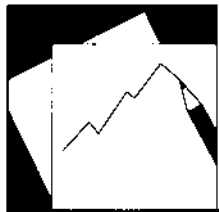


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Can Covered Bonds Resuscitate Residential Mortgage Finance in the United States?

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IMF Working Paper

Monetary and Capital Markets Department

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Abstract

This Working Paper should not be reported as representing the views of the IMF.

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

This paper considers the case for mortgage covered bonds as an alternative to the originate-to-distribute mortgage funding model. It argues that the economic incentives provided to market participants under the covered bonds model are less susceptible to moral hazard even while retaining the key benefits of securitization such as capital market funding and flexibility in risk allocation. Notwithstanding these advantages, however, limited market size and the greater pro-cyclicality of mortgage loan quality in the United States—potentially reflecting borrower incentives under the personal bankruptcy framework—impose limits on the benefits ensuing from this model. The analysis underscores the need for a comprehensive legal-regulatory framework to underpin market development and discusses a number of ways in which the current draft legislation may be further strengthened. A potential strategy to hasten market development within the current institutional framework is identified.

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I. MOTIVATION AND SUMMARY

The recent financial crisis exposed a number of weaknesses in the housing finance sector in the United States (U.S.). The resulting problems can be sourced to incentives guiding decisions in the funding and loan management chains, to incentives driving households' repayment and default decisions under the personal bankruptcy framework, and to incentives for loan servicers and investors to choose foreclosure over loan modification.

At the lending node, incentives for conducting satisfactory collateral valuation and a sound assessment of borrower repayment capacity and willingness weakened following the take-off in securitization of non-conforming mortgages during the last decade. By end-2007, residential mortgage-backed securities (RMBS) collateralized by such mortgages stood at over USD 2¼ trillion, about 20 percent of the total volume of outstanding residential mortgage debt. This reflected average, annual growth in private-label mortgage securitization of 40 percent over the period 2004–2007, almost 3 times the average annual rate of growth during 1994–2003.

As originators began selling an increasing proportion of these mortgages off their balance-sheets, they freed themselves of the deleterious consequences of worsening loan performance. Consequently, the financial motivation to accurately screen borrowers and value property declined. A borrower's ability to meet point-in-time *hard information* constraints such as a credit (FICO) score cut-off and loan-to-value (LTV) and debt-to-income (DTI) ceilings became sufficient to qualify for a mortgage loan and its subsequent inclusion in a securitization deal. The static—and backward looking—nature of these ratios limit their ability to predict (the likelihood of) default and make qualitative risk assessment by loan officers a critical complementary factor in the underwriting process. Not underwriting loans on a *fully indexed basis*, for example, was a problem in the subprime market for loans issued at low rates but subject to discrete interest rate hikes within 12-to-24 months. A recent study finds that the evolution of a borrower's FICO score since loan origination is a better predictor of default propensity than the score at the time the loan was issued. Others argue that the use of FICO scores in qualifying loans for securitization is susceptible to a *Lucas critique*; i.e., their effectiveness in predicting default propensity erodes over time.²

Legislative changes during this period also enabled the government sponsored enterprises (GSEs) to increase their exposure to residential mortgage loans not satisfying their own underwriting standards for conventional, conforming loans.³ Hence, the increase in the size

² Respectively, Demyanyk et. al. (2010) and Keys et. al. (2010) or Rajan et. al. (2010).

³ Unless otherwise noted, GSEs will be understood as circumscribing the activities of the Federal Home Loan Mortgage Corporation (Freddie Mac) and the Federal National Mortgage Corporation (Fannie Mae). The mission—and incentives—of the GSEs to serve the policy goal of universal home ownership were boosted further by the October 2000 American Home Ownership and Economic Opportunity Act.

of their balance-sheets was accompanied by a weakening in average credit quality owing to increasing exposure to subprime and Alt-A loans and to non-GSE RMBS collateralized by such loans.⁴

Market discipline—exerted at the funding node—was, in principle, supposed to control moral hazard at the lending node. However, incentives for doing so by appropriately pricing risk also weakened. First, because for conforming loans, correctly perceived implicit Federal government guarantees extended to the GSEs meant that banks could substantially reduce capital costs by substituting essentially risk free GSE debt for mortgages. Second, because the credit risk of non-conforming loans targeted for securitization was systematically underestimated by credit ratings agencies (CRAs) and investors. Third, because of the subjective, and yet remarkably uniform, low likelihood assigned by market participants to a break in the trend growth in nationwide house prices. Under this baseline scenario, borrowers with low or unstable incomes or with contracts carrying risk of a discrete increase in interest payments 12-to-24 months into the loan would be able to refinance, due to quick accretion of home equity.⁵ And, in the event of default, the home's market value would have risen sufficiently so that selling the house to a new borrower would be feasible at a discount-to-market still yielding a premium on the outstanding mortgage principal.

These assumptions unraveled quickly once the housing market turned in late 2006 and loan performance worsened. By end-2009, the Case-Shiller single family homes index had fallen by 30 percent and the unemployment rate had doubled relative to their levels at the peaks of the housing and business cycles. Data from the Mortgage Bankers' Association of America indicate that by end-2009 over 4½ percent of all mortgage loans, (including more than 3 percent of conforming conventional loans), were in the foreclosure process. Securitized loans fared worse with over 11½ percent, (18 percent of subprime and 14 percent of Alt-A), having entered the foreclosure process.

The impact of the crisis on the real sector, and in particular, on the labor market, is an important factor making for such a significant deterioration in loan performance. This is borne out by the significantly higher than (national) average foreclosure rates in states—such as California and Nevada—that were particularly hard hit by the crisis. However, rational

⁴ Data from the Federal Reserve Bulletins indicate that by end-2007, the GSEs' retained portfolios had grown to about USD 1½ trillion, or close to 40 percent of their guarantee business. Their 10-K filings indicate that of this amount, over USD 550 billion represented holdings of subprime, Alt-A, and option ARM loans / loan-backed RMBS. Some estimates, such as Pinto (2008), place such exposures at substantially higher levels.

⁵ Expectation of quick accretion of home equity was based on the twin assumptions of a quick increase in house prices and high prepayment speeds on such loans.

exercise of the mortgage default option—not uncommon in the U.S—also reflects two sets of factors which increase borrower incentives to opt for default during macroeconomic downturns.⁶

The first set of factors lower the cost of default. Default propensity is exaggerated by state laws providing for a greater amount of homestead protection or for less-than-full recourse on the defaulting borrowers by lenders. This is because they shield a greater proportion of the borrower’s wealth and income from capture by the lender post-default and, (if applicable), a subsequent bankruptcy. Recent evidence also suggests that the 2005 personal bankruptcy reform may have contributed to lessening (non-strategic) borrowers’ financial ability and incentive to use the Chapter 13 option, remain current on their mortgage obligations, and save their homes.⁷

The second set of factors relates to contractual features of loan agreements which increase the cost of staying current on a loan in a falling housing market. *Predatory loans*, usually embodying a combination of high loan-to-value (LTV) at origination, significant coupon rate hikes following a teaser period, and prepayment penalties became prevalent in the Alt-A and subprime segments at—or close to—the peak of the market. Borrowers’ repayment ability under these loans was severely impacted once house prices fell rapidly starting the second half of 2006 without a commensurate adjustment in interest rates.⁸

Ameliorating these incentive problems should be a central component of any post-crisis strategy to better manage credit risk and set future financial sector growth on a stable footing. This paper examines the case for a statutory covered bonds mortgage funding framework as a possible approach to achieving this objective. Part of the appeal of covered bonds derives from their basic financial structure. They combine the scale advantages of capital market funding with on-balance sheet credit risk management by the lender. Incentives for maintaining high quality of collateral, capacity, and credit assessment are, therefore, stronger than under the incumbent model. Moreover, so long as the issuer is a going concern, it is obliged to actively manage the cash flows from the collateral pool to ensure that their net

⁶ In an analysis based on purchase mortgages originated between 1976 and 1983 and information thereon running through the first quarter of 1992, Deng et. al. (2000), concluded that the event that the mortgage *went underwater* was a central factor impacting borrowers’ default decision and that this was particularly so during periods in which unemployment rates were high.

⁷ Li and White (2009) and Li et. al. (2010). The popular impression that borrowers can “turn in the key and leave” is generally incorrect. Lenders can, and apparently do, effectively threaten to pursue deficiency judgments in a majority of states under normal cyclical conditions, and this seems to inhibit strategic default ending in contested foreclosure. See for e.g., Federal Housing Finance Agency (2009) and Ghent and Kudlyak (2009). However, threat of a deficiency judgment is unlikely to be effective against non-strategic defaulters particularly in a downturn as severe as the one accompanying the global financial crisis.

⁸ Bhattacharya et. al. (2006) discuss prepayment penalty backed RMBS. On predatory lending practices and the impact of anti-predatory laws on subprime origination, see Ho and Pennington-Cross (2006).

present value (PV) matches and exceeds bond-holders' claims. Statutory constraints typically ensure that the equity contribution required of the borrower at the time of home purchase is above a conservatively set level (20 percent or more is the norm) in order for the loan to qualify for funding. All of these factors are important in reducing both, the likelihood of default and the loss-given-default.

While provision of a stronger incentive to issuers-originators for prudent underwriting is a primary benefit of the covered bonds model, it is not a *free lunch*. Funding (mortgage) loans via covered bonds involves greater outlay of capital by the issuer or originator relative to the originate-to-distribute (OtD) model (in both, it's GSE-guaranteed and private label securitization segments). To the extent that the lower cost of capital was passed on to the borrower in the U.S. pre-crisis, this would also entail an increase in the cost of mortgage financing for home buyers.⁹

The efficient distribution of risks across market participants has often been cited as one of the primary benefits ensuing from the OtD model. Funding via covered bonds retains this flexibility in risk allocation in all respects except for credit risk which is retained by the issuer. For example, covered bond funding can be perfectly consistent with the use of pass-through securities wherein all risks other than credit risk—including prepayment risk—can be allocated to investors. Danish callable annuity bonds—currently around 30 percent of the total volume outstanding in the Danish market—replicate most of the key aspects of U.S. RMBS in terms of risk allocation and secondary market liquidity. On the other hand, investors unwilling or unable to tolerate risk of variable interest rates or of a call option on the bonds can still be attracted to the product. Pfandbriefe-style covered bonds issued in their liquid benchmark format; i.e., non-callable fixed-rate bullet bonds can be attractive to such investors. In this case, with the bonds typically being of shorter expected duration than the loans, the issuer would bear refinancing risk and interest rate risk in case of variable interest loans. Moreover, should the loans be prepayable-at-par—as is typical in the U.S.—the issuer would also bear the option risk.

It is important to note that the benefits of the covered bonds model ensue in part from two factors that could be difficult to recreate in the U.S. in the short-to-medium term. First, the systemic importance of this funding instrument and its secondary market in European countries provides a strong incentive to issuers to manage the programs well. Country authorities for similar reasons have an equally strong incentive to prevent program defaults

⁹ Empirical evidence regarding the pass-through to the borrower of lower capital costs under the OtD model, particularly due to GSE securitization, is mixed. Naranjo and Toevs (2002) concluded that GSE securitization and purchase programs lowered mortgage yield spreads and volatility. Heuson et. al. (2001) and Lehnert et. al. (2008) did not find evidence to support the hypothesis that increases in securitization and in GSE purchases lowered mortgage spreads. The analyses of Passmore et. al. (2002), and Jaffee (2003), suggest that the negative conclusion of the latter set of papers may reflect oligopolistic pricing practices by the GSEs.

through tighter supervision and to actively manage program resale following issuer insolvency in order to limit haircuts to bond holders. Second, the personal bankruptcy framework in the U.S. is quite distinct from that in many mature market European countries in terms of the nature of the recourse lenders have on borrowers and the pace of exit of borrowers from debt obligations.¹⁰ Greater lender recourse and slower debt extinction in European countries weakens borrowers' incentive to default relative to the U.S. when the mortgage goes under water. This may explain why—despite macroeconomic and housing downturns of considerable severity during the recent crisis—deterioration in mortgage loan quality in countries like Denmark or Spain has been significantly less severe than in the U.S.

The funding model discussed in this paper entails incorporation of comprehensive statutory and regulatory frameworks under which the bonds are issued and managed, rather than evaluation of their financial characteristics alone. Regulation ensures that the collateral valuation process and issuer risk management meet minimum quality thresholds. Investor safeguards protecting payment continuity are generally more comprehensive and transparent under covered bonds relative to those provided to RMBS note holders.

In fact, given the nascent state of the U.S. covered bonds market, reliance on a sound legal framework, on regulation, and on effective supervision and enforcement to ensure competent management of bond programs will be high. Recent progress on the legislative front has culminated in the drafting of a bill currently in line for a vote in the U.S. House of Representatives. The paper argues that the legislation—if passed—will bring the legal framework up to the standards of mature market European countries in most areas, albeit scope remains for further improvement on a number of key issues.

A proposal to hasten market development is offered entailing a role for the Federal Home Loan Banks (FHLBs) in making a market for covered bonds. Trade-offs related to incentive issues arising from the FHLB system's federal charter and related benefits need to be given careful consideration, but intermediate caps on the volume of business handled by them, and eventual privatization of the market making arrangement may resolve these.

The paper is organized as follows. Section II examines the case for U.S. covered bonds. Section III argues that issuance under a statutory framework is necessary, analyzes the current and proposed legislative frameworks, and makes concrete recommendations for further improvement. Section IV discusses a proposal to facilitate market development. An annex takes up analysis of the potential for a conflict of interest between covered bond holders and the administrator of an insolvent covered bond issuer's estate, and implications thereof, for the perfection of bond holders' security interests.

¹⁰ See Kilborn (2007) for a careful comparison of the U.S. personal bankruptcy framework with a number of mature market European economies.

II. THE CASE FOR COVERED BONDS

A. Credit Risk Retention: Capital Market Funding with Skin in the Game

One of the principle arguments made in favor of the OtD model is its promotion of efficiency. It lowers the cost for home buyers by widening the investor base through securitization, conserves financial institutions' capital through the sale of loans off their balance-sheet, and facilitates the exploitation of potential scale economies in loan servicing and collateral management through specialization. However, the model is heavily reliant on market discipline being exerted in sufficient amount and intensity to contain the moral hazard entailed by the associated proliferation of agency relationships.

In searching for alternatives to the current framework, one would ideally want to preserve its positive attributes while pegging capital cost at a level that reflects the risk of the underlying loans and the financial structure used to fund them. Funding loans via covered bonds retains the advantage of a wide capital markets investor base that is associated with a stable and low cost supply of capital. However, since the mortgage collateral (*cover pool*) backing an issue of covered bonds is held on an issuer's balance-sheet, this funding strategy entails a higher capital cost for the originator-issuer compared to OtD, which potentially, could raise borrowing costs in the home purchase market.

One should, however, weigh the increase in (capital) cost entailed by covered bonds against the salutary incentive impact of greater credit risk retention. Deterioration of credit quality in a falling housing market directly hurts the originators' bottom-line. This provides stronger incentives to subscribe to a more comprehensive underwriting process and to ensure higher levels of borrower equity investment at the time of loan issuance. Correspondingly, the financial attractiveness to issue *piggyback* loans atop the primary mortgage—second mortgages or home equity loans—also decreases. These factors—particularly increasing borrower equity in the transaction—serve to lower the overall leverage involved in credit issuance to individual borrowers (Table 1). They also lower the likelihood of mortgage default as it takes a larger fall in home values to push mortgages underwater in which case greater levels of issuer capital lowers investor losses if the borrower defaults.

