Chapter 6: Corporate Bank Transactions in Securities Markets

A. Bank Investment in Government Securities Markets

In Chapters 4 and 5, we focused on how corporate banks serve customers on a one-to-one basis, by negotiating loans, providing exchange, treasury, credit and other services, etc. In this chapter, we discuss how banks serve customers and manage their own assets, liabilities and risks in securities markets. Recall from Table 2 in Chapter 4 that approximately 23% of bank assets are invested in securities, the bulk of these being Treasury securities. In addition, many banks will carry off-balance sheet instruments, sometimes listed in footnotes. In this section of the chapter, we focus on bank investment in *money market securities*, which are low-risk, high-denomination (typically), highly liquid debt instruments with terms to maturity less than a single year. Banks invest in money market instruments to earn returns and to maintain a given (normally low) risk profile. In particular, we will focus in this section on Treasury instruments and agency issues.

U.S. Treasury Securities and Markets

Banks and other depository institutions are significant purchasers of U.S. Treasury issues, holding a combined total of $990.9 billion of $18.9 trillion of Treasury issues as of September 30, 2019 (Securities Industry and Financial Markets Association (2020). The U.S. Treasury is the largest issuer of debt securities in the world. In 2019, the U.S. Treasury (technically, the Fed) auctioned $11.806 trillion in Treasury instruments through 322 public auctions using the *Treasury Automated Auction Processing System* (TAAPS) (TreasuryDirect (2020)). The federal government raises (borrows) money through the sale of U.S. Treasury issues including Treasury bills (T-Bills), Treasury notes, Treasury bonds, Treasury inflation protected Securities (TIPS), and Floating Rate Notes (FRNs). By purchasing Treasury issues, an investor is loaning the government money.

In addition to investing in and trading U.S. Treasury instruments, banks also assist their corporate and individual clients in their purchases and sales of Treasury instruments. For example, banks will submit client bids to Fed auctions for Treasury instruments along with their own bids. Banks also make markets (buy and sell in secondary markets) for Treasury instruments and use them in portfolios associated with repurchase agreements (discussed shortly).

Notwithstanding the 2011 debt ceiling crisis, the U.S. federal government has proven to be an extremely reliable debtor (at least it has made good on all of its Treasury obligations). Treasury issues are fully backed by the full faith and credit of the U.S. government, which has substantial resources due to its ability to tax citizens and create and borrow money. Thus, these securities are generally expected to have the lowest default risk and should generally be safer than the safest of corporate bonds or short-term notes.

Treasury Instruments

Aside from occasionally issued *cash management bills* (CMBs) with maturities as short as a single day, the Treasury obligations with the shortest terms to maturity are *Treasury bills*, which typically mature in less than one year (4, 13, 26 or 52 weeks). These issues are sold as pure discount debt securities, meaning that their purchasers receive no explicit interest payments. Instead, investors purchase them at a discount from their maturity or face values. Such pure discount instruments are also known as zero-coupon issues.

One variation on the T-Bill issue is a so-called *STRIP*, issued through the U.S. Treasury's

Separate Trading of Registered Interest and Principal Securities (STRIPS) program beginning in 1985. While by no means identical to T-Bills, STRIPS are portfolios of single payment instruments sold by the Treasury in blocks with varying maturities. For example, a single STRIP maturing at the end of 5 years from now would provide for a fixed payment in 5 years. Individual STRIPS sold in blocks can be "stripped" from the block and sold separately in secondary markets.

In addition to the short-term pure discount instrument issues discussed above, the Treasury also offers a number of longer-term coupon issues. For example, *Treasury notes* (T-Notes) have maturities ranging from 1 to 10 years (typically, 2, 3, 5, 7 and 10 years) and make semi-annual interest payments. Similarly, *Treasury bonds* (T-Bonds) typically range in maturity from 10 to 30 years and make semi-annual interest payments. Bonds issued prior to 1985 were frequently callable, meaning that the Treasury maintained an option to repurchase them from investors at a stated price. The last such call occurred in 2009.

