note: The figure shows implied effort levels under equity retention compared to the benchmark case of retaining the entire loan portfolio. Calculations are done assuming that chances of entering a recession equal 80 percent and further that only 20 percent of the loans are of high quality and that the thickness of the equity tranche equals 12 percent.

“state” during the life of the loan. For example, assume that 80 percent of the loans in the portfolio are “low-quality” and 100 percent of them are likely to default in the low economic state. The other 20 percent are “high-quality” loans, only at risk of defaulting in the low economic state. There is an 80 percent probability of a downturn occurring during the life of the loan. For the sake of simplicity, the probability of a high-quality loan defaulting in a low state is assumed to be the same as the probability of a low-quality loan defaulting in a high state. Also, the example assumes that the loss given default is 100 percent.¹ Figure 1 shows the relative optimal effort levels for different

¹The example used here assumes quadratic screening costs, reflecting the idea that as more bad loans are rejected, more bad loans must be screened to achieve the target portfolio size. A similar assumption is made in Carletti (2004) and Duffie (2008). Fender and Mitchell (forthcoming) also work with a convex cost function, but do not specify the exact functional form. Also, the gross return R is set to 5 percent.

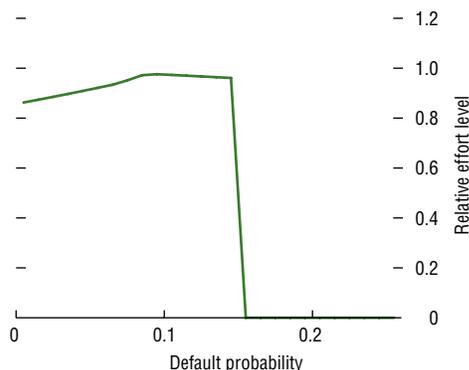
Figure 2. Optimal Effort Level of Vertical Slice Retention: Low-Quality Borrowers and High Odds of Recession



Source: IMF staff estimates.

Note: The figure shows implied effort levels when retaining a vertical slice of 12 percent compared to the benchmark case of retaining the entire loan portfolio. Calculations are done assuming that chances of entering a recession equal 80 percent and further that only 20 percent of the loans are of high quality.

Figure 3. Optimal Effort Level of Mezzanine Retention: Low-Quality Borrowers and High Odds of Recession



Source: IMF staff estimates.

Note: The figure shows implied effort levels under mezzanine retention compared to the benchmark case of retaining the entire loan portfolio. Calculations are done assuming that chances of entering a recession equal 80 percent and further that only 20 percent of the loans are of high quality and that the thickness of the mezzanine tranche equals 12 percent.

default probabilities incentivized by retaining an equity tranche that absorbs the first 12 percent of losses.

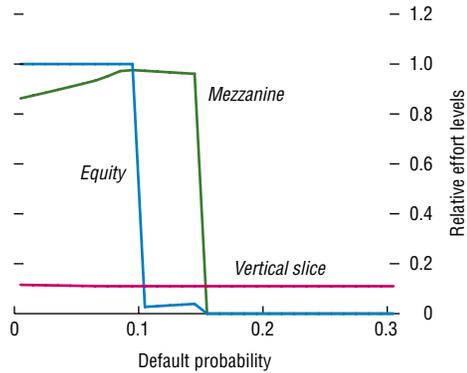
It can be seen that when default probabilities exceed 15 percent (on the x axis), a profit-maximizing originator will not exert any effort if forced to hold the 12 percent equity tranche. This is because there are so many low-quality loans in the portfolio and the low economic state is so likely that the equity tranche is almost sure to be exhausted, regardless of effort exerted. In other words, because the equity tranche holders only receive the residual claim after payments to more senior tranche holders have been made, if chances are high that no residual claim will be left, then there is no incentive for screening loans when the originator is forced to retain the equity tranche. Note that from zero through a default probability of 10 percent, the originator holding a 12 percent equity tranche will screen loans as if the entire loan portfolio were held on the balance sheet.

Figure 2 shows, however, that in the example used here the retention of a 12 percent vertical slice (i.e., 12 percent of each tranche) will incentivize effort, regardless of the default probability (represented by the horizontal line). While this is the case being discussed in regulatory circles, given the very low level of effort to screen that would take place (only 12 percent of the first best effort level), the model can be used to examine other retention schemes and underlying conditions to judge whether there are better options.

