IMF Working Paper

The Use of Mortgage Covered Bonds

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Monetary and Capital Markets

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Abstract

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The rapid mortgage credit growth experienced in recent years in mature and emerging countries has raised some stability concerns. Many European credit institutions in mature markets have reacted by increasing securitization, particularly via mortgage covered bonds. From the issuer's perspective, these instruments have become an attractive funding source and a tool for asset-liability management; from the investor's perspective, covered bonds enjoy a favorable risk-return profile and a very liquid market. In this paper, we examine the two largest "jumbo" covered bond markets, Germany and Spain. We show how movements in covered bond prices can be used to analyze the credit developments of the underlying issuer and the quality of its mortgage portfolio. Our analysis also suggests that mortgage covered bonds could be of interest to other mature and emerging markets facing similar risks related to mortgage credit.

Contents   Page

I. INTRODUCTION

Rapid mortgage growth over the last few years has been driven by demand and supply factors and has changed financial markets in mature and emerging countries alike.[2] From the demand side, favorable macroeconomic conditions, falling interest rates, and international diversification of investments played an important role. On the supply side, increased competition, decreasing interest rates and low demand for corporate debt, were important factors behind banks' redirection towards higher-margin mortgage lending for diversification of income.

The rapid mortgage credit growth has raised financial stability concerns for banks and their supervisors.[3] For banks, low interest rates made it more difficult to attract deposits, creating the need to find alternative stable sources of non-core-deposit funding. In addition, lengthening of banks' asset duration stemming from mortgage lending, created liquidity and maturity risks. The funding risks became more acute for smaller banks as they had fewer opportunities to access stable non-deposit funding. In addition to the liquidity and maturity risks, the supervisors became increasingly concerned about the credit risk of mortgage portfolios.

In this paper we analyze how securitization via mortgage covered bonds has helped banks in developed markets to mitigate the risks related to mortgage lending. Securitization has important benefits for both issuers and investors. From the issuer's perspective, mortgage covered bonds have gained predominance as an alternative stable funding source and as an asset-liability management tool. In terms of risk/return profile, mortgage covered bonds are attractive for international investors relative to sovereign and corporate debt, especially as the fiscal stance of some European governments deteriorated and corporate troubles emerged on both sides of the Atlantic. The substantial development of new securitization tools over the last 5 years has taken place while markets were looking for long duration, high quality assets.

We then argue that the development of these securitization markets has also permitted a greater transparency in the evaluation of the credit quality of banks' portfolios. First, through securitization, portions of the banks' loan portfolios are priced by the market. Second, while these markets become more liquid, the prices of the securitization bonds quoted in the secondary markets can provide more precise indications of the evolving credit quality of the underlying portfolio. The "jumbo" or benchmark issues of European mortgage covered bonds are good candidates for such an analysis, given the size and liquidity of their secondary market. There are several ways to monitor the dynamics of these markets. In this paper, we evaluate the dynamics of the asset swap spreads as we believe that this is an appropriate tool to assess their credit risk.[4]

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[2] BIS (2006); for overview of emerging European countries see Enoch and Ötker-Robe (2006).

[3] BIS (2006).

[4] This type of analysis was already used as an IMF surveillance tool; see IMF Technical Note (2006).

The remainder of this paper is structured as follows. Section II provides a description of European mortgage covered bonds as well as the main features of the two largest jumbo covered bond markets: Germany and Spain. Section III shows how to assess the credit risk of mortgage covered bonds by analyzing their asset swap spreads. Section IV applies this methodology to analyze the German and Spanish jumbo covered bond markets. Finally, in Section V we conclude with some recommendations for other markets on the use of mortgage covered bonds and their risk-mitigating features.

II. THE EUROPEAN MORTGAGE COVERED BOND MARKET

Covered bonds are debt instruments secured against a pool of mortgages to which the investor has a preferred claim in the event of an issuer default. In EU countries, the issuance of mortgage covered bonds is regulated by laws that define the criteria for eligible assets as well as various other specific requirements.[5] In most cases, assets are earmarked as collateral for the outstanding covered bond and are kept in separate cover pools. In some countries (such as Spain), all mortgages on the balance sheet of the issuer are acting as collateral for the bonds. Following the 'cover principle', the outstanding amount and interest claims on covered bonds must be covered by the amount of eligible cover assets.

In contrast to other mortgage-backed securities (MBS), there is a special legal regime that governs the issuance and provides "special" protection to investors. The law governs the type of eligible assets for the covered pool, the asset/liability management (ALM), credit enhancements and over-collateralization requirements. Additionally, the cover pool remains on the balance sheet of the issuer and eligible assets are substitutable. Individual covered bonds do not face individual claims within the respective pool. Instead, all mortgage loans are facing the total volume of all outstanding mortgage bonds. In fact, mortgage cover pools are dynamic and of unlimited duration (when a loan meets the legal requirements, it is included in the existing pool). At the same time, when a loan is repaid or if, for other reasons, it no longer meets the quality criteria, it is withdrawn immediately. The large number of claims within the mortgage pools should offset the risks of individual claims, which constitutes an important safety criterion for the bondholder.

In general, holders of mortgage bonds do have a preferential claim on the collateral and the proceeds arising from it. Loan-to-value (LTV) ratios, prudent property valuation rules (e.g. mortgage lending value), and the trustees or the cover asset monitors acting in the interest of the covered bondholders reinforce the safety of the covered bond in most countries. The described attractive risk/return features of the covered bond allows lenders to obtain funds in capital markets at a reduced borrowing cost (with respect to other wholesale sources) enabling them to provide medium- or long-term finance for housing, non-residential property or urban development at a more convenient and stable rate of interest for the borrower.

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[5] In the UK, covered bonds are structured on existing corporate law, not on the basis of a specific legal framework. However, the FSA is currently working on the adoption of an EU compliant regulatory framework.