Treasury inflation-protected securities (TIPs) are currently offered with 5-, 10-, and 30-year maturities, and have coupon and principal amounts adjusted by the Consumer Price Index. Floating rate notes are currently offered with 2-year maturities and have coupon rates indexed to the most recent 13-week Treasury bill offering. The U.S. Treasury also offers nonmarketable issues such as Series EE U.S. Savings Bonds, Series I U.S. Savings Bonds, and Series H U.S. Savings Bonds. These savings bonds are normally issued only to individuals and cannot be traded among investors. These bonds can be purchased through most U.S. banks and savings institutions.

Treasury Auctions

U.S. Treasury auctions make use of a variant of a single-price Dutch auction or descending bid auction to allocate its instruments in primary markets. This means that the bids will be ranked from best to worst and awarded to the top bidders in the quantities that they desire, but at the lowest successful bid. We will illustrate this process shortly. The Dutch auction is particularly useful for matching a number of identical goods to some number of highest bidders.

There are two ways to purchase U.S. T-Bills. The first is to enter a competitive bid at the auction where the bidding institution competes for a given dollar amount of the new issue based on how much it is willing to pay at the Fed auction. Second, noncompetitive bids can be tendered by anyone. The prospective noncompetitive purchaser simply states how many bills she would like to purchase at the yet unknown lowest price implied by accepted competitive bids. Competitive bidders for T-Bills generally enter their bids just before the deadline (1:00 PM Eastern Time) to participate in the auction. Noncompetitive bids are limited to $5 million per bidder and are normally due before 12:00 noon (Eastern Time) on the day of an auction. The Treasury determines the dollar amount of competitive bids that it wishes to satisfy by subtracting the face values of the noncompetitive bids from the total level of bills that the Treasury wishes to sell. Successful competitive bids are selected by ranking them, starting with the highest price bid (or, lowest yield bid). Successful bidders obtain their bills at the lowest bid of a successful bidder; the lowest successful bid is referred to as the *stop-out price*, the price to be paid by all successful bidders.

Consider the following example involving a single price Dutch auction of $20 billion in 91-day U.S. T-Bills, where the competitive bids (based on yields to maturity, inversely related to prices) placed by financial institutions are given in Table 6.1. Obviously, the Treasury wants to

sell as many bills as possible at the highest possible prices. This results in it paying the lowest yields. In addition, suppose that $2.5 billion in non-competitive bids have been submitted.

First, $2.5 billion in bills will be reserved for noncompetitive bidders. Competitive bids will be ranked and satisfied from the lowest yield (highest price) until $17.5 billion ($20 billion - $2.5 billion) in bills have been allocated. The stop-out price will be at a yield of 1.30% and all winners (Citigroup, Cantor Fitzgerald, UBS and Deutsche Bank) will pay the same price implied by the 1.3% yield. Actually, Deutsche Bank will be allocated only $5.5 billion, because its bid filled the $17.5 billion total being offered to competitive bidders. This means that $11.5 billion in bids will not be successful.

The bid to cover ratio is an indicator of market strength for treasury instruments, and might be calculated either with or without noncompetitive bids. The benchmark for bid to cover ratios is usually some average of prior auction bid to cover ratios. Based on competitive bids and the total to be auctioned, the bid-to-cover ratio in this illustration is $31.5 billion/$20 billion = 1.525.

Citigroup	$2.0 billion at 1.15%
Cantor Fitzgerald	$4.5 billion at 1.20%
UBS	$5.5 billion at 1.25%
Deutsche Bank	$7.5 billion at 1.30%
JP MorganChase	$5.5 billion at 1.35%
Bank of America	$6.5 billion at 1.40%

TABLE 6.1 Treasury Bids Illustration

Agency and Government-Sponsored Enterprise Issues

The U.S. federal government has created and sponsored a number of institutions known as agencies and government-sponsored enterprises (GSEs). These institutions enable the government to make funds available for a number of policy-related functions such as encouraging home ownership and making post-secondary education available to students. Banks are also significant investors in Agency and GSE issues.

