

The CMBX: the Future is Here

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I. Introduction

Commercial mortgage backed securities (CMBS) are the latest asset class to join the family of credit derivatives indices. Since 2004, the total notional amount in the credit derivatives market has more than quadrupled, particularly after the introduction of global indices for credit default swaps (CDS) of corporate credit risk. Over the same period, CDS for structured finance securities have gradually gained traction. In January 2006, the synthetic index for home equity loan ABS, called the ABX.HE, began trading.¹ On March 7, 2006, the index of CMBS securities, called the CMBX, was introduced. In this paper, we explain the basic mechanism of the CMBX indices and explore their implications for the CMBS market as a whole.

II. The CMBX in Brief

In a nutshell, the CMBX is a group of indices consisting of 25 CMBS tranches, sorted by rating class. What differentiates the CMBX from other CMBS indices is that market participants *can trade a CMBX index as a CDS contract*. The CMBX belongs to the same index family as the indices for corporate CDS, the DJ CDX. Using the CMBX, one can either gain synthetic risk exposure to a portfolio of CMBS by "selling protection" or take a short position by "buying protection." The contract for the CMBX is designed to closely mirror the cash flow of the portfolio of cash CMBS bonds.

The CMBX indices are rolled into a new "on-the-run" series every six months, with a new portfolio composition that reflects the current CMBS market. The CMBX uses the credit derivatives template specifically designed for structured finance securities, published by Internal Swaps and Derivatives Association (ISDA). This specific CDS format is called "pay-as-you-go (PAUG)," which involves ongoing, two-way payments over the life of a contract between the buyer and the seller of protection.

¹ For more information on the ABX, see: *Synthetic ABS 101: PAUG and ABX.HE*, Nomura Fixed Income Research (7 March 2006).

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As in the CDX and ABX indices, all administrative issues for the CMBX are handled by Markit[®], who publishes various information including index composition and price data.

In our view, the CMBX presents a completely new venue for trading exposures to the U.S. commercial real estate market, offering many potential applications. The relative transparency in portfolio selection and pricing allows various trading strategies, such as relative value trades and dynamic hedging. *The key, however, is to understand the contractual mechanism of the PAUG CDS format and to analyze the construction of the index in relation to the overall CMBS market.* In the following sections, we present the basic mechanism of the PAUG CDS and some important issues for users of the CMBX.

What is a CDS?

A CDS is a derivative contract that works like an insurance policy against the credit risk of a company ("reference entity") or an asset ("reference obligation"). The seller of protection assumes the credit risk of the reference entity or the reference obligation from the buyer of protection in exchange for periodic payments of a protection premium. The term "ABS CDS" is often used for CDS referencing various structured finance products, including residential mortgage backed securities (RMBS) and commercial mortgage backed securities (CMBS).

Selling protection using a CDS differs from actually owning a bond in several ways. First, the issuer (or the borrower) is not directly involved in a CDS contract. Instead, the issuer is merely "referenced" in a private contract between the buyer and the seller of protection. A CDS can be created even if a certain reference obligation is not available in the cash bond market. Also, one can "short" credit risk by buying protection via CDS. Furthermore, as a derivative contract, a CDS contract does not require an initial investment. Hence, the synthetic form of credit risk offers greater flexibility for hedging or expressing a view.

III. A Short History of Synthetic CMBS

Trading of CDS of CMBS picked up in the fall of 2005, with the backdrop of surging volume in CDS of structured finance securities ("ABS CDS").² The big growth spurt came after ISDA published its first standardized templates for ABS CDS in June 2005. The total notional amount of ABS CDS reached \$70-75 billion by the third quarter of 2005, and is likely to reach \$150 billion in the first quarter of 2006.

CDS referencing CMBS represent around 30% of all ABS CDS volume, while CDS referencing subordinate tranches of home equity loan (HEL) ABS account for about 60% of the market. For CDS of HEL ABS, trading volume is concentrated in the triple-B area, while CDS of CMBS have seen a large volume in the triple-A area.³ As for major players, CDOs and hedge funds continue to dominate, each representing about a third of the market. The rest of the market is believed to be split between dealers and money managers.

In the past, CMBS dealers were using interest rate swaps to hedge their positions. Over the past few years, some started to use total return swaps (TRS) linked to CMBS indices and the corporate CDS index (*i.e.*, DJ CDX) to hedge their loan pipeline.⁴ TRS is a type of derivative instrument where the total return of the reference bond is exchanged for a stream of Libor-based cash flow. TRS of CMBS has been around for several years, but the exact size of this market is not known. Typically, just a handful of investors have been receiving the total return in such transactions. Because hedging short-term pipeline was the main motive of these transactions, the terms of TRS of CMBS generally were much shorter than the maturities of the reference CMBS.