Relative performance of securitized loans—particularly Alt-A and subprime—wherein lenders had less ability or were less constrained to collect and process *soft* information on borrower repayment capacity, relying instead on *hard* information variables became markedly worse during the crisis (Figure 1). GSE guaranteed mortgages; i.e., conventional, conforming loans significantly outperformed subprime and Alt-A loans. Data from Lending Performance Services indicate that as of June 2010, about 4½ percent of GSE guaranteed mortgages were either 90+ days delinquent or in foreclosure. Relative to other advanced economies, including those hard hit by the crisis, this credit performance appears weak. The reasons for this relative weakness may lie in differences in borrower incentives under the personal bankruptcy frameworks.

Table 1. Implied Leverage under Alternate Mortgage Funding Strategies

	S&L 80–20 1/	80–20 loan Owned by Lender	GSE RMBS 80–20	GSE 95-5 Program	Securitized Subprime Piggyback2/
	(in percentage points)				
LTV	80.0	80.0	80.0	95.0	100.0
Risk weight 3/	...	50.0	50.0
Capital charge 4/	10.0	4.0	0.5	0.5	0.1
Capital charge paid by PMI 5/	0.0	0.0	0.0	1.0	1.0
Capital charge paid by investors 5/	0.0	0.0	1.2	1.4	2.8
	(debt as a multiple of equity in transaction)				
Implied Leverage	2.7	3.3	3.7	12.1	26.2

Source: Author's calculations.

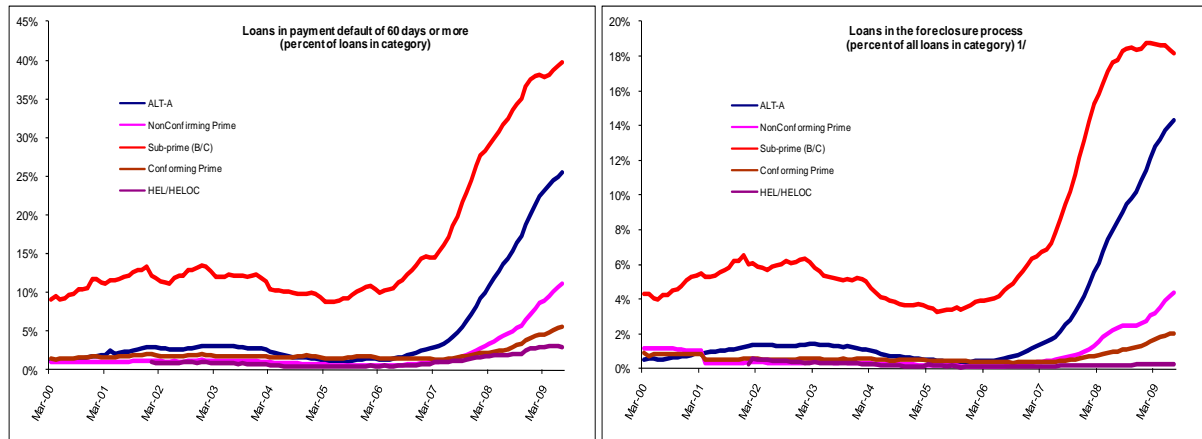
Notes: 1/ S&L = savings and loans association. Typical pre-1980 unsecuritized loan with 20 percent down payment and 12.5 percent capital charge on total exposure.

2/ Assuming 90 percent LTV plus 10 percent piggy-back home equity loan; 1 percent retention of both loans by lender in securitization deal; AAA/B subprime risk-weights of 20 percent/100 percent (90 percent/10 percent of deal).

3/ Assuming risk weight of 50 percent for on balance-sheet residential mortgage loans.

4/ Capital charge of (i) 10 percent of risk weighted assets for loans held on private bank's balance-sheet; (ii) 45 bps for GSE RMBS.

5/ PMI = private mortgage insurer. Assumption of PMI and investor capital injections of 1 and 1.5 percent of the total value of collateral.

Figure 1. Delinquency and Foreclosure Rates of Securitized Loans, 2000–09

Source: First American CoreLogic (all Loan Performance databases).

Note: 1/ Includes loans in foreclosure process *and* loans that are real-estate owned.

B. Risk Allocation and Choice of Covered Bonds Model

Credit risk transfer—either to the GSEs or to investors—is an integral component of U.S. RMBS programs. Moreover, since U.S. RMBS are typically structured as pass-through notes, most other risks—including prepayment risk arising from the call option available to borrowers—are distributed amongst the investors. The efficient distribution of risk; i.e., to market participants most willing and able to absorb them, is an important argument made in favor of the OtD model.

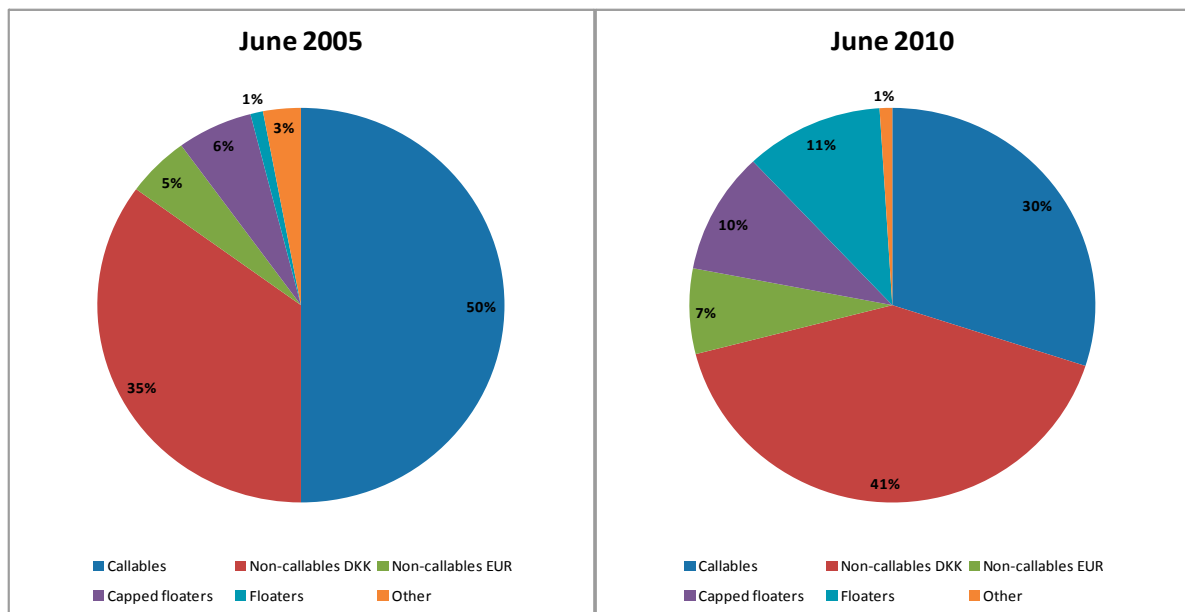
The allocation of risks across the participants in a covered bond market is a function of the manner in which loans and bonds are individually structured as well as the correspondence—or lack thereof—between the risks embedded in lending and funding instruments. Credit risk retention by the issuer/lender is an integral component of this funding model. With regard to the distribution of other risks, however, there is considerable variance in the covered bonds universe. Product design in the Pfandbriefe market is not very close to the U.S. on either the lending or the funding side (Dübel, 2005). The option to prepay a mortgage at par is not available to borrowers—or only available with penalties that can, depending on the jurisdiction, make it very costly to exercise. The predominant funding instrument in the jumbo Pfandbriefe market is a bullet bond; hence, if borrowers were to be given the option to prepay-at-par as in the U.S., the issuer would end up bearing the option risk. Moreover, the expected duration of the bond is usually shorter than that of the loans, meaning that—unlike in the U.S.—the issuer also bears refinancing risk.

The Danish market on the other hand, has products that are closer to the U.S. market in many respects (Box 1). In particular, the callable annuity segment of the Danish market closely resembles the benchmark loan and funding products in the U.S.

Box 1. Covered Bond Variants and the Bond Market in Denmark

The traditional housing loan in Denmark is a straight-line amortizing, 30 year fixed rate mortgage endowing borrowers with a right to prepay-at-par at any time without penalty. Over the last 10 years, product diversification has been rapid, but the 30 year callable annuity segment remains a highly liquid component of the market (chart).

Covered Bond Distribution-by-Type in the Danish Market



Source: Danske Markets.

Covered Bonds Funding Callable Annuity Loans

Traditionally, all callable loans were issued as level-pay amortizing credits (i.e., annuities). Following the *special balance* risk management principle, the covered bonds funding the loans are structured to ensure that all risks except for credit risk—which the lender retains—are passed onto the investors. These include, primarily, interest rate and prepayment risk. Cash flows into a cover pool (payment of interest and principal and prepayments) are distributed to investors in a bond series on a pro-rata basis.

Callable bonds are issued in tap format instead of by auction, with each bond series open for issuance over a 3 year period. On account of this opening period, there are loans in the cover pool with shorter maturity than the bonds. Hence, actual cash flows deviate from the bond's theoretical cash flows, with information on realized cash flows posted to the OMX Nordic Exchange subsequent to each payment date.

Following deregulation in 2003, mortgage credit institutions started offering borrowers interest-only payments for up to 10 years as part of callable loan contracts. Such *interest-only hybrids* are funded in callable bond series separate from traditional annuity loans.

Adjustable Rate Mortgage Loans (ARMs) and Non-callable Bullet Bonds

The significant spread between long-term and short-term Danish kroner (DKK) interest rates in the mid-1990s provided an impetus for the introduction of the interest reset loan in 1996. The subsequent expansion of reset profiles has helped to greatly increase the popularity of ARMs over the last decade, with the corresponding bonds used for funding them increasing their market share from around 10 percent of the total outstanding volume at end-2000 to close to 50 percent by June 2010. ARMs are funded by fixed-rate non-callable bullet bonds ranging from 1-to-11 years in maturity. Determination of the precise amount of issuance within each maturity segment is determined by the balance principle governing banks' risk management.

With regard to the loan repayment design, ARMs are amortizing annuity loans (with potential jumps in payment obligations at the interest reset points). Loans with interest-only periods are available, funded in separate bond series. Unlike the pass-through bonds funding (fixed rate) callable annuity loans, covered bonds funding ARMs entail assumption of interest rate risk by the borrower, refinancing risk by the issuer—correspondingly, extension risk by the investors—but no prepayment risk, since the loans are prepayable only by *delivering the bonds*; (i.e., at market value). The delivery option enables the borrower to refinance the mortgage at a lower cost in the event of an increase in interest rates over the tenor of the loan—the flip side being that the borrower would suffer a mark-to-market loss if the need arose to close the mortgage when interest rates have fallen (e.g., moving to a different city). In practice, under the current aggregate selection profile of ARMs by Danish borrowers, the delivery option does not provide a significant hedge against interest rate movements since the interest rates on the majority of such loans reset annually.

Owing to the very large quantum of bonds coming up for refinancing within a single month, banks—starting with Nykredit in 2005—have started more than one yearly auction with interest resets offered in April and October.

Managing Credit Risk: Junior Covered Bonds (JCBs)

JCBs, introduced in 2007, help in managing credit risk by providing a way to raise supplementary funding from the market, thereby shielding the banks' balance-sheet, capital, and ordinary creditors from deterioration in credit quality in the cover pools. A JCB-holder has recourse to assets in the cover pool that is subordinate to covered bond holders—and where applicable, to swaps counterparties—but is senior to the banks' ordinary creditors. The proceeds from JCB issuance must necessarily be directed towards the purchase of eligible substitute assets—primarily Danish and EU government bonds—for placement into the cover pool. Reflecting the fact that they are neither gilt-edged nor UCITS compliant, JCBs are costlier to issue, with a risk weight under Basel II of 20 percent, as opposed to 10 percent for ordinary covered bonds.

Risk Allocation Under Different Covered Bonds in Denmark

The allocation of risk across market participants is different depending upon the loan type and the funding instrument utilized. Given the balance-principle that underlies risk management of covered bond programs, there are strict limits to the deviation of the risk characteristics of the bonds from that of the cover pool. Accordingly, the table below summarizes the differences in the way in which the different bonds allocate risks:

	Callable annuity	Non-callable	Capped floater
Bond Characteristics			
Principle payment	Amortizing, with or without interest only period	Bullet	Amortizing, with or without interest only period
Interest payments	Quarterly	Annual	Quarterly
Coupon	Fixed	Fixed	Floating, capped
Currency denomination	DKK	DKK or euro	DKK
Maturities	10-30 years	1-11 years	30 years
Issuance	Tap	Tap or auction	Tap
Opening period	3 years	Until maturity	3 years
Risk Allocation			
Credit risk (cover pool)	Issuer	Issuer	Issuer
Interest rate risk	Investor	Borrower	Borrower (with issuer bearing related credit risk); investor once cap is hit
Refinancing risk	None, since issued as pass-through note with call option mirroring prepayment option on loans	Issuer	None; loans can be prepaid if cap is hit, in which case bonds are called automatically.
Extension risk	None (see above)	Investor	None (see above)
Prepayment risk	Investor	N/A	Investor, once cap is hit

Sources: Danske Markets and Realkredit Danmark.

C. Greater Transparency in the Provision of Investor Protection

Under the OtD model, private-label securitization programs were not subject to supervisory oversight. The GSEs were under the prudential purview of the Office of Federal Housing Enterprise Oversight (OFHEO),¹¹ albeit their obligations to boost home ownership—a by-product of benefits accruing under their Federal charters—also meant a systematic increase in their exposure to sub-prime and Alt-A loans over the last decade. Eligibility to issue covered bonds in many European countries is restricted to supervised financial institutions that need a license to issue the bonds. The supervisory authority exercises oversight of licensed institutions' management of covered bond programs and retains the right to withdraw the license for failure to do so.

In practical terms, prudential oversight translates into a number of constraints and obligations on the institutions issuing covered bonds. The most important of these, from an investor's perspective, are ensuring greater layers of equity buffer and credit enhancement in the transaction, and making property valuation more robust to the cycle (Table 2).

Credit enhancement

Reliance on overcollateralization (OC) is a credit enhancement strategy common to U.S. RMBS and European covered bond programs. A minimum level of excess collateral and its vestment in ratings-limited assets is mandated by legislation for covered bonds issued under special-law based frameworks. In contrast, internal credit enhancement for prime jumbo and low-rate premium Alt-A loans-backed RMBS was typically limited to senior-subordinate tranching. OC and excess spread were primarily added to high-rate premium Alt-A and sub-prime RMBS.¹² Credit enhancement in RMBS deals was, moreover, substantially limited by the fact that OC was often built-up gradually over the first 24 months of the life of the deal and drawn down thereafter. This exposed note-holders to significantly greater losses relative to a deal where OC was continuously maintained above a certain threshold whenever either: (i) home values started decreasing immediately after the deal was completed (as was the case for loans securitized at the peak of the housing bubble); or (ii) where the spike in loan defaults within a securitization structure was so discrete that the depleted OC (post draw-down) left very little buffer to cushion the loss.¹³ In contrast, OC in covered bond programs is constrained by statute to continuously exceed a pre-specified minimum level determined by a number of risk metrics and asset coverage tests (ACTs) throughout the tenor of the bonds.

¹¹ OFHEO was legislatively merged with the Federal Housing Finance Board and parts of the U.S. Department of Housing and Urban Development in 2008 to form the new Federal Housing Finance Agency (FHFA), now the supervisor of Fannie Mae, Freddie Mac, and the 12 Federal Home Loan Banks.

¹² Mansukhani (2006).

¹³ Goodman et. al. (2008).