For example, Figure 3 shows that mezzanine tranche retention can incentivize very high effort levels for less risky portfolios (those with default probabilities up to about 15 percent). In this specific example, a retained mezzanine tranche that absorbs between 12 and 24 percent of losses incentivizes more effort than equity retention only for default probabilities of between 10 and 15 percent, since effort falls off precipitously when the equity tranche is held after a default probability of 10 percent is reached (see Figure 1). Once default probabilities are too high, mez-

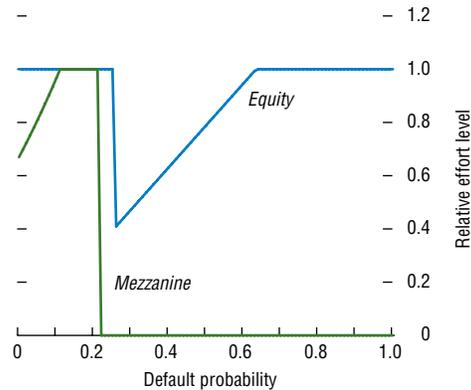
Box 2.7 (continued)

Figure 4. Comparison of Optimal Effort Levels: Low-Quality Borrowers and High Odds of Recession



Source: IMF staff estimates.
 Note: The figure shows implied effort levels under equity, mezzanine and vertical slice retention compared to the benchmark case of retaining the entire loan portfolio. Calculations are done assuming that chances of entering a recession equal 80 percent and further that only 20 percent of the loans are of high quality and that the thickness of the equity and mezzanine tranche or the vertical slice equals 12 percent.

Figure 5. Comparison of Optimal Effort Levels of Equity and Mezzanine Retention: High-Quality Borrowers and Equal Odds of Recession



Source: IMF staff estimates.
 Note: The figure shows implied effort levels under equity and mezzanine retention compared to the benchmark case of retaining the entire loan portfolio. Calculations are done assuming that two out of three loans are of high quality and that the thickness of the equity and mezzanine tranche equals 12 percent. Chances of recessionary and expansionary states are equal.

zantine tranche holders are also likely to receive no payment at all, which again induces zero screening effort when the originator is forced to hold the mezzanine tranche.

Figure 4 combines the previous figures and compares optimal effort levels for retaining a 12 percent equity or mezzanine tranche with a 12 percent vertical slice. In this case, equity retention generates the highest effort level for low default probabilities, whereas mezzanine tranche retention dominates for intermediate default probabilities of around 10 to 15 percent. However, for default probabilities of 15 percent or higher, retaining the 12 percent vertical slice guarantees a higher effort level than those implied by either equity or mezzanine retention.

However, if the previous example is changed by assuming that (1) there is a 50-50 chance of a recession during the evaluation period, i.e., assuming that economic conditions are stable, and (2) two out of three loans are “high-quality,” then the implications regarding the optimal

retention mechanisms are quite different. In fact, returning to the case of retaining a 12 percent tranche, Figure 5 shows that equity always dominates mezzanine retention.

In summary, as argued in Fender and Mitchell (forthcoming), the choice of retention schemes needed to incentivize more intensive loan screening depends critically on the quality of the loan pool and the economic conditions expected during the life of the securitization. Annex 2.1 and Kiff and Kisser (forthcoming) extend the analysis by explicitly considering the impact of regulatory capital requirements on retention-driven screening effort—yet another element that influences incentives.

As an example, under the Basel II standardized approach, capital charges are calculated for a simple three-tranche structure comprised of a senior tranche rated A- or higher and equal-sized mezzanine and equity tranches. The minimum regulatory capital requirement on the retained tranche(s) is equal to 8 per-

Box 2.7 (concluded)

cent of the risk-weighted par value(s). For example, the risk weight on any retained AAA-rated tranche is 20 percent, and 1,250 percent on any tranche rated below BB- (BCBS, 2009). No credit enhancements are considered. The formula below summarizes the calculation of the capital charges:

$$\text{capital charge} = 0.08 \times \text{risk weight} \\ \times \text{tranche thickness},$$

where the tranche thickness is the retention amount as a proportion of the total par value.

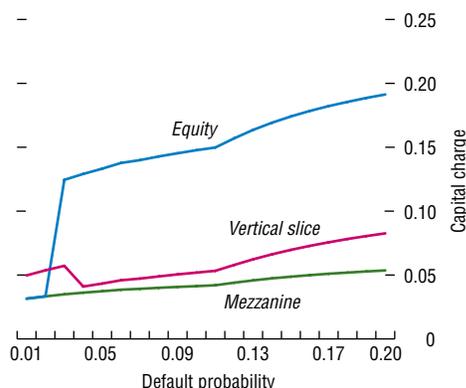
Figure 6 shows the capital charges over a range of default probabilities associated with retention of the equity or mezzanine tranches, or a vertical slice of the same size.² The underlying loan pool is comprised of reasonably high-quality loans (i.e., 60 percent are good) and there is a 50-50 chance of a low state.

Unsurprisingly, in this example, the capital requirements for mezzanine retention are lower than those for equity retention, because the latter almost always draws the maximum risk weight (1,250 percent), whereas the mezzanine tranche usually draws the 100 or 350 percent risk weight associated with BBB and BB rated securitization tranches. The vertical slice retention capital requirements are also higher than those for mezzanine retention, because mezzanine retention incentivizes a higher screening effort that results in higher-rated (lower risk-weighted) mezzanine tranches.³

²For example, at the 5 percent default probability, the three retention scenarios involve retaining a 13 percent equity or mezzanine tranche, or 13 percent of each of the three tranches. The retention amounts depend on the default probability, varying from 11 percent at a 1 percent probability to 19 percent at a 20 percent probability.