² The term "ABS CDS" often refers to CDS of structured finance securities in general, including those referencing RMBS, CMBS, ABS, and CDOs.

³ *Pipeline Hedging Fuels Synthetic CMBS*, Creditflux (1 September 2005).

⁴ The first CMBS TRS appeared in 1999. Also see; *Synthetic Structures Emerging in CMBS*, Derivatives Week (19 November 2004); *CMBS Dealers Using CDX Index for Hedging*, Securitization News (6 May 2005).

The portfolio-based use of synthetic CMBS emerged around 2004. In the CDO market, synthetic CDOs-squared used CDS referencing CMBS or ABS tranches to fill up 70-80% of their reference portfolios, while the rest was made up of synthetic CDO tranches. The main purpose for including CMBS or ABS was to "dilute" the risk of the corporate CDO-squared portion of the portfolio. Only highly rated CMBS/ABS tranches were used in such a structure, so market participants (including the rating agencies!) focused on the CDO-squared portion of the structure in risk analysis.

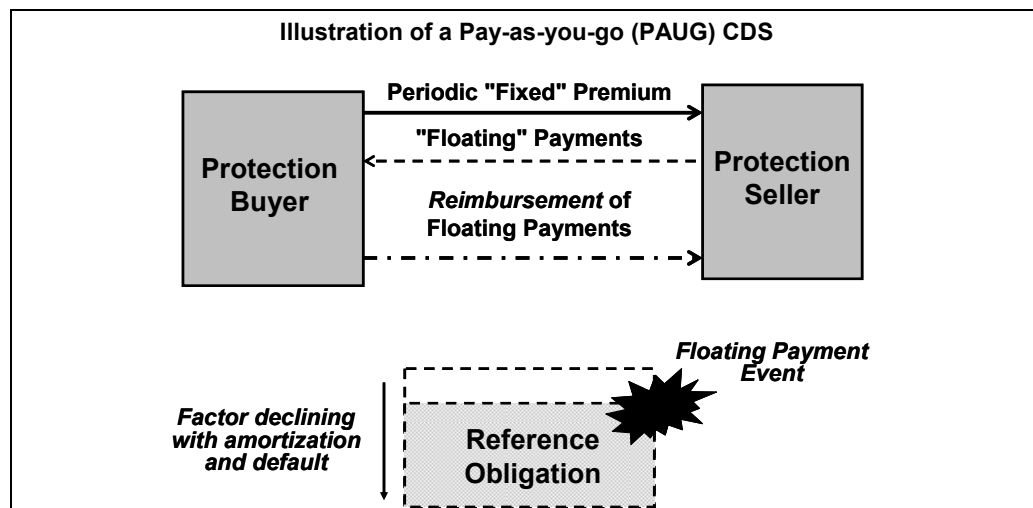
Cash CDOs of ABS have been also including a small bucket for synthetic exposure, some of which are CDS of CMBS. Between 2004 and 2005, the size of synthetic buckets grew from about 5% to more than 25% of a typical CDO portfolio. Over the summer of 2005, synthetic CDOs comprised of 100% of CMBS hit the market. The earlier deals involved a static portfolio of synthetic triple-A CMBS, while more recent deals use lower-rated investment-grade tranches.

Older synthetic CDOs used CDS templates that were similar to corporate CDS, but most deals now use the PAUG format. Needless to say, the risk profile of synthetic exposures in a CDO deal would be very different depending on the contractual format used. For example, CDS documentation in older deals tends not to closely reflect the risk of the reference ABS/CMBS. As a result, the contractual implications may pose additional risk for early vintages of synthetic ABS CDOs.

IV. The Pay-As-You-Go (PAUG) CDS

As we mentioned already, the CDS for structured finance products in the beginning was very similar to the one for corporate CDS. A certain "credit event" triggers a payment from the protection seller to the protection buyer, at which point the contract would terminate.⁵ In 2005, the pay-as-you-go (PAUG) template was introduced. The PAUG format involved ongoing settlements that closely mirror the cash flow of the reference bond.

Initially, the corporate CDS-like format was widely used in the Europe, while the pay-as-you-go (PAUG) format gained popularity in the U.S. As trading volume grew, the PAUG format emerged as a global standard. However, the most commonly used PAUG template, called the Dealer Form ("Form I"), is still undergoing some fine-tuning, with the latest version released in January 2006.⁶



Source: Nomura Securities International

⁵ This version of CDS template is referred to as the "Cash and Physical Settlement" format.

⁶ On the other hand, monoline insurers, who are sellers of protection in so-called "negative basis" trades, complained that the Dealer Form of the PAUG template favored protection buyers, with a wide scope of credit events and gave the protection buyer an option to terminate the contract by delivering the reference obligation. In December 2005, monolines published a revised template, called the End-User Form ("Form II"). The main differences between the two forms are that the End-User form excludes Implied Writedown and Rating Downgrade from credit events and eliminates the physical settlement option given to the protection buyer.

