This section contains product profiles of financial instruments that examiners may encounter during the course of their review of capital-markets and trading activities. Knowledge of specific financial instruments is essential for examiners' successful review of these activities. These product profiles are intended as a general reference for examiners; they are not intended to be independently comprehensive but are structured to give a basic overview of the instruments.

Each product profile contains a general description of the product, its basic characteristics and features, a depiction of the marketplace, market transparency, and the product's uses. The profiles also discuss pricing conventions, hedging issues, risks, accounting, risk-based capital treatments, and legal limitations. Finally, each profile contains references for more information.

GENERAL DESCRIPTION

Federal funds (fed funds) are reserves held in a bank's Federal Reserve Bank account. If a bank holds more fed funds than is required to cover its Regulation D reserve requirement, those excess reserves may be lent to another financial institution with an account at a Federal Reserve Bank. To the borrowing institution, these funds are *fed funds purchased*. To the lending institution, they are *fed funds sold*.

CHARACTERISTICS AND FEATURES

Fed funds purchases are not government-insured and are not subject to Regulation D reserve requirements or insurance assessments. They can be borrowed only by those depository institutions that are required by the Monetary Control Act of 1980 to hold reserves with Federal Reserve Banks: commercial banks, savings banks, savings and loan associations, and credit unions. These transactions generally occur without a formal, written contract, which is a unique feature of fed funds.

Most fed funds transactions are conducted on an overnight-only basis because of the unpredictability of the amount of excess funds a bank may have from day to day. *Term fed funds* generally mature between two days to one year. *Continuing contracts* are overnight fed funds loans that are automatically renewed unless terminated by either the lender or the borrower—this type of arrangement is typically employed by correspondents who purchase overnight fed funds from respondent banks. Unless notified to the contrary by the respondent, the correspondent will continually roll the interbank deposit into fed funds, creating a longer-term instrument of open maturity. The interest payments on continuing contract fed funds loans are computed from a formula based on each day's average fed funds rate.

Fed funds transactions are usually unsecured. Nevertheless, an upstream correspondent bank that is selling funds may require collateralization if the credit quality of the purchaser is not strong.

All fed funds transactions involve only Federal Reserve Bank accounts. Two methods are commonly used to transfer funds between depository institutions:

- The selling institution authorizes its district Federal Reserve Bank to debit its reserve account and credit the reserve account of the buying institution. Fedwire, the Federal Reserve's electronic funds and securities transfer network, is used to complete the transfer with immediate settlement. On the maturity date, the buying institution uses Fedwire to return the funds purchased plus interest.
- A respondent bank tells its correspondent that it intends to sell funds. In response, the correspondent bank purchases funds from the respondent by reclassifying the respondent's demand deposits as *federal funds purchased*. The respondent does not have access to its deposited money as long as it is classified as federal funds on the books of the correspondents. Upon maturity of the loan, the respondent's demand deposit account is credited for the total value of the loan plus interest.

USES

Banks lend fed funds to other banks which need to meet Regulation D reserve requirements or need additional funding sources. Since reserve accounts do not earn interest, banks prefer to sell fed funds rather than keep higher than necessary reserve account balances. Community banks generally hold overnight fed funds sold as a source of primary liquidity.

DESCRIPTION OF MARKETPLACE

Transactions may be done directly between banks, often in a correspondent relationship, or through brokers. They may be initiated by either the buyer or the seller. Many regional banks stand ready to buy all excess funds available from their community bank correspondents or sell needed funds up to a predetermined limit. Consequently, there is a large amount of demand in the fed funds market, with selling banks easily able to dispose of all excess funds. Correspondent banks may also broker funds as agent as long as their role is fully disclosed. Fed

funds, including the term fed funds, are nonnegotiable products and, therefore, there is no secondary market.

Market Participants

Participants in the federal funds market include commercial banks, thrift institutions, agencies and branches of banks in the United States, federal agencies, and government securities dealers. The participants on the buy side and sell side are the same.

Market Transparency

Price transparency is high. Interbank brokers disseminate quotes on market news services. Prices of fed funds are active and visible.

PRICING

Fed fund yields are quoted on an add-on basis. All fed funds yields are quoted on an actual/360-day basis. The fed funds rate is a key rate for the money market because all other short-term rates relate to it. Bid/offer spreads may vary among institutions, although the differences are usually slight. The fed effective rate on overnight fed funds, the weighted average of all fed funds transactions done in the broker's market, is published in *The Wall Street Journal*. Thompson Bankwatch rates the general credit quality of banks, which is used by banks when determining credit risk for fed funds sold.

Rates on term fed funds are quoted in the broker's market or over the counter. In addition, money market brokers publish indicative quotes on the Telerate screen.

HEDGING

Due to the generally short-term nature of fed funds, hedging does not usually occur, although fed funds futures contracts may be used as hedging vehicles.

RISKS

Interest-Rate Risk

For nonterm fed funds, interest-rate risk is minimal due to the short maturity. For term fed funds, interest-rate risk may be greater, depending on the length of the term.

Credit Risk

Fed funds sold expose the lender to credit risk. Upstream correspondent banks may require collateral to compensate for their risks. All banks should evaluate the credit quality of any bank to whom they sell fed funds and set a maximum line for each potential counterparty.

Liquidity Risk

The overnight market is highly liquid. As there is no secondary market for term fed funds rates, their liquidity is directly related to their maturity.

Banks may purchase fed funds up to the maximum of the line established by selling financial institutions. Those lines are generally not disclosed to purchasing banks. Active users may need to test the availability of funds periodically to ensure that sufficient lines are available when needed.

ACCOUNTING TREATMENT

Fed funds sold should be recorded at cost. Term fed funds sold should be reported as a loan on the call report.

RISK-BASED CAPITAL WEIGHTING

A 20 percent risk weight is appropriate for fed funds. For specific risk weights for qualified trading accounts, see section 2110.1, ''Capital Adequacy.''

LEGAL LIMITATIONS FOR BANK INVESTMENT

A bank may sell overnight fed funds to any counterparty without limit. Sales of fed funds with maturities of one day or less or under continuing contract have been specifically

excluded from lending limit restrictions by 12 CFR 32. Term fed funds are subject to the 15 percent lending limit with any one counterparty and may be combined with all other credit extensions to that counterparty. Sales of fed funds to affiliates are subject to 12 USC 371c, ''Loans to Affiliates.''

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GENERAL DESCRIPTION

Commercial paper (CP) is a short-term, fixed-maturity, unsecured promissory note issued in the open markets as an obligation of the issuing entity. CP is usually issued with maturities of less than 270 days, with the most common having maturities of 30 to 50 days or less. CP is sold either directly by the issuer or through a securities broker. For entities with a sufficient credit rating, CP is generally backed by bank lines of credit or letters of credit. However, some entities with lesser-quality credit will issue CP without credit enhancements. These issues are typically through private placements and are generally not rated. Foreign corporations may also issue CP. Banks are active in the CP market as issuers, investors, dealers, and lenders on lines of credit used to back CP issuance.

In 1996, outstanding CP in the United States totaled approximately $803 billion: about 70 percent was issued by financial companies, 20 percent by domestic nonfinancial entities, and the remainder by foreign corporations and governments. The CP market grew 14 percent a year on average from 1970 to 1991. Between 1991 and 1996, the market grew by 50 percent.

CHARACTERISTICS AND FEATURES

CP is issued in maturities which range anywhere from a few days to 270 days (the Securities and Exchange Commission (SEC) does not generally require registration of securities due in less than 270 days), depending on the funding needs of the issuer. Most CP matures in less than 30 days. Issuers prefer to issue CP with a maturity of less than 90 days so that banks can use the CP as collateral at the Federal Reserve discount window. Most issuers need ongoing financing and roll the CP over at maturity, using the new proceeds to pay off the maturing CP. The minimum round-lot transaction is $100,000. Some issuers will sell CP in denominations of $25,000. CP is quoted on a 360-day discount basis. A small amount of CP is issued in interest-bearing form; the rate paid on this paper is the quoted discount rate converted to the equivalent simple interest rate. CP is typically issued in bearer form, but it may also be issued in registered form.

CP Credit Ratings

Credit ratings are crucial to the CP market because most investors restrict their CP investments to high-quality CP or will only buy rated CP. The CP ratings are assessments of the issuer's likelihood of timely payment. Table 1 summarizes CP ratings from the major rating agencies.

Superior-rated issues are considered to have a high likelihood of repayment, satisfactory-rated issues are considered to have satisfactory likelihood, and so on. Before they will assign a rating, the credit agencies require issuers to prove that they have adequate short-term liquidity. Some issuers raise their credit ratings by obtaining credit support to guarantee payment, such as a letter of credit (credit-supported commercial paper), or by collateralizing the issue with high-quality assets (asset-backed commercial paper).

Table 1—Commercial Paper Ratings

	Moody's	*S&P*	*Duff & Phelps*	*Fitch*
Superior	P-1	A-1+/A-1	Duff 1, Duff 1, Duff 1+	F-1
Satisfactory	P-2, P-3	A-2	Duff 2	F-2
Adequate	P-3	A-3	Duff 2	F-2
Speculative	NP	B, C	Duff 4	F-3
Defaulted	NP	D	Duff 5	F-5

USES

Investors

CP is generally purchased as a short-term, liquid, interest-bearing security. The short maturity structure, low credit risk, and large number of issuers make CP an attractive short-term investment alternative for short-term portfolio managers and for the liquid portion of longer-term portfolios. CP is particularly attractive when interest rates are volatile, as many investors are unwilling to buy long-term, fixed-rate debt in a volatile interest-rate environment.

Investors wishing to take a position in short-term rates denominated in a foreign currency without taking the risks of investing in an unfamiliar counterparty or facing country risk often invest in an instrument such as Goldman Sachs's Universal Commercial Paper (UCP) or Merrill Lynch's Multicurrency Commercial Paper (MCCP). With UCP or MCCP, the dealer creates synthetic foreign-currency-denominated paper by having a U.S. issuer issue CP in a foreign currency. The dealer then executes a currency swap with the issuer, which eliminates foreign-exchange risk for the issuer. The investor is therefore left with a short-term piece of paper denominated in a foreign currency which is issued by a U.S. counterparty, thus eliminating country risk.

Banks and Bank Holding Companies

Bank holding companies (BHCs) are active issuers of CP. The money raised is often used to fund nonbank activities in areas such as leasing and credit cards and to fund offshore branches.

BHCs use commercial paper in sweep programs. On a BHC level, the sweep programs are maintained with customers at the bank level, and the funds are upstreamed to the parent as part of the BHC's funding strategy. Sweep programs use an agreement with the bank's deposit customers (typically corporate accounts) that permits them to reinvest amounts in their deposit accounts above a designated level in overnight obligations of the parent bank holding company, another affiliate of the bank, or a third party. These obligations include instruments such as commercial paper, program notes, and master-note agreements.

DESCRIPTION OF MARKETPLACE

Investors

The short-term nature of commercial paper, together with its low credit risk and large number of issuers, makes it an attractive short-term investment for many investors. Investment companies, especially money funds, are the largest investors in the CP market. Other significant investors include the trust departments of banks, insurance companies, corporate liquidity portfolios, and state and local government bodies. If CP carries a rating of A-2, P-2, or better, thrifts may buy CP and count it as part of their liquidity reserves.

Issuers

Issuers of CP include industrial companies such as manufacturers, public utilities and retailers, and financial institutions such as banks and leasing companies. Financial issuers account for approximately 75 percent of CP outstanding, with industrial issuance making up the remainder. Approximately 75 percent of the CP outstanding carries the highest credit rating of A-1/P-1 or better, while only approximately 5 percent of CP outstanding carries a credit rating of A-3/P-3 or below. In the U.S. market for CP, domestic issuers account for approximately 80 percent of issuance, with foreign issuers making up the remainder.

Several large finance companies and bank holding companies place their paper directly with the investor without using a dealer. Approximately 40 percent of all CP outstanding is placed directly with the investor.

Primary Market

The primary market consists of CP sold directly by issuers (direct paper) or sold through a dealer acting as principal (dealer paper). Dealer paper accounts for most of the market. As principals, dealers buy and immediately sell the CP (with a small markup called the dealer spread). Sometimes the dealers hold CP as inventory for a short time as a service to issuers in need of immediate funds. Dealers are mostly large invest-

ment banks and commercial banks with section 20 subsidiaries.

Although dealers do not normally inventory positions in CP, at times they will agree to position any paper which the issuer posted but did not sell on a particular day. The amount unsold is usually small, and the positions assumed are usually on an overnight basis only. If the market moves, most issuers give dealers the discretion to sell CP within established bands set by the issuer.

Issuers of CP have their own dedicated sales force marketing their paper. Direct issuers also post their rates on services such as Telerate and Reuters, and often with bank money desks. Sometimes a company sells direct paper under a master-note agreement, under which the investor can buy and sell CP daily, up to a specific amount, for a specific interest rate that is set daily. The return on the master-note CP is slightly higher than that on an overnight repo.

Secondary Market

The CP market is larger than the market for other money market instruments, but secondary trading is only moderately active. Most investors have purchased CP tailored to their short-term investment needs and hold it to maturity. If an investor chooses to sell CP, he can usually sell it back to the original seller (dealer or issuer). Although CP is not traded on an organized exchange, price quotes for most of the significant issues can be obtained from security brokers. Average yields on newly issued CP are published in the *Wall Street Journal.*

PRICING

Each issue is priced based on the strength of the credit rating of the issuer. CP is a discount instrument, which means that it is sold at a price less than its maturity value (though occasionally, CP is issued as interest-bearing paper). The difference between the maturity value and the price paid is the interest earned by the investor. When calculating commercial paper, a year is assumed to have 360 days.

The yield on CP tracks that of other money market instruments. CP yields are higher than those offered on comparable T-bills—the higher credit risk is due to less liquidity and the state and local income tax exemption of T-bills. The rate on CP is also slightly higher than that offered on comparable certificates of deposit (CDs) due to the poorer liquidity of CP relative to CDs.

HEDGING

As mentioned above, dealers do not usually inventory positions in CP. When they do, these positions tend to be small and are usually held only overnight. Due to the short-term nature of CP, dealers often do not hedge these open positions. When these positions are hedged, dealers generally use instruments such as T-bill futures or Eurodollar futures to hedge their residual exposure. However, use of these products may subject the dealer to basis risk to the extent that the underlying instrument and the hedge instrument do not move in tandem.

RISKS

Credit Risk

Given that CP is an unsecured obligation of the issuer, the purchaser assumes the risk that the issuer will not be able to pay the debt at maturity. This credit risk is generally mitigated by the financial strength of most issuers and by some form of credit enhancement (unused bank lines of credit, letters of credit, corporate guaranty, or asset collateralization). Historically, the default rate on CP has been extremely low.

Liquidity Risk

As most investors hold CP until maturity, trading in the secondary market is relatively thin. As a result, only the highest-rated issues may be readily marketable in the secondary market. Privately placed CP is subject to further legally mandated restrictions on resale, which presents additional impediments to marketability.

Interest-Rate Risk

Like all fixed-income instruments, CP is subject to interest-rate risk. However, this risk is usually minimal given CP's short-term nature.

Foreign-Exchange Risk

CP denominated in foreign currency may expose the purchaser to foreign-exchange risk.

ACCOUNTING TREATMENT

The accounting treatment for investments in commercial paper is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

CP is generally weighted at 100 percent unless it is backed by a bank letter of credit, in which case the asset weight would be 20 percent. Tax-exempt CP may carry weights of 20 percent or 50 percent, depending on the issuer (that is, depending on whether the obligation is a general obligation or a revenue obligation). For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENT

CP is considered a loan to the issuer and is therefore subject to the applicable lending limit of the purchasing institution. One exception would be a general obligation tax-exempt CP, which can be held without limitation. Holdings of CP issued by an affiliate are subject to the limitations of section 23A of the Federal Reserve Act regarding loans to affiliates.

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GENERAL DESCRIPTION

A repurchase agreement (repo) involves the sale of a security to a counterparty with an agreement to repurchase it at a fixed price on an established future date. At initiation of the transaction, the buyer pays the principal amount to the seller, and the security is transferred to the possession of the buyer. At expiration of the repo, the principal amount is returned to the initial buyer (or lender) and possession of the security reverts to the initial seller (or borrower). Importantly, the security serves as collateral against the obligation of the borrower and does not actually become the property of the lender. Given the short tenor of a typical repo and the need to make proper custody arrangements for the securities involved, operational issues are important to proper management of repo activities. At times, in addition to being a counterparty in some transactions, a bank may serve as third-party custodian of securities collateral in other transactions as a service to the buyer and the seller.

In a repurchase agreement, a bank borrows funds when it ''sells'' the security and commits to ''repurchase'' it in the future. In a reverse repurchase agreement, the bank lends funds when it ''buys'' the security and commits to ''resell'' it in the future. A reverse repo is sometimes termed a resale agreement or a security purchased under agreement to resell (SPAR). The terms ''repo'' and ''reverse repo'' thus describe the same transaction, but from the perspective of each counterparty.

A closely related instrument is a dollar roll, which is identical to a repurchase agreement except that the ''repurchase'' leg of the transaction may involve a *similar* security rather than the specific security initially ''sold.'' In a dollar roll, the transaction contract explicitly allows for substitution of the collateral. The borrower of funds in this transaction thus runs the risk that at the closing of the transaction he or she will own a security that is generally comparable but inferior in some material way to the original security.

CHARACTERISTICS AND FEATURES

Most repos are conducted with U.S. Treasury or agency securities as collateral. Repos of mortgage pass-through securities and collateralized mortgage obligations (CMOs) issued or guaranteed by U.S. government agencies are less common but occur frequently. Repos of other securities or loans are not common, in part because the Federal Reserve System generally considers repos with other assets to be deposits of the selling institution and subject to Regulation D reserve requirements.

Repos can be conducted on an overnight basis, for a longer fixed term, or on an open-account basis. Overnight repos, or one-day transactions, represent approximately 80 percent of all repo transactions. Anything longer (called a ''term repo'') usually extends for less than 30 days. Repo agreements ''to maturity'' are those that mature on the same day as the underlying securities. ''Open'' repo agreements have no specific maturity, so either party has the right to close the transaction at any time.

USES

In general, repos are attractive to a variety of market participants as (1) a low-cost source of short-term funding for borrowers and (2) an asset with high credit quality regardless of the counterparty for suppliers of funds. Participation in this market requires proper operational and administrative arrangements as well as an inventory of eligible collateral.

Dealers

Repos can be used to finance long positions in dealers' portfolios by short-term borrowing. The repo market is a highly liquid and efficient market for funding dealers' bond inventory at a short-term rate of interest. Dealers may also use repos to speculate on future levels of interest rates. The difference between the coupon rate on the dealer's bond and the repo rate paid by the dealer is called ''carry,'' and it can be a source of dealer profit. Sometimes the borrowing rate will be below the bond's coupon rate (positive carry), and sometimes the borrowing rate will be above the bond's coupon rate (negative carry).

Dealers may use reverse repos to cover short positions or failed transactions. The advantage

of the reverse repo is that a dealer may borrow a security it has sold short with either positive or negative carry. A problem arises, however, when demand exceeds supply for a specific bond issue (collateral), and it goes on ''special.'' This means that those who own the security can earn a premium by lending it to those needing to deliver on short positions. These ''lenders'' are compensated by paying a below-market borrowing rate on the cash side of the transaction (the repo rate is lower on ''specials'' because the owner of the special security is the borrower of cash funds and is seeking the lowest lending rate possible).

Bank Nondealer Activity

Like dealers, a bank can use repos to fund long positions and profit from the carry. The market also gives a bank the means to use its securities portfolio to obtain additional liquidity—that is, funding—without liquidating its investments or recognizing a gain or loss on the transaction. For money market participants with excess funds to invest in the short term, reverse repos provide a collateralized lending vehicle offering a better yield than comparable time deposit instruments.

Commercial Depositors

Repos have proved to be popular temporary investment vehicles for individuals, firms, and governments with unpredictable cash flows. Repos (like other money market instruments) can also be used as a destination investment for commercial depositors with sweep accounts, that is, transaction accounts in which excess balances are ''swept'' into higher-yielding nonbank instruments overnight. Again, as collateral for the corporation's investment, the counterparty or bank will ''sell'' Treasury bills to the customer (that is, collateralize the loan).

DESCRIPTION OF MARKETPLACE

On any given day, the volume of repo transactions amounts to an estimated $1 trillion. Important lenders of funds in the market include large corporations (for example, General Motors) and mutual funds. Borrowers generally include large money-center or regional banks with a need for funding.

Repos are not traded on organized exchanges. There is no secondary market, and quoted market values are not available. The Public Securities Association has produced a standard master repo agreement and supplements that are used throughout the industry. Although the transactions themselves are not rated, the entities undertaking repos (such as larger banks and dealers) may be rated by Moody's, Standard & Poor's, or other rating agencies.

PRICING

Repo rates may vary somewhat with the type of collateral and the term of the transaction. Overnight repos with U.S. government collateral, however, generally take place at rates slightly below the federal funds rate. Interest may be paid explicitly, so that the ''sale'' price and ''repurchase'' price of the security are the same, or it may be embedded in a difference between the sale price and repurchase price.

The seller of a security under a repo agreement continues to receive all interest and principal payments on the security while the purchaser receives a fixed rate of interest on a short-term investment. In this respect, interest rates on overnight repo agreements usually are lower than the federal funds rate by as much as 25 basis points. The additional security provided by the loan collateral employed with repos lessens their risk relative to federal funds.

Interest is calculated on an actual/360 day-count add-on basis. When executed under a continuing contract (known as a demand or open-basis overnight repo), repo contracts usually contain a clause to adjust the interest rate on a day-to-day basis.

HEDGING

Since repo rates move closely with those of other short-term instruments, the hedge vehicles available for these other instruments offer an attractive hedge for positions in repos. If the portfolio of repos is not maintained as a matched book by the institution, the dealer or bank could be subject to a level of residual market risk.

RISKS

Market Risk

Repos and reverse repos, if used to fund longer or more sensitive positions, expose the institution to changes in the future levels of interest rates.

Credit Risk

The buyer is exposed to the risk that the seller will default on his or her obligation to repurchase the security when agreed. Of course, the buyer has access to the security as collateral and, in the event of default, the security could be sold to satisfy the debt. However, this could occur only through legal procedures and bankruptcy. Despite the conventional terminology, this type of transaction is a collateralized advance and not truly considered a sale and repurchase. If the value of the security has declined since the funds were disbursed, a loss may be incurred. Overcollateralization and margin arrangements are used to reduce this risk.

Operational Risk

If the buyer is to rely on its ability to sell a security in the open market upon the seller's default, it must exercise effective control over the securities collateralizing the transactions. The Government Securities Act was passed in 1986 to address abuses that had resulted in customer losses when the security was held by the seller. Its requirements include (1) written repurchase agreements must be in place, (2) the risks of the transactions must be disclosed to the customer, (3) specific repurchase securities must be allocated to and segregated for the customer, and (4) confirmations must be made and provided to the customer by the end of the day on which a transaction is initiated and on any day on which a substitution of securities occurs. Participants in repo transactions now will often require securities to be delivered or held by a third-party custodian. (See section 2020.1 of the *Commercial Bank Examination Manual*.)

ACCOUNTING TREATMENT

The accounting treatment for repurchase agreements is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

In general, assets collateralized by the current market value of securities issued or guaranteed by the U.S. government, its agencies, or government-sponsored agencies are given a 20 percent risk weight. If appropriate procedures to perfect a lien in the collateral are not taken, the asset should be assigned a 100 percent risk weight. For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENT

Repos on securities that are eligible for bank investment under 12 USC 24(7th) and 12 CFR 1, and that meet guidelines set forth by the Federal Reserve System, may be held without limit. Repos that do not meet these guidelines should be treated as unsecured loans to the counterparty subject to 12 USC 84, and combined with other credit extensions to that counterparty. Repos with affiliates are subject to 12 USC 371c.

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GENERAL DESCRIPTION

U.S. Treasury bills, notes, and bonds (collectively known as ''Treasuries'') are issued by the Treasury Department and represent direct obligations of the U.S. government. Treasuries have very little credit risk and are backed by the full faith and credit of the U.S. government. Treasuries are issued in various maturities of up to 10 years.

CHARACTERISTICS AND FEATURES

Treasury Bills

Treasury bills, or T-bills, are negotiable, noninterest-bearing securities with original maturities of three months, six months, and one year. T-bills are offered by the Treasury in minimum denominations of $10,000, with multiples of $5,000 thereafter, and are offered only in book-entry form. T-bills are issued at a discount from face value and are redeemed at par value. The difference between the discounted purchase price and the face value of the T-bill is the interest income that the purchaser receives. The yield on a T-bill is a function of this interest income and the maturity of the T-bill. The returns are treated as ordinary income for federal tax purposes and are exempt from state and local taxes.

Treasury Notes and Bonds

Treasury notes are currently issued in maturities of 2, 3, 5, and 10 years on a regular schedule. Treasury notes are not callable. Notes and bonds pay interest semiannually, when coupon rates are set at the time of issuance based on market interest rates and demand for the issue. Notes and bonds are issued monthly or quarterly, depending on the maturity of the issue. Notes and bonds settle regular-way, which is one day after the trade date (T+1). Interest is calculated using an actual/365-day-count convention.

USES

Banks use Treasuries for investment, hedging, and speculative purposes. The lack of credit risk and deep liquidity encourages the use of Treasuries as investment vehicles, and they are often held in a bank's investment portfolio as a source of liquidity. Since it is the deepest and most efficient financial market available, many fixed-income and derivative instruments are priced relative to Treasuries. Speculators often use Treasuries to take positions on changes in the level and term structure of interest rates.

DESCRIPTION OF MARKETPLACE

Issuing Practices

T-bills are issued at regular intervals on a yield-auction basis. The three-month and six-month T-bills are auctioned every Monday. The one-year T-bills are auctioned in the third week of every month. The amount of T-bills to be auctioned is released on the preceding Tuesday, with settlement occurring on the Thursday following the auction. The auction of T-bills is done on a competitive-bid basis (the lowest-yield bids are chosen because they will cost the Treasury less money). Noncompetitive bids may also be placed on purchases of up to $1 million. The price paid by these bids (if allocated a portion of the issue) is an average of the price resulting from the competitive bids.

Two-year and 5-year notes are issued once a month. The notes are generally announced near the middle of each month and auctioned one week later. They are usually issued on the last day of each month. Auctions for 3-year and 10-year notes are usually announced on the first Wednesday of February, May, August, and November. The notes are generally auctioned during the second week of those months and issued on the 15th day of the month.

Primary Market

Treasury notes and bonds are issued through yield auctions of new issues for cash. Bids are separated into competitive bids and noncompetitive bids. Competitive bids are made by primary government dealers, while noncompetitive bids are made by individual investors and small institutions. Competitive bidders bid yields to

three decimal places for specific quantities of the new issue. Two types of auctions are currently used to sell securities:

- *Multiple-price auction.* Competitive bids are ranked by the yield bid, from lowest to highest. The lowest price (highest yield) needed to place the allotted securities auction is determined. Treasuries are then allocated to noncompetitive bidders at the average yield for the accepted competitive bids. After all Treasuries are allocated to noncompetitive bidders, the remaining securities are allocated to competitive bidders, with the bidder bidding the highest price (lowest yield) being awarded first. This procedure continues until the entire allocation of securities remaining to be sold is filled. Regional dealers who are not primary government dealers often get their allotment of Treasury notes and bonds through primary dealers, who may submit bids for the accounts of their customers as well as for their own accounts. This type of auction is used for 3-year and 10-year notes.

- *Single-price auction.* In this type of auction, each successful competitive bidder and each noncompetitive bidder is awarded securities at the price equivalent to the highest accepted rate or yield. This type of auction is used for 2-year and 5-year notes.

During the one- to two-week period between the time a new Treasury note or bond issue is auctioned and the time the securities sold are actually issued, securities that have been auctioned but not yet issued trade actively on a when-issued basis. They also trade when-issued during the announcement to the auction period.

Secondary Market

Secondary trading in Treasuries occurs in the over-the-counter (OTC) market. In the secondary market, the most recently auctioned Treasury issue is considered ''current,'' or ''on-the-run.'' Issues auctioned before current issues are typically referred to as ''off-the-run'' securities. In general, current issues are much more actively traded and have much more liquidity than off-the-run securities. This often results in off-the-run securities trading at a higher yield than similar-maturity current issues.

Market Participants

Sell Side

All U.S. government securities are traded OTC, with the primary government securities dealers being the largest and most important market participants. A small group of interdealer brokers disseminates quotes and broker trades on a blind basis between primary dealers and users of the Government Securities Clearing Corporation (GSCC), the private clearinghouse created in 1986 to settle trades for the market.

Buy Side

A wide range of investors use Treasuries for investing, hedging, and speculation. This includes commercial and investment banks, insurance companies, pension funds, and mutual fund and retail investors.

Market Transparency

Price transparency is relatively high for Treasury securities since several information vendors disseminate prices to the investing public. Govpx, an industry-sponsored corporation, disseminates price and trading information over interdealer broker screens. Prices of Treasuries are active and visible.

PRICING

Treasury Bills

Treasury bills are traded on a discount basis. The yield on a discount basis is computed using the following formula:

$$\text{Annualized Yield} = [(\text{Face Value} / \text{Price}) / \text{Face Value}] \times (360 / \text{Days Remaining to Maturity})$$

Treasury Notes and Bonds

Treasury note and bond prices are quoted on a percentage basis in 32nds. For instance, a price of 98:16 means that the price of the note or bond will be 98.5 percent of par (that is, 98 16/32). Notes and bonds can be refined to 64ths through the use of a plus tick. A 98:16+ bid means that the bid is 98 and 16½ 32nds (that is, 98 16.5/32), which is equivalent to 98.515625 percent of par. When the note or bond is traded, the buyer pays the dollar price plus accrued interest as of the settlement date. Yields are also quoted on an actual/365 day-count convention.

HEDGING

Treasuries are typically hedged in the futures or options markets or by taking a contra position in another Treasury security. Also, if a position in notes or bonds is hedged using an OTC option, the relative illiquidity of the option may diminish the effectiveness of the hedge.

RISKS

Market Risk

The risks of trading Treasury securities arise primarily from the interest-rate risk associated with holding positions and the type of trading conducted by the institution. Treasury securities are subject to price fluctuations because of changes in interest rates. Longer-term issues have more price volatility than shorter-term instruments. A large concentration of long-term maturities may subject a bank's investment portfolio to increased interest-rate risk. For instance, an institution which does arbitrage trading by buying an issue that is relatively cheap (that is, off-the-run securities) in comparison to historical relationships and selling one that is relatively expensive (that is, current securities) may expose itself to large losses if the spread between the two securities does not follow its historical alignments. In addition, dealers may take positions based on their expectations of interest-rate changes, which can be risky given the size of positions and the impact that small changes in rates have on the value of longer-duration instruments. If this type of trading is occurring, the institution's risk-management system should be sufficiently sophisticated to handle the magnitude of risk to which the dealer is exposed.

Liquidity Risk

Due to lower liquidity, off-the-run securities generally have a higher yield than current securities. Many institutions attempt to arbitrage these pricing anomalies between current and off-the-run securities.

ACCOUNTING TREATMENT

The accounting treatment for investments in Treasuries is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

U.S. Treasury bills, notes, and bonds have a 0 percent risk weighting. For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENT

U.S. Treasury bills, notes, and bonds are type I securities with no legal limitations on a bank's investment.

REFERENCES

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Chicago: Irwin Professional Publishing, 1995.

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U.S. Department of the Treasury. *Buying Treasury Securities.* Washington, D.C.: The Bureau of the Public Debt, 1995.

GENERAL DESCRIPTION

STRIPS are zero-coupon securities (zeros) of the U.S. Treasury created by physically separating the principal and interest cash flows. This process of separating cash flows from standard fixed-rate Treasury securities is referred to as "coupon stripping." Similar trademark securities with such acronyms as CATS and TIGRs are created by investment banks.

CHARACTERISTICS AND FEATURES

STRIPS is the U.S. Treasury's acronym for "Separate Trading of Registered Interest and Principal Securities," the Treasury program developed in 1985 to facilitate the stripping of designated Treasury securities. All new Treasury bonds and notes with maturities of 10 years and longer are eligible to be stripped under this program and are direct obligations of the U.S. government. Under the STRIPS program, the holder of any eligible security can request that the U.S. Treasury create separate book-entry instruments for all of the principal and interest cash flows. The principal and interest portions of these instruments are assigned separate identification (CUSIP) numbers and may be owned and traded separately.

Trademark Products

Trademark products, which predate the STRIPS market, are stripped Treasury securities created by investment banks. In August 1982, Merrill Lynch marketed its Treasury Income Growth Receipts (TIGRs) and Salomon Brothers marketed its receipts as Certificates of Accrual on Treasury Securities (CATS). Other investment banks followed suit by issuing their own receipts. These products were created by purchasing Treasury securities and depositing them in a trust. The trusts then issued receipts representing ownership interests in the coupon and principal payments of the underlying Treasury securities.

Since the start of the STRIPS program in 1985, creation of trademark products such as TIGRs and CATS has ceased, and STRIPS now dominate the market. Trademark products are, however, still traded in the secondary market.

USES

STRIPS and other zero-coupon instruments can be tailored to meet a wide range of portfolio objectives because of their known cash-flow value at specific future dates. Specifically, they appeal to investors who want to lock in a terminal value without incurring the risk associated with reinvesting intervening cash flows. They also appeal to investors with definite opinions on interest rates, as prices of STRIPS are highly sensitive to changes in interest rates. Due to this high sensitivity to interest-rate changes, disproportionately large long-maturity holdings of Treasury derivatives such as STRIPS, CATS, or TIGRs in relation to the total investment portfolio or total capital of a depository institution would be considered an imprudent investment practice.

DESCRIPTION OF MARKETPLACE

The STRIPS program provides that all stripped securities be maintained in a book-entry format. For maintenance and transfer purposes, each marketable Treasury security has a unique identification (CUSIP) number. Under STRIPS, each principal and interest component is assigned a separate CUSIP number. All STRIPS are traded over the counter (OTC), with the primary government securities dealers being the largest and most important market participants. A small group of interdealer brokers disseminates quotes and broker trades on a blind basis between market participants. Arbitrageurs continually monitor the prices of STRIPS and underlying coupon-bearing bonds, looking for profitable opportunities to strip or reconstitute. Price transparency is relatively high for STRIPS since several information vendors disseminate prices to the investment public.

Market Participants

A wide range of investors use zeros for investing, hedging, and speculation. This includes commercial and investment banks, insurance companies, pension funds, and mutual fund and retail investors.

PRICING

The prices of STRIPS, CATS, and TIGRs are quoted on a discount basis, as a percentage of par. Eligible securities can be stripped at any time. For a book-entry security to be separated into its component parts, the par value must be an amount which, based on the stated interest rate, will produce a semiannual interest payment of $1,000 or a multiple of $1,000. Quotes for STRIPS are quoted in yields to maturity.

HEDGING

Zeros are typically hedged in the futures or options markets, or by taking a contra position in another Treasury security. The effectiveness of any hedge depends on yield-curve and basis risk. Also, if a position in zeros is hedged with an OTC option, the relative illiquidity of the derivative Treasury security and the option may diminish the effectiveness of the hedge.

RISKS

Many factors affect the value of zeros. These include the current level of interest rates and the shape of their term structure (interest-rate risk), bond maturities (rate sensitivity or duration), and the relative demand for zero-coupon bonds (liquidity).

Interest-Rate Risk

Increases in the level of interest rates increase the advantages of stripping. This is because the constant-yield method applied to premium bonds results in a lower price than linear amortization does. Zeros have higher sensitivity to changes in interest rates than bonds with the same maturity. Because they are zero-coupon bonds, their duration equals their maturity. Duration measures the percentage change in price for a given change in rates. The higher the duration, the higher the potential volatility.

Liquidity Risk

The STRIPS market is significantly less liquid than the U.S. Treasury bond market. Investors encounter wider bid/ask spreads and are subject to higher commissions. In addition, liquidity may fluctuate significantly in times of market instability. However, since a dealer can strip or reconstitute bonds in a fairly flexible manner, if zero-coupon prices diverge too far from their equilibrium levels, a new supply can be created or reduced through the stripping and reconstitution process.

Trademark products may have an uncertain marketability, as some may be eligible to be purchased only though the sponsoring dealer. CATS, however, are listed on the New York Stock Exchange, enhancing their liquidity. The market for zero-coupon Treasuries is more retail-oriented than the rest of the market. This often results in wider trading spreads, smaller transaction size, and less liquidity.

Credit Risk

As an obligation of the U.S. Treasury, STRIPS are considered to be free from default (credit) risk. Trademark products such as CATS and TIGRs are collateralized by the underlying U.S. Treasury, but whether they are considered ''obligations'' of the U.S. Treasury is uncertain. Proprietary products should be reviewed individually to determine the extent of credit risk.

ACCOUNTING TREATMENT

The accounting treatment for investments in U.S. Treasury STRIPS is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), ''Accounting for Certain Investments in Debt and Equity Securities,'' as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), ''Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities.'' Accounting

treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

U.S. Treasury STRIPS have a 0 percent risk weighting. Trademark products have a 20 percent risk weighting. For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENT

U.S. Treasury STRIPS are a type I security with no limitations on a bank's investment. Trademark products are proprietary products, so legal limits vary. Appropriate supervisory personnel should be consulted on specific issues.

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GENERAL DESCRIPTION

Treasury inflation-indexed securities (TIIs) are issued by the Treasury Department and represent direct obligations of the U.S. government. The securities are designed to provide investors with a hedge against increases in inflation. The initial auction of these relatively new securities was held in January 1997, when a 10-year note was issued. Various longer-term maturities are planned for future auctions, which will be held quarterly. TIIs have very little credit risk, since they are backed by the full faith and credit of the U.S. government. Banks can be designated as primary dealers of Treasury securities, but they may sell them in the secondary markets and invest in TIIs for their own account.

CHARACTERISTICS AND FEATURES

TIIs were created to meet the needs of longer-term investors wanting to insulate their investment principal from erosion due to inflation. The initial par amount of each TII issue is indexed to the nonseasonally adjusted Consumer Price Index for All Urban Consumers (CPI-U). The index ratio is determined by dividing the current CPI-U level by the CPI-U level that applied at the time the security was issued or last re-indexed. If there is a period of deflation, the principal value can be reduced below par at any time between the date of issuance and maturity. However, if at maturity the inflation-adjusted principal amount is below par, the Treasury will redeem the security at par. Every six months, interest is paid based on a fixed rate determined at the initial auction; this rate will remain fixed throughout the term of the security. Semiannual interest payments are determined by multiplying the inflation-adjusted principal amount by one-half the stated rate of interest on each payment date. TIIs are eligible for stripping into their principal and interest components under the Treasury STRIPS program.

Similar to zero-coupon bonds, TIIs are tax disadvantaged in that investors must pay tax on the accretion to the principal amount of the security, even though they do not currently receive the increase in principal in cash. Paying tax on income not received reduces the effective yield on the security.

The following example illustrates how TIIs work: suppose an investor purchases a $1,000 note at the beginning of the year, in which the interest rate set at the time of the auction is 3 percent. Also suppose that inflation for the first year of the note is 3 percent. At the end of the first year, the $1,000 principal will be $1,030, reflecting the increase in inflation, although the investor will not receive this increase in principal until maturity. The investor will receive, however, the 3 percent interest payment. At the end of the first year, the notes will be paying 3 percent interest on the increased principal balance of $1,030. Principal will be adjusted each year, based on the increase or decrease in inflation.

USES

At present, the primary strategy behind the purchase of a TII would be to hedge against erosion in value due to inflation. However, banks also use TIIs for investment, hedging, and speculative purposes. As TIIs are tax disadvantaged, they are most likely to appeal to investors who are not subject to tax.

An investor in TIIs is taking a view that *real* interest rates will fall. Real interest rates are defined as the nominal rate of interest less the rate of inflation. If nominal rates fall, but inflation does not (that is, a decline in real interest rates), TIIs will appreciate because their fixed coupon will now represent a more attractive rate relative to the market. If inflation rises, but nominal rates rise more (that is, an increase in real interest rates), the security will decrease in value because it will only partially adjust to the new rate climate.

DESCRIPTION OF MARKETPLACE

Issuing Practices

The auction process will use a single pricing method identical to the one used for two-year and five-year fixed-principal Treasury notes. In this type of auction, each successful competitive

bidder and each noncompetitive bidder is awarded securities at the price equivalent to the highest accepted rate or yield.

Market Participants

Sell Side

Like all U.S. government securities, TIIs are traded over the counter, with the primary government securities dealers being the largest and most important market participants. A small group of interdealer brokers disseminate quotes and broker trades on a blind basis between primary dealers and users of the Government Securities Clearing Corporation (GSCC), the private clearinghouse created in 1986 to settle trades for the market.

Buy Side

A wide range of investors are expected to use TIIs for investing, hedging, and speculation, including commercial and investment banks, insurance companies, pension funds, mutual funds, and individual investors. As noted above, TIIs will most likely appeal to investors who are not subject to tax.

Market Transparency

Price transparency is relatively high for Treasury securities since several information vendors disseminate prices to the investing public. Govpx, an industry-sponsored corporation, disseminates price and trading information via interdealer broker screens. Prices of TIIs are active and visible.

RISKS

Interest-Rate Risk

TIIs are subject to price fluctuations because of changes in real interest rates. TIIs will decline in value if real interest rates increase. For instance, if nominal interest rates rise by more than the increase in inflation, the value of a TII will decrease because the inflation component will not fully adjust to the higher level of nominal rates in the market. As the coupon rate on TIIs is well below market for similar maturity instruments, the duration of TIIs will be higher, increasing the price sensitivity of the instrument for a given change in real interest rates. Also, the CPI-U index used in calculating the principal accretion on TIIs is lagged three months, which will hurt the investor when inflation is rising (and help the investor when inflation is falling).

Longer-term issues will have more price volatility than shorter-term instruments. A large concentration of long-term maturities may subject a bank's investment portfolio to unwarranted interest-rate risk.

Liquidity Risk

The Treasury securities market is the largest and most liquid in the world. While an active secondary market for TIIs is expected, that market initially may not be as active or liquid as the secondary market for Treasury fixed-principal securities. In addition, as a new product, TIIs may not be as widely traded or well understood as Treasury fixed-principal securities. Lesser liquidity and fewer market participants may result in larger spreads between bid and asked prices for TIIs relative to the bid/ask spreads for fixed-principal securities of the same maturity. Larger bid/ask spreads normally result in higher transaction costs and/or lower overall returns. The liquidity of the TII market is expected to improve over time as additional amounts are issued and more entities enter the market.

ACCOUNTING TREATMENT

The accounting treatment for investments in Treasury inflation-indexed securities is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for

Derivatives and Hedging Activities.'' (See section 2120.1, ''Accounting,'' for further discussion.)

RISK-BASED CAPITAL WEIGHTING

TIIs have a 0 percent risk weighting. For specific risk weights for qualified trading accounts, see section 2110.1, ''Capital Adequacy.''

LEGAL LIMITATIONS FOR BANK INVESTMENT

TIIs are a type I security so there are no legal limits on a bank's investment in them.

REFERENCES

U.S. Department of the Treasury. *Buying Treasury Inflation-Indexed Securities*. Washington, D.C.: The Bureau of the Public Debt, 1997.

GENERAL DESCRIPTION

Agency securities are debt obligations issued by federal agencies or federally sponsored agencies. Federal agencies are direct arms of the U.S. government; federally sponsored agencies are privately owned and publicly chartered organizations which were created by acts of Congress to support a specific public purpose (also referred to as government-sponsored entities or GSEs).

Federal agencies are arms of the federal government and generally do not issue securities directly in the marketplace. These agencies include the Government National Mortgage Association (GNMA or Ginnie Mae), Export-Import Bank, Farmers Home Administration (FmHA), General Services Administration (GSA), Maritime Administration, Small Business Administration (SBA), Tennessee Valley Authority, Commodity Credit Corporation, Rural Electrification Administration, Rural Telephone Bank, and Washington Metropolitan Area Transit Authority. All federally related institutions are exempt from registration with the Securities and Exchange Commission (SEC). Except for securities of the Private Export Funding Corporation and the Tennessee Valley Authority, the securities are backed by the full faith and credit of the U.S. government.

Government-sponsored entities include agencies in the following areas:

- housing (such as the Federal Home Loan Mortgage Corporation and Federal National Mortgage Association)
- farm credit (such as the Federal Farm Credit Bank System and Farm Credit System Financial Assistance Corporation)
- student loans (such as the Student Loan Marketing Association)
- small business (the Small Business Administration)
- export funding (the Export-Import Bank)

GSEs issue both discount and coupon notes and bonds. Discount notes are short-term obligations, with maturities ranging from overnight to 360 days. Coupon notes and bonds are sold with maturities greater than two years. The securities are not backed by the full faith and credit of the U.S. government. Consequently, investors purchasing GSEs are exposed to some potential credit risk. The yield spread between these securities and Treasury securities of comparable maturity reflects differences in perceived credit risk and liquidity.

GSEs issue direct debt obligations and guarantee various types of asset-backed securities. This section discusses only securities that represent direct obligations of federal and federally sponsored agencies. For a discussion of securities issued or guaranteed by some of these agencies, see ''Residential-Mortgage-Backed Securities,'' section 4110.1. Also, many GSEs are active in issuing structured notes. The role of the agency and particular risks involved in these securities are discussed in section 4040.1, ''Structured Notes.''

CHARACTERISTICS AND FEATURES

Federal-agency securities such as those issued by the Government National Mortgage Association are backed by the full faith and credit of the U.S. government. However, government-sponsored agency securities are not guaranteed by the U.S. government, although market participants widely believe that the government would provide financial support to an agency if the need arose. This view has gained some credence as a result of the federal government's operations to bolster the Farm Credit System in the mid-1980s. U.S. agency securities are also exempt from SEC registration.

USES

Agency securities are deemed suitable investments for banks. They are frequently purchased by banks and held in their investment portfolios.

DESCRIPTION OF MARKETPLACE

In the primary market, government agencies and GSEs sell their securities to a select group of commercial banks, section 20 subsidiaries of commercial banks, and investment banks known as ''selling groups.'' Members of a selling group advise the agencies on issuing debt, placing the

debt with end-users, and making markets in these securities.

Prices for the securities traded in the secondary market can be obtained from the ''Money and Investing'' section of *The Wall Street Journal* or the financial section of local newspapers. Other media, such as Internet financial sites and Bloomberg, provide over-the-counter quotes as well.

Federal Agencies

Federal agencies do not issue securities directly in the marketplace. Since 1973, most have raised funds through the Federal Financing Bank, although many of these institutions have outstanding obligations from previous debt issues. Federal agencies include the following: the Export-Import Bank of the United States, Commodity Credit Corporation, Farmers Home Administration, General Services Administration, Government National Mortgage Association, Maritime Administration, Private Export Funding Corporation, Rural Electrification Administration, Rural Telephone Bank, Small Business Administration, Tennessee Valley Authority, and Washington Metropolitan Area Transit Authority (neither the Tennessee Valley Authority nor the Private Export Funding Corporation is backed by the full faith and credit of the U.S. government).

Federally Sponsored Agencies

Following is a summary of the main federally sponsored agencies and the types of obligations that they typically issue to the public. The Federal Farm Credit Bank System issues discount notes; short-term bonds with maturities of three, six, and nine months; and long-term bonds with maturities of between one and 10 years. The Federal Farm Credit Bank also issues medium-term notes which have maturities of between one and 30 years. The Federal Farm Credit System Financial Assistance Corporation issues 15-year notes, guaranteed by the federal government, which were issued to support the Farm Credit System in the mid-1980s.

The Federal Home Loan Bank System issues discount notes that mature in one year or less and noncallable bonds with maturities ranging from one to 10 years. These debts are consolidated obligations of the 12 regional Federal Home Loan Banks whose mandate is to provide funds to savings and other home-financing member organizations.

The Federal National Mortgage Association (Fannie Mae) issues short-term discount notes and long-term bonds with maturities of up to 30 years. Fannie Mae has also issued indexed sinking-fund debentures which are callable and contain features of both mortgage-backed securities and callable corporate bonds. The Federal Home Loan Mortgage Corporation (Freddie Mac) issues discount notes and a limited number of bonds. The Student Loan Marketing Association (Sallie Mae) issues unsecured debt obligations in the form of discount notes to provide funds to support higher education.

PRICING

Agency notes and bonds are quoted in terms of 32nds (a percentage of par plus 32nds of a point). Thus, an investor will be willing to pay 101.5 percent of par for an agency security that is quoted at 101:16. Short-term discount notes are issued on a discount basis similar to the way that U.S. Treasury bills are priced.

Agency securities trade at yields offering a positive spread over Treasury security yields because of slightly greater credit risk (due to the lack of an explicit government guarantee for most obligations) and somewhat lower liquidity.

HEDGING

The price risk of most agency securities is hedged in the cash market for Treasury securities or by using Treasury futures or options. As with all hedges, yield curve and basis risk must be monitored closely. In addition, dealers who are actively conducting arbitrage trades and other strategies should have the capability to monitor their positions effectively.

RISKS

As with any security, much of the risk is a function of the type of trading strategy conducted by an institution.

Interest-Rate Risk

Agency securities are subject to price fluctuations due to changes in interest rates. As with other types of securities, the longer the term of the security, the greater the fluctuation and level of interest-rate risk. Moreover, some agency securities are subject to greater interest-rate risk than others. Agencies that issue structured notes that are direct obligations, such as step-up notes from a Federal Home Loan Bank, may have greater risk than other agency securities.

Credit Risk

The credit risk of agency securities is slightly higher than that of Treasury securities because they are not explicitly guaranteed by the U.S. government. However, their credit risk is still low due to the *implied* government guarantee.

Liquidity Risk

Agency securities as a whole are not as liquid as U.S. Treasury securities, but liquidity varies widely within the agency market, depending on the issuer and the specific debt obligation. In general, agency securities have large trading volumes on the secondary market that help to keep the liquidity risk low. However, various debt provisions and structured notes of different agency securities contribute to differing levels of liquidity risk within the agency market.

ACCOUNTING TREATMENT

The Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities," determines the accounting treatment for investments in government agency securities. Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Federal-agency securities have a 0 percent risk asset capital weight, as they are direct and unconditionally guaranteed obligations of federal agencies. Obligations of federally sponsored agencies (not explicitly guaranteed) have a 20 percent risk asset capital weight. For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENT

General obligations of U.S. government agencies are type I securities, and are exempt from the limitations of 12 USC 24 (section 5136 of the U.S. Revised Statutes). Banks may purchase these securities for their own accounts without limitation, other than the exercise of prudent banking judgment. (One exception is an obligation of the Tennessee Valley Authority (TVA), which is a type II security. Investments in the TVA are limited to 10 percent of a bank's capital stock and unimpaired surplus.)

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Stigum, Marcia L. *The Money Market.* 3d ed. Homewood, Ill.: Dow Jones-Irwin, 1990.

GENERAL DESCRIPTION

Structured notes are hybrid securities, possessing characteristics of straight debt instruments and derivative instruments. Rather than paying a straight fixed or floating coupon, the interest payments of these instruments are tailored to a myriad of possible indexes or rates. The Federal Home Loan Bank (FHLB), one of the largest issuers of such products in the United States, has more than 175 indexes or index combinations against which cash flows are calculated. In addition to the interest payments, the redemption value and final maturity of the securities can also be affected by the derivatives embedded in structured notes. Most structured notes contain embedded options, generally sold by the investor to the issuer. These options are primarily in the form of caps, floors, or call features. The identification, pricing, and analysis of these options give structured notes their complexity.

Structured notes are primarily issued by *government-sponsored enterprises (GSEs)*, such as the Federal Home Loan Bank (FHLB), Federal National Mortgage Association (FNMA), Student Loan Marketing Association (SLMA), and Federal Home Loan Mortgage Corporation (FHLMC). Although the credit risk of these securities is minimal, other risks such as interest-rate risk, market (price) risk, and liquidity risk can be material.

CHARACTERISTICS AND FEATURES

There are many different types of structured notes; typically, a structure is created specifically to meet one investor's needs. Thus, an exhaustive description of all the types of structures in which an institution may invest is impossible. However, certain structures are fairly common and are briefly described below.

In many cases, very complex probability and pricing models are required to accurately evaluate and price structured notes. As mentioned earlier, most structures have embedded options, implicitly sold by the investor to the note's issuer. The proper valuation of these options poses unique challenges to investors considering structured notes. Many popular structures include embedded, path-dependent options for which pricing involves complex models and systems.

Inverse Floating-Rate Notes

An inverse floating-rate note (FRN) has a coupon that fluctuates inversely with changes in the reference rate. The coupon is structured as a base rate minus the reference rate, for example, a three-year note with a semiannual coupon that pays 13 percent minus six-month LIBOR, and an interest-rate floor of 0 percent, which ensures that rates can never be negative. The return on an inverse FRN increases in a decreasing-rate environment, and decreases in an increasing-rate environment. An investor in an inverse FRN is taking a view that rates will decrease. An inverse FRN has the risk characteristics of a leveraged fixed-rate instrument: inverse FRNs will outperform nonleveraged fixed-rate instruments when rates decrease and underperform when rates increase. If rates increase significantly, the investor may receive no coupon payments on the note.

The leverage inherent in an inverse FRN varies with each structure. The leverage amount of a particular structure will be equal to the underlying index plus one (that is, 13 percent minus 6-month LIBOR has a leverage factor of 2; 20 percent – (2 × 6-month LIBOR) has a leverage factor of 3). The degree of leverage incorporated in an FRN will increase the volatility and, hence, the interest-rate and price risk of the note.

Step-Ups/Multi-Steps

Step-up notes or bonds are generally callable by the issuer; pay an initial yield higher than a comparable fixed-rate, fixed-maturity security; and have coupons which rise or ''step up'' at predetermined points in time if the issue is not called. If the coupon has more than one adjustment period, it is referred to as a multi-step. Step-up notes have final maturities ranging from one year to as long as 20 years. Typical *lock-out periods* (periods for which the note cannot be called) range from three months to five years.

An example of a step-up note is a five-year note which has an initial coupon of 6 percent; the coupon increases 50 basis points every six months. The note is callable by the issuer on any six-month interest-payment date.

Step-up notes contain embedded call options "sold" to the issuer by the investor. Any time an issue is callable, *the purchaser of the security has sold a call option to the issuer.* In the above example, the investor has sold a series of call options, called a *Bermuda option,* to the issuer. The note is callable on *any* interest-payment date after a specified lock-out period. Unlike callable issues which pay a *flat* rate until maturity or call, the step-up feature of these securities increases the value of the call options to the issuer and likewise increases the prospect of early redemption. Multi-steps can also be thought of as one-way floaters since the coupon can adjust higher, but never lower. As such, they can be viewed as securities in which the investor has bought a series of periodic floors and has sold a series of periodic caps in return for above-market initial yield.

As the investor has sold a series of call options to the issuer, a step-up note will outperform a straight bond issue when rates are relatively stable and underperform in a volatile rate environment. In a decreasing-rate environment, the note is likely to be called and the investor will be forced to invest the proceeds of the redemption in a low-interest-rate environment. Conversely, in a rising-rate environment, an investor will be in a below-market instrument when rates are high. Step-up notes with very long maturities (beyond 10 years) may have greater liquidity and price risk than other securities because of their long tenor.

Index-Amortizing Notes

An index-amortizing note (IAN) is a form of structured note for which the outstanding principal or note amortizes according to a predetermined schedule. The predetermined amortization schedule is linked to the level of a designated index (such as LIBOR, CMT, or the prepayment rate of a specified pass-through pool). Thus, the timing of future cash flows and, hence, the average life and yield to maturity of the note become uncertain. The IAN does have a stated maximum maturity date, however, at which time all remaining principal balance is retired.

An embedded option feature, called a *path-dependent option,* is present in this type of security. The option is termed path-dependent because the payoff structure of the option will depend not only on the future path of the underlying index but on where that index has been in the past. The investor, in return for an above-market initial yield, effectively sells this option to the issuer. The issuer has the option to alter the principal amortization as the interest-rate environment changes. Caps and floors may also be present if the issue has a floating-rate coupon.

A typical IAN is structured so that as the designated index (for example, LIBOR) rises above a trigger level, the average life extends. Conversely, if the designated index is at or below the trigger level, the IAN's principal will quickly amortize, leading to a shorter average life. The outstanding principal balance will vary according to the schedule at each redemption date. One may equate the amortization of the note to the retirement (call) of some portion of the principal. As the amortization quickens, more and more of the note is "called."

IANs generally appeal to investors who want an investment with a CMO-like risk-return profile, but with reduced uncertainty as to the average life. As the amortization schedule of an IAN depends only on the level of the underlying index, an IAN eliminates the noneconomic prepayment factors of a CMO. However, like a CMO, an IAN will outperform a straight bond issue in a stable rate environment and underperform it in a volatile rate environment. In a decreasing-rate environment, the IAN is likely to be called, and the investor will be forced to invest the proceeds of the redemption in a low interest-rate environment. Conversely, in a rising-rate environment, the maturity of the IAN will extend, and an investor will be in a below-market instrument when rates are high.

De-Leveraged and Leveraged Floaters

De-leveraged and leveraged floating-rate notes give investors the opportunity to receive an above-market initial yield and tie subsequent coupon adjustments to a specific point on the yield curve. A leveraged note's coupon will adjust by a multiple of a change in the relevant interest rate, for example, 1.25 × LIBOR + 100 basis points. Conversely, a de-leveraged securi-

ty's coupon adjusts by a fraction of the change in rates, for example, .60 × 10-year CMT + 100 basis points.

De-leveraged floaters are combinations of fixed- and floating-rate instruments. For example, a $10 million de-leveraged floater with a coupon of 60 percent of the 10-year CMT + 100 basis points is equivalent to the investor holding a $6 million note with a coupon equal to a 10-year CMT/LIBOR basis swap and a $4 million fixed-rate instrument. If rates rise, an investor in a de-leveraged floater participates in the rise, but only by a fraction. The leverage factor (for example, 60 percent) causes the coupons to lag the actual market. Thus, de-leveraged floaters will outperform straight bond issuances in a declining or stable interest-rate environment.

Conversely, a leveraged floater such as the example above should be purchased by investors with an expectation of rising rates in which they would receive better than one one-to-one participation. The degree of leverage amplifies the risks as well as the rewards of this type of security. The greater the leverage, the greater the interest-rate and price risk of the security.

Other alternatives in this category include floaters which do not permit the coupon to decrease, so-called one-way de-leveraged floaters which can effectively lock in higher coupons in an environment where the index rises then falls.

Ratchet Notes

Ratchet notes typically pay a floating-rate coupon that can never go down. The notes generally have periodic caps that limit the amount of the increases (ratchets) or that set a predetermined increase for each quarter. These periodic caps are akin to those found in adjustable-rate mortgage products.

An investor in a ratchet note has purchased from the issuer a series of periodic floors and has sold a series of periodic caps. As such, a ratchet note will outperform a straight floating-rate note in a stable or declining interest-rate environment, and it will underperform in a rapidly rising interest-rate environment. In a rapidly rising interest-rate environment, a ratchet note will perform similarly to a fixed-rate instrument with a low coupon which gradually steps up. The price volatility of the instrument will therefore depend on the frequency of resets, the amount of coupon increase at each reset, and the final maturity of the note. Longer maturity notes, which have limited reset dates and limited coupon increases, will be more volatile in rising- rate environments and will therefore have a greater degree of interest-rate and price risk.

Dual-Index Notes

A dual-index note (sometimes called a yield curve anticipation note (YCAN)) is a security whose coupon is tied to the spread between two market indexes. An example is a three-year security which pays a semiannual coupon equal to (prime + 250 basis points – 6-month LIBOR). Typical indexes used to structure payoffs to these notes are the prime rate, LIBOR, COFI, and CMT yields of different maturities. Yield-curve notes allow the investor to lock in a very specific view about forward rates. Such a play, while constructable in the cash market, is often difficult and costly to an investor. A purchaser of this type of security is typically making an assumption about the *future shape* of the yield curve. These notes can be structured to reward the investors in either steepening or flattening yield-curve environments. However, these notes can also be tied to indexes other than interest rates, such as foreign-exchange rates, stock indexes, or commodity prices.

An example of a note which would appeal to investors with expectations of a flattening yield curve (in a currently steep yield-curve environment) would be one with a coupon that floats at

[the 5-year CMT – the 10-year CMT + a designated spread].

Based on this formula, the coupon will increase if the yield curve flattens between the 5-year and the 10-year maturities. Alternatively, a yield-curve-steepening play would be an issue that floats at—

[the 10-year CMT – the 5-year CMT + a designated spread].

In this case, coupons would increase as the spread between the long- and medium-term indexes widens.

A dual-index note is equivalent to being a long basis swap (in the example above, the investor receives prime and pays LIBOR) and to being long a fixed-rate instrument. As such, the note has the risk-return elements of both a basis swap and a comparable fixed-rate instrument. The note will underperform comparable fixed-rate instruments in an environment when the basis relationship (between prime and LIBOR in the above example) narrows. These instruments are subject to incremental price risk in a rising-rate environment in which the basis spread is narrowing.

Principal-Linked Notes

An example of a principal-linked note is a one-year security which pays a fixed semi-annual coupon of 8 percent, and the principal received at maturity is determined by the following formula using market yields two days before maturity:

P = 100 + 5 (((2-year swap rate – 3-month LIBOR) – 1.40))

The resulting principal-redemption amount under varying rate scenarios would be as follows in table 1.

Table 1—Examples of Possible Principal-Redemption Schemes

	Rate			
Par	2-Year Swap Rate – 3-Month LIBOR	Rate – 1.40	5*(Rate – 140)	*Redemption Percentage*
100	180	.4	2.00	102
100	160	.2	1.00	101
100	140	.00	0.00	100
100	120	–0.20	–1.00	99
100	100	–0.40	–2.00	98

Under a principal-linked structured note, the maturity and the fixed coupon payments are unchanged from the terms established at issuance. The issuer's redemption obligation at maturity, however, is *not* the face value of the note. Redemption amounts are established by a formula whose components reflect historical or prevailing market levels. Principal-linked notes have been issued when the principal redemption is a function of underlying currency, commodity, equity, and interest-rate indexes. As the return of principal at maturity in many types of principal-linked notes is not ensured, these structures are subject to a great degree of price risk.

Range Notes

Range notes (also called accrual notes) *accrue* interest daily at a set coupon which is tied to an index. Most range notes have two coupon levels; the higher accrual rate is for the period that the index remains *within* a designated range, the lower rate is used during periods that the index falls outside the range. *This lower level may be zero.* Range notes have been issued which reference underlying indexes linked to interest rates, currencies, commodities, and equities. Most range notes reference the index daily such that interest may accrue at 7 percent on one day and at 2 percent on the following day, if the underlying index crosses in and out of the range. However, they can also reference the index monthly, quarterly, or only once over the note's life. If the note only references quarterly, then the index's relationship to the range matters only on the quarterly reset date. With the purchase of one of these notes, the investor has sold a series of digital (or binary) options:[1] a call

1. A digital option has a fixed, predetermined payoff if the underlying instrument or index is at or beyond the strike at expiration. The value of the payoff is not affected by the magnitude of the difference between the underlying and the strike price.

struck at the high end of the range and a put struck at the low end of the range. This means that the accrual rate is strictly defined, and the magnitude of movement outside the range is inconsequential. The narrower the range, the greater the coupon enhancement over a like instrument. In some cases, the range varies each year that the security is outstanding.