³In this example, the mezzanine tranche retention requirement incentivized screening effort that resulted in BB rated mezzanine tranches (with a risk weight of 350 percent), whereas the mezzanine tranches were rated below BB- in the vertical slice retention scenario (1,250 percent).

Figure 6. Corresponding Capital Charges for Equity, Mezzanine, and Vertical Slice Retention: High-Quality Borrowers and Equal Odds of Recession

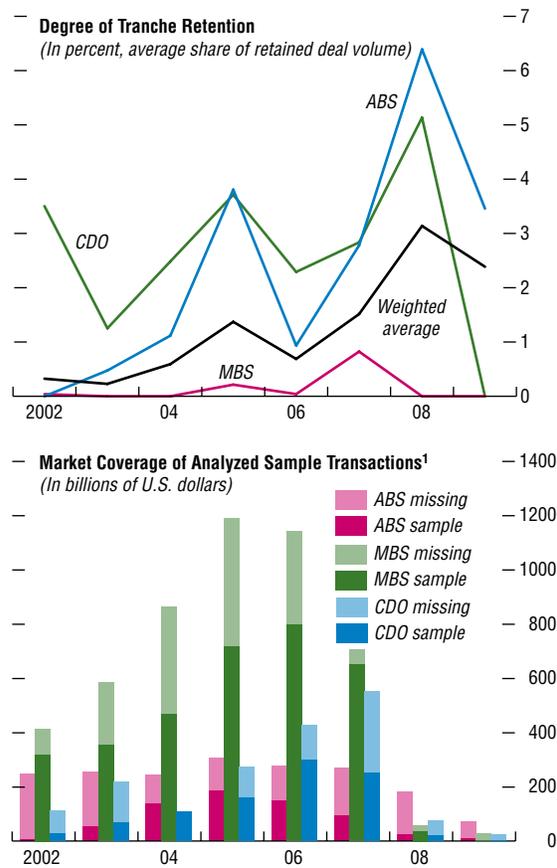


Source: IMF staff estimates.

Note: The figure shows capital charges that correspond to optimal retention strategies at particular default probabilities. Calculations assume that chances of entering a recession equal 50 percent and that 60 percent of the loans are of high quality. Capital charges are calculated according to the Standardized Approach following BCBS (2009).

The example thus shows that a better alignment of incentives between investors and the lender by inducing an optimal amount of screening does not necessarily coincide with a commensurate ranking of capital charges. This is due to the fact that the unrated equity tranche draws a risk weight of 1,250 percent, far more than the risk weights on typical mezzanine tranches. The example also suggests that some important feedback effects are missing from this simple model. Extensions of the model could make capital charges part of the effort level optimization calculations. A first step in this direction has been undertaken in Kiff and Kisser (forthcoming). Also, market pricing considerations could be incorporated into the model so that it would reflect the benefit of maximizing the size of the senior tranche. Further details and discussion regarding these potential extensions can be found in Annex 2.1 and in Kiff and Kisser (forthcoming).

Figure 2.13. U.S. Issuance of Asset-Backed and Mortgage-Backed Securities



Sources: Dealogic; and IMF staff estimates.
 Note: ABS = asset-backed security; MBS = mortgage-backed security; CDO = collateralized debt obligation. The data covers a subset of total securitized issues in the United States between 2002 and end-June 2009 whereby transactions with insufficient information in each group (collateral types and securitization category) are eliminated. The subsample excludes all issuance by U.S. government enterprises and issuance related to retention for the purposes of central bank repo operations in 2008 and 2009.
¹The values correspond to those in Figure 2.2.

transactions with static or substituting reference portfolios, which are most common in loan securitizations (such as ABS on student loans) with fixed balances, show higher degrees of retention than transactions with revolving reference portfolios underlying receivables securitization (such as ABS on auto receivables and credit card receivables). Table 2.2 shows that a 5 percent retention proposal would be binding for most, so careful consideration is needed before an across-the-board requirement is applied.

Additionally, the interplay of retention rates, accounting treatment, and regulatory capital requirements complicates the effectiveness of retention requirements. In principle, tighter accounting standards for consolidation and the movement of OBSEs on balance sheet should promote better management of risk exposures, both explicit and implicit, and achieve the desired alignment of incentives. In practice, tighter rules on consolidation are not seen as having as great an impact on European securitization as they will have in the United States. This is in part because accounting standards are not as tightly woven into European bank regulatory capital requirements as they are in the United States.²³ At the same time, higher risk weights for securitization may make it too costly to retain tranches.