The exhibit on the previous page illustrates the mechanism of a PAUG contract. Unlike a corporate CDS, a PAUG CDS does not terminate even after multiple trigger events. Moreover, a trigger event, such as writedown and interest shortfall, may be reversed in a subsequent period. The notional amount of an index is adjusted as any of the reference security (1) amortizes, (2) prepays, (3) is written down, or (4) defaults, and as (5) previous floating amount events are reversed. Furthermore, a PAUG contract may include a physical settlement option. The physical settlement option allows the protection buyer to terminate the contract before maturity by delivering the reference obligation.

A. The Floating Amount Events for CMBS

Trigger events under the PAUG are very different from those in a corporate CDS.⁷ While credit events for a corporate CDS are intended to capture an event of default, the PAUG aims to capture any non-default events that affect the cash flow of the reference obligation. Under the PAUG, a reduction in interest ("Interest Shortfall") also triggers a payment from the protection seller to the protection buyer. These trigger events are called "Floating Amount Events" and generally include;

1. Writedown

This refers to a reduction in outstanding principal of the reference CMBS. A writedown can occur as defaulted loans are liquidated and the realized losses reduce the principal amount of a bond.⁸ A writedown event may be reversed in a subsequent period, although it is less likely in CMBS. If the reference security does not allow for writedown, an Implied Writedown may apply as a credit event.⁹

2. Principal Shortfall / Failure to Pay Principal

This event occurs if the reference CMBS fails to pay off principal by its legal final maturity or the final amortization date (*i.e.*, when the collateral assets supporting the reference obligation are fully liquidated and distributed). This event is the equivalent to the principal default of a structured finance security.

3. Interest Shortfall

An interest shortfall occurs when the interest passed through from the underlying mortgage loans is less than the interest to be paid on the security. This may happen when: (i) the reference CMBS is distressed, or (ii) the reference CMBS is subject to an "available funds cap (AFC)" mechanism. The amount of interest shortfall is calculated as the difference between the expected interest payment and the actual interest payment paid on the reference obligation.

In the Dealer Form, the Interest Shortfall event covers interests that are deferred or capitalized (*i.e.*, PIK interest). Also, the revised Dealer Form allows selection of the "weighted average coupon (WAC) Cap" provisions as either applicable or not applicable.¹⁰ This is a relatively new provision. If the WAC Cap is NOT applicable, the expected interest is calculated *without* giving an effect to the WAC Cap, and the protection buyer is compensated for interest shortfall caused by such a cap. In

⁷ Corporate CDS generally use (1) bankruptcy, (2) failure-to-pay (principal and interest), and (3) restructuring as the credit events.

⁸ However, this should not include a temporary "appraisal reduction," where the value of a loan in special servicing is reduced to prevent excess advancing to subordinate tranches of a CMBS deal. See; Hsu, M. and L. Nicholas, *U.S. CMBS: Moody's Approach to Rating Synthetic CMBS Resecuritized*, Moody's special report (19 December 2005).

⁹ The amount of Implied Writedown is calculated based on the under-collateralization of the reference security, or any shortfall between the reference obligation's pool balance and the aggregate balance of all *pari passu* obligations and senior securities backed by the same pool.

¹⁰ A WAC cap in a reference CMBS limits the amount of interest paid on the bond based on the average coupon in the underlying pool.

contrast, if the WAC Cap *is* applicable, an interest shortfall does NOT occur when a cap is hit in the reference CMBS or if the reference CMBS is a so-called WAC bond.¹¹

B. Fixed Cap, Variable Cap, and No Cap in the Interest Shortfall

The Interest Shortfall event described in the previous section comes in three variations; fixed cap, variable cap, and no cap. Each of the three options is detailed below;

1. The "**Fixed Cap Applicable**" option refers to an arrangement where an interest shortfall is covered up to the Fixed Rate amount. The protection buyer simply offsets the interest shortfall amount with the periodic CDS premium, so the amount the protection seller receives is reduced by the shortfall amount. If the shortfall amount exceeds the Fixed Rate amount, the protection buyer is partially exposed to the risk of interest shortfall. At present, this seems to be the most popular option in the market.
2. The "**Variable Cap Applicable**" option protects the buyer from an interest shortfall up to Libor plus the Fixed Rate amount. That means the protection seller may need to pay out of pocket. From the standpoint of a protection buyer, the variable cap offers better protection against AFC risk than the fixed cap.
3. If no cap is selected ("**Cap Not Applicable**"), the protection seller must cover the entire amount of interest shortfall.