Fannie Mae

Among the oldest of these government-sponsored enterprises is the Federal National Mortgage Association (FNMA or Fannie Mae), created in 1938 by the Federal Housing Administration (FHA) to expand the flow of money to housing markets during the Great Depression. This institution was intended to spur investment into real estate, improve employment during the Great Depression, and to help enable people to purchase homes by enhancing liquidity and stability of U.S. mortgage markets. The primary functions of Fannie Mae were to purchase, hold, and sell FHA-insured (and, after World War II, Veterans Administration-insured) mortgage loans originated by private lenders. Created with a congressional charter, and then privatized in 1968, FNMA was, until September 2008, one of the largest privately owned corporations in the United States with shares traded on the New York Stock Exchange. However, the institution was delisted and placed in conservatorship by the federal government during the financial crisis of 2008.[1] The firm received a bail-out package from the federal government to

[1] A conservatorship is the legal process in which an entity is appointed to establish control and oversight of a Company to return it to a sound and solvent condition. The Federal Housing Finance Agency was appointed by

support it until 2012, and remains controlled by the federal government. FNMA is and, after it emerges from its conservatorship, will remain under the regulatory authority of the Federal Housing Finance Agency (FHFA). Technically, the company is owned by shareholders, but the government owns warrants on 79.9% of company shares, controls the institution's activities and has the right to receive dividends. FNMA is expected to emerge from conservatorship in the early- to mid-2020s.

FNMA facilitates capital acquisition in the mortgage industry by serving as a *mortgage aggregator*, meaning that it purchases large quantities of mortgages, aggregates them into pools (portfolios), then creates *mortgage-backed securities*, instruments denoting ownership in or claims on these pools of mortgages (we will discuss this process later in this chapter). Mortgage-backed securities are created by their sponsors who purchase residential mortgages from banks and thrift institutions and then create debt and other securities backed by pools of these mortgages. In effect, FNMA purchases the mortgage obligations held by banks and thrifts, repackages them as debt security portfolios, insures them, and re-sells them to the general public. The funds raised by the sale of these securities are then used to purchase additional mortgages from banks, increasing capital available to the mortgage and housing markets. These portfolios of mortgage-backed securities are also called pass through securities because the interest and principal obligations associated with the mortgages are passed through to the security holders and enable banks with relatively short liability terms to remove 30-year mortgage assets from their balance sheets.

Ginnie Mae

The Government National Mortgage Association (GNMA or Ginnie Mae) was established by the U.S. Congress in 1968 as a "spin-off" of FNMA to expand affordable housing opportunities. GNMA is a mortgage insurance corporation fully owned by the U.S. federal government and administered under the Department of Housing and Urban Development (HUD). GNMA guarantees mortgage-backed securities on behalf of the Federal Housing Administration (FHA), Veterans Administration (VA), and other agencies. Many mortgages originated by approved private lenders and insured by these agencies are targeted towards particular groups of Americans such as those with low income or veterans' families, though experience relatively high default rates.

GNMA typically charges issuers of mortgages monthly fees for mortgage guarantees along with one-time fees each time issuers seek to securitize (create securities to trade on a pool of debt instruments; process described later in the chapter) a pool of mortgages. These fees are collected to cover GNMA operating costs and to cover GNMA's insured losses. Fees not needed to cover either go into GNMA's contingency reserve or is refunded to the U.S. government into its fiscal budget. GNMA screens and regularly evaluates financial institutions that originate, underwrite and service mortgages in its programs in order to limit its liabilities. The FHA and other federal government agencies with which it works do as well. Insurance provided by the FHA or VA on the actual mortgages mitigates credit risk on GNMA securitized issues (securities created by GNMA), making it possible for GNMA to guarantee the securitized mortgage-backed securities and enhance their marketability. The mortgage securities guaranteed by GNMA, unlike those issued by government-sponsored enterprises such as FNMA, are *full faith and credit* instruments, meaning that the U.S. federal government explicitly backs GNMA securities with