However, range notes also exist which require that the investor sell two barrier options:[2] a down-and-out put struck at the low level of the range and an up-and-out call struck at the high level of the range. For these range notes, the index must remain within the target band for the entire accrual period, and sometimes for the entire life of the instrument. If it crosses either barrier on even one day, the investor's coupon will drop to zero for the whole period.[3] This type of range note is quite rare, but investors should pay careful attention to the payment provisions attached to movements outside the range.

As the investor has sold leveraged call and put options to the issuer of these securities, a range note will outperform other floating-rate instruments in stable environments when the index remains within the specified range, and it will underperform in volatile environments in which the underlying index is outside of the specified range. Given the degree of leverage inherent in these types of structures, the securities can be very volatile and often exhibit a significant degree of price risk.

USES

Structured notes are used for a variety of purposes by investors, issuers, and underwriters or traders. Banks are often involved in all three of these capacities.

Uses by Investors

Structured notes are investment vehicles that allow investors to alter the risk profile of their portfolios and/or to express a viewpoint about the course of interest rates or other financial variables. The basic appeal of structured notes lies in their attendant *customized* risk parameters. Attributes that typically are *not* available (or not *easily* available) to an investor are assembled in a prepackaged format. Additionally, investors find the notes attractive for other distinct reasons. In a sustained period of low interest rates (such as the United States experienced for the five years leading up to February 1994), receiving an ''acceptable'' return on an investment became increasingly difficult. Structured notes, whose cash flows and market values are linked to one or more benchmarks, offered the *potential* for greater returns than prevailing market rates. The desire for higher yield led investors to make a risk-return tradeoff which reflected their market view.

The fact that most structured notes are issued by government-sponsored enterprises (GSEs) means that credit risk—the risk that the issuer will default—is minimal. GSEs are not, however, backed by the full faith and credit of the U.S. government, though most have explicit lines of credit from the Treasury. As a result, investors were attracted by the potential returns of structured notes and by their high credit quality (implied government guarantee). As noted above, however, the credit risk of these notes may be minimal, but their price risk may be significant.

Uses by Issuers

Issuers often issue structured notes to achieve all-in funding rates, which are more advantageous than what is achievable through a straight debt issue. To induce issuers to issue complex and often very specialized debt instruments, investors often will sacrifice some return, which lowers the issuer's all-in cost of funding. Generally, only highly rated (single-A or better) banks, corporations, agencies, and finance companies will be able to issue in the structured-note market. A detailed discussion of issuing practices is included in the ''Description of Marketplace'' subsection below.

Uses by Underwriters or Traders

Investment banks and the section 20 subsidiaries of banks often act to underwrite structured-note

2. Path-dependent options with both their payoff pattern and their survival to the nominal expiration date are dependent not only on the final price of the underlying but on whether the underlying sells at or through a barrier (instrike, outstrike) price during the life of the option.

3. McNeil, Rod. ''The Revival of the Structured Note Market.'' *International Bond Investor.* Summer 1994, pp. 34–37.

issuances. They are often actively involved in making a market in secondary structured notes. A detailed discussion of these activities is included in the ''Description of Marketplace'' subsection below.

DESCRIPTION OF MARKETPLACE

Background

In its heyday, the structured-note market was a by-product of a unique period in financial history. In 1992 and 1993, Wall Street firms engineered debt that allowed borrowers to attain highly attractive below-market funding and that rewarded investors (in large part) *as long as interest rates remained low.* The incredible and at times implausible array of structure types came into being in response to the investment community's desire for higher returns during a sustained period of low interest rates. Issuers and investment dealer firms were more than willing to address this need, introducing investors to more attractive (and by definition riskier) securities whose cash flows were linked to, for example, the performance of the yen; the yen's relationship to the lira; and a host of other indexes, currencies, or benchmarks.[4] Investors' quest for enhanced yield caused them to adopt, in many cases, very tenuous risk-reward measures with respect to potential investment choices.

Structured notes received heightened attention from both regulators and investors in the spring and summer of 1994. Many of these structured securities, created to satisfy a perceived need at the time, deteriorated in value as a result of the rate increases of 1994. In many cases, the leverage inherent in the security worked against the investor, obliterating once attractive coupon payments. Market values of many of these instruments fell below par as their coupons became vastly inferior to comparable maturity investments and as maturities were extended beyond investors' original expectations.

4. As more exotic structured-note issues came into being (and especially in light of the Orange County debacle), much of the bad press centered on the (quasi-government) agencies who issued the paper. As discussed later, the impetus for the vast majority of deals in fact emanated from Wall Street.

Primary Market

Structured notes are primarily issued by GSEs such as the FHLB, FNMA, SLMA, and FHLMC, which carry an implicit government guarantee and are rated triple-A. Many large corporations, banks, and finance companies, generally rated single-A or better, also issue structured notes.

Most structured-note issuances originate with investors on a *reverse inquiry basis*, through the *medium-term note (MTN)* market. The process originates when an investor has a demand for a security with specific risk characteristics. Through a reverse inquiry, an investor will use MTN agents such as the underwriting desk of an investment bank or section 20 subsidiary of a bank to communicate its desires to the issuer. If the issuer agrees to the inquiry, the issuer will issue the security which is sold through the MTN agent to the investor.

Although structured notes in the MTN market often originate with the investor, investment banks and section 20 subsidiaries of banks also put together such transactions. Most investment banks and section 20 subsidiaries have derivative-product specialists who design structured notes to take advantage of specific market opportunities. When an opportunity is identified, the investment bank or section 20 subsidiary will inform investors and propose that they buy the structured note. If an investor tentatively agrees to purchase the security, the MTN agents in the investment bank or section 20 subsidiary will contact an issuer with the proposed transaction. If the structure meets the funding needs of the issuer, the structured note will be issued to the investors.

Secondary Market

Structured notes are traded in the secondary market through market makers such as investment banks or section 20 subsidiaries of banks or through brokers. Market makers will buy or sell structured notes, at a predetermined bid and offer. Market makers will usually trade GSE structured notes through their secondary agency trader and trade corporate-issued structured notes through their corporate bond trader. Some market makers trade secondary structured notes through their structured-note desk, a specialized group who will buy and trade all types of structured notes.

Investors in secondary structured notes may buy the notes at a discount or premium to issuance and receive the performance characteristics of the note as shown in the prospectus. Investors may also purchase structured notes on an *asset-swap basis*, which strips the optionality out of a note and leaves the investor with a synthetically created ''plain vanilla' return such as LIBOR. Asset-swap pricing is discussed in the ''Pricing'' subsection below.

Secondary structured notes are also used to create special-purpose vehicles such as Merrill Lynch's STEERS program. In these types of programs, secondary structured notes are placed in a special-purpose vehicle, the receipts of which are then sold to investors. A series of swap transactions is then entered into between a swap counterparty and the special-purpose vehicle, which strips the optionality out of the structures. The investor therefore receives a trust receipt which pays a plain vanilla return such as LIBOR.

Structured notes often possess greater liquidity risk than many other types of securities. The most important factor affecting the liquidity of the note in the secondary market is the size of the secondary note being traded. Generally, the larger the size of the note, the more liquid the note will be in the secondary market. Most investors will not buy a structured note of limited size unless they receive a significant premium to cover the administrative costs of booking the note. Similarly, most market makers will not inventory small pieces of paper unless they charge a significant liquidity premium.

Another factor which may affect the liquidity of a structured note in the secondary market is the one-way ''bullishness'' or ''bearishness'' of a note. For example, in a rising-rate environment, leveraged bullish instruments such as inverse floaters may not be in demand by investors and may therefore have less liquidity in the secondary market. As many structured notes are sold on an asset-swap basis, the characteristics of the structured note can be ''engineered'' out of the note, leaving the investor with a plain vanilla return. The asset-swap market, therefore, helps to increase the liquidity of these types of notes.

PRICING

The two primary methods by which structured notes are priced in the secondary market are (1) on an asset-swap basis or (2) on a straight-pricing basis.

Asset-Swap Pricing

Structured notes are typically constructed by embedding some form of optionality in the coupon, principal, or maturity component of a debt issue. Once these embedded derivatives are quantified, a swap or series of swaps can be undertaken to strip out those options and effectively create a synthetic instrument with either fixed or variable cash-flow streams. This process is known as asset-swap pricing.[5]

Asset-swap pricing initially involves decomposing and valuing the components of the note, including contingent cash flows. It conveys where those components can be cashed out in the market, often referred to as the *break-up value* of the note. After the note is decomposed, an alternate cash-flow stream is created through the asset-swap market.

When structured notes are priced on an asset-swap basis, the issue is analyzed based on its *salvage value*.[6] The salvage value on most agency structured issues varies based on the current market and the size, type, and maturity of the note.

Liquidity in the structured-notes market exists because every note has a salvage value. If demand for the note as a whole is weak, its cash flows can be reconstructed via the asset-swap market to create a synthetic security. In many cases, the re-engineered security has broader investor appeal, thereby generating needed liquidity for the holder of the original issue.

Straight Pricing

Contrasted with an asset-swapped issue, a note trading on a straight-pricing basis is purchased and sold as is.[7] Traders who price structured notes on this basis compare the note with similar types of instruments trading in the market and derive a price accordingly.

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5. See the Federal Reserve product summary *Asset Swaps—Creating Synthetic Instruments* by Joseph Cilia for a detailed treatment on the topic.

6. Goodman, Laurie. ''Anatomy of the Secondary Structured Note Market.'' *Derivatives Quarterly,* Fall 1995.

7. Peng, Scott Y., and Ravi E. Dattatreya. *The Structured Note Market.* Chicago: Probus, 1995.

HEDGING

Structured notes are, from a cash-flow perspective, a combination of traditional debt instruments and derivative contracts. As a result, the value (or performance) of a structured note can be replicated by combining components consisting of appropriate zero-coupon debt plus appropriate futures or options positions that reflect the optionality embedded in the issue. Similar to the decomposition process employed in an asset-wap transaction, the fair value of this replicated portfolio should be equivalent to the fair value of the structured note.

Theoretically, one should be indifferent about investing in a structured note or in its equivalently constructed portfolio as long as the price of the note equals the present value of its replication components.[8] Price discrepancy should govern the selection process between these alternatives.

A hedge of a structured-note position involves engaging in the opposite of the replication trades noted above. To be fully protected in a hedge, the sum of the present values of each component of the hedge should be less than or equal to the market value of the note. If, for some reason, the note was priced *higher* than the cost of the worst-case replication components, the hedging firm stands to lock in a positive spread if that worst-case scenario fails to materialize.[9]

A structured-note position itself can serve to hedge unique risks faced by the investor. For example, a company which is long (owns) Japanese yen (¥) is exposed to the risk of yen depreciation. The FHLB issued a one-year structured range note which accrued interest daily at 7 percent if the ¥/U.S.$ is greater than 108.50 or at 0 percent if the ¥/U.S.$ is less than 108.50. If the yen depreciates, the note accrues interest at an above-market rate. Meanwhile, the company's yen holdings will decline in value. This note could serve as a perfectly tailored hedge for the company's business-risk profile. In fact, the design of many of the most complicated structured notes is driven not by the innovations of note issuers and underwriters, but rather by investors seeking to hedge their own unique risk profiles.

8. Kawaller, Ira G. "Understanding Structured Notes." *Derivatives Quarterly*, Spring 1995.
9. Ibid., p. 32.

RISKS

Market Risk

The embedded options and other leverage factors inherent in structured notes result in a great deal of uncertainty about future cash flows. Thus, price volatility is generally high in these types of securities. An institution should have—or should have ready access to—a model which is able to quantify the risks. The model should be able to forecast the change in market price at various points in time (for example, one year later or the first call date) for a given shift in interest rates. For the many variants of these products which are tied to the shape of the yield curve, the ability to model price effects from nonparallel interest-rate shifts is also crucial. In most cases (except for some principal-linked notes), full principal will be returned at maturity. However, between issuance and redemption, changes in fundamental factors can give rise to significant reductions in the "market" price.

As with other types of instruments in which an investor has sold an option, structured notes will underperform similar straight debt issuances in a volatile rate environment. For notes such as callable step-ups and IANs, the investor may be exposed to reinvestment risk (investing the proceeds of the note in a low-interest-rate environment) when rates decrease and to extension risk (not being able to invest in a high-interest-rate environment) when rates increase.

Liquidity Risk

Due to the complex nature of structured notes, the number of firms that are able and willing to competitively price and bid for these securities is quite small; however, an active secondary market has developed over the past few years. When the structure is complex, however, bidders may be few. Consequently, an institution hoping to liquidate a structured-note holding before maturity may find that their only option is to sell at a significant loss. In certain cases, the issue's original underwriter is the only source for a bid (and even that is not always guaranteed).

Some factors influencing the liquidity of the note include the type, size, and maturity of the note. In general, the more complex the structure or the more a note exhibits one-way bullishness or bearishness, the less liquidity a note will have. Although the asset-swap market allows

the derivative components to be engineered out of these complex structures, liquidity may be impaired because many institutions have investment guidelines which prohibit the purchase of certain types of complex notes. Thus, the size of the potential market is diminished, and liquidity decreases. Also, notes with a smaller size (generally under $10 million) and a longer maturity (generally greater than five years) will tend to be less liquid.

Volatility Risk

For each of these structures with embedded options, assumptions about the volatility of interest-rate moves are also inherent. For any of these options which are purchased by investors (for example, interest-rate floors), the risk that expectations for market-rate volatility will decrease over time exists. If this happens, market valuation of these securities will also decrease, and the investor will have "purchased" an overvalued option for which he or she will not be compensated if the instrument is sold before maturity. For options which are sold by investors (for example, interest-rate caps), the risk that volatility increases after the note is purchased exists. If this occurs, the market valuation of the structured note will decrease, and the investor will have "sold" an undervalued option for which he or she will have to pay a higher price if the instrument is sold before maturity.

ACCOUNTING TREATMENT

The Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities," determines the accounting treatment for investments in structured notes. Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Structured notes issued by GSEs should be given a 20 percent risk weighting. Structured notes issued by investment-grade corporations should be given a 100 percent risk weighting. For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENTS

The limitations of 12 CFR 1 apply to structured notes. Structured notes issued by GSEs are type I securities, and there is no limitation on the amount which a bank can purchase or sell. Structured notes issued by investment-grade-rated corporations are type III securities. A bank's purchases and sales of type III securities are limited to 10 percent of its capital and surplus.

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GENERAL DESCRIPTION

Corporate bonds are debt obligations issued by corporations. Corporate bonds may be either secured or unsecured. Collateral used for secured debt includes but is not limited to real property, machinery, equipment, accounts receivable, stocks, bonds, or notes. If the debt is unsecured, the bonds are known as debentures. Bondholders, as creditors, have a prior legal claim over common and preferred stockholders as to both income and assets of the corporation for the principal and interest due them and may have a prior claim over other creditors if liens or mortgages are involved.

Corporate bonds contain elements of both interest-rate risk and credit risk. Corporate bonds usually yield more than government or agency bonds due to the presence of credit risk. Corporate bonds are issued as *registered bonds* and are usually sold in *book-entry form*. Interest may be fixed, floating, or the bonds may be zero coupons. Interest on corporate bonds is typically paid semiannually and is fully taxable to the bondholder.

CHARACTERISTICS AND FEATURES

Security for Bonds

Various types of security may be pledged to offer security beyond that of the general standing of the issuer. Secured bonds, such as first-mortgage bonds, collateral trust bonds, and equipment trust certificates, yield a lower rate of interest than comparable unsecured bonds because of the greater security they provide to the bondholder.

First-Mortgage Bonds

First-mortgage bonds normally grant the bondholder a first-mortgage lien on the property of the issuer. Often first-mortgage bonds are issued in series with bonds of each series secured equally by the same first mortgage.

Collateral Trust Bonds

Collateral trust bonds are secured by pledges of stocks, notes, bonds, or other collateral. Generally, the market or appraised value of the collateral must be maintained at some percentage of the amount of the bonds outstanding, and a provision for withdrawal of some collateral is often included, provided other acceptable collateral is provided. Collateral trust bonds may be issued in series.

Equipment Trust Certificates

Equipment trust certificates are usually issued by railroads or airlines. The issuer, such as a railroad company or airline, buys a piece of equipment from a manufacturer, who transfers the title to the equipment to a trustee. The trustee then leases the equipment to the issuer and at the same time sells equipment trust certificates (ETCs) to investors. The manufacturer is paid off through the sale of the certificates, and interest and principal are paid to the bondholders through the proceeds of lease payments from the issuer to the trustee. At the end of some specified period of time, the certificates are paid off, the trustee sells the equipment to the issuer for a nominal price, and the lease is terminated. As the issuer does not own the equipment, foreclosing a lien in event of default is facilitated. These bonds are often issued in serial form.

Debenture Bonds

Debenture bonds are not secured by a specific pledge of designated property. Debenture bondholders have the claim of general creditors on all assets of the issuer not pledged specifically to secure other debt. They also have a claim on pledged assets to the extent that these assets have value greater than necessary to satisfy secured creditors. Debentures often contain a variety of provisions designed to afford some degree of protection to bondholders, including limitation on the amount of additional debt issuance, minimum maintenance requirements on net working capital, and limits on the payment of cash dividends by the issuer. If an issuer

has no secured debt, it is customary to provide a *negative pledge clause*—a provision that debentures will be secured equally with any secured bonds that may be issued in the future.

Subordinated and Convertible Debentures

Subordinated debenture bonds stand behind secured debt, debenture bonds, and often some general creditors in their claim on assets and earnings. Because these bonds are weaker in their claim on assets, they yield a higher rate of interest than comparable secured bonds. Often, subordinated debenture bonds offer conversion privileges to convert bonds into shares of an issuer's own common stock or the common stock of a corporation other than an issuer—referred to as *exchangeable bonds.*

Guaranteed Bonds

Guaranteed bonds are guaranteed by a corporation other than the issuer. The safety of a guaranteed bond depends on the financial capability of the guarantor, as well as the financial capability of the issuer. The terms of the guarantee may call for the guarantor to guarantee the payment of interest and/or repayment of principal. A guaranteed bond may have more than one corporate guarantor, who may be responsible for not only its pro rata share but also the entire amount guaranteed by other guarantors.

Maturity

Corporate bonds are issued in a broad maturity spectrum, ranging from less than one year to perpetual issues. Issues maturing within one year are usually viewed as the equivalent of cash items. Debt maturing between one and five years is generally thought of as short-term. Intermediate-term debt is usually considered to mature between 5 and 12 years, whereas long-term debt matures in more than 12 years.

Interest-Payment Characteristics

Fixed-Rate Bonds

Most fixed-rate corporate bonds pay interest semiannually and at maturity. Interest payments once a year are the norm for bonds sold overseas. Interest on corporate bonds is based on a 360-day year, made up of twelve 30-day months.

Zero-Coupon Bonds

Zero-coupon bonds are bonds without coupons or a stated interest rate. These securities are issued at discounts to par; the difference between the face amount and the offering price when first issued is called the *original-issue discount* (OID). The rate of return depends on the amount of the discount and the period over which it accretes. In bankruptcy, a zero-coupon bond creditor can claim the original offering price plus accrued and unpaid interest to the date of bankruptcy filing, but not the principal amount of $1,000.

Floating-Rate Notes

The coupon rates for floating-rate notes are based on various benchmarks ranging from short-term rates, such as prime and 30-day commercial paper, to one-year and longer *constant maturity Treasury rates* (CMTs). Coupons are usually quoted as spread above or below the base rate (that is, three-month LIBOR + 15 bp). The interest rate paid on floating-rate notes adjusts based on changes in the base rate. For example, a note linked to three-month U.S. LIBOR would adjust every three months, based on the then-prevailing yield on three-month U.S. LIBOR. Floating-rate notes are often subject to a maximum (cap) or minimum (floor) rate of interest.

Features

A significant portion of corporate notes and bonds has various features. These include call provisions, in which the issuer has the right to redeem the bond before maturity; put options, in which the holder has the right to redeem the bond before maturity; sinking funds, used to retire the bonds at maturity; and convertibility features that allow the holder to exchange debt for equity in the issuing company.

Callable Bonds

Callable bonds are bonds in which the investor has sold a call option to the issuer. This increases the coupon rate paid by the issuer but exposes the investor to prepayment risk. If market interest rates fall below the coupon rate of the bond on the call date, the issuer will call the bond and the investor will be forced to invest the proceeds in a low-interest-rate environment. As a rule, corporate bonds are callable at a premium above par, which declines gradually as the bond approaches maturity.

Put Bonds

Put bonds are bonds in which the investor has purchased a put option from the issuer. The cost of this put option decreases the coupon rate paid by the issuer, but decreases the risk to an investor in a rising interest-rate environment. If market rates are above the coupon rate of the bond at the put date, the investor can ''put'' the bond back to the issuer and reinvest the proceeds of the bond in a high-interest-rate environment.

Sinking-Fund Provisions

Bonds with sinking-fund provisions require the issuer to retire a specified portion on a bond issue each year. This type of provision reduces the default risk on the bond because of the orderly retirement of the issue before maturity. The investor assumes the risk, however, that the bonds may be called at a special sinking-fund call price at a time when interest rates are lower than rates prevailing at the time the bond was issued. In that case, the bonds will be selling above par but may be retired by the issuer at the special call price that may be equal to par value.

Convertible Bonds

Convertible securities are fixed income securities that permit the holder the right to acquire, at the investor's option, the common stock of the issuing corporation under terms set forth in the bond indenture. New convertible issues typically have a maturity of 25 to 30 years and carry a coupon rate below that of a nonconvertible bond of comparable quality. An investor in a convertible security receives the upside potential of the common stock of the issuer, combined with the safety of principal in terms of a prior claim to assets over equity security holders. The investor, however, pays for this conversion privilege by accepting a significantly lower yield-to-maturity than that offered on comparable nonconvertible bonds. Also, if anticipated corporate growth is not realized, the investor sacrifices current yield and risks having the price of the bond fall below the price paid to acquire it. Commercial banks may purchase eligible convertible issues if the yield obtained is reasonably similar to nonconvertible issues of similar quality and maturity, and the issues are not selling at a significant conversion premium.

USES

Corporate bonds can be used for hedging, investment, or speculative purposes. In some instances, the presence of credit risk and lack of liquidity in various issues may discourage their use. Speculators can use corporate bonds to take positions on the level and term structure of both interest rates and corporate spreads over government securities.

Banks often purchase corporate bonds for their investment portfolios. In return for increased credit risk, corporate bonds provide an enhanced spread relative to Treasury securities. Banks may purchase investment-grade corporate securities subject to a 10 percent limitation of its capital and surplus for one obligor. Banks are prohibited from underwriting or dealing in these securities. A bank's section 20 subsidiary may, however, be able to underwrite and deal in corporate bonds.

Banks often act as corporate trustees for bond issues. A corporate trustee is responsible for authenticating the bonds issued and ensuring that the issuer complies with all of the covenants specified in the indenture. Corporate trustees are subject to the Trust Indenture Act, which specifies that adequate requirements for the performance of the trustee's duties on behalf of the bondholders be developed. Furthermore, the trustee's interest as a trustee must not conflict with other interest it may have, and the trustee must provide reports to bondholders.

DESCRIPTION OF MARKETPLACE

The size of the total corporate bond market was $2.2 trillion dollars at the end of 1993. Nonfinancial corporate business comprised approximately 56 percent of total issuance in 1993.

Market Participants

Buy Side

The largest holder of corporate debt in the United States is the insurance industry, accounting for more than 33 percent of ownership at the end of 1993. Private pension funds are the second-largest holders with 13.7 percent of ownership. Commercial banks account for approximately 4.5 percent of ownership of outstanding corporate bonds.

Sell Side

Corporate bonds are underwritten in the primary market by investment banks and section 20 subsidiaries of banks. In the secondary market, corporate bonds are traded in the listed and unlisted markets. Listed markets include the New York Stock Exchange and the American Stock Exchange. These markets primarily service retail investors who trade in small lots. The over-the-counter market is the primary market for professional investors. In the secondary market, investment banks and section 20 subsidiaries of banks may act as either a broker or dealer. Brokers execute orders for the accounts of customers; they are agents and get a commission for their services. Dealers buy and sell for their own accounts, thus taking the risk of reselling at a loss.

Sources of Information

For a primary offering, the primary source of information is contained in a *prospectus* filed by the issuer with the Securities and Exchange Commission. For seasoned issues, major contractual provisions are provided in Moody's manuals or Standard & Poor's corporation records.

Bond ratings are published by several organizations that analyze bonds and express their conclusions by a ratings system. The four major nationally recognized statistical rating organizations (NRSROs) in the United States are Duff & Phelps Credit Rating Co. (D&P); Fitch Investor Service, Inc. (Fitch); Moody's Investor Service, Inc. (Moody's); and Standard & Poor's Corporation (S&P).

PRICING

The major factors influencing the value of a corporate bond are—

- its coupon rate relative to prevailing market interest rates (typical of all bonds, bond prices will decline when market interest rates rise above the coupon rate, and prices will rise when interest rates decline below the coupon rate) and
- the issuer's credit standing (a change in an issuer's financial condition or ability to finance the debt can cause a change in the risk premium and price of the security).

Other factors that influence corporate bond prices are the existence of call options, put features, sinking funds, convertibility features, and guarantees or insurance. These factors can significantly alter the risk/return profile of a bond issue. (These factors and their effect on pricing are discussed in the ''Characteristics and Features'' subsection above.)

The majority of corporate bonds are traded on the over-the-counter market and are priced as a spread over U.S. Treasuries. Most often the benchmark U.S. Treasury is the on-the-run (current coupon) issue. However, pricing ''abnormalities'' can occur where the benchmark U.S. Treasury is different from the on-the-run security.

HEDGING

Interest-rate risk for corporate debt can be hedged either with cash, exchange-traded, or over-the-counter instruments. Typically, long corporate bond or note positions are hedged by selling a U.S. Treasury issue of similar maturity or by shorting an exchange-traded futures contract. The effectiveness of the hedge depends, in part, on basis risk and the degree to which the hedge

has neutralized interest-rate risk. Hedging strategies may incorporate assumptions about the correlation between the credit spread and government rates. The effectiveness of these strategies may be affected if these assumptions prove inaccurate. Hedges can be constructed with securities from the identical issuer but with varying maturities. Alternatively, hedges can be constructed with issuers within an industry group. The relative illiquidity of various corporate instruments may diminish hedging effectiveness.

RISKS

Interest-Rate Risk

For fixed-income bonds, prices fluctuate with changes in interest rates. The degree of interest-rate sensitivity depends on the maturity and coupon of the bond. Floating-rate issues lessen the bank's interest-rate risk to the extent that the rate adjustments are responsive to market rate movements. For this reason, these issues generally have lower yields to compensate for their benefit to the holder.

Prepayment or Reinvestment Risk

Call provisions will also affect a bank's interest-rate exposure. If the issuer has the right to redeem the bond before maturity, the action has the potential to adversely alter the investor's exposure. The issue is most likely to be called when market rates have moved in the issuer's favor, leaving the investor with funds to invest in a lower-interest-rate environment.

Credit Risk

Credit risk is a function of the financial condition of the issuer or the degree of support provided by a credit enhancement. The bond rating may be a quick indicator of credit quality. However, changes in bond ratings may lag behind changes in financial condition. Banks holding corporate bonds should perform a periodic financial analysis to determine the credit quality of the issuer.

Some bonds will include a credit enhancement in the form of insurance or a guarantee by another corporation. The safety of the bond may depend on the financial condition of the guarantor, since the guarantor will make principal and interest payments if the obligor cannot. Credit enhancements often are used to improve the credit rating of a bond issue, thereby reducing the rate of interest that the issuer must pay.

Zero-coupon bonds may pose greater credit-risk problems. When a zero-coupon bond has been sold at a deep discount, the issuer must have the funds to make a large payment at maturity. This potentially large balloon repayment may significantly increase the credit risk of the issue.

Liquidity Risk

Major issues are actively traded in large amounts, and liquidity concerns may be small. Trading for many issues, however, may be inactive and significant liquidity problems may affect pricing. The trading volume of a security determines the size of the bid/ask spread of a bond. This provides an indication of the bond's marketability and, hence its, liquidity. A narrow spread of between one-quarter to one-half of 1 percent may indicate a liquid market, while a spread of 2 or 3 percent may indicate poor liquidity for a bond. Even for major issues, news of credit problems may cause temporary liquidity problems.

Event Risk

Event risk can be large for corporate bonds. This is the risk of an unpredictable event that immediately affects the ability of an issuer to service the obligations of a bond. Examples of event risk include leveraged buyouts, corporate restructurings, or court rulings that affect the credit rating of a company. To mitigate event risk, some indentures include a maintenance of net worth clause, which requires the issuer to maintain its net worth above a stipulated level. If the requirement is not met, the issuer must begin to retire its debt at par.

ACCOUNTING TREATMENT

The Financial Accounting Standards Board's Statement of Financial Accounting Standards

No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities," determines the accounting treatment for investments in corporate notes and bonds. Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Corporate notes and bonds should be weighted at 100 percent. For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENT

Corporate notes and bonds are type III securities. A bank may purchase or sell for its own account corporate debt subject to the limitation that the corporate debt of a single obligor may not exceed 10 percent of the bank's capital and surplus. To be eligible for purchase, a corporate security must be "investment grade" (that is, rated BBB or higher) and must be marketable. Banks may not deal in or underwrite corporate bonds.

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GENERAL DESCRIPTION

Municipal securities are interest-bearing obligations issued by local governments or their political subdivisions (such as cities, towns, villages, counties, or special districts) or by state governments, agencies, or political subdivisions. These governmental entities can borrow at favorable rates because the interest income from most municipal securities generally receives advantageous treatment under federal income tax rules. There are important restrictions on these tax advantages, however, and banks are subject to different tax treatment than other investors.

The two principal classifications of municipal securities are general obligation bonds and revenue bonds. *General obligation bonds* are secured by the full faith and credit of an issuer with taxing power. General obligation bonds issued by local governments are generally secured by a pledge of the issuer's specific taxing power, while general obligation bonds issued by states are generally based on appropriations made by the state's legislature. In the event of default, the holders of general obligation bonds have the right to compel a tax levy or legislative appropriation to satisfy the issuer's obligation on the defaulted bonds.

Revenue bonds are payable from a specific source of revenue, so that the full faith and credit of an issuer with taxing power is not pledged. Revenue bonds are payable only from specifically identified sources of revenue. Pledged revenues may be derived from operation of the financed project, grants, and excise or other taxes. *Industrial development bonds* are a common example of revenue bonds. These bonds are municipal debt obligations issued by a state or local government (or a development agency) to finance private projects that generate tax revenues. The debt service on these bonds is dependent on the lease income generated by the project or facility. In certain instances, industrial development bonds may be categorized as loans (see the instructions to the call report).

In addition to municipal and industrial development bonds, state and local governmental entities issue short-term obligations in the form of notes. These debt obligations are generally issued to bridge the gap between when expenses are paid and tax revenues are collected. The types of notes issued include *tax anticipation notes (TANs), revenue anticipation notes (RANs), tax and revenue anticipation notes (TRANs), grant anticipation notes (GANs),* and *bond anticipation notes (BANs).*

CHARACTERISTICS AND FEATURES

Municipal bonds are typically issued in denominations of $5,000, known as the par value or face value amount of the bond. Municipal bonds are generally issued in serial maturities. A typical offering is made up of different maturities which allow the issuer to spread out debt service and stay within financial requirements. In recent years, however, term bonds have become increasingly popular. Term bonds are bonds comprising a large part or all of a particular issue which comes due in a single maturity. The issuer usually agrees to make periodic payments into a sinking fund for mandatory redemption of term bonds before maturity or for payment at maturity. Most municipal bonds are issued with call provisions which give the issuer flexibility in controlling its borrowing costs through the early retirement of debt.

A prime feature of municipal securities had been the exemption of their interest from federal income taxation. However, two significant restrictions have been imposed on the tax benefits of owning municipal securities. First, beginning in 1986, all taxpayers became subject to the alternative minimum tax (AMT), which was intended to provide an upper limit on the degree to which individuals and corporations can protect their income from taxation. Interest income from private-activity securities issued since then is potentially subject to the AMT. Second, investors became unable to deduct interest expense incurred in funding tax-advantaged securities, a measure that was intended to remove the benefit of borrowing funds from others to invest in municipal securities. In this regard, special federal tax rules apply to bank holdings of municipal securities, including the manner in which the amount of nondeductible interest expense is calculated. Exceptions to these various limitations apply only to tax-exempt obligations issued after August 1986 that are issued by small entities and are not private-activity bonds.

The state and local income taxation treatment of municipal securities varies greatly from state to state. Many states and local governments exempt interest income only on those bonds and notes issued by government entities located within their own boundaries.

USES

Municipal securities have traditionally been held primarily for investment purposes by investors who would benefit from income that is advantaged under federal income tax statutes and regulations. This group includes institutional investors such as insurance companies, mutual funds, commercial banks, and retail investors. The value of the tax advantage and, therefore, the attractiveness of the security increase when the income earned is also advantaged under state and local tax laws. Wealthy individuals and corporations face the highest marginal tax rates and, therefore, stand to receive the highest tax-equivalent yields on these securities. Private individuals are the largest holders of municipal securities, accounting for three-fourths of these securities outstanding.

DESCRIPTION OF MARKETPLACE

Issuing Practices

State and local government entities can market their new bond issues by offering them publicly or placing them privately with a small group of investors. When a public offering is selected, the issue is usually underwritten by investment bankers and municipal bond departments of banks. The underwriter may acquire the securities either by negotiation with the issuer or by award on the basis of competitive bidding. The underwriter is responsible for the distribution of the issue and accepts the risk that investors might fail to purchase the issues at the expected prices. For most sizable issues, underwriters join together in a syndicate to spread the risk of the sale and gain wider access to potential investors.

Standards and practices for the municipal securities activities of banks and other market participants are set by the Municipal Securities Rulemaking Board (MSRB), a congressionally chartered self-regulatory body that is overseen by the SEC. Examination and enforcement of MSRB standards is delegated to the NASD for securities firms and to the appropriate federal banking agency (Federal Reserve, OCC, or FDIC) for banking organizations.

Secondary Market

Municipal securities are not listed on or traded in exchanges; however, there are strong and active secondary markets for municipal securities that are supported by municipal bond dealers. These traders buy and sell to other dealers and investors and for their own inventories. The bond broker's broker also serves a significant role in the market for municipal bonds. These brokers are a small number of interdealer brokers who act as agents for registered dealers and dealer banks. In addition to using these brokers, many dealers advertise municipal offerings for the retail market through the *Blue List*. The *Blue List* is published by Standard & Poor's Corporation and lists securities and yields or prices of bonds and notes being offered by dealers.

Market Participants

Market participants in the municipal securities industry include underwriters, broker-dealers, brokers' brokers, the rating agencies, bond insurers, and investors. Financial advisors, who advise state and local governments for both competitive and negotiated offerings, and bond counsel, who provide opinions on the legality of specific obligations, are also important participants in the industry. The underwriting business primarily consists of a small number of large broker-dealers, typically with retail branch systems, and a large number of regional underwriters and broker-dealers with ties to local governments and who specialize in placing debt in their individual regions.

Market Transparency

Price transparency in the municipal securities industry varies depending on the type of security and the issuer. Prices for public issues are more readily available than prices for private placements. Two publications quote prices for municipal securities: *The Bond Buyer* and the *Blue List.*

PRICING

Municipal securities are priced either on a yield or dollar basis depending on the issue. Securities that are priced on a dollar basis are quoted as a percentage of the par value. A bond that is traded and quoted as a percentage of its par value is called a "dollar bond." Municipal securities, however, are generally traded and quoted in terms of yields because there are so many issues of different maturities. A bond quoted at 6.751-6.50 percent means that a dealer is willing to purchase the bond to yield 6.75 percent and will sell it to yield 6.50 percent.

To compare the yield of a municipal security with that of a taxable bond, the yield of the maturity must be adjusted to account for a number of factors that may be unique to the individual investor. For example, a fully taxable equivalent (FTE) yield would consider the relevant federal, state, and local marginal tax rates of the investor; specific characteristics of the security; the applicability of the alternative minimum tax (AMT); the ability to deduct interest expense associated with funding the acquisition; and other elements of the institution's tax status. (These factors are discussed more fully in the "Characteristics and Features" subsection.)

HEDGING

Generally, the special features and unique potential tax advantages of municipal securities make it difficult to construct an ideal hedge. The municipal bond futures contract from the Chicago Board of Trade (and corresponding options) is frequently used to hedge positions in municipal bonds. These contracts are cash settled to the value of the Bond Buyer Index, an index of actively traded municipal bonds, whose composition changes frequently. The market for these exchange contracts is not very liquid, however, and the possibility of basis risk may be large.

Municipal securities also can be hedged using more liquid Treasury securities, futures, and options. Treasury securities can be used to mitigate exposure to yield-curve risk; however, the significant basis risk present in the municipal/Treasury securities price relationship would remain unhedged. Some dealers use over-the-counter municipal swaps to hedge interest-rate risk. This would reduce basis risk to the relationship between the security being hedged and the municipal index employed in the swap transaction. Municipal swaps are relatively new and are not widespread in the industry. As a result, their use as hedging vehicles is limited.

RISKS

Credit Risk

Municipal securities activities involve differing degrees of credit risk depending on the financial capacity of the issuer or economic obligor. Noteworthy cases in which municipal securities have been unable to perform as agreed range from New York City in the 1970s and WPPSS (a Washington state power utility) in the 1980s to more recent examples. For revenue bonds, the ability to perform depends primarily on the success of the project or venture funded by the bond. Trends in real estate values, fiscal management, and the size of the tax base bear directly on the issuer's ability to service general obligation bonds.

An important starting point in performing a credit review of a potential issuer is to obtain a legal opinion that the issuing entity has the legal authority to undertake the obligation. The entity must also have the capacity to repay as well as the willingness to perform, both influenced not only by financial factors but by political factors. Since some issuers depend on legislatures or voters to approve bond issues or new funding, credit analysis can become problematic; issuers could default on their bond obligations despite having the funds to service debt. These political issues may reach beyond the direct jurisdiction of the issuing entity, including decisions made by state legislatures or Congress. Therefore, to fully evaluate market risk, market participants must monitor how political and legislative factors may affect a security's default risk.

The lack of standardized financial statements and the large number of different issuers (as many as 50,000 entities issue municipal bonds) also make credit analysis of municipal securities more difficult. This heightens the importance of the role of the rating agencies and bond insurers in comparison to other markets. Larger issuers of municipal securities are rated by nationally recognized rating agencies. Other issuers achieve an investment-grade rating through the use of credit enhancements such as insurance from a municipal bond insurance company or a letter of credit issued by a financial institution. Credit

enhancements are often used to improve the credit rating of a security, thereby lowering the interest that the issuer must pay.

Liquidity Risk

One of the problems in the municipal market is the lack of ready marketability for many municipal issues. Many municipal bonds are relatively small issues, and most general obligation issues are sold on a serial basis, which in effect breaks the issues up into smaller components. Furthermore, a large percentage of municipal securities are purchased by retail investors and small institutions that tend to hold securities to maturity. Overall, smaller issues and those with thin secondary markets often experience liquidity difficulties and are therefore subject to higher risk.

Interest-Rate Risk and Market Risk

Like other fixed-income securities, fixed-income municipal securities are subject to price fluctuations based on changes in interest rates. The degree of fluctuation depends on the maturity and coupon of the security. Variable-rate issues are typically tied to a money market rate, so their interest-rate risk will be significantly less. Nonetheless, since bond prices and interest rates are inextricably linked, all municipal securities involve some degree of interest-rate risk.

Holders of municipal securities are also affected by changes in marginal tax rates. For instance, a reduction in marginal tax rates would lower the tax-equivalent yield on the security, causing the security to depreciate in price.

Prepayment or Reinvestment Risk

Call provisions will affect a bank's interest-rate exposure. If the issuer has the right to redeem the bond before maturity, the risk of an adverse effect on the bank's exposure is greater. The security is most likely to be called when rates have moved in the issuer's favor, leaving the investor with funds to invest in a lower-interest-rate environment.

ACCOUNTING TREATMENT

The accounting treatment for investments in municipal securities is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

General obligations, BANs, and TANs have a 20 percent risk weight. Municipal revenue bonds and RANs have a 50 percent risk weight. Industrial development bonds are rated at 100 percent. For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENT

The limitations of 12 USC 24 (section 5136 of the Revised Statutes) apply to municipal securities. Municipal securities that are general obligations are type I securities and may be purchased by banks in unlimited amounts. Municipal revenue securities, however, are either type II or type III securities. The purchase of type II and type III securities is limited to 10 percent of equity capital and reserves for each obligor. That limitation is reduced to 5 percent of equity capital and reserves for all obligors in the aggregate when the judgment of the obligor's ability to perform is based predominantly on reliable estimates versus adequate evidence.

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GENERAL DESCRIPTION

A Eurodollar certificate of deposit (Eurodollar CD) is a negotiable dollar-denominated time deposit issued by a U.S. bank located outside the United States or by a foreign bank located abroad. Dollars deposited in international banking facilities (IBFs) in the United States are also considered Eurodollars.

CHARACTERISTICS AND FEATURES

Eurodollar CDs are not FDIC-insured. Eurodollar deposits are generally free from domestic (U.S.) regulation and reserve requirements, and are not subject to other fees imposed by the FDIC. Most Eurodollar CDs are issued in denominations over $1 million. Although their maturities must be at least seven days, and most CDs are issued for three to six months, there is no upward limit on the term. Issuing banks cannot purchase their own CDs.

USES

The primary reason for issuing in the Eurodollar market (besides the basic reason to issue a CD—to provide a source of funds) is the lower cost of funds available as a result of the elimination of regulatory costs and reserve requirements. Buyers, on the other hand, can take advantage of the slightly higher yields while maintaining reasonable liquidity. Eurodollar CD issuers subsequently take the funds received from the issuance and redeposit them with other foreign banks; invest them; retain them to improve reserves or overall liquidity; or lend them to companies, individuals, or governments outside the United States.

DESCRIPTION OF MARKETPLACE

The Eurodollar CD market is centered in London. Activity also takes place in offshore branches, including those in Nassau and the Cayman Islands. Issuers include the overseas branches of money-center U.S. banks, large British banks, and branches of major Canadian and Japanese banks. Only the largest banks with strong international reputations usually sell Eurodollar CDs. Since the advent of the medium-term note market, the Eurodollar CD market has been on a decline and is now a relatively illiquid market.

Eurodollar CDs are sold by the issuing bank at face value either directly to investors or depositors or through CD dealers and brokers. Settlement is on a two-day basis and occurs at the New York correspondents of the issuers' and investors' banks.

PRICING

Eurodollar CDs are priced off the London Interbank Offered Rate (LIBOR). Their yields are generally slightly higher than yields for domestic CDs to compensate the investor for the slightly higher risk.

Eurodollar CDs are quoted and sold on an interest-bearing basis on an actual 360-day basis. The bid/offer quotes are in 16ths (for example, 12 7/16). The quotes directly translate to rates on the given Eurodollar CD. Thus, bid/offer rates of 12 7/16 and 12 3/16 would roughly translate to a bid interest rate of 12.4375 percent and an offer rate of 12.1875 percent, respectively, giving the dealer a spread of .25 percent.

HEDGING

Eurodollar futures may be used to hedge Eurodollar time deposits. Eurodollar futures are one of the most actively traded futures contracts in the world.

RISKS

The risks associated with purchasing Eurodollar CDs include credit risk, sovereign risk, and liquidity risk. To reduce credit risk, a detailed analysis should be performed on all Eurodollar CD issuers in which the investor has invested. Although the instruments themselves are not rated, most issuers are rated by either Thompson

Bankwatch (for domestic banks) or IBCA, Ltd. (for foreign banks).

The secondary market for Eurodollar CDs is less developed than the domestic CD market. The current perception of the issuer's name, as well as the size and maturity of the issue, may affect marketability.

ACCOUNTING TREATMENT

The Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statment of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities," determines the accounting treatment for investments in Eurodollar CDs. Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statment of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

In general, a 20 percent risk weighting is appropriate for depository institutions based in OECD countries. For specific risk weights for qualified trading accounts, see section 2110.1, "Capital Adequacy."

LEGAL LIMITATIONS FOR BANK INVESTMENT

Owning Eurodollar CDs is authorized under the "incidental powers" provisions of 12 USC 24 (7th). Banks may legally hold these instruments without limit.

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GENERAL DESCRIPTION

Asset-backed securities (ABS) are debt instruments that represent an interest in a pool of assets. Technically, mortgage-backed securities (MBS) can be viewed as a subset of ABS, but the term "ABS" is generally used to refer to securities in which underlying collateral consists of assets other than residential first mortgages such as credit card and home equity loans, leases, or commercial mortgage loans. Issuers are primarily banks and finance companies, captive finance subsidiaries of nonfinancial corporations (for example, GMAC), or specialized originators such as credit card lenders (for example, Discover). Credit risk is an important issue in asset-backed securities because of the significant credit risks inherent in the underlying collateral and because issuers are primarily private entities. Accordingly, asset-backed securities generally include one or more credit enhancements, which are designed to raise the overall credit quality of the security above that of the underlying loans.

Another important type of asset-backed security is commercial paper issued by special-purpose entities. Asset-backed commercial paper is usually backed by trade receivables, though such conduits may also fund commercial and industrial loans. Banks are typically more active as issuers of these instruments than as investors in them.

CHARACTERISTICS AND FEATURES

An asset-backed security is created by the sale of assets or collateral to a conduit, which becomes the legal issuer of the ABS. The securitization conduit or issuer is generally a bankruptcy-remote vehicle such as a grantor trust or, in the case of an asset-backed commercial paper program, a special-purpose entity (SPE). The sponsor or originator of the collateral usually establishes the issuer. Interests in the trust, which embody the right to certain cash flows arising from the underlying assets, are then sold in the form of securities to investors through an investment bank or other securities underwriter. Each ABS has a servicer (often the originator of the collateral) that is responsible for collecting the cash flows generated by the securitized assets—principal, interest, and fees net of losses and any servicing costs as well as other expenses—and for passing them along to the investors in accord with the terms of the securities. The servicer processes the payments and administers the borrower accounts in the pool.

The structure of an asset-backed security and the terms of the investors' interest in the collateral can vary widely depending on the type of collateral, the desires of investors, and the use of credit enhancements. Often ABS are structured to reallocate the risks entailed in the underlying collateral (particularly credit risk) into security tranches that match the desires of investors. For example, senior subordinated security structures give holders of senior tranches greater credit risk protection (albeit at lower yields) than holders of subordinated tranches. Under this structure, at least two classes of asset-backed securities are issued, with the senior class having a priority claim on the cash flows from the underlying pool of assets. The subordinated class must absorb credit losses on the collateral before losses can be charged to the senior portion. Because the senior class has this priority claim, cash flows from the underlying pool of assets must first satisfy the requirements of the senior class. Only after these requirements have been met will the cash flows be directed to service the subordinated class.

ABS also use various forms of credit enhancements to transform the risk-return profile of underlying collateral, including third-party credit enhancements, recourse provisions, overcollateralization, and various covenants. Third-party credit enhancements include standby letters of credit, collateral or pool insurance, or surety bonds from third parties. Recourse provisions are guarantees that require the originator to cover any losses up to a contractually agreed-upon amount. One type of recourse provision, usually seen in securities backed by credit card receivables, is the "spread account." This account is actually an escrow account whose funds are derived from a portion of the spread between the interest earned on the assets in the underlying pool of collateral and the lower interest paid on securities issued by the trust. The amounts that accumulate in this escrow account are used to cover credit losses in the

underlying asset pool, up to several multiples of historical losses on the particular asset collateralizing the securities.

Overcollateralization is another form of credit enhancement that covers a predetermined amount of potential credit losses. It occurs when the value of the underlying assets exceeds the face value of the securities. A similar form of credit enhancement is the cash-collateral account, which is established when a third party deposits cash into a pledged account. The use of cash-collateral accounts, which are considered by enhancers to be loans, grew as the number of highly rated banks and other credit enhancers declined in the early 1990s. Cash-collateral accounts provide credit protection to investors of a securitization by eliminating "event risk," or the risk that the credit enhancer will have its credit rating downgraded or that it will not be able to fulfill its financial obligation to absorb losses.

An investment banking firm or other organization generally serves as an underwriter for ABS. In addition, for asset-backed issues that are publicly offered, a credit-rating agency will analyze the policies and operations of the originator and servicer, as well as the structure, underlying pool of assets, expected cash flows, and other attributes of the securities. Before assigning a rating to the issue, the rating agency will also assess the extent of loss protection provided to investors by the credit enhancements associated with the issue.

Although the basic elements of all asset-backed securities are similar, individual transactions can differ markedly in both structure and execution. Important determinants of the risk associated with issuing or holding the securities include the process by which principal and interest payments are allocated and downstreamed to investors, how credit losses affect the trust and the return to investors, whether collateral represents a fixed set of specific assets or accounts, whether the underlying loans are revolving or closed-end, under what terms (including maturity of the asset-backed instrument) any remaining balance in the accounts may revert to the issuing company, and the extent to which the issuing company (the actual source of the collateral assets) is obligated to provide support to the trust/conduit or to the investors. Further issues may arise based on discretionary behavior of the issuer within the terms of the securitization agreement, such as voluntary buybacks from, or contributions to, the underlying pool of loans when credit losses rise.

A bank or other issuer may play more than one role in the securitization process. An issuer can simultaneously serve as originator of loans, servicer, administrator of the trust, underwriter, provider of liquidity, and credit enhancer. Issuers typically receive a fee for each element of the transaction.

Institutions acquiring ABS should recognize that the multiplicity of roles that may be played by a single firm—within a single securitization or across a number of them—means that credit and operational risk can accumulate into significant concentrations with respect to one or a small number of firms.

TYPES OF SECURITIZED ASSETS

There are many different varieties of asset-backed securities, often customized to the terms and characteristics of the underlying collateral. The most common types are securities collateralized by revolving credit-card receivables, but instruments backed by home equity loans, other second mortgages, and automobile-finance receivables are also common.

Installment Loans

Securities backed by closed-end installment loans are typically the least complex form of asset-backed instruments. Collateral for these ABS typically includes leases, automobile loans, and student loans. The loans that form the pool of collateral for the asset-backed security may have varying contractual maturities and may or may not represent a heterogeneous pool of borrowers. Unlike a mortgage pass-through instrument, the trustee does not need to take physical possession of any account documents to perfect security interest in the receivables under the Uniform Commercial Code. The repayment stream on installment loans is fairly predictable, since it is primarily determined by a contractual amortization schedule. Early repayment on these instruments can occur for a number of reasons, with most tied to the disposition of the underlying collateral (for example, in the case of an ABS backed by an automobile loan, the sale of the vehicle). Interest is typically passed through to bondholders at a fixed rate that is slightly

below the weighted average coupon of the loan pool, allowing for servicing and other expenses as well as credit losses.

Revolving Credit

Unlike closed-end installment loans, revolving credit receivables involve greater uncertainty about future cash flows. Therefore, ABS structures using this type of collateral must be more complex to afford investors more comfort in predicting their repayment. Accounts included in the securitization pool may have balances that grow or decline over the life of the ABS. Accordingly, at maturity of the ABS, any remaining balances revert to the originator. During the term of the ABS, the originator may be required to sell additional accounts to the pool to maintain a minimum dollar amount of collateral if accountholders pay down their balances in advance of predetermined rates.

Credit card securitizations are the most prevalent form of revolving-credit ABS, although home equity lines of credit are a growing source of ABS collateral. Credit card ABS are typically structured to incorporate two phases in the life cycle of the collateral: an initial phase during which the principal amount of the securities remains constant, and an amortization phase during which investors are paid off. A specific period of time is assigned to each phase. Typically, a specific pool of accounts is identified in the securitization documents, and these specifications may include not only the initial pool of loans but a portfolio from which new accounts may be contributed.

The dominant vehicle for issuing securities backed by credit cards is a master-trust structure with a ''spread account,'' which is funded up to a predetermined amount through ''excess yield''—that is, interest and fee income less credit losses, servicing, and other fees. With credit card receivables, the income from the pool of loans—even after credit losses—is generally much higher than the return paid to investors. After the spread account accumulates to its predetermined level, the excess yield reverts to the issuer. Under GAAP, issuers are required to recognize on their balance sheet an excess yield asset that is based on the fair value of the expected future excess yield; in principle, this value would be based on the net present value of the expected earnings stream from the transaction. Issuers are further required to revalue the asset periodically to take account of changes in fair value that may occur due to interest rates, actual credit losses, and other factors relevant to the future stream of excess yield. The accounting and capital implications of these transactions are discussed further below.

Asset-Backed Commercial Paper

A number of larger banks have started using a new structure, a ''special-purpose entity (SPE),'' which is designed to acquire trade receivables and commercial loans from high-quality (often investment-grade) obligors and to fund those loans by issuing (asset-backed) commercial paper that is to be repaid from the cash flow of the receivables. Capital is contributed to the SPE by the originating bank which, together with the high quality of the underlying borrowers, is sufficient to allow the SPE to receive a high credit rating. The net result is that the SPE's cost of funding can be at or below that of the originating bank itself. The SPE is ''owned'' by individuals who are not formally affiliated with the bank, although the degree of separation is typically minimal.

These securitization programs enable banks to arrange short-term financing support for their customers without having to extend credit directly. This structure provides borrowers with an alternative source of funding and allows banks to earn fee income for managing the programs. As the asset-backed commercial paper structure has developed, it has been used to finance a variety of underlying loans—in some cases, loans purchased from other firms rather than originated by the bank itself—and as a remote-origination vehicle from which loans can be made directly. Like other securitization techniques, this structure allows banks to meet their customers' credit needs while incurring lower capital requirements and a smaller balance sheet than if it made the loans directly.

USES

Issuers obtain a number of advantages from securitizing assets, including improving their capital ratios and return on assets, monetizing gains in loan value, generating fee income by providing services to the securitization conduit,

closing a potential source of interest-rate risk, and increasing institutional liquidity by providing access to a new source of funds. Investors are attracted by the high credit quality of ABS, as well as their attractive returns.

DESCRIPTION OF MARKETPLACE

The primary buyers for ABS have been insurance companies and pension funds looking for attractive returns with superior credit quality. New issues often sell out very quickly. Banks typically are not active buyers of these securities. The secondary market is active, but new issues currently trade at a premium to more seasoned products.

Market transparency can be less than perfect, especially when banks and other issuers retain most of the economic risk despite the securitization transaction. This is particularly true when excess yield is a significant part of the transaction and when recourse (explicit or implicit) is a material consideration. The early-amortization features of some ABS also may not be fully understood by potential buyers.

PRICING

ABS carry coupons that can be fixed (generally yielding between 50 and 300 basis points over the Treasury curve) or floating (for example, 15 basis points over one-month LIBOR). Pricing is typically designed to mirror the coupon characteristics of the loans being securitized. The spread will vary depending on the credit quality of the underlying collateral, the degree and nature of credit enhancement, and the degree of variability in the cash flows emanating from the securitized loans.

HEDGING

Given the high degree of predictability in their cash flows, the hedging of installment loans and revolving-credit ABS holdings is relatively straightforward and can be accomplished either through cash-flow matching or duration hedging. Most market risk arises from the perceived credit quality of the collateral and the nature and degree of credit enhancement, a risk that may be difficult to hedge. One source of potential unpredictability, however, is the risk that acceleration or wind-down provisions would be triggered by poor credit quality in the asset pool—essentially, a complex credit-quality option that pays off bondholders early if credit losses exceed some threshold level.

For issuers, variability in excess yield (in terms of carrying value) or in the spread account (in terms of income) can represent a material interest-rate risk, particularly if the bonds pay interest on a variable-rate basis while the underlying loans are fixed-rate instruments. While the risk can be significant, the hedging solutions are not complex (that is, dollar-for-dollar in notional terms). Potential hedging strategies include the use of futures or forwards, forward rate agreements (FRAs), swaps, or more complex options or swaptions. In the case of home equity loans or other revolving credits for which the pool earnings rate is linked to prime while the ABS interest rate is not, prime LIBOR swaps or similar instruments could be used to mitigate basis risk. Note that the presence of interest-rate risk may have credit-quality ramifications for the securities, since tighter excess yield and spread accounts would reduce the ability of the structure to absorb credit losses.

An asset-backed commercial paper (ABCP) program can lead to maturity mismatches for the issuer depending on the pricing characteristics of the commercial loan assets. Similarly, the presence of embedded options—such as prepayment options, caps, or floors—can expose the ABCP entity to options risk. These risks can be hedged through use of options, swaptions, or other derivative instruments. As with home equity ABS, prime-based commercial loans could lead to basis-risk exposure, which can be hedged using basis swaps.

RISKS

Credit Risk

Credit risk arises from (1) losses due to defaults by the borrowers in the underlying collateral and (2) the issuer's or servicer's failure to perform. These two elements can blur together as, for example, in the case of a servicer who does not provide adequate credit-review scrutiny to the serviced portfolio, leading to a higher incidence

of defaults. ABS are rated by major rating agencies.

Market Risk

Market risk arises from the cash-flow characteristics of the security, which for most ABS tend to be predictable. Rate-motivated prepayments are a relatively minor phenomenon due to the small principal amounts on each loan and the relatively short maturity. The greatest variability in cash flows comes from credit performance, including the presence of wind-down or acceleration features designed to protect the investor in the event that credit losses in the portfolio rise well above expected levels.

Interest-Rate Risk

Interest-rate risk arises for the issuer from the relationship between the pricing terms on the underlying loans and the terms of the rate paid to bondholders, and from the need to mark to market the excess servicing or spread-account proceeds carried on the balance sheet. For the holder of the security, interest-rate risk depends on the expected life or repricing of the ABS, with relatively minor risk arising from embedded options. The notable exception is valuation of the wind-down option.

Liquidity Risk

Liquidity risk can arise from increased perceived credit risk, like that which occurred in 1996 and 1997 with the rise in reported delinquencies and losses on securitized pools of credit cards. Liquidity can also become a major concern for asset-backed commercial paper programs if concerns about credit quality, for example, lead investors to avoid the commercial paper issued by the special-purpose entity. For these cases, the securitization transaction may include a ''liquidity facility,'' which requires the facility provider to advance funds to the SPE if liquidity problems arise. To the extent that the bank originating the loans is also the provider of the liquidity facility, and that the bank is likely to experience similar market concerns if the loans it originates deteriorate, the ultimate practical value of the liquidity facility to the transaction may be questionable.

Operations Risk

Operations risk arises through the potential for misrepresentation of loan quality or terms by the originating institution, misrepresentation of the nature and current value of the assets by the servicer, and inadequate controls over disbursements and receipts by the servicer.

ACCOUNTING TREATMENT

The Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), ''Accounting for Certain Investments in Debt and Equity Securities,'' as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), ''Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities,'' determines the accounting treatment for investments in government agency securities. Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), ''Accounting for Derivatives and Hedging Activities.'' (See section 2120.1, ''Accounting,'' for further discussion.)

RISK-BASED CAPITAL WEIGHTING

For the holder of ABS, a 100 percent risk weighting is assigned for corporate issues and a 20 percent rating for state or municipal issues. Under risk-based capital regulations, a transfer of assets is a ''true sale'' as long as the banking organization (1) retains no risk of loss and (2) has no obligation to any party for the payment of principal or interest on the assets transferred. Unless these conditions are met, the banking organization is deemed to have sold the assets with recourse; thus, capital generally must be held against the entire risk-weighted amount of the assets sold unless (1) the transaction is subject to the low-level capital rule or (2) the loans securitized are small-business loans and receive preferential treatments. Assets sold in which an interest-only receivable is recognized under FAS 140, or in which the spread account is recognized on the balance sheet and provides credit enhancement to the assets sold, are deemed to have

been sold with recourse. In the case of asset-backed commercial paper, capital generally must be held against the entire risk-weighted amount of any guarantee, other credit enhancement, or liquidity facility provided by the bank to the special-purpose entity.

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Asset-backed securities can be either type IV or type V securities. Type IV securities were added as bank-eligible securities in 1996 primarily in response to provisions of the Riegle Community Development and Regulatory Improvement Act of 1994 (RCDRIA), which removed quantitative limits on a bank's ability to buy commercial mortgage and small-business-loan securities. In summary, type IV securities include the following asset-backed securities that are fully secured by interests in a pool (or pools) of loans made to numerous obligors:

- investment-grade residential-mortgage-related securities offered or sold pursuant to section 4(5) of the Securities Act of 1933 (15 USC 77d(5))
- residential-mortgage-related securities, as described in section 3(a)(41) of the Securities Exchange Act of 1934, (15 USC 78c(a)(41)) that are rated in one of the two highest investment-grade rating categories
- investment-grade commercial mortgage securities offered or sold pursuant to section 4(5) of the Securities Act of 1933 (15 USC 77d(5))
- commercial mortgage securities as described in section 3(a)(41) of the Securities Exchange Act of 1934 (15 USC 78c(a)(41)) that are rated in one of the two highest investment-grade rating categories
- investment-grade, small-business-loan securities as described in section 3(a)(53)(A) of the Securities Exchange Act of 1934 (15 USC 78c(a)(53)(A))

For all type IV commercial and residential mortgage securities and for type IV small-business-loan securities rated in the top two rating categories, there is no limitation on the amount a bank can purchase or sell for its own account. Type IV investment-grade small-business-loan securities that are not rated in the top two rating categories are subject to a limit of 25 percent of a bank's capital and surplus for any one issuer. In addition to being able to purchase and sell type IV securities, subject to the above limitations, a bank may deal in those type IV securities which are fully secured by type I securities.

Type V securities consist of all ABS that are not type IV securities. Specifically, they are defined as marketable, investment-grade-rated securities that are not type IV and are "fully secured by interests in a pool of loans to numerous obligors and in which a national bank could invest directly." They include securities backed by auto loans, credit card loans, home equity loans, and other assets. Also included are residential and commercial mortgage securities as described in section 3(a)(41) of the Securities Exchange Act of 1934 (15 USC 78c(a)(41)) which are not rated in one of the two highest investment-grade rating categories, but are still investment-grade. A bank may purchase or sell type V securities for its own account provided the aggregate par value of type V securities issued by any one issuer held by the bank does not exceed 25 percent of the bank's capital and surplus.