Clearly, a variable cap provides stronger protection to the buyer than a fixed cap, but protection is the strongest when no cap is applied. Depending on the price of reference CMBS, significant basis can exist among the three options. The variable cap and the no cap are equivalent *if the reference obligation is trading at par*, but the degree of protection will diverge if the reference CMBS is trading at a premium. "No cap" always covers the entire coupon of the reference CMBS.

C. Reimbursement of Floating Rate Payments

Interest shortfalls and principal writedowns in a CMBS may be reversed in a subsequent period. When an interest shortfall is recovered or a principal writedown is reversed in the reference CMBS, the protection buyer must repay the amount previously received from the protection seller. The amount of this reimbursement is called an "Additional Fixed Payment." In general, the obligation to make reimbursements remains in force for one year after the final maturity, so that the protection seller will receive reimbursements on a successful workout or final liquidation of a defaulted loan.

D. Physical Settlement Option¹²

The PAUG includes a provision for giving an option to the protection buyer to terminate the contract by delivering the reference obligation. This feature, called the "Physical Settlement Option," is triggered by a credit event, *just like the physical settlement under a corporate CDS*. In other words, if a certain credit event happens, the protection buyer can deliver the reference obligation, either for the full notional amount or a portion of the notional amount of the CDS contract. If the protection buyer delivers the reference bond for a portion of the CDS notional, the PAUG contract remains in force for the remaining portion of the notional amount. On the other hand, if the full notional amount is physically delivered, the contract terminates at that point.

¹¹ On the other hand, the End-User Form (Form II) takes into account the WAC cap when calculating the expected interest (*i.e.*, the protection buyer is NOT protected against reduced interest payments). Form II also does not cover PIK interest.

¹² A previously included event called "maturity extension" has been removed from the latest ISDA template, released in January 2006, as an optional credit event.

The Physical Settlement Option can be triggered by: (1) Writedown, (2) Failure to Pay Principal, or (3) Distressed Ratings Downgrade.¹³ The third item is an optional credit event and is triggered when the reference obligation is downgraded to 'Caa2/CCC' or below, or the rating is withdrawn by one or more of the three major rating agencies.¹⁴ Note that these events are called "Credit Events," as opposed to the Floating Amount Events that trigger two-way payments. Physical settlement is optional and is only possible if the protection buyer can deliver the bond physically.

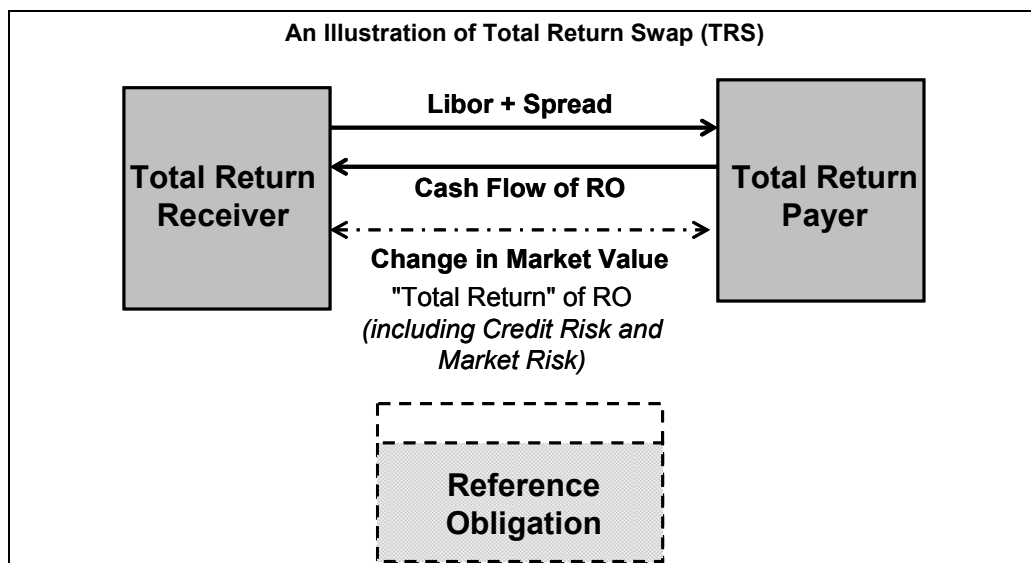
E. Coupon Step-up

Some ABS and European CMBS come with a feature called the "coupon step-up." A coupon step-up is triggered if a security is not called before a certain date before its final maturity. If the Step-up provisions in a PAUG CDS are elected, the protection buyer is given an option to terminate the contract if the coupon step-up occurs on the reference bond to avoid paying higher premium. If the option is not exercised, the CDS contract will continue and the premium will be raised *by the same basis points* as the coupon step-up in the reference bond.¹⁵

In contrast, if the Step-up provisions are marked "not applicable," the CDS premium will NOT step up even if the clean-up call is not exercised and the coupon on the reference CMBS is raised. This in fact is the case with the CMBX and ABX.HE indices. Obviously, a PAUG CDS without the Step-up provisions is less favorable to the protection seller, because the CDS premium he receives remains unchanged when the coupon on the reference bond increases.