Table 2. Comparison of U.S. RMBS and Covered Bond Programs

	US RMBS	European Mortgage CBs 1/
Loans and Collateral		
Type	Residential mortgage loans.	Typically a mix of residential and commercial mortgage loans.
Property valuation	See Table 3 for details.	See Table 3 for details.
Issuer		
Issuer	GSE or special purpose vehicle (SPV) sponsored by investment bank or bank holding company.	Financial institution
Relationship to originator	Issuer is not necessarily the originator nor necessarily part of the originator's group.	Typically the same, or part of the same group. In Spain, the pooled funding model used by the cajas entails a single issuer ("Fondo") securitizing a mortgage pool across multiple lenders who jointly own the issuer.
Capital cost	Only applies to retained interest in the RMBS loan pool (e.g., first loss piece), for which it depends on Basel II methodology applied.	Depends on the Basel II methodology applied to the entire pool.
Oversight and licensing	Federal Housing Finance Agency exercises regulatory oversight over the GSEs. SPV issuers are not subject to regulatory oversight nor need to be specially licensed to issue.	Issuer is a supervised financial institution licensed to issue the bonds. Covered bond programs subject to special supervision.
Management of collateral pool and of cash flows to, and from, the program	Typically, loan originator or outsourced to specialized mortgage servicing firm.	Cover pool and obligations to investor are managed by the issuer/originator.
Investors		
Funding source and investor base	Capital market funding spread over wide investor base.	Capital market funding spread over wide investor base.
Capital cost	Depends on the rating of the RMBS/CDO tranche purchased.	10 percent risk weight under standardized Basel II for banks.
Preferential claim to collateral in the event of issuer insolvency	In a typical securitization deal, preferential access to collateral by note holders is an integral component of the financial contract.	Yes, typically with segregation of the cover pool into an estate separate from issuer's insolvency estate. In Spain, asset segregation does not exist. Instead, bond holders have preferential access to cash flows ensuing from all mortgage loans on the balance-sheet.
Residual recourse on sponsor/issuer	No	Yes
Program Features		
Oversight and monitoring	None by regulatory authorities. Due diligence performed by asset monitor, bond trustee, and CRAs.	CB program and cover pool quality and management is subject to special supervision. Due diligence is performed by CRAs, and typically also, by an investor representative (e.g., cover pool monitor).
Security type	Pass-through structure typical.	Bullet structure typical, including soft bullets. Danish 30 year callables and (capped) floaters are issued as pass-throughs.
Prepayment option and risk	Loans are typically payable-at-par by the borrower without penalty. Prepayment risk is borne by RMBS investors	Prepayment penalties exist, but can be low (e.g., France and Spain), and issuer typically bears the risk. Danish pass-throughs are collateralized by loans payable-at-par with prepayment risk borne by the covered bond investors.

Table 2. Comparison of U.S. RMBS and Covered Bond Programs (continued)

	US RMBS	European Mortgage CBs 1/
Collateral management	Collateral pool is typically static and cash flow shortfalls owing to borrower delinquency/default are borne by the investor upon exhaustion of credit enhancement buffers	Collateral pool is dynamically managed by the issuer who is obliged to (i) make up for unexpected shortfalls in cash flows from the pool to cover cash obligations due to bond holders; and (ii) maintain individual LTV, PV and cash flow matching thresholds pre- and post-stress tests
Cash flow allocation	Depends on waterfall specific to the deal. Priority may be impacted by liquidity and credit events	When issuer is a <i>going concern</i> , cashflow shortfalls are not an issue. Under a <i>gone concern</i> scenario, pro-rata allocation is typical.
Credit enhancement techniques utilized	Mortgage insurance (GSE/private) is primary external method. Internal enhancements include tranching investor class into a senior-subordinate structure, equity injections by sponsor (initially, via establishing a first loss piece, or a reserve funded by excess spread)	Primarily via overcollateralization <i>and</i> through market risk hedging techniques and instruments
Overcollateralization	Voluntary means of internal credit enhancement, primarily a component of alt-a and subprime loan pool securitization	Mandatory minima established by statute. Voluntary levels often in excess of minima in order to obtain necessary rating uplift relative to issuer senior debt rating
Program rating	Depends on level(s) of credit enhancement for the investors as a class, as well as relative levels of credit and prepayment protection provided to individual tranches via the waterfall structure	Uplift relative to issuer's senior debt rating depends on overcollateralization levels, degree of asset-liability maturity mismatch between cover pool and bond liabilities, systemic importance of issuer and CB market, strength of legal framework in protecting bond holder rights under issuer insolvency. Rating also depends upon ratings of sponsor bank(s) and service providers
Payment acceleration	Prospectus defines performance triggers and covenants	Defined by statute; typically, following issuer default <i>and</i> CB program default

Sources: Asociación Hipotecaria Española, Djbél (2005), Fabozzi (2006a), Fitch Ratings (2009), Goodman et. al. (2008), Moody's Investors Service (2010a), Realkreditrådet (2003, 2007), Standard and Poor's (2009), Verband Deutscher, and Pfandbriefbanken (2009).

Note: 1/ Description confined to covered bonds issued under a special law based framework.

The Capital Requirements Directive (CRD) of the European Union (EU) establishes ceilings on mortgage LTV ratios in order for them to carry minimum risk weights under Basel II. Continuous observance of these limits is a necessary condition for bonds collateralized by these loans to be deemed covered bonds and carry capital relief in the form of a lower risk weight of 10 percent. In many EU countries, borrowers' cumulative LTV ratios can exceed the ceilings (in a range of 60–80 percent depending on the jurisdiction). But in order to make the loan eligible for inclusion in the cover pool, the investors are only exposed to that portion of the loan that meets the statutory LTV limit while still enjoying a first lien on the property that collateralized the mortgage loan.

Collateral assessment

A final contribution of legislation and regulation is the placement of tighter performance standards on the property valuation process. Under the CRD, valuation of a property in accordance with its long-term sustainable resale price, conservatively capitalized income

earning capacity, or similarly discounted reconstruction cost, is the metric against which regulatory LTV limits are assessed. Standards are not uniform across the EU, but most of the major covered bonds statutes utilize a valuation basis (*mortgage lending value*) and associated methodology conforming to the CRD specification (Table 3).

In the U.S., property valuation for lending purposes is usually based on an appraised market value derived at a single point in time. Unlike the *mortgage lending value*, there is no legal or regulatory requirement that appraisers filter out the impact of short-term speculative pressures and other market noise in deriving this value.¹⁴ Loeb (2005) found in his assessment of close to 3 million purchase mortgages originated during 1977–2004, that relying

Full Appraisal Bias
(Purchase Transactions, 1977–2004)

Appraisal value/ purchase price	Share of mortgages in sample
≤ 95 %	Less than 4 percent
≥ 100 %	More than 93 percent
≥ 105 %	More than 9 percent
≥ 110 %	~ 5 percent

Source: Loeb (2005).

on qualified and experienced appraisers was not sufficient to preclude systematic upward bias in property valuation. This is evidenced, for example, by the left-skewed frequency distribution of the ratio of appraised-to-sales value (text table). This statistical bias pre-dated the housing boom of 2003–06. A joint assessment of adherence by mortgage lenders to the Federal Deposit Insurance Corporation’s (FDIC) 1994 appraisal guidelines related such biases in property valuation to sales pressures on appraisers.¹⁵ This study emphasized the use by lenders of borrower-ordered or readdressed appraisals, contamination of the appraiser selection process; for e.g., due to interference by lender sales teams, and lack of adequate internal controls at financial institutions.

Insofar as the consequences of biased valuation in a hot property market fall adversely on the appraiser and lender, moral hazard problems are susceptible to better control even outside of supervisory enforcement of standards. The retention of loans on a lender’s balance-sheet under a covered bonds funding model means that the loss-given-default/foreclosure on a property is greater than in the U.S. for a similar level of positive valuation bias. Moreover, it is not uncommon in a number of European countries to require that appraiser indemnity be extended by statute to cover valuation services performed for the lender. Mistakes—while insurable—are, therefore, costlier in pecuniary terms to an appraiser.

¹⁴ Council of Mortgage Lenders (2007).

¹⁵ Office of the Comptroller of the Currency et. al. (2003). For the guidelines, see FDIC (1994).

Table 3. Valuation of Residential Property for Lending Purposes

Denmark 2/	France	Germany	Spain 3/	U.S.A.
Valuation Bases				
MV; use of AVMs granted to mortgage credit institutions on a discretionary basis by the Danish FSA, on submission of calculation and data collection models. Basis of approval not known.	MV for general law based covered bonds; MLV for loans sold by Credit Foncier to subsidiary issuing obligations foncier.	<i>MLV for loans funded via covered bonds; MV used otherwise. Use of AVMs is restricted to quality control and property value adjustment purposes in the context of Basel II, and must provide the option of manual adjustment of individual valuation data.</i>	MLV. Use of AVMs is restricted to loan portfolio value monitoring and quality control purposes.	MV or via an AVM
<i>based on arms-length transaction</i>	<i>MV based on arms-length transaction According to Regulation 99-10 relating to Société de Crédit Foncier, real estate properties are valued on a yearly basis. They are valued conservatively, excluding any element of a speculative nature. Valuations have to be made on the basis of the lasting, long-term characteristics of the real estate properties, normal market and local conditions, the current use of the real estate and other uses to which it could be assigned. This mortgage lending value shall be determined clearly and transparently in writing and may not exceed the market value.</i>	<i>MV based on arms-length transaction MLV conceived as the top-limit for long-term mortgage credits, based on sustainable aspects of the property and its present and alternative uses, free of short-term speculation and volatility. MLV is constrained to be no more than the MV by regulation. Valuation is to be carried out by an independent and approved valuer.</i>	<i>MLV conceived as value of the real estate determined by prudent appraisal of the future potential for commercially exploiting the real estate, taking into account its long-lasting aspects, normal and local market conditions, its use at the time of appraisal and its alternative uses, setting aside any speculative elements of the market price.</i>	
Valuation Methodology				
Comparison method	Comparison method and depreciated cost methods for single family homes, and income method for rental properties.	<i>When using MLV basis</i>	Comparison, Depreciated cost, and Income methods.	Comparison method for single-family and apartment homes; income method for rental properties.
<i>Fixtures and fittings are considered part of the value of the property.</i>	<i>Fixtures and fittings are considered part of the value of the property.</i>	<i>Comparison, depreciated reconstruction cost, and income methods are applied. The income stream is limited to sustainable net rental income, excluding extraordinary cash-flows, and net of management costs. Moreover, capitalization rates are estimated conservatively.</i>	<i>Use of most conservative value obtained encouraged.</i>	
		<i>When using MV basis</i>		
		<i>Comparison method for freehold apartments, single-family, and town houses, except for single-family homes that are difficult to compare to other local properties, for which the depreciated cost method is used.</i>		

Table 3. Valuation of Residential Property for Lending Purposes (continued)

Denmark 2/	France	Germany	Spain 3/	U.S.A.
Loan-to-Value Thresholds 4/				
80 percent of the MV of the property.	80 percent of MV for general-law based, 80 percent of MLV for obligations foncieres (home purchase); 60 percent of MLV (guarantee mortgages).	60 percent of the MLV of the property.	With credit insurance, 95 percent of the MLV of the property; without, 80 percent.	No limit, but requires mortgage insurance if LTV exceeds 80 percent.
Property Insurance				
Required by law for fire, flood, and external damage (unspecified)	Information unavailable.	Required by law covering property and all fixtures, etc. used in valuation.	Required by law.	Required by most lenders.
Valuer/Appraiser				
Qualification requirements: no formal legal requirements, but "real estate agent" is a legally protected title.	Qualification requirements: no formal legal requirements; however, professional standards exist and certification standards are under development.	Qualification requirements: No formal legal requirements or licensing; however professional certification; e.g., appointment of the RICS as Chartered Surveyor is a common quality control measure exercised.	Qualification requirements: Title of valuer is legally protected, and valuers are required to meet minimum educational requirements and valuation companies/lenders' valuation departments must be licensed by Banca de España.	Qualification requirements: No formal legal requirements; however, professional certification or experience required by regulation and by industry. Knowledge of USPAP required. Appraisers valuing properties backing loans sold to GSEs after May 1, 2009, must be licensed and certified by the state in which the property resides.
Independence: Valuers traditionally work in the mortgage credit institutions, albeit recent trends indicate a considerable number of valuations for lending purposes are carried out by external appraisers and real estate agents.	Independence: information unavailable.	Independence: Valuers are required by the Pfandbriefe Act to be independent of the lender; i.e., external appraiser or if lender-employed, fire-walled from lending/sales department.	Independence: Specific legal requirements related to internal controls and technical organization to ensure independent and prudent valuation.	Independence: Valuers are required by regulation to be independent of lender and also not a representative of the parties to the property sale transaction. Loan production staff cannot be involved in appraiser selection.
Professional indemnity: lenders using in-house valuers bear risk of error in valuation themselves; indemnity of external appraisers for mistakes is not common and insurance is not required.	Professional indemnity: legally required.	Professional indemnity: No legal requirement, but in practice, valuations are accepted only when the valuer proves insurance covering the expected property value.	Professional indemnity: legally required.	Professional indemnity: not common practice.

Sources: Asociación Hipotecaria Española, European Mortgage Federation (2009), Loeb's (2005), Realkreditrådet, and Verband Deutscher Pfandbriefbanken.

Notes: 1/ MV = Market Value; MLV = Mortgage Lending Value; AVM = Automated Valuation Model.

2/ Applies to both commercial banks and mortgage credit institutions.

3/ Applies to mortgage loans funded via cedulas hipotecarias, mortgage covered bonds, or ultimately, via mortgage passthrough certificates (multi cedulas).

4/ A borrower's cumulative LTV is often in excess of the limit stipulated here, especially for a purchase mortgage loan. However, funding via covered bonds is limited to stay within the stipulated limit.

Security of bond-holder interests

When the issuer is a going concern

When the issuer is solvent and not facing funding constraints, investors face no payment continuity risk in special-law based covered bond programs. The issuer is obliged to honor payments falling due over the life of the bonds. Supervisory requirements ensure that the issuer top-up the cover pool to substitute for realized and anticipated PV shortfalls due to adverse credit or house price developments.

Payment continuity risk can also be mitigated by hedging strategies under the OtD model, albeit often not as comprehensively, nor as transparently as in special law based covered bond models. Loan service agents or deal managers usually provide or purchase a liquidity facility or set aside a reserve fund to ensure that the cash flow to investors does not deviate from its contracted time-path owing to temporary loan repayment shortfalls. However, payment waterfalls readjust post-utilization of liquidity facilities, favoring repayments to the liquidity provider over payments to investors. In such cases, the evaluation of current and future cash flow risk becomes a more complex exercise.¹⁶ Even if all delinquent mortgages eventually cure, note holders can still suffer significant losses on a PV-of-cash-flows basis.

In the case where uncured defaults in a RMBS cover pool exceed a critical threshold, they automatically translate into note-holder losses since they have no further recourse to the sponsor's insolvency estate. The financial institution that arranges the securitization deal, and sometimes provides liquidity and other hedge protection, is under no legal obligation to *re-wrap* the RMBS program back onto its balance-sheet. Hence, in the event that credit losses or cash flow shortfalls increase in magnitude to overwhelm hedge buffers, investors have no guarantee that the deal manager—usually an investment bank or commercial bank—will provide additional support. In fact, lack of such support is the norm.