The main transformation in the mortgage covered bond market took place with the issuance of jumbo or benchmark covered bonds. The jumbo model has become the European standard for the issuance of new bonds. It has also been the main driver for a very liquid secondary market, especially through bond standardization and listing on widely used electronic platforms. The jumbo model was first introduced by a syndicate of banks in Germany in 1995. Several features were added to increase liquidity and improve the security in order to attract foreign institutional investors. The main features of the jumbo model are: (i) the minimum size is Euro 1 billion; (ii) jumbos need to be plain vanilla bonds (fixed coupon, paid annually in arrears); (iii) buybacks are allowed; (iv) the bond must be officially listed on an organized market (typically an electronic platform); and (v) there must be at least 3 market makers that quote bid/ask prices simultaneously to maintain a liquid market. The total value of all issues in the jumbo covered bond market in Europe has grown rapidly to over Euro 500 billion by end-2004, about a half of which is accounted for by German and Spanish mortgage covered bonds (Figure 1).

Figure 1. Outstanding Volume of German Jumbo Mortgage Pfandbriefe and
Spanish Jumbo Cédulas Hipotecarias

(Euro, billion)

Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05

☐ Jumbo Mortgage Pfandbriefe
■ Jumbo Cédulas Hipotecarias
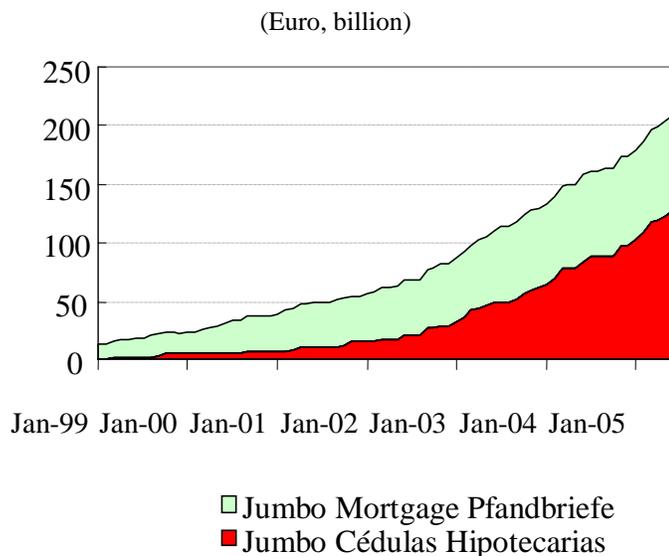
Source: Banco Bilbao Vizcaya Argentaria.

Regulatory issues

Covered bond legislation has been developed in most European countries (Figure 2). In fact, the rapid growth of European covered bonds has to a large extent been fostered by a favorable European law, the 1988 UCITS directive 85/611/EEC of 12/20/1985, which allows mortgage covered bonds to benefit from increased investment possibilities and relatively low regulatory risk weightings. The directive allows investment funds to invest up to 25 percent

of their assets in the covered bonds of a single issuer as long as the issuer and the bonds satisfy the following eligibility criteria:[6]

1.   the covered bonds must be issued by an EU credit institution;

2.   they must be subject to special supervision by the public authorities with the aim of protecting the bond holders;

3.   the sums deriving from the issue of these bonds must be placed in assets which provide sufficient cover for the liabilities deriving from the bonds until maturity; and

4.   the bonds under consideration must be covered and should grant preferential rights to the bondholder in the event of the bankruptcy of the issuer, i.e. the sums deriving from the issue of the bond are intended as a priority to repay the capital and interest becoming due.

The benefit of low risk weightings derives from the fact that, under European bank capital adequacy rules, member states can assign a 10 percent risk weighting to covered bonds complying with these criteria. This represents a risk weighting that is 50 percent lower than would otherwise be the case.

Figure 2. Covered Bond Legislation Across European Markets
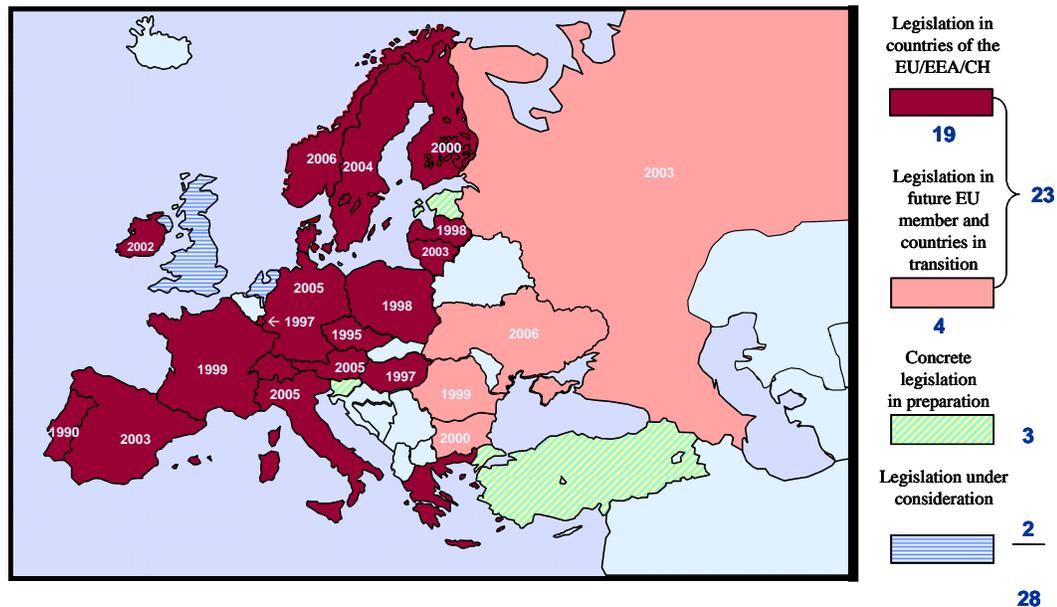
Source: European Covered Bond Council, 2006.

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[6] For the full UCITS directive, see:
http://Europe.eu.int/comm/internal_market/en/finances/mobil/ucits/index.htm. Most EU member states have transposed Art 22(4) of the UCITS directive into national legislation.

The new treatment of covered bonds under Basel II is likely to further boost banks' demand for mortgage covered bonds. Under the standardized approach of Basel II, the risk weights will be either 10 or 20 percent depending on the modality of the standardized approach chosen by the regulators. Under the Internal Rating-Based (IRB) approach, given the different estimates for probabilities of default and loss-given-default considered in the scenarios run by commercial banks, risk weights are estimated between 11 and 4 percent, depending on whether the bank applies the foundation or advanced IRB and on the rating of the issues. Since banks buying covered bonds are mostly sophisticated institutions, which are likely to apply IRB, a boost for covered bonds is to be expected as risk weights are likely to fall to around 4 percent.