F. PAUG vs. Total Return Swap (TRS) for CMBS

A total return swap (TRS) is a bilateral agreement where two parties exchange the total return of a cash bond and a stream of fixed-rate or floating-rate coupon plus principal. A TRS closely mirrors the cash flow on the underlying bond, as adjusted for any interest shortfalls and credit losses. A TRS allows a very close replication of actually owning the underlying cash bond, as it contains both the credit risk and the market risk.



Source: Nomura Securities International

¹³ Another credit event called "Maturity Extension" used to be an optional credit event but has been removed from the revised PAUG template released in January 2006.

¹⁴ However, an exception is where the reference obligation was rated 'Baa3/BBB-' or higher immediately before the rating is withdrawn and then a rating of 'Caa1/CCC+' or higher is given within three months of the rating withdrawal.

¹⁵ This could result in a difference in the relative amounts of coupon increase between the CDS and the reference CMBS, if the cash bond is trading at a discount or a premium.

TRS on CMBS typically come in short maturities, such as 3, 6, or 12 months. In most cases, a TRS is written on an index of highly-rated CMBS tranches (*i.e.*, triple-A), where the "receiver" of total return pays a periodic, pre-determined "funding rate" to the total return "payer." At the maturity of contract, the two parties settle any market value change. For example, if the market value of the underlying bond increases by the maturity of a contract, the total return payer pays to the receiver the amount of increase.

The CDS format that was prevalent in the early days of structured finance CDS, which is now called the "cash/physical settlement" template, did not closely replicate the cash flow of the underlying bond, because (1) it transferred only the credit component of the bond's risk, and (2) it could be terminated long before the bond matures.

In contrast, a PAUG CDS is more similar to a TRS. A PAUG transfers credit risk and some interest rate risk. However, a PAUG CDS has a much longer term than a TRS, usually lasting for the entire life of the underlying bond. Moreover, some features of the PAUG CDS give rise to cash-synthetic basis risk. For instance, if a fixed cap is elected, a PAUG CDS would cover interest shortfall up to the CDS premium ("Fixed Rate"), while a TRS would transfer the entire risk to the TRS receiver.

V. The Future is Here: the CMBX Index

The CMBX indices began trading on March 7, 2006. The CMBX is the second group of synthetic indices for structured finance securities. The ABX.HE indices consisting of 20 home equity (HEL) ABS tranches, launched in January 2006, were the first of their kind. Additional indices for other ABS asset classes, such as credit card ABS, are planned for the near future, although no specific date has been set at the time of this writing.

A. The Documentation and Credit Events

Like the ABX.HE indices, the CMBX uses the standardized template based on the PAUG template published by ISDA. The template for CMBX trading is standardized with three floating amount events with a fixed cap for the Interest Shortfall event. Also, a CMBX index contract does not include a physical delivery option for protection buyers.¹⁶ Furthermore, the Interest Shortfall is calculated *after* giving effect to any WAC provisions or WAC caps (*i.e.*, hitting a WAC cap does NOT cause an interest shortfall). The index contract does not include the "step-up" provision, either. Hence, the fixed coupon on the index will NOT increase even when a reference CMBS in the index experiences a coupon step-up.

B. How the CMBX Works

Unlike the ABX.HE indices, the CMBX trades based on spread rather than price, although each index comes with a pre-determined fixed coupon (*i.e.*, Fixed Rate). The buyer and the seller of protection settle the net present value when they enter into a contract.¹⁷ For example, if the quoted spread is below the Fixed Rate, the protection seller pays to the protection buyer, and vice versa. Over the life of a contract, the protection buyer pays the Fixed Rate amount ("coupon")¹⁸ to the protection seller, based on the current notional amount of the index.

The CMBX indices use three floating amount events; (1) Writedown, (2) Principal Shortfall, and, (3) Interest Shortfall with a Fixed Cap. The Writedown and Principal Shortfall events trigger payment

¹⁶ An index contract does not include Rating Downgrade or Maturity Extension as credit events. Hence, a CMBX contract will not terminate before the reference CMBS bonds mature.

¹⁷ This is similar to corporate CDS indices, where each series of indices come with a fixed spread and the buyer and the seller of protection settle the net present value at the onset.