Post issuer insolvency

Off-balance-sheet special purpose entities (SPVs) issuing RMBS are designed to be bankruptcy remote. The failure of the sponsor or deal manager need not have a direct impact on investors. Sponsor default could become materially relevant for investors where cash flow

¹⁶ For example, increasing delinquencies in a RMBS loan pool—if accompanied by a lag in declaration of defaults and in foreclosures—can lead to a relative *gain (loss)* for subordinate (senior) note holders as the servicer steps in to make interest, tax, and (if applicable) mortgage insurance payments until the loan cures or is put into the default pipeline. If, and when, the loan eventually defaults, the cash-flow waterfall typically flips to redirect payments first to the liquidity provider which increases principal losses incurred by the senior creditors. While the definition of a loan default can be tailored at deal initiation to be more sensitive to missed payments in order to capture excess spread to the benefit of senior note holders, this is not a universal feature of RMBS transactions. See for e.g., Batchvarov et. al. (2006), Fabozzi (2006b), and Goodman et. al. (2008) for further discussion.

and credit risk protection—a liquidity facility or a pay-as-you-go credit default swap (CDS)—are being provided by the sponsor. Similarly, bankruptcy of the loan servicing agent could materially adversely impact security of investor claims. These risks are, therefore, addressed at deal initiation—in response to CRA imposed requirements for obtaining a desired rating—by ensuring successor arrangements to replace the hedge provider or loan servicer under these contingencies without a significant increase in costs to the investors.

Covered bond holders also benefit from comprehensive and clear protection under a *gone concern* environment. Cover pools are either bankruptcy remote, or as in Spain, bond holders have a priority claim on the entire set of mortgage loans in the lender's balance-sheet. Bond holders also benefit from dual recourse; i.e., any shortfall in the cover pool is compensated for by an unsecured claim on the issuer's insolvency estate that ranks *pari passu* with the financial institution's other creditors. As noted above, this benefit has no counter-part under the OtD model. Successor arrangements are typically comprehensively defined under the law for covered bond programs. Upon declaration of issuer bankruptcy, an independent cover pool administrator is appointed to take over management of the cover pool from the issuer. In a number of jurisdictions, a wide range of financial strategies is available to these agents to manage the cover pool and its refinancing, including sale of new loans, liquidation and sale of substitute assets, transfer to another licensed issuer of part or all of the program, and in some cases; (e.g., Sweden), ability to borrow against cover pool collateral.

D. Caveats

The salutary incentive impact of market size

Two principle advantages of the covered bond framework for European countries can be seen to follow from the systemic importance of this instrument as a funding and liquidity management tool. First, incentives for financial institutions to manage program risks hinge upon the reliance they place on the bonds to fund their credit extension and trading businesses. The reputation cost of a program default could be punitive in terms of its impact on refinancing ability and profit margin.

Second, the enhanced security for bond holders under issuer insolvency appears—in practice—to be less a function of legal protection than of country authorities' incentives in preventing the adverse systemic implications of failure of a (major) bond program. Since the covered bond markets are critical to both funding real estate and public sector loans and for banks' liquidity management, a loss of confidence in the instrument could have serious real and financial sector implications. Authorities may, therefore, prefer to ensure a transfer of the insolvent issuer's bond programs to other eligible issuers with minimal haircuts to bond holders. Dübel (2009) notes five Pfandbrief bank insolvencies since 1995, none of which tested the performance of their covered bond programs *within the bankruptcy framework*.

Borrower incentives and loan performance

It has been argued in the preceding discussion that incentives for screening borrowers' ability and willingness to repay are stronger under the covered bond model than under the OtD model. However, changing the funding strategy and regulation alone do not necessarily ensure better borrower compliance with the terms of the loan contract over the loan term. This is largely a function of the amount of equity the borrower has in the property, repayment capacity (typically, a function of employment status), and the nature of recourse available to the lender.¹⁷ The latter is a function of the (personal) bankruptcy framework, and hence, differences therein across countries will generate differences in mortgage default frequencies. Recourse of lenders on borrowers is limited in a number of U.S. states, debt extinction is faster under Chapter 7 bankruptcy, and filing under Chapter 13 is more expensive following the passage of the Bankruptcy Abuse Protection and Consumer Protection Act of 2005. Consequently, incentivizing borrowers to remain current on underwater mortgages is harder, and changing the funding model alone will not make loan quality more robust to the cycle. The same factors are also important in driving differential loan performance outside the U.S. The delinquency and foreclosure statistics of the 2006-07 vintages of residential mortgages securitizing Spanish RMBS are significantly higher than more seasoned vintages and closer to non-GSE securitized U.S. loans, albeit still substantially lower than subprime and Alt-A. These loans exhibit contractual features (high LTV-at-origination and reverse amortization windows) and poor borrower repayment incentives (high proportion of non-resident or first-time borrowers) similar to corresponding vintages of non-conforming loan in the U.S.¹⁸

How do unsecured creditors fare under the covered bonds model?

The extensive legal protection granted to covered bond holders' security interests in Europe is in part justified by the greater safety of (residential) mortgage loans relative to other assets on a bank's book. The preceding discussion begs the question of the extent to which such protection can be extended to secured creditors in the U.S. if—partly reflecting the differences in the personal bankruptcy framework—the credit quality of residential mortgage loans is not as robust to the business cycle? Applied to the safeguards protecting the rights of covered bond investors, a trade-off may arise between ensuring the contractual characteristics that make covered bonds an attractive—and cost-efficient—funding vehicle against ensuring adequate protection to the interests of the issuer's unsecured creditors.

¹⁷ A number of socio-cultural factors—beyond the scope of the current analysis—also arguably influence the decision. Personal and professional mobility as well as the default/foreclosure rate in one's locality or social group may be vitally important.

¹⁸ See Moody's Investors Service (2009) or Standard and Poor's (2010) for a discussion of recent developments in Spanish RMBS loan pools.

Take a situation where the credit quality of residential mortgages collateralizing securities issued under a bank's covered bond program is highly sensitive to the business cycle. In this case, maintenance of minimum OC levels in the cover pool and the dual recourse available to bond holders can prove to be costly to the bank's unsecured creditors and the deposit insurance fund (DIF) in the event of bank insolvency. This trade-off exists independent of the country in which banks issue covered bonds to fund loans retained on their balance-sheets and is an important reason for imposing comprehensive entry, regulatory risk, and supervisory constraints on the business. The necessity of ensuring that the business operates under such constraints is even greater when credit quality of the collateral securing the bonds is more cyclically sensitive. Alternatively, one could consider making the extensive legal protection available to covered bond holders contingent on whether or not deterioration in cover pool asset quality rendered the issuer insolvent. However, this would probably result in a product significantly different from the one that has been so successful in Europe and could lead to a dissipation of the benefit of low cost issuance.

III. A ROBUST FRAMEWORK FOR U.S. COVERED BONDS

A. The Rationale for Issuing Under a Legal Framework

The landscape prior to the FDIC's final policy statement

To date there have been two covered bond issues from U.S. financial institutions. Washington Mutual (WaMu) made the first issue of covered bonds backed by U.S. residential mortgage loans in September 2006, followed by a similar issue by Bank of America (BoA) in 2007.

Both bonds were issued into the euro jumbo covered bond market by SPVs that were legally separated from the federally insured depositories (FIDI) (Table 4 and Figure 2).¹⁹ The proceeds of the issue were lent to the FIDI in each case, which in turn provided a *perfected security interest* on a portfolio of mortgage bonds backed by (residential) mortgage loans pledged to a mortgage bond trustee. OC was incorporated into both deals with the pool of mortgage bonds exceeding the issued covered bonds in value.

The design of these covered bond transactions reflected the constraints on the perfection of bond holders' security interests upon FIDI insolvency under the Federal Deposit Insurance Act (FDIA). Under Title 12 of the U.S. Code (12 U.S.C.), §1821(e)(13)(C), the FDIC can stay the execution of a claim by the mortgage bond trustee to terminate the contract and take possession of the mortgages for up to 45 (respectively, 90) days in a FIDI conservatorship (respectively, receivership). Besides the option to eventually honor the original terms of the contract, the FDIC also retains the option, under 12 U.S.C. §1821(e)(12), to repudiate the FIDI's contractual obligations to the mortgage bond holder (i.e., the SPV), and hence, by

¹⁹ A jumbo issue is one where the volume of funding required exceeds EUR 1 billion.

extension to the covered bond holders to release collateral (Figure 3). In this case, in lieu of the collateral, the FDIC can execute cash payment up to the face value of the (mortgage) bonds outstanding. In the event that the market value of the covered bonds was assessed to be less than their face value, the FDIC would, in principle, be empowered to pay the market value.²⁰

Table 4. Main Features of WaMu and BoA Structured Covered Bond Issues

	WaMu	BoA
Size of Covered Bonds Program	EUR 20 billion	EUR 20 billion
Amount Issued	USD 5.1 billion (Sept. 2006) and EUR 2 billion (May 2007)	EUR 2 billion (April 2007)
Structure	5/10 year fixed rate soft bullet (Sept. 2006); 7 year fixed rate soft bullet (May 2007) <i>extendible by 4 months at 1M EURIBOR plus 5bps (May 2007)</i>	10 year fixed rate soft bullet <i>extendible by 4 months at 1M EURIBOR plus 6bps</i>
Collateral 1/	USD 2.7 billion in mortgage bond issued by WaMu • <i>Floating rate of 1M USD LIBOR minus 4.63bps</i> • <i>Mortgage bonds backed by residential mortgage loans with WA OLTV of 64.35 percent; WA FICO of 754; LTV eligibility limit of 75% for cover pool inclusion; and voluntary overcollateralization floor of 7 percent.</i>	USD 2.7 billion in mortgage bonds issued by Bank of America • <i>Floating rate of 1M USD LIBOR</i> • <i>Mortgage bonds backed by residential (hybrid AR and FR) mortgage loans with WA OLTV of 65.9 percent; WA FICO of 743; LTV eligibility limit of 75 percent for cover pool inclusion; and voluntary overcollateralization floor of 7 percent.</i>
Issue Rating	AAA (S&P); Aaa (MIS); AAA (Fitch)	AAA (S&P); Aaa (MIS); AAA (Fitch)
Hedging Techniques Deployed 2/	Currency and interest rate swap <i>and</i> general investment contract	Currency and interest rate swap <i>and</i> deposit account contract

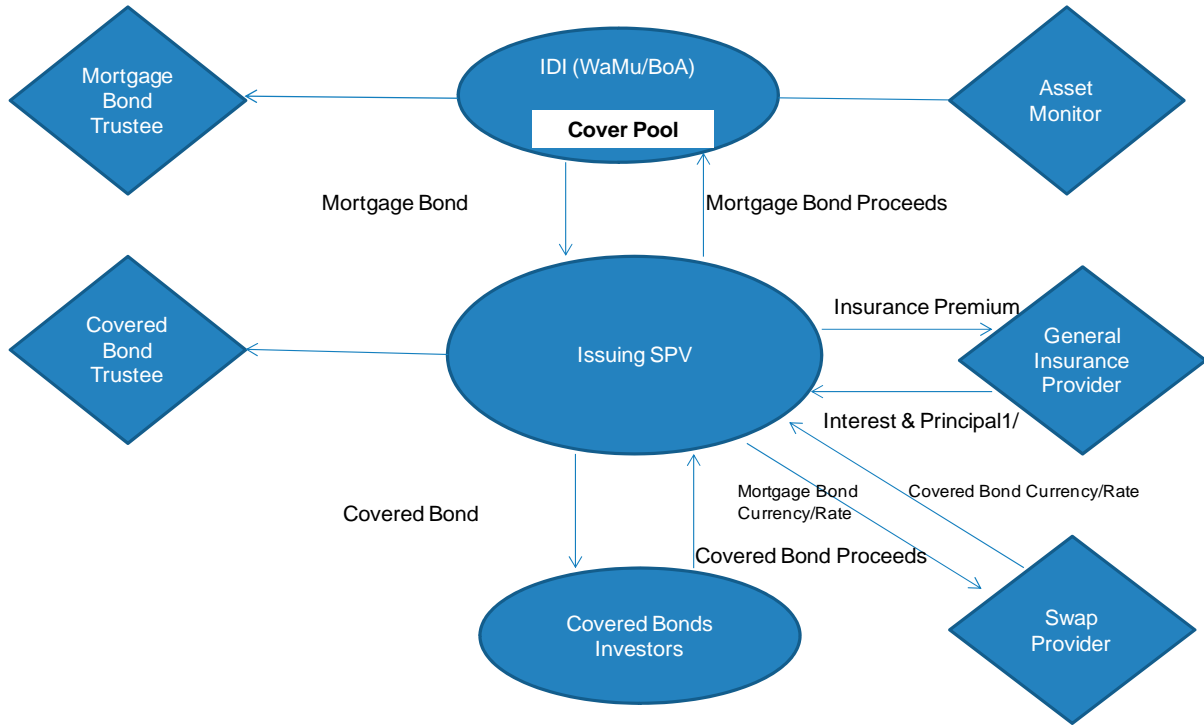
Sources: Author's summary from Moody's Investors' Service (2006) and issuers' final terms.

Note: 1/ For WaMu, collateral information is for the EUR 2 billion of Series 3 bonds issued in May 2007. For the September 2006 issue, the cover pool consisted of 5/1 ARMs, 47 percent exposure to California, weighted average (WA) FICO of 742 and WA LTV of 68 percent, WA seasoning of 24 months, and 61 percent of loans in the cover pool being interest only.

2/ Subject to no change in German legislation, swap counterparties rank below covered bonds holders in the event of program or IDI default.

²⁰ In its September 5, 2006 pre-sales report on WaMu's covered bond program, Moody's Investors Service (2006) noted this as a post-insolvency legal risk factor. It assessed this risk to be partially mitigated by daily adjustments to the interest rate on the mortgage bonds, and potentially further, by the issuer adjusting the level of OC in the cover pools to minimize the likelihood of market value of the cover pool dipping below face value of the bonds.

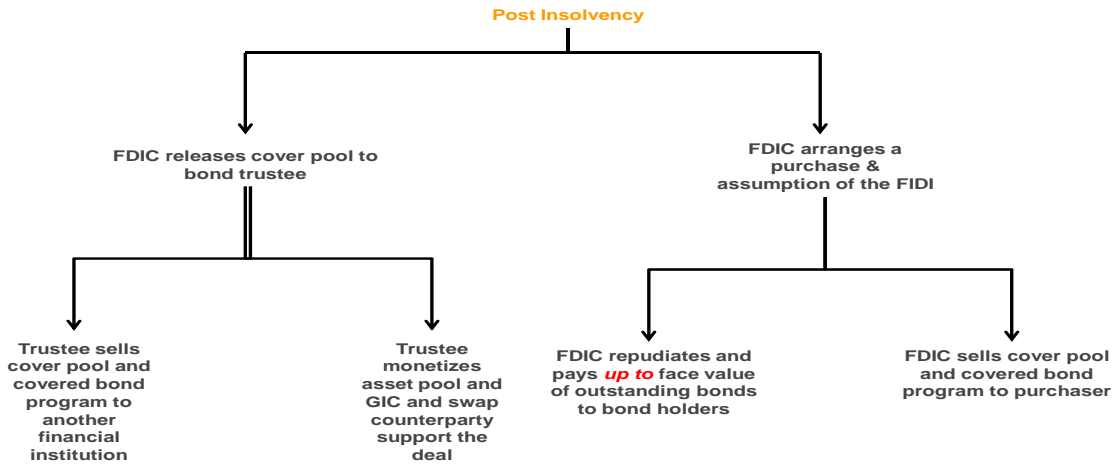
Figure 2. SPV Issuance Structure of U.S. Covered Bond Programs



Source: U.S. Department of the Treasury (2009); and author.

Note: ^{1/} Conditional on the occurrence of a trigger event; e.g., mortgage bond issuer insolvency or default of the covered bonds.

Figure 3. FDIC Treatment of Bond Holder Claims



Source: FDIC; and author.