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Congress to serve as the conservator for FNMA and FHLMC (discussed shortly).

its full ability to tax, borrow, and create money.[2] This enables GNMA to sell instruments that are virtually free of default risk.

Freddie Mac

The Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac), a public stockholder corporation created in 1970 by the federal government, also creates, insures, services, and sells pass-through securities related to single family and multifamily residential mortgages. Freddie Mac's creation was essentially to provide competition in the secondary mortgage market to the virtual monopoly then enjoyed by Fannie Mae, thanks to federal protections granted to Fannie Mae. Freddie Mac and Fannie Mae were intended to compete in a "separate but equal" regulatory framework. As was Fannie Mae, Freddie Mac was placed in conservatorship by the federal government during the financial crisis of 2008, and the federal government owns warrants on 79.9% of its shares.

Sallie Mae

The Student Loan Marketing Association (SLMA or Sallie Mae) was established in 1972 to create, insure, and sell pass-through securities related to student loans. While originally created as a government agency in 1972, the company began a privatization process in 1997 that was completed in 2004. The institution is now a shareholder-owned publicly traded firm known as SLM Corporation, and originates, services, and collects private student loans. In 2014, the firm spun off its federal student loan servicing businesses into a separately traded company known as Navient Corporation.

Secondary Mortgage Markets

Secondary mortgage markets are venues in which residential markets, securities issued on pools of residential mortgages and contracts that grant rights to service mortgages are traded. Secondary mortgage markets in the U.S. are often characterized as having three sectors: government, conventional-conforming and conventional-nonconforming.

Government, Conforming and Non-conforming Mortgages

The government mortgage sector trades mortgages insured by the Federal Housing Administration (FHA), Veterans Administration (VA), Office of Public and Indian Housing or Rural Housing Service (RHS). Loans not issued or insured by these federal entities are said to be conventional. Government mortgage sector mortgages are securitized by GNMA, which is able to guarantee payment on the securities because of the insurance provided by the government agencies on the underlying mortgages. GNMA itself does not originate mortgages or buy, securitize or sell mortgages or mortgage-backed securities.

Conventional-conforming mortgages are limited in size by the Federal Housing Finance Agency (FHFA) with 2015 maximums between $417,000 and $625,000 (maximum levels differ by region) and require either 20% down payments or specific credit enhancements such as private mortgage insurance (PMI) or second mortgages, which provide additional default protection for primary mortgages. can be issued only on "suitable" properties (e.g., condominiums are sometimes unsuitable because their associations are engaged in litigation or

[2] One might argue that FNMA and FHLMC became "full faith and credit" institutions when they were brought into conservatorship in 2008. In conservatorship, they are essentially wards of the U.S. Treasury. This condition should change when the two corporations exit conservatorship.

have too many units used for commercial purposes) and to borrowers with income levels deemed high enough to repay them. While not insured by the FHA or guaranteed by GNMA, conforming mortgages are eligible to be purchased, aggregated, securitized and guaranteed by FNMA and FHLMC ("Freddie Mac"), which play major roles in secondary markets for these mortgages, significantly enhancing their liquidity.

Conventional-nonconforming mortgages do not conform to purchasing standards of FNMA and FHLMC, and are securitized by other financial institutions such as banks and subsidiaries of investment banks. These mortgages are not securitized or guaranteed by GSEs such as FNMA or FHLMC, and are sometimes referred to as non-agency residential mortgage-backed securities (non-agency RMBS). Many of these mortgages are called *jumbo mortgages* because they exceed the FHA limits on size.