The results of formal modeling suggest that retention that would provide appropriate incentives would result in a complex matrix of rules, which would be difficult to put into operation. On the other hand, it is clear that the decision for regulatory retention requires more in-depth analysis than simply assigning a 5 percent formula. Instead, a quantitative impact study should be conducted, using a variety of economic conditions as well as realistic data on probabilities of default, loss estimates, a variety of types of loans, and so on. From such an analysis, a simpler, second-best retention regime could be recommended that would

²³Risk-based capital requirements are not as closely tied to accounting in Europe as in the United States (BCBS, forthcoming).

Table 2.2. United States: Issuance of Asset-Backed and Mortgage-Backed Securities—Average Degree of Tranche Retention*(In percent of deal volume)*

	ABS	MBS	CDO	Total ¹	ABS-Auto Receivables	ABS-Credit Card Receivables	ABS-Student Loans	CMBS	RMBS
2002	0.0	0.0	3.5	0.3	0.0	0.0	0.0	0.2	0.0
2003	0.5	0.0	1.3	0.2	0.0	0.4	0.0	0.0	0.0
2004	1.1	0.0	2.5	0.6	0.0	0.0	14.3	0.0	0.0
2005	3.8	0.2	3.7	1.4	0.0	0.0	10.2	0.3	0.2
2006	0.9	0.0	2.3	0.7	0.0	0.0	0.0	0.0	0.0
2007	2.8	0.8	2.8	1.5	0.0	0.8	3.6	1.8	0.7
2008	6.4	0.0	5.1	3.1	0.0	0.0	5.3	0.0	0.0
2009	3.5	0.0	0.0	2.4	0.0	1.2	0.0	0.0	0.0

Sources: Dealogic; and IMF staff estimates.

Note: ABS = asset-backed security; CDO = collateralized debt obligation; CMBS = commercial mortgage-backed security; MBS = mortgage-backed security; RMBS = residential mortgage-backed security.

¹Weighted by annual deal volume of ABS, MBS, and CDO.

hold under a variety of conditions. Ultimately, such recommendations should also account for the additional impact of higher capital charges and accounting requirements that might result in an actual retention higher than the regulatory requirement.²⁴ Authorities should consider other mechanisms that incentivize due diligence and may be able to produce results comparable to a retention requirement, including, perhaps, representations and warranties.

Should the retention scheme, consolidation requirements, or both result in securitized loans remaining on balance sheet, there could be material effects, as the resultant increase in regulatory capital could deter securitization and make it more costly. For example, at a time when banks' capital positions are already under pressure, reconsolidation could be particularly costly for unrated credit card ABSs that draw a 100 percent risk weight (FitchRatings, 2009). Coordination is needed across those responsible for setting accounting standards, capital requirements, and retention schemes to ensure that structuring a securitization promotes greater attention to risk, both explicit and implicit, but does not introduce requirements so burdensome as to eliminate securitization altogether.

²⁴Also, although the European and U.S. retention proposals prohibit issuers from hedging their retention-related credit risk exposure, enforcing this prohibition will be challenging.

Covered Bonds Provide Near Perfect Incentive Alignment

An alternative to more risk retention in the securitization context is encouraging covered bond issuance. Covered bonds help redress some of the fundamental incentive problems that contaminated the economic rationale of securitization, because the issuer retains full exposure to the performance of the underlying assets. Also, particularly in the case of “special law” covered bonds (e.g., German *Pfandbriefe* and Spanish *cédulas*), solid prudential standards help limit excessive originator risk-taking and slippage in origination and monitoring standards.

Such standard setting has also been achieved in a securitization context by the mortgage insurance offered by Fannie Mae and Freddie Mac in the United States, and the Canada Mortgage and Housing Corporation in Canada (Kiff, 2009). This layering of strictly enforced underlying asset quality standards on top of issuer credit risk retention makes covered bonds less prone to the effects of dramatic asset quality deterioration. Securitization could benefit from the adoption of such stringent asset quality standards.

Authorities should continue to encourage the use of covered bond markets as a complementary form of capital markets-based funding. However, since covered bonds involve no risk transfer, the prospects for credit and economic growth in a financial economy dominated by

covered bond financing may be less than in an economy in which securitization plays a bigger role. For example, the range of eligible assets is typically quite narrow under most covered bond frameworks.²⁵ Moreover, the dispersion of credit risk across a diversity of investors will likely be greater with the ability to tranche. Future research could review the evidence in this regard. Also worth exploring is the trade-off between securitization and its potential for fueling higher credit growth (and, seemingly, the associated boom-bust cycles), covered bonds, and the traditional deposit funding of on-balance-sheet assets.