In the case of covered bond programs, wherein the FIDI wanted to issue bonds that would not accelerate if it failed—a necessary condition for the bonds to get the desired rating uplift from the CRAs—a two-tier structure had to be utilized wherein a trust owned the secured mortgage bonds and used it to collateralize the covered bonds. Once the trustee obtained (and sold) the collateral following FIDI insolvency, it would transfer these (sales) proceeds to the general investment contract (GIC) provider who in turn would initiate payment of interest and principal at a pre-specified rate agreed to at deal initiation. The swap counterparty would pick up the spread—and currency—differential between:

- (*FIDI is a going concern*) the mortgage bond return and the covered bond return (mortgage bond payments are U.S. dollar denominated; covered bond payments are euro denominated);
- (*FIDI is a gone concern / bond acceleration*) the GIC return and the yield on the covered bonds.

Moreover, the swap counterparty was also responsible for covering for the *delay risk*; i.e., the time the FDIC took to decide whether it would assume and assign the covered bonds or reject them—which could add up to 45 or 90 days.

Shortcomings

Risk of program non-compliance and investor protection under bond default

Covered bond issuance by U.S. FIDIs was undertaken outside of a specific legal framework applicable to covered bonds and without specifically applicable regulatory constraints. Incentives for issuers to limit risk taking rely exclusively on constraints imposed by CRAs. The programs initiated, and utilized thus far, are small in size relative to the overall business of the issuers, thereby potentially softening the incentive constraints imposed by CRAs and by cross-issuer competition for market funding. CRAs specify conditions relating to deployment of hedges to mitigate risks related to movements in market prices (swaps), issuer insolvency (GIC), and changes to credit quality of the cover pool (OC floors). The issuer must design the deal structure and manage program risks so that a desired rating can be obtained at the point of bond issuance and through the tenor of the program.

Generally speaking, the effectiveness of these constraints on the quality of risk management of the program will depend upon the degree to which an issuer's depends upon this instrument to fund its business. In Europe, the need to issue covered bonds in large volume, on a regular basis, is critical to successfully finance public sector and mortgage loans. Ratings downgrades of ongoing programs can, therefore, be very damaging in terms of the impact on the reputation, cost, and market access of an issuer.

In contrast, issuance by U.S. institutions is at an incipient stage, the existing programs are small, and cheap funding alternatives exist in the form of FHLB advances, GSE (and pre-crisis, also private label) securitization. Under these circumstances, the magnitude and

quality of market discipline that can be imposed over the tenor of a covered bond program will generally depend on the pecuniary impact of weaker program performance or program failure on the issuer's business. Reputation costs, *if limited to the covered bond business alone*, will be insufficient to provide incentives for robust risk management in the event that credit quality in the cover pool deteriorates significantly.

Under the current funding mix, a U.S. FIDI may have less incentive than a European mortgage bank to strengthen performance relative to CRA risk benchmarks in order to maintain program ratings. This can adversely impact bond holders' expected returns. For example, the incentive to mitigate the risk of the market value of the cover pool going below that of the outstanding principal on the bonds by adjusting the level of voluntary OC could weaken upon a worsening in cover pool credit performance. And, the possibility of ratings haircuts on the covered bonds will not provide sufficient counter-balance to the extent that such haircuts only impact the uplift of the program over that of the issuer's senior debt. In the event that the bonds do eventually accelerate, investors do not have a right to residual recourse on the FIDI, and hence, their losses can be significant in such circumstances.²¹

Arguably, these were not important factors impinging upon performance of the covered bond programs of WaMu and BoA described above. Nonetheless, in the absence of a statutory framework providing legal certainty, CRAs' assessment of the cost to the issuer of bond acceleration becomes vital to guiding issuer incentives throughout the tenor of the program.

Perfection of bond holders' security interests under issuer insolvency

An additional problem is the absence of legal certainty regarding perfection of bond holders' security interests under issuer insolvency.

First, the 45-to-90 day delay could be costly. Should this delay materially constrain the bond trustee in attempting a sale of the cover pool upon its release (e.g., very short time remains until the covered bonds mature), this can increase the haircut experienced by bond holders on their investment. This issue acquires greater significance in the U.S. context because bond holders do not have residual recourse on the issuer's insolvency estate.

Second, there is a potential loss of interest income ensuing from the fact that the insolvency administrator was not obliged to make good any interest deferred during the delay period.

²¹ In addition, there need be no direct linkage between acceleration of the covered bonds and bankruptcy of the FIDI issuer. Neither the FIDI nor its creditors have the ability under bank insolvency statutes to direct the institution into conservatorship or receivership. Such a decision can be made solely by the FIDI's primary regulator. In the event of deterioration in cover pool asset quality—and subsequent failure of an ACT that triggers acceleration of the bonds—it is possible, that the FIDI's regulator could make a determination to release the cover pool and let the bank continue as a viable entity. As long as bond holders do not have dual recourse (which is the case for the incumbent programs of BoA and JPMC), this is an additional risk bond holders have to consider in pricing and investing in such securities.

The swap counterparty was contractually obliged to subrogate itself in place of the issuer for this purpose. Until recently, however, legal certainty regarding this obligation appears to have been missing as reflected in the differing—and opportunistic—interpretation of the ability to terminate swap agreements in the aftermath of the bankruptcy of Lehman Brothers.²²

Third, there exists potential for a conflict of interest between bond holders and the insolvency administrator due to the repudiation option available to the latter whose usage may be to the detriment of the investors (Annex). However, this paper's analysis shows that the likelihood of a conflict of interest would be low in the absence of a covered bond market of reasonable size. Moreover, the attendant risks to bond holders can be hedged using the SPV-based issuance structure utilized by WaMu and BoA for their ongoing covered bond programs.

The conflict of interest problem is largely relevant to cases where FIDI insolvency is brought about by deterioration in assets outside of the cover pool. The case of interest is one where the expected PV of cash flows to the covered bonds is greater than the face value of the outstanding principal. In this case, the FDIC may prefer to pay face value to the bond holders and retain the cover pool to enhance resale value in a purchase and assumption of the insolvent estate by (an) other FIDI(s). Since the FDIC represents the interests of a single class of creditors (i.e., insured depositors), it has a clear-cut incentive to direct revenue from asset sales and operating cash flows to first cover such claims besides its own cost of administering the FIDI's insolvency estate.

The question of the extent to which such a situation would be relevant in the U.S. is an empirical one. But, recent evidence suggests that in the event of a systemic dislocation in the financial sector, (residential) mortgage loan quality in the U.S. could deteriorate substantially. Consequently, it is plausible that losses to the cover pool—rather than losses in other areas of business—become responsible for FIDI insolvency. In such circumstances, the FDIC may prefer to release collateral to the bond trustee over repudiating the contract. The relevant economic question is the trade-off between providing levels of investor protection; (i.e., dual recourse) that make the covered bond product attractive and cost effective and the negative externality imposed on the DIF and unsecured creditors by a combination of transfer of good assets to the cover pool (pre-insolvency) and dual recourse (post-insolvency).

²² The New York Bankruptcy Court's July 2009 ruling in the *Lehman Brothers Special Finance vs. Metavante* case has now established a legal precedent potentially safeguarding bond holder interest payments during the delay period in the event that a hedge contract establishing such a guarantee exists. In this particular case, the debtor in question; i.e., an out-of-the-money swaps counterparty to the Lehman subsidiary, unsuccessfully claimed a right to terminate a contract—without payment of compensatory damages/contract replacement cost—that it interpreted as a *burdensome executory contract*. See for e.g., Marchetti (2010).

The current landscape, following the FDIC's final policy statement (FPS)

On July 18, 2008, the FDIC released a FPS regarding treatment of covered bond holders' claims in the event of FIDI insolvency. Subject to the constraints on the programs outlined below (Table 5), the FDIC essentially (i) recognized bonds issued by the FIDIs under a covered bond program as constituting properly perfected secured obligations; hence, (ii) following 12 U.S.C. §1821(e)(12), prohibiting by statute, the FDIC—in its role as conservator or receiver—from avoiding such interest; thereby (iii) securing its obligation when choosing the option to repudiate the contract to equal the face value of the principal outstanding on the bonds plus any unpaid interest that had accrued *as of the date of the FDIC's takeover* of the FIDI.²³ The most important of the constraints that the FDIC required FIDI covered bond issuers to meet was a ceiling on issuance of up to 4 percent of the FIDI's liabilities.

Table 5. Conditions for Early Release of Cover Pool to Bond Holders

Type of Constraint	Condition to be Met for Early Release of Collateral
Covered Bond	Non-deposit, recourse debt obligation.
Tenor of Covered Bond	No less than 12 months <i>and</i> no more than 30 years
Eligible Collateral in Cover Pool	First lien residential mortgage loans for 1-to-4 family homes <i>and</i> upto 10 percent of the cover pool, AAA rated mortgage bonds
Mortgage Underwriting Criteria 1/	(i) Loan under-written at the fully indexed rate <i>where applicable</i> ; (ii) full income documentation required; and (iii) underwriting complies with existing supervisory guidance in this area.
Substitute Collateral	Cash, treasury, and GSE securities <i>without specified limi.</i>
Constraint on Magnitude of Funding via Covered Bonds 2/	No more than 4 percent of non-equity liabilities of the IDI
Ownership of the Cover Pool	Mortgage loans and other pledged collateral must be held and owned by IDI

Source: Author summary from FDIC (2008).

Note: 1/ Must comply with Interagency Guidance on Non-Traditional (Oct 5, 2006) and Subprime (July 10, 2007) Mortgage Products and Lending.

2/ Specifically, 4 percent of line 21 "Total liabilities" (Schedule RC) for banks that file quarterly Call Reports or line SC70 "Total liabilities" (Schedule SC) for Thrifts filing TFR Reports.

The FDIC agreed to reduce the *delay* period to 10 days from the original length of 45-to-90 days pursuant to 12 U.S.C. §1821(e) (13) (C) and 12 U.S.C. §1825(b) (2). Suppose the FDIC either (i) fails to pay interest or principal on the bonds, including for 10 days after written notice of such failure is received; or (ii) provides written notice of contract repudiation to the bond holders. Immediately following (i), or within 10 days of (ii), as applicable, the FDIC will allow the bond trustee to take control of the cover pool and monetize it.

The FPS addresses bond holder concerns in two ways. First, in cases where the contract is repudiated, it potentially reduces the delay in bond holders' access to the cover pool by up to

²³ While under Title 12 CFR Part 360.6, the FDIC is obliged to pay received and unpaid interest up to the date of repudiation, the corresponding obligation in the case of covered bond holders is further limited to the amount received and unpaid up to the date of FDIC's assumption of receivership or conservatorship. See FDIC (2008, Covered Bond Policy Statement, §c(3)).

35 days (conservatorship) or up to 80 days (receivership). Second, it explicitly recognizes the extent of FDIC's liability to bond holders to be the face value of the bonds outstanding plus any interest due at the point-in-time of the FDIC's takeover of the FIDI.

Should no interest be due for the first 90 days of FDIC receivership of a FIDI, however, the potential delay risk remains effectively the same as prior to the FPS. Since the FDIC is not obliged to accelerate notice of repudiation or contract rejection, the risk of the delay adversely impacting resale value of the cover pool remains unchanged.

Moreover, the 4 percent issuance ceiling unnecessarily limits the scope for development of a market, particularly in the event that the pre-crisis business model of the GSEs is retained and the Federal Home Loan Banks (FHLBs) remain a cheap and abundant source of funding for regional and community banks. In principle, the 4 percent cap relative to the total liabilities of the banking system leaves scope for funding a significant volume of mortgage loans via covered bonds. However, as a share of total mortgage loans outstanding, or originated on a quarterly frequency, this amount is small. For example, the four largest U.S. banks (JPMC, BoA, Citibank, and Wells Fargo), could have funded USD 183 billion in new residential mortgage loans via covered bonds at end-2009. If one assumed that other banks can be given sufficient incentive to use covered bonds to fund mortgage loans, the 4 percent of non-equity liabilities limit would translate into a total volume of origination of USD 434 billion at end-2009. This would be less than two quarters worth of new originations even at the bottom of the market and, as a proportion of outstanding residential mortgage loans, less than 5 percent at end-2009.²⁴

It could be challenging under such constraints to get issuance in the volume and regularity necessary to get a secondary market going, which would adversely impact the liquidity of, and investor base for, these instruments. Given no major changes to the GSE business model, including continuation of implicit government support, FIDIs would issue mortgage covered bonds at a spread relative to GSE RMBS, which would enable the GSEs to continue their dominance over the conforming segment of the market. This, in turn, could reduce the interest of credit product investors (e.g., pensions, sovereign wealth funds) in covered bonds.

B. An Assessment of the Proposed Legislative Framework²⁵

The current proposal for a statutory framework (Table 7) addresses a number of the shortcomings identified above.

²⁴ Based on data from call reports (bank liabilities), and from the Mortgage Bankers' Association of America (new mortgage originations).

²⁵ This section discusses U.S. House of Representatives (2010b)—including amendments cleared in the mark-up session—approved by the House Financial Services Committee on July 28, 2010 for a vote by the full House.

- First, it removes the 4 percent of total liabilities ceiling on issuance by FIDIs. This provides greater scope for market development and is a key advantage provided for by the bill. In any event, the limit does not apply to other potentially eligible issuers such as bank-holding and savings and loans-holding companies and their subsidiaries, non-bank financial institutions (NBFIs), SPVs or issuers sponsored jointly by mortgage originators (as in a pooled funding model).
- Second, by widening the set of eligible issuers to circumscribe NBFIs and SPVs, it considerably enhances scope for market development. Regional and community banks play a key role in mortgage origination, and as in the case of a number of the Spanish *cajas*, are too small to issue covered bonds on a scale large enough to realize low issuance costs. The bill facilitates arrangements whereby such banks can combine their originated mortgages in a common cover pool that can collateralize issuance by a separate legal entity jointly owned by the banks (akin to a *Fondo de Titulización de Activos* in Spain).²⁶ To the extent that this facilitates pooling of mortgages originated in different regions of the country—as in the case of Spanish multi-cédulas—this also benefits investors by lowering default correlation in and aggregate risk of losses to the cover pool.
- Third, it extinguishes delay risk for investors in non-FIDI covered bonds. The bill specifies the creation of a separate estate for the covered bonds and corresponding cover pool in the event of either program default or issuer insolvency. The situation for FIDI issued covered bonds is different and is discussed separately below.
- Fourth, the treatment of bond holder claims in the event of either program or issuer default is clearer and more transparent. Cover pool segregation is assured and excess collateral in the cover pool remains immune to claw-back from the issuer’s insolvency estate, albeit the latter obtains a residual claim to any realized excess in the cover pool upon satisfaction of all claims of bond holders.

²⁶ The *Fondo* is a separate, bankruptcy remote legal entity. The senior claims on the pool of mortgages in the cover pool “belong” to the investors, whereas the *cajas* may retain a residual claim thereon. Together, this entire set of participants “own” the *Fondo*.