B. Bank Issues and Sales of Securities

Depository institutions are obviously significant issuers and borrowers in the primary markets for debt securities. Securities are issued and sold by banks to raise money and capital from individual and institutional investors in the marketplace, to generate fee revenues, to offload assets from their balance sheets and to alter their risk profiles. We begin here by discussing bank issues of money market securities.

Repurchase Agreements

A *Repurchase Agreement* (Repo) is created and issued by a financial institution (usually bank or securities firm) to acknowledge the sale of a portfolio of securities and an agreement to re-purchase at a specific higher price on a specific date in the near term. The future repurchase price and date are locked in. Because the repurchase price and date are locked in by agreement, the repurchase price exceeds the original purchase price by an amount comparable to interest on a relatively safe short-term loan. Hence, this repurchase agreement has essentially the same cash flow characteristics as a short-term loan collateralized by the underlying portfolio of securities. The counterparty institution, often a central bank, buying the securities with the agreement to resell them is said to be taking a *reverse repo*. While every repo transaction is also a reverse repo transaction from the counterparty's perspective, often the term used depends on whether the initiator of the transaction was the buyer or seller.

The short-term instruments that make up the portfolio serving as collateral tend to be highly liquid and low-risk, such as Treasury bills and government agency instruments, including GNMA and FNMA instruments. The underlying portfolio is normally valued at a discount relative to its market value, which is generally known as a *haircut*. Most repo transactions are very short-term, typically overnight or just for a few days. The repo transaction, with the haircut reflecting its cost to the borrower, can save the borrower from having to dump its securities in secondary markets at fire sale prices in order to meet reserve and other regulatory requirements.

Negotiable and Brokered Certificates of Deposit

Normally, bank accounts are not regarded as marketable securities. One exception to this is the *Negotiable Certificates of Deposit* (NCD). The NCD is a tradable depository institution certificate of deposit account with a denomination or balance exceeding $100,000 (a negotiable Jumbo CD). NCDs were first issued by National City Bank (now Citibank) in 1961 as a way to compete with the corporate bond market in an era of rising interest rates on low-risk instruments. The amounts by which Jumbo C.D.s exceed $250,000 are not subject to FDIC insurance, hence,

their issue does pose more risk to investors. Negotiable CDs are issued by depository institutions and often purchased by wealthier individual investors, financial institutions, corporate treasuries and by *money market mutual funds,* which are created by banks and investment institutions for the purpose of pooling together depositor or investor funds to invest in money market instruments. NCDs typically range in denomination from $100,000 to $10,000,000, with $1,000,000 being most common.

NCDs provide banks the opportunity to raise large sums of money in a cost effective manner by enabling their depositors to, in effect, sell their accounts should they wish. NCDs are bearer instruments; that is, the individual or institution presenting the NCD to the bank collects the funds due at maturity. Furthermore, NCDs are often issued over longer terms, which are useful when the issuing bank needs to raise funds for longer terms. However, larger-denomination NCDs (>$250,000) are not fully insured by FDIC, and generally sell at higher interest rates to compensate for the higher risk. Of course, this increases the cost of funding for the bank. Many observers notice higher interest rates on NCDs issued by higher risk banks; in fact, market discipline leads to higher NCD rates being good indicators of higher bank risk (e.g., Hannon and Hanweck [1988]).

Brokered CDs are issued by banks, which place them with brokerage firms to sell to the investing public, facilitating the original bank's efforts to raise a large amount of fixed-term funding. While brokered CDs do not allow for early withdrawal upon payment of a penalty as do many directly-placed CDs, brokered CDs can be re-sold on secondary markets, though market (price) risk of CDs remains a risk in an environment with changing interest rates. In addition, many brokered CDs do allow for early withdrawal without penalty in the event of the account holder's death (survivor put estate benefit).