In addition, authorities should balance the encouragement of covered bond markets with the potential impact that they have on bank failure resolution and deposit insurance programs. In any case, potential covered bond investors will require certainty that they not be denied access to the cover pool assets in the event of a bank failure. For example, prior to the August 2009 finalization of its “Covered Bond Policy Statement,” the Federal Deposit Insurance Corporation (FDIC) could tie up investor access to cover pool assets when a bank was put into receivership or conservatorship. In this regard, the aforementioned “special law” frameworks ensure that the covered bonds have priority access to the cover pool, although this is not absolutely necessary. For example, in 2008 the FDIC set out policies that ensure predictable performance of covered bonds issued by U.S. banks.²⁶

Representations and Warranties Provide Partial Skin in the Game

The securitization industry, led by the ASF, is working on improvements to and standard-

ization of the representations and warranties that, in theory, allow investors in securitization vehicles to return loans that do not meet pre-agreed upon quality standards back to arranger. The current draft of the ASF’s standard model representations and warranties includes provisions that cover fraud by any party to the loan origination, the quality of appraisals, and due diligence tests with respect to income, employment, and assets of the borrower. However, the model representations and warranties could be weaker than some other proposed forms of skin in the game because, in reality, the model provisions allow the arranger to negotiate with investors to assert that “to the best of its knowledge” the lender has taken steps to ensure that the quality standards are met and does not require the arranger to scrutinize further. Furthermore, because arrangers and other participants are often playing multiple roles in the ABS market generally, they may be reluctant to trigger a return of the loans.²⁷

Along the same lines, “assignee liability” can play a role in incentivizing diligent loan screening. Assignee liability ensures that some entity in the securitization chain remains legally liable for securitized loans that do not meet certain ability-to-pay and “net tangible benefit” standards. Although this is usually seen as a consumer protection mechanism, if it had been in place prior to the crisis, U.S. nonprime lending might have been more prudent. However, it is important that the legal liability be quantifiable at origination and capped at some reasonable level. Otherwise, loan origination would be curtailed, due to a withdrawal of MBS market financing for loans that carry assignee liability, as it was in a failed experiment with uncapped assignee liability in the U.S. state of Georgia in 2002 (Engel and McCoy, 2007).

²⁵For instance, *Pfandbriefe* can only be covered by public debt, mortgages, and shipping finance, which, in the absence of viable securitization markets, effectively limits the capital markets access of other important industry sectors such as small and medium-size enterprises.

²⁶In addition, the *Equal Treatment of Covered Bonds Act* recently proposed by the U.S. House of Representatives would provide even more certainty as to the treatment of covered bonds upon issuer insolvency.

²⁷The analysis of the ASF’s model representations and warranties benefited greatly from discussions with Isaac Lustgarten of the IMF’s Legal Department.

Conclusions and Policy Recommendations

Restarting private-label securitization markets, especially in the United States, is critical to limiting the fallout from the credit crisis and to the withdrawal of central bank and government interventions. However, policies should not aim to take markets back to their high octane levels of 2005–07, but rather to put them on a solid and sustainable footing. It should also be recognized that the return to a more robust securitization market will not be instantaneous, as it will take time for the new policies to be put in place and become effective, in part because deleveraging will continue for some time. Ongoing regulatory reforms could do much to internalize some of the externalities that result from the misalignment of incentives to securitize. There is still much work to be done in clearing away the legacy assets, and in this regard, public-private sector partnerships such as the TALF and PPIP are helpful. Key policies include the following:

- Authorities should continue to press for the minimization of incentives and rewards for rating shopping and ratings-related regulatory arbitrage, recognizing that credit rating agencies will continue to play a key role in the securitization process. Credit rating agencies should continue to be pushed to disclose methodologies and publish rating performance data to enhance investor due diligence and credit rating agency competition. Authorities should continue to look for ways to reduce or even eliminate regulatory reliance on ratings.
- Proposals for retention requirements should not be imposed uniformly across the board, but tailored to the type of securitization and underlying assets to ensure that those forms of securitization that already benefit from skin in the game and operate well are not weakened. The effects induced by interaction with other regulations will require careful consideration.
- Disclosure and transparency standards should be improved along the intermediation chain, and efforts are well under way. This includes tightening the standards for off-balance-sheet treatment of risk exposures, accounting standards that require more tabular presentations of data, and making transaction performance data more widely available. However, care should be taken to emphasize the materiality of the information and not overburden securitizers and investors by releasing irrelevant information.
- Securitizer compensation should be better linked to the longer-term performance of the securitized assets, and recent changes to accounting standards go a long way toward this goal. Quantity targets for the origination of loans and other compensation incentives to pass risks along the intermediation chain should also be discouraged.
- Securitization products should be simplified and standardized to the extent possible to improve liquidity and reduce valuation challenges. Although industry bodies are usefully working to standardize transaction legal documentation, little interest is seen in taking this to the product structuring level.