Table 6. Comparison of Main Features of Covered Bond Programs Under Past, Current, and Proposed Regulatory Frameworks

	Pre-FDIC FPS	Current / FDIC FPS	Under Covered Bonds Act
Constraints on Funding 1/	None	Up to 4 percent of total issuer liabilities for FIDIs	None
Legal / prudential framework and oversight			
Special supervision 2/	No	No	Yes, by issuer's covered bond regulator (it's primary federal regulator)
Issuer needs a license to issue	No	No	Yes
Approval and on-site audit of covered bond programs	N/A	N/A	Approval, yes; audits and frequency to be determined by regulator
Off-site supervision	N/A	N/A	Monthly by regulator; semi-annual or more frequent by bond trustee
Investor Risks			
Bond holder representative program monitor	By contract	By contract	By statute
Perfection of security interest post-issuer default	Not guaranteed for FIDIs	Not guaranteed for FIDIs	Yes
Delay risk 3/	Yes	Yes, but reduced	Yes
Independent cover pool administrator post-issuer default	N/A	N/A	Appointed by regulator
Set-off risk	Yes	Yes	Reduced for FIDI issuers
Commingling risk	Yes	Yes	Reduced for FIDI issuers
Clawback of excess collateral	N/A	N/A	Not under current draft bill
Risk Management			
Asset coverage test			
Liabilities (present value basis)	Not mandated by regulation or statute	Not mandated by regulation or statute	Yes. OC floor to be determined by covered bond regulator
Liabilities (nominal value basis)	Not mandated by regulation or statute	Not mandated by regulation or statute	Yes. OC floor to be determined by covered bond regulator
Interest rate risk	Not mandated by regulation or statute	Not mandated by regulation or statute	Yes. OC floor to be determined by covered bond regulator
Operating Risk Limits			
Cash flow risk hedging	Not mandated by regulation or statute	Not mandated by regulation or statute	Not mandated by statute
OLTV ceiling	Not mandated by regulation or statute	Not mandated by regulation or statute	Not mandated by statute
Underwriting Standards 3/	Adherence to federal regulatory guidelines	Besides adherence to federal guidelines, full income documentation required, and where applicable, loans to be underwritten at fully indexed rate.	Statute requires adherence to federal regulatory guidelines. Regulator has discretion to introduce additional criteria.
Collateral valuation	Market value or AVM.	Market value or AVM.	Market value or AVM.

Sources: Author's summary, based on FDIC (2008) and U.S. House of Representatives (2010b).

Notes: 1/ There are no legal or regulatory limits on funding mortgage loans via covered bonds. However, in order to ensure that bond holders to avail of benefits under the FPS such secured funding is limited to no more than 4 percent of total issuer liabilities.

2/ The covered bond regulator is: (i) the OCC for national banks and federal savings associations; (ii) the FDIC for a state chartered non-member bank; (iii) the Federal Reserve Board for the Federal Reserve System banks, bank-holding companies, and savings association-holding companies; and (iii) the SEC for any other institution.

3/ Applies to FIDIs for pre-FPS and post-FPS.

- Fifth, in terms of program (risk) management by the issuer, the framework lays out a largely satisfactory template for further development jointly by the covered bond regulators. In place are requirements on the issuer to: (i) satisfy minimum OC thresholds corresponding to a number of asset coverage tests (ACTs) related to market, collection, and credit risks; (ii) substitute for assets whose credit quality has deteriorated beyond identified thresholds (e.g., mortgage loans delinquent for 60 days or more),²⁷ or where prior perfected security interests are found to be established; (iii) submit monthly reports on cover pool constitution and satisfaction of ACTs to investors and its covered bond regulator; (iv) appoint an independent covered bond indenture trustee (similar to a cover pool monitor in the German and Spanish frameworks) whose responsibilities include verification of cover pool constitution and ACTs at least at a semi-annual frequency.
- Sixth, the constraint on the cover pool to contain assets from at most a single eligible asset class is eminently reasonable as a starting point for loans secured by property as opposed to loans secured by other eligible asset classes. Looking beyond mortgages, there is wide variance in the treatment of different types of creditors under Chapters 7 and 13 bankruptcy filings.²⁸ For example, under a Chapter 13 rehabilitation plan, it may be possible for a household to extinguish credit card debt or auto loans while continuing to service mortgage debt. Within the category of secured home loans, first lien mortgage creditors are more protected than subordinate lien holders (e.g., second mortgage / home equity loan creditors). Under Chapter 13, the latter may see their claims experience severe haircuts, whereas under Chapter 7, they typically cannot rely on seeking deficiency judgments to recover value of any claims outstanding after receiving their share from forced sale of the property. Inclusion of loan types with highly pro-cyclical credit quality or where borrower incentives to default are higher because of greater possibility of eluding creditors under bankruptcy could also harm the interests of issuers' unsecured creditors in the case of FIDIs.

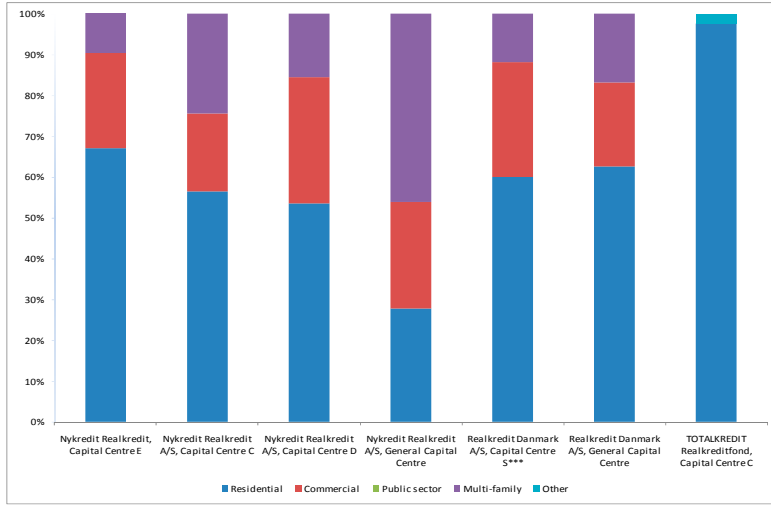
There is one exception to the argument for separation of asset classes made above. The mixing of commercial and residential real estate loans within a single cover pool may be desirable from the perspective of risk diversification. The credit quality of commercial mortgages is typically more pro-cyclical than of residential mortgage loans. Placement of both types of loans in the same cover pool may, therefore, lower loss rates during cyclical downturns. This may explain the retention of both commercial and residential real estate loans in a common cover pool collateralizing covered bonds in several programs of Nordic and Euro Area financial institutions (Figure 4).

²⁷ However, the bill leaves open the possibility of re-inclusion of such delinquent mortgages that cure subsequently, notwithstanding the possibility that such loans are subject to a significantly higher rate of re-default.

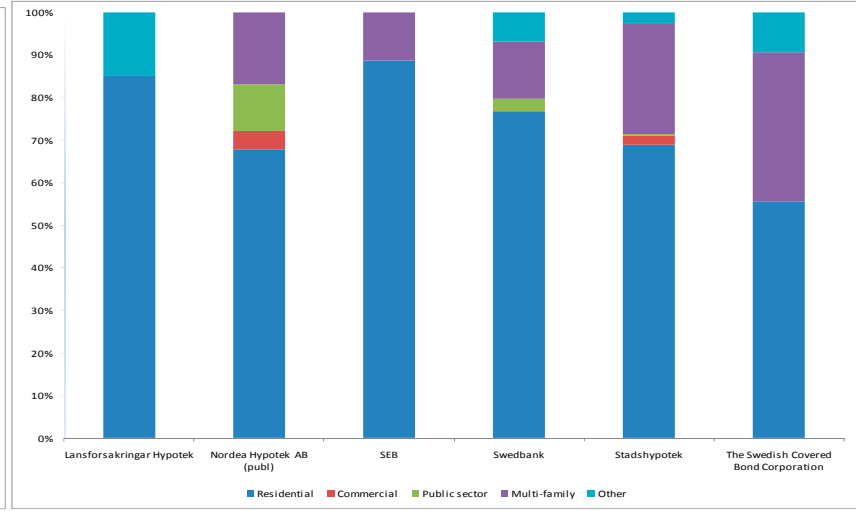
²⁸ See for e.g., White (2007), for a discussion.

Figure 4. European Covered Bond Programs: Cover Pool Composition, Q42009

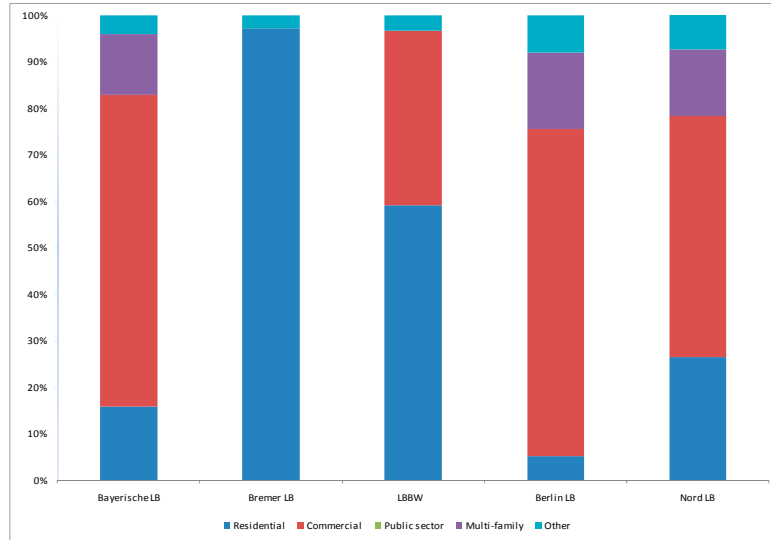
Denmark



Sweden



Germany: Landesbanken



Germany: Mortgage Banks

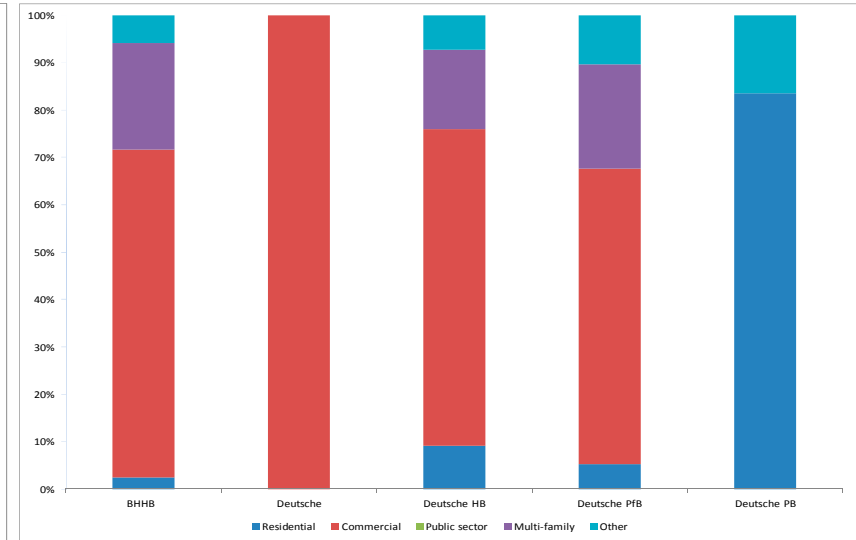
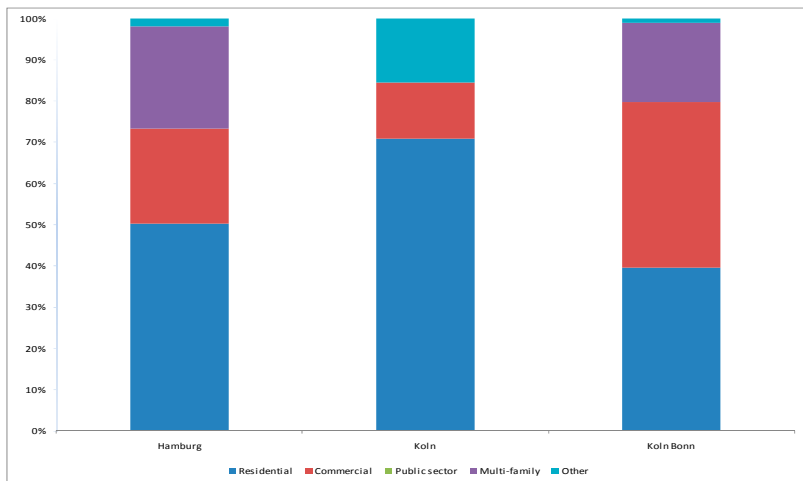
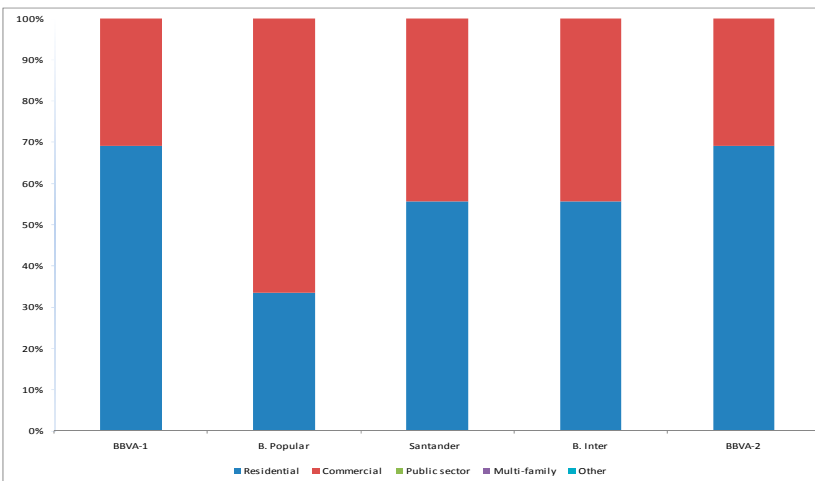


Figure 4. European Covered Bond Programs: Cover Pool Composition, Q42009 (continued)

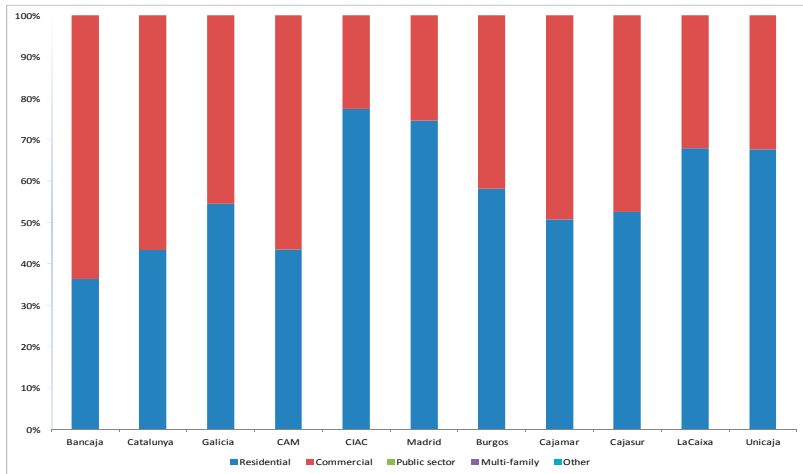
Germany: Savings Banks



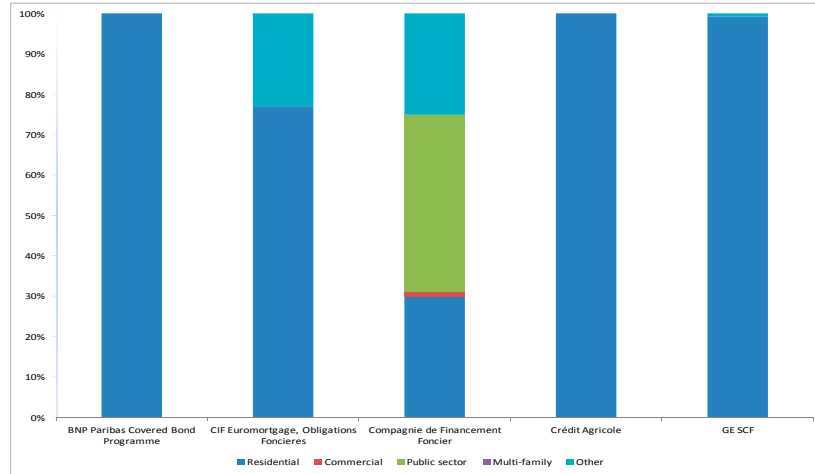
Spain: Commercial Banks



Spain: Cajas



France



Source: Moody's Investors Service (2010b). Information supplied is for a subset of the sample of cover pools reported by Moody's Investors Service, and is meant to be illustrative, rather than representative, of recent trends in the asset mix in mortgage cover pools.