In addition to a well established regulatory framework, there are other features of mortgage covered bonds that make them attractive to a wide range of investors including banks, insurers, pension funds, asset management companies, and central banks. With the booming of the jumbo market, the secondary market for these instruments has become highly liquid at a wide range of maturities (up to 20 years), as well as a source for portfolio diversification across different markets. With comparable ratings to sovereigns but considerably higher yields, demand for covered bonds has increased over the last 2 years relative to both corporate and sovereign bonds. German *Pfandbriefe* usually receive a triple-A rating and Spanish *Cédulas* receive 2-5 notches above the senior rating of the issuer.

There are some key common aspects that rating agencies' methodologies take into account in assessing credit risk: (i) the quality of the **country**'s regulatory framework and, in particular, the strength of the investor protections in the regulatory framework such as the collateral eligibility criteria, quality of prudential supervision, LTV ceilings, mandatory overcollateralization, insolvency treatment, and ALM requirements; (ii) the creditworthiness of the **issuer**; and (iii) the credit quality of the **specific issue** and, in particular, the quality of the asset pool and the possible structural enhancements.

III. ASSESSING THE CREDIT RISK OF COVERED BONDS VIA ASSET SWAP SPREADS

Due to the rapid expansion of mortgage debt, concerns have emerged regarding the credit quality of banks' portfolios. In this section we suggest that, in order to assess the credit quality of the covered bonds issued and to monitor the evolution of their risk profile, it is useful to apply a measure commonly adopted by market participants in liquid markets: the asset swap spread.[7]

The mechanics of an asset swap is as follows: an investor holding a fixed rate corporate or government bond wants to preserve an exposure to the issuer (credit risk), but would like to eliminate fixed interest rate risk. Having bought the bond, the investor enters into an asset swap transaction with a counterparty or a swap dealer. The investor in the bond agrees to pay the swap dealer the fixed rate coupon (i.e., the cash flow of the bond) while receiving the

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[7] For details on how to engineer an asset swap, see, for example, Neftci (2004) and Morgan Stanley (2005).

floating rate (i.e., Libor) payments plus or minus a spread reflecting mostly the credit risk of the issuer. For example, most governments trade with a negative asset swap spread to Libor, while corporate bonds have a positive spread. If a default occurs, however, the investor sells the bond and receives the recovery value. At the same time the investor must continue to honor the swap deal, paying the fixed coupon and receiving Libor plus or minus the spread, or choosing to close out the swap deal at the prevailing market rates.

Accordingly, the asset swap spread is mainly a measure of the market's assessment of the credit risk of an issuer. While the bond spread incorporates a number of risks, including credit risk, funding risk (an investor needs cash to buy the bond), and fixed interest rate risk (when coupon payments on a bond are fixed); an asset swap spread eliminates the fixed interest rate risk (see Figure 3).[8] We choose to use the asset swap spread over Libor for the larger liquidity and homogeneity that the rates in this market have vis-á-vis Government bond rates.

Figure 3. Different Measures of Credit Risk
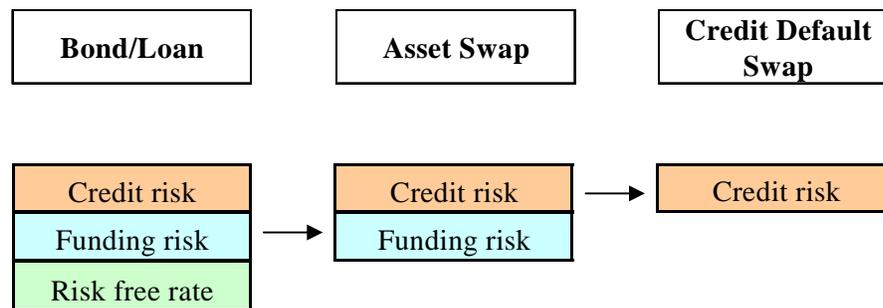
In the subsequent analysis we use par/par asset swap spreads, where the value of the asset swap is equal to the difference between the par value and the market price of the bond, setting the net present value of all the cash flows to zero.[9] Hence the investor pays the market value for the bond (P) and the remaining amount (P-1) to the swap dealer for the asset swap contract. During the life of the asset swap spread the fixed coupon payments are exchanged for flexible Libor payments plus or minus the spread (A). The formula to calculate the swap spread is therefore as follows:

$$(P-1) - C \sum_{i=1}^{N_{Fixed}} df(0,i) + \sum_{i=1}^{N_{Float}} \Delta_i (L(i-1,i) + A) df(0,i) = 0$$

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[8] The most focused measure of credit risk is the credit default swap, as it also eliminates the funding risk (no up-front payment equivalent to the price of a bond is needed to take a position).

[9] For a detailed analysis and an example using Bloomberg asset swap calculator, see Appendix I.

where, C is the annual coupon; $L(i\text{-}1,i)$ is the forward Libor rate set at the time of cash flow $i\text{-}1$ and paid at the time of cash flow i; Δ_i is the accrual factor in the corresponding basis, i.e., it represents the number of days in the appropriate basis (e.g., "actual/360 annual" for the bond, and "actual/360 semiannual" for the floater) over which the corresponding rate is calculated; and $df(0,i)$ is the discount factor from the present to the coupon payment i.

IV. THE JUMBO COVERED BOND MARKET: THE GERMAN PFANDBRIEFE AND THE SPANISH CÉDULAS HIPOTECARIAS

A. The German Mortgage Pfandbriefe

German Pfandbriefe (Pfandbriefe hereafter) were taken as a model in several European countries when legal frameworks were reformed in the late 1990s to enable the issuance by certain financial institutions of similar instruments secured on portfolios of mortgage loans. The high credit quality of mortgage Pfandbriefe, generally a triple-A rating from at least one rating agency, stems from some key features: first, a well-established regulatory framework, which was revised in July 2005 (see Appendix II for details); second, the quality of the collateral pool, which must be covered by related assets of at least an equal amount and yield; third, the high quality of the cover pool encompassing first ranking mortgages with LTV ratios no higher than 60 percent; and fourth, in case of the bankruptcy of the issuer, the privileged position of Pfandbriefe holders is guaranteed by a statutory preferential right and the separation of the cover pool (administered by an independent trustee).