¹⁸ The Fixed Rate payments for the CMBX indices are paid *monthly*, while premium in a corporate CDS is generally paid quarterly.

from the protection seller to the protection buyer. On the other hand, Interest Shortfall is covered up to the amount of the fixed premium, meaning that, when an interest shortfall occurs, the protection buyer simply skips the fixed rate payment or pays only a portion of it. Unlike the ABX.HE indices, the CMBS does not include the Implied Writedown as a floating event.

C. Early CMBX Trading and Market Analytics

About half a billion dollars were traded on the first day of CMBX trading. Unlike in the ABX.HE indices, early trading of CMBS saw huge volume in the triple-A index, likely reflecting hedging demand from CMBS trading desks. Over the first two weeks of trading, each CMBX index has seen its spread tighten significantly. As the table below shows, the market has so far seen "negative basis" between the CMBX indices and equivalent cash CMBS spreads.

CMBX.NA Indices vs. Cash Spreads (bps; as of March 21, 2006)				
Index	Coupon	Index spread	2-week change*	Cash CMBS** (to Swap)
CMBX.NA.AAA.06-1	10	8.00	- 0.83	26
CMBX.NA.AA.06-1	25	17.94	- 4.06	40
CMBX.NA.A.06-1	35	27.94	- 3.88	50
CMBX.NA.BBB.06-1	76	62.75	- 7.88	90
CMBX.NA.BBB-.06-1	134	113.88	- 9.75	140

* since closing levels on March 7, 2006 ** indicative as of March 22, 2006
Source: Markit, Nomura Securities International

Markit publishes daily pricings and monthly payment calculations and provides a calculation tool for index transactions. Also, TreppDerivative™ offers analytics for the index portfolios, where a user can get a "snapshot" of the index reference portfolio. Trepp also allows the user to drill down to the loan-level information in each reference CMBS deal. Intex Solutions also offers analytical tools for the CMBS to its CMBS database clients.

CMBX Index At-a-Glance

Index Administration:

The CMBX indices are part of the DJ CDX index family owned and managed by CDS IndexCo. Markit serves as the Administration and Calculation Agent for the indices.

Trading Terms:

Use the pay-as-you-go CDS template from ISDA, with (1) Writedown, (2) Failure to Pay Principal (Principal Shortfall), and (3) Interest Shortfall, as Floating Payment Events. The Fixed Cap applies to Interest Shortfall. The three floating payment events may be reversed (*i.e.*, reimbursement). The physical settlement option and the Step-up provisions are not applicable. Each index is a static portfolio of 25 CMBS deals, where the notional amount mirrors amortization of the reference bonds. Market quotes are based on spread, not on price. Protection buyers pay monthly premiums based on a predetermined Fixed Rate.

Index Roll:

Each series of the CMBX indices will be rolled every six months (in April and October). Before the roll date, Markit will send out a list of 25 eligible CMBS deals to dealers. *Unlike in the case of the ABX.HE indices, a new series can include deals that are already in the previous series of the CMBX index.* Dealers will then vote for any deals that are deemed undesirable, and deals with 75% or more of vote for removal will be eliminated from the list. Once created, the index composition remains static. The new index composition will be announced to public at least four days before the roll date. Also, new fixed rates will be determined from the average of spreads submitted by each market maker one day before the roll date.

Index Construction:

Each of the CMBX index classes will be created from the 25 CMBS deals issued within the past two years. Reference obligations must satisfy the below eligibility criteria:

- Minimum deal size of \$700 million; minimum size of \$100 million for triple-A tranche
- Fixed-rate debt or pass-through securities backed by a pool of fixed-rate commercial mortgages
- Have a factor of 1.0
- Backed by at least 50 separate mortgages from at least 10 unaffiliated borrowers
- No more than 40% of the aggregate property value in the same state
- No more than 60% of the aggregate property value in the same property type
- Registered under the U.S. Securities Act of 1933 (*i.e.*, publicly issued) for triple-A CMBS
- Weighted average life of between 8-12 years using 0% CPY scenario for the triple-A CMBS
- Rated by at least two of Moody's, S&P, and Fitch (the lowest rating used in case of a split rating)

The standardized CDS confirmation for the CMBX indices and other information is available on Markit's web site; <http://www.markit.com/cmbx.jsp>.

D. Scrutinizing the CMBX.NA 06-1

Since the composition of the index will be made available at least four days before the roll date, it is possible to analyze the underlying collateral and compare it to the current vintage or overall market in an attempt to find relative value. Data vendors such as Trepp, with their TreppDerivative™ system, offer tools to simplify the analysis of the deals/loans backing the indices. For example, one can easily view the basket of deals and stratify the data by property type, or run cash flows for the index with specified loss assumptions.