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GENERAL DESCRIPTION

A mortgage loan is a loan which is secured by the collateral of a specified real estate property. The real estate pledged with a mortgage can be divided into two categories: residential and nonresidential. Residential properties include houses, condominiums, cooperatives, and apartments. Residential real estate can be further subdivided into single-family (one- to four-family) and multifamily (apartment buildings in which more than four families reside). Nonresidential property includes commercial and farm properties. Common types of mortgages which have been securitized include traditional fixed-rate level-payment mortgages, graduated-payment mortgages, adjustable-rate mortgages (ARMs), and balloon mortgages.

Mortgage-backed securities (MBS) are products that use pools of mortgages as collateral for the issuance of securities. Although these securities have been collateralized using many types of mortgages, most are collateralized by one- to four-family residential properties. MBS can be broadly classified into four basic categories:

1. mortgage-backed bonds
2. pass-through securities
3. collateralized mortgage obligations and real estate mortgage investment conduits
4. stripped mortgage-backed securities

Mortgage-Backed Bonds

Mortgage-backed bonds are corporate bonds which are general obligations of the issuer. These bonds are credit enhanced through the pledging of specific mortgages as collateral. Mortgage-backed bonds involve no sale or conveyance of ownership of the mortgages acting as collateral.

Pass-Through Securities

A mortgage-backed pass-through security provides its owner with a pro rata share in underlying mortgages. The mortgages are typically placed in a trust, and certificates of ownership are sold to investors. Issuers of pass-through instruments primarily act as a conduit for the investors by collecting and proportionally distributing monthly cash flows generated by homeowners making payments on their home mortgage loans. The pass-through certificate represents a sale of assets to the investor, thus removing the assets from the balance sheet of the issuer.

Collateralized Mortgage Obligations and Real Estate Mortgage Investment Conduits

Collateralized mortgage obligations (CMOs) and real estate mortgage investment conduit (REMICs) securities represent ownership interests in specified cash flows arising from underlying pools of mortgages or mortgage securities. CMOs and REMICs involve the creation, by the issuer, of a single-purpose entity designed to hold mortgage collateral and funnel payments of principal and interest from borrowers to investors. Unlike pass-through securities, however, which entail a pro rata share of ownership of all underlying mortgage cash flows, CMOs and REMICs convey ownership only of cash flows assigned to specific classes based on established principal distribution rules.

Stripped Mortgage-Backed Securities

Stripped mortgage-backed securities (SMBS) entail the ownership of either the principal or interest cash flows arising from specified mortgages or mortgage pass-through securities. Rights to the principal are labeled POs (principal only), and rights to the interest cash flows are labeled IOs (interest only).

CHARACTERISTICS AND FEATURES

Products Offered under Agency Programs

The Government National Mortgage Association (GNMA or Ginnie Mae), Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac), and the Federal National Mortgage Association (FNMA or Fannie Mae) are the three

main government-related institutions which securitize like groups of mortgages for sale to investors. Major mortgage-purchasing programs sponsored by these three agencies are listed below.

Abbreviation	*Description*
GNMA	
30-YR	30-year single-family programs
15-YR	15-year single-family programs
GPMs	Graduated-payment programs
PROJ Loans	Project-loan programs
ARMs	Single-family adjustable-rate programs
FNMA	
30-YR SF	30-year single-family programs
30-YR MF	30-year multifamily programs
30-YR FHA/VA	FHA/VA 30-year single- and multifamily programs
15-YR	15-year single-family programs
SF ARMs	Single-family adjustable-rate programs
MF ARMs	Multifamily adjustable-rate programs
Balloons	Balloon-payment seven-year programs
Two-step	Five- and seven-year two-step programs
FHLMC	
30-YR	30-year single-family programs
15-YR	15-year single-family programs
TPMs	Tiered-payment single-family programs
ARMs	Single-family adjustable-rate programs
MF	Multifamily programs
5- & 7-year balloons	Balloon-payment, five- to seven-year programs

While the majority of outstanding mortgage loans are structured as 30-year fixed-rate loans, in recent years the size of the 15-year, fixed-rate sector has grown. Declining interest rates and a steep yield curve have led many borrowers to refinance or prepay existing 30-year, higher-coupon loans and replace them with a shorter maturity. This experience also has demonstrated the prepayment risk inherent in all mortgages.

Public Securities Association Prepayment Rates

Mortgagors have the option to prepay the principal balance of their mortgages at any time. The value of the prepayment option to investors and mortgagors depends on the level of interest rates and the volatility of mortgage prepayments. Prepayment rates depend on many variables, and their response to these variables can be unpredictable. The single biggest influence on prepayment rates is the level of long-term mortgage rates; mortgage prepayments generally increase as long-term rates decrease. While future long-term rates are not known, higher volatility in long-term interest rates means lower rates are more likely, making the prepayment option more valuable to the mortgagor. This higher value of the prepayment option is reflected in lower mortgage security prices, as mortgage investors require higher yields to compensate for increased prepayment risk.

The importance of principal prepayment to the valuation of mortgage securities has resulted in several standardized forms of communicating the rate of prepayments of a mortgage security. One standard form is that developed by the Public Securities Association (PSA). The PSA standard is more accurately viewed as a benchmark or reference for communicating prepayment patterns. It may be helpful to think of the PSA measurement as a kind of speedometer, used only as a unit for measuring the speed of prepayments.

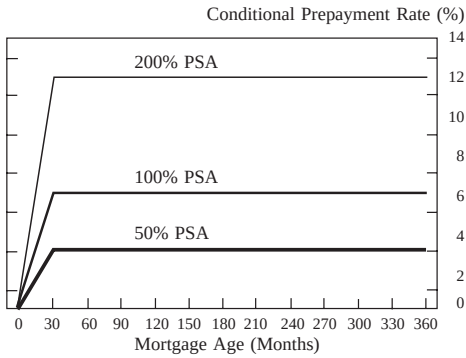
For a pool of mortgage loans, the PSA standard assumes that the mortgage prepayment rate increases at a linear rate over the first 30 months following origination, then levels off at a constant rate for the remaining life of the pool. Under the PSA convention, prepayments are assumed to occur at a 0.2 percent annual rate in the first month, 0.4 percent annual rate in the second month, escalating to a 6.0 percent annual rate by month 30. The PSA's annualized prepayment rate then remains at 6.0 percent over the remaining life of the mortgage pool (see chart 1). Using this convention, mortgage prepayment rates are often communicated in multiples of the PSA standard of 100 percent. For example, 200 percent PSA equals two times the PSA standard, whereas 50 percent PSA equals one-half of the PSA standard.

Mortgage Pass-Through Securities

Mortgage pass-through securities are created when mortgages are pooled together and sold as undivided interests to investors. Usually, the mortgages in the pool have the same loan type and similar maturities and loan interest rates. The originator (for instance, a bank) may continue to service the mortgage and will ''pass through'' the principal and interest, less a servicing fee, to an agency or private issuer of mortgage-backed securities. Mortgages are then packaged by the agency or private issuer and sold to investors. The principal and interest, less guaranty and other fees are then ''passed through'' to the investor, who receives a pro rata share of the resulting cash flows.

Every agency pass-through pool is unique, distinguished by features such as size, prepayment characteristics, and geographic concentration or dispersion. Most agency pass-through securities, however, trade on a generic or to-be-announced (TBA) basis. In a TBA trade, the seller and buyer agree to the type of security, coupon, face value, price, and settlement date at the time of the trade, but do not specify the actual pools to be traded. Two days before settlement, the seller identifies the specific pools to be delivered to satisfy the commitment. Trading in agency pass-throughs may take place on any business day, but TBA securities usually settle on one specific date each month. The Public Securities Association releases a monthly schedule that divides all agency pass-throughs into six groups, each settling on a different day. Agency pass-throughs generally clear through electronic book-entry systems.

Chart 1—PSA Model



Nonagency pass-throughs are composed of specific pools and do not trade on a TBA basis. New issues settle on the date provided in the prospectus. In the secondary market, these securities trade on an issue-specific basis and generally settle on a corporate basis (three business days after the trade).

Collateralized Mortgage Obligations

Since 1983, mortgage pass-through securities and mortgages have been securitized as collateralized mortgage obligations (CMOs).[1] While pass-through securities share prepayment risk on a pro rata basis among all bondholders, CMOs redistribute prepayment risk among different classes or tranches. The CMO securitization process recasts prepayment risk into classes or tranches. These tranches have risk profiles ranging from extremely low to significantly high risk. Some tranches can be relatively immune to prepayment risk, while others bear a disproportionate share of the risk associated with the underlying collateral.

CMO issuance has grown dramatically throughout the 1980s and currently dominates the market for FNMA and FHLMC pass-throughs or agency collateral. Given the dramatic growth of the CMO market and its complex risks, this subsection discusses the structures and risks associated with CMOs.

In 1984, the Treasury ruled that multiple-class pass-throughs required active management; this resulted in the pass-through entities' being considered corporations for tax purposes rather than trusts. Consequently, the issuer was no longer considered a grantor trust, and the income was taxed twice: once at the issuer level and again at the investor level. This ruling ultimately had complex and unintended ramifications for the CMO market.

The issue was ultimately addressed in the Tax Reform Act of 1986 through the creation of real estate mortgage investment conduits (REMICs). These instruments are essentially tax-free vehicles for issuing multiple-class mortgage-backed securities. REMIC is a tax designation; a REMIC may be originated as a trust, partnership, or other entity.

1. Today almost all CMOs are structured as real estate mortgage investment conduits (REMICs) to qualify for desirable tax treatment.

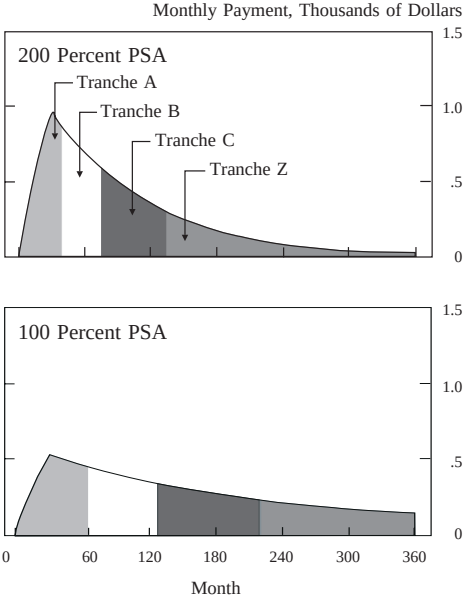
The Tax Reform Act of 1986 allowed for a five-year transition during which mortgage-backed securities could be issued pursuant to existing Treasury regulations. However, as of January 1, 1992, REMICs became the sole means of issuing multiple-class mortgage-backed securities exempt from double taxation. As a practical matter, the vast majority of CMOs carry the REMIC designation. Indeed, many market participants use the terms ''CMO'' and ''REMIC'' interchangeably.

CMOs do not trade on a TBA basis. New-issue CMOs settle on the date provided in the prospectus and trade on a corporate basis (three business days after the trade) in the secondary market. Common CMO structures include sequential pay, PACs, TACs, and floaters and inverse floaters as described below.

Sequential pay structure. The initial form of CMO structure was designed to provide more precisely targeted maturities than the pass-through securities. Now considered a relatively simple design for CMOs, the sequential pay structure dominated CMO issuance from 1983 (when the first CMO was created) until the late 1980s. In the typical sequential pay deal of the 1980s (see chart 2), mortgage cash flows were divided into four tranches, labeled A, B, C, and Z. Tranche A might receive the first 25 percent of principal payments and have an average maturity, or average life, of one to three years.[2] Tranche B, with an average life of between three and seven years, would receive the next 25 percent of principal. Tranche C, receiving the following 25 percent of principal, would have an average life of 5 to 10 years. The Z tranche, receiving the final 25 percent, would be an ''accrual'' bond with an average life of 15 to 20 years.[3]

The sequential pay structure was the first step in creating a mortgage yield curve, allowing mortgage investors to target short, intermediate, or long maturities. Nevertheless, sequential pay structure maturities remained highly sensitive to prepayment risks, as prepayments of the underlying collateral change the cash flows for each tranche, affecting the longer-dated tranches most, especially the Z tranche. If interest rates declined and prepayment speeds doubled (from 100 percent PSA to 200 percent PSA as shown on chart 2), the average life of the A tranche would change from 35 months to 25 months, but the average life of the Z bond would shift from 280 months to 180 months. Hence, the change in the value of the Z bond would be similarly greater than the price change of the A tranche.

Chart 2—Four-Tranche Sequential Pay CMO



Planned amortization class (PAC) structure. The PAC structure, which now dominates CMO issuance, creates tranches, called planned amortization classes, with cash flows that are protected from prepayment changes within certain limits. However, creating this ''safer'' set of tranches necessarily means that there must be other tranches, called ''support'' bonds, that are by definition more volatile than the underlying pass-throughs. While the PAC tranches are relatively easy to sell, finding investors for higher-yielding, less predictable support bonds has been crucial for the success of the expanding CMO market.

Chart 3 illustrates how PACs are created. In the example, the estimated prepayment rate for the mortgages is 145 percent of the PSA standard, and the desired PAC is structured to

2. Average life, or weighted average life (WAL), is defined as the weighted average number of years that each principal dollar of the mortgage security remains outstanding.

3. Unlike the Z tranche, the A, B, and C tranches receive regular interest payments in the early years before the principal is paid off.

be protected if prepayments slow to 80 percent PSA or rise to 250 percent PSA. The PACs therefore have some protection against both ''extension risk'' (slower than expected prepayments) and ''call risk'' (faster than expected prepayments). In order to create this 80 to 250 percent ''PAC range,'' principal payments are calculated for 80 percent PSA and 250 percent PSA.

The area underneath both curves indicates that amount of estimated principal that can be used to create the desired PAC tranche or tranches. That is, as long as the prepayment rates are greater than 80 percent PSA or less than 250 percent PSA, the four PACs will receive their scheduled cash flows (represented by the shaded areas).

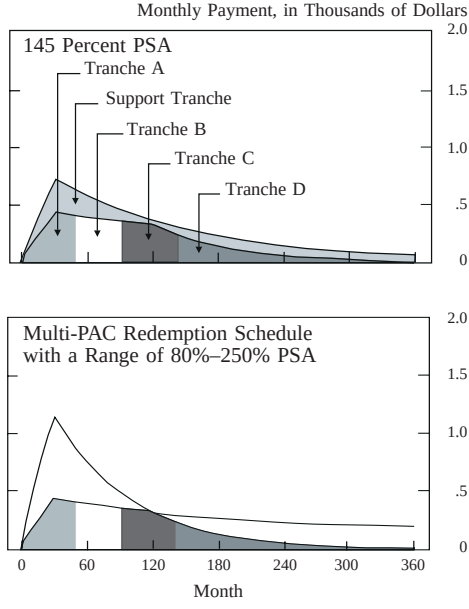
This PAC analysis assumes a constant prepayment rate of between 80 and 250 percent of the PSA standard over the life of the underlying mortgages. Since PSA speeds can change every month, this assumption of a constant PSA speed for months 1 to 360 is never realized. If prepayment speeds are volatile, even within the PAC range, the PAC range itself may narrow over time. This phenomenon, termed ''effective PAC band,'' affects longer-dated PACs more than short-maturity PACs. Thus, PAC prepayment protection can break down from extremely high, extremely low, or extremely volatile prepayment rates.

A PAC bond classified as PAC 1 in a CMO structure has the highest cash-flow priority and the best protection from both extension and prepayment risk. In the past, deals have also included super PACs, another high-protection, lower-risk-type tranche distinguished by extremely wide bands. The mechanisms that protect a PAC tranche within a deal may diminish, and its status may shift more toward the support end of the spectrum. The extent of a support-type role that a PAC might play depends in part on its original cash-flow priority status and the principal balances of the other support tranches embedded within the deal. Indeed, as prepayments accelerated in 1993, support tranches were asked to bear the brunt, and many disappeared. A PAC III, for example, became a pure support tranche, foregoing any PAC-like characteristics in that case.

A variation on the PAC theme has emerged in the scheduled tranche (SCH). Like a PAC, an SCH has a predetermined cash-flow collar, but it is too narrow even to be called a PAC III. An SCH tranche is also prioritized within a deal using the above format, but understand that its initial priority status is usually below even that of a PAC III. These narrower band PAC-type bonds were designed to perform well in low-volatility environments and were popular in late 1992 and early 1993. At that time, many investors failed to realize what would happen to the tranche when prepayments violated the band.

In chart 3, the four grey shaded areas represent the PAC structure, which has been divided into four tranches to provide investors with an instrument more akin to the bullet maturity of Treasury and corporate bonds.[4] The two support tranches are structured to absorb the full amount of prepayment risk to the extent the prepayment rate for the PAC tranches is within the specified range of 80 to 250 percent PSA. The second panel of chart 3 shows principal cash flows at the original estimated speed of 145 percent PSA, which are divided between the PAC and support bonds throughout the life of the underlying mortgages.

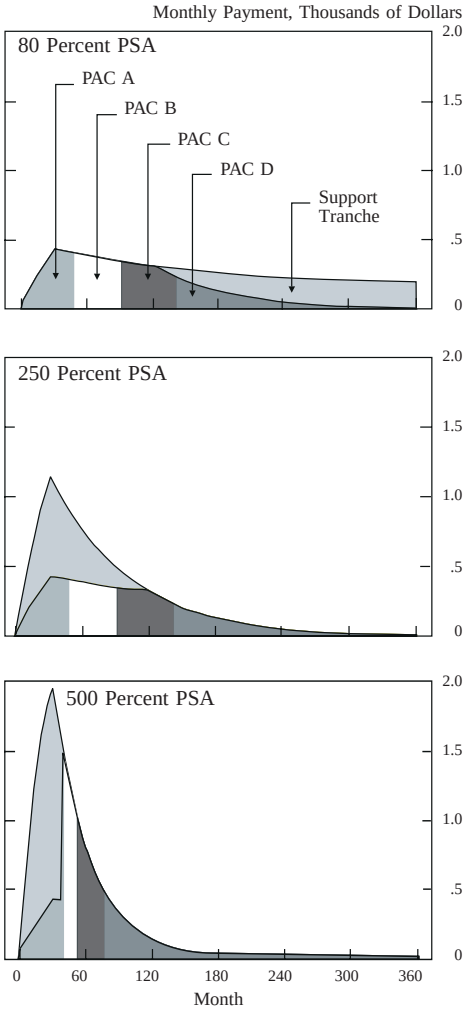
Chart 3—Principal Payments



4. Treasury and corporate bonds usually return principal to investors at stated maturity; the PAC structure narrows the time interval over which principal is returned to the investors.

Chart 4 shows how both PACs and the support tranches react to different prepayment speeds. The average lives of the support bonds in this example could fluctuate from 1½ to 25 years depending on prepayment speeds. Simply put, support-bond returns are diminished whether prepayment rates increase or decrease (a lose-lose proposition). To compensate holders of support bonds for this characteristic (sometimes referred to as ''negative convexity''), support bonds carry substantially higher yields than PAC bonds.[5] Conversely, PAC bond investors are willing to give up yield in order to reduce their exposure to prepayment risk or negative convexity. Nevertheless, PAC bond holders are exposed to prepayment risk outside the protected range and correspondingly receive yields above those available on comparable Treasury securities. In extreme cases, even PAC tranches are subject to prepayment risk. For example, at 500 percent PSA (see the third panel of chart 4), the PAC range is broken. The support bonds fail to fully protect even the first PAC tranche; principal repayment accelerates sharply at the end of the scheduled maturity of PAC A.

Chart 4—Principal Payments



Targeted amortization tranche structure. A targeted amortization tranche (TAC) typically offers protection from prepayment risk but not extension risk. Similar to the cash-flow schedule of a PAC that is built around a collar, a TAC's schedule is built around a single pricing speed, and the average life of the tranche is ''targeted'' to that speed. Any excess principal paid typically has little effect on the TAC; its targeted speed acts as a line of defense. Investors in TACs, however, pay the price for this defense with their lack of protection when rates increase, subjecting the tranche to potential extension risk.

Floaters and inverse floaters. CMOs and REMICs can include several floating-rate classes. Floating-rate tranches have coupon rates that float with movements in an underlying index. The most widely used indexes for floating-rate tranches are the London Interbank Offered Rate (LIBOR) and the Eleventh District Cost of Funds Index (COFI). While LIBOR correlates closely with interest-rate movements in the domestic federal funds market, COFI has a built-in lag feature and is slower to respond to changes in interest rates. Thus, the holders of COFI-indexed floaters generally experience a delay in the effects of changing interest-rate movements.

5. Price/yield curves for most fixed-income securities have a slightly convex shape, hence the securities are said to possess convexity. An important and desirable attribute of the convex shape of the price/yield curve for Treasury securities is that prices rise at a faster rate than they decline. Mortgage price/yield curves tend to be concave, especially in the range of premium prices, and are said to possess negative convexity. Securities with negative convexity rise in price at a slower rate than they fall in price.

Since most floating-rate tranches are backed by fixed-rate mortgages or pass-through securities, floating-rate tranches must be issued in combination with some kind of ''support.'' The designed support mechanism on floaters is an interest-rate cap, generally coupled with a support bond or inverse floater. If interest rates rise, where does the extra money come from to pay higher rates on the floating CMO tranches? The solution is in the form of an inverse floating-rate tranche. The coupon rate on the inverse tranche moves opposite of the accompanying floater tranche, thus allowing the floater to pay high interest rates. The floater and the inverse tranches ''share'' interest payments from a pool of fixed-rate mortgage securities. If rates rise, the coupon on the floater moves up; the floater takes more of the shared interest, leaving less for the inverse, whose coupon rate must fall. If rates fall, the rate on the floater falls, and more money is available to pay the inverse floater investor and the corresponding rate on the inverse rises.

Effectively, the interest-payment characteristics of the underlying home mortgages have not changed; another tranche is created where risk is shifted. This shifting of risk from the floater doubles up the interest-rate risk in the inverse floater, with enhanced yield and price ramifications as rates fluctuate. If rates fall, the inverse floater receives the benefit of a higher-rate-bearing security in a low-rate environment. Conversely, if rates rise, that same investor pays the price of holding a lower-rate security in a high-rate environment. As with other tranche types, prepayments determine the floating cash flows and the weighted average life of the instrument (WAL).

With respect to floaters, the two most important risks are the risk that the coupon rate will adjust to its maximum level (cap risk) and the risk that the index will not correlate tightly with the underlying mortgage product. Additionally, floaters that have ''capped out'' and that have WALs that extend as prepayments slow may experience considerable price depreciation.

Stripped Mortgage-Backed Securities: Interest-Only and Principal-Only

Interest-only (IO) and principal-only (PO) securities are another modification of the mortgage pass-through product. This market is referred to as the stripped mortgage-backed securities (SMBS) market. Both IOs and POs are more sensitive to prepayment rates than the underlying pass-throughs.[6] Despite the increased exposure to prepayment risk, these instruments have proved popular with several groups of investors. For example, mortgage servicers may purchase POs to offset the loss of servicing income from rising prepayments. IOs are often used as a hedging vehicle by fixed-income portfolio managers because the value of IOs rises when prepayments slow—usually in rising interest-rate environments when most fixed-income security prices decline.

Two techniques have been used to create IOs and POs. The first, which dominates outstandings in IOs and POs, strips pass-throughs into their interest and principal components, which are then sold as separate securities. As of October 1993, approximately $65 billion of the supply of outstanding pass-throughs had been stripped into IOs and POs.[7] The second technique, which has become increasingly popular over the past few years, simply slices off an interest or principal portion of any CMO tranche to be sold independently. In practice, IO slices, called ''IOettes,''[8] far outnumber PO slices.

Since IOs and IOettes produce cash flows in proportion to the mortgage principal outstanding, IO investors are hurt by fast prepayments and aided by slower prepayments. The value of POs rises when prepayments quicken and falls when prepayments slow because of the increases in principal cash flows coupled with the deep discount price of the PO.

IOs and IOettes are relatively high-yielding tranches that are generally subject to considerable prepayment volatility. For example, falling interest rates and rising prepayment speeds in late 1991 caused some IOs (such as those backed by FNMA 10 percent collateral) to fall up to 40 percent in value between July and December. IOs also declined sharply on several occasions in 1992 and 1993 as mortgage rates moved to 20- and 25-year lows, resulting in very high levels of prepayment. CMO dealers use IOettes to reduce coupons on numerous tranches, allowing these tranches to be sold at a discount

6. This counterintuitive result arises because IO and PO prices are negatively correlated.

7. Of this amount, FNMA has issued $26 billion, FHLMC $2.3 billion, and private issuers $6.5 billion.

8. Securities and Exchange Commission regulations forbid pure IO slices within CMOs. IO slices therefore include nominal amounts of principal and are termed ''IOettes.'' As a practical matter, IOettes have the price performance characteristics of IOs.

(as preferred by investors). In effect, much of the call risk is transferred from these tranches to the IOette.

The fact that IO prices generally move inversely to most fixed-income securities makes them theoretically attractive hedging vehicles in a portfolio context. Nevertheless, IOs represent one of the riskiest fixed-income assets available and may be used in a highly leveraged way to speculate about either future interest rates or prepayment rates. Given that their value rises (falls) when interest rates increase (decrease), many financial institutions, including banks, thrifts, and insurance companies, have purchased IOs and IOettes as hedges for their fixed-income portfolios, but such hedges might prove problematic as they expose the hedger to considerable basis risk.

USES

Both pass-through securities and CMOs are purchased by a broad array of institutional customers, including banks, thrifts, insurance companies, pension funds, mortgage ''boutiques,''[9] and retail investors. CMO underwriters customize the majority of CMO tranches for specific end-users, and customization is especially common for low-risk tranches. Since this customization results from investors' desire to either hedge an existing exposure or to assume a specific risk, many end-users perceive less need for hedging. For the most part, end-users generally adopt a buy-and-hold strategy, perhaps in part because the customization makes resale more difficult.

Uses by Banks

Within the mortgage securities market, banks are predominately investors or end-users rather than underwriters or market makers. Furthermore, banks tend to invest in short to intermediate maturities. Indeed, banks aggressively purchase short-dated CMO tranches, such as planned amortization classes, floating-rate tranches, and adjustable-rate mortgage securities.

To the extent that banks do operate as market makers, the risks are more diverse and challenging. The key areas of focus for market makers are risk-management practices associated with trading, hedging, and funding their inventories. The operations and analytic support staff required for a bank's underwriting operation are much greater than those needed for its more traditional role of investor.

Regulatory restrictions limit banks' ownership of high-risk tranches. These tranches are so complex that the most common approaches and techniques for hedging interest-rate risks could be ineffective. High-risk tranches are so elaborately structured and highly volatile that it is unlikely that a reliable hedge offset exists. Hedging these instruments is largely subjective, and assessing hedge effectiveness becomes extremely difficult. Examiners must carefully assess whether owning such high-risk tranches reduces a bank's overall interest-rate risk.

DESCRIPTION OF MARKETPLACE

Primary Market

The original lender is called the mortgage originator. Mortgage originators include commercial banks, thrifts, and mortgage bankers. Originators generate income in several ways. First, they typically charge an origination fee, which is expressed in terms of basis points of the loan amount. The second source of revenue is the profit that might be generated from selling a mortgage in the secondary market, and the profit is called secondary-marketing profit. The mortgage originator may also hold the mortgage in its investment portfolio.

Secondary Market

The process of creating mortgage securities starts with mortgage originators which offer consumers many different types of mortgage loans. Mortgages that meet certain well-defined criteria are sold by mortgage originators to conduits, which link originators and investors. These conduits will pool like groups of mortgages and either securitize the mortgages and sell them to an investor or retain the mortgages as investments in their own portfolios. Both

9. Mortgage boutiques are highly specialized investment firms which typically invest in residuals and other high-risk tranches.

government-related and private institutions act in this capacity. Ginnie Mae; Freddie Mac, and Fannie Mae are the three main government-related conduit institutions; all of them purchase *conforming* mortgages which meet the underwriting standards established by the agencies for being in a pool of mortgages underlying a security that they guarantee.

Ginne Mae is a government agency, and the securities it guarantees carry the full faith and credit of the U.S. government. Fannie Mae and Freddie Mac are government-sponsored agencies; securities issued by these institutions are guaranteed by the agencies themselves and are generally assigned an AAA credit rating partly due to the implicit government guarantee.

Mortgage-backed securities have also been issued by private entities such as commercial banks, thrifts, homebuilders, and private conduits. These issues are often referred to as private label securities. These securities are not guaranteed by a government agency or GSE. Instead, their credit is usually enhanced by pool insurance, letters of credit, guarantees, or over-collateralization. These securities usually receive a rating of AA or better.

Private issuers of pass-throughs and CMOs provide a secondary market for conventional loans which do not qualify for Freddie Mac and Fannie Mae programs. There are several reasons why conventional loans may not qualify, but the major reason is that the principal balance exceeds the maximum allowed by the government (these are called ''jumbo'' loans in the market).

Servicers of mortgages include banks, thrifts, and mortgage bankers. If a mortgage is sold to a conduit, it can be sold in total, or servicing rights may be maintained. The major source of income related to servicing is derived from the servicing fee. This fee is a fixed percentage of the outstanding mortgage balance. Consequently, if the mortgage is prepaid, the servicing fee will no longer accrue to the servicer. Other sources of revenue include interest on escrow, float earned on the monthly payment, and late fees. Also, servicers who are lenders often use their portfolios of borrowers as potential sources to cross-sell other bank products.

PRICING

Mortgage valuations are highly subjective because of the unpredictable nature of mortgage prepayment rates. Despite the application of highly sophisticated interest-rate simulation techniques, results from diverse proprietary prepayment models and assumptions about future interest-rate volatility still drive valuations. The subjective nature of mortgage valuations makes marking to market difficult due to the dynamic nature of prepayment rates, especially as one moves farther out along the price-risk continuum toward high-risk tranches. Historical price information for various CMO tranche types is not widely available and, moreover, might have limited value given the generally different methodologies used in deriving mortgage valuation.

Decomposition of MBS

A popular approach to analyzing and valuing a callable bond involves breaking it down into its component parts—a long position in a noncallable bond and a short position in a call option written to the issuer by the investor. An MBS investor owns a callable bond, but decomposing it is not as easy as breaking down more traditional callables. The MBS investor has written a series of put and call options to each homeowner or mortgagor. The analytical challenge facing an examiner is to determine the value and risk profile of these options and their contribution to the overall risk profile of the portfolio. Compounding the problem is the fact that mortgagors do not exercise these prepayment options at the same time when presented with identical situations. Most prepayment options are exercised at the least opportune time from the standpoint of the MBS investor. In a falling-rate environment, a homeowner will have a greater propensity to refinance (or exercise the option) as prevailing mortgage rates fall below the homeowner's original note (as the option moves deeper into the money). Under this scenario, the MBS investor receives a cash windfall (principal payment) which must be reinvested in a lower-rate environment. Conversely, in a high- or rising-rate environment, when the prevailing mortgage rate is higher than the mortgagor's original term rate, the homeowner is less apt to exercise the option to refinance. Of course, the MBS investor would like nothing more than to receive his or her principal and be able to reinvest that principal at the prevailing higher rates. Under this scenario, the MBS investor holds an instrument

with a stated coupon that is below prevailing market rates and relatively unattractive to potential buyers.

Market prices of mortgages reflect an expected rate of prepayments. If prepayments are faster than the expected rate, the mortgage security is exposed to call risk. If prepayments are slower than expected, the mortgage securities are exposed to extension risk (similar to having written a put option). Thus, in practice, mortgage security ownership is comparable to owning a portfolio of cash bonds and writing a combination of put and call options on that portfolio of bonds. Call risk is manifested in a shortening of the bond's effective maturity or duration, and extension risk manifests itself in the lengthening of the bond's effective maturity or duration.

Option-Adjusted Spread Analysis

For a further discussion of option-adjusted spread (OAS) analysis or optionality in general, see section 4330.1, ''Options.''

HEDGING

Hedging mortgage-backed securities ultimately comes down to an assessment of one's expectation of forward rates (an implied forward curve). A forward-rate expectation can be thought of as a no-arbitrage perspective on the market, serving as a pricing mechanism for fixed-income securities and derivatives, including MBS. Investors who wish to hedge their forward-rate expectations can employ strategies which involve purchasing the underlying security and the use of swaps, options, futures, caps, or combinations thereof to hedge duration and convexity risk.[10]

With respect to intra-portfolio techniques, one can employ IOs and POs as hedge vehicles. Although exercise of the prepayment option generally takes value away from the IO class and adds value to the PO class, IOs and POs derived from the same pool of underlying mortgages *do not* have a correlation coefficient of negative one.[11] If that were the case, the value of a pass-through security would *always* be hedged with respect to interest rates. However, IOs and POs do represent extremities in MBS theory and, properly applied, can be used as effective risk-reduction tools. Because the value of the prepayment option and the duration of an IO and PO are not constant, hedges must be continually managed and adjusted.

In general, a decline in prepayment speeds arises largely from rising mortgage rates, with fixed-rate mortgage securities losing value. At the same time, IO securities are rising in yield and price. Thus, within the context of an overall portfolio, the inclusion of IOs serves to increase yields and reduce losses in a rising-rate environment. More specifically, IOs can be used to hedge the interest-rate risk of Treasury strip securities. As rates increase, an IO's value increases. The duration of zero-coupon strips equals their maturity, while IOs have a negative duration.[12] Combining IOs with strips creates a portfolio with a lower duration than a position in strips alone.[13]

POs are a means to synthetically add discount (and positive convexity) to a portfolio, allowing it to more fully participate in bull markets. For example, a bank funding MBS with certificates of deposit (CDs) is exposed to prepayment risk. If rates fall faster than expected, mortgage holders (in general) will exercise their prepayment option while depositors will hold their higher-than-market CDs as long as possible. The bank could purchase POs as a hedge against its exposure to prepayment and interest-rate risk. As a hedging vehicle, POs offer preferable alternatives to traditional futures or options; the performance of a PO is directly tied to actual prepayments, thus the hedge should experience potentially less basis risk than other cross-market hedging instruments.

RISKS

Prepayment Risk

All investors in the mortgage sector share a common concern: the mortgage prepayment

10. Davidson, Andrew S., and Michael D. Herskovitz. *Mortgage Backed Securities—Investment Analysis and Advanced Valuation Techniques*. Chicago: Probus Publishing, 1994.

11. Zissu, Anne, and Charles Austin Stone. ''The Risks of MBS and Their Derivatives.'' *Journal of Applied Corporate Finance*, Fall 1994.

12. Ibid., p. 102.

13. Ibid., p. 104.

option. This option is the homeowner's right to prepay a mortgage any time, at par. The prepayment option makes mortgage securities different from other fixed-income securities, as the timing of mortgage principal repayments is uncertain. The cash-flow uncertainty that derives from prepayment risk means that the maturity and duration of a mortgage security are uncertain. For investors, the prepayment option creates an exposure similar to that of having written a call option. That is, if mortgage rates move lower, causing mortgage bond prices to move higher, the mortgagor has the right to call the mortgage away from the investor at par.

While lower mortgage interest rates are the dominant economic incentive for prepayment, idiosyncratic, noneconomic factors to prepay a mortgage further complicate the forecasting of prepayment rates. These factors are sometimes summarized as the ''five D's'': death, divorce, destruction, default, and departure (relocation). Prepayments arising from these causes may lead to a mortgage's being called away from the investor at par when it is worth more or less than par (that is, trading at a premium or discount).

Funding and Reinvestment Risk

The uncertainty of the maturities of underlying mortgages also presents both funding and reinvestment risks for investors. The uncertainty of a mortgage security's duration makes it difficult to obtain liabilities for matched funding of these assets. This asset/liability gap presents itself whether the mortgage asset's life shortens or lengthens, and it may vary dramatically.

Reinvestment risk is normally associated with duration shortening or call risk. Investors receive principal earlier than anticipated, usually as a result of declines in mortgage interest rates; the funds can then be reinvested only at the new lower rates. Reinvestment risk is also the opportunity cost associated with lengthening durations. Mortgage asset durations typically extend as rates rise. This results in lower investor returns as they are unable to reinvest at the now higher rates.

Credit Risk

While prepayments expose pass-throughs and CMOs to considerable price risk, most MBS pass-throughs have little credit risk.[14] Approximately 90 percent of all outstanding pass-through securities have been guaranteed by Ginnie Mae, Fannie Mae, and Freddie Mac.[15] This credit guarantee gives ''agency'' pass-through securities and CMOs a decisive advantage over nonagency pass-throughs and CMOs, which comprise less than 10 percent of the market.

In general, nonagency pass-through securities and CMOs use mortgages that are ineligible for agency guarantees. Issuers can also obtain credit enhancements, such as senior subordinated structures, insurance, corporate guarantees, or letters of credit from insurance companies or banks. The rating of the nonagency issue then partially depends upon the rating of the insurer and its credit enhancement.

Settlement and Operational Risk

The most noteworthy risk issues associated with the trading of pass-through securities is the forward settlement and operational risk associated with the allocation of pass-through trades. Most pass-through trading occurs on a forward basis of two to three months, often referred to as ''TBA'' or ''to be announced'' trading.[16] During this interval, participants are exposed to counterparty credit risk.

Operating risk grows out of the pass-through seller's allocation option that occurs at settlement. Sellers in the TBA market are allowed a 2.0 percent delivery option variance when meeting their forward commitments. That is, between 98 and 102 percent of the committed par amount may be delivered. This variance is provided to ease the operational burden of recombining various pool sizes into round trading lots.[17] This delivery convention requires significant operational expertise and, if mismanaged, can be a

14. Credit risk in a pass-through stems from the possibility that the homeowner will default on the mortgage *and* that the foreclosure proceeds from the resale of the property will fall short of the balance of the mortgage.

15. For a full explanation of the minor differences between these agencies, see chapter 5 in Fabozzi, *The Handbook of Mortgage-Backed Securities*, 1995.

16. In the forward mortgage pass-through trading, or TBA trading, the seller announces the exact pool mix to be delivered the second business day before settlement day.

17. ''Good delivery'' guidelines are promulgated by the Public Securities Association in its *Uniform Practices* publication.

source of significant risk in the form of failed settlements and unforeseen carrying costs.

Price Volatility in High-Risk CMOs

When the cash flow from pass-through securities is allocated among CMO tranches, prepayment risk is concentrated within a few volatile classes, most notably residuals, inverse floaters, IOs and POs, Z bonds, and long-term support bonds. These tranches are subject to sharp price fluctuations in response to changes in short- and long-term interest rates, interest-rate volatility, prepayment rates, and other macroeconomic conditions. Some of these tranches—especially residuals and inverse floaters—are frequently placed with a targeted set of investors willing to accept the extra risk. These classes are also among the most illiquid bonds traded in the CMO market.

These high-risk tranches, whether held by dealers or investors, have the potential to incur sizable losses (and sometimes gains) within a short period of time.[18] Compounding this price risk is the difficulty of finding effective hedging strategies for these instruments. Using different CMOs to hedge each other can present problems. Although pass-through securities from different pools tend to move in the same direction based on the same event, the magnitude of these moves can vary considerably, especially if the underlying mortgage pools have different average coupons.[19]

Risks in ''Safe'' Tranches

Investors may also be underestimating risks in some ''safe'' tranches, such as long-maturity PACs, PAC 2s, and 3s, and floaters, because these tranches can experience abrupt changes in their average lives once their prepayment ranges are exceeded. Even floating-rate tranches face risks, especially when short-term rates rise significantly and floaters reach their interest-rate caps. At the same time, long rates may rise and prepayments slow, causing the floaters' maturities to extend significantly since the floater is usually based on a support bond. Under such circumstances, floater investors could face significant losses.

In addition to possible loss of market value, these safe tranches may lose significant liquidity under extreme interest-rate movements. These tranches are currently among the most liquid CMOs. Investors who rely on this liquidity when interest-rate volatility is low may find it difficult to sell these instruments to raise cash in times of financial stress. Nevertheless, investors in these tranches face lower prepayment risk than investors in either mortgage pass-throughs or the underlying mortgages themselves.

Cap Risk

The caps in many floating-rate CMOs and ARMs are an embedded option. The value of floating-rate CMOs or ARMs is equal to the value of an uncapped floating-rate security less the value of the cap. As the coupon rate of the security approaches the cap rate, the value of the option increases and the value of the security falls. The rate of change is non-linear and increases as the coupon approaches the cap. As the coupon rate equals or exceeds the cap rate, the security will exhibit characteristics similar to those of a fixed-rate security, and price volatility will increase. All else being equal, securities with coupon rates close to their cap rates will tend to exhibit greater price volatility than securities with coupon rates farther away from their cap rates. Also, the tighter the ''band'' of caps and floors on the periodic caps embedded in ARMs, the greater the price sensitivity of the security will be. The value of embedded caps also increases with an increase in volatility. Thus, all else being equal, higher levels of interest-rate volatility will reduce the value of the floating-rate CMO or ARM.

FFIEC Regulations Concerning Unsuitable Investments

The Federal Financial Institutions Examination Council (FFIEC) issued a revised policy state-

18. Examples of single-firm losses include a $300 million to $400 million loss by one firm on POs in the spring of 1987; more recently, several firms have lost between $50 million and $200 million on IO positions in 1992 and 1993.

19. For a discussion of the idiosyncratic prepayment behavior of pass-throughs, see Sean Becketti and Charles S. Morris, *The Prepayment Experience of FNMA Mortgage-Backed Securities*. New York University Salomon Center, 1990, pp. 24–41.

ment concerning securities activities for member banks. These rules became effective February 10, 1992, for member banks and bank holding companies under the Board's jurisdiction. A bank's CMO investments are deemed unsuitable if—

- the present weighted average life (WAL) is greater than 10 years,
- the WAL extends more than four years or shortens more than six years for a parallel interest-rate shift of up and down 300 basis points, or
- the price changes by more than 17 percent from the asking price for a parallel interest-rate shift of up and down 300 basis points.

An affirmation of any of these three parameters means that the bond in question (1) may be considered high risk and (2) may not be a suitable investment for banks or bank holding companies. An institution holding high-risk securities must demonstrate that they reduce overall interest-rate risk for the bank.

Floating-rate CMOs with coupons tied to indexes other than LIBOR (sometimes called "mismatched floaters") are generally exempt from the average-life and average-life-sensitivity tests. Given the degree of price sensitivity associated with these securities, however, institutions that purchase non-LIBOR-indexed floaters must maintain documentation showing that they understand and are able to monitor the risks of these instruments. The documentation should include a prepurchase analysis and at least an annual analysis of the price sensitivity of the security under both parallel and nonparallel shifts of the yield curve. See the *Commercial Bank Examination Manual* for more information on the FFIEC testing parameters detailed above.

ACCOUNTING TREATMENT

The accounting treatment for investments in mortgage-backed securities is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Pass-through securities are assigned the following weights:

GNMA (Ginnie Mae)	0
FNMA (Fannie Mae)	20 percent
FHLMC (Freddie Mac)	20 percent
Private label	50–100 percent

Collaterialized mortgage obligations are assigned the following weights:

Backed by Ginnie Mae, Fannie Mae, or Freddie Mac securities	20–100 percent
Backed by whole loans or private-label pass-throughs	50–100 percent

Stripped MBS are assigned a 100 percent risk weighting.

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Pass-Through Securities

Ginnie Mae, Fannie Mae, and Freddie Mac pass-through securities are type I securities. Banks can deal in, underwrite, purchase, and sell these securities for their own accounts without limitation.

CMOs and Stripped MBS

CMOs and stripped MBS securitized by small business–related securities and certain residential- and commercial-related securities rated Aaa and Aa are type IV securities. As such, a bank may

purchase and sell these securities for its own account without limitation. CMOs and stripped MBS securitized by small business–related securities rated A or Baa are also type IV securities and are subject to an investment limitation of 25 percent of a bank's capital and surplus. Banks may deal in type IV securities which are fully secured by type I transactions without limitations.

CMOs and stripped MBS securitized by certain residential- and commercial-mortgage-related securities rated A or Baa are type V securities. For type V securities, the aggregate par value of a bank's purchase and sales of the securities of any one obligor may not exceed 25 percent of its capital and surplus.

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GENERAL DESCRIPTION

The Australian Treasury issues Australian Commonwealth Government Bonds (CGBs) to finance the government's budget deficit and to refinance maturing debt. Since 1982, bonds have been issued in registered form only, although some outstanding issues may be in bearer form. The principal and interest on CGBs are guaranteed by the Commonwealth Government of Australia.

CHARACTERISTICS AND FEATURES

CGBs, with maturities ranging from one to 20 years, are issued every six to eight weeks in an average tender size totaling A$800 million. Most CGBs are noncallable, fixed-coupon securities with bullet maturities. The Australian Treasury has issued some indexed-linked bonds with either interest payments or capital linked to the Australian consumer price index. However, there are few of these issues and they tend to be very illiquid. CGBs can be issued with current market coupons, but in many cases the Australian Treasury will reopen existing issues.

Interest for government bonds is paid semiannually on the 15th day of the month, and it is calculated on an actual/365 day-count basis. Coupon payments that fall on weekends or public holidays are paid on the next business day. Semiannual coupon payments are precisely half the coupon rate. Bonds that have more than six months left to maturity settle three business days after the trade date (T+3). Bonds with less than six months left to maturity may settle on the same day, provided they are dealt before noon; otherwise, they settle the next day.

USES

Australian banks are the largest single group of investors in outstanding CGB issues. They use these securities to meet regulatory capital requirements. The Australian pension industry holds CGBs mainly as investment vehicles. In addition, CGBs are viewed as attractive investment vehicles by many foreign investors because (1) they offer high yields relative to those available on other sovereign debt instruments and (2) the Australian bond market is regarded as stable. Although the bond market has a substantial foreign participation, due to its attractive yield and a much shorter period of time required for the bonds to mature, the majority of CGB investors are domestic. U.S. banks purchase CGBs to diversify their portfolios, speculate on currency and Australian interest rates, and to hedge Australian-denominated currency positions and positions along the Australian yield curve.

DESCRIPTION OF MARKETPLACE

Issuing Practices

CGBs are issued periodically on an as-needed basis, typically every six to eight weeks. Generally, issuance is through a competitive tender whereby subscribers are invited to submit bids as they would in an auction. Issue size is announced one day before the tender day. Bids, which are sent to the Reserve Bank of Australia through the Reserve Bank Information Transfer System (RBITS), are submitted to the Reserve Bank of Australia on a semiannual, yield-to-maturity basis. Specific information on the issue is announced later on the tender day, such as the amounts tendered and issued, the average and range of accepted bids, and the percentage of bids allotted at the highest yield.

Secondary Market

While CGBs are listed on the Australian Stock Exchange, nearly all trading takes place over the counter (OTC), by screen or direct trading. The primary participants in the secondary market are authorized dealers and share brokers. OTC transactions must be in amounts of A$250,000 or more. Stock-exchange transactions are essentially limited to retail transactions under A$1 million. Usually, authorized dealers trade bonds which are within five years of maturing.

Market Participants

Sell Side

Authorized dealers are the primary participants in the sell side of the CGB market.

Buy Side

Australian banks and other financial institutions are the largest single group of investors in CGBs. These entities usually hold large quantities of shorter-term government bonds for regulatory purposes, as these securities may be included in the prime asset ratios of banks. In addition, a variety of other domestic investors participate in the CGB market.

The Australian bond market has been known to attract substantial foreign participation over the years, primarily because it is regarded as a stable market which offers relatively high yields. In general, foreign market participants are institutional investors, such as securities firms, life insurance companies, banks, and fund managers.

Market Transparency

Prices tend to be active and liquid. Price transparency is enhanced by the dissemination of prices by several information vendors including Reuters and Telerate.

PRICING

CGBs are quoted in terms of yield and rounded to three decimal places to determine gross price for settlement purposes. While tick size is equivalent to one basis point, yields are often quoted to the half basis point.

HEDGING

Interest-rate risk may be hedged by taking an offsetting position in other government bonds or by using interest-rate forward, futures, options, or swap contracts. Foreign-exchange risk may be hedged by using foreign-currency derivatives and swaps.

RISKS

Liquidity Risk

The CGB market is considered fairly active and liquid. Trading volume among the benchmark bonds is about equal, although the three-year and 10-year benchmark issues tend to have the most turnover.

Interest-Rate Risk

CGBs are subject to price fluctuation resulting from interest-rate volatility. Generally, longer-term bonds have more price volatility than shorter-term instruments. If an institution has a large concentration of long-term maturities, it may be subject to unwarranted interest-rate risk.

Foreign-Exchange Risk

Currency fluctuations may affect the bond's yield as well as the value of coupons and principal paid in U.S. dollars. A number of factors may influence a country's foreign-exchange rate, including its balance of payments and prospective changes in that balance; inflation and interest-rate differentials between that country and the United States; the social and political environment, particularly with regard to the impact on foreign investment; and central bank intervention in the currency markets.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in

Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Australian CGBs are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Australian CGBs are a type III security. As such, a bank's investment is limited to 10 percent of its equity capital and reserves.

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J.P. Morgan Securities. *Government Bond Outlines.* 9th ed. April 1996.

GENERAL DESCRIPTION

The federal government of Canada issues bonds, known as ''Canadas,'' to finance its public debt. The Canadian government bond market is the sixth largest in the world, with about C$270 billion (U.S.$195 billion) in bonds outstanding as of April 1996. Overall, this market is structurally similar to the U.S. bond market, particularly with regard to the types of securities issued. Canadas come in a wide variety of maturities ranging from 2 to 30 years. Recently, the longer maturity bonds have increased in popularity.

CHARACTERISTICS AND FEATURES

Canadas are issued at a price close to par value and are denominated in C$1,000, C$25,000, C$100,000, and C$1 million allotments. Canadas are available in bearer form with coupons attached or in registered form. All new Canadian bonds are issued with bullet maturities and are not callable; there is one callable issue outstanding that matures in 1998. All Canadas have fixed coupons ranging from 3 percent to 18 percent. Real return bonds, inflation-indexed bonds, were introduced in December 1991 and are currently issued once per quarter. Principal and coupon payments for these bonds are linked to the Canadian consumer price index.

Interest on Canadas is paid semiannually and is accrued from the previous coupon date (exclusive) to the settlement date (inclusive) up to a maximum value of 181.5 days. As a result, the value date is always the same as the settlement date. New issues may offer short first coupons, but not long first coupons. Interest on short first coupons is accrued from the dated date to the first coupon date. Any ''reopened'' bonds include the accrued interest in the issue price to ensure that the new tranches carry the same coupons as the existing bond and trade indistinguishably. Canadas with remaining maturities of less than three years settle two market days after the trade date (T+2), while Canadas with maturities over three years settle three market days after the trade date (T+3).

USES

Canadas are held for investment, hedging, and speculative purposes by both domestic (Canadian) and foreign investors. U.S. banks purchase Canadas to diversify their portfolios, speculate on currency and Canadian interest rates, and hedge Canadian-denominated currency positions and positions along the Canadian yield curve.

DESCRIPTION OF MARKETPLACE

Issuing Practices

Canadas are issued by two methods: by allotment and auction. With the allotment system, the amount, coupon, and issue price for each of the maturity tranches is announced after consultation with the primary distributors. The Bank of Canada pays a commission to all primary distributors who are responsible for placing the issue.

The auction system is very similar to the U.S. system. On the Thursday before the regular Wednesday auction, the Bank of Canada announces details, including the size, maturity, and delivery date for the upcoming auction, and active open market trading begins on a yield basis. The coupon for new issues is not known until auction results are released, and it is set at the nearest ¼ percent increment below the auction average. The Bank of Canada accepts both competitive and noncompetitive bids from primary distributors. However, it will only accept one noncompetitive bid, which may have a maximum value of C$2 million.

On the auction date, bids are submitted to the Bank of Canada and primary distributors receive bonds up to 20 percent of the total amount issued based on the competitiveness of their bids. The delivery date and dated date are usually ten days to two weeks after the auction. Issues typically range from C$100 million to C$8.8 billion, and any issue may be reopened by the Department of Finance based on market conditions.

Secondary Market

Canadas are not listed on any stock exchanges

but trade in over-the-counter (OTC) markets 24 hours a day. Settlement occurs through a book-entry system between market participants and the Canadian Depository for Securities (CDS). Therefore, Canadas may trade *when-issued* without an exchange of cash.

Market Participants

Sell Side

Primary distributors include investment dealers and Canadian chartered banks.

Buy Side

A wide range of investors use Canadas for investing, hedging, and speculation, including domestic banks, trust and insurance companies, and pension funds. The largest Canadian holders of Canadas are trust pension funds, insurance companies, chartered banks, and the Bank of Canada.

Foreign investors are also active participants in the Canadian government bond market. In general, foreign market participants are institutional investors such as banks, securities firms, life insurance companies, and fund managers.

Market Transparency

Price transparency is relatively high for Canadas and several information vendors disseminate prices to the investing public. Trading of Canadas, both domestically and internationally, is active and prices are visible.

PRICING

Bonds trade on a clean-price basis (net of accrued interest) and are quoted in terms of a percentage of par value, with the fraction of a percent expressed in decimals. Canadas typically trade with a ⅛- to ¼-point spread between bid and offer prices. Canadas do not trade ex-dividend. If a settlement date occurs in the two weeks preceding a coupon payment date, the seller retains the upcoming coupon but must compensate the buyer by postdating a check payable to the buyer for the amount of the coupon payment.

HEDGING

Interest-rate risk on Canadas may be hedged using interest-rate swaps, forwards, futures (such as futures on 10-year and 5-year Canadas, which are traded on the Montreal Stock Exchange), and options (such as options on all Canadas issues, which are traded on the MSE). Hedging may also be effected by taking a contra position in another Canadian government bond. Foreign-exchange risk may be hedged through the use of currency forwards, futures, swaps, and options. The effectiveness of a particular hedge depends on the yield curve and basis risk. For example, hedging a position in a 10-year Canadas future with an overhedged position in a 5-year bond may expose the dealer to yield-curve risk. Hedging a 30-year bond with a Canadas future exposes the dealer to basis risk if the historical price relationships between futures and cash markets are not stable. Also, if a position in notes or bonds is hedged using an over-the-counter option, the relative illiquidity of the option may diminish the effectiveness of the hedge.

RISKS

Liquidity Risk

The Canadian bond market is considered to be one of the most liquid bond markets in the world, with Canadas traded actively in both domestic and international capital markets. Most investment dealers in Canadas will make markets on all outstanding issues. The most liquid issues are the short-term issues of less than 10 years, but several 15-year and 30-year Canadas are actively traded and very liquid. All government bond issues are reasonably liquid when their outstanding size, net of stripping, is over C$1 billion. ''Orphaned'' issues, small issues that are not reopened, are the only Canadas that are very illiquid because they are not actively traded.

Interest-Rate Risk

Canadas are subject to price fluctuations due to changes in interest rates. Longer-term issues tend to have more price volatility than shorter-term issues and, therefore, a large concentration

of longer-term maturities in a bank's portfolio may subject the bank to a high degree of interest-rate risk.

Foreign-Exchange Risk

Due to the low volatility of the Canadian dollar exchange rate, there has been a low level of foreign-exchange risk associated with Canadian bonds. To the extent that this risk exists, it can be easily reduced by using foreign-currency derivatives instruments as described above.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statment of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Canadas are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Canadas are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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J.P. Morgan Securities. *Government Bond Outlines.* 9th ed. April 1996.

GENERAL DESCRIPTION

The French Treasury is an active issuer of three types of government debt securities, which cover all maturities. Obligation Assimilable du Tresor (OATs), issued since 1985, are the French government's long-term debt instruments with maturities of up to 30 years. Bons du Tresor a Taux Fixe et Interest Annuel (BTANs) are medium-term, fixed-rate notes with maturities of up to five years. The French Treasury also issues discount Treasury bills, Bons du Tresor a Taux Fixe et Interest Precomptes (BTFs), with maturities of up to one year. In addition, an active market for stripped OATs has developed since May 1991. Stripping involves separating a bond's interest and principal payments into several zero-coupon bonds.

French government securities are mainly denominated in French francs (FFr). However, the Treasury has also been issuing OATs and BTANs in European Currency Units (ECUs) since 1989 and 1993, respectively. Until 1985, the French Treasury issued bonds known as Emprunts d'Etats. However, these bonds are approaching the end of their trading life and are illiquid. The following discussion will focus on OATs, BTANs, BTFs, and stripped securities.

CHARACTERISTICS AND FEATURES

The French Treasury issues OATs in units of FFr 2,000 (ECU 500), with maturities of up to 30 years. Most OATs carry a fixed interest rate and have bullet maturities. However, some OATs are issued with floating rates that are referenced to various short-term or long-term indexes. OATs generally pay interest annually. OATs are settled three days after the trade date (T+3), both domestically and internationally. OATs are cleared through the SICOVAMs Relit system domestically, while OATs that settle internationally are cleared through Euroclear or Cedel.

BTANs and BTFs are issued in units of FFr 1 million (ECU 1,000). All BTANs are fixed-rate, bullet maturity notes with maturities of up to five years. Interest on BTANs is paid annually on the 12th of the month. Domestic settlement for BTANs and BTFs usually occurs one day after the trade date (T+1) through the Bank of France's Saturne system. Internationally, BTANs and BTFs settle three days after the trade date. Like OATS, BTANs and BTFs may also be cleared through Euroclear or Cedel. Interest on all government bonds and notes is calculated using a 30/360-day count convention in which each month is assumed to have 30 days.

Since May 1991, French government securities primary dealers, Specialistes en Valuers du Tresor (SVTs), have been allowed to strip most long-term OATs. Primary dealers may strip OATs denominated in either FFr or ECUs and subsequently reconstitute them. All stripped coupons carry a face value of FFr 5 (ECU 1.25). This is done to ensure the fungibility of receipts that have the same maturities but are derived from OATs of different maturities.

USES

French government securities are used for investment, hedging, and speculative purposes. They are considered attractive for investment purposes by foreign and domestic investors because of the market's liquidity, lack of credit risk, and wide range of maturities and structures (for example, fixed vs. floating rate). Foreign investors often choose to invest internationally to enhance the diversification of their investment portfolios or derive higher returns. Stripped OATs can be used as tools for hedging or asset liability management purposes, for example, to immunize a portfolio in terms of interest-rate risk. Speculators also use OATs, BTANs, and stripped OATs to take positions on the direction of interest-rate changes and yield curve shifts. Finally, there is an active market for futures and options on French government securities traded on the Marche a terme international de France (Matif), the Paris financial futures exchange.

DESCRIPTION OF MARKETPLACE

Issuing Practices

The French Treasury issues OATs, BTANs, and BTFs through Dutch Auction. The Treasury usually issues tranches of securities that are part of a single borrowing line. The auction schedule

is generally announced several months in advance. Securities are supplied at the price or effective rate tendered by the bidder rather than the marginal price or rate. The highest bids are filled first, followed by lower bids. Although bidding is open to any institution that has an account with the SICOVAM, Saturne, or Bank of France, SVTs account for 90 percent of the securities bought in the primary market. SVTs also quote two-way prices on a *when-issued* basis several business days before an auction.

Secondary Market

There is an active secondary market for most issues of French government securities. OATs, BTANs, and BTFs are listed on the Paris Stock Exchange, but are principally traded over the counter. SVTs are responsible for making markets in these securities and account for most of the trading activity. However, other broker-dealers, banks, and specialized financial institutions are also active participants in the secondary market. Since 1994, the repo market in French government securities has grown considerably. The repo market, also managed by the SVTs, allows investors to finance short-term positions.

Market Participants

Sell Side

Since 1987, a network of primary government securities dealers, known as Specialistes en Valuers de Tresor (SVTs), has managed the market for French government securities. The SVTs work closely with the French Treasury in determining issuance policy, market conditions, and prices. SVTs are required to quote prices for clients and other primary dealers in tradeable securities and are responsible for the maintenance of liquid primary and secondary markets. In exchange, the French Treasury permits SVTs to strip and reconstitute OATs and participate in noncompetitive bidding.

Buy Side

French government securities are used for investment, hedging, and speculative purposes by a wide range of institutional investors, both international and domestic. This includes insurance companies, pension funds, mutual funds, and commercial and investment banks.

Market Transparency

The market of French government bonds is active and market transparency is relatively high for most issues. The French Treasury regularly publishes the debt issuance schedule and other information on the management of its debt. Auction results, trading information, and prices for most issues are available on interdealer broker screens such as Reuters, Telerate, and Bloomberg.

PRICING

OATs are quoted as a percentage of par to two decimal places. For example, the price quote of 106.85 refers to an OAT that is trading at 106.85 percent of its par value. Strips are quoted on the basis of their yield. BTANs and BTFs are quoted on an annual-yield basis to two decimal places.

HEDGING

The interest-rate risk of French government securities can be hedged in the futures or options market at the Matif or by taking a contra position in another French government security. Swaps and options can also be used to hedge interest-rate risk. The effectiveness of a particular hedge is dependent on yield curve and basis risk. For example, hedging a position in a five-year note with an overhedged position in a three-year note may expose the dealer to yield curve risk. Hedging a 30-year bond with a treasury bond future exposes the dealer to basis risk if historical price relationships between futures and cash markets are not stable. Also, if a position in notes or bonds is hedged using an OTC option, the relative illiquidity of the option may diminish the effectiveness of the hedge.

International investors are also exposed to foreign-exchange risk. Foreign-exchange risk can be hedged using currency forwards, futures, swaps, or options. An international investor can

use a series of forward foreign-exchange contracts corresponding to each of the coupon payments and the final principal payment to hedge this risk. Swaps, futures contracts, or currency options, traded either on the Matif or OTC, can also be used to hedge currency risk.

RISKS

Liquidity Risk

French bonds are among the most liquid in Europe. Because the French Treasury issues OATs and BTANs as tranches of existing bonds, most bond issues have sizable reserves and liquidity. SVTs make a market in French government bonds, a practice that enhances liquidity of the market. The most recently issued 10-year OAT generally serves as the benchmark, and is thus the most liquid of these issues. For the medium-term market, the most recent issues of two- and five-year BTANs serve as the benchmark. Next to the U.S. Treasury strip market, French strips are the most liquid in the world. As stated above, the face value of all stripped OATs is FFr 5 ensuring the fungibility of coupons of different maturities. Because primary dealers may reconstitute strips at any time, their liquidity is comparable to the reference OAT.

Interest-Rate Risk

From the perspective of an international investor, the market risk of French government bonds consists primarily of interest-rate risk and foreign-exchange risk. The interest-rate risk of a French government bond depends on its duration and the volatility of French interest rates. Bonds with longer durations are more price sensitive to changes in interest rates than bonds with shorter durations. Because they are zero-coupon instruments, French strips have longer durations than OATs of comparable maturity, and they are more volatile.

Foreign-Exchange Risk

From the perspective of an international investor, the total return from investing in French government securities is partly dependent on the exchange rate between the U.S. dollar and the French franc. Several factors affect the volatility of a foreign-exchange rate, including the country's balance of payments and prospective changes in that balance, inflation and interest-rate differentials between countries, the social and political environment, relative changes in the money supply, and central bank intervention in the currency markets. Traditionally, the French foreign-exchange rate has been relatively stable.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Acounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

French government bonds and notes are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

French government bonds and notes are type III

securities. A bank's investment in them is limited to 10 percent of its equity capital and reserves.