Figure 4 presents the mortgage Pfandbriefe asset swap spreads for 37 jumbo issues, which match the Pfandbriefe included in the *iBoxx € Hypothekenpfandbriefe Index*. Analysis of the spreads indicates that, since 2003, Pfandbriefe spreads have fallen substantially, especially those that were at higher levels, reflecting the market's perception of lower credit risk. As a result, most of the Pfandbriefe trade currently at a premium relative to the swap rate (i.e. negative spread) within a relatively narrow band between +2 and −10 basis points.

There is an exception to this general positive trend. In September 2005, one of the main issuers of mortgage Pfandbriefe, Allgemeine Hypotekenbank Rheinboden (AHBR), was on the brink of bankruptcy. This was the result of a protracted period of financial difficulties on account of the mismanagement of its fixed income loan book. The markets reacted strongly to the critical situation of AHBR and the issuer was downgraded to non-investment grade (from single A). The spreads for its mortgage Pfandbriefe increased from nearly zero to about 15 basis points, as shown in Figure 4. After AHBR was taken over by a U.S. financial investment company and following the announcement of the restructuring plans in January 2006, the spreads seem to have stabilized. It is worth noting that while AHBR's rating was severely downgraded, its covered bonds remained highly rated (AA-AAA) throughout this process.

B. The Spanish Cédulas Hipotecarias

Spain also has a well-developed market in mortgage covered bonds. The main features of Cédulas Hipotecarias (see Appendix II) can be summarized as follows. Issuance of Cédulas Hipotecarias is limited to 90 percent of the issuer's collateral pool. This is constrained to first-lien mortgages with LTV capped at 80 percent and 70 percent for residential and commercial mortgages, respectively. Unlike other covered bonds, the collateral backing Cédulas Hipotecarias does not constitute a special or protected fund if the issuer goes bankrupt. However, the credit quality of Cédulas Hipotecarias is high because of both the preferential rights their holders enjoy in the event of bankruptcy and the demanding minimum level of over-collateralization required by law (11 percent). In fact, the actual level of overcollateralization is much higher, as shown in Figure 5.

Figure 4: Asset Swap Spreads of Jumbo Mortgage Pfandbriefe
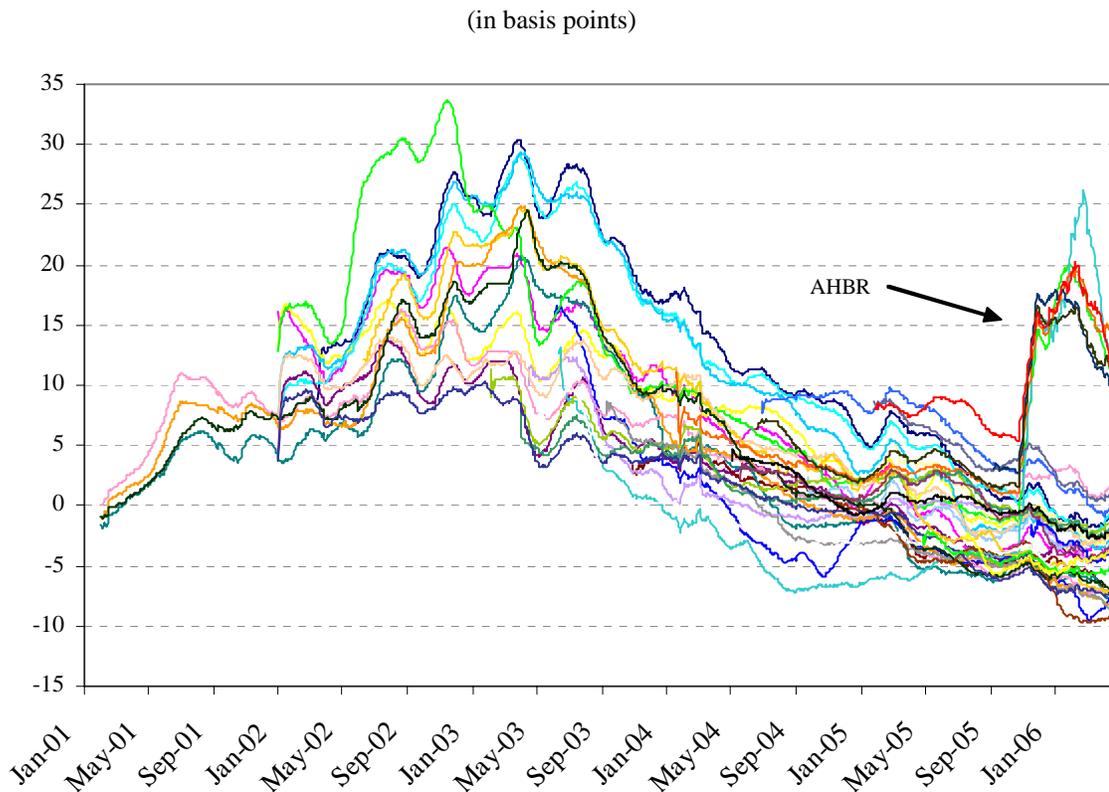
(in basis points)

Sources: Bloomberg and IMF staff estimates. A 25-day moving average was applied to the daily spreads. The Pfandbriefe included in the analysis correspond to 37 jumbo issues (at least one billion Euro) which match the *iBoxx € Hypothekenpfandbriefe Index* (see http://www.iboxx.com).