The following table summarizes the current basket and compares it against 2nd half 2005 and 1Q 2006 fusion issuance:

Typical Deal Characteristics, Then & Now		
Characteristic	CMBX	2H 2005 & 1Q 2006 "Vintage"
% Office	32.9	31.8
% Retail	31.3	31.9
% Multifamily	15.9	16.0
% Industrial	3.9	4.2
% Lodging	9.0	9.2
Top Ten %	40.5	38.1
Stressed LTV	98.6	~ 102.0
UW DSCR	1.62	1.60
UW LTV > 80%	6.5	6.6
Full IO %	25.5	26.4
Partial IO %	43.3	43.2
Average Deal Size	\$2.53 billion	\$2.77 billion
Average Loans / Deal	181	197
5-Year Loans %	12.4	13.7
AA C/E	10.33	10.54
A C/E	7.89	7.82
BBB C/E	4.53	4.54
BBB- C/E	3.36	3.35

Source: Moody's Investor Service, Standard & Poors, Trepp LLC, Nomura Securities International

There were about 50 conduit/fusion new issues during the 2nd half of 2005 and the 1st quarter of 2006 to compare the underlying collateral of the CMBX to. As can be seen from the table above, the CMBX collateral is a little stronger in terms of leverage, but slightly weaker by selected diversity

measures. Overall though, the underlying collateral reflects the current fusion market very closely, and should serve as a valuable hedging, or speculative tool.

E. Likely Strategies for the CMBX

The CMBX enables market participants to engage in trading of commercial real estate debt in an unfunded format. The CMBX indices allow an investor to express a macro view of the CMBS sector by either taking a long or short position in the form of a CDS. Also, an investor can separate spread risk and credit risk of the CMBS market by rolling into a new index series every six months.

Moreover, the CMBX indices can be used for various relative value strategies. For example, it is now possible to express a rating-specific relative value view within the CMBS sector. If an investor feels that the triple-B index is rich relative to the single-A index, he may buy protection in the triple-B index while selling protection in the single-A index. Another relative value strategy is to isolate the deal-specific risk from the market-wide risk via taking a long-short position in single-name CMBS CDS and a CMBX index.

As new series of the CMBX are rolled out each six months, a relative value strategy between different vintages will become available. For instance, one may compare the CMBX 06-1 index and, say, the CMBX 07-1 index, as the general market conditions change.

VI. Some Natural Questions

Because trading of the CMBX has just started, it is difficult to infer any indication about the future of the synthetic CMBS trading. However, here are some natural questions, which we try to answer;

A. "What will move first, CMBX spreads or cash spreads?"

We believe CMBX spreads would likely move first, simply because buyers/sellers might want to take a view at a certain point in time (and express that view quickly, before the market prices it in) when supply is not available (and if the move is to sell short, the supply is "never" available in the cash market; you can only express that view in CDS/CMBX)... We would not expect the lag to last very long though, given that the conduit market averaged a little over one deal per week during 2004 and 2005 - in other words, there aren't many periods where supply isn't available for a meaningful length of time.

We expect to see more volatility in synthetic spreads than in cash spreads. This phenomenon was observed in the corporate CDS market and the synthetic HEL ABS market. One reason for greater volatility in the synthetic market is that leveraged players tend to be more active in the derivatives market than in the cash bond market. These accounts tend to go in and out of the synthetic market in a relatively short period of time.

B. "Who are the players?"

As in the ABX.HE market, hedge funds will likely be very active in the CMBX market. One reason for that is that the synthetic market allows investors to take highly leveraged positions. Long-short strategies are their favorite, where they exploit relative value between the general market and specific deals based on rating, vintage, and other attributes. CMBS trading desks, on the other hand, will likely be natural buyers of protection, as they would hedge CMBS pipeline. Both hedge funds and dealers are likely to be short-term players, taking advantage of temporary price dislocation in the CMBS market.

CDOs will likely be long-term protection sellers, although it is unlikely that they would fill up their portfolios with index exposures. Also, CDOs will use the CMBX for managing their portfolios, either for a quick ramp-up or by engaging in a long-short strategy. Issuance of commercial real estate

(CRE) CDOs has been brisk since 2005.¹⁹ To date, most CRE CDOs have consisted predominantly of cash assets only, but they are likely to start to include a synthetic bucket. Also, we might start to see cash-synthetic hybrid CRE deals, as seen in the ABS CDO sector. In a hybrid deal, the CDO manager can choose freely between cash and synthetic collateral to take advantage of asset availability and market spread levels.

C. "What are the sources of CDS/cash basis?"

As we saw on Page 8, we currently see negative basis between the CMBX and cash CMBS spreads. Most of this basis is likely being caused by market technicals, especially given the limited scope of participants in the synthetic market. Possible sources of the spread basis include contractual details of the PAUG CDS, including the treatment of interest shortfalls (e.g., the use of a fixed cap), counterparty risk, funding cost, and liquidity. Less than perfect transfer of risk in the reference bond should lead to a tighter CDS spread, while liquidity and counterparty risk should counterbalance it.