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GENERAL DESCRIPTION

The federal government of Germany issues several types of securities: bonds (Bunds), notes (Bobls and Schätze) and Treasury discount paper (U-Schätze). Government agencies such as the Federal Post Office and the Federal Railway have also issued bonds (Posts and Bahns) and notes (Schätze). In addition, with the unification of West and East Germany in October 1990, the German Unity Fund began to issue Unity Fund bonds (Unities) and notes (Schätze). The outstanding debt issues of the Post Office, Railway, and Unity Fund have since been folded into the so-called Debt Inheritance Fund, which has led to an explicit debt service of these issues through the federal government. Hence, these issues are guaranteed by the full faith and credit of the federal government. All government-guaranteed securities are available in book-entry form only.

The government also issues U-Schätze, zero-coupon Treasury notes with maturities of one to two years which may not be purchased by foreigners, and short-term Treasury bills, with one-half- to one-year maturities, which may be purchased by foreigners. However, the secondary market for these instruments is small and does not attract substantial foreign investment. Therefore, the following discussion will focus on bonds and notes.

CHARACTERISTICS AND FEATURES

Bunds are issued regularly, usually in deutschemarks (DM) 20 billion to DM 30 billion blocks, with maturities ranging from 8 to 30 years. Bunds are issued in a minimum denomination of DM 1,000, and a typical issue carries a maturity of 10 years. Bunds are redeemable in a lump sum at maturity at face value (bullet structure) with interest paid annually. Until 1990, all bonds issued by the federal government and other public authorities were noncallable and bore a fixed coupon. However, since February 1990, some callable floating-rate bonds have been issued.

Special five-year federal notes (Bobls) have been issued by the federal government since 1979, but foreign investment in these securities has been permitted only since 1988. In the past, medium-term notes with four- to six-year maturities (Schätze) were issued irregularly by the federal government, the Unity Fund, and the Federal Post Office and Railway. However, in 1995, the Ministry of Finance decided to discontinue the issuance of these securities to create more transparency in the market. All Bobls and existing Schätze issues are fixed-coupon securities with bullet maturities.

Stock-exchange settlement takes place two market days after trade date (T+2). International settlement takes place three business days after trade date (T+3). As of January 1, 1994, German federal government notes and bonds no longer trade ex-coupon. They trade on a cum-coupon basis; the purchaser of the bond pays the seller accrued interest from the last coupon date to settlement. Interest is accrued on a 30/360-day-count basis in which each month is assumed to have 30 days and a year is assumed to have 360 days.

USES

German government bonds and notes are used for investment, hedging, and speculative purposes. Foreign investors, including U.S. banks, often purchase German government securities as a means of diversifying their securities portfolios. In particular, the low credit risk and deep liquidity of German government bonds and notes encourages the use of these instruments as non-U.S. investment vehicles. German government securities may also be used to hedge German interest-rate risk or foreign-currency risk related to positions in deutschemarks. Speculators may use German government bonds to take positions on changes in the level and term structure of German interest rates or on changes in the foreign-exchange rates between Germany and the United States. Because it is a deep and efficient market, some German futures contracts and options are priced relative to Bund issues.

DESCRIPTION OF MARKETPLACE

Issuing Practices

Bunds are issued using a combination of syndi-

cation and bidding procedures. Part of the issue is offered at fixed terms to the members of the Federal Bond Consortium, which consists of German banks, foreign banks in Germany, and the Deutsche Bundesbank (German Central Bank). The Bundesbank is the lead bank in the syndicate and determines the allocation of the offerings among the syndicate members. These allocations are changed infrequently. During the syndicate meeting, the coupon rate, maturity, and issue price are determined by the government and syndicate, although the total size of the issue is unknown. Syndicate members receive a fee from the government for selling bonds received through syndicate negotiations.

A further tranche is issued to the syndicate by means of an American-style auction. The terms—coupon rate, maturity, and settlement date—are the same as those determined in the syndicate meeting, although the overall size of the issue is not specified. The German Central Bank accepts bids starting with the highest price and accepts lower bids until the supply of securities it wishes to sell is depleted. Noncompetitive bids may also be submitted, which are filled at the average accepted price of the auction. The size of the issue is announced after the auction. The difference between the issue size and the amount that has been issued through the underwriting syndicate plus the auction is retained by the Bundesbank for its bond market operations.

Bobls are issued on a standing-issue basis (similar to a tap form in which a fixed amount of securities at a fixed price is issued when market conditions are considered favorable) with stated coupon and price. During the initial selling period, which may last a few months, the price is periodically adjusted by the Ministry of Finance to reflect changes in market conditions. The sales of a given series are terminated when either the issuing volume has been exhausted or the nominal interest rate has moved too far away from the going market rate. The new series is launched within a short period of time. Only domestic private individuals and domestic nonprofit institutions are permitted to purchase the issues in the primary market. German banks (which cannot purchase these securities for their own account) receive a commission for selling the bonds to qualified investors. After the selling period is over and an issue is officially listed on the German stock exchange, the securities may be purchased by any investor.

Secondary Market

German bonds are listed and traded on all eight German stock exchanges seven days after they are issued. Bobl issues are officially listed on the stock exchanges after the initial selling period of one to three months. In addition to the stock-exchange transactions, substantial (OTC) over-the-counter trading occurs. In Germany, the secondary market for both stocks and bonds is primarily an interbank market.

For some issues, prices are fixed once during stock-exchange hours (stock-exchange fixing takes place from 11:00 a.m. to 1:30 p.m. Greenwich mean time +1). However as of October 3, 1988, variable trading was introduced at the German stock exchanges for Bunds, Bobls, Bahns, and Posts issued after January 2, 1987, with a minimum size of DM 2 billion. The Unity Fund issues also participate. After the fixing of the prices on the stock exchanges, the securities are traded on the OTC market (OTC hours are from 8:30 a.m. to 5:30 p.m.). Bunds are typically quoted in the OTC market on the basis of a difference from the fixing price, for example, a price quote of –10 means a price of 10 pfennigs (1/100 of a DM) less than the fixing price.

Seventy to 80 percent of the secondary-market trading of Bunds, Bahns, and Posts takes place in the OTC market. About 75 percent of Bobl trading takes place in the OTC market, as does most Schätze trading. However, the stock markets are important because the prices determined there provide standard, publicly available benchmarks.

Market Participants

Sell Side

The underwriting of public authority bonds is done by the Federal Bond Syndicate, which consists of German banks, foreign banks in Germany, and the Deutsche Bundesbank (German Central Bank). German banks are responsible for placing Bobls with qualified investors.

Buy Side

Domestic banks are the largest holders of German bonds, and private German individuals are the second largest investment group due in

part to the propensity of German households to save and invest their savings. German insurance companies are also major holders of German bonds, as are German investment funds. Foreign investors, such as U.S. commercial and investment banks, insurance companies, and money managers also hold German government securities.

Market Transparency

The market for German government bonds and notes is active and liquid, and price transparency is considered to be relatively high for these securities. Several vendors, including Reuters and Telerate, disseminate price information to the investing public.

PRICING

Bonds and notes are quoted as a percentage of par to two decimal places. For example, a price of 98.25 means that the price of the bond or note is 98.25 percent of par. Bonds are traded on a price basis, net of accrued interest (clean). Prices generally move in increments of five pfennigs. The bid/offer spread is usually eight pfennigs for liquid issues and 15 pfennigs for less-liquid issues. For notes, bid/offer spreads are five to 10 pfennigs for liquid issues.

HEDGING

Interest-rate risk can be hedged using swaps, forwards, futures, or options, or by taking a contra position in another German government security. The effectiveness of a particular hedge is dependent on yield-curve and basis risk. For example, hedging a position in a five-year note with an overhedged position in a three-year note may expose the dealer to yield-curve risk. Hedging a 30-year bond with a bond future exposes the dealer to basis risk if the historical price relationships between futures and cash markets are not stable. Also, if a position in notes and bonds is hedged using an OTC option, the relative illiquidity of the option may diminish the effectiveness of the hedge. Foreign-exchange risk may be hedged with currency swaps, forwards, futures, and options.

RISKS

Liquidity Risk

The German government bond market is the third largest bond market in the world and is considered the most liquid government bond market after the U.S. government bond market. Bunds are the most liquid and actively traded bond issues in Germany. Unities issued by the German Unity Fund are generally as liquid as Bunds, but Bahn and Post issues of government agencies are fairly limited compared with the federal government's bonds. Therefore, these agency securities tend to be less liquid and generally trade at a higher yield than Bunds.

The on-the-run (most recent) Bund issue is the most liquid of its category and serves as the benchmark. The most liquid area of the Bund yield curve is in the eight- to-10-year maturity range, as most Bund issues carry a 10-year maturity. Similar to Bunds, on-the-run Bobls are the most liquid type of note. Off-the-run prices are not as transparent as current coupon securities, which makes these issues less liquid and trading more uncertain. Of course, larger issues of bonds and notes are generally more liquid than smaller ones.

At the stock exchange, the German Central Bank makes a market in Bunds, Bobls, Unities, and Post issues. The German Central Bank is responsible for maintaining an orderly secondary market in these securities and regularly intervenes to support or regulate their prices. This tends to increase the liquidity in the market for these issues. However, the Bundesbank is not responsible for stabilizing Schätze prices. For this reason, these securities tend to be much less liquid than Bunds or Bobls; their issue sizes are also normally much smaller. The Railway Bank makes a market in Bahn issues, which enhances the liquidity of these issues.

Interest-Rate Risk

German bonds and notes are subject to price fluctuations due to changes in German interest rates. The variation in the term structure of interest rates accounts for the greatest amount of local market risk related to foreign bonds. Longer-term issues have more price volatility due to interest-rate fluctuations than do shorter-term instruments. Therefore, a large concentration of long-term maturities may subject a bank's

investment portfolio to unwarranted interest-rate risk.

Foreign-Exchange Risk

Currency fluctuations can account for up to two-thirds of the return and risk of an unhedged international fixed-income portfolio. There are two types of currency risk related to foreign bonds: (1) the coupons and face value are paid in the foreign currency, which means that any change in the exchange rate affects the bond's value to the U.S. investor, and (2) the bond's yield may be affected by currency movements.

A number of factors exert a direct influence on foreign-exchange rates, including the balance of payments and prospective changes in that balance; inflation and interest-rate differentials between Germany and the United States; the social and political environment in Germany, particularly with regard to the impact on foreign investment; and central bank intervention in the currency markets. Historically, German exchange rates have been very stable.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Finanical Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

German government bonds and notes are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

German government bonds and notes are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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GENERAL DESCRIPTION

Irish government bonds (IGBs) are issued by the National Treasury Management Agency (NTMA), which is responsible for the management of Ireland's national debt. Bonds are issued to fund the government's borrowing requirements and to fund maturing bond issues.

CHARACTERISTICS AND FEATURES

Bonds are issued in maturities of 5, 10, and 20 years. Issues are transferable in any amount and are listed and traded on the Irish stock exchange. Fixed-rate bonds issued before 1993 pay interest semiannually, while bonds issued since then pay interest annually. Coupons on variable-rate bonds are paid quarterly. Interest is accrued from the coupon payment date to the settlement date, and bonds go ex-dividend on the Wednesday nearest to three weeks before the coupon is paid. Interest is computed using the actual/365 day-count convention on semiannual coupon bonds and using the 30/365 day-count convention on annual coupon bonds. Settlement is done the day after the trade date (T+1) domestically and three days after the trade date (T+3) internationally. IGBs are available in registered form and are cleared through the Central Bank of Ireland Securities Settlement System (CBISS).

USES

Irish government bonds and notes are used for investment, hedging, and speculative purposes, by both domestic (Irish) and foreign investors and traders. U.S. banks purchase Irish government bonds to diversify their portfolios, speculate on currency and Irish interest rates, and hedge Irish-denominated currency positions and positions along the Irish yield curve.

DESCRIPTION OF MARKETPLACE

Issuing Practices

About 80 percent of issuance is by the tap system, and the rest of the bonds are issued by regular auctions. Taps are sales of a fixed amount of securities at a fixed price when market conditions are considered favorable. The type of bond and size of the tap issue are communicated to the market, but the price is only communicated to the primary dealers who bid by telephone. The auction system has both a competitive and noncompetitive element. The competitive auction is open to all investors who may bid directly or via a primary dealer or stockbroker. Following the auction, noncompetitive bids are filled at the average auction price. Only primary dealers may submit noncompetitive bids.

Secondary Market

IGBs are listed on the Dublin, Cork, and London Stock Exchanges. They are also traded in the over-the-counter (OTC) market.

Market Participants

Sell Side

Six primary dealers quote firm bid and offer prices in each of a specified list of eight bonds. In return for their market-making services, the NTMA provides these dealers with exclusive access to the supply of bonds issued in tap form. The designated brokers are CS First Boston, UBS Ltd., Davy, Goodbody, NCB, and Riada.

Buy Side

The principal holders of IGBs are domestic (Irish) and foreign institutional investors, such as banks, securities firms, insurance companies, pension funds, and money managers.

Market Transparency

Price transparency is relatively high for Irish government securities as a result of the structure of the primary dealer system, which enhances liquidity. Several information vendors disseminate prices to the investing public.

PRICING

Bonds are quoted as a percent of par to two decimal places. The price paid by the buyer does not include accrued interest. The bid/offer spread ranges from .05 to .20 basis points, depending on the liquidity of the issue.

HEDGING

Interest-rate risk may be hedged by taking contra positions in government securities or by using swaps or futures. Foreign-exchange risk can be hedged by using currency swaps, futures, or forward rate agreements.

RISKS

Liquidity Risk

Active portfolio management, the wide range of coupons and maturities available, and the development of a trading, rather than a purely investment outlook, among Irish investors has increased the liquidity of the Irish government bond market. The large issues tend to be very liquid throughout the yield curve, particularly the eight bonds in which the primary dealers are obliged to make markets.

Interest-Rate Risk

IGBs are exposed to interest-rate risk as a result of the inverse relationship between bond prices and interest rates. Longer-term issues have more price volatility than short-term instruments.

Foreign-Exchange Risk

Currency fluctuations may affect the bond's yield as well as the value of coupons and principal paid in U.S. dollars.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Finanical Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Irish government bonds are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Irish government bonds are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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GENERAL DESCRIPTION

The Italian Treasury issues bonds, notes, and bills, which are guaranteed by the Italian government. These securities are issued with maturities ranging from three months to 30 years in a wide variety of structures. These structures include Treasury bonds, Treasury floating-rate notes, Treasury notes with a put option, and short-term Treasury bills. The Treasury also issues notes and bills denominated in European Currency Units (ECUs). Government securities are issued in book-entry form but may be converted to bearer form following issuance.

CHARACTERISTICS AND FEATURES

Treasury bonds, or Buoni del Tesero Poliennali (BTPs), are fixed-coupon medium- to long-term government bonds with semiannual dividend payments. These bonds have played an important role in financing the Treasury, especially after the establishment of the Telematic Market for government bonds, which provides the liquidity necessary for these instruments. These bonds are issued with 5-, 10-, and 30-year maturities in denominations of lire 5, 10, 50, 100, 500, and 1,000 million. Interest on these bonds is paid through deferred semiannual coupons.

Treasury floating-rate notes, or Certificati di Credito del Tesoro (CCTs), are floating-rate notes indexed to T-bill rates. CCTs are generally issued in denominations of lire 5, 10, 50, 100, 500, and 1,000 million, with 7-year maturities, although 5- and 10-year notes have also become popular. Interest on these bonds is paid through deferred semiannual or annual dividend coupons, with rates indexed to Italian Treasury Bill (BOT) yields. For BOTs issued after December 1994, the coupon is calculated by adding a spread of 30 basis points to the six-month T-bill recorded in the last auction. For issues before December 1994, the coupon is calculated by adding a spread of 30 basis points to the average gross semiannual yields of one-year BOTs auctioned in the second and third months preceding the coupon period.

Treasury notes with options, or Certificati del Tesoro con Opzione (CTOs), are fixed-coupon securities with an embedded put. The embedded option in the CTO permits investors to redeem the bond halfway through nominal maturity, and it is designed to encourage investors to extend their investment horizons. Any request for refunding must be forwarded within an 11-day period beginning precisely one month before the scheduled date for anticipated redemption. The bonds are issued in maturities similar to BTPs. The Treasury has not issued any CTOs since May 1992.

Treasury notes denominated in ECUs, or Certificati del Tesoro in ECU (CTEs), were introduced by the Italian government in 1982 as part of an effort to diversify the instruments issued for financing public deficits. They are fixed-coupon ECU-denominated bonds issued in denominations of ECU 5,000, 10,000, 100,000, 500,000, and 1 million, generally with a five-year maturity. The foreign-currency weighting of the CTEs is attractive to investors who fear devaluation of Italian exchange rates. Interest on these bonds is paid in the form of deferred annual coupons in ECUs or, at the holder's request, in an ECU-equivalent lira amount.

Domestic and international settlement of Italian government bonds takes place three business dates after the trade date (T+3). The only exception is BOTs, which settle two business dates after the trade date (T+2). Italian government bonds with a coupon can be settled via Euroclear or Cedel. Settlement through Euroclear and Cedel takes five days. Interest is calculated using a 30/360-day count in which each month is assumed to have 30 days.

USES

Italian government securities are used for investment, hedging, and speculative purposes. While investors may buy Italian bonds as part of diversifying their investment portfolios, the bonds may also be used to hedge positions that are sensitive to movements in interest rates. Speculators, on the other hand, may use long-term bonds to take positions on changes in the level and term structure of interest rates.

DESCRIPTION OF MARKETPLACE

Issuing Practices

Italian government bonds are issued via a marginal auction, in which there is no base price. Each allotment is made at the marginal accepted bid which represents the stop-out price, below which no bids are considered. Partial allotments may be given at the stop-out price if the amount bid at that price exceeds the amount not covered by the higher-priced bids. Each participant is limited to three bids. The exclusion price, or the price below which no bids will be accepted, is calculated by listing the bids in decreasing order and proceeding as follows:

If the amount of competitive bids is greater than or equal to the amount offered—

- take the amount of bids (in a decreasing price order) needed to cover half the offered amount,
- calculate the weighted average of the above set of bids, and
- subtract 200 basis points from the weighted average to obtain the exclusion price.

If the amount of competitive bids is less than the amount offered—

- take half of the bids in a decreasing price order,
- calculate the weighted average of the above set of bids, and
- subtract 200 basis points from the weighted average to obtain the exclusion price.

Once the exclusion yield is calculated, bids are accepted in decreasing order of price. Bids are accepted to the point that covers the amount to be offered up to the stop-out price. Partial allotments may be given at the stop-out price if the amount bid at that price exceeds the amount not covered by the higher-priced bids. Noncompetitive bids may also be accepted and awarded at the average of accepted competitive bids plus a Treasury spread.

The Treasury makes an announcement of auction dates annually and also makes a quarterly announcement of the types of bonds and minimum issue sizes to be offered in the following three months. The auctions are held at the beginning and middle of the month. Generally, 3- and 5-year bills are sold on the same day, 10- and 30-year bonds are sold together, and CCTs are sold on the third day of the auctions.

The Bank of Italy may reopen issues, that is, sell new tranches of existing bonds, until the level outstanding reaches a certain volume, generally over lire 10 trillion. After that threshold volume is reached, a new bond must be issued. If an issue is reopened, the Bank of Italy issues new tranches of securities with the same maturities, coupons, and repayment characteristics as existing debt. The ability to reopen issues improves liquidity and avoids the potential poor pricing of securities that often occurs when a market is flooded with one very large issue.

Secondary Market

Italian government bonds can be traded on any of the following: the Milan Stock Exchange, the telematic government bond spot market (Mercato Telematico dei Titoli di Stato or MTS), and the over-the-counter (OTC) market. Bonds may be traded on the Milan Stock Exchange if they are transformed into bearer bonds (at least six months after being issued). The stock exchange is the reference market for the small saver as only small dealings are transacted there. At the end of the day, the exchange publishes an official list of the prices and volumes of trading. The MTS is the reference market for professional dealers.

MARKET PARTICIPANTS

Sell Side

Only banks authorized by the government of Italy may act as primary dealers of Italian government bonds. Branches of foreign banks and nonfinancial institutions can also act as dealers, provided they are residents in the European Union and subject to comparable financial regulations.

Buy Side

A wide range of investors use Italian government bonds for investing, hedging, and speculation. This includes domestic banks, nonfinancial corporate and quasi-corporate public and private enterprises, insurance companies, and

private investors. Foreign investors, including U.S. commercial banks, securities firms, insurance companies, and money managers, are also active in the Italian government bond market.

Market Transparency

The Italian government bond market is an active one. Price transparency is relatively high for Italian government securities as several information vendors, including Reuters, disseminate prices to the investing public.

PRICING

Prices and yields of Italian government securities are stated as a percentage of par to two decimal places. For instance, a price of 97.50 means that the price of the bond is 97.50 percent of par. The price spread is generally narrow due to the efficiency of the market.

Bonds trade on a clean-price basis, quoted net of accrued interest. Italian government bonds do not trade ex-dividend. Interest on Italian bonds is accrued from the previous coupon date to the settlement date (inclusive). In this regard, Italian bonds pay an extra day of interest compared with other bond markets.

HEDGING

Italian government bonds can be hedged for interest-rate risk in the Italian futures market (*Mercato Italiano Futures* or MIF) as well as the London International Financial Futures Exchange (LIFFE). The MIF and LIFFE offer futures on 10-year Italian government securities, and the MIF offers futures on five-year Italian government securities. The LIFFE also offers OTC options on individual bonds as well as options on futures contracts. OTC forwards and swaps can also be used to hedge interest-rate risk.

The effectiveness of a hedge depends on the yield-curve and basis risk. For example, hedging a position in a five-year note with an overhedged position in a two-year note may expose the dealer to yield-curve risk. Hedging a 30-year bond with an Italian bond future exposes the dealer to basis risk if the historical price relationships between futures and cash markets are not stable. Additionally, if a position in notes or bonds is hedged using an OTC option, the relative illiquidity of the option may diminish the effectiveness of the hedge.

RISKS

Liquidity Risk

The Italian bond market is one of the most liquid markets in the world. Liquidity is maintained by 40 market makers, which include 16 specialists, top-tier market makers (Morgan Guaranty, Milan), and 24 other market makers who are obligated to quote two-way prices. Ten market makers have privileged access to the Bank of Italy on the afternoon of an auction to buy extra bonds at the auction price. The purchases are subject to a limit set by the Bank. For instance, if a particular issue were oversubscribed and prices were likely to shoot up, the selected market makers would be able to buy more of the same bond and maintain or increase market liquidity.

As discussed above, the Bank of Italy may reopen issues until they reach a certain volume before selling a new bond. The ability to reopen issues improves liquidity and avoids the unfavorable pricing which may occur if the market is flooded with one very large issue. Liquidity is also maintained by limiting the number of government entities that issue debt. In the case of Italy, only the central government may issue debt securities.

Interest-Rate Risk

Italian government bonds are subject to price fluctuations due to changes in interest rates. Longer-term issues have more price volatility than shorter-term instruments. Therefore, a large concentration of longer-term maturities in an investment portfolio may increase interest-rate risk.

Foreign-Exchange Risk

From a U.S. investor's perspective, there are two types of risk related to foreign bonds: (1) the coupons and face value are paid in the foreign currency, which means that any change in the exchange rate affects the bond's value to the

U.S. investor, and (2) the bond's yield may be affected by currency movements. A number of factors exert a direct influence on foreign-exchange rates, including the balance of payments and prospective changes in that balance; inflation and interest-rate differentials between Italy and the United States; the social and political environment in Italy, particularly with regard to the impact on foreign investment; and central bank intervention in the currency markets.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Italian government bonds and notes are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Italian government notes and bonds are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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GENERAL DESCRIPTION

Japanese government bonds (JGBs) are issued by the Japanese national government. The Ministry of Finance (MOF) authorizes the issuance of coupon and non-coupon-bearing JGBs in a variety of maturities: long-term (10 and 20 years) and medium-term (two through five years). The MOF also issues short-term Treasury bills, which are issued at a discount with a maturity of 180 days. JGBs are guaranteed by the Japanese national government and, therefore, are considered to have very little credit risk.

CHARACTERISTICS AND FEATURES

The two types of long-term bonds are ''long-term'' and ''super long-term.'' The long-term bond, the most common, has a maturity of 10 years, and the super long-term bond has a 20-year maturity. Both long-term and super long-term bonds are numbered serially. They are referred to by number and issue month (for example, #182 August) rather than by maturity and coupon. JGB issues are categorized as construction bonds, deficit financing bonds, or refunding bonds, although there is no difference among these bonds from an investment perspective.

JGBs are typically issued in registered form but they may be converted to bearer form within two market days of issue. Exchange transactions of registered bonds must be issued in blocks of 1,000. There are no such restrictions for bearer bonds. JGBs have bullet maturities and are callable at any time, although call provisions are rarely exercised. Ten-year JGBs maturing after mid-1997 pay interest on the standard March/September or June/December semiannual coupon cycle. Twenty-year JGBs, however, pay interest only in March and September. Since new issues can appear monthly, the practice of using quarterly coupon dates leads to odd first coupons for both 10- and 20-year JGBs.

The two types of medium-term bonds are coupon bonds and five-year discount, or zero-coupon, bonds. Medium-term coupon bonds are issued with maturities of two, three, and four years. Issue sizes of both types of bonds vary considerably from month to month. However, the most common issue sizes are yen (¥) 50,000, ¥ 100,000, ¥ 1 million, ¥ 10 million, and ¥ 100 million. Medium-term coupon bonds make interest payments semiannually, and redemption is on the 20th day of the month in which the bond matures.

Previously, trades in JGBs were settled on the 5th, 10th, 15th, 20th, 25th and 30th of each month, based on trade date. This convention has been replaced by a T+7 (trade date plus seven Japanese business days) settlement method as of September 19, 1996.

USES

Domestic and foreign investors use JGBs for investment, hedging, and speculative purposes. U.S. investors, including commercial banks, may purchase JGBs to speculate on interest rates or foreign-exchange rates, to diversify portfolios, to profit from spreads between U.S. and Japanese interest rates, and to hedge various positions.

DESCRIPTION OF MARKETPLACE

Issuing Practices

The Bank of Japan (BOJ) is responsible for issuing JGBs in an aggregate amount not to exceed the limit set by the MOF. JGBs are issued monthly by the BOJ by competitive auction and syndicate. A syndicate comprising banks, life insurance companies, and securities firms underwrite 40 percent of each 10-year issue. The remaining 60 percent are issued via competitive auction. The coupon size and issue size are announced on the day of the auction after consultation with the syndicate. The average auction price determines the price of the syndicated portion. No firm may bid for more than 30 percent of the tranche issued via competitive auction. All 20-year bonds are issued via fully competitive auction. Medium-term coupon bonds are issued primarily through public subscriptions, but a certain portion are issued through fixed-rate private placements.

Secondary Market

Most JGBs are listed on the Japanese stock exchanges, although the majority of JGB trading occurs in the over-the-counter (OTC) market. While the OTC market is characterized by very large trading volume, stock-exchange trading is important in that it enhances transparency in pricing—the Tokyo Stock Exchange closing prices serve as a public pricing source for JGBs. Long-term government bonds account for the largest share of secondary-market trading of government securities, partly because they have higher credit ratings and greater marketability than shorter maturity JGBs. In the secondary market, the broker and investor negotiate the ''invoice price,'' which includes commissions for the agent.

The secondary market for JGBs has some unusual features. The first relates to the benchmark or bellwether bond issue. In the U.S. Treasury market, the on-the-run issue (that is, the most recently auctioned issue for a given maturity) is the benchmark issue for each maturity. However, the Japanese benchmark issue is determined through an informal process that occurs over a few weeks. Benchmark issue characteristics are as follows: (1) a coupon that is near the prevailing rate, (2) a large outstanding amount (approximately ¥ 1.5 trillion or more), (3) a wide distribution or placement after its issue, and (4) remaining maturity that is very close to 10 years.

Another unusual feature of the JGB market is the so-called reverse coupon effect. In most bond markets, high-coupon bonds trade at a higher yield than low-coupon bonds of the same duration. This ''coupon effect,'' which varies with the duration of the bond as well as over time, is often attributed to such institutional factors as different taxation of capital gains and ordinary income. In Japan, however, there is a strong preference for high-coupon bonds. As a result, high-coupon bonds trade at lower yields than low-coupon bonds for the same duration (the ''reverse coupon effect''). This effect occurs in spite of the Japanese tax code that requires income tax to be paid on coupon income but generally not on capital gains on Japanese government bonds. Banks prefer coupon interest because banks' current income ratios are closely monitored by Japanese bank regulators.

Market Participants

Sell Side

JGBs are issued through a syndicate consisting of domestic (Japanese) banks, life insurance companies, other domestic financial institutions, and some foreign securities firms.

Buy Side

A wide range of domestic and foreign investors use JGBs for investing, hedging, and speculation. Japanese financial institutions, particularly city, long-term credit, regional banks and insurance companies, tend to be the largest investors in yen-denominated bonds, although corporate and individual investors are very active investors in the medium-term government bond market. Foreign investors, such as U.S. commercial banks, securities firms, insurance companies, and money managers, are also active in the Japanese government bond market.

MARKET TRANSPARENCY

Price transparency is relatively high for JGBs. JGBs are actively traded and pricing information is available from a variety of price information services, including Reuters and Telerate.

PRICING

JGB prices are quoted in yield, specifically on the basis of simple yield, in basis points. Market price is calculated from simple yield. The following formulas are used to calculate price and yield:

$$Y_S = [C + (100 - P / T] / P, \text{ or}$$
$$P = [(C * T) + 100] / [1 + (T * Y_S)],$$

where

Y_S = simple yield
C = coupon stated in decimal form
P = price
T = time to maturity = number of days to maturity/365

Discount Bonds

Discount bonds are quoted on a simple-yield basis, which is different from the simple yield used on coupon bonds. Simple yield is used for discount bonds with a maturity of less than one year, but the formula is adjusted to reflect the fact that discount bonds do not pay interest. Annually compounded yield is used for discount bonds with a maturity greater than one year.

The yield on a discount bond with less than one year remaining to maturity is the value of Y_s that solves—

$$P = 100 / (1 + T + Y_s).$$

The yield on a discount bond with more than one year remaining to maturity is the value of Y_m that solves—

$$P = 100 / (1 + Y_m)t,$$

where t is the number of days to maturity (excluding leap days) divided by 365.

HEDGING

Because of the multiple risks associated with positions in foreign government bonds, investors may need to hedge one position in several markets using various instruments. Interest-rate risk related to JGBs is typically hedged by taking contra positions in other government bonds or by investing in interest-rate forwards, futures, options, or swaps. Similarly, foreign-exchange risk can be reduced by using currency forwards, futures, options, or swaps.

RISKS

Liquidity Risk

The market for longer-term JGBs tends to be more liquid than for the shorter-term issues, although liquidity has improved for the shorter-term issues in the past few years. The benchmark 10-year JGB still accounts for the majority of trading volume in the secondary market and therefore enjoys the best liquidity. JGBs issued more recently also tend to be more liquid than older issues. The market for medium-term bonds is less liquid because such bonds are typically purchased by individuals and investment trust funds, which tend to be buy-and-hold investors. The existence of a large and active JGB futures market enhances the liquidity of these issues.

Interest-Rate Risk

Like all bonds, the price of JGBs will change in the opposite direction from a change in interest rates. If an investor has to sell a bond before the maturity date, an increase in interest rates will mean the realization of a capital loss (selling the bond below the purchase price). This risk is by far the major risk faced by an investor in the bond market. Interest-rate risk tends to be greater for longer-term issues than for shorter-term issues. Therefore, a large concentration of long-term maturities may subject a bank's investment portfolio to unwarranted interest-rate risk.

Foreign-Exchange Risk

A non-dollar-denominated bond (a bond whose payments are made in a foreign currency) has unknown U.S. dollar cash flows. The dollar-equivalent cash flows depend on the exchange rate at the time the payments are received. For example, a U.S. bank that purchases a 10-year JGB receives interest payments in Japanese yen. If the yen depreciates relative to the U.S. dollar, fewer dollars will be received than would have been received if there had been no depreciation. Alternatively, if the yen appreciates relative to the U.S. dollar, the investor will benefit by receiving more dollars than otherwise. Over the last few years, volatility in the U.S.-Japanese exchange rate has been particularly high, primarily due to the Japanese banking crisis.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Japanese government bonds and yields are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Japanese government bonds and notes are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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GENERAL DESCRIPTION

The Spanish Treasury issues medium- and long-term bonds, Bonos del Estado (Bonos) and Obligaciones del Estado (Obligaciones), which are guaranteed by the Spanish government. Since 1987, these bonds have been issued in book-entry form only.

CHARACTERISTICS AND FEATURES

Bonos are issued with maturities of three or five years, while Obligaciones are issued with maturities of 10 or 15 years. Both types of bonds are issued in denominations of 10,000 pesetas (pta). Bonos and Obligaciones are noncallable with bullet maturities and can be issued with either annual or semi-annual coupons. All Spanish government bonds bear a fixed coupon. Domestic settlement takes place the market date after the trade date (T+1), while international settlement takes place seven calendar days following the trade date (T+7). Settlement is done on a delivery-against-payment basis for all transactions between interbank market participants. Bonos and Obligaciones are also eligible for settlement through Euroclear and Cedel. Interest is calculated using an actual/365-day count.

USES

Historically, Bonos and Obligaciones have been used as medium- and long-term investments. However, in the early 1990s, the trading volume of these bonds doubled as banks and corporations began to use Bonos and Obligaciones for cash-management purposes. These securities can also be used for hedging and speculative purposes.

DESCRIPTION OF MARKETPLACE

Issuing Practices

Currently, all Bonos and Obligaciones are issued through monthly competitive auctions. The Spanish Treasury publishes the auction calendar at the beginning of the year. On the first Tuesday of the month, the 3- and 10-year bonds are issued. The 5- and 15-year bonds are issued on the following Wednesday. Each issue is sold in at least three competitive tenders. Bids are submitted before 10:30 a.m. on the auction date. Auction results are announced at 11:30 a.m. on the same day on Reuters page BANCN. Payments generally occur on the 15th of the same month.

At the beginning of each issue, the Treasury fixes the coupon to be paid for at least the next three auctions. After all bids are made, the Treasury fixes the total issue amount and allocates bids from the highest price to a cut-off price. The total issue amount is not disclosed. The lowest bid submitted is referred to as the marginal price of the issue. Bids between the average and the marginal price are filled at the price the bidders submitted. Bids above the average are filled at the average price bid.

If the Treasury announces a target issuance level and the volume awarded during the initial bidding stage is equal to or higher than 70 percent of the target level—but does not reach the target issuance level—the Treasury has the right, but not the obligation, to hold a second auction exclusively with the primary dealers. In this case, every primary dealer must submit bids for an amount at least equal to—

(target issuance level – the volume awarded) / the number of primary dealers.

If the target issuance level is met with the first bidding stage or if the Treasury does not announce a target issuance level, primary dealers may submit up to three additional bids. These bids cannot have yields higher than the average yield during the first bidding stage. In this scenario, the Treasury must accept bids equal to at least 10 percent of the volume awarded during the first bidding stage if it had accepted more than 50 percent of the bids. If it had accepted less than 50 percent of the bids, the Treasury must accept bids equal to at least 20 percent of the volume awarded during the first bidding stage.

Interest begins to accrue from a date nominated by the Treasury. Historically, the date has been set so that the first coupon period will

be exactly one year. Thus, tranches issued before the nominated date have an irregular period during which they trade at a discount without accrued interest.

Secondary Market

About 40 percent of all transactions are executed through a system of interdealer brokers (blind brokers) instituted by the Bank of Spain. In the secondary market, only entities designated as ''primary dealers'' can deal directly with the Bank of Spain. For example, if a customer wants to buy a bond that a dealer does not have in inventory, a primary dealer can go to the Bank of Spain to obtain the bond. Nonprimary dealers would have to obtain the bonds through interdealer trading. Interdealer trading is executed through information screens. Amounts and prices are quoted, but counterparties are not disclosed.

Competitive tenders must be at least pta 50 million in the interbank market and pta 100 million in the blind-broker system. Trading volume in the secondary market varies between pta 500 million and pta 1 billion. Trading hours are between 9:00 a.m. to 5:00 p.m. local time through blind brokers, and at any hour through regular brokers.

Market Participants

Sell Side

As noted above, the dealers of government securities are classified as either primary dealers or nonprimary dealers. The Bank of Spain designates primary dealers with whom they will conduct business. Other dealers obtain government securities through interdealer trading.

Buy Side

The primary holders of Bonos and Obligaciones are private and savings banks. The Bank of Spain, corporations, and foreign investors, including U.S. commercial banks, securities firms, insurance companies, and money managers also hold outstanding bonds.

MARKET TRANSPARENCY

Several information vendors disseminate price information on Spanish government bonds. Reuters and Telerate provide pricing information for Bonos and Obligaciones. A Telerate service called ''38494'' provides the latest auction information. Reuters carries bond prices, dealer prices, the latest auction results, and Spanish Treasury pages.

PRICING

Bonos and Obligaciones are quoted on a percentage of par basis in eighths. Bid/offer spreads are typically 5 to 10 basis points for actively traded issues and about 20 basis points for illiquid issues. Bonos and Obligaciones do not trade ex-dividend, but they do trade before the Treasury nominates a date to begin coupon accruals. The period before the nomination date is referred to as the *irregular period.* Because there is no accrued interest until a coupon payment date is nominated by the Treasury, issues outstanding before the nomination are priced at a discount and adjustments to yield must be made accordingly. The following price/yield relationship holds during the irregular period:

$$PV_0 = PV_1 / (1 + y)^{(n/365)},$$

where

PV_1 = standard price/yield on the nominated date

y = annual internal rate of return

n = the number of days until the end of the irregular period

HEDGING

Foreign-currency and interest-rate risk may be hedged by using derivative instruments such as forwards, futures, swaps, or options. Interest-rate risk may also be hedged by taking an offsetting position in another Spanish fixed-income security.

RISKS

Liquidity Risk

Liquidity risk is increased when market volumes of a security are low. In the case of Bonos and Obligaciones, market volumes have been volatile as investor objectives and strategies change, for example, when banks and corporations began to use Bonos and Obligaciones as cash-management instruments rather than as medium-term investments. Therefore, these bonds may experience varying levels of liquidity. Liquidity may also be a function of how close to maturity a bond issue is. In other words, more recently issued bonds tend to be more liquid than bonds that have been traded in the market for a longer period of time.

Interest-Rate Risk

Interest-rate risk is derived from price fluctuations caused by changes in interest rates. Longer-term issues have more price volatility than shorter-term issues. A large concentration of long-term maturities may subject a bank's investment portfolio to greater interest-rate risk.

Foreign-Currency Risk

From the perspective of an international investor, the total return from investing in Spanish government securities is partly dependent on the exchange rate between the U.S. dollar and the Spanish peseta. Several factors affect the volatility of a foreign-exchange rate including the following: the country's balance of payments and prospective changes in that balance; inflation and interest-rate differentials between countries; the social and political environment; relative changes in the money supply; and central bank intervention in the currency.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Spanish government bonds are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Spanish government bonds are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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J.P. Morgan Securities. *Government Bond Outlines.* 9th ed. April 1996.

GENERAL DESCRIPTION

Swiss government notes (SGNs) and bonds (SGBs), also known as confederation notes and bonds, are fully guaranteed debt obligations of the Swiss government. The Swiss government debt market has historically been relatively small as a result of the country's low level of debt and its balanced-budget policy. The Swiss government does not engage in open market operations because of the high degree of liquidity in the banking system. However, budget deficits in recent years have resulted in an increase in the volume of activity. Bonds and notes are issued through the Swiss National Bank in bearer form only.

CHARACTERISTICS AND FEATURES

Bonds have average maturity ranges of seven to 20 years and are issued in denominations of Swiss franc (SFr) 1,000, SFr 5,000, and SFr 100,000. Notes have average maturities of three to seven years and are issued in denominations of SFr 50,000 and SFr 100,000. Both bonds and notes are fixed-coupon securities redeemable at par (bullets). Interest is paid annually and there are no odd first coupons. Most issues are callable, but many recent issues do not have a call feature. Settlement is based on Euroclear (an international clearing organization) conventions, three days after the trade date (T+3). Interest is calculated using the 30E+/360 day-count convention. If a starting date is the 31st, it is changed to the 30th, and an end date that falls on the 31st is changed to the 1st.

USES

Swiss government bonds and notes are used for investment, hedging, and speculative purposes. Foreign investors, including U.S. banks, often purchase Swiss government securities as a means of diversifying their securities portfolios. The low credit risk and liquidity of Swiss government bonds encourage their use. Swiss government securities may also be used to hedge an investor's exposure to Swiss interest rates or currency risk that is related to its positions in Swiss francs. Speculators may use Swiss government bonds to take positions on changes in the level and term structure of Swiss interest rates or on changes in the foreign-exchange rates between Switzerland and the United States.

DESCRIPTION OF MARKETPLACE

Issuing Practices

The Swiss Treasury issues debt through a Dutch auction, and allocations are made to the highest bidders in descending order until the supply of securities the Treasury wishes to sell is depleted. The lowest accepted tender price is considered the clearing price. The debt-issuance calendar is announced at the beginning of each year. Currently, issuance takes place on the fourth Thursday of every second month.

Secondary Market

SGBs are listed on the Swiss stock exchanges in Zurich, Geneva, and Basel, as well as on the over-the-counter (OTC) market. SGNs are traded over the counter only.

Market Participants

Sell Side

The main dealers of SGBs are the Union Bank of Switzerland, Credit Suisse, and the Swiss Bank Corporation. The Swiss National Bank does not allow non-Swiss banks to underwrite or manage issues.

Buy Side

Many investors, foreign and domestic, are attracted to the Swiss bond market because of the strength of the Swiss economy, the country's low inflation rates, and the stability of its political environment and currency, all of which contribute to a stable and low-risk

government bond market. Investors include banks, securities firms, insurance companies, and money managers.

Market Transparency

The market of SGBs and SGNs is fairly active. Price transparency is relatively high for Swiss government securities since several information vendors, including Reuters and Telerate, disseminate prices to the investing public.

PRICING

Notes and bonds are quoted as a percentage of par to two decimals. For example, a quote of 98.16 would mean a price that is 98.16 percent of par value. The price quoted does not include accrued interest. Notes and bonds do not trade ex-dividend.

HEDGING

Interest-rate risk may be hedged by taking contra positions in other government securities or by using interest-rate swaps, forwards, options, or futures. Foreign-exchange risk can be hedged by using currency swaps, forwards, futures, or options.

RISKS

Liquidity Risk

The market for SGBs is more liquid than SGNs due to a lower number of SGN issues. Bonds typically trade in a liquid market for the first few months after they are issued. However, after a few months on the secondary market, liquidity tends to decrease as a result of the fact that issue size is relatively small. In addition, liquidity is hampered by buy-and-hold investment practices and by federal and cantonal taxes levied on secondary transactions.

Interest-Rate Risk

SGBs and SGNs are subject to interest-rate risk as a result of the inverse relationship between bond prices and interest rates. Longer-term issues have more price volatility than short-term instruments. However, the Swiss capital market is characterized by relatively low and stable interest rates.

Foreign-Exchange Risk

Currency fluctuations may affect the bond's yield as well as the value of coupons and principal paid in U.S. dollars. The Swiss franc is one of the strongest currencies in the world as a result of the strength of the Swiss economy and the excess liquidity in the banking system. Volatility of Swiss foreign-exchange rates has historically been low.

Political Risk

A change in the political environment, withholding tax laws, or market regulations can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The accounting treatment for investments in foreign debt is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Swiss government notes and bonds are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Swiss government notes and bonds are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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GENERAL DESCRIPTION

United Kingdom government bonds, known as ''gilts'' or ''gilt-edged stocks,'' are Sterling-denominated bonds issued by the Bank of England (BOE) on behalf of the Treasury. The bonds are unconditionally guaranteed by the U.K. government and, therefore, are considered to have very low credit risk. Shorts are those gilts having 0 to 5 years remaining to maturity; mediums, 5 to 15 years; and longs, over 15 years. The securities are generally held in registered form in the domestic settlement system. The securities can also be held via Euroclear and Cedel.

CHARACTERISTICS AND FEATURES

Gilts come in a variety of structures. Conventional gilts or ''straights'' are noncallable bullet issues that pay interest semiannually. These bonds comprise around 80 percent of the outstanding gilt-edged securities. The government also issues callable gilts, so called ''double-dated'' gilts, which may be called at the government's discretion anytime after the designated call date. In addition to these bonds, a number of nonconventional gilt issues are considered to be of minor importance because of their insignificant issue sizes and lack of liquidity. Such nonconventional issues include convertible gilts (in which short-dated bonds may be converted to longer-dated bonds), index-linked gilts, and irredeemable gilts (consols). Most gilt issues pay a fixed coupon. Floating-rate gilts, first issued in March 1994, have coupon payments linked to the London Interbank Bid Rate (LIBID). Unlike fixed-rate gilts, interest on floating-rate gilts is paid quarterly to investors.

Settlement in the gilt market is usually done on the market date following the trade date (T+1), although two-day and seven-day settlements are also fairly common. Deals are normally cleared through the Bank of England's Central Gilt Office (CGO). The CGO is linked to Euroclear and Cedel. Interest is calculated using an actual/365-day count.

USES

Gilts are used for investment, hedging, and speculative purposes by domestic and foreign entities. While foreign investors may buy gilts as a means of diversifying their investment portfolios, gilts may also be used to hedge positions that are sensitive to movements in U.K. interest rates or foreign-exchange rates. Speculators, on the other hand, may use long-term bonds to take positions on changes in the level and term structure of interest rates.

DESCRIPTION OF MARKETPLACE

Issuing Practices

The BOE issues a debt management report in March of each year, which lays out gilt-issuance plans for the fiscal year running from April to March. The report represents the Treasury's forecast of the gilts that need to be sold and also details the percentage of issuance expected to fall into each area of the maturity spectrum. Complete details of the auction, including the amount and terms of gilt to be auctioned and other information, are announced eight days before the auction. Gilt-edged market makers (GEMMs) quote prices on a when-issued basis. Deals cannot be settled until the business day after the auction when trading in the newly issued bonds officially begins. The existence of a shadow market, however, ensures that the market can trade to a level where new bonds will be easily absorbed, limiting the chances of a surplus inventory of bonds.

During the auction process, bids are accepted on a competitive and a noncompetitive basis. Competitive bids are for a minimum of £500,000 and can be made at any price. Bids are accepted going from the highest price to the lowest price until the bank exhausts the amount of securities it wants to sell. If the issue size is not large enough to satisfy demand at the lowest accepted price, bidders get a proportion of their requests. In such a bid, the BOE cannot give more than 25 percent of the amount offered to any one bidder. Noncompetitive bids vary between £1,000 and £500,000 per bidder. Bonds are allocated to noncompetitive bidders at a price

equal to that of the weighted average of bids filled in the competitive auction.

The BOE also sells a fixed amount of securities at a fixed price (tap form). This form of issuance allows the BOE to respond to market demand and add liquidity to the market. More specifically, tap issues are normally done from the supply of bonds that have not been sold at an auction. Typically, bonds are held back with the intent to sell them when demand has improved or when there is an increased need for funds. In a tap issuance, stock is issued to GEMMs in the form of ''tranchettes,'' typically up to £500 million.

Payment for gilts may be made in full or in part. In a partly paid auction, competitive bidders are required to deposit a portion of the amount bid, with the rest due after issue as specified in the prospectus. In a partly paid auction, the first coupon payment and the market price reflect the partly paid status of the gilt. After the installments are cleared as per the prospectus, the partly paid distinction disappears.

Secondary Market

U.K. gilts are traded on the London Stock Exchange, International Stock Exchange, and London International Financial Futures Exchange (LIFFE). Gilts can be traded 24 hours a day. Generally, gilts are traded on the International Stock Exchange between the hours of 9 a.m. and 5 p.m. and on the LIFFE between the hours of 8:30 a.m. and 4:15 p.m. and between 4:30 p.m. and 6:00 p.m. The typical transaction size in the secondary market varies between £5 to £100 million.

Market Participants

Sell Side

The primary dealers of U.K. government bonds are known as gilt-edged market makers or GEMMs. GEMMs quote the exact size, amount, and terms of the issuance beginning eight days before an auction, thereby creating a ''shadow market.'' At this time, they quote prices on a when-issued basis.

Buy Side

A wide range of investors use U.K. government bonds for investing, hedging and speculation. This includes banks, nonfinancial corporate and quasi-corporate public and private enterprises, pension funds, charities, pension arms of life insurance companies, and private investors. The largest holders of gilts are domestic entities, but foreign investors, including U.S. banks, are also active participants in the market.

Market Transparency

The gilt market is active and price transparency is relatively high for these securities. Several information vendors disseminate prices to the investing public, including Reuters.

PRICING

Prices are quoted as a percent of par in 32nds. For example, a price of 98:16 means that the price of the bond is 98.5 percent of par value (98 16/32). Prices are quoted on a clean-price basis, net of accrued interest. The settlement price takes accrued interest into account so that the total price equals the clean price plus or minus the accrued interest. The bid/offer spreads tend to be extremely thin. For liquid issues with a maturity of up to seven years, the spread is normally 1/16 or less; for liquid issues with longer maturities, the spread is normally 1/16 to 1/8.

HEDGING

U.K. gilts may be hedged for foreign-exchange risk using foreign-exchange options, forwards, and futures. These securities can be hedged for interest-rate risk by taking a contra position in another gilt or by using derivative instruments such as forwards, swaps, futures, or options. Currently, the LIFFE gilt futures contract is the most heavily traded hedging instrument. The effectiveness of a particular hedge depends on the yield curve and basis risk. For example, hedging a position in a six-year note with an over-hedged position in a two-year bill may expose the dealer to yield curve risk. Hedging a 30-year bond with a bond future exposes the

dealer to basis risk if the historical price relationships between futures and cash markets are not stable.

RISKS

Liquidity Risk

Gilts trade in an active and liquid market. Liquidity in the market is ensured by the BOE, which is responsible for maintaining the liquidity and efficiency of the market and, in turn, supervises the primary dealers of gilts. GEMMs, who act as primary dealers, are required to quote two-way prices at all times. An increase in foreign investment activity in the gilt market has led to a substantial increase in competition and enhanced liquidity.

Liquidity is also enhanced through the BOE's ability to reopen auctions and tap issues. The ability to reopen issues improves liquidity and avoids the unfavorable pricing that may occur when the market is flooded with one very large issue. A tap issue, as explained above, allows the BOE to relieve market shortage of a particular bond. An active repo market allows market makers (GEMMs) to fund their short positions, and it improves turnover in the cash market, attracting international players familiar with the instrument, which further improves liquidity.

Foreign-Exchange Risk

Currency movements have the potential to affect returns of fixed-income investments whose interest and principal are paid in foreign currencies. The devaluation of a foreign currency relative to the U.S. dollar would not only affect a bond's yield, but would affect bond pay-offs in U.S. dollar terms. Some factors that may affect the U.K. foreign-exchange rate include—

- wider exchange-rate mechanism bands, which increase the risk of holding high-yielding currencies;
- central bank intervention in the currency markets;
- speculation about the European economic and monetary union and its potential membership, which puts European currencies under pressure vis-à-vis the deutsche mark; and
- endemic inflation in the United Kingdom.

Political Risk

A change in the political environment, withholding tax laws, or market regulation can have an adverse impact on the value and liquidity of an investment in foreign bonds. Investors should be familiar with the local laws and regulations governing foreign bond issuance, trading, transactions, and authorized counterparties.

ACCOUNTING TREATMENT

The Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities," determines the accounting treatment for investments in foreign debt. Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

United Kingdom government bonds are assigned to the 0 percent risk-weight category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

United Kingdom government bonds are type III securities. As such, a bank's investment in them is limited to 10 percent of its equity capital and reserves.

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GENERAL DESCRIPTION

In 1989, the Brady plan, named after then-U.S. Treasury Secretary Nicholas Brady, was announced to restructure much of the debt of developing countries that was not being fully serviced due to economic constraints. The plan provided debt relief to troubled countries and, in theory, opened access to further international financing. It also provided the legal framework to securitize and restructure the existing bank debt of developing countries into bearer bonds. Linking collateral to some bonds gave banks the incentive to cooperate with the debt reduction plan.

Brady bonds are restructured bank loans. They comprise the most liquid market for below-investment-grade debt (though a few Brady countries have received investment-grade debt ratings) and are one of the largest debt markets of any kind. Banks are active participants in the Brady bond market. Once strictly an interbank market, the Brady market has evolved into one with active participation from a broad investor base.

CHARACTERISTICS AND FEATURES

Brady bonds have long-term maturities, and many have special features attached. Callable bonds or step-up coupons are among the most common features. Others pay additional sources of income based on various economic factors or the price of oil. Listed below are the individual characteristics of several types of Brady bonds:

- *Par bonds* have fixed coupons or coupon schedules and bullet maturities of 25 to 30 years. Typically, these bonds have principal-payment and rolling interest-rate guarantees. Because pars are loans exchanged at face value for bonds, debt relief is provided by a lower interest payment.
- *Discount bonds* have floating-rate coupons typically linked to LIBOR. These bonds have principal and rolling interest-rate guarantees. Bond holders receive a reduced face amount of discount bonds, thereby providing debt relief.
- *Front-loaded interest-reduction bonds* provide a temporary interest-rate reduction. These bonds have a low fixed-interest rate for a few years and then step up to market rates until maturity.
- *Debt conversion bonds (DCBs)* and *new money bonds* are exchanged for bonds at par and yield a market rate. Typically, DCBs and new money bonds pay LIBOR + ⅞. These bonds are amortized and have an average life of between 10 and 15 years. DCBs and new money bonds are structured to give banks an incentive to inject additional capital. For each dollar of new money bond purchased, an investor converts existing debt into a new money bond at a fixed proportion determined by the Brady agreement. DCBs and new money bonds are normally uncollateralized.

The terms of local debt market instruments also vary widely, and issues are denominated in either local or foreign currency such as U.S. dollars. Brief descriptions of instruments in Argentina, Brazil, and Mexico follow.

Argentina

Letes are Argentine Treasury bills. They are offered on a discount basis and have maturities of 3, 6, and 12 months. Auctions are held on a monthly basis.

Brazil

Currently, the primary internal debt instruments issued in Brazil are so-called BBC bonds, which are issued by the central bank. As of mid-1996, BBC bonds were being issued in 56-day denominations, up from 35-, 42-, and 49-day denominations. Total outstandings as of June 30, 1996, were U.S.$49.9 billion, and these instruments are highly liquid. The central bank also issues bills and notes known as LTNs and NTNs that have maturities up to one year (though one NTN has been issued as of this writing with a two-year maturity). LTNs and NTNs are less liquid and have smaller outstandings (U.S.$34.4 and U.S.$18.2 billion, respectively) than BBC bonds.

Mexico

Ajustabonos

Though issuance of these bonds has been halted, ajustabonos are peso-denominated Treasury bonds. They are indexed to inflation and pay a real return over the Mexican consumer price index (CPI). These bonds are longer-term instruments with maturities of 1,092 days (three years) and 1,820 days (five years). Ajustabonos pay a quarterly real rate coupon over the CPI and are tax exempt to foreign investors. As of May 1996, U.S.$5.6 billion ajustabonos remained outstanding.

Bondes

Bondes are floating-rate, peso-denominated government development bonds. They have maturities of 364 and 728 days. Bondes pay interest every 28 days at the higher of the 28-day cetes rate or the retail pagares rate, calculated by the central bank. They are auctioned weekly and are tax exempt to foreign investors. The total amount outstanding as of mid-1996 was approximately U.S.$5 billion.

Cetes

Cetes are government securities and are the equivalent of Mexican T-bills. They are denominated in pesos and are sold at a discount. Cetes have maturities of 28, 91, 182, 364, and 728 days (though this maturity is presently discontinued). Cetes are highly liquid instruments and have an active repo market.

The capital gain for these instruments is determined by the difference between the amortized value and the purchase price; the day-count convention is actual/360-day. Auctions are held weekly by the central bank for the 28- through 364-day maturities. Foreign investors are exempted from paying taxes on these instruments.

Tesobonos

Though these instruments are not currently being issued, they comprised the majority of debt offerings in the time leading up to the 1994 peso crisis. Tesobonos are dollar-indexed government securities with a face value of U.S.$1,000. At the investors' option, they are payable in dollars, and they are issued at a discount. Maturities include 28, 91, 182, and 364 days.

UDIbonos

During the week of May 27, 1996, the Mexican central bank sold three-year UDIbonos for the first time. They are inflation-adjusted bonds denominated in accounting units or UDIs (a daily inflation index), which change in value every day. These instruments replaced the ajustabonos. UDIbonos pays interest semiannually and offer holders a rate of return above the inflation rate. They are auctioned biweekly and may have limited liquidity.

USES

Brady bonds and local debt market instruments can be used for investment, hedging, and speculation. Speculators will often take positions on the level and term structure of sovereign interest rates. Arbitragers will take positions based on their determination of mispricing.

DESCRIPTION OF MARKETPLACE

Issuing Practices

A Brady deal exchanges dollar-denominated loans for an agreed-upon financial instrument. These instruments include various debt instruments, debt equity swaps, and asset swaps. At the close of a collateralized Brady deal (not all Brady bonds are collateralized), collateral is primarily posted in the form of U.S. Treasury zero-coupon bonds and U.S. Treasury bills. The market value of this collateral depends on the yield of 30-year U.S. Treasury strips and tends to increase as the bond ages. Developing countries have also used their own resources for collateral as well as funds from international donors, the World Bank, and the International Monetary Fund (IMF) to support their Brady deals. Local debt instruments are subject to the issuing practices of each individual country.

Market Participants

The number of market participants in each emerging market differs with the characteristics of each market, such as regulatory barriers, liquidity constraints, and risk exposures. However, there are many participants in the Brady bond market. Securitization of Brady bonds enables banks to diversify and transfer some of their country exposures to other banks. New market participants in the Brady market include investment banks as well as traditional commercial banks, mutual funds, pension funds, hedge funds, insurance companies, and some retail investors.

Market Transparency

For many instruments, prices are available on standard quote systems such as Bloomberg, Reuters, and Telerate. In addition, many brokers can quote prices on less developed country (LDC) debt instruments. For all but the most liquid Brady bonds and internal debt instruments, however, transparency can be very limited.

PRICING

Pricing for the various LDC issues differs across instruments and countries. The price of a Brady bond is quoted on its spread over U.S. Treasuries. Standard bond pricing models are often used to price the uncollateralized bond and unsecuritized traded bank loans, with emphasis on the credit risk of the issuers (sovereign risk) in determining whether a sufficient risk premium is being paid. Most of the volatility in Brady bonds comes from movement in the spread over U.S. Treasuries.

HEDGING

Over-the-counter (OTC) options are the primary vehicles to hedge Brady bonds. Because the volume of the OTC options market is approximately one-tenth that of the cash Brady bond market, liquidity is relatively poor.

Cash instruments from the identical sovereign issuer can be used to hedge positions. However, as in other hedging situations, mismatch of terms can lead to basis risk.

Hedging strategies for Brady bonds are often focused on decomposing the sovereign risk from the U.S. rate risk and on neutralizing the latter. For example, a long fixed-coupon Brady bond position is exposed to the risk that U.S. rates will rise and Brady prices will fall. A hedge aimed at immunizing U.S. rate risk can be established with a short U.S. Treasury, Treasury futures, or forward position.

RISKS

Sovereign Risk

One of the most significant risks related to trading of LDC debt is sovereign risk. This includes political, regulatory, economic stability, tax, legal, convertibility, and other forms of risks associated with the country of issuance. Real risk is that of potential controls or taxes on foreign investment. While there is no way to predict policy shifts, it can help to be familiar with any current controls and to closely follow the trend of inflation.

Liquidity Risk

Liquidity risk is the risk that a party may not be able to unwind its position. In emerging markets, liquidity risk can be significant. During the Mexican peso crisis, bids on various instruments were nonexistent. Portfolio values of Latin American instruments plunged. In the OTC market, options are far less liquid than cash bonds. As a result, option positions are often held to expiry rather than traded.

Interest-Rate Risk

Debt issues of various countries are subject to price fluctuations because of changes in sovereign-risk premium in addition to changes in market interest rates and changes in the shape of the yield curve. Spreads between U.S. rates and sovereign rates capture this sovereign-risk premium. In general, the greater the uncertainty of future payoffs, the greater the spread between country rates and U.S. rates. This spread will not necessarily be stable, however, making interest-rate risk *at least* equivalent to that found in U.S. Treasury instruments.

ACCOUNTING TREATMENT

LDC debt that remains in the form of a loan and does not meet the definition of a security in the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," should be reported and accounted for as a loan. If the loan was restructured in a troubled-debt restructuring involving a modification of terms, and the restructured loan meets the definition of a security in FAS 115, then the instrument should be accounted for according to the provisions of FAS 115.

The accounting treatment for investments in foreign debt is determined by FAS 115, as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." Accounting treatment for derivatives used as investments or for hedging purposes is determined by Statement of Financial Accounting Standards No. 133 (FAS 133), "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

Claims that are directly and unconditionally guaranteed by an OECD-based central government or a U.S. government agency are assigned to the zero percent risk category. Claims that are not unconditionally guaranteed are assigned to the 20 percent risk category. A claim is not considered to be unconditionally guaranteed by a central government if the validity of the guarantee depends on some affirmative action by the holder or a third party. Generally, securities guaranteed by the U.S. government or its agencies and securities that are actively traded in financial markets are considered to be unconditionally guaranteed.

Claims on, or guaranteed by, non-OECD central governments which do *not* represent local currency claims that are unconditionally or conditionally guaranteed by non-OECD central governments to the extent that the bank has liabilities booked in that currency are assigned a 100 percent risk weight. Also, all claims on non-OECD state or local governments are assigned to the 100 percent risk category.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Obligations which are guaranteed by a department or an agency of the U.S. government, if the obligation commits the full faith and credit of the United States for the repayment of the obligation, are type I securities and are not subject to investment limitations. Also, obligations guaranteed by the Canadian government are classified as type I securities.

Obligations guaranteed by other OECD countries which are classified as investment-grade are type III securities. A bank's investment is limited to 10 percent of its capital and surplus.

Non-investment-grade LDC debt may be purchased under a bank's "reliable estimates" bucket. If a bank concludes, on the basis of reliable estimates, that an obligor will be able to perform, and the security is marketable, it can purchase the security notwithstanding its investment-grade rating. Such securities are subject to a 5 percent limit of a bank's capital and surplus for all securities purchased under this authority.

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GENERAL DESCRIPTION

Foreign exchange (FX) refers to the various businesses involved in the purchase and sale of currencies. This market is among the largest in the world and business is conducted 24 hours a day in most of the financial centers. The major participants are financial institutions, corporations, and investment and speculative entities such as hedge funds. Any financial institution which maintains *due from* bank balances, commonly known as ''nostro'' accounts, in foreign countries in the local currency can engage in foreign exchange. The volume in this market has been estimated to be the equivalent of $1 trillion a day.