Figure 5. Cédulas Hipotecarias: Overcollateralization of the Largest Four Credit Institutions

(September, 2005)
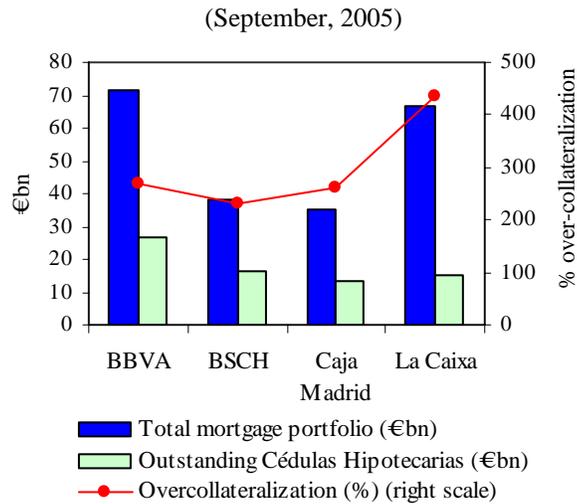
Source: Banco Bilbao Vizcaya Argentaria.

Club funding is a key feature of Spanish market (Figure 6). While large credit institutions have better access to international capital markets, smaller credit institutions (regional savings banks and credit cooperatives) can tap the international capital markets through the

Figure 6: Club Funding with Cédulas Hipotecarias
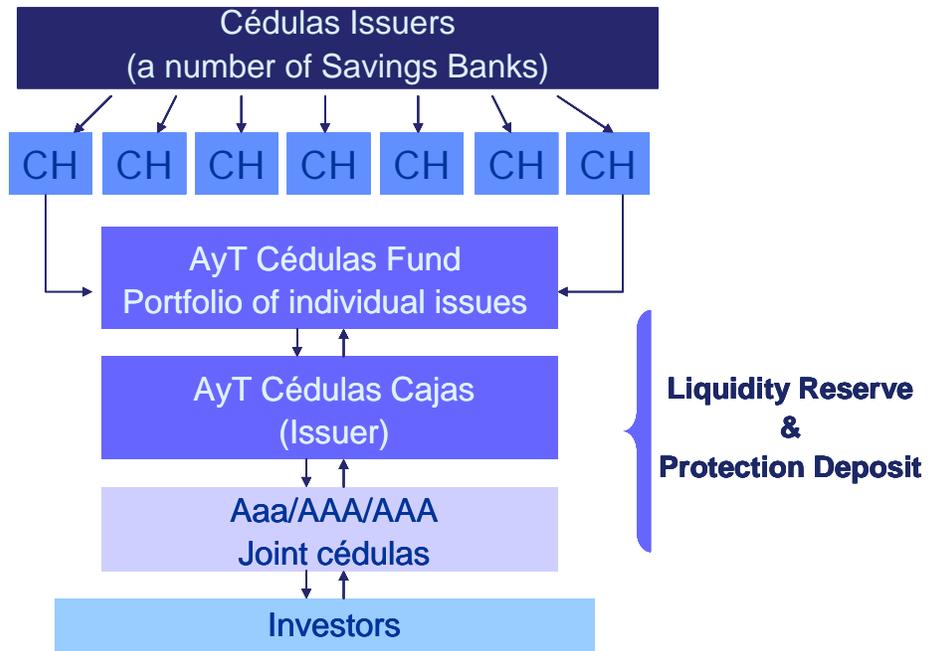
Sources: AyT, HVB.

joint issuance of Cédulas Hipotecarias and other securities backed by a common pool of mortgages.

Given that their good credit quality is widely recognized, this funding is relatively cheap. About 62 percent of the securitization bonds were bought by foreign investors. Thus, the quality of the mortgage portfolio becomes of paramount importance not only for the credit risk of the Spanish financial institutions but also for their ability to raise funding abroad at favorable rates.

Analysis of Cédula Hipotecaria spreads (Figure 7) indicates that the spreads have narrowed since 2002, and for some of the older issues, the spreads in 2005 show a premium relative to

Figure 7: Asset Swap Spreads of Jumbo Cédulas Hipotecarias
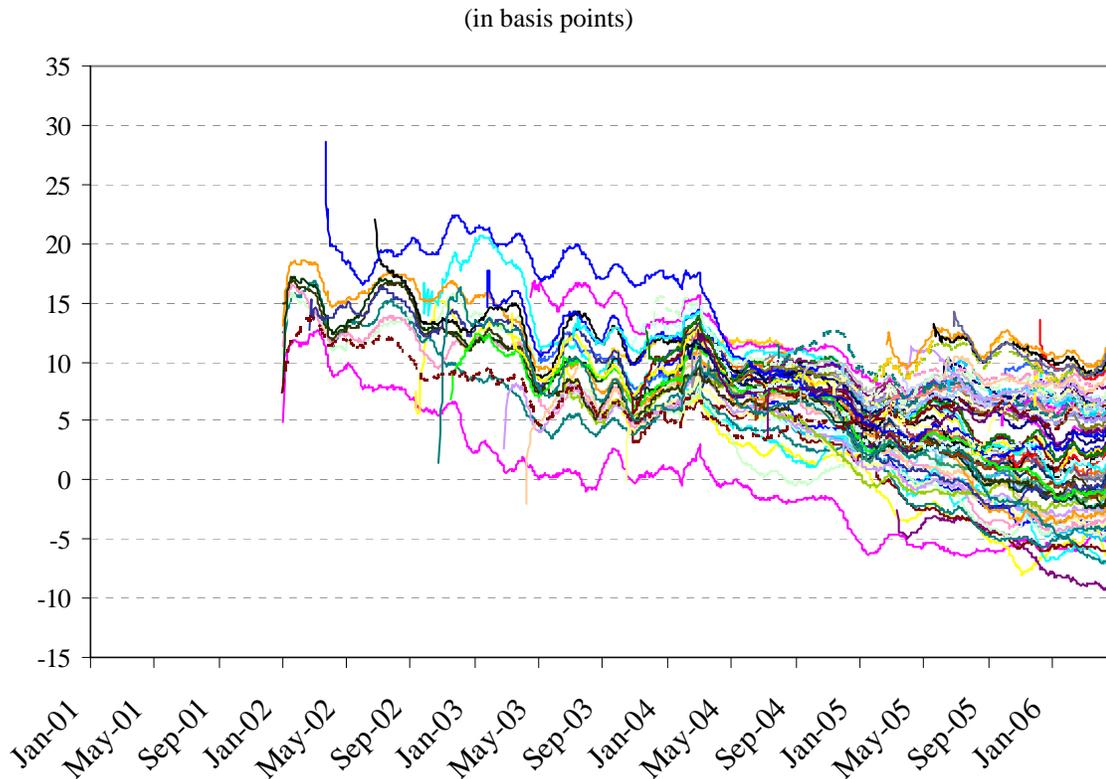
(in basis points)