Letters of Credit and Banker's Acceptances

We discussed letters of credit and banker's acceptances in several earlier chapters of this book (See Section 4.E, for example) as enabling well-known creditworthy financial institutions to guarantee the obligations of their less creditworthy clients. Essentially, the issuing bank underwrites the credit risk of its client with a letter of credit.

In some respects, a letter of credit (though less so than a banker's acceptance) is similar to a post-dated cashier's check written by a bank. In fact, the "traveler's check" evolved from paper "traveler's letters of credit" used by international travelers through the 1950s. Most letters of credit are issued under rules provided by the International Chamber of Commerce, in particular, the Uniform Customs and Practice for Documentary Credits (UCP 600) established in 1933 to standardize letters used for trade and reduce the risks associated with trade. The UCP 600 has been endorsed and implemented by numerous governmental banking authorities.

A *Banker's Acceptance* is an instrument originated when a bank accepts the unconditional responsibility for making payment on a client's loan or assuming some other financial responsibility on behalf of the client. The bank issues a promise to pay a specific sum at a given date to the bearer of the instrument. Because the bank is likely to be regarded as a good credit risk, and that banker's acceptances are normally payable to the bearers of the document, a acceptance can be sold by its beneficiary to an investor and is usually easily marketable as a security among banks and other financial institutions that trade them.

Suppose that an exporter contracts to sell goods to a foreign importer who has arranged for a letter of credit from its bank. The importer deposits money or other valuable assets as agreed to with the issuing bank, which, in turn, creates a time draft (promise of specific payment

on a given date) on that deposit. Once the exporter fulfills its obligations under the terms of the letter of credit, the issuing bank stamps the draft (or its electronic equivalent) as having been accepted, thereby guaranteeing that draft. This draft, in effect, becomes a *banker's acceptance*, an unconditional guarantee that the bank will pay the bearer (e.g., the exporter) the amount specified on the draft at the given future date. The banker's acceptance is delivered to the exporter. In most cases, these instruments provide for payment to the bearer of the letter. Thus, the stated beneficiary of the letter or other bearer (letters can be endorsed), can choose to hold the instrument until maturity to receive the full face value or sell the instrument at a discount as a marketable security. As zero-coupon instruments, banker's acceptances normally trade at a time-dependent discount from their face value. The risk of the banker's acceptance is low because its face value is paid in full unless both the issuing bank and its client must otherwise default. Furthermore, the imported goods are also subject to seizure by the bearer of the instrument.

Commercial Paper

Large, well-known creditworthy firms needing to borrow for operating purposes often issue large denomination (typically, $100,000 round lots, making notes less suitable for individual investors) short-term zero-coupon promissory notes referred to as commercial paper. Typically, issuers of commercial paper are finance companies, including those owned by banks, but large industrial companies and occasionally banks issue commercial paper as well. We will discuss the issue and underwriting of commercial paper in greater detail in later chapters and collateralized commercial paper later in this chapter.

Historically, the term commercial paper was used for promissory notes, drafts, bills of exchange, and bankers' acceptances, but have referred more specifically to the short term promissory notes described above since the 1790s in New York. Commercial paper markets have largely been dealer-oriented, with issuers tending to sell their paper to dealers who resell to their clients. The venerable investment bank, Goldman Sachs, started as a dealer in commercial paper shortly after the U.S. Civil War before growing to become a full-service investment bank.

These marketable instruments have well-developed primary markets that include banks, though over-the-counter secondary markets are sometimes inactive as original purchasers often hold the instruments until they mature. In addition, commercial paper is very heterogeneous in nature, further weakening secondary markets. While most commercial paper issues are unsecured, there have been numerous asset-backed issues, particularly shortly before the 2008 financial crisis. In addition, many issuers of commercial paper will have the potential to be supported by bank lines of credit and some paper issued by less creditworthy institutions will have bank guarantees through standby letters of credit, with either feature serving to enhance the quality of the paper.