CHARACTERISTICS AND FEATURES

The FX market is divided into spot, forward, swap, and options segments. Each of these segments is discussed in the following subsections.

Spot

Buying and selling FX at market rates for immediate delivery represents spot trading. Generally, spot trades in foreign currency have a ''value date'' (maturity or delivery date) of two to five business days (one day for Canada). Foreign-exchange rates that represent the current market value for the currency are known as spot rates. The risk of spot trading results from exchange-rate movements that occur while the financial institution's position in foreign currency is not balanced with regard to the currency it has bought and sold. Such unbalanced positions are referred to as net open positions.

Net Open Positions

A financial institution has a net open position in a foreign currency when its assets, including spot and forward/futures contracts to purchase, and its liabilities, including spot and forward/futures contracts to sell, in that currency are not equal. An excess of assets over liabilities is called a net ''long'' position, and liabilities in excess of assets are called a net ''short'' position. A long position in a foreign currency which is depreciating will result in an exchange loss relative to book value because, with each day, that position (asset) is convertible into fewer units of local currency. Similarly, a short position in a foreign currency which is appreciating represents an exchange loss relative to book value because, with each day, satisfaction of that position (liability) will cost more units of local currency.

The net open position consists of both balance-sheet accounts and contingent liabilities. For most financial institutions, the nostro accounts represent the principal assets; however, foreign-currency loans as well as any other assets or liabilities that are denominated in foreign currency, which are sizeable in certain financial institutions, must be included. All forward/futures foreign-exchange contracts outstanding are contingents. When a contract matures, the entries are posted to a nostro account in the appropriate currency.

Each time a financial institution enters into a spot foreign-exchange contract, its net open position is changed. For example, assume that Bank A opens its business day with a balanced net open position in pound sterling (assets plus purchased contracts equal liabilities plus sold contracts). This is often referred to as a ''flat'' position. Bank A then receives a telephone call from Bank B requesting a ''market'' in sterling. Because it is a participant in the interbank foreign-exchange trading market, Bank A is a ''market maker.'' This means it will provide Bank B with a two-sided quote consisting of its bid and offer for sterling. If a different currency was requested, European terms would be the opposite since the bid and offer would be for dollars instead of the foreign currency. In determining the market given, Bank A's trader of sterling will determine where the market is presently (from brokers and/or other financial institutions), attempt to anticipate where it is headed, and determine whether Bank B is planning to buy or sell sterling.

Forward Transactions

A forward transaction differs from a spot transaction in that the value date is more than two to

five business days in the future. The maturity of a forward foreign-exchange contract can be a few days, months, or even years in some instances. In practice, dates that are two years or more in the future are usually referred to as the long-dated forward market or the long-term FX (LTFX) market. The exchange rate is fixed at the time the transaction is agreed on. However, nostro accounts are not debited or credited, that is, no money actually changes hands, until the maturity date of the contract. There will be a specific exchange rate for each forward maturity, and each of those rates will generally differ from today's spot exchange rate. If the forward exchange rate for a currency is higher than the current spot rate, the currency is trading at a premium for that forward maturity. If the forward rate is below the spot rate, then the currency is trading at a discount. For instance, sterling with a value date of three months is at a discount if the spot rate is $1.75 and the three-month forward rate is $1.72.

Foreign-Exchange Swaps

Financial institutions that are active in the foreign-exchange market find that interbank outright forward currency trading is inefficient and engage in it infrequently. Instead, for future maturities, financial institutions trade among themselves as well as with some corporate customers on the basis of a transaction known as a *foreign-exchange swap*. A swap transaction is a simultaneous purchase and sale of a certain amount of foreign currency for two different value dates. The key aspect is that the financial institution arranges the swap as a single transaction with a single counterparty, either another financial institution or a nonbank customer. This means that, unlike outright spot or forward transactions, a trader does not incur a net open position since the financial institution contracts both to pay and to receive the same amount of currency at specified rates. Note that a foreign-*exchange* swap is different from a foreign-*currency* swap, because the currency swap involves the periodic exchange of interest payments. See the discussion in section 4335.1, "Currency Swaps."

A foreign-exchange swap allows each party to use a currency for a period in exchange for another currency that is not needed during that time. Thus, the swap offers a useful investment facility for temporary idle currency balances of a corporation or a financial institution. Swaps also provide a mechanism for a financial institution to accommodate the outright forward transactions executed with customers or to bridge gaps in the maturity structure of outstanding spot and forward contracts.

The two value dates in a swap transaction can be any two dates. But, in practice, markets exist only for a limited number of standard maturities. One of these standard types is called a *spot-against-forward swap*. In a spot-against-forward swap transaction, a trader buys or sells a currency for the spot value date and simultaneously sells or buys it back for a value date a week, a month, or three months later.

Another type of transaction of particular interest to professional market-making financial institutions is called a *tomorrow-next* swap or a *rollover*. These are transactions in which the dealer buys or sells a currency for value the next business day and simultaneously sells or buys it back for value the day after. A more sophisticated type of swap is called a *forward-forward* in which the dealer buys or sells currency for one future date and sells or buys it back for another future date. Primarily, multinational banks specialize in transactions of this type.

Options

The foreign-exchange options market includes both plain vanilla and exotic transactions. See section 4330.1, "Options," for a general discussion. Most options activity is plain vanilla.

USES

Foreign exchange is used for investment, hedging, and speculative purposes. Most banks use it to service customers and also to trade for their own account. Corporations use the FX market mainly to hedge their foreign-exchange exposure.

DESCRIPTION OF MARKETPLACE

Market Participants

Sell Side

The majority of U.S. banks restrict their foreign-exchange activities to serving their customers'

foreign-currency needs. The banks will simply sell the currency at a rate slightly above the market and subsequently offset the amount and maturity of the transaction through a purchase from another correspondent bank at market rates. This level of activity involves virtually no risk exposure as currency positions are covered within minutes. For these banks, a small profit is usually generated from the rate differential, but the activity is clearly designated as a service center rather than a profit center.

Usually, the larger the financial institution, the greater the emphasis placed on foreign-exchange activity. For instance, while serving the needs of corporate customers is still a priority, most regional banks also participate in the interbank market. These banks may look at the trading function as a profit center as well as a service. Such banks usually employ several experienced traders and may take positions in foreign currencies based on anticipated rate movements. These banks use their involvement in the interbank market to get information about the various markets. For most of these participants, the trading volume in the interbank market constitutes the bulk of the volume. (In some cases, the interbank volume is about 80 to 90 percent of total volume). Multinational banks assume by far the most significant role in the foreign-exchange marketplace. While still serving customer needs, these banks engage heavily in the interbank market and look to their foreign-exchange trading operation for sizeable profits. These banks trade foreign exchange on a global basis through their international branch networks.

One of the major changes in the structure of the foreign-exchange market over the past few years has been the increase in the use of electronic market-making and execution systems. In the past, most interbank dealing was done through the interbank brokers' system; however, advances in technology have made it more efficient for market participants to use electronic systems. (Among the more popular systems are Reuters and EBS (Electronic Brokering Systems).) These developments have decreased the number of errors that are common in the use of the brokers' market (for example, the use of points and error checks) and have also cut down on the costs of doing business.

Buy Side

The buy side consists of corporate hedgers, investors, and speculators. Corporations use this market to hedge their assets and liabilities incurred as a result of their overseas operations. Investors (for example, international mutual funds) use this market to gain exposure to markets and sometimes to hedge away the currency risk of their equity portfolios.

Market Transparency

Price transparency is very high. The prices for most of the markets are disseminated through various vendors such as Reuters and Telerate.

PRICING

Two methods are used to quote foreign-exchange rates. The method used depends on the currency.

- *American quote*. Number of foreign-currency units per U.S. dollar (for example, 105 yen per dollar). Most currencies are quoted using this convention.
- *European quote*. Number of U.S. dollars per foreign-currency unit (for example, $1.60 per British pound sterling). British and Irish pounds and Australian and New Zealand dollars are the most common currencies using this convention.

Spot FX

Most institutions will quote both a bid and an offer. When, for example, Bank A quotes sterling at $1.7115-25, it is saying that it will buy (bid) sterling at $1.7115 or sell (offer) sterling at $1.7125. If Bank B's interest is to buy sterling and the given quote is appealing, it will buy sterling from Bank A at $1.7125 (Bank A's offer price). Note that while Bank B may choose to buy, sell, or pass as it wishes, it must do business on the terms established by Bank A. These terms will be in Bank A's favor. As soon as Bank B announces it will purchase sterling at $1.7125, Bank A acquires a net open position (short) in sterling. Bank A must then decide whether to hold its short position (in anticipation of a decline in sterling) or cover its position. If it wishes to cover, it may call another bank and purchase the amount it sold to Bank B. However, as the calling bank, Bank A would buy its

sterling from the offered side of the quote it receives and must buy it at $1.7125 or less to avoid a loss.

Foreign-Exchange Swaps

In foreign-exchange swap transactions, the trader is only interested in the difference between spot and forward rates—the premium or discount—rather than the outright spot and forward rates themselves. Premiums and discounts expressed in points ($0.0001 per pound sterling or DM 0.0001 per dollar) are called swap rates. If the pound spot rate is $1.8450 and the six-month forward rate is $1.8200, the dollar's six-month premium is 250 points ($0.0250). If the pound spot rate is $1.8450 and the six-month forward rate is $1.8625, the dollar's six-month discount is 175 points ($0.0175).

Since, in a swap transaction, a trader is effectively borrowing one currency and lending the other for the period between the two value dates, the premium or discount is often evaluated in terms of percent per annum. For the examples above, the premium of 250 points is equivalent to 2.71 percent per annum, while the discount of 175 points is equivalent to 1.90 percent per annum. To calculate the percentage premium for the first case—

- take the swap rate ($0.0250),
- multiply by 12 months and divide by six months (a per annum basis),
- divide by the spot rate ($1.8450), and
- multiply by 100 (to get a percent basis).

This formula can be expressed as—

$$\%\ per\ annum = \frac{Premium\ or\ Discount * 12}{Spot\ rate * no.\ of\ months\ of\ forward\ contract} * 100$$

Forward rates (premiums or discounts) are solely influenced by the interest-rate differentials between the two countries involved. As a result, when the differential changes, forward contracts previously booked could now be covered at either a profit or loss. For example, assume an interest-rate differential between sterling and dollars of 3 percent (with the sterling rate lower). Using this formula, with a spot rate of $1.80, the swap rate on a three-month contract would be a premium of 135 points. If that interest-rate differential increases to 4 percent (by a drop in the sterling rate or an increase in the dollar rate), the premium would increase to 180 points. Therefore, a trader who bought sterling three months forward at 135 points premium could now sell it at 180 points premium, or at a profit of 45 points (expressed as .0045).

Thus, the dealer responsible for forward trading must be able to analyze and project dollar interest rates as well as interest rates for the currency traded. Additionally, because forward premiums or discounts are based on interest-rate differentials, they do not reflect anticipated movements in spot rates.

HEDGING

Spot FX

Banks engaged in trading in the spot market will acquire net open positions in the course of dealing with customers or other market makers. The bank must then decide whether to hold its open position (in anticipation of a move in the currency) or cover its position. If it wishes to cover, the bank may call another bank and either buy or sell the currency needed to close its open position.

Financial institutions engaging in interbank spot trading will often have sizeable net open positions, though many for just brief periods of time. No matter how skilled the trader, each institution will have occasional losses. Knowing when to close a position and take a small loss before it becomes large is a necessary trait for a competent trader. Many financial institutions employ a "stop-loss policy," whereby a net open position must be covered if losses from it reach a certain level. While a trader's forecast may ultimately prove correct within a day or week, rapid rate movements often cause a loss within an hour or even minutes. Also, access to up-to-the-minute information is vital for involvement in spot trading. Financial institutions that lack the vast informational resources of the largest multinationals may be particularly vulnerable to sudden spot rate movements. As a result, examiners should closely review financial institutions in which foreign-exchange activities consist primarily of interbank spot trading.

Forwards

Active trading financial institutions will generally have a large number of forward contracts outstanding. The portfolio of forward contracts is often called a *forward book*. Trading forward foreign exchange involves projecting interest-rate differentials and managing the forward book to be compatible with these projections.

Forward positions are generally managed on a gap basis. Normally, financial institutions will segment their forward books into 15-day periods and show the net (purchased forward contracts less sold ones) balance for each period. Volumes and net positions are usually segregated into 15-day periods for only the first three months, with the remainder grouped monthly. The trader will use the forward book to manage his or her overall forward positions.

A forward book in an actively traded currency may consist of numerous large contracts but, because of the risks in a net open position, total forward purchases will normally be approximately equal to total forward sales. What matters in reviewing a forward book is the distribution of the positions among periods. For example, if a forward book in sterling has a long net position of 3,200,000 for the first three months and is short a net 3,000,000 for the next four months, the forward book is structured anticipating a decline in dollar interest rates as compared with sterling interest rates since these sold positions could be offset (by purchase of a forward contract to negate the sold forward position) at a lower price—either through reduced premium or increased discount. See the subsection below for a discussion of the risks encountered in hedging foreign-exchange exposure.

RISKS

Exchange-Rate Risk

Exchange-rate (market) risk is an inevitable consequence of trading in a world in which foreign-currency values move up and down in response to shifting market supply and demand. When a financial institution's dealer buys or sells a foreign currency from another financial institution or a nonbank customer, exposure from a net open position is created. Until the time that the position can be covered by selling or buying an equivalent amount of the same currency, the institution is exposed to the risk that the exchange rate might move against it. That risk exists even if the dealer immediately seeks to cover the position because, in a market in which exchange rates are constantly changing, a gap of just a few minutes can be long enough to transform a potentially profitable transaction into a loss. Since exchange-rate movements can consistently run in one direction, a position carried overnight or over a number of days entails greater risk than one carried a few minutes or hours.

At any time, the trading function of a financial institution may have long positions in some currencies and short positions in others. These positions do not offset each other, even though, in practice, the price changes of some currencies do tend to be correlated. Traders in institutions recognize the possibility that the currencies in which they have long positions may fall in value and the currencies in which they have short positions may rise. Consequently, gross trading exposure is measured by adding the absolute value of each currency position expressed in dollars. The individual currency positions and the gross dealing exposure must be controlled to avoid unacceptable risks.

To accomplish this, management limits the open positions dealers may take in each currency. Practices vary among financial institutions, but, at a minimum, limits are established on the magnitude of open positions which can be carried from one day to the next (overnight limits). Several institutions set separate limits on open positions dealers may take during the day. These are called ''daylight limits.'' Formal limits on gross dealing exposure also are established by some institutions, while others review gross exposure more informally. The various limits may be administered flexibly, but the authority to approve a temporary departure from a limit is typically reserved for a senior officer.

For management and control purposes, most financial institutions distinguish between positions arising from actual foreign-exchange transactions (trading exposure) and the overall foreign-currency-translation exposure of the institution. The former includes the positions recorded by the institution's trading operations at the head office and at offices abroad. In addition to trading exposure, overall exposure incorporates all the institution's assets and liabilities denominated in foreign currencies,

including loans, investments, deposits, and the capital of foreign branches.

Maturity Gaps and Interest-Rate Risk

Interest-rate risk arises whenever mismatches or gaps occur in the maturity structure of a financial institution's foreign-exchange forward book. Managing maturity mismatches is an exacting task for a foreign-exchange trader.

In practice, the problem of handling mismatches is complex. Eliminating maturity gaps on a contract-by-contract basis is impossible for an active trading institution. Its foreign-exchange book may include hundreds of outstanding contracts, with some maturing each business day. Since the book is changing continually as new transactions are made, the maturity gap structure also changes constantly.

While remaining alert to unusually large mismatches in maturities that call for special action, traders generally balance the net daily payments and receipts for each currency through the use of rollovers. Rollovers simplify the handling of the flow of maturing contracts and reduce the number of transactions needed to balance the book. Reliance on day-to-day swaps is a relatively sound procedure as long as interest-rate changes are gradual and the size and length of maturity gaps are controlled. However, it does leave the financial institution exposed to sudden changes in relative interest rates between the United States and other countries. These sudden changes influence market quotations for swap transactions and, consequently, the cost of bridging the maturity gaps in the foreign-exchange book.

The problem of containing interest-rate risk is familiar to major money market banks. Their business often involves borrowing short-term and lending longer-term to benefit from the normal tendency of interest rates to be higher for longer maturities. But in foreign-exchange trading, it is not just the maturity pattern of interest rates for one currency that counts. In handling maturity gaps, the differential between interest rates for two currencies is decisive, making the problem more complex.

To control interest-rate risk, senior management generally imposes limits on the magnitude of mismatches in the foreign-exchange book. Procedures vary, but separate limits are often set on a day-to-day basis for contracts maturing during the following week or two and for each consecutive half-monthly period for contracts maturing later. At the same time, management relies on officers abroad, domestic money market experts, and its economic research department to provide ongoing analysis of interest-rate trends.

Credit and Settlement Risk

When a financial institution books a foreign-exchange contract, it faces a risk, however small, that the counterparty will not perform according to the terms of the contract. To limit credit risk, a careful evaluation of the creditworthiness of the customer is essential. Just as no financial institution can lend unlimited amounts to a single customer, no institution would want to trade unlimited amounts of foreign exchange with one counterparty.

Credit risk arises whenever an institution's counterparty is unable or unwilling to fulfill its contractual obligations—most blatantly when a corporate customer enters bankruptcy or an institution's counterparty is declared insolvent. In any foreign-exchange transaction, each counterparty agrees to deliver a certain amount of currency to the other on a particular date. Every contract is immediately entered into the financial institution's foreign-exchange book. In balancing its trading position, a financial institution counts on that contract being carried out in accordance with the agreed-upon terms. If the contract is not liquidated, then the institution's position is unbalanced and the institution is exposed to the risk of changes in the exchange rates. To put itself in the same position it would have been in if the contract had been performed, an institution must arrange for a new transaction. The new transaction may have to be arranged at an adverse exchange rate. The trustee for a bankrupt company may perform only on contracts which are advantageous to the company and disclaim those contracts which are disadvantageous. Some dealers have attempted to forestall such arbitrary treatment through the execution of legally recognized bilateral netting agreements. Examiners should determine whether dealers have such agreements in place and whether they have a favorable legal opinion as to their effectiveness, particularly in cross-border situations.

Another form of credit and settlement risk stems from the time-zone differences between the United States and foreign nations. Inevitably, an institution selling sterling, for instance,

must pay pounds to a counterparty before it will be credited with dollars in New York. In the intervening hours, a company can go into bankruptcy or an institution can be declared insolvent. Thus, the dollars may never be credited. Settlement risk has become a major source of concern to various supervisory authorities because many institutions are not aware of the extent of the risks involved. The Bank for International Settlements (BIS) has laid out the various risks in a paper that was published in July 1996.

Managing credit risk is the joint responsibility of the financial institution's trading department and its credit officers. A financial institution normally deals with corporations and other institutions with which it has an established relationship. Dealing limits are set for each counterparty and are adjusted in response to changes in its financial condition. In addition, most institutions set separate limits on the value of contracts that can mature on a single day with a particular customer. Some institutions, recognizing that credit risk increases as maturities lengthen, restrict dealings with certain customers to spot transactions or require compensating balances on forward transactions. An institution's procedures for evaluating credit risk and minimizing exposure are reviewed by supervisory authorities as part of the regular examination process.

ACCOUNTING TREATMENT

The accounting treatment for foreign-exchange contracts is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of a foreign-exchange contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are as follows.

Remaining Maturity	*Credit-Conversion Factor*
One year or less	1.00%
Five years or less	5.00%
Greater than five years	7.50%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, "Capital Adequacy.") For institutions that apply market-risk capital standards, all foreign-exchange transactions are included in value-at-risk (VAR) calculations for market risk.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Foreign-exchange contracts are not considered investment securities under 12 USC 24(7th). However, the use of these instruments is considered to be an activity incidental to banking, within safe and sound banking practices.

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GENERAL DESCRIPTION

Forwards are financial contracts in which two counterparties agree to exchange a specified amount of a designated product for a specified price on a specified future date or dates. Banks are active participants in the forward market. Forwards differ from futures (discussed separately in this manual) in that their terms are not standardized and they are not traded on organized exchanges. Because they are individually negotiated between counterparties, forwards can be customized to meet the specific needs of the contracting parties.

CHARACTERISTICS AND FEATURES

Forwards are over-the-counter (OTC) contracts in which a buyer agrees to purchase from a seller a specified product at a specified price for delivery at a specified future time. While forward contracts can be arranged for almost any product, they are most commonly used with currencies, securities, commodities, and short-term debt instruments. (Forwards on short-term debt instruments, or ''forward rate agreements,'' are discussed separately in this manual.) Commitments to purchase a product are called long positions, and commitments to sell a product are called short positions.

Foreign-exchange forward contracts constitute the largest portion of the forward market. They are available daily in the major currencies in 30-, 90-, and 180-day maturities, as well as other maturities depending on customer needs. Contract terms specify a forward exchange rate, a term, an amount, the ''value date'' (the day the forward contract expires), and locations for payment and delivery. The date on which the currency is actually exchanged, the ''settlement date,'' is generally two days after the value date of the contract.

In most instances, foreign-exchange forwards settle at maturity with cash payments by each counterparty. Payments between financial institutions arising from contracts that mature on the same day are often settled with one net payment.

USES

Market participants use forwards to (1) hedge market risks, (2) arbitrage price discrepancies within and between markets, (3) take positions on future market movements, and (4) profit by acting as market makers. Financial institutions, money managers, corporations, and traders use these instruments for managing interest-rate, currency, commodity, and equity risks. While most large financial institutions are active in the interest-rate and foreign-exchange markets, only a handful of financial institutions have exposures in commodities or equities.

Hedging Interest-Rate Exposure

Financial institutions use forwards to manage the risk of their assets and liabilities, as well as off-balance-sheet exposures. Asset-liability management may involve the use of financial forwards to lock in spreads between borrowing and lending rates. For example, a financial institution may sell an interest-rate forward contract in advance of an anticipated funding to lock in the cost of funds. If LIBOR subsequently increases, the short position will increase in value, offsetting the higher spot interest cost that the financial institution will have to pay on its funding.

Forward contracts may be used to hedge investment portfolios against yield curve shifts. Financial institutions can hedge mortgage portfolios by selling GNMA forwards, and government bond dealers may sell forwards to hedge their inventory. Pension and other types of benefits managers may hedge a fixed future liability by selling forwards or may hedge an expected receipt by buying forwards. When offsetting swaps with the necessary terms cannot be found, interest-rate swap dealers may also use forwards, as well as Eurodollar futures and Treasury futures, to hedge their unmatched commitments.

Hedging Foreign-Exchange Exposure

Corporations engaged in international trade may use foreign-currency contracts to hedge payments and receipts denominated in foreign currencies. For example, a U.S. corporation that

exports to Germany and expects payment in deutschemarks (DM) could sell DM forwards to eliminate the risk of a depreciation of the DM at the time that the payment arrives. A corporation may also use foreign-exchange contracts to hedge the translation of its foreign earnings for presentation in its financial statements.

Financial institutions use foreign-exchange forwards to hedge positions arising from their foreign-exchange dealing businesses. An institution that incurs foreign-exchange exposure from assisting its customers with currency risk management can use offsetting contracts to reduce its own exposure. A financial institution can also use forwards to cover unmatched currency swaps. For example, a dealer obligated to make a series of DM payments could buy a series of DM forwards to reduce its exposure to changes in the DM/$ exchange rate.

Arbitrage

Risk-free arbitrage opportunities in which a trader can exploit mispricing across related markets to lock in a profit are rare. However, for brief periods of time, pricing in the forward market may not be consistent with pricing in the cash market. For example, if DM forwards are overpriced relative to the rates implied by interest-rate parity relationships, a trader could borrow dollars, sell them against spot DM, purchase a DM deposit, and sell the DM forward. This arrangement would lock in a risk-free return.

DESCRIPTION OF MARKETPLACE

Primary Market

Forward contracts are not standardized. Market makers such as banks, investment banks, and some insurance companies arrange forward contracts in various amounts, including odd lots, to suit the needs of a particular counterparty. Brokers, who arrange forward contracts between two counterparties for a fee, are also active in the forward market. End-users, including banks, corporations, money managers, and sovereign institutions, use forwards for hedging and speculative purposes.

Secondary Market

Once opened, forwards tend not to trade because of their lack of standardization, the presence of counterparty credit risk, and their limited transferability.

Market Transparency

The depth of the interest-rate and foreign-exchange markets and the interest-rate parity relationships help ensure transparency of forward prices. Market makers quote bid/ask spreads, and brokers bring together buyers and sellers, who may be either dealers or end-users. Brokers distribute price information over the phone and via electronic information systems.

PRICING

In general, the value of a long forward contract position equals the spot price minus the contract price. For example, forward (and spot) foreign-exchange rates are quoted in the number of units of the foreign currency per unit of the domestic currency. Forward foreign-exchange rates depend on interest-rate parity among currencies. Interest-rate parity requires the forward rate to be that rate which makes a domestic investor indifferent to investing in the home currency versus buying foreign currency at the spot rate, investing it in a foreign time deposit, and subsequently converting it back to domestic currency at the forward rate. The interest-rate parity relationship can be expressed as—

$$F = S \times [1 + r(F)] / [1 + r(D)],$$

where F is the forward rate, S is the spot rate, $r(D)$ is the domestic interest rate, and $r(F)$ is the foreign interest rate. Currency rates are foreign currency per unit of domestic currency. For example, assume the 180-day dollar ($) interest rate is 5 percent, the 180-day DM interest rate is 10 percent, and the DM/$ spot rate is 1.3514 (DM per dollar). A dollar-based investor can borrow dollars at 5 percent, sell them against DM at the DM/$ spot rate of 1.3514, and invest the DM at a 10 percent rate of return. When the investment matures, the DM proceeds can be reconverted to dollars at the forward rate of 1.4156 DM for each dollar, giving the investor a total dollar return of 5 percent, which is the

same return available in dollar deposits. In this instance, the forward rate is higher than the spot rate to compensate for the difference between DM- and dollar-based interest rates. The difference between the domestic and foreign interest rates is referred to as the ''cost of carry.''

HEDGING

Positions in forwards can be offset by cash-market positions as well as other forward or futures position. A financial institution's exposure from a foreign-exchange forward contract can be split into a spot-currency component and an interest-rate differential between the two currencies. For the spot foreign-exchange component, consider a three-month long forward position that receives sterling (£) and pays dollars (in three months, the institution receives sterling and pays dollars). This position is comparable to the combination of receiving a three-month dollar deposit and making a three-month sterling loan. The forward position implicitly locks in a spread between the lending and borrowing rates while exposing the institution to future £/$ spot rates.

To eliminate the currency and interest-rate exposure, the financial institution can either enter into an offsetting forward or take a short position in sterling. By entering into a three-month forward contract to deliver sterling against dollars, the financial institution could virtually eliminate its currency exposure. Alternatively, the institution could borrow three-month sterling, sell it, and invest the dollar proceeds in a three-month deposit. When the long £/$ forward comes due, the institution can use the maturing dollar deposit to make its payment and apply the sterling proceeds to the repayment of the sterling loan.

RISKS

Users and providers of forwards face various risks, which must be well understood and carefully managed. The risk-management methods applied to forwards and futures may be similar to those used for other derivative products.

Credit Risk

Generally, a party to a forward contract faces credit risk to the degree that its side of the contract has positive market value. In other words, credit risk in forwards arises from the possibility that a contract has positive replacement cost and the counterparty to the contract fails to perform its obligations. The value of a contract is generally zero at inception, but it changes as the market price of the product underlying the forward changes. If the institution holds a contract that has positive market value (positive replacement cost) that the counterparty defaults on, the institution would forfeit this value. To counter this risk, weak counterparties may be required to collateralize their commitments. Counterparties dealing with financial institutions may be required to maintain compensating balances or collateral. Because of their credit risk and the lack of standardization, forwards generally cannot be terminated or transferred without the consent of each party.

As part of their risk management, financial institutions generally establish credit lines for each trading counterparty. For foreign exchange (spot and forward), the lines are most often expressed in notional terms. These credit lines include global counterparty limits, daily counterparty settlement limits, and maturity limits. Some sophisticated financial institutions use credit-equivalent risk limits rather than notional amounts for their foreign-exchange exposure. For interest-rate risk, financial institutions usually express their exposure in credit equivalents of notional exposure. Financial institutions may require a less creditworthy counterparty to pledge collateral and supplement it if the position moves against the counterparty.

Market Risk

The risk of forward contracts should be evaluated by their effect on the market risk of the overall portfolio. Institutions that leave positions in the portfolio unhedged may be more exposed to market risk than institutions that ''run a matched book.'' A financial institution may choose to leave a portion of its exposure uncovered to benefit from expected price changes in the market. However, if the market moves against the institution's prediction, the institution would incur losses.

Basis Risk

Basis risk is the potential for loss from changes

in the price or yield differential between instruments in two markets. Although risk from changes in the basis tends to be less than that arising from absolute price movements, it can sometimes represent a substantial source of risk. Investors may set up hedges, which leave them vulnerable to changes in basis between the hedge and the hedged instrument.

Yield-curve risk may also arise by holding long and short positions with equal durations but different maturities. Although such arrangements may protect against a parallel yield-curve shift, they may leave investors exposed to the risk of a nonparallel shift causing uneven price changes. In foreign currency, basis risk arises from changes in the differential between interest rates of two currencies.

Liquidity Risk

Forwards are usually not transferable without the consent of the counterparty and may be harder to liquidate than futures. To eliminate the exposure of a contract, a customer may have to buy an offsetting position if the initial dealer does not want to unwind or allow the transfer of the contract.

Clearing and Settlement Risk

In OTC markets, clearing and settlement occur on a bilateral basis thereby exposing counterparties to intraday and overnight credit risks. To reduce these risks as well as transactions costs, many financial institutions have bilateral netting arrangements with their major counterparties. Position netting allows counterparties to net their payments on a given day, but does not discharge their original legal obligations for the gross amounts. Netting by novation replaces obligations under individual contracts with a single new obligation.

ACCOUNTING TREATMENT

The accounting treatment for foreign-exchange forward contracts is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of a forward contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are below.

Remaining Maturity	*Credit-Conversion Factor*
One year or less	0.00%
Five years or less	0.50%
Greater than five years	1.50%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, "Capital Adequacy.") For institutions that apply market-risk capital standards, all foreign-exchange transactions are included in value-at-risk (VAR) calculations for market risk.

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Forwards are not considered investments under 12 USC 24 (seventh). The use of these instruments is considered to be an activity incidental to banking, within safe and sound banking practices.

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GENERAL DESCRIPTION

A forward rate agreement (FRA) is an over-the-counter (OTC) contract for a cash payment at maturity based on a *market (spot) rate* and a prespecified *forward rate*. The contract specifies how the spot rate is to be determined (this is sometimes called the *reference rate*). If the spot rate is higher than the contracted rate, the seller agrees to pay the buyer the difference between the prespecified forward rate and the spot rate prevailing at maturity, multiplied by a *notional principal amount*. If the spot rate is lower than the forward rate, the buyer pays the seller. The notional principal, which is not exchanged, represents a Eurocurrency deposit of a specified *maturity* or *tenor*, which starts on the day the FRA matures. The cash payment is the present value of the difference between the forward rate and the spot rate prevailing at the settlement date times the notional amount. This payment is due at the settlement date. Buying and selling FRAs is sometimes called *taking* and *placing* FRAs, respectively. FRAs with maturities longer than a year are called *long-dated* FRAs.

FRAs are usually *settled* at the start of the agreed-upon period in the future. At this time, payment is made of the discounted present value of the interest payment corresponding to the difference between the contracted fixed rate (the forward rate at origination) and the prevailing reference rate (the spot rate at maturity). For example, in a six-against-nine-month (6x9) FRA, the parties agree to a three-month rate that is to be netted in six months' time against the prevailing three-month reference rate, typically LIBOR. At settlement (after six months), the present value of the net interest rate (the difference between the spot and the contracted rate) is multiplied by the notional principal amount to determine the amount of the cash exchanged between the parties. The basis used in discounting is actual/360-day for all currencies except pounds sterling, which uses an actual/365-day count convention.

CHARACTERISTICS AND FEATURES

An FRA can be entered into either orally or in writing. Each party is, however, required to confirm the FRA in writing. FRAs are customized to meet the specific needs of both parties. They are denominated in a variety of currencies and can have customized notional principal amounts, maturities, and interest periods. The British Bankers' Association (BBA) has developed standards for FRAs, called *Forward Rate Agreements of the BBA (FRABBA) terms*, which are widely used by brokers and dealers. The standards include definitions, payment and confirmation practices, and various rights and remedies in case of default. Under these standards, counterparties execute a master agreement, under which they agree to execute their FRA transactions.

USES

Hedging

FRAs are often used as a hedge against future movement in interest rates. Like financial futures, they offer a means of managing interest-rate risk that is not reflected on the balance sheet and, therefore, generally requires less capital.

FRAs allow a borrower or lender to ''lock in'' an interest rate for a period that begins in the future (assuming no change in the basis), thus effectively extending the maturity of its liabilities or assets. For example, a financial institution that has limited access to funds with maturities greater than six months and has relatively longer-term assets can contract for a six-against-twelve-month FRA, and thus increase the extent to which it can match asset and liability maturities from an interest-rate risk perspective. By using this strategy, the financial institution determines today the cost of six-month funds it will receive in six months' time. Similarly, a seller of an FRA can lengthen the maturity profile of its assets by determining in advance the return on a future investment.

Trading

Banks and other large financial institutions employ FRAs as a trading instrument. Market makers seek to earn the bid/ask spread through buying and selling FRAs. Trading may also take the form of arbitrage between FRAs and interest-rate futures or short-term interest-rate swaps.

DESCRIPTION OF MARKETPLACE

Primary Market

Commercial banks are the dominant player in the FRA market, both as market makers and end-users. Nonfinancial corporations have also become significant users of FRAs for hedging purposes. Most contracts are originated in London and New York, but all major European financial centers have a significant share of volume. Market transparency is high in the FRA market, and quotes for standard FRA maturities in most currencies can be obtained from sources such as Telerate and Bloomberg.

A significant amount of trading in FRAs is done through brokers who operate worldwide. The brokers in FRAs usually deal in Euros and swaps. The principal brokers are Tullet & Tokyo Foreign Exchange; Garvin Guy Butler; Godsell, Astley & Pearce; Fulton Prebon; and Eurobrokers.

Secondary Market

The selling of an existing FRA consists of entering into an equal and opposite FRA at a forward rate offered by a dealer or other party at the time of the sale. The secondary market in FRAs is very active and is characterized by a significant amount of liquidity and market transparency.

PRICING

Initial Cost

When an FRA is initiated, the FRA *rate* is set such that the value of the contract is zero, since no money is exchanged, except perhaps a small arrangement fee (which may not be payable until settlement). Forward rates are directly determined from spot rates. For example, the rate on a 6-against-12-month FRA will be derived directly from rates on 6- and 12-month deposits. (This rate derived from the yield curve is termed an *implied forward rate*.) As an example, suppose the 6-month Eurodollar deposit rate is 6.00 percent and the 12-month Eurodollar deposit rate is 7.00 percent. The rate on a 6-against-12-month FRA would be derived by finding the 6-month forward rate, 6 months hence ($_6R_{12}$):

$$(1.07) = (1.06)^{.5}(1 + {}_6R_{12})^{.5}$$

$$_6R_{12} = 8.00\%$$

There is little evidence that arbitrage opportunities exist between the FRA and deposit markets after taking into account bid/offer spread and transactions costs.

Valuation at Settlement

Settlement on an FRA contract is made in advance, that is at the settlement date of the contract. The settlement sum is calculated by discounting the interest differential due from the maturity date to the settlement date using the relevant market rate.

Let f = the FRA rate (as a decimal), s = the spot rate at maturity (as a decimal), t = the tenor of the notional principal in number of days, P = the notional principal, and V = the sum due at settlement. Assume that the basis is actual/360-day. The interest due the buyer before discounting is $(s - f)P(t/360)$. The discount factor is $1 - s(t/360)$. V is the sum due at settlement:

$$V = [(s - f)P(t/360)][1 - s(t/360)]$$

For example, consider a \$10 million three-against-six-month FRA with a forward rate of 6.00 percent and a spot rate at maturity of 6.50 percent.

$$V = [\$10\text{mm}(.065 - .06)(91/360)]$$
$$[1 - ((.065)(91/360))]$$

$$V = \$12{,}431.22$$

A payment of \$12,431.22 would be made by the seller to the buyer of the FRA at settlement.

HEDGING

Market Risk

Eurodollar futures are usually used to hedge the market risk of FRA positions. However, the only perfect economic hedge for an FRA is an offsetting FRA with the same terms.

Credit Risk

Letters of credit, collateral, and other credit

enhancements can be required to mitigate the credit risks of FRAs. In practice, however, this is rarely done because the credit risk of FRAs is very low.

RISKS

Interest-Rate Risk

The interest-rate risk (or market risk) of an FRA is very similar to a short-term debt instrument with maturity equal to the interest period of the FRA. For example, a six-against-nine-month FRA has a price sensitivity similar to that of a three-month debt instrument (approximate duration of one-fourth of a year).

Liquidity Risk

Liquidity risk (the likelihood that one cannot close out a position) is low. The FRA markets are very liquid, although generally not as liquid as the futures markets.

Credit Risk

The credit risk of FRAs is small but greater than the credit risk of futures contracts. The credit risk of futures is minimal because of daily margining and the risk management of the futures clearing organizations. If an FRA counterparty fails, a financial institution faces a loss equal to the contract's replacement cost. The risk of loss depends on both the likelihood of an adverse movement of interest rates and the likelihood of default by the counterparty. For example, suppose a financial institution buys an FRA at 10 percent to protect itself against a rise in LIBOR. By the settlement date, LIBOR has risen to 12 percent, but the counterparty defaults. The financial institution therefore fails to receive anticipated compensation of 2 percent per annum of the agreed notional principal amount for the period covered by the FRA. Note that the financial institution is not at risk for the entire notional principal amount, but only for the net interest-rate differential.

FRAs raise the same issues about measuring credit-risk exposure as interest-rate swaps. Because the periods covered by FRAs are typically much shorter, many institutions calculate the credit exposure on FRAs as a flat rate against the counterparty's credit limit, for example, 5 percent (sometimes 10 percent) of the notional principal amount. The 5 percent credit exposure is a rule of thumb adopted for administrative ease, and it represents the approximate potential loss from counterparty default if the reference interest rate for a three-month future period moves against the financial institution by 20 percentage points before the settlement date. For an agreement covering a six-month future interval, the 5 percent charge to a counterparty's credit limit represents exposure against approximately a 10 percentage point movement in the reference interest rate.

ACCOUNTING TREATMENT

The accounting treatment of single-currency forward interest-rate contracts, such as forward rate agreements, is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, ''Accounting for Derivatives and Hedging Activities.'' (See section 2120.1, ''Accounting,'' for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of an FRA contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are below.

Remaining Maturity	*Credit-Conversion Factor*
One year or less	0.00%
Five years or less	0.50%
Greater than five years	1.50%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, ''Capital Adequacy.'') For institutions that apply market-risk capital standards, all foreign-exchange trans-

actions are included in value-at-risk (VAR) calculations for market risk.

LEGAL LIMITATIONS FOR BANK INVESTMENTS

FRAs are not considered investments under 12 USC 24 (seventh). The use of these instruments is considered to be an activity incidental to banking, within safe and sound banking practices.

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GENERAL DESCRIPTION

Futures contracts are exchange-traded agreements for delivery of a specified amount and quality of a particular product at a specified price on a specified date. Futures contracts are essentially exchange-traded forward contracts with standardized terms. Futures exchanges establish standardized terms for futures contracts so that buyers and sellers only have to agree on price.

Unlike the over-the-counter (OTC) derivative markets, futures contracts are required by U.S. law to trade on federally licensed contract markets that are regulated by the Commodity Futures Trading Commission (CFTC). Banks may invest in futures for their own account or act as a futures broker through a futures commission merchant (FCM) subsidiary. The two generic types of futures contracts are commodity futures (such as coffee, cocoa, grain, or rubber) and financial futures (that is, currencies, interest rates, and stock indexes). This section focuses on financial futures.

CHARACTERISTICS AND FEATURES

Terms

All futures contracts have the following standardized terms: specific product, quality (or grade), contract size, pricing convention, and delivery date. The following is an example of the terms on a futures contract for U.S. Treasury notes traded on an exchange such as the Chicago Board of Trade (CBOT).

Product:	10-year Treasury notes
Contract size:	$100,000
Price quoted:	32nds of 100 percent
Delivery date:	Any business day of delivery month (March, June, September, or December, depending on the particular contract)
Deliverable grade:	Any U.S. Treasury notes with maturity of 6½ to 10 years

Margin

In addition, all exchanges require a *good faith* deposit or *margin* in order to buy or sell a futures contract. The amount of margin will vary from contract to contract and from exchange to exchange. The required margin deposit may also vary depending on the type of position held. The margin requirement is meant to ensure that adequate funds are available to cover losses in the event of adverse price changes. Margin requirements are determined and administered by the exchange's clearinghouse.

As an example of how margin requirements operate, consider a deutschemark (DM) 125,000 futures contract against the dollar with a price of $.68/DM. One trader takes a long DM position, meaning that it will receive DM 125,000 and pay $85,000 in December. Another trader takes a short DM position, such that it will pay the DM 125,000 in return for $85,000. Each trader puts up an initial margin of $4,250, which is invested in U.S. Treasuries in margin accounts held at each trader's broker. Time passes and the $/DM rate increases (the DM decreases in value) so that the trader with the long DM position must post additional margin. When the spot rate subsequently reaches $.61/DM, the long trader decides to cut his losses and close out his position. Ignoring the limited effect of prior fluctuations in margin, the long trader's cumulative loss measures $8,750 ($.68/DM – $.61/DM) × DM 125,000).

Exchanges

Futures contracts are traded on organized exchanges around the world. Exchanges for the major futures contracts in currencies, interest rates, and stock indexes are discussed below.

Currency Futures

In the United States, futures contracts trade in the International Monetary Market (IMM) of the Chicago Mercantile Exchange (CME) in the major currencies, including the deutschemark, Japanese yen, British pound, Canadian dollar, and Swiss franc. Overseas, the most active currency futures exchanges are the London

International Financial Futures Exchange (LIFFE) and the Singapore International Monetary Exchange (SIMEX).

Interest-Rate Futures

The IMM and the CBOT list most of the fixed-income futures in the United States. Contracts on longer-term instruments, such as Treasury notes (2-, 5-, and 10-year) and Treasury bonds (30-year), are listed on the CBOT. Futures on short-term instruments such as Eurodollar deposits and Treasury bills trade on the IMM. There are also futures on bond indexes such as those for municipal bonds, corporate bonds, Japanese government bonds, and British gilts. As with currencies, the most active overseas exchanges are in London and Singapore.

Stock-Index Futures

In the United States, stock-index futures are available for the S&P 500 (CME), Major Market Index (CME), New York Stock Exchange Composite Index (New York Futures Exchange), and Nikkei 225 Index (CME). Overseas, there are futures on many of the major equity markets, including the Nikkei (Osaka and Singapore Futures Exchanges), DAX (LIFFE), and FTSE 100 (LIFFE).

Clearinghouses

Clearinghouses provide centralized, multilateral netting of an exchange's futures contracts. Centralized clearing, margin requirements, and daily settlement of futures contracts substantially reduce counterparty credit risk. A futures exchange operates in tandem with a clearinghouse that interposes itself between a contract's counterparties and, thus, guarantees payment to each.

In addition, customers in futures markets post collateral, known as initial margin, to guarantee their performance on the obligation. At the end of each day, the futures position is marked to market with gains paid to or losses deducted from (variation margin payments) the margin account. The balance in a margin account cannot fall below a minimum level (known as maintenance margin). If the position falls below the maintenance margin, the counterparty must put up additional collateral.

Under some circumstances, traders that have positions in a variety of futures and options on futures can have their margin determined on a portfolio basis. This process takes into account the natural offsets from combinations of positions which may reduce the total margin required of a market participant. The industry has developed a scenario-based portfolio margining system called SPAR$_{TM}$ which stands for the Standard Portfolio Analysis of Risk.

Many futures contracts specify settlement in cash, rather than by physical delivery, upon expiration of the contract. Cash settlement has the advantage of eliminating the transaction costs of purchasing and delivering the underlying instruments. Examples of cash-settled contracts are futures on Eurodollars, municipal bond indexes, and equity indexes.

USES

Market participants use futures to (1) hedge market risks, (2) arbitrage price discrepancies within and between markets, (3) take positions on future market movements, and (4) profit by acting as market makers (forwards) or brokers (futures). Financial institutions, money managers, corporations, and traders use these instruments for managing interest-rate, currency, commodity, and equity risks. While most large financial institutions are active in the interest-rate and foreign-exchange markets, only a handful of financial institutions have exposures in commodities or equities.

Hedging

Futures are used to hedge the market risk of an underlying instrument. For example, financial institutions often face interest-rate risk from borrowing short-term and lending long-term. If rates rise, the institution's spread will decrease or even become negative. The institution can hedge this risk by shorting a futures contract on a fixed-income instrument (such as a Treasury security) maturing at the same time as the asset. If rates rise, the futures position will increase in value, providing profit to offset the decrease in net interest spread on the cash position. If rates fall, however, the value of the futures contract

will fall, offsetting the increase in the institution's interest-rate spread.

Arbitrage

Risk-free arbitrage opportunities in which a trader can exploit mispricing across related markets to lock in a profit are rare. For brief periods of time, pricing in the futures market may be inconsistent with pricing in the cash market. For example, if DM futures are overpriced relative to the rates implied by interest-rate parity relationships, a trader could borrow dollars, sell them against spot DM, purchase a DM deposit, and sell the DM future. This arrangement would lock in a risk-free return.

Positioning

Traders and investors can use futures for speculating on price movements in various markets. Futures have the advantage of lower transactions costs and greater leverage than many cash-market positions. Speculators may make bets on changes in futures prices by having uncovered long or short positions, combinations of long and short positions, combinations of various maturities, or cash and futures positions. Speculators may profit from uneven shifts in the yield curve, fluctuations in exchange rates, or changes in interest-rate differentials.

For example, a speculator expecting stock prices to increase buys 10 contracts on the S&P 500 index for March delivery at a price of $420. Each contract covers 500 times the price of the index, thereby giving the speculator immediate control of over $2.1 million (420 × 500 × 10) of stock. By February, the index increases to 440, giving the speculator an unrealized profit of $100,000 ((440 – 420) × 500 × 10). The market is still bullish, so the speculator decides to hold the contract for several more weeks, anticipating more profits. Instead, negative economic news drives the index down to 405 and induces the speculator to close out his position, leaving a loss of $75,000.

Money managers use financial futures as an asset-allocation tool. Futures allow managers to shift the fixed-income, currency, and equity portions of their portfolios without having to incur the costs of transacting in the cash market. A fixed-income manager may use bond futures to readjust the composition of a fixed-income portfolio in response to a particular outlook on interest rates. For example, a manager anticipating an increase in interest rates can shorten portfolio duration to reduce the risk of loss by selling Treasury bond or bill futures. Currency futures could be used to reduce or increase currency risk in an international portfolio. Equity index futures can be used to adjust a portfolio's exposure to the stock market.

Market Making or Brokering

A financial institution can also attempt to profit by holding itself out as a market maker or broker, providing two-way prices (bid and offer) to the market. While earning the bid offer spread, the institution will either hedge the resulting positions or choose to hold the position to speculate on expected price movements.

DESCRIPTION OF MARKETPLACE

The combination of contract standardization, centralized clearing, and limited credit risk promotes trading of futures on exchanges such as the CBOT, CME, and LIFFE. In the United States, futures exchanges traditionally use the "open outcry" method of trading, whereby traders and floor brokers, standing in pits on the trading floor, shout out or use hand signals to indicate their buy and sell orders and prices. Technological innovation and the desire for after-hours trading have fostered the development of electronic trading systems. These systems have become quite popular overseas, especially on newer exchanges. For example, GLOBEX is an electronic trading system that currently provides after-hours trading of contracts listed on the CME and the MATIF (Marche a Terme International de France) in Paris. The LIFFE after-hours trade-matching system is called APT, and the CBOT system is called Project A. In addition to these electronic trading systems, several exchanges have extended trading hours through exchange linkages. The oldest and most well-known linkage is the mutual offset system between the CME and the SIMEX for Eurodollar futures contracts. SIMEX has similar arrangements with the International Petroleum Exchange (IPE). LIFFE has announced

plans for futures linkages with the CBOT and the CME.

Customers submit their buy or sell orders through registered commodity brokers known as FCMs. Several large domestic and foreign banks and bank holding companies have established their own FCM subsidiaries. Most of these subsidiaries are also clearing members of the major commodity exchange clearinghouses and have an established floor staff working on the clearinghouse's associated futures exchange. Institutional customers often place their orders directly with the FCM's phone clerks on the exchange floor. The clerk signals the order to a pit broker (usually an independent contractor of the FCM). The pit broker completes the transaction with another member of the exchange and then signals a confirmation back to the phone clerk who verbally relates the trade information back to the customer. The trade is then processed by the FCM for trade matching, clearing, and settlement. An FCM's back-office clerks usually recap the customer's transactions at the end of day with the customer's back-office staff. Paper confirmation is mailed out the following day; however, on-line confirmation capability is becoming increasingly common.

PRICING

As with forward rates, futures prices are derived from arbitrage-free relationships with spot prices, taking into account carrying costs for corresponding cash-market goods. With commodities, carrying costs include storage, insurance, transportation, and financing costs. The cost-of-carry for financial instruments consists mostly of financing costs, though it may also include some fixed costs such as custody fees. The cost-of-carry concept when referred to in the context of futures contracts is known as the *basis* (that is, the difference between the cash price for a commodity or instrument and its corresponding futures price).

In the case of fixed-income, interest-rate futures, the cost-of-carry represents the difference between the risk-free, short-term interest rate and the yield on the underlying instrument. The price of a fixed-income future can be expressed by the formula:

$$F = P + [P \times (r - y)],$$

where F is the futures price, P is the cash price of the deliverable security, r is the short-term collateralized borrowing rate (or repo rate), and y is any coupon interest paid on the security divided by P. To understand the relationship between spot and futures prices, imagine an investor who borrows at the repo rate, takes a long position in the underlying bond, and sells a bond future. At the maturity of the futures contract, the investor can deliver the bond to satisfy the futures contact and use the cash proceeds from the short futures position to repay the borrowing. In competitive markets, the futures price will be such that the transaction does not produce arbitrage profits.

For foreign-exchange futures, the cost-of-carry can be derived from the differential between the interest rates of the domestic and foreign currencies. When foreign interest rates exceed domestic rates, the cost-of-carry is negative. The spread that could be earned on the difference between a short domestic position and a long foreign position would subsidize the combined positions. For the no-arbitrage condition to hold, therefore, a comparable futures position (domestic per foreign) must cost less than the cash (spot) position.

HEDGING

Hedge Ratio

The hedge ratio is used to calculate the number of contracts required to offset the interest-rate risk of an underlying instrument. The hedge ratio is normally constructed by determining the price sensitivity of the hedged item and the price sensitivity of the futures contract. A ratio of these price sensitivities is then formulated to determine the number of futures contracts needed to match the price sensitivity of the underlying instrument.

Interest-Rate Exposure

Financial institutions use futures to manage the risk of their assets and liabilities, as well as off-balance-sheet exposures. Asset/liability management may involve the use of futures to lock in spreads between borrowing and lending rates. For example, a financial institution may sell Eurodollar futures in advance of an anticipated

funding to lock in the cost of funds. If LIBOR subsequently increases, the short futures position will increase in value, offsetting the higher spot interest cost that the financial institution will have to pay on its funding.

These contracts may be used to hedge investment portfolios against yield-curve shifts. Financial institutions can hedge mortgage portfolios by selling futures contracts (or GNMA forwards), and government bond dealers may sell Treasury futures to hedge their inventory. Pension and other types of benefits managers may hedge a fixed future liability by selling futures, or they may hedge an expected receipt by buying futures.

Interest-rate swap dealers use futures (or forwards) to hedge their exposures because directly offsetting swaps with the necessary terms cannot be found easily. The dealers rely on Eurodollar futures, Treasury futures, and floating-rate agreements (a type of interest-rate forward) to hedge their unmatched commitments. For example, a dealer obligated to pay LIBOR may sell Eurodollar futures to protect itself against an increase in interest rates.

Foreign-Exchange Exposure

Corporations engaged in international trade may use foreign-currency contracts to hedge payments and receipts denominated in foreign currencies. For example, a U.S. corporation that exports to Germany and expects payment in DM could sell DM futures (or forwards) to eliminate the risk of lower DM spot rates at the time that the payment arrives. A corporation may also use foreign-exchange contracts to hedge the translation of its foreign earnings for presentation in its financial statements.

Financial institutions use foreign-exchange futures (or forwards) to hedge positions arising from their businesses dealing in foreign exchange. An institution that incurs foreign-exchange exposure from assisting its customers with currency risk management can use offsetting contracts to reduce its own exposure. A financial institution can also use futures (or forwards) to cover unmatched currency swaps. For example, a dealer obligated to make a series of DM payments could buy a series of DM futures (or forwards) to reduce its exposure to changes in the DM/$ exchange rate.

RISKS

Users and brokers of futures face various risks, which must be well understood and carefully managed. The risk-management methods applied to futures (or forwards) may be similar to those used for other derivative products.

Credit Risk

Unlike OTC derivative contracts, the credit risk associated with a futures contract is minimal. The credit risk in futures is less because the clearinghouse acts as the counterparty to all transactions on a given exchange. An exchange's clearinghouse may be a division of the exchange, as in the case of the CME, or may be a separately owned and operated entity, such as the Chicago Board of Trade Clearing Corporation (BOTCC) or the London Clearing House (LCH). In addition to the credit protection a futures clearinghouse receives from prospective (initial) margin and the daily contract revaluations and settlement (marking to market), a clearinghouse is usually supported by loss-sharing arrangements with its clearing member firms. These loss-sharing provisions may take the form of limited liability guarantees (''pass-the-hat rules'' (BOTCC, LCH)) or unlimited liability guarantees (''good-to-the-last-drop rules'' (CME, NYMEX, SIMEX)). Because of these safeguards, no customer has lost money due to default on a U.S. futures exchange.

In addition, customer-account segregation significantly reduces the risk a customer faces with regard to excess margin funds on deposit with its FCM. Segregation is required for U.S. futures brokers but is less common overseas. However, even with customer-account segregation, FCM customers are exposed to the performance of the FCM's other customers. Unlike a U.S. broker-dealer securities account, the futures industry does not have a customer insurance scheme such as the Securities Investor Protection Corporation (SIPC). The exchanges and their clearinghouses often maintain small customer-guarantee funds, but disbursement from these funds is discretionary.

Finally, clearinghouses maintain their margin funds in their accounts at their respective settlement banks. These accounts are not unique and carry the same credit risks as other demand deposit accounts at the bank. For this reason, the

European Capital Adequacy Directive assigns futures and options margins a 20 percent risk-based capital treatment.

Market Risk

Because futures are often used to offset the market risk of other positions, the risk of these contracts should be evaluated by their effect on the market risk of the overall portfolio. Institutions that leave positions in the portfolio unhedged may be more exposed to market risk than institutions that "run a matched book." A financial institution may choose to leave a portion of its exposure uncovered to benefit from expected price changes in the market. If the market moves against the institution's prediction, the institution would incur losses.

Basis Risk

Basis risk is the potential for loss from changes in the price or yield differential between instruments in two markets. Although risk from changes in the basis tends to be less than that arising from absolute price movements, it can sometimes represent a substantial source of risk.

With futures, basis may be defined as the price difference between the cash market and a futures contract. As a contract matures, the basis fluctuates and gradually decreases until the delivery date, when it equals zero as the futures price and the cash price converge. Basis on interest-rate futures can vary due to changes in the shape of the yield curve, which affects the financing rate for holding the deliverable security before delivery. In foreign currency, basis risk arises from changes in the differential between interest rates of two currencies.

Investors may set up hedges with futures, which leave them vulnerable to changes in basis between the hedge and the hedged instrument. For example, Treasury note futures could be sold short to hedge the value of a medium-term fixed-rate corporate loan. If market forces cause credit spreads to increase, the change in value of the hedge may not fully offset the change in value of the corporate bond.

Yield-curve risk may also arise by holding long and short positions with equal durations but different maturities. Although such arrangements may protect against a parallel yield-curve shift, they may leave investors exposed to the risk of a nonparallel shift causing uneven price changes.

Liquidity Risk

Because of the multilateral netting ability of a futures clearinghouse, futures markets are generally more liquid than their equivalent OTC derivative contracts. However, experience varies with each product and market. In the futures markets, most liquidity is found in near-term contracts and can be rather thin in the more distant contracts.

Clearing and Settlement Risk

In OTC markets, clearing and settlement occurs on a bilateral basis, exposing counterparties to intraday and overnight credit risks. To reduce these risks as well as transactions costs, many financial institutions have bilateral netting arrangements with their major counterparties. Position netting allows counterparties to net their payments on a given day, but does not discharge their original legal obligations for the gross amounts. Netting by novation replaces obligations under individual contracts with a single new obligation.

ACCOUNTING TREATMENT

The accounting treatment for foreign-currency futures contracts is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of a financial futures contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are below.

Remaining Maturity	*Credit-Conversion Factor*
One year or less	0.00%
Five years or less	0.50%
Greater than five years	1.50%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, ''Capital Adequacy.'')

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Banks may invest in any futures contract. However, in taking delivery of nonfinancial products, the bank may need to place the physical commodity in other real estate owned (OREO). In addition, the bank may not engage in the buying and selling of physical commodities or hold itself out as a dealer or merchant in physical commodities.

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GENERAL DESCRIPTION

Interest-rate swaps are over-the-counter (OTC) derivative contracts in which two parties agree to exchange interest cash flows or one or more notional principal amounts at certain times in the future according to an agreed-on formula. The cash flows may be in the same currency or a different currency. The formula defines the cash flows using one or more interest rates and one or more hypothetical principal amounts called *notional principal amounts.*

As an example, suppose that Company A and Bank B enter into a three-year interest-rate swap, in which Bank B agrees to pay a 6 percent fixed rate (quoted on a 30/360-day count basis) on a notional principal of $100 million, every six months, on January 1 and July 1. In return, Company A agrees to pay U.S. dollar six-month LIBOR on the same dates, on the same notional principal. Thus, the cash flows on the swap will have semiannual fixed-rate payments of $300,000 going to Company A on each January 1 and July 1, and floating payments based on the prevailing level of U.S. dollar six-month LIBOR on each January 1 and July 1 going to Bank B. These semiannual cash flows will be exchanged for the three-year life of the swap.

Banks, corporations, sovereigns, and other institutions use swaps to manage their interest-rate risks, reduce funding costs (fixed or floating), or speculate on interest-rate movements. Banks (commercial, investment, and merchant) also act as *swaps dealers* or *brokers* in their role as financial intermediaries. As a dealer, a bank offers itself as a counterparty to its customers. As a broker, a bank finds counterparties for its customers, in return for a fee.

The interest-rate swaps market has grown rapidly since its inception in the early 1980s. As of March 1995, interest-rate swaps accounted for 69 percent of the market in interest-rate derivatives, in terms of notional principal outstanding. The notional principal outstanding in swaps at this date was $18.3 trillion. The gross market value of these swaps was $562 billion, or 87 percent of all interest-rate derivative contracts.

CHARACTERISTICS AND FEATURES

Swap Terminology and Conventions

An interest-rate swap is an off-balance-sheet, OTC contractual agreement in which two counterparties agree to make interest payments to each other, based on an amount called the notional principal. In an interest-rate swap, only the interest payments are exchanged; the notional principal is not exchanged, it is used only to calculate the interest payments. Each counterparty's set of payments is called a *leg* or *side* of the swap. The fixed-rate payer has *bought the swap*, or is *long the swap*. Conversely, the floating-rate payer has *sold the swap*, or is *short the swap*. The counterparties make *service payments* at agreed-on periods during the swap's tenor. The payer of a fixed leg makes service payments at a fixed price (or rate). The payer of a floating leg makes payments at a floating price that is periodically *reset* using a *reference rate*, which is noted on specific reset dates. The actual dates on which payments are made are payment dates.

The reference floating rate in many interest-rate swap agreements is the *London Interbank Offered Rate (LIBOR)*. LIBOR is the rate of interest offered on short-term interbank deposits in Eurocurrency markets. These rates are determined by trading between banks, and they change continuously as economic conditions change. One-month, three-month, six-month, and one-year maturities are the most common for LIBOR quoted in the swaps market. Other floating-rate indexes common to the swaps market include prime, commercial paper, T-bills, and the 11th District Cost of Funds Index (COFI).

A day count convention for the fixed-rate and floating-rate payments is specified at the beginning of the contract. The standard convention is to quote the fixed leg on a semiannual 30/360-day basis, and to quote LIBOR on an actual/360-day basis. The fixed and floating legs, however, can be quoted on any basis agreed to by the counterparties.

The date that the swap is entered into is called the *trade date*. The calculation for the swap starts on its *settlement date* (effective or value date). Unless otherwise specified in the agree-

ment, the settlement date on U.S. dollar interest-rate swaps is two days after the trade date. The swap ends on its *termination* or *maturity* date. The period of time between the effective and termination dates is the swap's *tenor* or *maturity*.

Swap Agreement

Swaps are typically initiated through telephone conversations and confirmed by fax, telex, or letter (a *confirmation*). Both parties are legally bound by the initial agreement and complete documentation is not exchanged until later. Swap contracts are usually executed according to the standards of the International Swaps and Derivatives Association (ISDA) or the British Bankers Association's Interest-Rate Swaps (BBAIRS). The complete documentation of a particular swap consists of the confirmation; a payment schedule (in a format standardized by ISDA or BBAIRS); and a *master swap agreement* that uses standard language, assumptions, and provisions. As a rule, counterparties execute one master agreement to cover all their swaps. Thus, two different swaps may have different confirmations and payment schedules but may use the same master agreement. The master agreements cover many issues, such as (1) termination events; (2) methods of determining and assessing damages in case of default or early termination; (3) netting of payments; (4) payment locations; (5) collateral requirements; (6) tax and legal issues; and (7) timely notification of changes in address, telex numbers, or other information.

Types of Swaps

This general swap structure permits a wide variety of generic swaps. Common types of interest-rate swaps are outlined below.