Sources: Bloomberg and IMF staff estimates. A 25-day moving average was applied to the daily spreads. The Cédulas Hipotecarias included correspond to 78 jumbo issues (at least 1 billion Euro) by the largest commercial and savings banks, as well as "pooled-issues" of small credit institutions.

the swap rate. This reflects positive market sentiment about the quality of the issuers and their mortgage portfolio. However, since early 2005, there has been an increased dispersion in the spreads of different issues as a result of new, longer-term Cédulas Hipotecarias, which tend to pay higher spreads. Credit institutions seem to be trying to secure funding while the

spreads are still relatively narrow, in the anticipation of a possible turn-around in the housing market cycle. At the same time, the considerably higher spreads paid on longer-term (i.e., riskier) instruments may reflect the market perception of increased riskiness associated with the growing exposures of credit institutions to a possibly overvalued housing market.[10]

V. CONCLUSIONS

Mortgage covered bonds have experienced exceptional growth in recent years in Europe, quickly becoming one of the preferred securitization instruments. The well established regulatory framework and relatively low capital charges have created a favorable environment for both issuers and investors. The successful experience in some European countries can provide lessons for other mature and emerging markets with similar risk profiles and financing needs. As an illustration, one of the largest US mortgage lenders has recently announced the first mortgage covered bond fundraising program. The program is intended to diversify the wholesale funding sources and take advantage of lower funding costs relative to the issuance of MBS in the US. This development is likely to encourage other US issuers to follow suit.[11]

The main advantages of the use of mortgage covered bonds for other mature and emerging markets can be briefly summarized as follows:

- First, covered bonds help credit institutions gain access to an alternative stable and relatively cheap funding source in an environment of increasing reliance on wholesale funding as opposed to a core deposit base.

- Second, small regional credit institutions have the possibility of "club" funding. Through joint-issuance of a covered bond, small institutions can access international capital markets, typically only available to medium or large financial institutions. The mortgage pool may enjoy further credit enhancement as a result of the regional diversification of the underlying mortgage portfolios.

- Third, similar to other instruments, such as credit and interest rate derivatives, covered bonds allow for better long-term liquidity management and the matching of the increasing duration of assets with long-term bonds.

There are some additional features of covered bonds which are of particular interest to emerging markets. The gap between the average long-term rating on emerging market

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[10] The Spanish housing market has experienced a boom in the last 10 years—in fact, the increase in the real housing price is among the steepest in industrial countries. Mortgage loans have grown rapidly in the context of a booming housing market and good macroeconomic performance. Most of the empirical work on the assessment of the "long-run equilibrium" level of Spanish housing prices finds evidence of a misalignment of about 25 percent with respect to the estimated equilibrium.

[11] For further details, see the cover page of Financial Times, weekend edition, Saturday 2/Sunday 3, September 2006.

commercial bank debt and the credit quality of their residential and commercial mortgage assets creates incentives for these institutions to raise funds through mortgage covered bonds. As commercial banks maintain their mortgages on their books, they can issue covered bonds against those assets which would allow cheaper wholesale funding relative to other types of debt instruments. In addition, the current benign conditions seem favorable for banks in these markets to issue new funding instruments, as international investors are likely to require some time to assess the risk profile of new covered bonds. In the event of a reversal in international capital flows to emerging markets, credit institutions with well-established mortgage covered bonds would have enhanced the stability and diversification of their funding sources.

Finally, in order to assess the risks of covered bonds, we have used asset swap spreads—they measure the credit risk that would be incurred by holding a mortgage covered bond which is the object of the swap. The application to the jumbo market for European mortgage covered bonds is of particular interest as these instruments have become a key financing instrument for credit institutions, as well as a very liquid and safe asset for institutional investors. As mortgage covered bonds develop in other mature and emerging markets, the analysis based on asset swap spreads would permit greater transparency in the evaluation of the credit quality of these banks and their mortgage portfolios.

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APPENDIX I: Asset Swap Calculation: an Application to Spanish Covered Bonds

In this Appendix we use a specific case to show the characteristics of an asset swap transaction involving a mortgage covered bond. Suppose we were holding a *Cédula Hipotecaria* issued by *AyT* maturing 06/30/2025 paying a fixed annual coupon of 3.75 percent (ISIN: ED996101 Corp). On February 27, 2006 this bond was trading in the market under par at a price of 96.0478/96.2478 (bid/ask). Suppose that we want to protect ourselves against the risk of a possible default of this bond while, at the same time, switching our cash flow from a fixed to a floating rate index. For these reasons we initiate an asset swap deal in which a market counterpart accepts from us the payment of the fixed rate coupon while paying us, in exchange, a floating Libor +/- a spread (i.e., the so-called asset swap spread). The different cash flows exchanged are the basic components of the transactions:

1.   the stream of the fixed rate coupons of the corporate bond from the date on which the contract is initiated to the bond maturity;

2.   the difference between the quoted price at the contract date and the notional value of the bond;

3.   the cash flows from the floating leg which are the forward interest rates paid on the reset dates (e.g., typically the floating leg is indexed to a 6 months rate) and set one period in advance.

The asset swap spread is determined by setting the net present value of all the cash flows to zero, while taking into account the difference between the par value of the bond (100) and the market value (P), in our case 96.2478 (the ask price). The asset swap buyer (we) will be willing to receive the spread A that is implied by the following equation:

$$(P-1) - C \sum_{i=1}^{N_{Fixed}} df(0,i) + \sum_{i=1}^{N_{Float}} \Delta_i (L(i-1,i) + A) df(0,i) = 0$$

where, C is the annual coupon; $L(i\text{-}1,i)$ is the forward Libor rate set at the time of cash flow $i\text{-}1$ and paid at the time of cash flow i; Δ_i is the accrual factor in the corresponding basis, i.e., it represents the number of days in the appropriate basis (e.g., "actual/360 annual" for the bond, and "actual/360 semiannual" for the floater) over which the corresponding rate is calculated; and $df(0,i)$ is the discount factor from present to the coupon payment i.