This chapter showed that policies designed to put more securitizer skin in the game also risk closing down parts of securitization markets if poorly designed and implemented. In particular, the analysis presented demonstrates that variations in schemes that force securitizers to retain some slices of their securitization products can have dramatic effects on the incentives to improve loan screening, in some cases with the unintended effect of making some types of securitization too costly to execute, effectively shutting down these markets. Furthermore, the interaction of these schemes with changes to accounting standards and regulatory capital requirements should be carefully considered. Before implementing such schemes, authorities should conduct impact studies to ensure that they fully understand the potential effects of all the regulations in their totality.

Both securitization and covered bond markets can provide the financial system with cost-effective, capital-markets-based funding. However, securitization has the added benefit that it can be used to disperse credit risk outside the banking sector to investors most willing and able to manage it. Securitization that involves tranching has the added advantage of allowing risks to be more closely matched to investor desires, and should result in more credit growth, depending on the amount of retained risk and capital requirements. The key to using these markets successfully is to ensure that market participants and authorities have the knowledge, resources, and information to price and manage the risks accurately. Only then will the real benefits be attainable.

Annex 2.1. Optimal Retention Policy and Capital Requirements²⁸

The analysis in Box 2.7 is based on a model by Fender and Mitchell (forthcoming) as well as Kiff and Kisser (forthcoming), who extend their approach. In the baseline model, an originating institution, which subsequently will be referred to as the securitizer, can extend loans to individual borrowers and then choose to securitize the portfolio and sell different tranches to outside investors. The securitizer and the investors are assumed to be risk-neutral and the risk-free rate is set to zero. There are two types of loans, which differ in their quality. The total amount of loans is normalized to one and it is assumed that a performing loan returns $R > 1$, whereas there is zero recovery if the loan defaults. The model further specifies an exogenous probability θ of making a high-quality loan, which can be increased to $(\theta + e)$ by exerting screening effort e . Denoting the probability of making a good- and bad-quality loan by $\alpha_G(e)$ and $\alpha_B(e)$, it follows that $\alpha_G(e) = \max[\theta + e, 1]$ and $\alpha_B(e) = \min[1 - \theta - e, 0]$.

²⁸This annex was prepared by Michael Kisser and John Kiff.

Screening loans is costly, which is captured by the convex cost function $c(e)$.²⁹

The model follows Chiesa (2008) by introducing a systemic risk component. Specifically, it is assumed that the economy can take on two different states of nature; “high” and “low” states with probabilities p_H and p_L , respectively. Default probabilities of individual loans are contingent on the state of the economy. The model assumes that low-quality loans always default in the downturn and high-quality loans never default in the upturn.

It is further assumed that at the time when the loans are extended, the securitizer has already decided if and in what form the loan portfolio will be securitized. Effort level is chosen accordingly and then different tranches of the portfolio are sold to outside investors. Specifically, the model compares total expected profit (π) under vertical slice (v), equity (E) or mezzanine (M) tranche retention by solving the following maximization problems:

$$\max \pi_v(e) = \Omega S_v + Rv [p_L \Delta_L \alpha_G(e) + p_H (1 - (1 - \alpha_G(e)) \Delta_H)] - c(e) - 1$$

$$\max \pi_E(e) = \Omega S_E + p_L \max\{\Delta_L R \alpha_G(e) - B_1, 0\} + p_H \max\{R(1 - (1 - \alpha_G(e)) \Delta_H) - B_1, 0\} - c(e) - 1$$

$$\max \pi_M(e) = \Omega S_M + p_L \min\{\max\{\Delta_L R \alpha_G(e) - B_2, 0\}, B_M\} + p_H \min\{\max\{R(1 - (1 - \alpha_G(e)) \Delta_H) - B_2, 0\}, B_M\} - c(e) - 1,$$

where ΩS captures the upfront payment that outside investors are willing to pay for the exposure to the loan portfolio under the different retention mechanisms, where S is the cash proceeds at issuance, and Ω reflects institution- and instrument-specific securitization benefits to the issuer. B_1 is the promised payment to both mezzanine and senior tranche holders and B_M is the promised payment to mezzanine tranche hold-

²⁹Box 2.7 assumes that the specific functional form of the cost function is given by $e^2/2$.

ers. Finally, the added benefits from screening in the low and high states are given by $\Delta_L = 1 - PD_L$ and $\Delta_H = PD_H$, where PD_L is the probability of a high-quality loan defaulting in a downturn, and PD_H is the probability of a low-quality loan defaulting in an upturn.

Box 2.7 analyzes the implied effort level under the different retention schemes by comparing different scenarios, finding that vertical slice retention can actually dominate mezzanine and equity retention even when the vertical slice is small.

As a last step, the box derives implied capital charges by relating the optimal retention amounts to capital requirements following the standardized Basel II approach. Having calculated optimal effort levels for the different maximization problems, the next step specifically involves calculating the probability of default of the entire portfolio, assuming the three possible retention mechanisms. This is done by evaluating

$$TPD_i = \alpha_B(e_i^*)[p_L + PD_H p_H] + \alpha_G(e_i^*)PD_L p_L,$$

where i denotes the equity, mezzanine, and vertical slice retention schemes.