- The *generic* (or *plain vanilla*) *swap* has a fixed and a floating leg; the notional amount and payments are all in the same currency.
- The *basis* (or *floating-for-floating*) *swap* has two floating legs, each tied to a different reference rate. These instruments are often used to reduce basis risk for a balance sheet that has assets and liabilities based on different indexes.
- The *forward swap* has a settlement at some agreed-on future date. A forward swap allows counterparties to lock in a fixed rate (as a payer or receiver) at the time of contract origination, but to postpone the setting of the floating rate and the calculation of cash flows until some time in the future. These swaps are often used to hedge future debt refinancings or anticipated issuances of debt.
- The *amortizing swap* has a notional principal which is reduced at one or more points in time before the termination date. These swaps are often used to hedge the interest-rate exposure on amortizing loans, such as project-finance loans.
- The *accreting swap* has a notional principal which is increased at one or more points in time before the termination date. These swaps are often used to hedge the interest-rate exposure on accreting loans, such as the drawdown period on project-finance loans.
- The *zero-coupon swap* is a fixed-for-floating swap in which no payments are made on the fixed leg until maturity. These swaps are often used to hedge the exposure on a zero-coupon instrument.
- *Callable*, *putable*, and *extendible swaps* are swaps with embedded options in which one party has the right, but not the obligation, to extend or shorten the tenor of the swap. As the counterparty has sold an option to the swap dealer in these transactions, the swaps will have a lower fixed rate in the case of a fixed-rate payer and a higher fixed rate in the case of a fixed-rate receiver. The counterparty is, however, subject to call or extension risk.
- The *seasonal swap* has different payment dates for the two legs (which may both be fixed), usually tied to the counterparties' cash-flow needs. These swaps are often used to create synthetic cash flows when actual cash flows change over time. This technique is called *deseasoning*. For example, suppose Firm A expects to make $120 million a year, or on average $10 million a month, but also expects to earn on average $15 million a month in June, July, and August; $5 million a month in May, September, and October; and $10 million a month in the remaining months. It can enter into a seasonal swap in which it pays $5 million a month in June, July, and August, when its revenues are high, and receives $5 million a month in May, September, and October, when its revenues are low.

USES

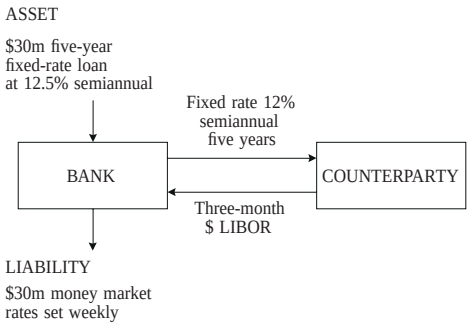
Interest-rate swaps are used for hedging, investment, and speculative purposes. Interest-rate swaps are also used to reduce funding costs and arbitrage purposes. Examples of how banks use interest-rate swaps for asset/liability management, investment purposes, and speculation are shown below.

Asset/Liability Management: Closing the Balance-Sheet Gap

Suppose a bank has a $30 million, five-year, fixed-rate loan asset with a semiannual coupon of 12.5 percent which it has funded with $30 million of money market deposits. The bank is faced with a balance-sheet gap—the asset has a fixed rate of interest, but the cost of the underlying liability resets every week. The risk faced by the bank is that a rise in short-term interest rates will cause the cost of its liabilities to rise above the yield on the loan, causing a negative spread. The bank can use a fixed-for-floating interest-rate swap to achieve a closer match between its interest income and interest expense, thereby reducing its interest-rate risk (see figure 1).

As shown in figure 1, the bank has entered into a five-year interest-rate swap in which it pays a dealer 12 percent and receives three-month U.S. dollar LIBOR. In effect, the bank has locked in a positive spread of 50 basis points.

Figure 1



Cash Flows on Transaction

Assumed cost of money market deposits (pays)	–3-month LIBOR
Swap inflow (receives)	+3-month LIBOR
Swap outflow (pays)	–12.00%
Loan interest inflow (receives)	+12.50%
Net position with hedge	+50 basis points

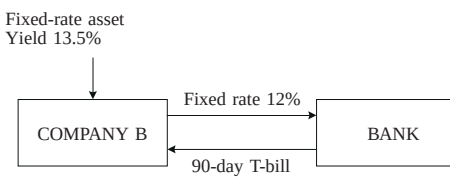
While the bank has effectively locked in a positive 50 basis point spread, it remains subject to basis risk between the three-month U.S. dollar LIBOR rate which it is receiving in the swap and the weekly money market rates which it pays to its depositors.

Investment Uses: Transforming a Fixed-Rate Asset into a Floating-Rate Basis

Interest-rate swaps are often used by investment managers to create synthetic assets, often in response to temporary arbitrage opportunities between the cash and derivative markets. A plain vanilla interest-rate swap can be used to transform the yield on a fixed- (floating-) rate asset such as a corporate bond into a floating- (fixed-) rate asset.

As an example, suppose that the investment manager of Company B has a five-year fixed-rate bond which yields 13.5 percent. Also, suppose that the investment manager has a strong view that interest rates will rise, but does not want to sell the bond because its credit quality could improve substantially in the future. To position the portfolio for a rise in rates without selling the bond, the investment manager can enter into an interest-rate swap in which Company B pays a fixed rate of 12 per-

Figure 2



cent and receives a floating rate based on the 90-day T-bill rate, effectively creating a synthetic floating-rate security yielding the 90-day T-bill rate plus 150 basis points (see figure 2).

Cash Flows on Transaction

Fixed rate on bond (receives)	+13.50%
Fixed rate on swap (pays)	−12.00%
Floating-rate 90-day T-bill (receives)	+90-day T-bill
Net Rate Received by Company B	90-day T-bill + 1.50%

Speculation: Positioning for the Expectation of Rate Movements

Interest-rate swaps can be used to take a position on interest-rate movements. In this example, an end-user establishes positions with swaps, believing that interest rates will fall in a six-month period. The end-user believes that short-term interest rates will decrease, but does not want to sell its floating-rate asset. The end-user can therefore enter into an interest-rate swap to receive a fixed rate of interest and pay a floating rate of interest, thereby converting the floating-rate asset to a fixed-rate basis.

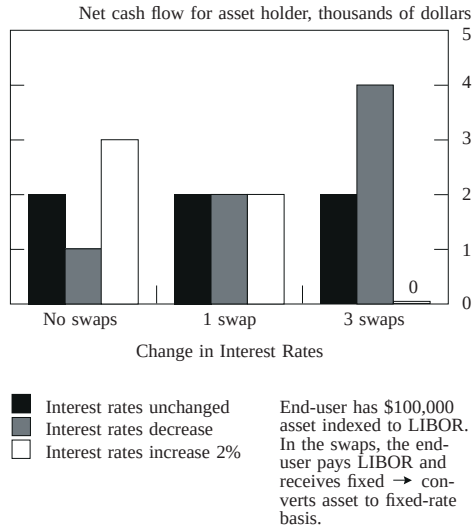
Figure 3 shows the cash flow to an end-user who has a $100,000 asset indexed to LIBOR, under various interest-rate scenarios for a period of six months. The vertical axis shows the end-user's net cash flow after six months, and the horizontal axis shows different interest-rate exposure strategies, ranging from holding the asset without entering into interest-rate swaps to entering into swaps to pay LIBOR and receive a fixed rate.

In each of the three clusters of bars on the horizontal axis, the return to the end-user under different interest-rate scenarios is displayed (from left to right) for no change in interest rates, a 2.00 percent decrease in interest rates, and a 2.00 percent increase in interest rates. As can be seen from the middle bar in the first cluster (the ''no swaps'' scenario), if the investor is correct and short-term interest rates decrease, the return on the asset will fall dramatically.

The second cluster of bars on the horizontal axis (the ''1 swap'' scenario) shows the asset return after the investor has entered into one swap based on a notional principal amount of $100,000 (equal to the amount invested in the asset), in which the investor pays a floating rate and receives a fixed rate. This swap is effectively a hedge which transforms the floating-rate asset return to a fixed-rate basis so that the asset return remains constant under all interest-rate scenarios.

The third cluster of bars on the horizontal axis (the ''3 swaps'' scenario) demonstrates the return from the investor's ''leveraged'' speculation that short-term interest rates will decrease. Here, the investor enters into three interest-rate swaps based on a notional principal of $100,000 (which is equivalent to one swap based on a notional principal of $300,000), in which the investor pays a floating rate and receives a fixed rate. Again, the first swap effectively transforms the floating-rate asset to a fixed-rate basis; in the second and third swaps, the investor receives (pays) the differential between the fixed and floating rates in the swap. Hence, if interest rates decrease 2.00 percent and the investor has entered into three interest-rate swaps (the middle bar in the third cluster), the asset return is increased substantially compared to just holding onto the asset (the middle bar in the first cluster). However, if the investor is wrong, and interest rates increase 2.00 percent after three interest rates have been entered into, the return on the asset will be zero.

Figure 3—Using Plain Vanilla Swaps to Leverage Interest-Rate Exposure



DESCRIPTION OF MARKETPLACE

Primary Market

The primary market for interest-rate swaps consists of swap dealers, swap brokers, and end-users.

Brokers and Dealers

Financial institutions, such as commercial banks, investment banks, and insurance companies, act as *dealers* in interest-rate swaps. Banks are a natural intermediary in the swaps market because of their exposure to interest-rate movements and their expertise in analyzing customer credit risk.

Swap brokers are paid a fee for arranging a swap transaction between two counterparties. Swap brokers do not take positions and do not act as a counterparty to a swap transaction.

End-Users

End-users of interest-rate swaps include financial institutions, corporations, sovereigns, government-sponsored enterprises (GSEs), and money managers. Banks who are dealers often also use swaps in an end-user capacity for asset/liability management, funding, and investment purposes. End-users use interest-rate swaps for hedging, investment, and speculative purposes. They also often use interest-rate swaps to reduce funding costs.

The nature of an end-user's business often determines whether he or she will wish to be a fixed-rate receiver or a fixed-rate payer. Fixed-rate payers are often firms whose minimum cash flows are reasonably predictable regardless of the level of interest rates. This class includes manufacturing and distribution firms in the developed countries, financial institutions with large portfolios of fixed-rate assets, and national agencies of certain developed countries that have difficulty accessing fixed-rate funds.

Fixed-rate receivers are often highly sensitive to changes in short-term market rates of interest. This class includes large money-center or regional banks that have large portfolios of floating-rate assets. The interest rates on the assets held in their loan portfolios may be indexed to U.S. prime rates, LIBOR, or other short-term market rates. The class also includes borrowers who have fixed-rate debt outstanding and prefer to convert it to floating-rate debt. Institutions such as life insurance companies, pension funds, wealthy investors, and managed trust accounts are notable examples of natural fixed-rate receivers.

Secondary Market

If a counterparty wishes to terminate, or *unwind*, an existing swap position in the secondary market, it must do so by one of three methods: *swap reversal*, *swap assignment*, or *swap buyback* (also called *close-out* or *cancellation*).

In a swap reversal, a counterparty of a swap enters into an offsetting swap with the same terms as the original swap. For example, if Firm A is in a fixed-for-floating swap, paying 10 percent on $10 million notional for U.S. dollar three-month LIBOR, with one year to maturity, the offsetting swap would be a one-year floating-for-fixed swap, paying U.S. dollar three-month LIBOR for 10 percent on $10 million notional. If market rates have changed since the position was initiated, which is likely, a *mirror offsetting position* cannot be established unless a fee is paid to establish the off-market mirror transaction. For instance, in the example above, if one-year rates at the time that the mirror swap is traded are 8 percent, the counterparty will have to pay a fee of approximately $185,000 to enter into the mirror trade ((10 percent – 8 percent) × $10 million discounted at 8 percent). The counterparty does not cancel the first swap; it adds a second swap to its books at the cost of increasing default risk.

In a swap assignment, a counterparty finds a new counterparty who is willing to assume its position in the swap. Swap assignments require the acquiescence of the other counterparty to the swap. At the time of the assignment, a payment representing the net present value of the swap is made either to or from the new assigned counterparty. For example, using the example above in which Firm A is in a 10 percent one-year fixed-for-floating swap, Firm A can assign its position in the swap to a new counterparty—Counterparty B (usually a dealer). In this case, as the swap has a negative mark-to-market value for Firm A, Firm A will be required to make a payment of $185,000 to Counterparty B. Counterparty B then assumes Firm A's position in the

swap with the original counterparty. A key issue in swap sales is the creditworthiness of the firm or dealer who will assume the swap. If the creditworthiness is poor, the other counterparty may not agree to the sale.

In a buy-back, one of the counterparties to a swap sells the swap to the other counterparty. Unlike the swap assignment example above, buy-backs are between the original counterparties and do not involve a third party. Buy-backs usually involve a payment which is based on the mark-to-market value of the swap at the time of the buy-back. In the example above, Firm A would be required to make a payment of $185,000 to the other original counterparty to terminate the swap.

Market Transparency

Market transparency in the swaps market is generally high. Market quotes are readily available on sources such as Telerate and Bloomberg. Increased competition has, in part, led to the narrowing of bid/offer spreads on plain vanilla deals. For instance, in the early 1980s, bid/offer spreads were in the 40 to 50 basis point range for deals under five years, and liquidity was almost nonexistent for deals beyond 10 years. Today, spreads have narrowed to 1 to 3 basis points for swaps under 10 years, and liquidity has increased significantly on swaps beyond 10 years.

Liquidity in the secondary market is high but is somewhat less than in the primary market because it is cumbersome to unwind existing positions. To make the secondary market more liquid, several people have proposed the creation of a clearing corporation similar to the clearing corporations for futures and options. If this happens, the disadvantages for end-users would be less customization and more regulation. The advantages would be reduction in default (credit) risk and increased transparency.

PRICING

Market Conventions and Terminology

The market convention for pricing swaps is to quote the fixed rate in terms of a basis point spread over the Treasury rate (usually quoted on a semiannual bond-equivalent yield basis) as the price for receiving the floating-interest-rate index flat (no basis points are added to or subtracted from the floating rate). For example, if an investor wants to receive a floating rate, such as LIBOR, the fixed rate it will have to pay would be the current *on-the-run* Treasury yield for the appropriate maturity category of the swap, plus a basis point spread over that yield (on-the-runs are the securities of the relevant maturity that were most recently auctioned). This basis point spread over the relevant Treasury is called the swap spread. For example, assuming that the on-the-run two-year Treasury yield is 6.00 percent and a two-year swap is quoted at 18/20 (bid/offer), then a fixed-rate receiver would pay the dealer LIBOR and receive a fixed rate of 6.18 percent, and a fixed-rate payer would pay the dealer 6.20 percent to receive LIBOR flat.

It is important to distinguish between the swap spread and the bid/offer spread (discussed above in the primary market information). The swap spread is the spread over the Treasury yield to pay or receive fixed while the *bid/offer spread* is the difference between the fixed rate which must be paid to the market maker and the fixed rate that the market maker will pay. The swap spread represents the difference between investment-grade spreads (from Eurodollar futures and corporate bond markets) and the risk-free rate of Treasury securities. This spread adjustment is appropriate because non-U.S.-government swap counterparties typically cannot borrow at risk-free Treasury rates. The supply and demand for fixed-rate funds also influences the swap spread. For instance, if there is a predominance of fixed-rate payers in the market, swap spreads will increase as the demand for paying fixed on swaps will exceed the supply of dealers willing to book these swaps, thus bidding up the spread.

Swaps are priced relative to other funding and investment vehicles with the same type of exposure. For shorter maturities, in which liquid interest-rate futures contracts are available, swaps are priced relative to futures contracts. Swaps of one- to five-year maturities are generally priced relative to Eurodollar futures.

At longer maturities, swaps are priced relative to rates in alternative traditional fixed- and floating-rate instruments. For instance, swap spreads for 5- to 10-year maturities are roughly equivalent to investment-grade (single A or higher) corporate spreads over U.S. Treasuries.

Pricing Using Eurodollar Futures Contracts

An interest-rate swap can be thought of as a series of forward contracts. As such, if forward rates are observable, a swap can be priced as a series of these forward contracts. Eurodollar futures contracts are observable, liquid market forward rates for U.S. dollar LIBOR. As the fixed rate on a swap is simply the blended forward rates for each floating reset date, swaps can be priced by reference to the Eurodollar strip (a series of Eurodollar futures contracts) out to the maturity date of the swaps contract. For example, consider a hypothetical one-year swap starting March 19, 1997, and terminating March 18, 1998 (March to March contract dates).

Step 1: Determine forward rates by reference to the one-year Eurodollar strip.

Month	*Futures Price*	*Rate*
March '97		5.75% (spot 3-month LIBOR)
June '97	94.07	5.93% (100 – 94.07)
September '97	93.82	6.18% (100 – 93.82)
December '97	93.60	6.40% (100 – 93.60)

Step 2: Calculate the swap rate based on the following formula:

$$\begin{aligned} R = {} & ([1 + R_0(D_0/360)] \\ & \times [1 + F_1(D_1/360)] \\ & \times \ldots \\ & \times [1 + F_n(D_n/360)] - 1) \\ & \times 360/365 \end{aligned}$$

where

R = Eurodollar strip rate (swap rate) stated as an annualized money market yield

R_0 = spot LIBOR to first futures expiration

F_1 = first futures contract (100 – futures price)

F_n = futures rate for the last relevant contract in the strip

D_i = actual number of days in each period

$$\begin{aligned} R = {} & ([1 + .0575(91/360)] \\ & \times [1 + .0593(91/360)] \\ & \times [1 + .0618(91/360)] \\ & \times [1 + .064(91/360)] - 1) \\ & \times 360/364 \\ R = {} & 6.21\% \end{aligned}$$

The above example is simplified because the swap begins and terminates on contract expiration dates. However, a similar methodology incorporating stub periods can be used to price swaps which do not fall on contract expiration dates by using the following generalized formula:

$$\begin{aligned} & [1 + R_0(D_0/360)] \\ & \times [1 + F_1(D_1/360)] \\ & \times \ldots \\ & \times [1 + F_n(D/360)] \\ = {} & [1 + R(365/360)]^N \\ & \times [1 + R(D_r/360)] \end{aligned}$$

where

D_r = total number of days in the partial-year period of the strip

N = number of whole years in the strip

Swaps are often priced using the Eurodollar strip for maturities of five years or less when liquidity in the Eurodollar strip is high.

Pricing Using Zero-Coupon Methodology

A zero-coupon methodology, another method used to value swap contracts, is often used to value swaps with maturities greater than five years. Unlike a yield-to-maturity (*YTM*) method in which each cash flow is valued at a constant discount rate, a zero-coupon methodology discounts each cash flow by a unique zero-coupon (spot) rate. A zero-coupon rate (zero) can be

thought of as the *YTM* of a zero-coupon bond. As such, the return in period *n* on a zero-coupon bond can be derived by making *n* period investments at the current forward rates. For instance, the discount factors for a three-period instrument priced on a *YTM* basis would be derived as follows.

YTM discount factors:

$$[1/(1 + YTM)] + [1/(YTM)^2] + [1/(YTM)^3],$$

where *YTM* = constant yield-to-maturity rate.

The discount factors for a three-period instrument priced on a zero-coupon basis would be derived as follows.

Zero-coupon discount factors:

$$[1/(1 + S_0)] + [1/(1 + S_0)(1 + {}_1f_2)] + [1/(1 + S_0)(1 + {}_1f_2)(1 + {}_2f_3)],$$

where

S_0 = Spot zero rate at time 0
${}_1f_2$ = forward rate for time period 1 to 2
${}_2f_3$ = forward rate for time period 2 to 3.

Zero-coupon swap rates can be calculated either from the price of an appropriate zero-coupon swap or from a series of forward rates such as the Eurodollar futures strip. The market in zero-coupon swaps, however, is not active and zero-coupon prices are not observable. However, zero-coupon swap rates can be derived from observable coupon-bearing swaps trading in the market using a technique called *bootstrapping*. Once zero-coupon swap rates have been derived, an interest-rate swap can be priced similar to a fixed-rate bond by solving for the swap rate which, when discounted by the appropriate zero-coupon rates, will equate the swap to par.

The first step in the bootstrapping method is to construct a swap yield curve based on coupon-paying swaps trading in the market. Once this yield curve has been constructed, the coupon rates on the swaps can be used to calculate zero swap rates. Based on the observable first-period swap rate, a zero rate can be derived for the first period. Often, this rate may already be stated on a zero-coupon basis, such as six-month LIBOR (coupons are not paid on the instrument). The first period zero rate (z_1) is derived by discounting the coupon rate on the first-period instrument by the zero-coupon rate which gives a price equal to par.

$$100 = (100 + c_1)/(1 + z_1),$$

where

c_1 = coupon rate on first-period instrument
z_1 = zero coupon rate for first period.

The first-period zero rate and the second-period coupon swap rate are then used to calculate the second-period zero rate (z_2) using the following relationship:

$$100 = [c_2/(1 + z_1)] + [(100 + c_2)/(1 + z_2)^2],$$

where

c_2 = coupon rate on second-period instrument
z_1 = zero-coupon rate for period 1
z_2 = zero-coupon rate for period 2.

This process is then continued to calculate an entire zero-rate curve. Zero rates for all other dates can then be calculated by interpolation.

As an example of the zero-coupon pricing methodology, consider the following simplified example for a $100 million two-year amortizing fixed-for-floating interest-rate swap, quoted on an annual basis. The swap amortized by $50 million at the end of year one, and amortizes to zero at the end of year two.

Step 1: Construct the cash-swap yield curve for two years.

Maturity	*On-the-Run Treasury Yield*	*Swap Spread*	*Swap Rate (Offer)*
1 year	4.80%	.18%–.20%	5.00%
2 year	5.70%	.28%–.30%	6.00%

Step 2: Derive the zero-coupon rates by the bootstrap method.

Using the coupon swap rates from the swap yield curve above, the first-period zero-coupon rate can be solved using the bootstrap method:

$$100 = 105/(1 + z_1)$$
$$z_1 = 5.00\%$$

Likewise, using the above cash-market swap rates to solve for the zero rate in year 2 by the bootstrap method:

$$100 = [6.00/(1.05)] + [106/(1 + z_2)^2$$
$$z_2 = 6.02\%$$

Step 3: Using iteration, solve for the swap-coupon rate which equates the cash flows on the swap to par using the zero rates obtained in step 2 as the discount factors.

$$\begin{aligned}\$100\text{mm} = [&\$50\text{mm} \\ &+ (100\text{mm} * \text{Swap Coupon}) \\ &\div (1.05)] \\ &+ [\$50\text{mm} \\ &+ (50\text{mm} * \text{Swap Coupon}) \\ &\div (1.0602)^2] \\ \text{Swap-Coupon Rate} &= 5.65\%\end{aligned}$$

Pricing Unwinds

After a swap has been entered into, the mark-to-market (MTM) value can be calculated by discounting the remaining cash flows on the swap by the appropriate zero-coupon rates prevailing at the time of the termination of the swap. The resulting value, above or below par, would then represent the amount which would be either received or paid to terminate the swap.

For example, using the amortizing swap example above, suppose that after one year, the counterparty who is a fixed-rate payer in the swap wishes to terminate the swap. At the time, one-year swap rates are 7.00 percent. The mark-to-market value of the swap would be calculated as follows:

Step 1: Determine the one-year (time remaining to maturity) zero-coupon rate.

$$100 = 107/(1.07)$$
$$z_1 = 7.00\%$$

Step 2: Discount remaining cash flows on the swap by the zero rate obtained in step 1.

$$\text{Price of Swap} = [\$50\text{mm} + (\$50\text{mm} \times .0565)] \div (1.07)$$

$$\text{Price of Swap} = \$49.37\text{ mm}$$

$$\text{MTM Value} = \$50\text{ mm} - \$49.37\text{ mm} = \$630{,}000$$

In this example, as rates have risen since the inception of the swap, the fixed-rate payer would receive a fee of $630,000 for terminating the swap.

HEDGING

Any firm that has a position in swaps is exposed to interest-rate, basis, and credit risks (discussed below). From a dealer standpoint, these risks are ideally hedged by entering immediately into mirror (offsetting) swaps, which eliminate exposure to these risks. However, in practice, dealers warehouse swap positions and hedge residual exposure with Eurodollar futures, forward rate agreements, or Treasuries until offsetting swaps can be established. End-users who have a swaps book face the same risks, and apply the same techniques, as dealers.

Hedging Interest-Rate and Basis Risk

Interest-rate risk in a swap portfolio is the risk that an adverse change in interest rates will cause the value of the portfolio to decline. Basis risk arises from an imperfect correlation between the hedge instrument and the instrument being hedged. Interest-rate and basis risk can be hedged one swap at a time (''microhedging''), or a portfolio (set) of swaps can be hedged (''macrohedging''). Microhedging is rare today. In macrohedging, the overall risks of the portfolio (or subsets of it) are evaluated and hedged using offsetting interest-rate swaps and other interest-rate derivatives. Residual exposures are hedged in the Eurodollar futures or Treasury markets. Most dealers dynamically hedge the residual exposure of their swap portfolio by adjusting the hedge position as interest rates change.

Risk managers usually take into account the effect of various interest-rate changes on the profitability of a swap book—for example, when interest rates change by 5, 10, 50, or 100 basis points. Dealers usually hedge for an arbitrary movement in rates, such as 50 basis points, which generally depends on senior management's risk appetite.

Hedging Credit Risk

The main techniques by which credit risk is hedged are (1) to require collateral if a counter-

party is out of money; (2) to establish termination clauses in the master agreement for assessment of damages in the event of default; (3) to net payments (when several swaps are outstanding with the same counterparty), according to terms established in a master netting agreement (or master agreement); and (4) to sell the swap to another party.

Hedging the credit risk of a swap book is difficult for a number of reasons. First, since there is no formal secondary market in swaps, it may not be immediately possible to trade out of a position. Second, assumptions about the certainty of cash flows and the level and term structure of interest rates are implicit in swap valuation. If these assumptions do not hold, the value of a swap book may not behave as expected, depending on how it is hedged. Third, to the extent to which some contracts are customized, they may be difficult to value accurately and to hedge.

If risk models are used to estimate a market maker's potential future credit exposure, the assumptions between the risk-management model and the credit-risk model should be consistent. As is the case for risk management, it is important to understand the assumptions in the model in order to estimate potential credit risk.

RISKS

The principal risks in swap contracts are interest-rate, basis, credit, and legal and operating risk. For participants entering into highly customized transactions, liquidity risk may be important because hedging or an assignment of the contract may be difficult.

Interest-Rate Risk

Interest-rate risk for swaps is the risk that an adverse change in interest rates causes the swap's market value to decline. The price risk of interest-rate swaps is analogous to that of bonds. In fact, a swap can be described as an exchange of two securities: a hypothetical fixed-rate bond and a floating-rate note. The swap involves the simultaneous exchange of these two securities of equal amount and maturity, in which netting of principal payments at origination and maturity results in no principal cash flow. Along these lines, a swap dealer who makes fixed-rate payments is considered to be short the bond market. This dealer has established the price sensitivities of a longer-term liability and a floating-rate asset. The price risk here is that if short-term interest rates decrease, the dealer would be receiving less on the asset but still paying out the same amount on the liability. This interest-rate exposure could be hedged by buying Eurodollar futures (or by being long Treasuries of the same maturity as the swap). Then, if short-term interest rates decrease, the gain on the hedge should offset the loss on the swap.

Basis Risk

A major form of market risk that dealers are exposed to is basis risk. Dealers have to hedge the price exposure of swaps they write until offsetting swaps are entered into, and the hedges may not be perfect.

Basis risk affects profitability. The bid/offer spread is the profit a dealer can make on a hedged swap book, but the dealer can earn less than this due to basis risk.

Sources of Basis Risk

When a dealer hedges swaps that have some credit risk with instruments of little or no credit risk (Treasuries), it creates basis risk. For instance, dealers often hedge swaps with maturities of five or more years with Treasuries. The risks in the swaps usually include credit risks, which are reflected in the floating rate(s). Since Treasuries are credit-risk-free securities, they do not provide a perfect hedge; this is a source of basis risk for the dealer, since there can be divergence between the two rates. Dealers are exposed to TED (Treasury-Eurodollar) spread risk when they hedge swaps of shorter maturities with Treasuries. In essence, the price of Eurodollar futures can change, which will cause swap spreads to change even if Treasury prices remain the same, since the swap spread is linked to the difference between the Eurodollar and Treasury markets.

Credit Risk

After the swap is executed, changes in interest rates cause the swap to move in the money for one counterparty and out of the money for the

other. For example, an increase in market interest rates would increase the floating-rate payments from a swap, causing the value of the swap to the fixed-rate payer to rise, and the value of the swap to the floating-rate payer to fall.

As no principal amount is exchanged in an interest-rate swap contract, credit risk is significantly less than it is on instruments in which principal is at risk. Credit-related loss can occur when the counterparty of an in-the-money swap defaults. The credit loss would be limited to the present value of the difference between the original and current market rates over the remaining maturity of the contract, which is called the replacement cost of the swap. For example, if a dealer had originally swapped fixed payments at 8.5 percent for six-month LIBOR for seven years, and the current market rate for the same transaction is 10 percent, the actual loss when a counterparty defaulted at the end of the first year would be the present value of 1.5 percent over six years on the notional principal amount of the swap.

Credit risk is a function of both current credit exposure and potential future credit exposure. The example above only illustrates current credit exposure. Potential future exposure depends primarily on the volatility of interest rates. One approach to estimating peak potential credit exposure (PkCE) is to perform a full-blown Monte Carlo simulation on a counterparty's portfolio. This strategy has many appealing features and is the most statistically rigorous. In essence, the model is calculating ''maximum'' potential market value of the transaction, given a set of market conditions and a set confidence interval. However, problems arise from having to assume desired correlations among variables when making multiple simulations of market conditions. These correlations need to hold true over the life of the contract and be adjusted for the introduction of new instruments. Aside from these methodology problems, it is almost impossible to run the necessary number of simulated portfolio market values within response times acceptable to the trading floor. Also, Monte Carlo simulations do not readily highlight the specific sources of potential exposure or suggest ways to neutralize this exposure.

An alternative to the full-blown Monte Carlo strategy can be characterized as the ''primary risk-source approach.'' This approach attempts to identify the market variable that is the primary source of changes in the contract's value and then simulate values based on changes in this variable. In practice, a single market variable is not usually the only factor that causes a contract's value to change. However, other factors that might affect the value are generally of secondary importance. In addition, if the secondary-market variables are not highly correlated with the primary risk source, their impact on market value is further reduced.

Estimating PkCE for a single contract can be complex. Accurately estimating PkCE for a portfolio of contracts executed with one counterparty can be so analytically difficult or computationally intensive that it is not always feasible. A trade-off has to be made between the ideal methodology and the computational demands.

Other factors which affect potential credit exposure include the shape and level of the yield curve, the frequency of payments, the maturity of the transaction, and whether collateral has been posted. In addition, the changing credit quality of counterparties can affect potential credit risk.

Legal Risk

Legal risk arises from the possibility that a swap contract will not be enforceable or legally binding on the counterparty. For instance, the enforcement of netting agreements with foreign counterparties varies by country and may expose a counterparty to risk in case of nonenforceability. As such, the adequacy of legal documentation, including master swap agreements and netting agreements, should be reviewed.

ACCOUNTING TREATMENT

The accounting treatment for swap instruments is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, ''Accounting for Derivatives and Hedging Activities.'' (See section 2120.1, ''Accounting,'' for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of an interest-rate swap contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are as follows.

Remaining Maturity	*Credit-Conversion Factor*
One year or less	0.00%
Five years or less	0.50%
Greater than five years	1.50%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, ''Capital Adequacy.'')

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Swaps are not considered investments under 12 USC 24 (seventh). The use of these instruments is considered to be an activity incidental to banking within safe and sound banking practices.

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GENERAL DESCRIPTION

Options transfer the right but not the obligation to buy or sell an underlying asset, instrument, or index on or before the option's exercise date at a specified price (the *strike price*). A *call option* gives the option purchaser the right but not the obligation to purchase a specific quantity of the underlying asset (from the call option seller) on or before the option's exercise date at the strike price. Conversely, a *put option* gives the option purchaser the right but not the obligation to sell a specific quantity of the underlying asset (to the put option seller) on or before the option's exercise date at the strike price.

The designation ''option'' is only applicable to the buyer's status in the transaction. An option *seller* has an obligation to perform, while a *purchaser* has an option to require performance of the seller and will only do so if it proves financially beneficial.

Options can be written on numerous instruments. Commercial banks are typically involved most with interest-rate, foreign-exchange, and some commodity options. Options can be used in bank dealer activities, in a trading account, or to hedge various risks associated with the underlying instruments or portfolio.

CHARACTERISTICS AND FEATURES

A basic option has six essential characteristics, as described below.

1. *Underlying security*. An option is directly linked to and its value is derived from a specific security, asset, or reference rate. Thus, options fit into the classification of ''derivative instruments.'' The security, asset, index, or rate against which the option is written is referred to as the option's *underlying instrument*.
2. *Strike price*. The strike price is the price at which an option contract permits its owner to buy or sell the underlying instrument. The strike price is also referred to as the exercise price. A call option is said to be in the money when the price of the underlying asset exceeds the strike price. A put option is in the money when the price of the asset is less than the exercise price.
3. *Expiration date.* Options are ''wasting assets''; they are only good for a prespecified amount of time. The date after which they can no longer be exercised is known as the *expiration date*.
4. *Long or short position*. Every option contract has a buyer and a seller. The buyer is said to have a long option position, while the seller has a short option position. This is not the same as having a long or short position in the *underlying instrument, index,* or *rate*. A bank which is *long puts* on government bonds has bought the right *to sell* government bonds at a given strike price. This gives the bank protection from falling bond prices. Conversely, if the bank were *short puts*, it would be obligating itself *to purchase* government bonds at a specific price.
5. *American or European.* The two major classifications of options are American and European. American options can be exercised on any date after purchase, up to and including the final expiration date. European options can be exercised only on the expiration date of the contract. Because American options give the holder an additional privilege of early exercise, they will generally be more valuable than European options. Most exchange options are American, while most over-the-counter (OTC) options are European.
6. *Premium.* The price paid for an option is referred to as the option's *premium*. This premium amount is a dynamic measure of the factors which affect the option's value. Therefore, options with identical contract terms can trade at a multitude of different premium levels over time. Premium has two components: *time value* and *intrinsic value*. Intrinsic value refers to the amount of value in the option if it were exercised today. Time value is the difference between the total premium and the intrinsic value; it encompasses the uncertainty of future price moves. The time value of an option is a function of the security's volatility (or risk); the current level of interest rates; and the option's maturity (or time to expiration). The option's positive time value gradually approaches zero at expiration, with the option price at expiration equal to its intrinsic value.

For example, a long call option with a strike price of $50 on an underlying security which is trading at $52 has an intrinsic value of $2. If the option is trading for a *total* price of $3.50, $1.50 of the price ($3.50 – $2.00) would be time value, reflecting the fact that the underlying security may further increase in value before the option's expiration. Not all options will have an intrinsic value component; often the entire premium amount is time value.

Exotic Options

In the past few years, the growth of so-called "exotic" derivative products has been significant. Options have been no exception, and many varied types of exotic options exist today which are traded in the OTC markets. Some of the more common exotic options are discussed below.

In general, markets for many of the exotic options are not as liquid as their more generic counterparts. Thus, a quoted price may not be a good indication of where actual liquidation of the trade could take place.

Asian options, also called average-price options, depend on the *average price* of the underlying security during the life of the option. For example, a $60 call on a security which settled at $65 but traded at an average price of $63.5 during the option's life would be worth only $3.50 at expiration, not $5. Because of this feature, which essentially translates into lower volatility, Asian options tend to trade for a lower premium than conventional options. These options are generally cash settled, meaning that the actual underlying does not change hands. They belong in the category known as *path-dependent options*, meaning that the option's payoff depends on the path taken by the underlying security before the option's expiration.

Barrier options, are options which either come into existence or cease to exist based on a specified (or barrier) price on the underlying instrument. This also puts them in the category of path-dependent options. The two basic types of barrier options are knock-in and knock-out. A knock-in option, either put or call, comes into existence only when the underlying asset's price reaches a specified level. A knock-out option, either put or call, ceases to exist when the barrier price is reached.

A typical knock-in put option has a barrier price which is higher than the strike price. Thus, the put only comes into existence when and if the barrier price is reached. A knock-out call barrier price is generally below the strike price. A $60 call with a $52 barrier would cease to exist if at any time during the option's life the security traded $52 or lower. Because of this cancelable feature, barrier options trade for lower premiums than conventional options.

An important issue for barrier options is the frequency with which the asset price is monitored for the purposes of testing whether the barrier has been reached. Often the terms of the contract state that the asset price is observed once a day at the close of trading.

Bermudan options give the holder the right to exercise on multiple but specified dates over the option's life.

Binary options, also called digital options, are characterized by discontinuous payoffs. The option pays a fixed amount if the asset expires above the strike price, and pays nothing if it expires below the strike price. Regardless of how much the settlement price exceeds the strike price, the payoff for a binary option is fixed.

Contingent-premium options are options on which the premium is paid only if the option expires in the money. Because of this feature, these premiums tend to be higher than those for conventional options. The full premium is also paid at expiration, regardless of how in the money the option is. Thus, the premium paid can be significantly higher than the profit returned from the option position.

Installment options are options on which the total premium is paid in installments, with the actual option issued after the final payment. However, the buyer can cancel the payments before any payment date, losing only the premium paid to date and not the full premium amount.

Lookback options, also in the category of path-dependent, give call buyers the right to purchase the security for the lowest price attained during the option's life. Likewise, put sellers have the right to sell the security for the highest price attained during the option's life. The underlying asset in a lookback option is often a commodity. As with barrier options, the value of a lookback can depend on the frequency with which the asset price is monitored.

USES

Options can be used for hedging or speculative purposes. Hedgers can use options to protect against price movements in an underlying instrument or interest-rate exposure. Speculators can use options to take positions on the level of market volatility (if delta-hedged with the underlying instrument) or the direction and scope of price movements in the underlying asset.

The asymmetric payoff profile of an option is a unique feature that makes it an attractive hedging vehicle. For example, an investor with a long position in an underlying asset can buy a put option to offset losses from the long position in the asset if its price falls. In this instance, the investor's position in the asset will be protected at the strike price of the option, and yet the investor will still gain from any rise in the asset's value above the strike price. Of course, this protection against loss combined with the ability to gain from appreciation in the asset's value carries a price—the premium the investor pays for the option. In this sense, the purchase of an option to hedge an underlying exposure is analogous to the purchase of insurance.[1]

Options may also be used to gain exposure to a desired market for a limited amount of capital. For instance, by purchasing a call option on a Treasury security, a portfolio manager can create a leveraged position on a Treasury security with limited downside. For the cost of the option premium, the portfolio manager can obtain upside exposure to a movement in Treasury rates on the magnitude of the full underlying amount.

Many banks sell interest-rate caps and floors to customers. Banks also frequently use caps and floors to manage their assets and liabilities. Caps and floors are essentially OTC interest-rate options customized for a borrower or lender. Most caps and floors reference LIBOR (and thus are effectively LIBOR options). Eurodollar options are essentially the exchange-traded equivalent of caps and floors.

A cap, which is written independent of a borrowing arrangement, acts as an insurance policy by capping the borrower's exposure (for a fee, the option premium) to higher borrowing costs if interest rates rise. This is equivalent to the cap writer selling the purchaser a call on interest rates. Above the cap rate, the purchaser is entitled to remuneration from the cap writer for the difference between the higher market rate and the cap rate. Often caps have a sequence of (three-month) expiration dates. Each of these three-month pieces is known as a *caplet*. A bank looking to ensure that it does not pay above a specified rate on its LIBOR-based liabilities can achieve this objective by purchasing an interest-rate cap.

A floor is the opposite of a cap and sets a minimum level on interest rates. Thus, it is like a put option on interest rates. If interest rates fall below the floor rate, the purchaser is entitled to remuneration from the floor writer for the difference between the lower market rate and the floor rate. An asset manager with floating-rate LIBOR assets can purchase a floor to ensure that his or her return on the asset does not fall below the level of the floor.

An option strategy consisting of selling a floor and buying a cap is referred to as an interest-rate collar. Collars specify both the upper and lower limits for the rate that will be charged. It is usually constructed so that the price of the cap equals the price of the floor, making the net cost of the collar zero. Caps and floors are also linked to other indexes such as constant maturity Treasury rates (CMT), commercial paper, prime, 11th District Cost of Funds Index (COFI), and Treasury bills.

DESCRIPTION OF MARKETPLACE

Options trade both on exchanges and OTC. The vast majority of exchange options are American, while most OTC options tend to be European. Exchange-traded (or simply traded) options are generally standardized as to the underlying asset, expiration dates, and exercise prices. OTC options are generally tailored to meet a customer's specific needs.

Banks, investment banks, and certain insurance companies are active market makers in OTC options. End-users of options include banks, money managers, hedge funds, insurance

1. Note that the investor's position in this example, a long position in the underlying asset and a purchased put option, has exactly the same payoff profile as a position consisting of only a purchased call option. This example illustrates the ability to combine options and the underlying asset in combinations that can replicate practically any desired payoff profile. For example, a purchased call combined with a written put, both with the same exercise price, have the same exposure profile as a long position in the underlying asset.

companies, corporations, and sovereign institutions.

PRICING

In terms of valuation and risk measurement, instruments with option characteristics differ significantly from other assets. In particular, options require an assessment of the probability distribution of possible movements in the relevant market-risk factors. Changes in the expected volatility of an instrument's price will affect the value of the option. Option values not only vary with the degree of expected volatility in the price of the underlying asset, but also vary with the price of the underlying in a decidedly asymmetric way.

Although the supply and demand for options is what directly determines their market prices, option valuation theory plays a crucial role in informing market participants on both sides of the market. A number of valuation techniques are used by market participants and are described below.

Approaches to Option Valuation

Black-Scholes

The ''standard'' model used to value options is the Black-Scholes option pricing model. Based on a few key assumptions—including that asset prices follow a ''random walk'' (they fluctuate randomly up or down), the risk-free interest rate remains constant, and the option can be exercised only at expiration—the Black-Scholes model can incorporate all the main risk concepts of options and, therefore, provides a useful basis for discussion. In practice, many financial institutions use more sophisticated models, in some cases proprietary models.

The Black-Scholes formula for the value of a call option depends on five variables: (1) the price of the underlying asset, (2) the time to expiration of the option, (3) the exercise price, (4) the risk-free interest rate (the interest rate on a financial institution deposit or a Treasury bill of the same maturity as the option), and (5) the asset's expected volatility. Of the five variables, only four are known to market participants. The asset price and the deposit or Treasury bill rate of the appropriate maturity can be ascertained from dealers or a public information source. The maturity of the option and the strike price are known from the terms of the option contract.

Assuming that the price of an asset follows a random walk, Black and Scholes derived their formula for pricing a call option on that asset given the current spot price (S_t) at time t, the exercise price (X), the option's remaining time to maturity (T), the probability distribution (standard deviation) of the asset price (σ), and a constant interest rate r. Specifically, the price C at time t of a call option with a strike price of X which matures at time T is—

$$C(S_t,t;X,T,\sigma,r) = S_t N(d + \sigma\sqrt{T-t}) - Xe^{-r(T-t)}N(d),$$

where $N(d)$ is the probability that a standardized normally distributed random variable takes on a value less than d, and

$$d = \frac{\ln(S_t/X) + (r - \sigma^2/2)(T-t)}{\sigma\sqrt{T-t.}}$$

The easiest way to understand this formula is as the present value of the expected difference between the future price of the underlying asset and the exercise price, adjusted for the probability of exercise. In other words, it is the expected value of the payoff, discounted to the present at the risk-free rate. The first term in the Black-Scholes equation is the present value of the expected asset price at expiration given that the option finishes in the money. The standard normal term, $N(d)$, is the probability that the option expires in the money; hence, the entire second term, $Xe - r(T - t)N(d)$, is the present value of the exercise price times the probability of exercise.

The key unknown in the formula is future volatility of the underlying asset price. There are two ways of estimating this price. First, it can be estimated directly from historical data on the asset price, for example, by calculating the standard deviation of daily price changes over some recent period. When calculating volatility using historical prices, different estimates of volatility may be arrived at (and consequently, also different estimates of an option's value), depending on the historical period chosen and other factors. Hence, the historical period used in volatility estimates should be chosen with some care.

Alternatively, volatility can be estimated by using the Black-Scholes formula, together with the market prices of options, to back out the estimate of volatility implicit in the market price of the option, given the four known variables. This is called the implied volatility of the option. Note that the use of implied volatility may not be appropriate for thinly traded options due to the wide variation of options prices in thin markets.

Some institutions use a combination of both historical and implied volatilities to arrive at an appropriate estimate of expected volatility. Examiners should determine if management and the traders understand the benefits and shortcomings of both the estimated implied volatility and historical methods of calculating volatility, considering that the values derived under either or both methods may be appropriate in certain instances and not appropriate in others. In any case, the method used to estimate volatility should be conservative, independent of individual traders, and not subject to manipulation in risk and profitability calculations. The last point is especially important because volatilities are a critical component for calculating option values for internal control purposes.

Other Closed-Form Models

Since the publication of Black-Scholes, other widely-used formula-based valuation techniques have been developed for use by market makers to value European options as well as options on interest-bearing assets. These techniques include the Hull and White model and the Black, Derman, and Toy (BDT) model. These models are often described as *no-arbitrage models* and are designed so that the model is, or can be made, consistent with the current term structure of interest rates. Other models, such as the Cox, Ingersoll, and Ross (CIR) model, apply other disciplines to the term structure but allow prices to evolve in a way that need not be consistent with today's term structure of interest rates.

Binomial Model

An alternative technique used to value options is the binomial model. It is termed ''binomial'' because it is constructed as a ''tree'' of successive event points in which each branch has two possible events: the asset price either rises or falls. The amount of the rise or fall at each event point depends on the volatility of the underlying asset price. Each path of the variable—from the valuation date through each event point until expiration—then leads to an ultimate profit or loss for the option holder. The value of the option is then the ''average'' present value of these various ultimate outcomes.

The binomial approach is attractive because it is capable of pricing a wider variety of options than Black-Scholes. For example, a binomial model can allow for a different value function to be applied at different points in time or for options with multiple exercise dates. The binomial model is used by some to value options because it is perceived to be a more reasonable representation of observed prices in particular markets. It is also used to check the accuracy of modifications to the Black-Scholes model. (The Ho-Lee model of interest-rate options, for example, is an elaboration of a binomial model.) In addition, although it requires more computing time than the Black-Scholes model, the binomial model can be more easily adapted for computer use than other still more rigorous techniques. Under the same restrictive assumptions described above, the binomial model and the Black-Scholes formula will produce identical option values.

Monte Carlo Simulations

A final approach to valuing options is simply to value them using a large sample of randomly drawn potential future movements in the asset price, and calculate the average or expected value of the option. The random draws are based on the expected volatility of the asset price so that a sufficiently large sample will (by the Law of Large Numbers) accurately portray the expected value of the option, considering the entire probability distribution of the asset price.

The advantage of this technique is that it allows for different value functions under different conditions, particularly if the value of an instrument at a point in time depends in part on past movements in market-risk factors. Thus, for example, the value of a collateralized mortgage obligation security at a point in time will depend in part on the level of rate-motivated mortgage prepayments that have taken place in the past, making Monte Carlo simulation the valuation technique market participants prefer. Because of the time and computer resources required, this

technique is generally reserved for the most complex option valuation problems.

Sensitivity of Market Risk for Options

Given the complexity of the market risk arising from options, and the different models of option valuation, a set of terms has evolved in the market and in academic literature that now serves as a common language for discussing options risk. The key terms (loosely known as ''the greeks'') are described below. Each term is linked to one of the key variables needed to price an option, as described earlier; however, there is no ''greek'' for the exercise price.

Delta and Gamma

Delta and gamma both describe the sensitivity of the option price with respect to changes in the price of the underlying asset. The delta of an option is the degree to which the option's value will be affected by a (small) change in the price of the underlying instrument. As such, the estimate of an instrument's delta can be used to determine the appropriate option hedge ratio for an unhedged position in that instrument.

Gamma refers to the degree to which the option's delta will change as the instrument's price changes. The existence of gamma risk means that the use of delta hedging techniques is less effective against large changes in the price of the underlying instrument. While a delta-hedged short option position is protected against small changes in the price of the underlying asset, large price changes in either direction will produce losses (though of smaller magnitude than would have occurred had the price moved against a naked written option).

Vega

The vega of an option, or a portfolio of options, is the sensitivity of the option value to changes in the market's expectations for the volatility of the underlying instrument. An option value is heavily dependent upon the expected price volatility of the underlying instrument over the life of the option. If expected volatility increases, for example, there is a greater probability that an option may become in the money (profitable for the holder to exercise); thus the vega is typically positive. As noted above, market participants rely on implied rather than historical volatility in this type of analysis and measurement.

Theta

The theta of an option, or a portfolio of options, is the measure of how much an option position's value changes as the option moves closer to its expiration date (simply with the passage of time). The more time remaining to expiration, the more time for the option to become profitable to the holder. As time to expiration declines, option values tend to decline.

Rho

The rho of an option, or a portfolio of options, is the measure of how much an option's value changes in response to a change in short-term interest rates. The impact of rho risk is more significant for longer-term or in-the-money options.

HEDGING

Financial institutions using options may choose from basically three hedging approaches:

1. hedging on a ''perfectly matched'' basis,
2. hedging on a ''matched-book'' basis, and
3. hedging on a portfolio basis.

Hedging on a Perfectly Matched Basis

Some financial institutions prefer to trade and hedge options on a perfectly matched basis. In this instance, the financial institution arranges an option transaction only if another offsetting option transaction with exactly the same specifications (that is to say, the same underlying asset, amount, origination date, and maturity date) is simultaneously available. The trade-off in trading options on a perfectly matched basis is that the financial institution may miss opportunities to enter into deals while it is waiting to find the perfect match. However, many risks are reduced or eliminated when options and other

instruments are traded on a perfectly matched basis. In any event, the financial institution continues to assume credit risk when hedging on a perfectly matched basis.

Hedging on a Matched-Book Basis

As a practical matter, managing a portfolio of perfectly matched transactions is seldom possible because of the difficulty in finding two customers with perfectly offsetting needs. Less than perfectly matched hedging, called the matched-book hedging, attempts to approximate the perfectly matched approach. In matched-book hedging, all or most of the terms of the offsetting transactions are close but not exactly the same, or transactions are booked ''temporarily'' without an offsetting transaction.

For example, a financial institution may enter into an option transaction with a customer even if an offsetting OTC option transaction with similar terms is not available. The financial institution may temporarily hedge the risk associated with that option by using futures and exchange-traded options, or forward contracts. When an appropriate offsetting transaction becomes available, the temporary hedge is unwound. In reality, it may be some time before an offsetting transaction occurs, and it may never occur. Typically, institutions that run a matched book establish position limits on the amount of residual exposure permitted. By offering transactions on a matched-book basis, financial institutions are able to assist their customers without waiting for a counterparty with simultaneous, offsetting needs to appear.

Hedging on a Portfolio Basis

More sophisticated institutions usually find it more practical to hedge their exposure on a portfolio basis when trading options (and other traded instruments) in more liquid markets, such as those for interest rates and foreign exchange. Portfolio hedging does not attempt to match each transaction with an offsetting transaction, but rather attempts to minimize and control the residual price exposure of the entire portfolio.

Risk-management or hedging models determine the amount of exposure remaining in the portfolio after taking into consideration offsetting transactions currently in the book. Offsetting transactions using futures, swaps, exchange-traded options, the underlying asset, or other transactions are then entered into to reduce the portfolio's residual risk to a level acceptable to the institution. Portfolio hedging permits financial institutions to act more effectively as market makers for options and other traded instruments, entering into transactions as requested by customers. It is also more efficient and less costly than running a matched book since there is less need to exactly match the particulars of a transaction with an offsetting position.

RISKS

Credit Risk

One of the key risks in an option transaction is the risk that the counterparty will default on its obligation to perform.[2] Accordingly, credit risk arises when financial institutions purchase options, not when they write (sell) options. For example, when a financial institution sells a put or call option, it receives a premium for assuming the risk that it may have to perform if the option moves in the money and the buyer chooses to exercise. On the other hand, when a financial institution purchases a put or call option, it is exposed to the possibility that the counterparty may not perform if the option moves in the money.

When estimating the credit risk associated with an option contract, some institutions calculate credit risk under a worst-case scenario. To develop this scenario, financial institutions typically rely on statistical analysis. In essence, the financial institution attempts to project, within a certain confidence level, how far, in dollar terms, the option can move in the money. This amount represents the ''maximum potential loss exposure'' if the counterparty (option seller) defaults on the option contract and the financial institution is required to replace the transaction in the market. For a discussion of other ways financial institutions measure credit risk, see

2. This discussion of credit risk is relevant for over-the-counter products. Exchange-traded options are guaranteed by a clearing organization and have minimal credit risk.

section 2020.1, ''Counterparty Credit and Presettlement Risk.''

Settlement Risk

The importance of settlement risk may vary materially among countries, depending on the settlement procedures used. In the United States, for example, transactions are typically settled on a net payment basis, with payment being made to only one party to the contract. The beneficiary of the payment incurs the credit risk that the counterparty will not make payment and will default, but does not face the greater settlement risk that a one-sided exchange of securities will occur. Examiners should determine what settlement procedures are used by the markets in which the financial institution participates and should determine what procedures the financial institution takes to minimize any settlement risk. For further discussion of settlement-risk issues, see section 2020.1, ''Counterparty Credit and Presettlement Risk.''

Liquidity Risk

The financial institution's ability to offset or cancel outstanding options contracts is an important consideration in evaluating the usefulness and safety and soundness of its options activities. OTC options contracts are often illiquid since they can only be canceled by agreement of the counterparty. If the counterparty refuses to cancel an open contract, the financial institution must either find another party with which to enter an offsetting contract or go to one of the exchanges to execute a similar, but offsetting, contract. On the other hand, if a counterparty defaults and the financial institution is unable to enter into an offsetting contract because of market illiquidity, then the default will expose the financial institution to unexpected market risk.

Exchanges also do not ensure liquidity. First, not all financial contracts listed on exchanges are heavily traded. While some contracts have greater trading volume than the underlying cash markets, others trade infrequently. In addition, even with actively traded futures and options contracts, the bulk of trading occurs in the first or second expiration month. Thus, to be able to offset open contracts quickly as needs change, the financial institution must take positions in the earlier expiration months when the bulk of trading occurs.

Some exchange-traded contracts limit how far prices can move on any given day. When the market has moved ''limit up'' or ''limit down'' for the day, trading ceases until the next day. These limits cause illiquidity in certain instances. Hedging contracts with such limited price-movement potential may not adequately protect the holders against large changes in the value of underlying asset prices. Examiners should review the financial institution's policies and procedures to determine whether the financial institution recognizes problems that these limits could create (for example, ineffective hedges). This review should also determine whether the financial institution has contingency plans for dealing with such situations.

ACCOUNTING TREATMENT

The accounting treatment for option contracts is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, ''Accounting for Derivatives and Hedging Activities.'' (See section 2120.1, ''Accounting,'' for further discussion.)

Purchased Options

The purchaser of an option has the right, but not the obligation, to purchase a fixed amount of the underlying instrument according to the terms of the option contract. If a purchased option is held as a trading asset or otherwise does not qualify for hedge accounting, it should be marked to market. Options that qualify for hedge accounting should record unrealized gains and losses in the appropriate period to match the recognition of the revenue or expense item of the hedged item. The premium paid on options qualifying as hedges generally are amortized over the life of the option.

Written Options

The writer of an option is obligated to perform according to the terms of the option contract. Written options are generally presumed to be speculative and, therefore, should be marked to market through the income statement.

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of an option contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are listed below.

Remaining Maturity	*Interest Rate*	*Exchange Rate*
One year or less	0.00%	1.00%
Five years or less	0.50%	5.00%
Greater than five years	1.50%	7.5%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, ''Capital Adequacy.'')

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Options are not considered investment securities under 12 USC 24 (seventh). However, the use of these contracts is considered to be an activity incidental to banking within safe and sound banking principles.

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GENERAL DESCRIPTION

A currency swap is a private over-the-counter (OTC) contract which commits two counterparties to exchange, over an agreed period, two streams of interest payments denominated in different currencies, and, at the end of the period, to exchange the corresponding principal amounts at an exchange rate agreed upon at the start of the contract. The term ''currency swap'' can sometimes be used to refer to foreign-exchange swaps. Foreign-exchange swaps refers to the practice of buying or selling foreign currency in the spot market and simultaneously locking in a forward rate to reverse that transaction in the future. Foreign-exchange swaps, unlike currency swaps, do not involve interest payments—only principal amounts at the start and maturity of the swap.

CHARACTERISTICS AND FEATURES

The term ''currency swap'' is used to describe interest-rate swaps involving two currencies. The strict application of the term is limited to fixed-against-fixed interest-rate swaps between currencies. Cross-currency swaps, a generic variation of the currency swap, involve an exchange of interest streams in different currencies, at least one of which is at a floating rate of interest. Those swaps that exchange a fixed rate against a floating rate are generally referred to as cross-currency coupon swaps, while those that exchange floating-against-floating using different reference rates are known as cross-currency basis swaps.

Other types of cross-currency swaps include annuity swaps, zero-coupon swaps, and amortizing swaps. In cross-currency annuity swaps, level cash-flow streams in different currencies are exchanged with no exchange of principal at maturity. Annuity swaps are priced such that the level payment cash-flow streams in each currency have the same net present value at the inception of the transaction. Annuity swaps are often used to hedge the foreign-exchange exposure resulting from a known stream of cash flows in a foreign currency. For example, a U.S. corporation which receives a deutschemark (DM) 2 million semiannual dividend payment from its German subsidiary can execute an annuity swap with a dealer in which it will make semiannual payments of DM 2 million and receive semiannual payments of $300,000—thus locking in a dollar value of its DM-denominated dividend payments.

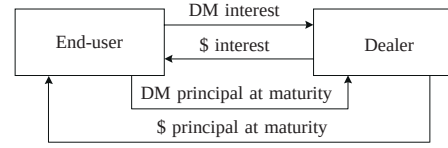
A zero-coupon swap involves no periodic payments (representing ''coupon'' payments). Rather, these cash flows are incorporated into the final exchange of principal. Cross-currency zero-coupon swaps are equivalent to a long-dated forward contract and are used to hedge long-dated currency exposures when the exchange-traded and OTC foreign-exchange market may not be liquid.

An amortizing cross-currency swap is structured with a declining principal schedule, usually designed to match that of an amortizing asset or liability. Amortizing cross-currency swaps are typically used to hedge a cross-border project-financing loan in which the debt is paid down over a series of years as the project begins to generate cash flow.

Plain Vanilla Example

Figure 1 illustrates the most simple example of a currency swap. An institution enters into a currency swap with a counterparty to exchange U.S. dollar interest payments and principal for offsetting cash flows in German DM.

Figure 1—Plain Vanilla Currency Swap



As illustrated, there are three stages to a currency swap. The first stage is an initial exchange of principal at an agreed rate of exchange, usually based on the spot exchange rate. The initial exchange may be on either a *notional basis* (no physical exchange of principal) or a *physical exchange* basis. The initial exchange is

important primarily to establish the quantity of the respective principal amounts for the purpose of calculating the ongoing payments of interest and for the re-exchange of principal amounts under the swap. Most commonly, the initial exchange of principal is on a notional basis.

The second stage involves the exchange of interest. The counterparties exchange interest payments based on the outstanding principal amounts at the respective fixed interest rates agreed on at the outset of the transaction. The third stage entails the re-exchange of principal. On maturity, the counterparties re-exchange principal at the original exchange rate agreed on at the execution of the swap.

USES

Currency swaps create exposures to the risk of changes in exchange rates and interest rates. Therefore, they can be used to take risk positions based on expectations about the direction in which the exchange rate, interest rates, or both will move in the future. Firms can alter the exposures of their existing assets or liabilities to changes in exchange rates by swapping them into foreign currency. Also, a reduction in borrowing costs can be achieved by obtaining more favorable financing in a foreign currency and using currency swaps to hedge the associated exchange-rate risks. Conversely, a firm can enhance the return on its assets by investing in the higher-yielding currency and hedging with currency swaps.

DESCRIPTION OF MARKETPLACE

Market Participants

Sell Side

Most of the major international financial institutions are willing to enter into currency swaps. However, the group of those institutions acting as market makers (that is, quoting firm buying and selling prices for swaps in all trading conditions) is limited to a handful of the most active swap participants who make markets for interest-rate swaps in the major currencies. Even this group is focused largely on swaps involving U.S. dollar LIBOR as one of the legs. Furthermore, because of the credit risk involved, many customers prefer only to deal with the highest-rated institutions. In fact, most of the investment banking dealers book these swaps in special-purpose, ''AAA''-rated, derivative product subsidiaries.

Buy Side

The end-users of currency swaps are mainly financial institutions and corporations. These firms can enter into a swap either to alter their exposures to market risk, enhance the yields of their assets, or lower their funding costs.

Quoting Conventions

Currency swaps are generally quoted in terms of all-in prices, that is, as absolute annual fixed percentage interest rates. Swap intermediaries may quote two all-in prices for each currency swap, for example, 6.86–6.96 percent for the U.S. dollar leg and 7.25–7.35 percent for the DM leg. This is a two-way price, meaning a dual quotation consisting of a buying and selling price for each instrument. The terms buying and selling can be ambiguous in the case of swaps; the terms paying and receiving should be used instead. In currency swaps, that is, fixed-against-fixed swaps, both sides of the swap should be specified. It may not be obvious which side of a two-way price is being paid and which is being received.

Trading

Since the market for currency swaps is a highly customized OTC market, most of the trading is done by telephone. In negotiating swaps, key financial details are agreed on orally between dealers. Key details are confirmed in writing.

In the early days of the swaps market, intermediaries tried to avoid the risk of acting as principals by acting as arrangers of swap deals between end-users. Arrangers act as agents, introducing matching counterparties to each other and then stepping aside. Arrangers were typically merchant and commercial banks. Arrangement continues to be a feature of currency swaps. Brokers act as agents, arranging deals by matching swap counterparties, but they do not

participate in the actual transactions. Brokers do not earn dealing spreads, but are paid a flat fee based on the size of the deal. Brokers disclose indicative swap price information over networks such as Reuters and Telerate.

The market for currency swaps has become more complex and diverse. Commercial banks have begun entering this market as principal intermediaries to provide their expertise in assessing credit risk to end-users of swaps. Many end-users lack credit analysis facilities and prefer having credit exposure to a large financial intermediary rather than to another end-user counterparty. However, in several cases, the credit rating of the financial intermediary is not strong enough for a particular end-user. For this reason, a large number of these swaps are booked in the AAA subsidiaries.

The secondary market for currency swaps is more limited than the market for single-currency interest-rate swaps due to the credit risk involved. There are cases in which a buyer of a swap has assigned it to a new counterparty (that is, the buyer substitutes one of the original counterparties). Recently, assignment has been by novation, meaning that the swap contract to be assigned is in fact terminated and a new but identical contract is created between the remaining counterparty and the assignee.

Market Transparency

A large volume of currency swaps consists of customized transactions whose pricing is sensitive to credit considerations. Consequently, the actual pricing of these swaps is less transparent than it is for single-currency interest-rate swaps. Price information is distributed over screen-based communication networks, such as Reuters and Telerate, but this consists primarily of broker's indicative prices for plain vanilla cross-currency transactions.