We can better understand the mechanics of the deal by looking at Table 1. Supposing the deal is closed on February 27 and settled on March 1, 2006, the first payment will take place on June 30, 2006, the day on which the next annual coupon on the bond is due. On June 30, 2006 we, the protection buyer, will have to pay to the protection seller the portion of the annual coupon which has matured in the meantime. The amount due is computed using the annual coupon matured over the appropriate period in the actual/actual annual basis, i.e.,

C* (Feb 27+2 day to June 30 on actual/actual) = 3.75 *0.358904 = 1.2431507.

Table 1. Asset Swap Cash Flows

Payment Dates	Payments (Pay)	Payments (Receive)	Net Payments	Discount	Net PV
6/30/2006	-124315.07	94916.63	-29398.44	0.991053	-29135.4
12/29/2006	0	155686.22	155686.22	0.976127	151969.6
6/29/2007	-375000	167374.35	-207625.65	0.960321	-199387
12/31/2007	0	176555.74	176555.74	0.943922	166654.8
6/30/2008	-375000	175276.26	-199723.74	0.927916	-185327
12/31/2008	0	180646.81	180646.81	0.911702	164696.1
6/30/2009	-375000	179841.88	-195158.12	0.895839	-174830
12/31/2009	0	185151.44	185151.44	0.879796	162895.6
6/30/2010	-375000	185437.73	-189562.27	0.864013	-163784
12/31/2010	0	191630.08	191630.08	0.848001	162502.5
6/30/2011	-375000	188184.32	-186815.68	0.832564	-155536
12/30/2011	0	190736.95	190736.95	0.817205	155871.1
6/29/2012	-375000	193157.82	-181842.18	0.801938	-145826
12/31/2012	0	199140.35	199140.35	0.786497	156623.4
6/28/2013	-375000	194704.05	-180295.95	0.771683	-139131
12/31/2013	0	204218.44	204218.44	0.75645	154481
6/30/2014	-375000	201828.97	-173171.03	0.741686	-128438
12/31/2014	0	207571.46	207571.46	0.726803	150863.7
6/30/2015	-375000	205496.14	-169503.86	0.712362	-120748
12/31/2015	0	210118.61	210118.61	0.697894	146640.4
6/30/2016	-375000	209945.02	-165054.98	0.683729	-112853
12/30/2016	0	212617.77	212617.77	0.669678	142385.4
6/30/2017	-375000	213015.1	-161984.9	0.655888	-106244
12/29/2017	0	214107.38	214107.38	0.642314	137524.3
6/29/2018	-375000	215310.11	-159689.89	0.628947	-100437
12/31/2018	0	219717.33	219717.33	0.615596	135257
6/28/2019	-375000	212875.48	-162124.52	0.602926	-97749
12/31/2019	0	221542.39	221542.39	0.590022	130714.8
6/30/2020	-375000	216867.15	-158132.85	0.577655	-91346.2
12/31/2020	0	219310.11	219310.11	0.565413	124000.9
6/30/2021	-375000	216698.53	-158301.47	0.553571	-87631.1
12/31/2021	0	220738.95	220738.95	0.541764	119588.4
6/30/2022	-375000	216896.03	-158103.97	0.530406	-83859.3
12/30/2022	0	219026.6	219026.6	0.51918	113714.2
6/30/2023	-375000	217448.88	-157551.12	0.508269	-80078.3
12/29/2023	0	217009.38	217009.38	0.497609	107985.7
6/28/2024	-375000	216502.74	-158497.26	0.487196	-77219.2
12/31/2024	0	220723.32	220723.32	0.476807	105242.5
6/30/2025	-10375000	10214098.95	-160901.05	0.466939	-75131
Total					**334920**

Source: Bloomberg.

On the other hand, the protection seller will have to pay us the amount implied by the 6 months forward rate determined on January 1, 2006 (i.e., 2.637 percent) over the appropriate period (Feb 27+2 days to June 30) in the actual/360 semiannual basis plus the required spread over Libor (A). In this specific case the total amount of the floating leg will be equal to 0.9491663. Now these two amounts need to be (i) multiplied by the notional which we assume to be Euro 10 million and (ii) discounted to present using the appropriate discount factor, which could be inferred from Table 2 for the term 3.8 months (i.e., between 0.993256 and 0.9908.)

Table 2. Libor and Discount Curves

M/Term	Rate	Discount	Mty/Term	Rate	Discount	Mty/Term	Rate	Discount
1 DY	2.35	0.999935	11 MO	2.934	0.973269	10 YR	3.7	0.693147
1 WK	2.394	0.999535	1 YR	2.965	0.970816	11 YR	3.739	0.665046
1 MO	2.571	0.997649	18 MO	3.139	0.954381	12 YR	3.775	0.637746
2 MO	2.618	0.995511	2 YR	3.2223	0.938314	15 YR	3.862	0.561479
3 MO	2.657	0.993256	3 YR	3.325	0.906297	20 YR	3.948	0.453954
4 MO	2.689	0.990823	4 YR	3.399	0.874568	25 YR	3.985	0.368858
5 MO	2.735	0.98851	5 YR	3.468	0.842794	30 YR	3.992	0.302425
6 MO	2.769	0.986045	6 YR	3.5166	0.812035	35 YR	3.986	0.249715
7 MO	2.804	0.98353	7 YR	3.566	0.781525	40 YR	3.986	0.20543
8 MO	2.84	0.981039	8 YR	3.612	0.751415	45 YR	3.97	0.171959
9 MO	2.876	0.978503	9 YR	3.658	0.721915	50 YR	3.964	0.142726
10 MO	2.91	0.975785						

Source: Bloomberg.

It must be noticed that the constant spread over Libor (A) for the floating leg is determined so that the total net present value of the two cash flows is equal to the difference between the market value of the bond and the par value, as implied by the previous formula:

$$(P-1) = C \sum_{i=1}^{N_{Fixed}} df(0,i) - \sum_{i=1}^{N_{Float}} \Delta_i (L(i-1,i) + A) df(0,i)$$

In our case the value of this difference is Euro 334920.