Assuming a 100 percent loss-given-default, the Moody's binomial extension technique (BET) is applied to the calculated default probability to generate a loss distribution for a portfolio of 1,000 equal-sized loans.³⁰ The loss distribution is then applied to the Box 2.7 three-tranche example based on this portfolio and assuming a 10-year term to maturity to calculate expected losses for each tranche. These expected losses are then used to back out credit ratings based on the Moody's idealized expected loss tables (Table 2.3).³¹

³⁰See Fender and Kiff (2005) for implementation details. Although more accurate loss distributions can be calculated with Monte Carlo methods, the binomial expansion technique is a sufficient approximation for this purpose.

³¹Alternatively, ratings could have been implied from the default probabilities, which is the way that DBRS, Fitch, and S&P derive their ratings (Fender and Kiff, 2005).

Table 2.3. Credit Ratings versus Idealized Expected Losses and Basel II Risk Weights
(In percent)

Credit Rating	Maximum Expected Loss for Each Rating Level	Risk Weight
AAA	0.0055	20
AA+	0.0550	
AA	0.1100	
AA-	0.2200	
A+	0.3850	50
A	0.6600	
A-	0.9900	
BBB+	1.4300	100
BBB	1.9800	
BBB-	3.3550	
BB+	5.1700	350
BB	7.4250	
BB-	9.7130	
B+ and lower	≥ 12.2100	1,250

Sources: Yoshizawa (2003) for the idealized expected losses and BCBS (2009) for the risk weights.

The capital charge calculation example in Box 2.7 assumes that the exogenous probability of making a good loan (θ) is 60 percent and the probability of the low state (p_L) is 50 percent. In order to show the details of the capital charge calculation, assume that the probability of a good loan defaulting in a low state (PD_L) and a bad loan defaulting in a high state (PD_H) are always identical. Hence, if these default probabilities are 5 percent, an effort level (e) of 20 percent will imply that the probability of making a good loan ($\alpha_G(e)$) increases from 60 to 80 percent, and a total probability of default (TPD) of 12.5 percent.

If the loan defaults in this portfolio were uncorrelated, at this point the tranche-by-tranche expected loss calculations could be done with a huge spreadsheet comprised of (in this case) 1,000 binomial probabilities. However, the systematic risk factor (represented by p_L in this case) implies that the loan defaults will indeed be correlated, and the BET is used to produce reasonably accurate approximations of the true loss probability distributions under these conditions.

In this case, by assuming that the pairwise default correlations between the 1,000 loans are all equal to 10 percent, the actual portfolio can be replaced by a simpler portfolio of just

Table 2.4. Calculation of Tranche Sizes (Steps 1 and 2) with Assumed 20 Percent Effort Level

Defaults	Probability (%) (1)	Dollar Losses			
		Total (\$)	Equity (\$) (2)	Mezzanine (\$) (3)	Senior (\$) (4)
0	26.31	0	0	0	0
1	37.58	100	100	0	0
2	24.16	200	133.20	66.80	0
3	9.20	300	133.20	133.20	33.60
4	2.30	400	133.20	133.20	133.60
5	0.39	500	133.20	133.20	233.60
6	0.05	600	133.20	133.20	333.60
7	0.00	700	133.20	133.20	433.60
8	0.00	800	133.20	133.20	533.60
9	0.00	900	133.20	133.20	633.60
10	0.00	1,000	133.20	133.20	733.60
Expected loss (\$)		125	85.68	32.06	7.26
Tranche size		1,000	133.20	133.20	733.60
Expected loss/tranche size (%)		12.50	64.3254	24.0668	0.9900
Credit rating			No rating	B-to CCC	A-
Risk weight (%)			1,250	1,250	50

Source: IMF staff estimates.
 Note: (1) Probability of n defaults = $(10!/(n!(10-n)!))TPD^n(1-TPD)^{10-n}$
 (2) Loss(equity) = $\min\{\text{Total Loss}, \text{Size}(\text{equity})\}$
 (3) Loss(mezzanine) = $\min\{\text{Total Loss}-\text{Loss}(\text{equity}), \text{Size}(\text{mezzanine})\}$
 (4) Loss(senior) = $\text{Total Loss}-\text{Loss}(\text{equity})-\text{Loss}(\text{mezzanine})$

10 homogeneous uncorrelated loans.³² The mechanics of the calculation for this example ($p_L = 50$ percent, $\theta = 60$ percent, $e = 20$ percent, and $PD_L = PD_H = 5$ percent) are illustrated in Table 2.4.