PRICING

A currency swap is valued as the present value (*PV*) of the future interest and principal payments in one currency against the *PV* of future interest and principal payments in the other currency, denominated in the same currency:

$$\textit{Value of currency swap} = PV_{\textit{currency A cash flow}} - \frac{PV_{\textit{currency B cash flow}}}{\textit{Exchange rate}_{B/A}}$$

The cash flows above (the streams of interest and principal payments) are functions of the current market exchange rate, which is used to translate net present values into the same currency, and the current market interest rates, which are used to discount future cash flows.

Calculating the present value of the stream of fixed interest payments is done as follows:

$$PV_{\textit{fixed interest + principal}} = \sum_{n=1}^{N} \frac{C_n}{V^n} + \frac{P}{V^n},$$

where $V^n = [1 + (\text{day count}/360 \times \text{I})]^n$
and C_n = fixed interest cash flow at time n
P = principal cash flow
I = prevailing annual market interest rate
N = years to maturity
n = settlement period number
day count = number of days between regular coupon payments

For example, a $/DM currency swap is used with these specifications:

Remaining life = 3 years
$ fixed interest rate = 5% APR
DM fixed interest rate = 9% APR
$ principal = $100 million
DM principal = DM 170 million
Agreed-upon swap
exchange rate = 1.700 DM/$
Current prevailing rates:
3-year DM interest rate = 8% APR
3-year $ interest rate = 6% APR
Spot exchange rate = 1.5 DM/$

The *PV* of the deutschemark part of the transaction would be—

$$PV = \text{DM } 174{,}381{,}065.$$

To find the *PV* of the dollar cash flow, the following constants are known:

N = 3 (years)
I = 6% APR

such that—

$$PV = \$97{,}326{,}988.$$

The value of the swap is the difference between the *PV*s of the deutschemark and dollar cash flows. To calculate the difference, first convert the DM leg to dollar amounts, using the spot exchange rate of 1.5:

(DM 174,381,065/1.50 =) $116,254,043
– $97,326,988 = $18,927,055.

The pricing of currency swaps is similar to that used for interest-rate swaps, with the difference that the exchange rate has to be accounted for in assessing cash flows. A currency swap in which the two counterparties are both paying fixed interest should have a net present value of zero at inception. The fixed interest rate is set at inception accordingly. For a cross-currency swap in which at least one side is paying a floating interest rate, implied forward interest rates are used to price the swap.

HEDGING

Currency swaps are used to manage interest-rate risk and currency risk. A company with mainly deutschemark revenues that has borrowed fixed-rate dollars is faced with the prospect of currency appreciation or depreciation, which would affect the value of its interest payments and receipts. In this example, the prospect of a dollar appreciation would mean that the DM revenue would have to increase in order to raise enough (stronger) dollars to repay the fixed-rate (dollar) loan. The German firm could hedge its exposure to the appreciating dollar by entering into a DM/$ currency swap.

Furthermore, if the German company expects not only that the dollar will appreciate but that German interest rates will fall, then a cross-currency swap could be used. The German firm could swap fixed-rate dollars for floating-rate marks to take advantage of the expected fall in German interest rates, as well as hedge against exchange-rate risk.

In the example above, initial exchange of principal is not needed. Exchange of principal is needed only when a swap counterparty needs to acquire foreign currency or needs to convert new borrowing from one currency to another. If the foreign currency of a liability is expected to depreciate (in the example above, if the dollar is expected to depreciate) or the domestic currency is expected to appreciate, a currency swap would restrict currency gains. In such cases, the only risk that would need to be hedged against would be interest-rate risk, in which case engaging in a domestic currency interest-rate swap would be appropriate. (In these hedges, assumptions must be made about the movement of the exchange rate. The swap counterparty is still exposed to exchange-rate risk, but is hedging only interest-rate risk based on an assumption about the exchange rate.)

RISKS

Market Risk

A currency swap that is not hedged or used as a hedge exposes the institution to dual market risks: exchange-rate risk and interest-rate risk. Exchange-rate risk refers to movements in the prices of a swap's component parts (specifically, the spot rate), while interest-rate risk is caused by movements in the corresponding market interest rates for the two currencies.

Liquidity Risk

As stated earlier, the market for currency swaps is confined to a small number of institutions and is very credit intensive. Reversing out of a trade at short notice can be very difficult, especially for the more complicated structures. Occasionally, an institution can go to the original counterparty, resulting in the cancellation or novation of the trade, which frees up credit limits needed for some other transaction.

Credit Risk

Credit risk in currency swaps may be particularly problematic. Whereas interest-rate swaps involve the risk of default on interest payments only, for currency swaps, credit and settlement risk also extends to the payment of principal. The consequences of an actual default by a currency-swap counterparty depends on what the swap is being used for. If the currency swap is being used to hedge interest-rate and currency

risk, the default of one counterparty would leave the other counterparty exposed to the risk being hedged. This could translate into an actual cost if any of those risks are actually realized. If the swap is held to take advantage of expected rate movements, the default of a counterparty would mean that any potential gains would not be realized.

ACCOUNTING TREATMENT

The accounting treatment for foreign-currency transactions, including currency swaps, is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of a currency-swap contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are listed below.

Remaining Maturity	*Credit-Conversion Factor*
One year or less	1.00%
Five years or less	5.00%
Greater than five years	7.50%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, "Capital Adequacy.") For institutions applying market-risk capital standards, all foreign-exchange transactions are included in value-at-risk (VAR) calculations for general market risk.

LEGAL LIMITATIONS FOR BANK INVESTMENT

Currency swaps are not considered investments under 12 USC 24 (seventh). However, the use of currency swaps is considered to be an activity incidental to banking, within safe and sound banking practices.

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GENERAL DESCRIPTION

Options on swap contracts (swaptions) are over-the-counter (OTC) contracts providing the right to enter into an interest-rate swap. In exchange for a one-time, up-front fee, the buyer of the swaption has the right, but not the obligation, to enter into a swap at an agreed-on interest rate at a specified future date for an agreed-on period of time and interest rate. As such, swaptions exhibit all of the same characteristics inherent in options (including asymmetric risk-return profiles).

In general, an interest-rate call swaption gives the purchaser the right to receive a specified fixed rate, the strike rate, in a swap and to pay the floating rate for a stated time period. (In addition to interest rates, swaptions can be traded on any type of swap, such as currencies, equities, and physical commodities.) An interest-rate put swaption gives the buyer the right to pay a specific fixed interest rate in a swap and to receive the floating rate for a stated time period. Conversely, the writer of a call swaption sells the right to another party to receive fixed (the writer will thus be obligated to pay fixed if the option is exercised), while the writer of a put swaption sells the right to another party to pay fixed (the writer will thus be obligated to receive fixed if the option is exercised).

CHARACTERISTICS AND FEATURES

Swaptions are typically structured to exchange a stream of floating-rate payments for fixed-rate payments in one currency. The fixed rate is identified as the strike yield and is constant throughout the life of the swaption, while floating rates are based on a variety of indexes including LIBOR, Eurodollar futures, commercial paper, and Treasury bills.

The swap component of a swaption is not restricted to the fixed versus floating format. As with simple swaps, the structure of swaptions may vary. For a discussion of swap variations, see section 4325.1, ''Interest-Rate Swaps.''

Swaption maturities are not standardized, as all swaptions are OTC transactions between the buyer and the seller. Maturities for swaptions typically range from one month to two years on the option and up to 10 years on the swap. The option component of the swaption can be designated to be exercised only at its expiration date (a European swaption—the most common type), on specific prespecified dates (a Bermudan swaption), or at any time up to and including the exercise date (an American swaption).

Swaptions are generally quoted with references to both the option and swap maturity. For example, a quote of ''3 into 5'' references a 3-year option into a 5-year swap, for a total term of eight years. Terms can be arranged for almost any tenor from a 3-month to a 10-year option, or even longer. In general, the 5-year into 5-year swaption might be considered the end of the *very* liquid market. Longer-tenor instruments (for example, 10-year into 20-year) are not uncommon but do not display the same degree of liquidity. As with options, active swaption dealers are really speculating on volatility more than market direction.

Important Variations

Cancelable Swaps

Cancelable (callable or putable) swaps are popular types of swaptions. In exchange for a premium, a callable swap gives the fixed-rate payor the right, at any time before the strike date, to terminate the swap and extinguish the obligation to pay the present value of future payments. A putable swap, conversely, gives the fixed-rate receiver the right to terminate the swap. (In contrast, a counterparty in a plain vanilla swap may be able to close out a swap before maturity, but only by paying the net present value of future payments.) Cancelable swaptions are typically used by institutions that have an obligation in which they can repay principal before the maturity date on the obligation, such as callable bonds. Cancelable swaps allow companies to avoid maturity mismatches between (1) assets and liabilities with prepayment options and (2) the swaps put in place to hedge them. A ''3x5 cancelable swap'' would describe a five-year swap that may be terminated by one of the counterparties after three years.

Extendible Swaps

In exchange for a premium, extendible swaps allow the owner of the option to extend the tenor of an already-existing swap. If a firm has assets or liabilities whose maturities are uncertain, an extendible swap allows the investor to hedge the associated price risk more precisely.

Amortizing or Accreting Swaptions

Two additional instruments, amortizing and accreting swaptions, are useful for real estate–related or project-finance-related loans. Amortizing and accreting swaptions represent options to enter into an amortizing or accreting swap, where the principal amount used to calculate interest-rate payments in the swap decreases or increases during the life of the obligation. Specifically, the notional amount of the underlying swap decreases (amortizes) or increases (accretes) depending on loan repayments or drawdowns. For example, the swaption can be constructed to give the owner of the option some flexibility in reducing the prepayment risk associated with a loan.

USES

Swaptions are most commonly used to enhance the embedded call option value in fixed-rate callable debt and to manage the call risk of securities with embedded call features. Swaptions may be used to provide companies with an alternative to forward, or deferred, swaps, allowing the purchaser to benefit from favorable interest-rate moves while offering protection from unfavorable moves. Swaptions are also used to guarantee a maximum fixed rate of interest on anticipated borrowing.

Enhancing Embedded Call Option Value in Fixed-Rate Callable Debt

Through a swaption, the bond issuer sells the potential economic benefit arising from the ability to call the bonds and refinance at lower interest rates. This technique, known as ''call monetization,'' is effectively the sale (or early execution) of debt-related call options. The following example illustrates call monetization.

A firm has $100 million of 11 percent fixed-rate debt which matures May 15, 2002, and is callable May 15, 1999. The company sells to a bank a $100 million notional principal European call swaption with a strike yield of 11, an option exercise date of May 15, 1999, and an underlying swap maturity date of May 15, 2002. In return for this swaption, the firm receives $4 million. The company has sold to the bank the right to enter into a swap to receive a fixed rate of 11 and pay a floating rate. As a result of the sale, the firm's financing cost is reduced by $4 million, the amount of the premium. From the bank's perspective, a fee was paid for the right to receive fixed-rate payments that may be above market yields at the exercise date of May 15, 1999.

If, at May 15, 1999 (the call date), the company's three-year borrowing rate is 10, the debt will be called and the bank will exercise the call swaption against the firm. The company becomes a fixed-rate payer at 11 percent on a three-year interest-rate swap from May 15, 1999, through May 15, 2002, while receiving the floating rate from the bank. The firm will now attempt to refinance its debt at the same or lower floating rate than it receives from the bank. As long as the floating rate that the company receives does not fall below the firm's net refinancing cost, the monetization of the call lowers net borrowing costs because the firm starts out paying 11 percent interest and is still paying 11 percent interest, but has received the $4 million premium.

If, on the other hand, the company's three-year funding rate, as of May 15, 1999, is 11 percent or higher, the bank will allow the option to expire and the firm will not call the debt. The company will continue to fund itself with fixed-rate debentures at 11 percent, but the $4 million premium will reduce its effective borrowing cost.

Managing the Call Risk of Securities with Embedded Call Features

Investors also use swaptions to manage the call risks of securities with embedded call features. For example, an investor buys a seven-year $100 million bond that has a 12 coupon and is callable after five and wishes to purchase protection against the bonds' being called. Thus, in year four, the investor purchases

from a bank a one-year European call swaption, with a strike yield of 12 and a swap maturity of two years based on a notional principal of $100 million. The firm pays the bank a $1 million up-front fee for this option. In this case, the higher the strike yield, the higher the up-front fee will be.

At year five, if two-year floating rates are 10, the bond will be called, and the investor will exercise the swaption. The investor will reinvest its money at the current floating rate of 10, pass along the 10 interest to the bank, and receive 12 from the bank. Thus, the investor guarantees that it will not earn less than 12 on its investment. If, on the other hand, two-year floating rates are above 12, the bonds will not be called and the investor will let the option expire.

Guaranteeing a Maximum Interest Rate on Variable-Rate Borrowing

An additional use of swaptions is to guarantee a maximum interest rate on variable-rate borrowing. A company, for example, issues a two-year $10 million floating-rate note. The firm does not want to pay more than 10 interest so it purchases from a bank a one-year European put swaption for the right to enter into a one-year swap in which it will pay a fixed rate (strike yield) of 10 on a notional principal of $10 million. The bank, on the other hand, agrees to pay floating-rate interest payments to the firm if the option is exercised. The company pays the bank an up-front fee of $100,000 for this option.

At the end of the first year, if the floating rate increases to 12, the firm will exercise the option and pay 10 interest to the bank, and the bank will pay the current floating rate of 12 to the company. While this option will cost the firm $100,000, it will save $200,000 in interest costs ((12 – 10) × $10 million). Therefore, in total, the company will save $100,000. Once the option is exercised, however, the firm cannot return to floating rates even if floating rates should fall below 10 (unless the company reverses the swap, which can be very expensive). On the other hand, if the floating rate is below 10 at the end of the first year, the firm will let the option expire and continue to pay a floating rate.

DESCRIPTION OF MARKETPLACE

Swaptions are OTC-traded instruments, and they can easily be customized to suit a particular investor's needs. The market is very active and can be loosely coupled with other markets (for example, Eurodollar caps and floors and the OTC bond options market) in certain maturities. In addition, there is a very active secondary market.

In general, U.S. dollar swaptions with an option component of less than five years can be thought of as relatively short-term; the five-year to seven-year maturity is considered medium-term, with 10-year and longer options being considered long-term and displaying relatively more limited liquidity. A tenor such as a 10-year into 10-year swaption can be thought of as the upper bound on the liquid market.

PRICING

The pricing of swaptions relies on the development of models that are on the cutting edge of options theory. Dealers differ greatly in the models they use to price such options, and the analytical tools range from modified Black-Scholes to binomial lattice versions to systems based on Monte Carlo simulations. As a result, bid/ask spreads vary greatly, particularly from more complicated structures that cannot be easily backed off in the secondary markets. The price of a swaption, known as the premium, depends on several factors: the expected shape of the yield curve, the length of the option and swap periods, the strike yield's relationship to market interest rates, and expected interest-rate volatility.

HEDGING

Swaptions are often hedged using Eurodollar futures, Treasuries, and interest-rate swaps. Market participants have introduced a variety of features to mitigate counterparty credit risk, such as cash settlement and posting of cash collateral. Of these, cash settlement, in which the seller pays the net present value of the swap to the buyer upon exercise of the option, has been the most common. Cash settle-

ment has two significant benefits: (1) it limits the length of credit exposure to the life of the option and (2) banks are not required to allocate capital for the swap, since neither party actually enters into the swap.

RISKS

The risks of purchasing or selling a swaption include the price and credit risks associated with both swaps and options. For a more detailed discussion of the risks connected with these instruments, see sections 4325.1 and 4330.1, ''Interest-Rate Swaps'' and ''Options,'' respectively.

As a hybrid instrument, a swaption generates two important exposures: the probability of exercise and the credit risk emerging from the swap. The first risk is a function of the option's sensitivity to the level and volatility of the underlying swap rates. The swaption's credit risk is the cost to one counterparty of replacing the swaption in the event the other counterparty is unable to perform.

As mentioned earlier, liquidity risk is most pronounced for swaptions with option components of greater than 10 years. However, swaptions with five-year option components will have greater liquidity than those with 10-year option components.

ACCOUNTING TREATMENT

The accounting treatment for swaptions is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, ''Accounting for Derivatives and Hedging Activities.'' (See section 2120.1, ''Accounting,'' for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of a swaption contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are listed below:

Remaining Maturity	*Credit-Conversion Factor*
One year or less	0.00
Five years or less	0.50
Greater than five years	1.50

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, ''Capital Adequacy.'')

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Swaptions are not considered investments under 12 USC 24 (seventh). The use of these instruments is considered to be an activity incidental to banking within safe and sound banking practices.

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GENERAL DESCRIPTION

The term ''equity derivatives'' refers to the family of derivative products whose value is linked to various indexes and individual securities in the equity markets. Equity derivitives include stock index futures, options, and swaps. As in the interest-rate product sector, the over-the-counter (OTC) and futures markets are closely linked. Banks are involved in these markets in a variety of ways, depending on their customer base. Some banks are actively involved as market makers in all products, while others only use this market to satisfy customer needs or as part of a structured financial transaction.

CHARACTERISTICS AND FEATURES

Equity derivatives range in maturity from three months to five years or longer. The maturities in the OTC market are generally longer than those in the futures market. However, maturities in the futures market are gradually changing with the development of the LEAPs (Long-Term Equity AnticiPation) market on the exchanges. As with other futures markets, there is a movement towards more flexibility in the maturities and strike prices of equity derivitives.

The following are the major instruments that comprise the equity derivatives market and are available for most major markets around the world:

- *Equity swaps* are transactions in which an exchange of payments referenced to the change in a certain index and an interest rate are exchanged and are usually based on a fixed notional amount. For example, counterparty A may pay a spread over LIBOR to counterparty B and receive the return on a specified equity index. These swaps are documented using standard ISDA documentation. Some of these transactions also have a currency component and in many cases are done as quantos.[1]
- *Stock index futures* are futures on various stock indexes and are traded on most of the major exchanges.
- *Stock index options* are options on either the cash value of the indexes or on the stock index futures.
- *Equity options* are options on the individual stocks and are also traded on most major exchanges.
- *Warrants* are longer-term options on either individual stocks or on certain indexes. They are popular in Europe and Asia (especially Japan).
- *Equity-index-linked notes* are fixed-income securities issued by a corporation, bank, or sovereign in which the principal repayment of the note at maturity is linked to the performance of an equity index. The formula for principal repayment can reflect a long or short position in an equity index and can also provide an exposure to the equity market which is similar to an option or combination of options.
- *Other instruments* include ADRs (American Depository Receipts), and SPDRs (S&P 500 Depository Receipts).
- *Index arbitrage* is strictly not a product, but an activity; however, it is an important part of the equity derivatives market. As its name implies, index arbitrage is the trading of index futures against the component stocks.

As these markets have developed, various enhancements have been made to them, such as the introduction of futures on individual stocks. Some of the more structured deals that banks are involved in use more than one of the above products.

USES

Equity derivatives are used for investment, hedg-

1. Quantos (guaranteed exchange-rate options/quantity-adjusting options) are cross-border equity or equity index options that eliminate currency-exchange-rate exposure on an option or option-like payout by translating the percentage change in the underlying into a payment in the investor's base currency at a spot exchange rate set at the start of the contract. The investor holding a quanto option obtains participation in a foreign equity or index return, denominated in the domestic currency. Currency exchange rates are fixed at issuance by setting the option payoff in the investor's base currency as a multiple of the foreign equity or index rate of return. The rate of return determining the payoff can be positive (calls) or negative (puts). Guaranteed-exchange-rate put options are more common in some markets than guaranteed exchange-rate call options.

ing, and speculative purposes. The growth in this market has coincided with developments in other derivative markets. Users and customers of the banks have shown increased interest in equity derivitive products for purposes ranging from hedging to speculation. Some of the major users of these products are investment funds. Some banks also use them to hedge their index-linked certificates of deposit (CDs) (these are longer-term CDs, whose principal is guaranteed and whose yield is linked to the return on a certain stock index, for example, S&P 500). Some corporations also use equity derivatives to lower the yield on their issuance of securities. Some speculators (hedge funds) might use equity swaps or options to speculate on the direction of equity markets.

Equity-index-linked swaps are often used as an overlay to a portfolio of fixed-income assets to create a synthetic equity investment. For example, a portfolio manager may have a fixed-income portfolio whose yield is based on LIBOR. The manager can enter into an equity-index-linked swap with a bank counterparty in which the manager pays the bank LIBOR and receives the return on an equity index, plus or minus a spread. If the portfolio manager earns a positive spread on the LIBOR-based investments, an equity-index-linked swap may result in an overall return which beats the market index to which the portfolio manager is evaluated. For example, if the LIBOR-based portfolio yields LIBOR + 20 basis points, and the manager enters into an equity-index-linked swap in which he or she pays LIBOR flat and receives the return on the equity index flat, the manager will receive a return on the equity index plus 20 basis points, thus outperforming the index. In this way, equity-index-linked swaps allow portfolio managers to transfer expertise in managing one class of assets to another market.

Equity-index options, warrants, and futures are often used as hedging vehicles. A portfolio manager, for example, can protect an existing indexed equity portfolio against a decline in the market by purchasing a put option on the index or by selling futures contracts on the index. In the case of the put option, the portfolio will be protected from a decline in the index, while being able to participate in any future upside movement of the index. The protection of the put option, however, involves the cost of a premium which is paid to the seller of the option. In the case of selling futures contracts on the index, the portfolio is protected against a decline in the index, but will not be able to participate in future upside movement in the index. Unlike the put option, the futures contract does not involve an up-front payment of a premium.

Equity-linked options are also used by portfolio managers to gain exposure to an equity market for a limited amount of capital. For instance, by purchasing a call option on an equity index, a portfolio manager can create a leveraged position in an equity index with limited downside. For the cost of the option premium, the portfolio manager will obtain upside exposure to an equity market on the magnitude of the full underlying amount.

DESCRIPTION OF MARKETPLACE

Sell Side

The major sell-side participants in this market can be divided into three groups: investment banks, exchanges, and commercial banks. Investment banks have the greatest competitive advantages in these markets because of their customer base and the nature of their businesses and, therefore, have the largest market share. While commercial banks have much of the necessary technical expertise to manage these instruments, they are hampered by regulations and lack of a customer base.

The underlying instruments for equity derivative products are primarily the various stock indexes traded around the world. Even though there is a lot of activity in the individual stock options, banks are mostly active in the derivatives market on the various indexes. Their involvement in the market for individual stocks is affected by various regulations restricting bank ownership of individual equities.

Buy Side

Buy-side participants in the equity derivatives market include money managers; hedge funds; insurance companies; and corporations, banks, and finance companies which issue equity securities. Commercial banks are not very active users of equity derivatives because of regulations restricting bank ownership of equities.

PRICING

Because of the large volumes traded in equity derivatives markets, the pricing of most of these products is very transparent and widely disseminated—at least for the products that are based on the equity markets of the major industrialized countries. This transparency does not hold true for the prices in some of the developing countries or those countries which are highly regulated. The pricing of some of these products is also affected by tax considerations and regulatory constraints for certain cross-border transactions. As with some of the other derivative markets, there is less transparency for structured products, especially those that involve some of the swaps that include exotic options in both the interest-rate and index components.

HEDGING

Since banks' activities with customers often involve nonstandard maturities and amounts, equity derivatives instruments are often hedged using exchange-traded instruments. The hedges take the form of combinations of the products that are available on the relevant exchanges and also involve the interest-rate markets (swaps and futures) to hedge out the interest-rate risk inherent in equity derivatives.

The risks of individual equity securities, or a basket of equity securities are often hedged by using futures or options on an equity index. This hedge may be over- or underweighted based on the expected correlation between the index and the individual security or basket of securities. To the extent that the underlying and the hedge instrument are not correlated as expected, the hedge may not be effective and may lead to incremental market risk on the trade.

RISKS

Market Risk

Market risk in equity derivative products arises primarily from changes in the prices of the underlying indexes and their component stocks. There is also correlation risk associated with hedging certain transactions with the most liquid instrument available, which may be less than perfectly correlated with the instrument being hedged.

Interest-Rate Risk

Interest-rate risk in equity derivative products can be substantial, especially for those transactions with relatively long maturities. The implied interest rate is a very important component in the calculation of the forward prices of the index. For hedges that use futures to closely match the maturities of the transaction, interest-rate risk is minimized because the price of the future already has an implied interest rate. Interest-rate risk may arise in those transactions in which the maturity of the transaction is longer than the maturity of the hedges which are available. In swap transactions, this may affect the hedging of implied forward cash flows. In certain cross-border transactions, additional risks arise from the necessity of hedging the nondomestic interest-rate component.

Volatility Risk

A substantial portion of transactions in the equity derivatives market have option components (both plain vanilla and, increasingly, various exotic types, especially barrier options). In certain shorter-dated transactions, hedges are available on the exchanges. But when the maturity is relatively long, the options may carry substantial volatility risks. These risks may be especially high in certain developing equity markets, in which the absolute level of volatility is high and the available hedges lack liquidity.

Liquidity Risk

Liquidity risk is not significant for most equity derivative products in the major markets and for products with maturities of less than a year. Liquidity risk increases for longer maturities and for those transactions linked to emerging markets.

Currency Risk

Currency risk is relevant for cross-border and quanto products. As these transactions are often

dynamically hedged by the market maker, currency risk can be significant when there are extreme movements in the currency.

ACCOUNTING TREATMENT

The accounting treatment for equity derivatives, except those indexed to a company's own stock, is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.) Derivatives indexed to a company's own stock can be determined by Accounting Principles Board (APB) Opinion No. 18, "The Equity Method of Accounting for Investments in Common Stock," and SFAS 123, "Accounting for Stock-Based Compensation."

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of an equity derivative contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are listed below.

Remaining Maturity	*Credit-Conversion Factor*
One year or less	6.00%
Five years or less	8.00%
Greater than five years	10.00%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, "Capital Adequacy.")

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Equity derivatives are not considered investments under 12 USC 24 (seventh). A bank must receive proper regulatory approval before it engages in certain types of equity-linked activities.

REFERENCES

Allen, Julie A., and Janet L. Showers. *Equity-Index-Linked Derivatives, An Investor's Guide.* Salomon Brothers, April 1991.

Federal Reserve Bank of Chicago. *The Equity Derivatives Market: A Product Summary.* February, 1997.

GENERAL DESCRIPTION

Credit derivatives are off-balance-sheet financial instruments that permit one party (the *beneficiary*) to transfer the credit risk of a *reference asset*, which it typically owns, to another party (the *guarantor*) without actually selling the asset. In other words, credit derivatives allow users to ''unbundle'' credit risk from financial instruments and trade it separately.

Based on dealer estimates, the market for credit derivatives approached $40 billion in 1996, with total-return swaps and default puts (including default swaps and outright put options) accounting for more than half of the market. The average transaction size is rather small at $10 million to $25 million, while the average tenor of transactions is less than two years. The tenor of new transactions is lengthening, however, and swaps up to five years are not uncommon. While the slowly expanding market for credit derivatives has encouraged dealers and end-users to enter the market, secondary-market activity is very limited.

CHARACTERISTICS AND FEATURES

In general, credit derivatives have three distinguishing features:

1. the transfer of the credit risk associated with a reference asset through contingent payments based on events of default and, usually, the prices of instruments before, at, and shortly after default (reference assets are most often traded sovereign and corporate debt instruments or syndicated bank loans)
2. the periodic exchange of payments or the payment of a premium rather than the payment of fees customary with other off-balance-sheet credit products, such as letters of credit
3. the use of an International Swap Derivatives Association (ISDA) master agreement and the legal format of a derivatives contract

Credit derivatives fall into three basic transaction types: total-rate-of-return swaps, credit-default swaps, and credit-default notes. Presently, total-rate-of-return swaps are the most commonly used credit derivatives.

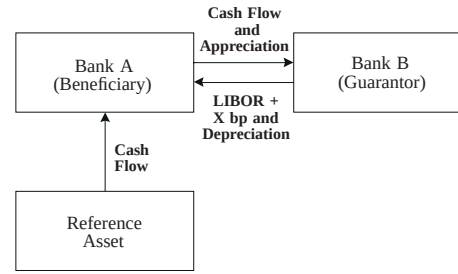
Total-Rate-of-Return Swaps

In a total-rate-of-return (TROR) swap, one counterparty (Bank A) agrees to pay the total return on an underlying reference asset to its counterparty (Bank B) in exchange for LIBOR plus a spread. Most often, the reference asset is a corporate or sovereign bond or a traded commercial loan. Since many commercial loans are based on the prime rate, both ''legs'' of the swap float with market rates. In this manner, credit risk is essentially isolated and potential interest-rate risk is generally limited to some form of basis risk (for example, prime vs. LIBOR).

TROR swaps are intended to be an efficient means of transferring or acquiring credit exposure without actually consummating a cash transaction. This feature may be desirable if a bank (Bank A) has credit exposure to a borrower which it would like to reduce while retaining the borrower as a customer, preserving the banking relationship. Also, entities which are not able to bear the administrative costs of purchasing or administering loans, or loan participations, may still acquire exposure to these loans through TROR swaps (Bank B).

In the example in figure 1, Bank A receives a LIBOR-based payment in exchange for paying out the return on an underlying asset. The total return payments due to Bank B include not only the contractual cash flows on the underlying assets, but also any appreciation or depreciation of that underlying asset that occurs over the life of the swap. Periodically (usually quarterly), the asset's market price is determined by an agreed-upon mechanism. Bank B would pay Bank A for any depreciation in the value of the

Figure 1—Total-Rate-of-Return Swap



underlying asset while receiving any appreciation. Consequently, for the term of the swap, it is as if Bank B actually owns the reference asset that resides on Bank A's balance sheet.

At the maturity of the swap, or in the event of default of the underlying asset, the swap is terminated[1] and the underlying asset is priced for purposes of determining the final swap obligations. The post-default price of the asset is most often determined by a poll of asset dealers or by direct market quotation, if available. Often, the final price will be the average of sample prices taken over time to mitigate any post-default volatility in the reference asset's value.

If Bank B is not satisfied with the pricing of the asset upon maturity of the swap or default (that is, believes the valuation is too low), then Bank B will often have the option of purchasing the underlying reference asset directly from Bank A and pursuing a workout with the borrower directly. However, it is not clear how often Bank B would choose to purchase the underlying instrument, particularly if the swap vehicle were used to avoid direct acquisition in the first place.

The final termination payment is usually based on the following formula:

Final Payment = Dealer Price – Notional Amount

The notional amount is essentially the price of the reference asset when the credit derivative is initiated. If the dealer price is greater than the notional amount, then the asset has appreciated and Bank A must pay Bank B this difference to settle the swap. On the other hand, if the dealer price is below the notional amount, either depreciation (for example, downgrade or default) or principal reduction (for example, amortization, prepayment) has occurred, and Bank B owes Bank A this difference. Therefore, the final payment (either at maturity or upon default) ultimately defines the nature and extent of the transfer of credit risk.

Default events are described in the transaction documentation, usually the trade confirmation. These events may include bankruptcy, payment defaults, breached covenants in loan or bond documentation, or even the granting of significant security interests by the reference obligor to one of its creditors. Often, a default event is defined so as to apply to any class of outstanding securities of the reference obligor in excess of a specified amount. In other words, a default can be triggered if the reference asset defaults or if any material class of securities issued by the underlying obligor defaults.

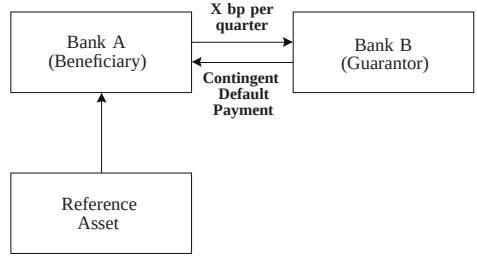
In an alternative structure, two banks may exchange the total return on underlying groups of loans. For example, a large money-center bank may receive the total return on a concentrated loan portfolio of a regional bank in exchange for the total return on a more diversified group of loans held by the money-center bank. These types of swaps may be readily marketable to smaller banks that are seeking to comply with the concentration of credit limitations of section 305(b) of the Federal Deposit Insurance Corporation Improvement Act (FDICIA).

Credit-Default Swaps

In a credit-default swap, one counterparty (Bank A) agrees to make payments of X basis points of notional amount, either per quarter or per year, in return for a payment in the event of the default of a prespecified reference asset (or name). (See figure 2.) Since the payoff of a credit-default swap is contingent on a default event (which may include bankruptcy, insolvency, delinquency, or a credit-rating downgrade), calling the structure a ''swap'' may be a misnomer; the transaction more closely resembles an option.

As with TROR swaps, the occurrence of default in credit-default swaps is contractually well defined. Usually, the default event must be publicly verifiable. The default definition must be specific enough to exclude events whose

Figure 2—Credit-Default Swap



1. Alternatively, the swap may continue to maturity with payments based on quarterly changes in the post-default asset price.

inclusion would be undesirable, such as when a reference name is delinquent due to the intentional withholding of a payment in a legal dispute that does not affect the creditworthiness of the organization. Further, a materiality threshold may be involved; that is, a default event must have occurred, *and* the cumulative loss on the underlying must be greater than Y percent. The materiality thresholds increase the likelihood that only significant changes in credit quality will trigger the default payment (rather than small fluctuations in value that tend to occur over time).

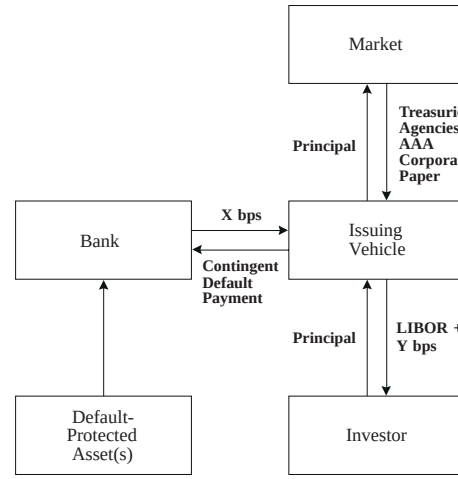
Finally, upon default, the ''swap'' is terminated and a default payment is calculated. The default payment is often calculated by sampling dealer quotes or observable market prices over some prespecified period after default has occurred. Alternatively, the default payment may be specified in advance as a set percentage of notional (for example, 25, 50, or 100 percent). Such swaps are usually referred to as *binary swaps*; they either pay the prespecified amount or nothing, depending on whether default occurs. Binary swaps are often used when the reference asset is not liquid but when loss in the event of default is otherwise subject to estimation. For example, if the reference asset is a senior, unsecured commercial bank loan, and such loans have historically recovered 80 percent of face value in the event of default, a binary default swap with a 20 percent contingent payout may be appropriate.

When the counterparty making the default payment (guarantor) is unhappy with the valuation, the option to purchase the reference asset is often available. On the other hand, some versions of default swaps may allow the beneficiary to put the asset to the guarantor in the event of default rather than receive a cash payment. Finally, when there is more than one underlying instrument (or name), which is often found in a ''basket'' structure, the counterparty making the contingent default payment is exposed to only the first instrument or name to default.

Credit-Default Notes

A credit-default note is a structural note and is the on-balance-sheet equivalent of a credit-default swap. In a credit-default note, an investor purchases a note from an issuing vehicle, often a trust. The proceeds of the note purchase are used by the trust to purchase paper of the highest credit quality: Treasuries, agencies, or AAA corporate paper. The note is structured such that a default by the underlying reference instrument(s) or name(s) results in a reduction of the repayment of principal to the investor. Default payments are calculated in the same manner as for TROR and credit-default swaps. In return for the contingent default payment, the arranging bank pays a spread to the investor through the issuing vehicle. The investor, meanwhile, receives a premium yield over LIBOR for accepting the default risk of the underlying instrument(s) or name(s). (See figure 3.)

Figure 3—Credit-Default Note



USES

Both total rate-of-return swaps and credit-default swaps are used to transfer the credit risk of the asset(s) referenced in the transaction. The counterparty seeking to transfer the credit risk (the *beneficiary*) often owns the reference asset. The counterparty receiving the credit risk of the reference asset (the *guarantor*) is able to do so without purchasing the reference asset directly.

Banks may use credit derivatives in several ways. They may elect to receive credit exposure (provide protection) for a fee or in exchange for credit exposure which they already hold in an effort to better diversify their credit portfolios.

Banks may also elect to receive credit exposure through credit derivatives rather than through some other transaction structure due to the relative yield advantage (arbitrage of cash-market pricing) of derivatives.

Alternatively, banks may use credit derivatives to reduce either individual credit exposures or credit concentrations in their portfolios. In other words, the banks are purchasing credit protection from another institution. Banks may use credit derivatives to synthetically take a short position in an asset which they do not wish to sell outright. From the bank customer's perspective, credit derivatives may be written to allow nonbank counterparties to obtain access to bank loan exposures and related returns either as a new asset class (for credit diversification) or without up-front funding (perhaps to obtain greater leverage). In the last example, the bank is essentially performing traditional credit intermediation using a new off-balance-sheet vehicle.

Finally, banks may seek to establish themselves as dealers in credit derivatives. Rather than pursuing credit portfolio efficiency or portfolio yield enhancement, dealer banks will seek to profit from buying and selling credit derivatives exposures quite apart from their portfolio management goals. Dealer banks may or may not hold the assets referenced in their credit-derivative transactions, depending on their risk tolerance, credit views, and (ultimately) their ability to offset contracts in the marketplace.

DESCRIPTION OF MARKETPLACE

Issuing Practices

Credit derivatives are transacted by banks, securities firms, and insurance companies through financial contracts traded over the counter. The size of the marketplace is fairly small, with up to 15 organizations actively transacting in credit derivatives by year-end 1996. Due to the small size and name-specific nature of the credit-derivative market, there is very little secondary-market support.

Market Participants

Commercial and investment banks, insurance companies, and hedge funds are active as both buyers and sellers of credit derivatives. Pension funds and money managers have also acted as counterparties to credit-derivative transactions.

Market Transparency

Currently, there is no market transparency in the pricing or volume of credit derivatives. Most transactions are highly structured, negotiated deals between sophisticated counterparties. One money-center bank has made price quotes publicly available for several transactions structures that reference the obligors most often found in current transactions or in whom there is the most interest at the time. However, pricing transparency is poor.

Further, regulatory and public reporting standards for credit derivatives have not yet been established. Consequently, the level of business activity is also not readily transparent. The estimates of the market size and composition available to date are the result of surveys conducted by credit-derivatives dealer banks (for example, CIBC/Wood-Gundy) or industry groups (for example, the British Bankers' Association). At year-end 1996, the market for credit derivatives was estimated to be $40 billion.

PRICING

To understand credit-derivative pricing and how different prices for reference assets might be obtained for different counterparties, consider the following example. A bank offers to provide default protection to another bank on a five-year loan to a BBB-rated borrower. Since reliable default and recovery data for pricing credit derivatives are not available, credit-derivatives providers rely on credit spreads to price these products. One of the more common pricing techniques is to price an asset swap of the reference asset. In an asset swap, a fixed-for-floating interest-rate swap is used to convert a fixed-rate instrument (here, a BBB-rated note) into a floating-rate instrument. The spread above LIBOR required for this conversion to take place is related to the creditworthiness of the reference borrower. That is, the lower the creditworthiness of the reference borrower, the greater the spread above LIBOR to complete the asset swap. Hence, if LIBOR is viewed as a base rate at which the most creditworthy institutions

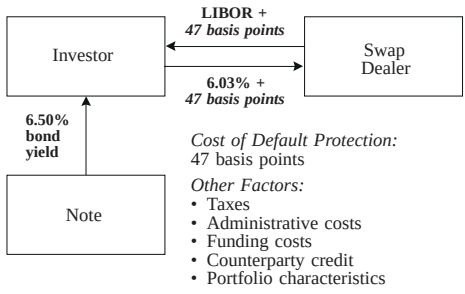
can fund themselves, then the spread above LIBOR represents the ''credit premium,'' or the cost of default risk, associated with that particular reference asset.

The credit premium is the most fundamental component of pricing. The credit premium is meant to capture the default risk of the reference asset. Often, the credit premium is the periodic payment rate required by market participants in exchange for providing default protection. In a total-return swap, LIBOR plus this credit premium is paid in exchange for receiving the total return on the underlying reference asset. Intuitively, the owner of the reference asset, who receives LIBOR plus the credit premium, is being compensated for funding costs and default risk of the reference asset.

Furthermore, assume the reference asset is a BBB-rated, senior unsecured note of five-year maturity yielding 6.50 percent. Further, assume that the asking price for a five-year, fixed-for-floating interest-rate swap is 6.03 percent against LIBOR flat. To complete the asset swap, the interest-rate swap legs need to be increased by 47 basis points each to convert the reference asset to a floating-rate instrument. (See figure 4.) Consequently, 47 basis points is the credit premium, or the implied market price to be charged, per year, for providing default protection on this BBB-rated reference asset. Alternatively, LIBOR plus 47 basis points would be the price to be paid in a TROR swap for receiving the total return on this asset for five years.

However, the borrower-specific factors that produced the implied market price of 47 basis points for the default swap are not the only factors considered in pricing. The spread may be adjusted for any number of factors which are unique to the counterparties. For example, the spread may need to be adjusted for counterparty credit considerations. In the example in figure 2, if the credit quality of the guarantor counterparty (Bank B) was a concern to the beneficiary (Bank A), the beneficiary might negotiate payment of a lower spread (fee) than 47 basis points to compensate for counterparty risk.

Figure 4—Asset Swap



Often, differences in funding costs between counterparties also affect pricing. A counterparty that could obtain credit exposure through direct acquisition of the asset on a favorable basis due to funding advantages might require a higher return for taking on the same exposure through a default swap, which is priced by analogy to an asset swap. Operational considerations, such as the inability of a guarantor counterparty to actually own the asset, may result in a pricing premium for the risk seller (protection buyer) who can own the asset. Similarly, tax consequences may have an impact on transaction pricing. For example, a beneficiary may wish to reduce credit exposure to an obligor without actually selling the reference asset to avoid triggering an unfavorable taxable event, such as a taxable gain or a capital loss that is not fully deductible. Clearly, these considerations may have an impact on the price which the protection buyer (risk seller) is willing to pay.

HEDGING

Credit derivatives may be hedged in two basic ways: users may *match* (or offset) their credit-derivative contracts, or they may *use a cash position* in the reference asset to hedge their contracts.

The ideal hedging strategy for dealers is to match positions, or to conduct ''back-to-back'' trading. Many deals actually are backed to back with offsetting transactions as a result of the highly structured nature of deals. That is, dealer banks won't enter into a credit-derivative trade unless a counterparty willing to enter the offsetting transaction has been identified. Alternatively, the credit-derivative-trading function may back to back trades with an internal counterparty (for example, the bank's own loan book). Because the secondary-market support for credit derivatives is characterized by substantial illiquidity, credit positions which are taken through credit derivatives may be ''warehoused'' for substantial periods of time before an offsetting trade can be found. Banks often set trading limits on the amount and time period over which

they will warehouse reference-asset credit exposures in credit-derivative transactions.

The second basic hedging practice is to own the underlying reference asset. Essentially, the risk-selling bank hedges by going long the reference asset and going short the swap. This is the simplest form of matched trading and is illustrated by Bank A in figures 1 and 2. Generally, whether or not the bank owned the reference asset before it entered the swap is a good indication of the purpose of the swap. If the bank owned the asset before executing the swap, it has most likely entered the swap for risk-management reasons. If the bank acquired the asset for purposes of transacting the swap, it is more likely to be accommodating a customer.

Interestingly, hedging a credit derivative in the cash market is not common when the cash position required is a short. Generally speaking, going short the reference asset and long the swap is problematic. To show this, consider what happens in a declining market: The long credit-derivative position (total-return receiver) declines in value, while the short cash position rises in value as the market falls. Unfortunately, most lenders of a security which is falling in value will not agree to continually lend and receive back a security that is undergoing a sustained depreciation in value. Since most short sales are very short term (in fact, overnight), the short cash hedge becomes unavailable when needed most—when there is a prolonged decline in the value of the reference asset. For this reason, a short credit-derivative position may be superior to a short cash position that must be rolled over.

A third and less common practice is to simply add or subtract the notional amount of long or short positions, respectively, to or from established credit lines to reference obligors. This is the least sophisticated risk-management treatment and is inadequate for trading institutions as it does not address counterparty risks. This method may be used effectively *in conjunction with* other methods and is useful in determining total potential credit exposure to reference obligors.

At some point, the potential exists for credit-derivatives dealers to apply a portfolio risk-management model that recognizes diversification and allows hedging of residual portfolio risks. However, the fundamental groundwork for quantitative modeling approaches to credit derivatives is still in development.

Finally, two other hedging issues are worth considering. First, it is not uncommon for banks to hedge a balance-sheet asset with a credit derivative that references a different asset of the same obligor. For example, a bank may hedge a loan to ABC Company that is highly illiquid with a credit-default swap that references the publicly traded debt of ABC Company. The fact that the public debt is more liquid and has public pricing sources available makes it a better reference asset than the loan. However, the bank is exposed to the difference in the recovery values of the loan and the debt if ABC Company defaults. Second, it is very common for the term of the credit derivative to be less than the term of the reference asset. For example, a two-year credit default swap could be written on a five-year bond. In this case, the last three years of credit risk on the underlying bond position would not be hedged. The appropriate supervisory treatment for credit derivatives is provided in SR-96-17 (see section 3020.1, ''Securitization and Secondary-Market Credit Activities'').

RISKS

Credit Risk

Banks using credit derivatives are exposed to two sources of credit risk: counterparty credit risk and reference-asset credit risk. In general, the most significant risk faced by banks in credit derivatives will be their credit exposure to the reference asset.

When a bank acquires credit exposure through a credit-derivative transaction, it will be exposed primarily to the credit risk of the reference asset. As with credit risk that is acquired through direct purchase of assets, banks should perform sufficient credit analysis of all reference assets to which they will be exposed through credit-derivative transactions. The financial analysis performed should be similar to that done for processing a loan or providing a letter of credit. Further, banks should have procedures in place to limit their overall exposure to certain borrowers, industries, or geographic regions, regardless of whether exposures are taken through cash instruments or credit-derivative transactions.

Examiners should be aware that the degree of reference-asset credit risk transferred in credit-derivative transactions varies significantly. For example, some credit derivatives are structured so that a payout only occurs when a predefined

event of default or a downgrade below a prespecified credit rating occurs. Other credit derivatives may require a payment only when a defined default event occurs *and* a predetermined materiality (or loss) threshold is exceeded. Default payments may be based on an average of dealer prices for the reference asset during some period of time after default using a prespecified sampling procedure or may be specified in advance as a set percentage of the notional amount of the reference asset. Lastly, the terms of many credit-derivative transactions are shorter than the maturity of the underlying asset and, therefore, provide only temporary credit protection to the beneficiary. In these cases, some of the credit risk of the reference asset is likely to remain with the asset holder (protection buyer).

Alternatively, a bank may own an asset whose risk is passed on to a credit-derivative counterparty. As such, the bank will only lose money if the asset deteriorates *and* the counterparty is unable to fulfill its obligations. Therefore, banks using credit derivatives to reduce credit exposure will be exposed primarily to counterparty risk. Because the ultimate probability of a loss for the bank is related to the default of both the reference credit *and* the inability of a counterparty to meet its contractual obligations, banks should seek counterparties whose financial condition and credit standing are not closely correlated with those of the reference credit.

In all credit-derivative transactions, banks should assess the financial strength of their counterparty before entering into a credit-derivative transaction. Further, the financial strength of the counterparty should be monitored throughout the life of the contract. In some cases, banks may deem it appropriate to require collateral from certain counterparties or for specific types of credit-derivative transactions.

Market Risk

While banks face significant credit exposure through credit-derivative transactions, significant market risk is also present. The prices of credit-derivative transactions will fluctuate with changes in the level of interest rates, the shape of the yield curve, and credit spreads. Furthermore, because of the illiquidity in the market, credit derivatives may not trade at theoretical prices suggested by asset-swap pricing methodologies. Therefore, price risk is a function of market rates as well as prevailing supply and demand conditions in the credit-derivative market.

The relative newness of the market for credit derivatives and the focus of some products on events of default makes it difficult for banks to hedge these contingent exposures. For example, banks that sell default swaps will probably make payments quite infrequently because events of default are rare. Hence, the payoff profile for a default swap includes a large probability that default will not occur and a small probability that a default will occur with unknown consequences. This small probability of a default event is difficult for banks to hedge, especially as the reference asset deteriorates in financial condition.

Liquidity Risk

Typically, liquidity risk is measured by the size of the bid/ask spread. Similar to other new products, credit derivatives may have higher bid/ask spreads because transaction liquidity is somewhat limited. Banks buying credit derivatives should know that their shallow market depth could make it hard to offset positions before a credit derivative's contract expires. Accordingly, banks selling credit derivatives must evaluate the liquidity risks of credit derivatives and assess whether some form of reserves, such as close-out reserves, is needed.

Banks using credit derivatives should include the cash-flow impact of credit derivatives into their regular liquidity planning and monitoring systems. Banks should also include all significant sources and uses of cash and collateral related to their credit-derivative activity into their cash-flow projections. Lastly, the contingency funding plans of banks should assess the effect of any early termination agreements or collateral/margin arrangements, along with any particular issues related to specific credit-derivative transactions.

Legal Risk

Because credit derivatives are new products that have not yet been tested from a legal point of view, many questions remain unanswered. At a minimum, banks should ensure that they and

their counterparties have the legal and regulatory authority to participate in credit-derivative transactions before committing to any contractual obligations. Moreover, banks should ensure that any transactions they enter into are in agreement with all relevant laws governing their activities.

While standard documentation for credit derivatives has yet to be developed, participating banks should use standardized documentation as soon as it becomes available. ISDA has been developing a standardized master agreement for use with credit-derivative transactions. Banks should have their legal counsel review all credit-derivative contracts to confirm that they are legally sound and that all terms, conditions, and contingencies are clearly addressed.

Examiner Guidance

When reviewing credit derivatives, examiners should consider the credit risk of the reference asset as the primary risk. A bank providing credit protection through a credit derivative can become as exposed to the credit risk of the reference asset as it would if the asset were on its own balance sheet. Thus, for supervisory purposes, the exposure typically should be treated as if it were a letter of credit or other off-balance-sheet guarantee. For example, this treatment would apply when determining an institution's overall credit exposure to a borrower when evaluating concentrations of credit.

In addition, examiners should perform the following procedures.

- Review SR-96-17.
- Note the bank's credit-derivative activities and ascertain (1) the level of credit-derivative activity, (2) the types of counterparties, (3) the typical underlying reference assets, (4) the structures and maturities of the transactions, (5) why management is using these instruments, and (6) whether the bank's credit exposure is being increased or reduced.
- Evaluate whether the bank subjects its credit-derivatives activities to a thorough, multifunctional new-product review and determine if senior management is aware of and approves the activities undertaken.
- Ensure that credit derivatives are reported correctly for regulatory purposes based on amendments to the call report and the FRY-9C as of March 31, 1997. Examiners should determine that any transfer risk received or passed on in a credit-derivative structure is captured in the bank's regulatory transfer risk reports.
- Ensure that the bank maintains documentation for its accounting policies for credit derivatives; examiners should determine whether the bank has consulted with outside accountants when determining its accounting policies and procedures for credit derivatives. Additionally, examiners should assess the bank's mark-to-market, profit recognition, and hedge-accounting practices.
- Review management's strategy for using credit derivatives, assessing the impact on the bank's risk profile and ensuring that adequate internal controls have been established for the conduct of all trading and end-user activities in credit derivatives.
- Review risk-management practices to ensure that bank systems capture and trading desks report all credit exposures to senior management, including counterparty and reference-asset exposures from credit derivatives.
- Ensure that risk-management reports are done on a timely basis and are disseminated to the appropriate personnel.
- Assess the bank's treatment of credit derivatives for purposes of legal lending limits, that is, when should the bank use credit derivatives to lower borrower concentrations and which type of credit derivative should the bank use. Further, examiners should ensure that the bank is in compliance with all regulatory lending limits.
- Review the bank's asset quality and loan-loss reserve policies with respect to credit derivatives and any reference assets owned. Examiners should ensure that assets protected by credit derivatives that are nonperforming are recognized in internal credit reports and assess how the bank's loan-loss reserves are affected by the use of credit derivatives. Moreover, examiners should ensure that the bank's classification system is reasonable given the types of credit-derivatives structures used, the degree to which credit risk is transferred, and the creditworthiness of its credit-derivative counterparties.
- Procure and review relevant marketing materials and policies regarding sales practices. Dealers should assess the financial character and sophistication of all counterparties. Since credit derivatives are new and complex instru-

ments, dealers should provide end-users with information sufficient to understand the risks associated with particular credit-derivative structures.

ACCOUNTING TREATMENT

The accounting treatment for certain credit derivatives is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivatives and Hedging Activities." (See section 2120.1, "Accounting," for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The appropriate risk-based capital treatment for credit-derivative transactions is included in SR-96-17. The appropriate treatment for credit derivatives under the market-risk capital amendment to the BIS Accord is not finalized as of this writing. As a general rule, SR-96-17 provides the appropriate capital treatment for credit derivatives which are carried in the banking book and for institutions which are not subject to the market-risk rules.

Under SR-96-17, credit derivatives generally are to be treated as off-balance-sheet direct credit substitutes. The notional amount of the contract should be converted at 100 percent to determine the credit-equivalent amount to be included in risk-weighted assets of the guarantor.[2] A banking organization providing a guarantee through a credit-derivative transaction should assign its credit exposure to the risk category appropriate to the obligor of the reference asset or any collateral. On the other hand, a banking organization that owns the reference asset upon which credit protection has been acquired through a credit derivative may, under certain circumstances, assign the unamortized portion of the reference asset to the risk category appropriate to the guarantor, for example, the 20 percent risk category if the guarantor is a bank, or the 100 percent risk category if the guarantor is a bank holding company.

Whether the credit derivative is considered an eligible guarantee for purposes of risk-based capital depends on the degree of credit protection actually provided. As explained earlier, the amount of credit protection actually provided by a credit derivative may be limited depending on the terms of the arrangement. For example, a relatively restrictive definition of a default event or a materiality threshold that requires a comparably high percentage of loss to occur before the guarantor is obliged to pay could effectively limit the amount of credit risk actually transferred in the transaction. If the terms of the credit-derivative arrangement significantly limit the degree of risk transference, then the beneficiary bank cannot reduce the risk weight of the "protected" asset to that of the guarantor bank. On the other hand, even if the transfer of credit risk is limited, a banking organization providing limited credit protection through a credit derivative should hold appropriate capital against the reference exposure while it is exposed to the credit risk of the reference asset. See section 3020.1, "Securitization and Secondary-Market Credit Activities."

Banking organizations providing a guarantee through a credit derivative may mitigate the credit risk associated with the transaction by entering into an offsetting credit derivative with another counterparty, a so-called "back-to-back" position. Organizations that have entered into such a position may treat the first credit derivative as guaranteed by the offsetting transaction for risk-based capital purposes. Accordingly, the notional amount of the first credit derivative may be assigned to the risk category appropriate to the counterparty providing credit protection through the offsetting credit-derivative arrangement (for example, to the 20 percent risk category if the counterparty is an OECD bank).

In some instances, the reference asset in the credit-derivative transaction may not be identical to the underlying asset for which the beneficiary has acquired credit protection. For example, a credit derivative used to offset the credit exposure of a loan to a corporate customer may use a publicly traded corporate bond of the customer as the reference asset, whose credit quality serves as a proxy for the on-balance-sheet loan. In such a case, the underlying asset will still generally be considered guaranteed for capital purposes as long as both the underlying

2. Guarantor banks which have made cash payments representing depreciation on reference assets may deduct such payments from the notional amount when computing credit-equivalent amounts for capital purposes. For example, if a guarantor bank makes a depreciation payment of $10 on a $100 notional total-rate-of-return swap, the credit-equivalent amount would be $90.

asset and the reference asset are obligations of the same legal entity and have the same level of seniority in bankruptcy. In addition, banking organizations offsetting credit exposure in this manner would be obligated to demonstrate to examiners that (1) there is a high degree of correlation between the two instruments; (2) the reference instrument is a reasonable and sufficiently liquid proxy for the underlying asset so that the instruments can be reasonably expected to behave similarly in the event of default; and (3) at a minimum, the reference asset and underlying asset are subject to mutual cross-default provisions. A banking organization that uses a credit derivative, which is based on a reference asset that differs from the protected underlying asset, must document the credit derivative being used to offset credit risk and must link it directly to the asset or assets whose credit risk the transaction is designed to offset. The documentation and the effectiveness of the credit-derivative transaction are subject to examiner review. Banking organizations providing credit protection through such arrangements must hold capital against the risk exposures that are assumed.

LEGAL LIMITATIONS FOR BANK INVESTMENT

While examiners have not seen credit-derivative transactions involving two or more legal entities within the same banking organization, the possibility of such transactions exists. Transactions between or involving affiliates raise important supervisory issues, especially whether such arrangements are effective guarantees of affiliate obligations, or transfers of assets and their related credit exposure between affiliates. Therefore, banking organizations should consider carefully the existing supervisory guidance on interaffiliate transactions before entering into credit-derivative arrangements involving affiliates, especially when substantially the same objectives could be achieved using traditional guarantee instruments.

Legal lending limits are established by individual states for state-chartered banks and by the Office of the Comptroller of the Currency (OCC) for national banks. Therefore, the determination of whether credit derivatives are guarantees to be included in the legal lending limits are the purview of the state banking regulators and the OCC.

REFERENCE

Board of Governors of the Federal Reserve System. SR-96-17, ‘‘Supervisory Guidance for Credit Derivatives.’’ August 12, 1996.

GENERAL DESCRIPTION

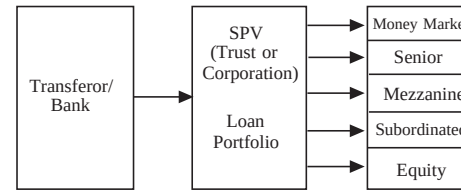
Collateralized loan obligations (CLOs) are securitizations of large portfolios of secured or unsecured corporate loans made to commercial and industrial customers of one or more lending banks. CLOs offer banking institutions a means of achieving a broad range of financial objectives, including, but not limited to, the reduction of credit risk and regulatory capital requirements, access to an efficient funding source for lending or other activities, increased liquidity, and increased returns on assets and equity. Furthermore, institutions are able to realize these benefits without disrupting customer relationships. CLO structures generally fall into two categories: cash-flow structures and market-value structures. Cash-flow structures are transactions in which the repayment and ratings of the CLO debt securities depend on the cash flow from the underlying loans. Market-value structures are distinct from cash-flow structures in that credit enhancement is achieved through specific overcollateralization levels assigned to each underlying asset. Most bank CLOs have been structured as cash-flow transactions.

To date, most bank-sponsored CLOs have been very large transactions—typically ranging from $1 billion to $6 billion—undertaken by large, internationally active banking institutions. However, as the CLO market evolves and the relative costs decline, progressively smaller transactions may become feasible, and the universe of banks that can profitably use the CLO structure will increase significantly.

CHARACTERISTICS AND FEATURES

In a CLO transaction, loans are sold, participated, or assigned into a trust or other bankruptcy-remote special-purpose vehicle (SPV), which, in turn, issues asset-backed securities consisting of one or more classes, or tranches. Alternatively, a CLO may be synthetically created through the use of credit derivatives, for example, default swaps or credit-linked notes, that are used to transfer the credit risk of the loans into the trust or SPV and, ultimately, into the capital markets.

Figure 1—Collateralized Loan Obligation



Typically, the asset-backed securities issued by the trust or SPV consist of one or more classes of rated debt securities, one or more unrated classes of debt securities that are generally treated as equity interests, and a residual equity interest. These tranches generally have different rates of interest and projected weighted average lives to appeal to different types of investors. They may also have different credit ratings. It is common for the bank to retain a subordinated or equity interest in the securitized assets to provide the senior noteholders with additional credit enhancement. This provision of credit support by the sponsoring bank triggers regulatory ''low-level recourse'' capital treatment.

Conceptually, the underlying assets collateralizing the CLO's debt securities consist of whole commercial loans. In reality, the underlying assets frequently consist of a more diverse mix of assets which may include participation interests, structured notes, revolving credit facilities, trust certificates, letters of credit, and guarantee facilities, as well as synthetic forms of credit.

One or more forms of credit enhancement are almost always necessary in a CLO structure to obtain the desired credit ratings for the most highly rated debt securities issued by the CLO. The types of credit enhancements used by CLOs are essentially the same as those used in other asset-backed securities structures—''internal'' credit enhancement provided by the underlying assets themselves (such as subordination, excess spread, and cash collateral accounts) and ''external'' credit enhancement provided by third parties (principally financial guaranty insurance issued by monoline insurers). In the past, most bank CLOs have relied on internal credit enhancement.

Bank CLOs can be further divided into linked and de-linked structures. In a linked structure, the sponsoring bank provides some degree of implicit or explicit credit support to the transaction as a means of improving the credit rating of some or all of the tranches. While such credit linkage may improve the pricing of a transaction, the bank's provision of credit support may constitute recourse for risk-based capital purposes, thus increasing the capital cost of the transaction. In contrast, the CLO issuer in a de-linked structure relies entirely on the underlying loan assets and any third-party credit enhancement for the credit ratings of the debt securities.

CLO transactions are evolving into highly customized and complex structures. Some transactions that may appear similar on the surface differ greatly in the degree to which credit risk has been transferred from the bank to the investor. In some cases, the actual transference of credit risk may be so limited that the securitization meets the regulatory definition of ''asset sales with recourse,'' thus requiring the bank to hold capital against the securitized assets.

TYPES

CLOs Using the Master Trust Structure

CLOs are complex transactions that typically use a master trust structure. Historically, the master trust has been used for revolving, short-term assets such as credit card receivables. This format affords the issuer a great deal of flexibility in structuring notes with different repayment terms and characteristics, and provides for the ongoing ability to transfer assets and offer multiple series, which allows for greater diversification and minimized transaction costs. Consequently, securitizations through a master trust structure are often assigned series numbers, such as 1998-1, 1998-2, etc., to identify each specific securitization. These transactions may have many interrelated components that make them particularly difficult to analyze.

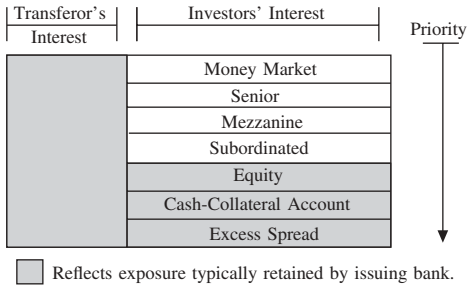
CLO master trust applications need to be carefully designed. In contrast to typical master trust assets such as credit card receivables, corporate loan portfolios are less diversified, cash flows are not as smooth, and lower yields generate less excess spread. The CLO master trust also needs to be structured to mitigate the resulting mismatches between the maturities of heterogeneous collateral assets and liabilities, and to pay all series by their stated maturities.