The home equity (HEL) ABS market exhibited significant volatility in the CDS/cash basis in late 2005, as some leveraged accounts expressed a negative view on the U.S. housing market by buying protection outright in the synthetic market. The spread differential in the triple-B-minus area moved as wide as 60 bps in November (*i.e.*, CDS wider than cash spreads) and then tightened to below *negative* 60 bps in early December. The ABX.HE market so far has generally seen negative basis, albeit to varying degrees by rating classes.

In the early days of the corporate CDS market, the so-called "default swap basis" between a CDS and cash corporate bonds exhibited significant fluctuation. Theoretically, the basis should be positive for corporate CDS/bonds, given the wider scope of credit events and deliverable obligations in the CDS documentation. On the other hand, the fact that a CDS does not require initial investment may contribute to a tighter CDS spread. More recently, the basis in the corporate market has become very small, and it generally does not persist for a long time, with market participants actively taking arbitrage between the two markets.

VII. Conclusion

In this paper, we provided a quick overview of the synthetic form of CMBS and the new CMBX indices. While synthetic CMBS itself is not a new concept, the introduction of widely traded indices is viewed as a potential catalyst for a tremendous growth of the market. Most importantly, daily trading of diverse, transparent portfolios and quick dissemination of pricing information should lead to greater liquidity. Also, the ability to freely go long or short is likely to mitigate technical conditions that can develop in the new issue market. Moreover, the derivatives format opens the door for various leveraged strategies which are more difficult to pursue in the cash CMBS market.

¹⁹ For more on CRE CDOs, please see: *The Evolution of Commercial Real Estate CDOs*, Nomura Fixed Income Research (4 January 2006).

Appendix I: Glossary of Basic Terms

Appraisal reduction is a structural feature in CMBS that limits the advancing of interest on a defaulted loan to subordinate tranches by reducing the notional value of the loan. An appraisal reduction can be temporary and reversed.

Constant Prepayment Yield (CPY) is a measure of prepayment speed in CMBS. A 100% CPY is the equivalent of 0% CPR up to the end of the yield maintenance (YM) period and 100% CPR thereafter.

Credit derivative is a type of derivative that transfers credit risk. The most widely used type of credit derivative is the credit default swap (CDS). Other types of products include Nth-to-default baskets, CDS indices and index tranches, which are based on a portfolio of CDS. If a certain pre-specified trigger event (called a "credit event") occurs, the protection seller compensates the protection buyer for the credit loss suffered. According to ISDA, the total notional amount in the global credit derivatives market reached \$17.3 trillion at the end of 2005.

Credit default swap (CDS) works like an insurance contract that provides protection against credit risk of a borrower or assets. The buyer of protection pays a periodic premium (fee) to the seller of protection over the life of a contract. If a certain pre-determined event ("credit event") occurs, the protection seller compensates the protection buyer for the credit loss suffered. The company or the assets on which a CDS contract is written is called a "reference entity" or "reference obligations."

Credit event is an event that triggers settlement in a CDS. CDS for corporations' credit risk generally include (1) bankruptcy, (2) failure to pay, and (3) restructuring as credit events. However, CDS of structured finance securities (such as ABS, RMBS, and CMBS) tend to require more detailed definitions of credit events, because defaults of these securities do not accompany the events specified in the documentation for corporate CDS.

Default swap basis is the difference between the CDS spread and the spread of the reference obligation. In a corporate CDS, default swap basis should be positive in theory, because the CDS generally riskier with (1) a wider coverage of credit events and (2) multiple deliverable obligations. However, negative basis is often observed in the market. In a structured finance security, the sign and magnitude of default swap basis is less clear.

Floating Rate Payer refers to the seller of protection in a CDS. Floating Rate is the contingent payment made to the protection buyer upon a certain credit/floating event.

Fixed Rate Payer refers to the buyer of protection in a CDS. Fixed Rate is the periodic premium (fee) for the protection provided via a CDS.

Total Return Swap (TRS) is a type of derivatives that involves an exchange of the "total return" on a bond for Libor plus a spread. The total return includes coupons and changes in the value of the bond. In other words, unlike a CDS that tends to transfers only credit risk, a TRS transfers the entire risk of owning the reference asset. A TRS can be used for other financial assets, such as a stock or a stock index.

Weighted average coupon (WAC) cap is a type of available funds cap (AFC) mechanism used in CMBS and residential ABS. The provision sets a limit on interest payable to investors at the amount of interest accrued on the pool of loans. In a CMBS, WAC caps address the problem where high-coupon loans pay off first and coupon payments on the remaining pool are insufficient to cover the coupon payments on the outstanding bonds.

— E N D —

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