As can be seen from the next Bloomberg screen (Figure 1) the appropriate spread in this case should be 5.5 basis points. This indicates that the credit quality of this Cédula Hipotecaria is very high since the market requires only a 5.5 basis point spread over a curve that is the benchmark for counterparties which enjoy AA rating.

Figure 1. Calculating the Asset Swap Spread: the Bloomberg Calculator

APPENDIX II: Regulatory Framework for Pfandbriefe and Cédulas Hipotecarias

Mortgage Pfandbriefe: A New Regulatory Framework

Changes	New German Covered Bond Law (July, 2005)	Old Regulations
Transparency requirements	Increased mandatory quarterly disclosure of asset quality and some other risk parameters. Although this is clearly an improvement, information remains backward looking and is not sufficient to fully allow investors to assess a pool's risk profile. The new Act in particular requires issuers to report: 1. Volume of outstanding covered bonds (by type) including their nominal, net present value as well as stressed net-present-value overcollateralization; 2. Term structure and fixed interest rate structure of the cover pool and covered bonds in buckets; and 3. Percentage of derivatives registered in the pool. 4. Stratifications of the cover pool by size, origin, and type of loan; 5. Amount of overdue loans (greater than 90 days) and stratification thereof (by origin).	Limited and only annual requirements to provide some asset quality data and nominal overcollateralization levels. However, "Jumbo" issuers have already voluntarily reported more often and in more detail than what was required by law.
Refined risk management	Banks are now also required to have a cover pool specific risk management that explicitly addresses concentration issues.	Refined risk management
Legal basis to issue covered bonds	Banks will need an approval by the German supervisory authority BaFin. They also have to adhere to some minimum requirements regarding: (i) minimum capital of Euro 25 million; (ii) adequate risk management of cover pools; and (iii) willingness to regularly tap the market.	Legal basis to issue covered bonds
Trustee	Mandatory for all.	Only needed for private mortgage banks (special and mixed mortgage banks).
Circulation limit	No longer in place.	60x liable capital for private sector mortgage banks; 48x for mixed mortgage banks; and no ruling for public sector banks.
Loans with LTVs > 60%	No longer a limit.	20%
Elements of the Old Law that Remain Unchanged		
Interest rate/ Maturity/Forex and Liquidity mismatches	Only implicit limitation via the 2 percent net-present-value requirement that has to be maintained at all times, whereby a shortfall has to be made up by additional cover and the bank has to have adequate risk-management systems in place. Furthermore, the yield on assets has to be at least as high as those paid on covered bonds; traffic light system: 100 basis point parallel shift of the yield curve should not exceed 10% of the banks liable capital.	

Source: Standard and Poors (2005) and IMF staff.

Regulatory Framework for Cédulas Hipotecarias

Issuers	Any Spanish credit institution regulated by the Bank of Spain
Supervisor	The Ministry of Economy & Finance through the Bank of Spain supervises at the issuer level and the National Stock Market Commission (*Comisión Nacional del Mercado de Valores*) must authorize any Cédula Hipotecaria issue prior to its listing.
Relevant laws	Mortgage Market Law 2/1981, further developed by Royal Decree 685/1982. The new Insolvency Law 22 /2003 of July 2003 amended the Mortgage Market Law improving the position of Cédula Hipotecaria holders in the event of the issuer becoming insolvent.
Collateral	The entire mortgage portfolio.
Eligibility Criteria	Only residential mortgages with a Loan-to-Value (LTV) ≤80 percent commercial mortgages with LTV≤70 percent are eligible to issue a Cédula Hipotecaria. All properties must be fully insured and valued by real estate surveyors approved by the Bank of Spain. Only properties which are wholly owned by the mortgagors. To qualify, the value of the mortgages on buildings under construction cannot exceed 20 percent of the total eligible portfolio. For buildings under construction, only 50 percent of the value of the land and 50 percent of the value of the construction may be taken into account. Non-performing loans are ineligible. Mortgage loans which originally exceeded the maximum LTV may become eligible as collateral if, as a result of the principal being repaid by the borrower or as a result of an increase in the market value of the property, the LTV falls within the established levels.
Transfer of Loans	No; the loans remain on the issuer's balance sheet together with any other assets.
Cover Register	No; Cédulas Hipotecarias are secured by all mortgages held on the issuer's balance sheet at any given time.
Mandatory Over-collateralization	Credit institutions can issue Cédulas Hipotecarias up to 90 percent of the eligible mortgage loan portfolio, and there is a minimum mandatory over-collateralization of 11 percent.
Real Estate Valuation	All properties collateralizing eligible mortgage loans must be valued by surveyors approved by the Bank of Spain. Ineligible assets are not mandatorily subject to this type of valuation. Valuations by the issuer's own valuation services are permitted if authorized by the Bank of Spain, although in practice most valuations are undertaken by third party assessors. In early 2004 new legislation was passed modifying the real estate valuation criteria for those mortgage loans eligible to back mortgage bonds. ECO/805/2003 introduced the concept of "mortgage value" (more sustainable and less volatile than the market value).
Geographical Constraints	Although the law does not specifically address the location of the property, the need to register the loan in the national Property Register means that in practice only property in Spain may be used to secure loans.
Interest Rate and Maturity Matching Requirements	The average interest rate on variable Cédulas Hipotecarias must not exceed the average rate on qualifying variable mortgage loans; although in practice most Cédula Hipotecaria issued are fixed-rate. No matching required in terms of maturity of assets and liabilities.
Substitute Collateral	No, the cover assets only comprise mortgage loans.
Prepayment Risk	Yes, residential mortgage loan prepayments are permitted with a penalty (see footnote 13).
Should the Issuing Bank Become Insolvent	A new Insolvency Law has enhanced the position of covered bondholders by stipulating the non interruption of payments of principal and interest on Cédulas Hipotecarias during insolvency proceedings. The insolvency administrators will satisfy their claims at their original due maturities, from the revenues obtained from the mortgages/ public sector loans, regardless of the stage of the insolvency process.
Preferential Claim of Covered Bondholders	Special privilege; preferential claim on the whole mortgage loan portfolio.
Separate Cover Pool Administrator in Insolvency	No.
Eligible for Tier 1 Repos with ECB	Yes

Source: FitchRatings and IMF staff.