The master trust structure can be contrasted with other types of trusts, such as the grantor's and owner's trusts, that restrict the types of asset-backed securities that can be issued or have other limitations. The simplest trust form requires the straight pass-through of the cash flows from trust assets to investors without any restructuring of those cash flows.

A distinguishing feature of CLOs using the master trust structure is the transferor's (seller's) interest, which represents the selling bank's required retained interest in the assets transferred to the master trust. One purpose of the transferor's interest in credit card securitizations is to ensure that the principal balance of assets in the trust is more than sufficient to match the principal balance of notes that have been issued to investors. In addition, the transferor's interest is essentially a ''shock absorber'' for fluctuations in principal balances due to additional draws under credit facilities and principal paydowns, whether scheduled or not. In definitional terms, the transferor's interest is equal to the total trust assets less the investors' interest, or that portion of the pool allocated to backing the notes issued to investors. The issuing bank is usually required to maintain its transferor's interest at a predetermined percentage of the overall trust size, usually 3 to 6 percent in a CLO transaction. As such, the transferor's interest within the master trust framework is on an equal footing with the investors' interest.

However, the use of a master trust structure and the creation of a transferor's interest in a CLO transaction may create some unique problems. The very existence of the two interests (transferor's and investors'), the nonhomogeneity of the loans being securitized, and the comparatively concentrated nature of commercial loan portfolios suggest that the distribution of those loans between the two interests must be reviewed and monitored carefully. It is critical to understand the basis for the distribution of credits between the two interests and the conditions under which this distribution may change over the life of the securitization in order to determine whether the transaction contains embedded recourse to the bank.

Figure 2—CLO Master-Trust Structure



Common Features of CLO Master-Trust Structures

In order for issuers of CLOs to attract institutional investors, for example, insurance companies and pension funds, the securities being issued are often rated. Rating agencies consider the credit quality and performance history of the securitized loan portfolio in determining the credit rating to be assigned, as well as the structure of the transaction and any credit enhancements supporting the transaction.

In CLO transactions, the three most common forms of credit enhancement are (1) subordination, (2) the funding of a cash-collateral account, and (3) the availability of any excess spread on the transaction to fund investor losses. Subordination refers to securitization transactions that issue securities of different seniority, that is, senior noteholders are paid before subordinated noteholders. It is common for the issuing bank to retain the most junior tranche of the investor notes. This interest is included in the investors' interest. It is distinct from the transferor's interest and is held on the transferor's balance sheet as an asset. Thus, third-party investors gain assurance that the bank will maintain the credit quality of the loans when the bank retains the first-loss exposure in the investor interest.

In addition to retaining the most junior tranche of investor notes, the bank may fund a cash-collateral account. The cash-collateral account functions as another layer of credit protection for the investors' interest. If there is a shortfall in loan collections in any period that prevents asset-backed noteholders from being paid, the cash collateral account may be drawn down.

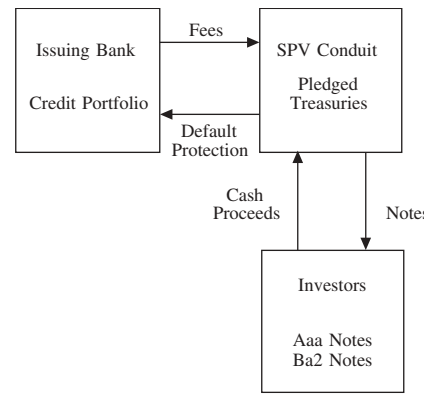
Finally, the yield of the loans placed in the trust often exceeds the total coupon interest payments due investors on the asset-backed notes issued. The residual yield is called excess spread and is usually available to fund investor losses.[1]

Synthetic CLO Securitizations

Recent innovations in securitization design have resulted in a class of synthetic securitization that involves different risk characteristics than the standard CLOs described above. One type of synthetic securitization uses credit derivatives to transfer a loss potential in a designated portfolio of credit exposures to the capital markets. The intent of the transaction is to transfer credit risk on a specific reference portfolio of assets to the capital markets and to achieve a capital charge on the reference portfolio that is significantly lower than 8 percent.

In the example in figure 3, the banking organization identifies a specific portfolio of credit exposures, which may include loan commitments, and then purchases default protection from a special-purpose vehicle. In this case, the

Figure 3—Synthetic CLO Securitization



1. Note that any loss position that a bank retains in its own securitization is subject to low-level-recourse capital treatment. A loss position would include retention of the most junior investor notes, the cash-collateral account, and excess spread, if recorded as an asset on the bank's balance sheet. (See Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities," for more information on the sale of assets and the recording of resulting assets and liabilities on the balance sheet.)

credit risk on the identified reference portfolio is transferred to the SPV through the use of credit-default swaps. In exchange for the credit protection, the institution pays the SPV an annual fee.

To support its guarantee, the SPV sells credit-linked notes (CLNs) to investors and uses the cash consideration to purchase Treasury notes that are then pledged to the banking organization to cover any default losses.[2] CLNs are obligations whose principal repayment is conditioned upon the default or nondefault of a referenced asset. The CLNs may consist of more than one tranche, for example, Aaa-rated senior notes and Ba2-rated subordinated notes, and are issued in an amount that is sufficient to cover some multiple of expected losses—typically, about 7 percent of the notional amount of the reference portfolio.

There may be several levels of loss in a synthetic securitization. The first-loss position may be a small cash reserve that accumulates over a period of years and is funded from the excess of the SPV's income (that is, the yield on the Treasury securities plus the fee for the credit-default swap) over the interest paid to investors on the notes. The investors in the SPV assume a second-loss position through their investment in the SPV's notes. Finally, the banking organization retains the risks associated with any credit losses in the reference portfolio that exceed the first- and second-loss positions.

In figure 3, default swaps on each of the obligors in the reference portfolio are executed and structured to pay the average default losses on all senior, unsecured obligations of defaulted borrowers. Typically, no payments are made until maturity, regardless of when a reference obligor defaults. A variation of this structure uses CLNs to transfer the credit risk from the transferring bank to the SPV instead of using credit-default swaps as in the above structure. In turn, the SPV issues a series of floating-rate notes (''notes'') in several tranches to investors. The notes are then collateralized by a pool of CLNs, with each CLN representing one obligor and its credit-risk exposure (such as bonds, loans, or counterparty exposure). Thus, the dollar amount of notes issued to investors equals the notional amount of the reference portfolio.

2. The names of corporate obligors included in the reference portfolio may be disclosed to investors in the CLNs.

The institution has the option to call any of the CLNs before maturity so long as they are replaced by CLNs that meet individual obligor and portfolio limits. These limits include concentration limits, maturity limits, and credit-quality standards that must be met to maintain the credit ratings of the notes. If the CLNs no longer meet collateral guidelines, there are early-amortization provisions that will cause the transaction to wind down early.

If any obligor linked to a CLN in the SPV defaults, the institution will call the note and redeem it based either on the post-default market value of the reference security of the defaulted obligor or on a fixed percentage of par that reflects the average historical recovery rate for senior unsecured debt. The fixed percentage method is used when the linked obligor has no publicly traded debt. Finally, the term of each CLN is set such that the credit exposure to which it is linked matures before the CLN, ensuring that the CLN will be in place for the full term of the exposure to which it is linked.

Synthetic CLO structures differ from many traditional CLO structures in two significant ways:

1. In most CLO structures, assets are actually transferred into the SPV. In the synthetic securitizations, the underlying exposures that make up the reference portfolio remain on the institution's balance sheet. The credit risk is transferred into the SPV through credit-default swaps or CLNs. In this way, the institution is able to avoid sensitive client relationship issues arising from loan-transfer notification requirements, loan-assignment provisions, and loan-participation restrictions. Client confidentiality may also be maintained. The CLN-backed synthetic CLO also simplifies the legal work involved by avoiding the transfer of collateral and the creation or perfection of a security interest in anything other than the CLN.
2. In many CLO structures, the opportunity to remove credit risk from—or add credit risk to—the underlying collateral pool is severely limited. In the CLN-backed CLO, the institution may actively manage the pool of CLNs, thereby managing the credit risk of the linked exposures on an ongoing basis. In this way, the structure can be used to free up credit lines for core clients with whom the institution would like to conduct more business.

RISK-TRANSFERENCE ISSUES

Reallocation of Cash Flows

One of the provisions commonly associated with complex CLOs is the provision for the reallocation of cash flows under certain circumstances. Cash-flow reallocation may take a number of forms, but is usually provided to ensure that senior noteholders get paid before junior noteholders. For example, if loan collections are insufficient to fund the payments of the senior notes of a CLO and other credit enhancements have been exhausted, or the securitization has entered an amortization phase, the servicer may be required to redirect payments from junior noteholders to senior noteholders. In some structures, principal payments on loans that are originally allocated to paying down the principal balance of the junior notes may be reallocated to the payment of current (or delinquent) interest on senior notes. This recharacterization of principal to interest may be a source of recourse if investor note balances are not reduced for the principal payment, due to the fact that a loan underlying the investor interest has paid off and is no longer available to support outstanding investor principal balances. Therefore, the bank will be required to provide new loans to back the investors' interest, either from the transferor's interest or from its own balance sheet.

Another distinguishing feature of CLOs that use the master trust structure is the revolving period. During the revolving period of a CLO, the investor notes are only paid interest, that is, the notes have not yet entered the amortization phase.[3] However, some of the underlying loan balances are actually being repaid during this time. During the revolving period, such repayments are automatically reinvested in new loans to maintain the principal balance of loans backing the investor notes. In some securitizations, this allocation of cash flows may be interrupted. Specifically, under certain conditions, such as a deteriorating collection rate, a collateral deficiency, or noncompliance with rating-agency guidelines, principal repayments on loans may be withheld from the transferor during the revolving period. Thereafter, if the deficiencies remain uncorrected, the funds thus withheld may be available to pay down investor notes. Examiners need to carefully review the conditions under which cash flows are reallocated and circumstances under which normal flows are interrupted to determine the overall impact on the credit-risk transference achieved in CLOs.

Early Amortization

A standard feature of CLO securitizations is a provision for early amortization. Early amortization provisions are designed to protect noteholders in the event the loans in the trust experience significant difficulty, diminishing the prospects for repayment of investor notes. When an early amortization event occurs (for example, defaults in the loan pool reach a certain predetermined level), collections on the underlying loans are reallocated so that investors are paid off at an accelerated rate. Typically, cash flows are allocated based on the proportional share of the trust that the transferor and investor interests represent when the early amortization event occurs. The allocation percentage thereafter remains fixed. This mechanism works to favor the investor interest, as additional drawdowns on facilities in the trust cause the transferor interest to increase (that is, additional lending under existing lines participated into the trust is assigned to the transferor's interest). Therefore, the size of the transferor interest grows rapidly relative to the size of the investor interest, but cash flow from the entire pool of trust assets continues to be allocated based on the fixed percentage that was determined when the early amortization event occurred. For example, assume the current allocation based on the relative size of investors' and transferor's interest is 80 percent and 20 percent, respectively. If early amortization were triggered, this percentage would be used to allocate all future principal collections, regardless of the actual relative size of the transferor and investor interests at any future date. While the existence of early amortization provisions has not been treated as recourse for regulatory purposes, early amortization is viewed in the marketplace as a form of credit enhancement. Credit-rating agencies indi-

3. Investor notes may either mature at a point in time or may amortize over a specific period, usually one year. In either case, principal payments on the underlying loans may begin to accumulate a few months before maturity or the commencement of an amortization period in order to provide additional assurance that contractual principal payments can be made.

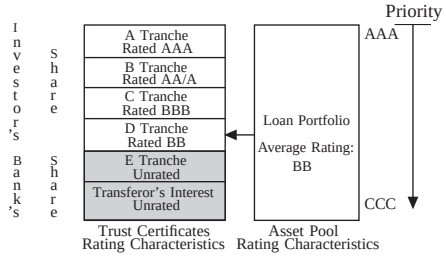
cate that such provisions can reduce the amount of credit enhancements or recourse needed to secure a given rating by more than half.

While early amortization provisions alone have not been deemed recourse to the bank, they have been recognized as creating conditions that might result in the transferring bank's retaining a degree of credit risk.[4] When a securitization triggers an early amortization event, the bank has two choices. It can allow the early amortization to proceed, causing the securitization to unwind. If a bank were to allow an early amortization to occur, its access to the asset-backed market in the future could become impaired and more expensive. Alternatively, the bank may choose to voluntarily correct the deficiency leading to the early amortization condition. Banks may be willing to support their securitizations, notwithstanding any legal obligation to do so, to preserve their name in the marketplace. However, such actions may have regulatory capital implications.

Other Issues

In some CLO transactions, it may be unclear whether a significant portion of underlying credit risk has been passed along to investors in the asset-backed securities. Assume that a $4 billion CLO has been completed in which the average underlying loan is rated BB. Further, assume that interests in these loans were segregated into a traditional CLO structure (see figure 4). In this case, the underlying loan pool has been transformed into interests in the securitization vehicle (trust or other SPV), and all of the securities issued to investors are rated equal to—or higher than—the average rating of the loans in the pool. The only other interests in the pool are retained by the issuing bank, that is, the subordinated piece of the investor interest and the transferor's interest. These interests are typically unrated. However, since the investor securities are all rated above the average loan rating of the loan pool, one could reasonably presume that the implicit credit rating of the bank's retained interests are lower than average. Further, since the dollar volume of the bank's retained interest is usually much smaller than the investors' interest, one might reasonably conclude that the implicit credit rating of these interests is much lower than the investor interest. In such cases, it is not clear whether the investors have assumed a meaningful portion of the credit risk of the underlying loans. Hence, the issue is not recourse in the traditional sense, but whether significant transference of risk has occurred in the first place.

Figure 4—Distribution of Risks



In some situations, certain trust covenants may function as credit support, leading to recourse to the securitizing bank. For example, the trust may require the bank to maintain the average credit rating of the loans in the trust. This may be accomplished by a requirement to remove deteriorating loans from the trust and replace them with higher-quality loans. Alternatively, the deteriorating loans may be ''reallocated'' to the transferor's interest, with the bank providing new loans of higher quality to the trust to back the investors' interest. In either case, the potential for recourse to the issuing bank is significant.[5]

To obtain a favorable credit rating, covenants may place limitations on the amount of credit extended to a particular industry as well as on the maximum exposure to any particular obligor. For example, rating agencies may require that total credit exposure to any particular industry not exceed 5 percent of the trust in order for the notes issued to achieve a particular rating. Any exposures over the limit may be assigned to

4. See SR-97-21, ''Risk Management and Capital Adequacy of Exposures Arising from Secondary Market Credit Activities,'' July 11, 1997.

5. One factor in determining whether transactions include recourse is the sharing of loss that occurs when deteriorating assets are sold from the trust. If the loss is shared proportionately between investor and transferor interests, it is less likely that the transaction will be deemed to have recourse to the bank.

the transferor's interest as an ''overconcentration'' amount. Because revolving credit facilities vary in size over time and their balances tend to be large, industry overconcentration appears to be common in these structures. The end result is that the investors' interest remains well diversified at all times, while the transferor's interest absorbs all overconcentration amounts. In this case, the risk of the transferor's interest and the investors' interest is not the same. However, such industry concentration limits by themselves generally will not result in a determination that the bank is providing recourse to the trust.

Similarly, trust documents may limit the exposure of any particular obligor in the trust. Obligor concentration limits may become problematic when the limit assigned is a function of the credit rating of the obligor. When a credit in the trust is downgraded below a defined threshold level, the ''excess'' exposure to the obligor may either be removed from the trust by the issuing bank or may be assigned to an overconcentration amount within the transferor's interest. In this case, it is not only possible that the transferor is absorbing credit exposures that exceed industry concentration limits (as described above), but it may also absorb exposures to credits that are deteriorating. If these requirements function in a manner that tends to reallocate deteriorating credits to the transferor's interest before default, the transaction may meet the regulatory definition of asset sales with recourse.

In addition to the common structural features described above, there may be other conditions under which loan balances may be reallocated between transferor and investor interests. Further, unique contractual requirements may specify how losses will be shared between the two interests in the event of default (or some other defined credit event). Through these contractual provisions, the bank may continue to have significant or contingent exposure to the securitized assets.

In summary, while examiners may be able to highlight recourse issues, it is not always clear where the lines should be drawn, as the mechanisms involved in these transactions are not always transparent. The issue is further complicated by the fact that banking organizations outside the United States are engaging in these transactions, and the treatment applied by foreign bank supervisory authorities may not parallel U.S. supervisory treatment.

USES

Banks have used CLOs to achieve a number of different financial objectives, including the important goal of maximizing the efficient use of their economic capital in the context of the current regulatory capital rules. Considering the small margins on commercial loans relative to other banking assets, the high risk-based capital requirement of these loans, especially those of investment-grade quality, makes holding them a less profitable or efficient use of capital for some banks. Using a CLO to securitize and sell a portfolio of commercial loans can free up a significant amount of capital that can be used more profitably for other purposes, such as holding higher-yielding assets, holding lower risk-weighted assets, making acquisitions, paying dividends, and repurchasing stock. As a result, this redeployment of capital can have the effect of reducing capital requirements, and/or improving return on equity and return on assets.

Issuers also obtain other advantages by using CLOs and synthetic securitizations, including accessing more favorable capital-market funding rates and, in some cases, transferring credit risk; increasing institutional liquidity; monetizing gains in loan value; generating fee income by providing services to the SPV; and eliminating a potential source of interest-rate risk. In addition, CLOs can be used for balance-sheet management and credit-risk hedging, that is, securitizations enable the sponsor to transfer assets with certain credit-quality, spread, and liquidity characteristics from the balance sheet while preserving relationships with borrowers. In this manner, the bank can reduce its exposure to risk concentrations.

From the viewpoint of investors, CLO spreads are attractive compared with those of other, more commoditized asset classes and can offer portfolio-diversification benefits. The various tranches represent a significant arbitrage opportunity to yield- seeking investors, and investment-grade CLOs can provide a spread premium to investors who are limited by regulatory or investment restrictions from directly purchasing individual non-investment-grade securities. In addition, the performance history of CLOs has so far been favorable—an important factor in attracting investors, especially in the lower, supporting mezzanine or equity tranches in a CLO capital structure. These subordinated investors demand a premium return that is commensurate with the higher risk they bear.

DESCRIPTION OF MARKETPLACE

The primary buyers for CLO securities have been insurance companies and pension funds seeking attractive returns with high credit quality. To date, banking organizations typically have not been not active buyers of these securities. The secondary market is less fully developed and less active than the market for more traditional types of asset-backed securities. However, as the market grows and expands globally to spread-seeking investors, CLO securities are becoming more liquid.

Market transparency can be less than perfect, especially when banks and other issuers retain most of the economic risk despite the securitization transaction. In addition, the early amortization features of some CLO transactions may not be fully understood by potential buyers.

PRICING

Securities issued in CLOs and synthetic securitizations carry coupons that can be fixed (generally yielding between 50 and 300 basis points over the Treasury curve) or floating (for example, 15 basis points over one-month LIBOR). Pricing is typically designed to reflect the coupon characteristics of the loans being securitized. The spread will vary depending on the credit quality of the underlying collateral, degree and nature of the credit enhancement, and degree of variability in the cash flows emanating from the securitized loans.

HEDGING

CLO issuers often use a variety of hedging instruments, including interest-rate swaps, currency swaps, and other derivatives, to hedge against various types of risk. For example, if the underlying assets are not denominated in U.S. dollars, currency risk may be hedged with swaps, caps, or other hedging mechanisms. Convertibility risk is considered for certain currencies in which the sovereign may be likely to impose currency restrictions. In such cases, certain currencies may not be permitted in the collateral pool regardless of the hedging mechanisms in place. Hedging instruments may also be used to address cash-flow mismatches between the payment characteristics of the CLO debt obligations and the underlying loans, such as differences in frequency of payments, payment dates, interest-rate indexes (basis risk), and interest-rate reset risk.

RISKS

Credit risk in CLOs and synthetic securitizations arises from (1) losses due to defaults by the borrowers in the underlying collateral and (2) the issuer's or servicer's failure to perform. These two elements can blur together, for example, a servicer who does not provide adequate credit-review scrutiny of the serviced portfolio, leading to a higher incidence of defaults. CLOs and synthetic securitizations are rated by major ratings agencies.

Market risk arises from the cash-flow characteristics of the security. The greatest variability in cash flows comes from credit performance, including the presence of wind-down or acceleration features designed to protect the investor in the event that credit losses in the portfolio rise well above expected levels. For certain dynamic CLO structures that allow for active management, adequate disclosure should be made regarding a manager's ability to sell assets that may have appreciated or depreciated in value. This trading flexibility represents an additional level of risk to investors because an investor is exposed to the collateral manager's decisions. As a result, there may be a greater risk in CLOs (versus, for example, credit card securitizations) that its rating can change over time as the composition of the asset pool deteriorates.

Interest-rate risk arises for the issuer from the relationship between the pricing terms on the underlying loans and the terms of the rate paid to noteholders, as well as from the need to mark to market the excess servicing or spread-account proceeds carried on the balance sheet. For the holder of the security, interest-rate risk depends on the expected life or repricing of the security, with relatively minor risk arising from embedded options. The notable exception is the valuation of the wind-down option.

Liquidity risk can arise from credit deterioration in the asset pool when early amortization provisions are triggered. In that situation, the seller's interest is effectively subordinated to the

interests of the other investors by the payment-allocation formula applied during early amortization. Other investors effectively get paid first, and the seller's interest will therefore absorb a disproportionate share of losses. Also, closure of the securitization conduit can create liquidity problems for the seller because the seller must then fund a steady stream of new receivables. When a conduit becomes unavailable due to early amortization, the seller must either find another buyer for the receivables or have receivables accumulate on its balance sheet, creating the need for another source of funding. In addition, these factors can create an incentive for the seller to provide implicit recourse—credit enhancement above and beyond any preexisting contractual obligation—to prevent early amortization. Although incentives to provide implicit recourse are present in other types of securitizations to some extent, the early-amortization feature of CLOs creates additional and more direct financial incentives to prevent its occurrence because of concerns about damage to the seller's reputation if one of its securitizations performs poorly.

Operational risk arises through the potential for misrepresentation of loan quality or terms by the originating institution, misrepresentation of the nature and current value of the assets by the servicer, and inadequate controls over disbursements and receipts by the servicer.

ACCOUNTING TREATMENT

Holder

The accounting treatment for investments in CLOs and synthetic securitizations is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards No. 115 (FAS 115), "Accounting for Certain Investments in Debt and Equity Securities," as amended by Statement of Financial Accounting Standards No. 140 (FAS 140), "Accounting for Transfers and Servicing of Financial Assets and Extinguishments of Liabilities." See section 2120.1, "Accounting," for further discussion.

Seller

FAS 140 covers the accounting treatment for the securitization of receivables. These standards address (1) when a transaction qualifies as a sale for accounting purposes and (2) the treatment of excess spread and servicing assets arising from a securitization transaction when a sale is deemed to have occurred.

RISK-BASED CAPITAL WEIGHTING

The current capital treatment for the standard master-trust CLO described in this section has three components. First, banks use the low-level-recourse rule when calculating capital charges against any first-loss exposures they retain. Thus, the most junior tranche would carry a dollar-for-dollar capital charge up to 8 percent of the investor interest. Second, banks receive transferor certificates for their investments in the trust through the transferor's interest. As this represents the bank's proportional share in a larger pool of assets, 8 percent capital is held against the transferor's interest. Finally, the loan facilities which the bank has assigned or participated into the trust typically are not fully drawn. The bank maintains capital for its commitment to lend up to the limit of these facilities. If the transferring bank that sponsors the CLO retains a subordinated tranche that would provide credit protection, then the low-level-recourse rule would apply, that is, dollar-for-dollar capital generally would be assessed on the retained risk exposure. This is also true if an interest-only receivable representing the future spread is booked as a receivable on the transferring bank's balance sheet. If the sale of assets is accounted for, in part or in its entirety, as a servicing asset under FAS 140, then the capital charge takes the form of a tier 1 capital limitation. The current capital treatment limits the total amount of mortgage- and nonmortgage-servicing assets that can be included in tier 1 capital to no more than 100 percent. It further limits the amount of nonmortgage-servicing assets that can be included in tier 1 capital to no more than 25 percent.

Examiners should evaluate whether the transferor's interest is of lower credit quality than the investors' interest and, if so, determine whether the 8 percent capital charge against the on-balance-sheet amount is sufficient given the issuing institution's risk exposure. If examiners determine that the transferor's interest is effectively subordinated to the investors' interest and

thus provides credit protection to the issued securities, then the low-level-recourse treatment may be appropriate. SR-96-17, "Supervisory Guidance for Credit Derivatives," provides some guidance for the capital treatment of synthetic securitizations.

Synthetic CLOs can raise questions about the appropriate capital treatment when calculating the risk-based and leverage capital ratios. Capital treatments for three synthetic transactions follow.

Transaction 1—Entire Notional Amount of Reference Portfolio Is Hedged

In the first type of synthetic securitization, the sponsoring banking organization, through a synthetic CLO, hedges the entire notional amount of a reference asset portfolio. An SPV acquires the credit risk on a reference portfolio by purchasing credit-linked notes (CLNs) issued by the sponsoring banking organization. The SPV funds the purchase of the CLNs by issuing a series of notes in several tranches to third-party investors. The investor notes are in effect collateralized by the CLNs. Each CLN represents one obligor and the banking organization's credit-risk exposure to that obligor, which could take the form of bonds, commitments, loans, and counterparty exposures. Since the noteholders are exposed to the full amount of credit risk associated with the individual reference obligors, all of the credit risk of the reference portfolio is shifted from the sponsoring banking organization to the capital markets. The dollar amount of notes issued to investors equals the notional amount of the reference portfolio. In the example shown in figure 1, this amount is $1.5 billion.

If the obligor linked to a CLN in the SPV defaults, the sponsoring banking organization will call the individual CLN and redeem it based on the repayment terms specified in the note agreement. The term of each CLN is set so that the credit exposure (to which it is linked) matures before the maturity of the CLN, which ensures that the CLN will be in place for the full term of the exposure to which it is linked.

An investor in the notes issued by the SPV is exposed to the risk of default of the underlying reference assets, as well as to the risk that the sponsoring banking organization will not repay principal at the maturity of the notes. Because of the linkage between the credit quality of the sponsoring banking organization and the issued notes, a downgrade of the sponsor's credit rating most likely will result in the notes also being downgraded. Thus, a banking organization investing in this type of synthetic CLO should assign the notes to the higher of the risk cate-

Figure 1—Transaction 1

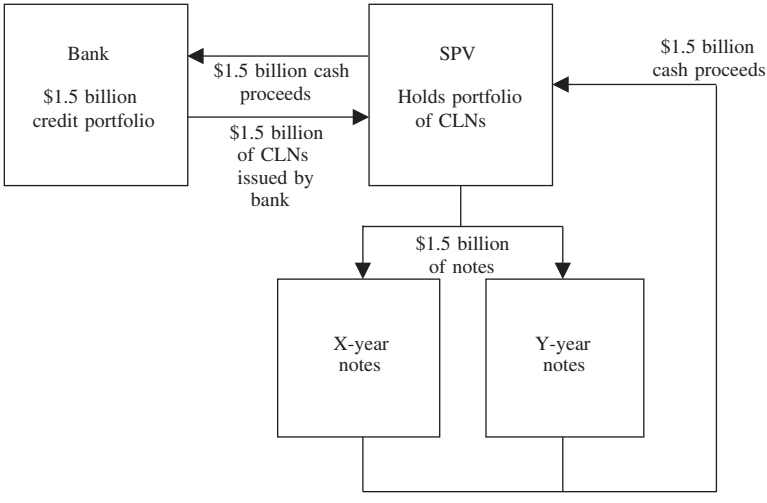
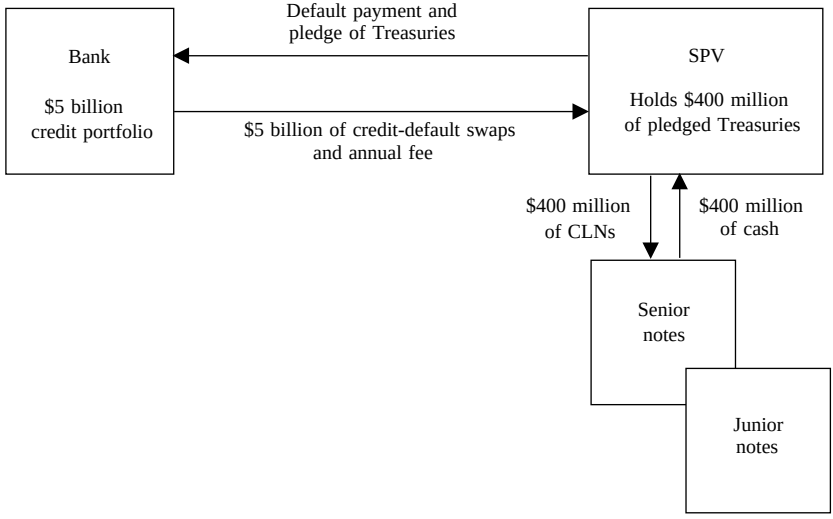


Figure 2—Transaction 2



gories appropriate to the underlying reference assets or the issuing entity.

For purposes of risk-based capital, the sponsoring banking organizations may treat the cash proceeds from the sale of CLNs that provide protection against underlying reference assets as cash collateralizing these assets.[6] This treatment would permit the reference assets, if carried on the sponsoring banking organization's books, to be assigned to the zero percent risk category to the extent that their notional amount is fully collateralized by cash. This treatment may be applied even if the cash collateral is transferred directly into the general operating funds of the banking organization and is not deposited in a segregated account. The synthetic CLO would not confer any benefits to the sponsoring banking organization for purposes of calculating its tier 1 leverage ratio, however, because the reference assets remain on the organization's balance sheet.

Transaction 2—High-Quality, Senior Risk Position in Reference Portfolio Is Retained

In the second type of synthetic CLO transaction, the sponsoring banking organization hedges a portion of the reference portfolio and retains a high-quality, senior risk position that absorbs only those credit losses in excess of the junior-loss positions. For some noted synthetic CLOs, the sponsoring banking organization used a combination of credit-default swaps and CLNs to transfer to the capital markets the credit risk of a designated portfolio of the organization's credit exposures. Such a transaction allows the sponsoring banking organization to allocate economic capital more efficiently and to significantly reduce its regulatory capital requirements.

In the structure illustrated in figure 2, the sponsoring banking organization purchases default protection from an SPV for a specifically identified portfolio of banking-book credit exposures, which may include letters of credit and loan commitments. The credit risk on the identified reference portfolio (which continues to remain in the sponsor's banking book) is transferred to the SPV through the use of credit-default swaps. In exchange for the credit protection, the sponsoring banking organization

6. The CLNs should not contain terms that would significantly limit the credit protection provided against the underlying reference assets, for example, a materiality threshold that requires a relatively high percentage of loss to occur before CLN payments are adversely affected, or a structuring of CLN post-default payments that does not adequately pass through credit-related losses on the reference assets to investors in the CLNs.

pays the SPV an annual fee. The default swaps on each of the obligors in the reference portfolio are structured to pay the average default losses on all senior unsecured obligations of defaulted borrowers. To support its guarantee, the SPV sells CLNs to investors and uses the cash proceeds to purchase U.S. government Treasury notes. The SPV then pledges the Treasuries to the sponsoring banking organization to cover any default losses.[7] The CLNs are often issued in multiple tranches of differing seniority and in an aggregate amount that is significantly less than the notional amount of the reference portfolio. The amount of notes issued typically is set at a level sufficient to cover some multiple of expected losses, but well below the notional amount of the reference portfolio being hedged.

There may be several levels of loss in this type of synthetic securitization. The first-loss position may consist of a small cash reserve, sufficient to cover expected losses. The cash reserve accumulates over a period of years and is funded from the excess of the SPV's income (that is, the yield on the Treasury securities plus the credit-default-swap fee) over the interest paid to investors on the notes. The investors in the SPV assume a second-loss position through their investment in the SPV's senior and junior notes, which tend to be rated AAA and BB, respectively. Finally, the sponsoring banking organization retains a high-quality, senior risk position that would absorb any credit losses in the reference portfolio that exceed the first- and second-loss positions.

Typically, no default payments are made until the maturity of the overall transaction, regardless of when a reference obligor defaults. While operationally important to the sponsoring banking organization, this feature has the effect of ignoring the time value of money. Thus, the Federal Reserve expects that when the reference obligor defaults under the terms of the credit derivative and when the reference asset falls significantly in value, the sponsoring banking organization should, in accordance with generally accepted accounting principles, make appropriate adjustments in its regulatory reports to reflect the estimated loss that takes into account the time value of money.

For risk-based capital purposes, the banking organizations investing in the notes must assign them to the risk weight appropriate to the underlying reference assets.[8] The sponsoring banking organization must include in its risk-weighted assets its retained senior exposure in the reference portfolio, to the extent these underlying assets are held in its banking book. The portion of the reference portfolio that is collateralized by the pledged Treasury securities may be assigned a zero percent risk weight. Unless the sponsoring banking organization meets the stringent minimum conditions for transaction 2 as outlined in the subsection ''Minimum Conditions'' (below), the remainder of the portfolio should be risk weighted according to the obligor of the exposures.

When the sponsoring banking organization has virtually eliminated its credit-risk exposure to the reference portfolio through the issuance of CLNs, and when the other minimum requirements are met, the sponsoring banking organization may assign the uncollateralized portion of its retained senior position in the reference portfolio to the 20 percent risk weight. However, to the extent that the reference portfolio includes loans and other on-balance-sheet assets, the sponsoring banking organization would not realize any benefits in the determination of its leverage ratio.

In addition to the three stringent minimum conditions, the Federal Reserve may impose other requirements as it deems necessary to ensure that a sponsoring banking organization has virtually eliminated all of its credit exposure. Furthermore, the Federal Reserve retains the discretion to increase the risk-based capital requirement assessed against the retained senior exposure in these structures if the underlying asset pool deteriorates significantly.

Federal Reserve staff will make a case-by-case determination, based on a qualitative review, as to whether the senior retained portion of a sponsoring banking organization's synthetic securitization qualifies for the 20 percent risk weight. The sponsoring banking organization must be able to demonstrate that virtually all the credit risk of the reference portfolio has been transferred from the banking book to the capital markets. As they do when banking organizations are engaging in more traditional securiti-

7. The names of corporate obligors included in the reference portfolio may be disclosed to investors in the CLNs.

8. Under this type of transaction, if a structure exposes investing banking organizations to the creditworthiness of a substantive issuer, for example, the sponsoring banking organization, then the investing banking organizations should assign the notes to the higher of the risk categories appropriate to the underlying reference assets or the sponsoring banking organization.

zation activities, examiners must carefully evaluate whether the sponsoring banking organization is fully capable of assessing the credit risk it retains in its banking book and whether it is adequately capitalized given its residual risk exposure. The Federal Reserve will require the sponsoring banking organization to maintain higher levels of capital if it is not deemed to be adequately capitalized given the retained residual risks. In addition, a sponsoring banking organization involved in synthetic securitizations must adequately disclose to the marketplace the effect of its transactions on its risk profile and capital adequacy.

The Federal Reserve may consider a sponsoring banking organization's failure to require the investors in the CLNs to absorb the credit losses that they contractually agreed to assume to be an unsafe and unsound banking practice. In addition, such a failure generally would constitute ''implicit recourse'' or support to the transaction, which results in the sponsoring banking organization's losing preferential capital treatment on its retained senior position.

If a sponsoring banking organization of a synthetic securitization does not meet the stringent minimum conditions, it may still reduce the risk-based capital requirement on the senior risk position retained in the banking book by transferring the remaining credit risk to a third-party OECD bank through the use of a credit derivative. Provided the credit-derivative transaction qualifies as a guarantee under the risk-based capital guidelines, the risk weight on the senior position may be reduced from 100 percent to 20 percent. Sponsoring banking organizations may not enter into nonsubstantive transactions that transfer banking-book items into the trading account to obtain lower regulatory capital requirements.[9]

Minimum Conditions

The following stringent minimum conditions are those that the sponsoring banking organizations must meet to use the synthetic securitization capital treatment for transaction 2. The Federal Reserve may impose additional requirements or conditions as deemed necessary to ascertain that a sponsoring banking organization has sufficiently isolated itself from the credit-risk exposure of the hedged reference portfolio.

Condition 1—Demonstration of transfer of virtually all the risk to third parties. Not all transactions structured as synthetic securitizations transfer the level of credit risk needed to receive the 20 percent risk weight on the retained senior position. To demonstrate that a transfer of virtually all of the risk has been achieved, sponsoring banking organizations must—

- produce credible analyses indicating a transfer of virtually all the credit risk to substantive third parties;
- ensure the absence of any early-amortization or other credit-performance-contingent clauses;[10]
- subject the transaction to market discipline through the issuance of a substantive amount of notes or securities to the capital markets;
- have notes or securities rated by a nationally recognized credit rating agency;
- structure a senior class of notes that receives the highest possible investment-grade rating, for example, AAA, from a nationally recognized credit rating agency;
- ensure that any first-loss position they retain in the form of fees, reserves, or other credit enhancement—which effectively must be deducted from capital—is no greater than a reasonable estimate of expected losses on the reference portfolio; and
- ensure that they do not reassume any credit risk beyond the first-loss position through another credit derivative or any other means.

Condition 2—Demonstration of ability to evaluate remaining banking-book risk exposures and provide adequate capital support. To ensure that the sponsoring banking organization has adequate capital for the credit risk of its unhedged exposures, it is expected to have adequate systems that fully account for the effect of these transactions on its risk profiles and capital adequacy. In particular, the sponsoring banking organiza-

9. For instance, a lower risk weight would not be applied to a nonsubstantive transaction in which the sponsoring banking organization (1) enters into a credit-derivative transaction to pass the credit risk of the senior retained portion held in its banking book to an OECD bank, and then (2) enters into a second credit-derivative transaction with the same OECD bank, in which it reassumes into its trading account the credit risk initially transferred.

10. Early-amortization clauses may generally be defined as features that are designed to force a wind-down of a securitization program and rapid repayment of principal to asset-backed securities investors if the credit quality of the underlying asset pool deteriorates significantly.

tion's systems should be capable of fully differentiating the nature and quality of the risk exposures it transfers from the nature and quality of the risk exposures it retains. Specifically, to gain capital relief sponsoring banking organizations are expected to—

- have a credible internal process for grading credit-risk exposures, including the following:
  - — adequate differentiation of risk among risk grades
  - — adequate controls to ensure the objectivity and consistency of the rating process
  - — analysis or evidence supporting the accuracy or appropriateness of the risk-grading system;
- have a credible internal economic capital-assessment process that defines them to be adequately capitalized at an appropriate insolvency probability and that readjusts, as necessary, their internal economic capital requirements to take into account the effect of the synthetic securitization transaction. (In addition, the process should employ a sufficiently long time horizon to allow necessary adjustments in the event of significant losses. The results of an exercise demonstrating that the organization is adequately capitalized after the securitization transaction must be presented for examiner review.);
- evaluate the effect of the transaction on the nature and distribution of the nontransferred banking-book exposures. This analysis should include a comparison of the banking book's risk profile and economic capital requirements before and after the transaction, including the mix of exposures by risk grade and by business or economic sector. (The analysis should also identify any concentrations of credit risk and maturity mismatches. Additionally, the sponsoring banking organization must adequately manage and control the forward credit exposure that arises from any maturity mismatch. The Federal Reserve retains the flexibility to require additional regulatory capital if the maturity mismatches are substantive enough to raise a supervisory concern. Moreover, as stated above, the sponsoring banking organization must demonstrate that it meets its internal economic capital requirement subsequent to the completion of the synthetic securitization.); and
- perform rigorous and robust forward-looking stress testing on nontransferred exposures (remaining banking-book loans and commitments), transferred exposures, and exposures retained to facilitate transfers (credit enhancements). The stress tests must demonstrate that the level of credit enhancement is sufficient to protect the sponsoring banking organization from losses under scenarios appropriate to the specific transaction.

Condition 3—Provide adequate public disclosures of synthetic CLO transactions regarding their risk profile and capital adequacy. In their 10-K and annual reports, sponsoring banking organizations must adequately disclose to the marketplace the accounting, economic, and regulatory consequences of synthetic CLO transactions. In particular, sponsoring banking organizations are expected to disclose—

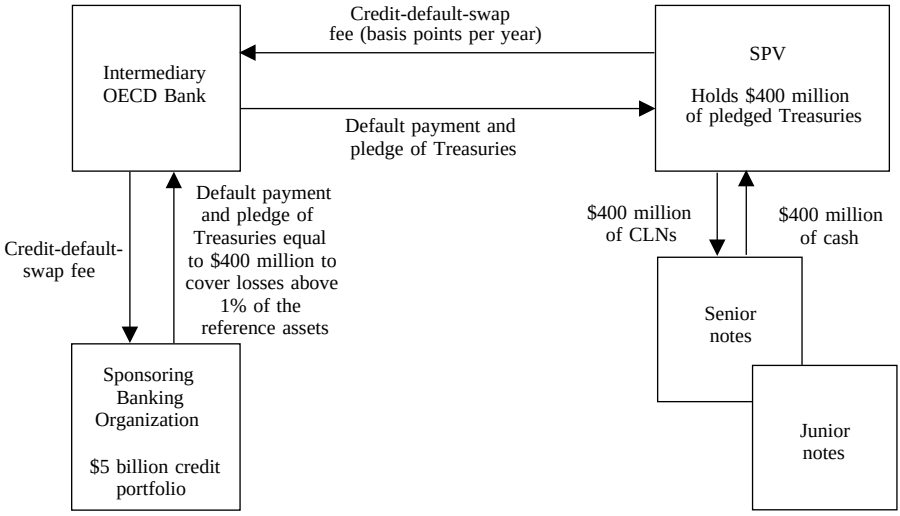
- the notional amount of loans and commitments involved in the transaction;
- the amount of economic capital shed through the transaction;
- the amount of reduction in risk-weighted assets and regulatory capital resulting from the transaction, both in dollar terms and in terms of the effect in basis points on the risk-based capital ratios; and
- the effect of the transaction on the distribution and concentration of risk in the retained portfolio by risk grade and sector.

Transaction 3—First-Loss Position Is Retained

In the third type of synthetic transaction, the sponsoring banking organization may retain a subordinated position that absorbs the credit risk associated with a first loss in a reference portfolio. Furthermore, through the use of credit-default swaps, the sponsoring banking organization may pass the second- and senior-loss positions to a third-party entity, most often an OECD bank. The third-party entity, acting as an intermediary, enters into offsetting credit-default swaps with an SPV, thus transferring its credit risk associated with the second-loss position to the SPV.[11] The SPV then issues CLNs to the capital markets for a portion of the reference

11. Because the credit risk of the senior position is not transferred to the capital markets but remains with the intermediary bank, the sponsoring banking organization should ensure that its counterparty is of high credit quality, for example, at least investment grade.

Figure 3—Transaction 3



portfolio and purchases Treasury collateral to cover some multiple of expected losses on the underlying exposures.

Two alternative approaches could be used to determine how the sponsoring banking organization should treat the overall transaction for risk-based capital purposes. The first approach employs an analogy to the low-level-capital rule for assets sold with recourse. Under this rule, a transfer of assets with recourse that contractually is limited to an amount less than the effective risk-based capital requirements for the transferred assets is assessed a total capital charge equal to the maximum amount of loss possible under the recourse obligation. If this rule applied to a sponsoring banking organization retaining a 1 percent first-loss position on a synthetically securitized portfolio that would otherwise be assessed 8 percent capital, the sponsoring banking organization would be required to hold dollar-for-dollar capital against the 1 percent first-loss risk position. The sponsoring banking organization would not be assessed a capital charge against the second- and senior-risk positions.[12]

The second approach employs a literal reading of the capital guidelines to determine the sponsoring banking organization's risk-based capital charge. In this instance, the 1 percent first-loss position retained by the sponsoring banking organization would be treated as a guarantee, that is, a direct credit substitute, which would be assessed an 8 percent capital charge against its face value of 1 percent. The second-loss position, which is collateralized by Treasury securities, would be viewed as fully collateralized and subject to a zero percent capital charge. The senior-loss position guaranteed by the intermediary bank would be assigned to the 20 percent risk category appropriate to claims guaranteed by OECD banks.[13]

The second approach may result in a higher risk-based capital requirement than the dollar-for-dollar capital charge imposed by the first approach, depending on whether the reference

12. The sponsoring banking organization would not realize any benefits in the determination of its leverage ratio since the reference assets remain on its balance sheet.

13. If the intermediary is a banking organization, then it could place both sets of credit-default swaps in its trading account and, if subject to the Federal Reserve's market-risk capital rules, use its general market-risk model and, if approved, specific-risk model to calculate the appropriate risk-based capital requirement. If the specific-risk model has not been approved, then the sponsoring banking organization would be subject to the standardized specific-risk capital charge.

portfolio consists primarily of loans to private obligors or undrawn long-term commitments. The latter generally have an effective risk-based capital requirement one-half of the requirement for loans because these commitments are converted to an on-balance-sheet credit-equivalent amount using the 50 percent conversion factor. If the reference pool consists primarily of drawn loans to private obligors, then the capital requirement on the senior-loss position would be significantly higher than if the reference portfolio contained only undrawn long-term commitments. As a result, the capital charge for the overall transaction could be greater than the dollar-for-dollar capital requirement set forth in the first approach.

Sponsoring banking organizations will be required to hold capital against a retained first-loss position in a synthetic securitization equal to the higher of the two capital charges resulting from application of the first and second approaches, as discussed above. Further, although the sponsoring banking organization retains only the credit risk associated with the first-loss position, it still should continue to monitor all the underlying credit exposures of the reference portfolio to detect any changes in the credit-risk profile of the counterparties. This is important to ensure that the sponsoring banking organization has adequate capital to protect against unexpected losses. Examiners should determine whether the sponsoring banking organization has the capability to assess and manage the retained risk in its credit portfolio after the synthetic securitization is completed. For risk-based capital purposes, banking organizations investing in the notes must assign them to the risk weight appropriate to the underlying reference assets.[14]

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Asset-backed securities can be either type IV or type V securities. Type IV securities include the following asset-backed securities that are fully secured by interests in a pool (or pools) of loans made to numerous obligors:

- investment-grade residential-mortgage-related securities offered or sold pursuant to section 4(5) of the Securities Act of 1933 (15 USC 77d(5))
- residential-mortgage-related securities as described in section 3(a)(41) of the Securities Exchange Act of 1934 (15 USC 78c(a)(41)) that are rated in one of the two highest investment-grade rating categories
- investment-grade commercial mortgage securities offered or sold pursuant to section 4(5) of the Securities Act of 1933 (15 USC 77d(5))
- commercial mortgage securities as described in section 3(a)(41) of the Securities Exchange Act of 1934 (15 USC 78c(a)(41)) that are rated in one of the two highest investment-grade rating categories
- investment-grade, small-business-loan securities as described in section 3(a)(53)(A) of the Securities Exchange Act of 1934 (15 USC 78(a)(53)(A))

Type V securities consist of all asset-backed securities that are not type IV securities. Specifically, they are defined as marketable, investment-grade-rated securities that are not type IV and are ''fully secured by interests in a pool of loans to numerous obligors and in which a national bank could invest directly.'' CLOs and synthetic securitizations are generally classified as type V securities. A bank may purchase or sell type V securities for its own account provided the aggregate par value of type V securities issued by any one issuer held by the bank does not exceed 25 percent of the bank's capital and surplus.

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GENERAL DESCRIPTION

The term *commodity-linked transaction* is used to denote all transactions that have a return linked to the price of a particular commodity or to an index of commodity prices. The term *commodity-derivative transaction* refers exclusively to transactions that have a return linked to commodity prices or indexes and for which there is no exchange of principal.

The term *commodity* encompasses both traditional agricultural products, base metals, and energy products, so that all those transactions that cannot be characterized as interest or exchange-rate contracts under the Basle Accord are designated commodity transactions. Precious metals, which have been placed into the foreign-exchange-rate category in deference to market convention, are not included.

CHARACTERISTICS AND FEATURES

A commodity-linked contract specifies exactly the type or grade of the commodity, the amount, and the future delivery or settlement dates. In these transactions, the interest, principal, or both, or the payment streams in the case of swaps, is linked to a price of a commodity or related index. However, given that banks are not allowed to trade in the underlying physical commodity (with the exception of gold) without special permission, these contracts are settled for cash.

Factors that affect commodity prices and risk are numerous and of many different origins. Macroeconomic conditions, local disturbances, weather, supply and demand imbalances, and labor strikes are examples of factors that have a direct impact on commodity prices. In many other traded markets, such factors would have a more indirect effect.

USES

Commodity-linked markets offer participants a way to hedge or take positions in future commodity prices. Market participants include commodity producers or users, such as mining, energy, and transportation companies, that want to lock in future costs or revenues by entering into a contract at a given price.

In general, financial institutions view commodity-linked transactions as a financial risk-management service for customers with commodity-price exposure, similar to the foreign-exchange and interest-rate risk management products that banks have historically offered. Over-the-counter (OTC) transactions can be tailored to the customer's needs and, therefore, offer more flexibility than exchange-traded contracts, particularly for longer-term insurance.

Examples of commodity-linked products offered by banks include commodity-linked deposits, commodity-linked loans, commodity-linked swaps, and commodity-linked options. Examples of these products and the ways in which hedgers and speculators use these products are described below.

Commodity-Linked Deposits

The following is an example of a deposit with the return linked to a commodity index:

A $100,000 one-year deposit has a return linked to the price of oil. The deposit pays at maturity either (1) a guaranteed minimum return of 3 percent or (2) 90 percent of any gain in the market index (relative to an index rate set at the outset of the transaction) of oil over the life of the deposit, whichever is greater. The depositor is able to benefit from a rise in the price of oil (however, by only 90 percent of the rise that would have been received if he or she had purchased the physical oil). The asset is less risky compared to the purchase of the actual physical oil because the principal is protected against a fall in the price of oil.

Commodity-Linked Loans

The following is an example of a loan with interest payments linked to a commodity index:

A financial institution lends an oil company $1 million for five years with interest payments linked to the price of oil as opposed to a conventional loan at 8 percent. The initial oil

index is set at $20 per barrel. Interest payments are the greater of 4 percent or the excess of any gain in the market price of oil relative to the $20 per barrel base, up to a maximum of 25 percent. The borrower pays a lower interest rate compared to a non-commodity-linked loan when oil prices fall, but shares the upside potential of its oil revenues with the lender when the price of oil rises.

Commodity-Linked Swaps

Commodity-linked swaps are defined as an agreement between two counterparties to make periodic exchanges of cash based on the following terms:

- notional quantity (for example, number of barrels or tons) of the specified commodity
- index, based on a defined grade and type of commodity, whose prevailing price is publicly quoted
- fixed price agreed to by the counterparties (The fixed price is usually above the spot price per unit for the defined commodity at the date the swap is consummated.)
- at specified intervals during the term of the swap, there are settlement dates at which the counterparties agree to a net exchange of cash (The amount of cash to be exchanged is determined as follows:
  - — One counterparty is the fixed price payer. At each settlement date, the fixed price payer owes the counterparty the notional amount of the contract multiplied by the fixed price.
  - — The other counterparty is the floating-rate price payer. At each settlement date, the floating price payer owes the counterparty the notional amount multiplied by the index price prevailing on the settlement date.)

As an example, suppose an oil company wishes to protect itself against a decline in oil prices and enters into a commodity-swap agreement with a bank. The company will receive a fixed price and pay a floating price linked to an index of the price of oil. Thus, the company trades the upside potential of rising oil prices for the assurance that it will not receive a price below the fixed price agreed on at the inception of the trade.

As a further example, suppose a utility company wishes to protect itself from rising oil prices and enters into a commodity-swap agreement with a bank. The utility company will pay a fixed price and receive a floating price linked to an index of the price of oil. Thus, the utility trades its upside potential if oil prices fall for the assurance that it will not pay a price above that agreed on at the inception of the trade.

Commodity-Linked Options

Commodity-linked options convey the right to buy (call) or sell (put) the cash-equivalent amount of an underlying commodity at a fixed exercise price (there is no physical delivery of the underlying commodity). The purchase of a commodity-linked call by an oil user, for example, sets a cap on the price of oil that the user will pay. If oil prices rise, the oil user will exercise the call option, which is the right to buy oil at the lower exercise price. The seller of a call option may have a long position in a given underlying commodity, thus selling off the upside potential of the commodity in exchange for the premium paid by the purchaser of the call.

The purchase by an oil producer of a put option indexed to the price of oil sets a floor on the price of oil that the producer will receive. The bought put therefore allows the holder to establish a minimum price level on the underlying commodity. If the price of oil in the open market falls below the strike price of the option, the oil producer will exercise the put to lock in the strike price.

DESCRIPTION OF MARKETPLACE

Commodity-linked derivatives are traded in both the exchange and OTC markets. There are several fundamental differences between the futures exchanges and the OTC markets for commodities. First, futures contracts may entail delivery of the physical commodity upon expiration of the contract, whereas OTC contracts generally are settled for cash. Second, futures contracts are standardized, while OTC contracts are tailored, often specifying commodities and maturities that are not offered on the exchanges. Third, the OTC market typically handles only large transactions, whereas exchanges may

accommodate transactions as small as the value of a single contract in a given commodity. As a result, the OTC commodity markets tend to be less liquid than the exchanges, but at the same time they offer products that can be more customized to meet the users' specific needs.

Market Participants

Primary players in the commodity markets are commodity producers and end- users, hedge funds and mutual funds, and investment and commercial banks. Commercial banks are relatively small players in the commodity markets; it is estimated that they account for roughly 5 to 10 percent of trading activity in the domestic energy sector and even less in agricultural commodities. However, these banks fill an important niche by acting as intermediaries between producers and users of oil and gas products, which is also important for market participants. Banks apply tested risk-management techniques and market-making skills, which has helped to increase liquidity in the markets. Additionally, the ability of banks, acting as financial intermediaries, to transform risks has enabled entities to hedge attendant exposures (for example, credit risk) which are a component of energy transactions, though not directly related to the price of energy.

Market Transparency

For all exchange-traded commodity products, transparency is high. In the OTC markets, wide variations of transparency exist based on the product, volume traded, grade, delivery point, maturity, and other factors.

PRICING

Similar to the term structure of interest rates, commodity price curves exist which convey information about future expectations. In addition, they reflect the prevailing yield curve (cost-of-carry) and storage costs.

Energy prices are said to be in ''contango'' when the forward prices are greater than expected spot prices at some future date; prices are said to be in ''backwardation'' when future spot prices exceed forward prices. The term structure has little forecasting power, however. Forward prices have not been proven to be accurate forecasts of future spot prices.

The theory of contango holds that the natural hedgers are the purchasers of a commodity, rather than the suppliers. In the case of wheat, grain processors would be viewed as willing to pay a premium to lock in the price that they must pay for wheat. Because long hedgers will agree to pay high futures prices to shed risk, and because speculators require a premium to enter into the short position, the contango theory holds that forward prices must exceed the expected future spot price.

The contrasting theory of contango is backwardation. This theory states that natural hedgers for most commodities will want to shed risk, such as wheat farmers who want to lock in future wheat prices. These farmers will take short positions to deliver wheat in the future at a guaranteed price. To induce speculators to take the corresponding long positions, the farmers need to offer speculators an expectation of profit. The theory of backwardation suggests that future prices will be bid down to a level below the expected spot price.

Any commodity will have both natural long hedgers and short hedgers. The compromise traditional view, called the ''net hedging hypothesis,'' is that the forward price will be less than the expected future spot price when short hedgers outnumber long hedgers and vice versa. The side with the most natural hedgers will have to pay a premium to induce speculators to enter into enough contracts to balance the natural supply of long and short hedgers.

The future price of an energy product is determined by many factors. The no-arbitrage, cost-of-carry model predicts that futures prices will differ from spot prices by the storage and financing costs relevant to inventory. The future spot price is the only source of uncertainty in the basic model. Carry is the sum of the riskless interest rate and the marginal cost of storage. Because carry is always positive, the cost-of-carry model predicts that energy prices will always be in contango.

Empirical evidence suggests, however, that the term structure of energy is not fully explained by carry. The term structure of energy prices is not always in contango. Oil and natural gas markets often become backwardated due to external factors or supply concerns. Further, the market rarely shows full carrying charges. In other words, futures prices as predicted by a

cost-of-carry model generally exceed those observed in the market, even when prices are in contango.

HEDGING

Participants in the OTC commodity markets may have more difficulty hedging their positions than participants in the foreign-exchange and interest-rate markets because of the shallowness and illiquidity of OTC commodity markets. It is also difficult to match the terms and maturities of exchange-traded futures hedges with OTC commodities instruments.

To hedge the spot risk associated with commodity-linked transactions, traders will offset a long position with a short position. The choice of the hedge instrument used generally depends on (1) market conditions, that is, whether the financial institution has a natural offsetting position; (2) the risk appetite of the institution; and (3) cost. Because exchange-traded futures contracts are standardized, they are usually cheaper than the equivalent OTC contracts and are normally the preferred hedge instrument. However, the margin and collateral requirements of exchange-traded contracts may mean that OTC contracts have lower transactions costs than futures traded on exchanges. Moreover, the terms of a futures contract will rarely be identical to the terms of an OTC contract, leaving the financial institution with residual risk.

Commodity swaps, in particular, may be entered into on a perfectly matched basis, with the financial institution guaranteeing the payments of two parties with equal and opposite interests. In a perfectly matched transaction, the financial institution writes a separate, offsetting long-term swap contract with each party, incorporating a margin to cover costs and the risk of counterparty default, and closes simultaneously both sides of the transaction. When engaging in matched commodity swaps, a financial institution is exposed to commodity-price risk only when the counterparty on one side of a matched transaction defaults, and the financial institution must enter the market to hedge or rebalance its book.

However, the need to match transactions perfectly at all times would limit the ability of financial institutions to serve their customers and to compete in the existing market. For example, if a financial institution enters into swap agreements for its own account with one counterparty, it may not be able to establish a matching offsetting transaction immediately. Therefore, it may wish to hedge its commodity-price risk in the futures or related markets until an offsetting swap can be written. When an exact offset is found, the two swaps are matched and the hedge position is unwound.

Some financial institutions may seek a matched book by the end of the day, while others are willing to carry an open swap for weeks or to rely on other hedging techniques, such as hedging on a portfolio basis. For example, a financial institution may hedge the commodity-price exposure of the entire portfolio of independently contracted swaps without ever seeking exactly offsetting transactions. Hedging models help to determine the amount of exposure already offset by the transactions currently in the book. The residual exposure is then hedged using exchange-traded futures and options so that it is reduced to less than the position limits established by the financial institution's management. Some of the most serious financial-institution participants in the commodity swap market are hedging on a portfolio basis.

The use of futures and options to hedge an individual commodity-linked transaction, or a portfolio of such transactions, does not eliminate the residual basis risk resulting from differences between the movements in the prices of two commodities used to offset one another. When risk managers or traders cannot profitably execute a hedge in the same commodity, they may use a second commodity whose price tends to move in line with the first. Such a hedge is necessarily imperfect and cannot eliminate all risk. For example, prospective oil hedgers may incur basis risk because of discrepancies between the nature of the underlying instrument (for example, a crude oil futures contract versus a jet fuel swap) or the location of the deliverable-grade commodity (for example, North Sea oil versus West Texas Intermediate oil).

RISKS

Many of the risks associated with commodity-linked activities are similar to those connected with interest-rate and foreign-exchange products. Price, counterparty credit, and delivery risks all exist. In the case of commodity-linked

transactions, these risks may be further exaggerated due to illiquidity, volatility, and forward pricing problems.

Basis Risk

One of the primary risks facing investors in commodity-linked transactions is basis risk—the risk of a movement in the price of a specific commodity relative to a movement in the price of the commodity-linked transaction. The definition of commodity that is often used to signify like, interchangeable products cannot be applied freely. Variances of grade, delivery location, and delivery time frame—among other things—give rise to numerous basis issues which must be carefully managed. Price risk can be reduced by hedging with either exchange-traded or OTC contracts. However, if contract terms are not equivalent, substantial basis risk can result. Types of basis risk include, but are not limited to, grade risk; location risk; calendar (nearby versus deferred-month) risk; stack-and-roll risk (hedging deferred obligations in nearby months on a rolling basis); and, in the energy markets, risks associated with crack spreads (the price differential between refined and unrefined products).

Liquidity Risk

The OTC-commodity derivative markets are generally much less liquid than the foreign-exchange and interest-rate derivative markets, since commodity-linked derivative products are currently offered by relatively few financial institutions. As a result of the shallow nature of the market, liquidity usually drops off for contracts on forward prices beyond one year.

In addition to their relative scarcity, OTC commodity-linked transactions are customized to meet the needs of the user. This characteristic of the market exacerbates the ability of a financial institution to hedge commodity-linked derivative transactions; perfectly offsetting instruments are rarely available in the OTC market and there may be a significant degree of basis risk when hedging with exchange-traded instruments. For purposes of hedging long-dated (more than one year) crude oil, the OTC market is superior to exchange-traded markets in terms of liquidity.

Volatility Risk

Commodity prices can be much more volatile than interest rates or foreign-currency rates, although this is sensitive to the time period and market conditions. The smaller size of the commodity markets is partially responsible for the heightened volatility of commodity prices. Changes in supply or demand can have a more dramatic effect on prices in smaller markets, as reflected in the measured volatility. Thus, a disruption in any one source of supply may greatly affect the price since many commodities are dominated by only a few suppliers. In addition, the fact that only a few suppliers exist can result in prices that are subject to manipulation. Demand for commodities can also depend heavily on economic cycles.

ACCOUNTING TREATMENT

The accounting treatment for commodity-linked transactions is determined by the Financial Accounting Standards Board's Statement of Financial Accounting Standards (SFAS) No. 133, ''Accounting for Derivatives and Hedging Activities.'' (See section 2120.1, ''Accounting,'' for further discussion.)

RISK-BASED CAPITAL WEIGHTING

The credit-equivalent amount of a commodity-linked contract is calculated by summing—

1. the mark-to-market value (positive values only) of the contract and
2. an estimate of the potential future credit exposure over the remaining life of each contract.

The conversion factors are as follows.

	0–1 Years	*1–5 Years*	*Over 5 Years*
Gold contracts	1.0%	5.0%	7.5%
Other precious metals	7.0%	7.0%	8.0%
Other commodities	10.0%	12.0%	15.0%

If a bank has multiple contracts with a counterparty and a qualifying bilateral contract with the counterparty, the bank may establish its current and potential credit exposures as net credit exposures. (See section 2110.1, ''Capital Adequacy.'')

LEGAL LIMITATIONS FOR BANK INVESTMENTS

Commodity derivatives are not considered investments under 12 USC 24 (seventh). A bank must receive proper regulatory approvals before engaging in commodity-linked activities.

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