The first step in the calculation process was to determine the senior tranche size that would result in the expected loss for this tranche such that an A- rating is obtained according to Table 2.3 (0.99 percent). This turns out to be \$733.60 of the assumed \$1,000 portfolio, which implies a size for both of the equal-sized equity

and mezzanine tranches of \$133.20. (The equity and mezzanine tranches are equal by assumption.)

This scenario puts the risk weights of the three tranches at 1,250, 1,250 and 50 percent, respectively, for the equity, mezzanine, and senior tranches. However, this first iteration assumed a 20 percent screening effort level, whereas the optimal effort level will vary according to the retention scheme (equity, mezzanine, or vertical slice) and size.

At the 5 percent default probability level the optimal absolute effort levels are 40 percent (equity retention), 31.2 percent (mezzanine), and 7 percent (vertical slice), and these effort levels were fed back into the rating/risk weight calculations of Table 2.5 to produce the total capital charges plotted in Figure 6 in Box 2.7.³³

³²The details of all of these calculations and the more accurate Monte Carlo simulation methodologies can be found in Fender and Kiff (2005). The pairwise default correlations used here measure the likelihood of two credits defaulting simultaneously. More specifically, the default correlation between two credits (A and B) is

$$\text{Corr}(A, B) = \frac{\text{Prob}(A \wedge B) \text{Prob}(A) \text{Prob}(B)}{(\text{StDev}(A) \text{StDev}(B))}$$

where $\text{Prob}(x)$ is the probability of credit x defaulting, $\text{Prob}(x \wedge y)$ is the probability of credits x and y simultaneously defaulting, and $\text{StDev}(x)$ is the standard deviation of the credit x default event:

$$\text{StDev}(x) = [\text{Prob}(x)(1 - \text{Prob}(x))]^{1/2}$$

³³The point of step one was to calculate the tranche sizes so that the senior tranche would be A- rated and the equity and mezzanine tranches were equal sized, given an assumed 20 percent effort level. The point of step four is to calculate the credit ratings of the three tranches given the new effort levels.

Table 2.5. Calculation of Ratings and Risk Weights (Step 3) with 31.2 Percent Effort Level: Mezzanine Tranche Retention

Defaults	Probability (%) (1)	Dollar Losses			
		Total (\$)	Equity (\$) (2)	Mezzanine (\$) (3)	Senior (\$) (4)
0	48.92	0	0	0	0
1	36.26	100	100	0	0
2	12.09	200	133.20	66.80	0
3	2.39	300	133.20	133.20	33.60
4	0.31	400	133.20	133.20	133.60
5	0.03	500	133.20	133.20	233.60
6	0.00	600	133.20	133.20	333.60
7	0.00	700	133.20	133.20	433.60
8	0.00	800	133.20	133.20	533.60
9	0.00	900	133.20	133.20	633.60
10	0.00	1,000	133.20	133.20	733.60
Expected loss (\$)		69.00	56.00	11.71	1.29
Tranche size		1,000	133.20	133.20	733.60
Expected loss/tranche size (%)		6.90	42.0420	8.7937	0.1755
Credit rating			No rating	BB	AA
Risk weight (%)			1,250	350	20

Source: IMF staff estimates.

Note: (1) Probability of n defaults = $(10!/(n!(10-n)!))TPD^n(1-TPD)^{10-n}$

(2) Loss(equity) = min{Total Loss, Size(equity)}

(3) Loss(mezzanine) = min{Total Loss-Loss(equity), Size(mezzanine)}

(4) Loss(senior) = Total Loss-Loss(equity)-Loss (mezzanine)

For example, the 31.2 percent effort level associated with mezzanine tranche retention decreases the TPD to 6.9 percent, which, as shown in Table 2.5, reduces the senior tranche expected loss to 0.1755 percent (AA rating) and the mezzanine tranche to 8.7937 percent (BB). On the other hand, the 7 percent effort level associated with vertical slice retention would increase the TPD to 19 percent, which increases the senior tranche expected loss to 3.1939 percent (BBB) (not shown).

The last step involves mapping the revised credit ratings and risk weights into the corresponding capital charges (*CC*) using the formula below:

$$CC = 0.08 \sum [t_{equity} RW_{equity} + t_{mezz} RW_{mezz} + t_{senior} RW_{senior}],$$

where the *ts* are the relevant retained tranche sizes or “thicknesses.” Table 2.5 shows, for example, that the mezzanine tranche retention scenario results in a risk weight of 20 percent

on the \$733.60 senior tranche, 350 percent on the \$133.20 mezzanine tranche, and 1,250 percent on the \$133.20 equity tranche. However, only the mezzanine risk weight is relevant in this case, so the retained tranche capital charge will be \$37.30 (0.08 x \$133.20 x 350 percent).

This is where the Box 2.7 analysis stops, and where Kiff and Kisser (forthcoming) continue on with various extensions. Specifically, the upfront payment is endogenized and capital costs introduced into the analysis.

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