There are a number of areas where further tightening is desirable.

- First, ACT imposed risk limits currently exclude coverage of cash flow shortfalls and currency mismatches. While CRAs will impose ACTs related these risks, regulations specifying minimum performance standards are desirable to buttress these.
- Second, covered bond regulators are apparently not obliged to *jointly* finalize the design of regulatory ACTs for eligible issuers. This leaves the door open to variations in the risk limits for programs initiated by different issuer types, which would provide a regulatory arbitrage opportunity. In a similar vein, while failure of meet an ACT results in program default, the period of time over which such failure may persist prior to a default being declared is subject to contractual—not statutory—determination. CRAs can be expected to set compliance standards for programs to obtain high ratings, but there is a risk that minimum standards set by regulation could differ by type of issuer.
- Third, the inclusion of LTV ceilings as part of the criteria covering the admissibility of mortgage loans into the cover pool would be a useful complement to the ACTs. LTV ceilings can contribute to increasing borrower equity investment in a mortgage loan transaction and reduce the likelihood of default.
- Fourth, the legislation does not establish tighter collateral valuation standards (e.g., through-the-cycle property valuation) as a pre-condition for mortgage loans to be admissible for cover pool inclusion. Practically, this may be achievable by greater use of AVMs as a supplementary tool to complement appraisals in order to minimize bias problems observed during the housing boom.²⁹
- Fifth, turning to *delay* risk, the situation for holders of FIDI issued covered bonds is different from investors in other covered bond programs. In contrast to the March 2010 version of the bill which largely extinguished this risk, the current legislative proposal exacerbates it to beyond the status quo after issuance of the FPS.³⁰ In the event of a FIDI insolvency, the FDIC now has up to 180 days to seek a purchase and assumption transaction to sell the issuer's businesses *including the covered bond program* to another financial institution eligible to issue covered bonds. The FDIC is obliged make scheduled payments to bond holders during this period but it retains the right to repudiate the contract or stop payments at its discretion at any time during this period. While this results in immediate segregation of the cover pool, including of excess collateral, this is cold comfort to bond holders in the event that such segregation occurs in the immediate temporal vicinity of bond maturity. This increases the ex-ante risk of bond extension or of haircuts when the bonds are of bullet maturity. This may then lead to lower ratings

²⁹ While values generated by an AVM may be more robust to the cyclical position of the economy and housing market, validation and back-testing of proprietary AVM models would be a necessary consequence of relying on their output to setting loan size limits corresponding to regulatory LTV ceilings.

³⁰ U.S. House of Representatives (2010a).

uplifts for FIDIs' covered bond programs.³¹ Since the delay in segregation does not apply to non-FIDI issuers, this disparate treatment of investors in FIDI covered bond programs could have the effect of inducing financial institutions to opt for SPV issuance over FIDI issuance. One option to extinguish delay risk would be to bring back into the draft bill, a proposal made in an earlier version (U.S. House of Representatives, 2009), which ensured a qualified financial contracts treatment of FIDIs' covered bond programs, and consequently, therefore, of immediate segregation of the bond program.

- Finally, a major change in the bill relative to past proposals is the expansion in the number of covered bond regulators. The March bill proposed the U.S. Department of the Treasury for this role, whereas the July 22 version of the current proposal foresaw the Comptroller of the Currency (OCC). Ultimately, the compromise solution adopted sees at least four agencies taking on the role of covered bond regulator for issuers which are under their prudential authority. The legislation—barring the exceptions listed above—seeks to ensure uniform regulatory standards via a jointly agreed upon prudential framework. However, ensuring uniform standards of supervision is very much a matter of relative resource constraints and competition from other items on each agency's portfolio of responsibilities. This problem is compounded by the absence of an oversight body responsible for ensuring maintenance of uniform supervisory standards and enforcement.

Bond holders will acquire dual recourse should the bill be passed. If the cash flows from/ resale value of the cover pool is insufficient to meet their claims in entirety, the remaining amount will become a senior unsecured claim on the issuer's insolvency estate. It is easiest to see how this works in the case of bullet bonds with expected duration shorter than the underlying cover pool of loans. The cover pool administrator will attempt a liquidation-via-resale of the cover pool at a point in time prior to the maturity of the bonds, whereupon the market value realizes either an excess over, or shortfall relative to, the amount due on the bonds. This results, respectively, in a payment of the excess back to the insolvency estate of the issuer or a residual claim of firm value being established in favor of the bond holders.³²

The options and strategies rendered feasible to cover pool administrators and loan pool servicers in the aftermath of issuer insolvency are quite comprehensive. However, it is worth pointing out that the benefits ensuing from such powers are often appropriable only upon establishment of a (secondary) market of sufficient size and scope. For example, transfer of a program to another issuer or liquidation of the cover pool to pay off maturing bonds can usually be affected without a significant haircut to bond holders only in such a market.

³¹ See Fitch Ratings (2009), Moody's Investors Service (2010a), and Standard and Poor's (2009) for an exposition of current ratings methodologies for covered bonds.

³² The legislation leaves open the establishment of an (estimated) contingent claim in favor of the bond holders prior to the separation of the cover pool from the insolvency estate. However, it is unclear whether this claim is transferable to another financial institution should the issuer's estate be sold in a purchase and assumption transaction, and if not, whether the FDIC continues to remain liable for any realized deficiency.

IV. MEETING CHALLENGES TO MARKET DEVELOPMENT³³

Market development is, realistically, a medium-to-long term objective. In the near-term, a number of factors have combined to ensure that most of the conforming and prime mortgages will continue being funded by the GSEs. These include the distressed credit environment, accounting changes precluding use of the pre-crisis private label securitization model to lower capital cost, and the tight supply, and increased cost, of capital to the financial sector. Smaller community and regional banks are unlikely to be interested in (pooled issuance of) covered bonds so long as the stable and low cost supply of advances currently available from the FHLBs continues.

In the longer-term, the feasibility of market development will hinge upon changes to the incumbent business models of the GSEs and the outcome of regulatory reform initiatives underway in the area of securitization. Proposals abound regarding Fannie Mae and Freddie Mac, albeit many of them agree that their retained asset portfolios should be eliminated or privatized, and their responsibilities for social objectives be reassigned to other, explicitly guaranteed public utilities.³⁴ The first option would create some space for alternative funding instruments, including potentially, covered bonds. Whether the market for covered bonds gets a leg-up due to such a reform will be a function of the scale of off-loading loans from the balance-sheet made available to financial institutions under the new securitization landscape. Current proposals—not yet set in stone—appear to leave substantial scope for capital cost savings through securitization relative to funding of mortgages via covered bonds owing to proposed credit risk retention limits substantially below 100 percent. On the other hand, should the draft covered bonds bill pass in its current form, the security interests of bond holders under issuer insolvency will have clear and wide protection, which in the case of FIDI issuers, would be beneficial to development of an investor base for the bonds.

Facilitation of a pooled funding model by the FHLBs

Funding of mortgage lending via FHLB advances already embeds most of the principle features of a pooled covered bond funding model. The model involves member banks bearing the credit risk of the mortgage loans by keeping them on their books. The FHLBs, which intermediate between their member banks and the capital market, bear the market risk. As in the covered bond systems, particularly the jumbo segment supported by market making agreements, the FHLB system was designed to promote a stable flow of financing for home purchases over the business cycle.³⁵

³³ In this section, GSEs will circumscribe, besides Fannie Mae and Freddie Mac, the FHLB System; i.e., the 12 banks and the Office of Finance.

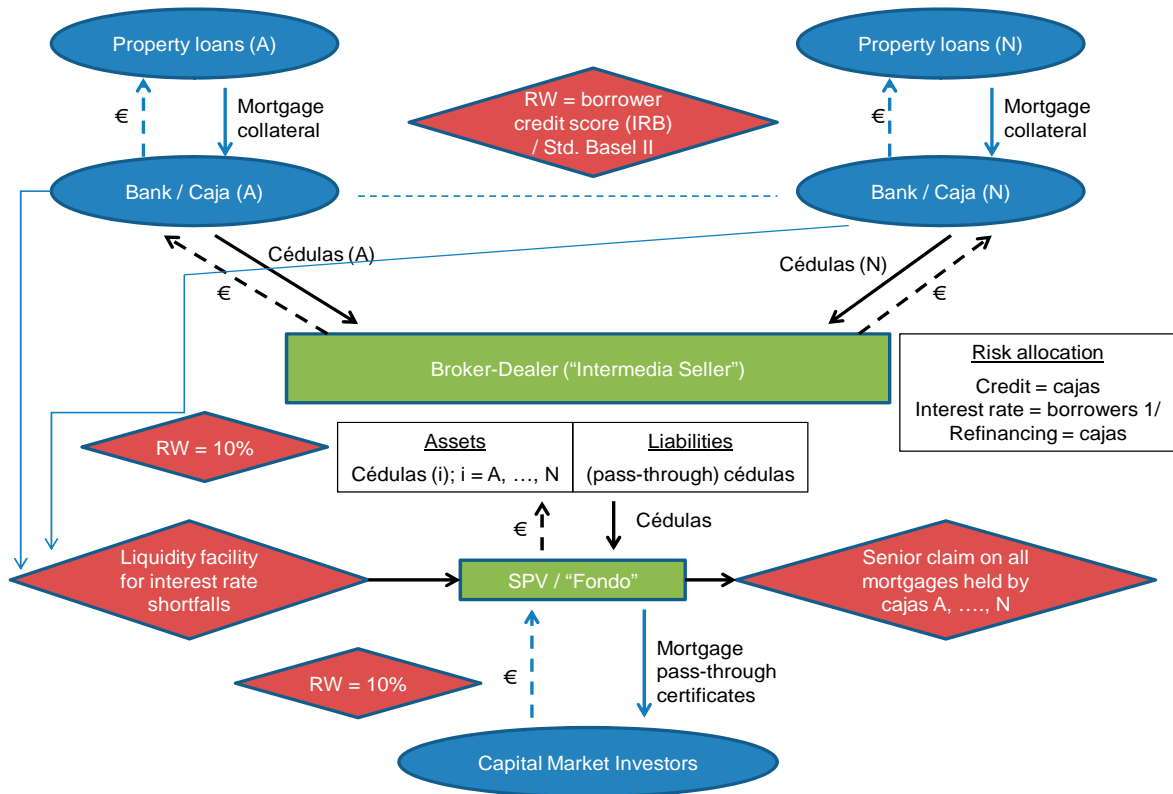
³⁴ See for e.g., IMF (2010), or Jaffee and Quigley (2008).

³⁵ The FHLB system is the oldest GSE, established by an Act of Congress in 1932. For a basic description of its role in the U.S. financial system, see for e.g., Flannery and Frame (2006), and references therein.

- FHLBs make loans to member financial institutions that are collateralized (primarily) by 1–4 family residential mortgage loans. Funding for these advances is obtained from debt capital markets.
- OC is the key credit enhancement tool with typical amount of excess collateral between 20 and 30 percent, and ranging, in some cases, up to 70 percent.
- The diversification within the collateral pool is high because the funding model relies on (i) financing advances made by all 12 FHLBs through joint debt issuance office; and (ii) individual and joint liability of all the FHLBs—and hence, by extension, of their respective member financial institutions—to the FHLB system’s creditors.

These characteristics of the FHLB system are quite similar to the pooled funding model utilized by the Spanish cajas to access stable and low cost capital market funding of mortgage loans in Spain (Figures 6 and 7).

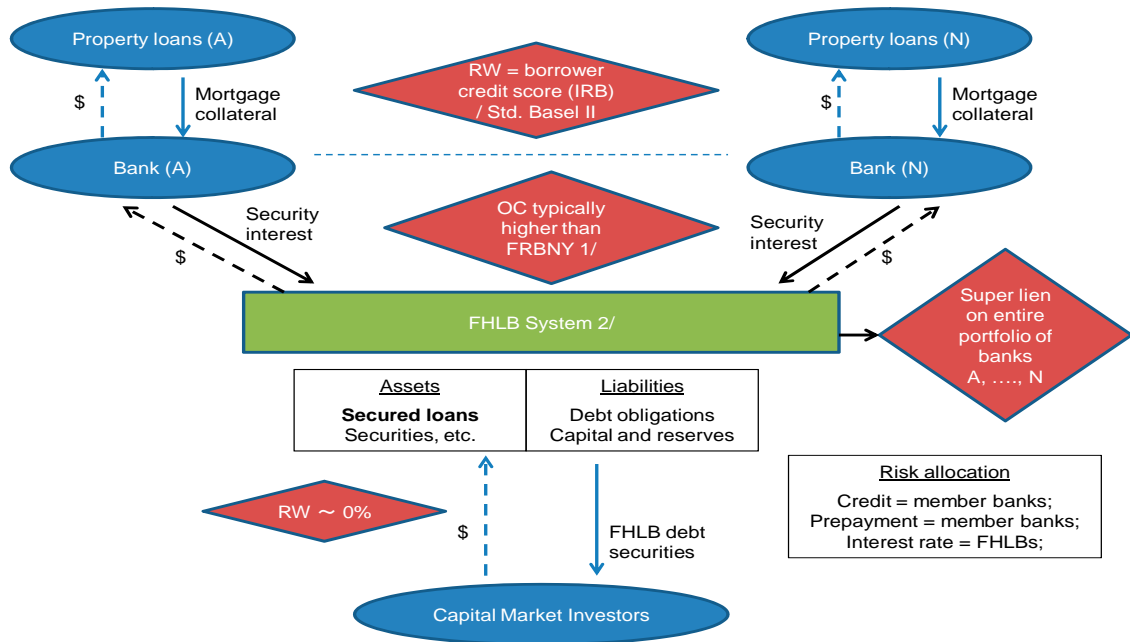
Figure 5. Spanish Cajas’ Pooled Funding Model



Source: Author's summary.

Note: 1/ Mortgage loans are typically variable rate.

Figure 6. FHLB Funding of Mortgages via Advances



Source: Author's summary.

Notes: 1/ As of May 11, 2010, FRBNY discount window haircuts for 1–4 family 1st lien loans range from 4 percent–22 percent for individually deposited loans and 24 percent for group deposited loans.

2/ Secured loans are issued to members by individual FHLBs and funded by debt issued by the FHLB System's Office of Finance ("consolidated obligations").

In terms of a market development strategy for covered bonds, it may be fruitful to have the FHLB debt office initiate a mortgage pass-through securities (MPS) program, using member issued covered bonds collateralized by their mortgage loans. The required increase in the capital contribution to the FHLBs of a member bank participating in an MPS program can be assessed in the same fashion as in the case of advances-based lending. A number of additional changes will, however, be needed in order to minimize material differences between the two pooled funding models depicted above, as well as ensuring a level playing field in the market.

- First, the FHLBs currently enjoy a "super lien" protecting the security interest of their advances to member institutions. This translates into priority interest over the entire estate of the borrowing member financial institution in the event that it enters receivership. The FHLB's priority trumps both, insured depositors and the FDIC, and in practice, the FDIC effectuates this by making FHLB claims whole immediately, including payment of any difference between the present and face value of the outstanding advances. This weakens the FHLB system's incentive in doing due diligence when making advances to members. In addition, ordinary covered bond holders do not have unfettered access to the entire insolvency estate of the issuer. Instead, they have a senior claim to a dedicated cover pool with dual recourse (if necessary). In order to

ensure a level playing field, the “super lien” attached to FHLB advances could be replaced by a senior right to the cover pool and dual recourse. An additional benefit of this change would be in the increased incentive possessed by the FHLBs to ensure that the equity and OC buffers placed by member banks to protect mortgage portfolios against losses are commensurate with credit risk. This is because recovery in an insolvency situation will become primarily dependent upon cover pool quality.

- The FHLB system is a GSE and is susceptible to incentive problems similar to those impacting Fannie Mae and Freddie Mac. The amount of leverage they can use and facilitate (for investors in their debt securities) is substantially higher than other financial institutions. Investors, CRAs, and federal regulators perceive negligible credit risk in FHLB-issued debt—despite products funded by FHLB advances embedding such risk—which encourages a rate product treatment of a credit product. The experience of the GSEs in the recent crisis indicates that the credit risk is picked up, in a downturn, by the taxpayer. Moral hazard problems can be addressed in two ways. First, the growth of, or absolute amount of, funding affected by the FHLBs via the MPS program can be capped at prudentially sound levels. Second, the pooling business can eventually be transferred to private market participants once the covered bonds market reaches a critical size.

V. CONCLUDING REMARKS

Funding mortgages via covered bonds provides a strong incentive to mortgage originators to maintain high underwriting and collateral valuation standards. Consequently, while the model entails higher capital costs than under OtD, the higher cost can potentially purchase higher levels of total equity buffers in mortgage lending that provide greater protection to investors during a market downturn. Since the model relies on private funding of mortgage loans, capital costs typically reflect the credit risk of the underlying real estate loans more accurately than under a model where lending is buttressed by (perceived) public guarantees. Covered bond design is flexible enough to permit widely varying ways to distribute risks other than credit risk across market participants.

Embedding the funding model within comprehensive licensing, regulatory, and supervisory frameworks builds on these advantages by establishing minimum criteria for risk and operational management of bond programs. Since the regulatory charges and supervisory oversight is directed at the bond programs—as opposed to being designed on an institutional basis—opportunities for regulatory and supervisory arbitrage can be minimized. The current draft legislation in the U.S. will provide sound framework for covered bonds issuance and program management. Scope remains, nevertheless, to strengthen it further by tightening the collateral valuation process, by integrating regulation and supervision within a single agency and by eliminating delay risk for investors in FIDI issued covered bonds.

Finally, it is worth bearing in mind that borrower repayment incentives in a downturn are critical to performance of mortgage loan portfolios independent of the funding model. Exploring ways in which such incentives can be further strengthened beyond the status quo resulting from the 2005 personal bankruptcy reform is important to ensuring housing market and broader financial stability. It remains a key topic for future research in this area.

Annex 1. Insolvency Administrator's Choice of FIDI Resolution in the Presence of a Covered Bond Program

- (a) Consider an FIDI with the simple balance-sheet given in Table A.1:

Table A.1 FIDI Balance Sheet

Assets	Liabilities and Equity
Cover Pool, CP (actual OC = 20 percent) = 240	Insured Deposits, Di = 550
Other Assets, OA = 760	Uninsured Deposits, Du = 50
	Secured liabilities = 200 of which: Covered Bonds, CB = 200
	Unsecured liabilities, UL = 140
	Regulatory capital, K (leverage ratio = (x%) = x% x TA of which: subordinated debt = 0
Total Assets = 1000	Total Liabilities and Equity = 1000

Source: Author

(b) It is assumed that the market value of assets has fallen in an amount sufficient to render the FIDI insolvent. Following such an assessment by its primary Federal regulator, FIDI is placed into a FDIC receivership. Rather than carry out an exhaustive case-by-case assessment, a variety of scenarios under purchase-and-assumption (P&A) by a single purchasing FIDI (*P*) will be considered in this annex. Revenue maximization may entail more complex alternatives. For example, a good bank-bad bank model is sometimes used, with good assets and (part of the) liabilities of FIDI transferred to *P* and bad assets transferred to a separate asset management company for disposal over a longer period of time. The discussion in the rest of this section can be interpreted as focusing on decisions related to the sale of good assets alone after the separation of the portfolio has taken place or to making a sale of the entire asset portfolio at fair market value without a good bank-bad bank model being involved. Yet another practical solution would be to break up the FIDI franchise and sell different parts of the business to different buyers. While an explicit analysis is not carried out of this strategy, it can be subsumed into the analysis of the strategy, *REP*, outlined below.

Following its final position statement (FPS) on covered bonds, the FDIC is constrained to pay the full face value (FV) on the outstanding principal of the covered bonds to bond holders in the event that it chooses to neither release the cover pool to the bond trustee nor sell the program to *P*. Three alternative sales strategies will be considered in the analysis. The first denoted *REP* involves repudiation of covered bond holders' contracts under the FIDI bond program in lieu of payment of the face value of outstanding principal on the bonds. The

second denoted *SP*, involves sale of the covered bond program to *P* as part of the P&A transaction. The third, denoted *RC*, entails the release of collateral to the bond trustee by the FDIC.

(c) In order to rule out analytically uninteresting cases, two additional assumptions are made. First, it is assumed that the credit quality of the cover pool remains sound. If not, the FDIC can likely maximize revenue by opting to release collateral (*RC*) instead of repudiating the contract and paying out the full face value of the outstanding principal on the bonds (*REP*). Second, it is assumed that a viable (primary) market for covered bonds exists. If not, then under the first assumption, both the FDIC and bond holders are likely to prefer repudiation followed by the face value payout (*REP*) as resale of the program is likely to result in a haircut to the market value of the collateral.³⁶

(d) Under a P&A transaction, *P* will purchase assets of FIDI using a combination of payment of its own existing assets (cash) and assumption of (part of) FIDI's liabilities. The net value of the P&A transaction to *P* may be summarized by:

$$MV = MV(Assets_+, Assets_-, Liabilities);$$

where in our simple example:

$$\begin{aligned} Assets_+ &= \{CP, OA\} \\ Assets_- &= \{cash\ paid\} \\ Liabilities &= \{D_i, D_u, \dots\} \end{aligned}$$

The following functional form is assumed for the market value:

$$\begin{aligned} MV &= MV(Assets_+) - MV(Assets_-) - MV(Liabilities) \\ &= MV(CP) + MV(OA) - (1 + \psi_L)(cash\ paid) - (1 - \psi_D)\alpha_D(D_i + D_u) - (1 + \psi_{OL})\alpha_{OL}OL \end{aligned}$$

where $\psi_L, \psi_D > 0$ represent respectively, the franchise values of a more liquid balance-sheet (i.e., of having more cash assets at hand) and of a wider stable funding base (deposits). ψ_{OL} denotes the franchise value / (refinancing) risk premium of purchasing FIDI liabilities other than deposits. It can take either a positive or a negative value depending on whether addition

³⁶ Indeed, prior to the FDIC's FPS—and given the absence of a market for covered bonds in the U.S.—CRAs assessed receipt of the market value of the outstanding principal on the bonds when it was less than the face value as one of the legal risks to bond holders post-FIDI insolvency.

of such liabilities adds more to the franchise value (wider funding base) or to risks (short-term unsecured funding). $\alpha_j \in (0,1)$; $j \in \{D, UL\}$ denote the proportion of deposit and unsecured liabilities purchased by P in the P&A transaction.

(e) The resulting net income to the FDIC from facilitating the P&A transaction is:

$$\pi = A - \chi_{A>0} \left[\chi_{A \leq B} A + \chi_{A > B} (B + \min \{A - B, C\}) \right];$$

where

$$\chi_{\{i:i \in \Omega\}} = \begin{cases} 1; & i \in \Omega \\ 0; & i \notin \Omega \end{cases}$$

$$A = -c + (\text{cash paid}) - \max \{D_i - \alpha_D (D_i + D_u), 0\} - \max \{FV - \alpha_{OL} OL, 0\};$$

$$B = D_u - \max \{\alpha_D (D_i + D_u) - D_i, 0\}$$

$$C = UL - \max \{\alpha_{OL} OL - FV\}$$

The interpretation of the profit function is that the cash received is allocated first towards covering administrative costs (c) and payments to insured deposits and (covered) bond holders whose claims are not purchased by P in the P&A deal. If any amount of cash remains (i.e., if A is positive), then—given U.S. depositor preference statutes governing U.S. FIDI resolution, this amount is first allocated towards paying off claims of uninsured depositors not purchased by P (i.e., the amount B). Finally, if anything else remains, it goes to the unsecured creditors of the FIDI. In the example being considered, it is implicitly assumed that the gap between market value of assets and liabilities is severe enough to wipe out FIDI shareholders in their entirety; i.e., $A - B - C \leq 0$. Note that where $A > 0$, $\pi = 0$.

(f) If the FDIC were to opt for the *REP* option, then: $Assets_+ = \{CP, OA\}$; $Assets_- = \{\text{cash paid}\}$; $Liabilities = \{\alpha_D (D_i + D_u)\}$. Begin by assuming $MV(CP) + MV(OA) > D_i$. Since $\psi_L, \psi_D > 0$, P would prefer to purchase deposit liabilities over paying cash. However, given the FDIC's priority of payments established above, the sales process will involve:

- Transfer to P of cover pool and other assets for $MV(CP) + MV(OA)$.
- Transfer to P of insured deposits D_i .
- Cash payment by P of:

- $C(REP) = \frac{MV(CP) + MV(OA) - (1 - \psi_D) D_i}{1 + \psi_L}$; if $C(REP) \leq c + FV$

- $c + FV$; if $0 < C(REP) - c - FV \leq D_u$

In the latter case, $\alpha_{D_u} = \frac{C(REP) - c - FV}{D_u} \in (0,1]$ is the proportion of uninsured deposits

purchased by P .³⁷ The FDIC's net cost is the absolute difference between P 's cash payment and its administrative costs plus the face value of outstanding principle on the bonds when $C(REP) \leq c + FV$. When this inequality is reversed, its net costs are zero.

(g) Next, consider the option involving a sale of the covered bond program to P ; i.e., SP . In this case, the transaction vector changes from the one defined above for REP to the following: $Assets_+ = \{CP, OA\}$; $Assets_- = \{cash\ paid\}$; $Liabilities = \{FV, \alpha_D(D_i + D_u)\}$. The sales process will entail:

- Transfer to P , the cover pool and other assets for $MV(CP) + MV(OA)$.
- Transfer to P , (part of) the insured deposits D_i and the covered bond program.
- Net outlay by the FDIC of:

- $\frac{MV(CP) + MV(OA) - (1 - \psi_D)D_i - (1 + \psi_{OL})FV}{1 + \psi_L} \equiv C(SP) - c$; if $C(SP) \leq c$
- 0 ; if $c < C(SP) \leq D_u$

In the latter case, $\alpha_{D_u} = \frac{C(SP) - c}{D_u} \in (0,1]$. The FDIC's net cost under SP is determined in a fashion similar to (f). In order to determine conditions under which the resolution agent prefers SP over REP , it may first be observed that if $c + FV \leq C(REP)$, then the net cost to opting for REP is zero. In this case, therefore, the FDIC cannot have a strong preference for SP over REP . So assuming not and comparing payoffs:

$$\begin{aligned} & \frac{MV(CP) + MV(OA) - (1 - \psi_D)D_i - (1 + \psi_{OL})FV}{(1 + \psi_L)} - c \\ & > \frac{MV(CP) + MV(OA) - (1 - \psi_D)D_i}{(1 + \psi_L)} - c - FV \\ & \Leftrightarrow \psi_L > \psi_{OL} \end{aligned}$$

³⁷ Payments to unsecured creditors and equity holders will not be explicitly calculated in this annex.

Recall that as the franchise value of acquiring the non-deposit funding base increases, or as the risk embedded in such acquisition decreases, ψ_{OL} decreases. Accordingly, the condition above is fairly intuitive. So long as, dollar-for-dollar, the franchise value of conserving a more liquid asset portfolio (paying less cash for the deal) is greater than the risk of acquiring additional non-deposit liabilities, the resulting market value assessment by P of SP will be favorable relative that of REP by a magnitude that results in the FDIC preferring a P&A under SP .

(h) A conflict of interest between the FDIC and bond holders can potentially arise if the former prefers a P&A deal under REP when the PV of cash flows outstanding to the bonds is higher than the face value of the outstanding principal on the bonds. In such a situation, bond holders would prefer the P&A to take place under SP . Is this situation feasible? From the analysis thus far, necessary conditions for this situation to arise are (i) $\psi_{OL} > \psi_L$; and (ii) $m - spread = i_M - c_B < 0$; where i_M and c_B are, respectively the annualized market yield-to-maturity (e.g., on the mortgage curve) and the annualized coupon rate on the covered bond. It is plausible that as the $m - spread$ decreases; i.e., as the market interest rates move lower relative to the bond coupon rate, SP becomes less attractive to P relative to REP despite the fact that under SP , P retains more cash. Hence, as the $m - spread$ declines, so does $\psi_L - \psi_{OL}$.

(i) Would (h)(i) and (h)(ii) necessarily yield a conflict of interest between bond holders and the FDIC? While (h)(i) and (h)(ii) are necessary conditions for a conflict of interest to arise, they are not sufficient. Resale of the cover pool for close to market value requires two conditions to be fulfilled. First, as noted in the text, the current and expected credit performance of the cover pool must be sufficiently good (i.e., the expected PV of cash flows on the bonds is higher than the bonds' face value). If not, then bond holders' would indeed prefer REP over SP under the P&A solution. Second, the cover pool or the covered bond program can be resold in the market at close to the PV of the cash flows; i.e., the haircut is not high. In other words, a conflict of interest would only materialize if bond holders can do better under RC than under REP . If $\rho \in (0,1)$ is the discount rate of bond holders, then this condition can be summarized as a constraint on the haircut, h_{CB} , on the PV of the cover pool's cash flows in a resale. Let $MV(RC) = \rho(c)FV(CP) > \rho(i)FV(CB) = MV(REP)$, where $FV(CP)$ and $FV(CB)$ are respectively, the face value of the cover pool and the

outstanding covered bonds.³⁸ Define $e := \frac{FV(CP)}{FV(CB)}$, the nominal value of the excess collateral

in the cover pool. Then, bond holders will prefer *RC* over *REP* in the event that $c_B > i_M$, and

$$h_{CB} < \bar{h}_{CB} := \left(1 - e^{-1} \frac{\rho(i)}{\rho(c)} \right).$$

(j) There are ways of designing the covered bond deal at the point of bond issuance that would preclude the situation described in (d)(i). An example is the SPV-based issuance structure used by WaMu and BoA in their covered bond programs described in III.A. and Figure 2 of the text. In this case, should the FDIC prefer and execute *REP*, the bond trustee can deliver the face value payout on the bonds to the GIC provider, whereupon the latter would initiate cash payments—supplemented where necessary by the swap counterparty—to the bond holders through the maturity of the securities. This would ensure receipt by investors of the PV of contracted cash flows. It should be noted that such a contract design would add to the cost of the deal for the issuer given the premiums to be paid to the GIC provider up to the point of bond maturity / issuer insolvency and any state-contingent payments due to the swap counterparty.

³⁸ In the case where an agent purchases a perpetuity carrying a continuous cash flow of c , $\rho(c) := \frac{c}{\rho}$. In the case of a non-amortizing bullet bond paying an annual coupon rate, c , nominal value of the bonds purchased, NV , maturity date, T , and (annual) discount factor, $\delta = e^{-\rho t}$, $\rho(c) := NV^{-1}c \frac{\delta}{1-\delta} (1-\delta^T) + \delta^T$.

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