Most commercial paper is issued and transferred through book-entry form through the Depository Trust Company. Many commercial paper issues are rated by major credit rating agencies such as Standard & Poor's and Moody's, as we will discuss later. Commercial paper issue maturities tend to be less than three months, but almost always are limited to less than 270 days due to S.E.C. requirements that issues with longer maturities register as publically-traded securities, which increases the issue costs of the paper. In addition, 90-day commercial paper is often the longest tenor that can be used for collateral purposes, especially for borrowing from the Fed.

Because of these maturity constraints, most commercial paper is simply rolled over into new issues at maturity. Major commercial and investment banks typically serve as dealers in

commercial paper markets. The most significant holders of commercial paper are money market mutual funds, foreign institutional investors and non-money-market mutual funds. Nonfinancial corporations often hold commercial paper as marketable securities, and pension funds, commercial banks and insurance companies often hold commercial paper.

During the financial crisis of 2008, the Federal Reserve System created a Commercial Paper Funding Facility (CPFF), intending to support the orderly functioning of the commercial paper market after U.S. credit markets froze. The CPFF was a special purpose vehicle (SPV) created to purchase commercial paper from qualified issuers (U.S. domiciled, sufficiently high credit ratings) with $10 billion in funding from the U.S. Department of the Treasury and its Exchange Stabilization Fund. The CPFF function as a lender of-last-resort for the commercial paper market. Unlike the normal lender-of last-resort activities, the CPFF supports the entire commercial paper market rather than just failing or at-risk institutions. The facility expired in 2010, but another was created in March, 2020 in the wake of the Covid-19 pandemic crisis, again, to support the flow of credit to households and businesses, including auto loans and mortgages and operating funds for business. The CPFF's are not permitted to remain as permanent institutions, but only as backstops for short periods.

C. Structured Finance and Derivative Instruments

A *derivative instrument* is a financial contract or security whose payoff function is derived from the value of some other security, rate, or index. Derivatives a used for a variety of purposes, including to manage, hedge or transfer risks, to speculate and leverage returns and to arbitrage markets. Derivatives include options, forward, futures and swap contracts and many instruments that we will discuss below that arise from structured finance.

Structured finance concerns the creation of financial processes and instruments needed to serve borrowers and lenders. Structured finance activities often involve somewhat unconventional activities such as the pooling of debts such as loans, credit card receivables, leases, bonds and mortgages, then repackaging these pools into securities to place among investors. This process to issue of these claims against the pools as tradable instruments is known as securitization. *Securitization* is the process that converts illiquid assets into tradable assets. U.S. Federal government sponsored enterprises are often directly involved in these activities along with banks, investment banks, investment companies and other institutions.

Derivative Instruments

As defined above, derivative instruments are contracts that have payoff functions derived from the values of other instruments, securities, rates, or indices. Some of the more common derivative instruments are:

Options: As defined in the appendix to Chapter 3, options are securities that grant their owners the right to buy or sell an asset at a specific price on or before the expiration date of the security. The two basic or "plain vanilla" types of options are:

Call: A security or contract granting its owner the right to purchase a given asset at a specified price on or before the expiration date of the contract.
Put: A security or contract granting its owner the right to sell a given asset at a specified price on or before the expiration date of the contract.

Options contracts can be traded over-the-counter or exchange-listed and often trade on interest-bearing securities such as Treasury instruments or on instruments denominated in foreign currencies. We will discuss later important options such as caps (protection from upward rate movement), floors (protection from downward rate movement) and collars (locking in a rate).

Forward contracts: Instruments that oblige their participants to either purchase or sell a given asset at a specified price on the future settlement date of that contract. A long position obligates the investor to purchase the given asset on the settlement date of the contract and a short position obligates the investor to sell the given asset on the settlement date of the contract. Forward contracts are often individually negotiated in bank-to-bank markets. Banks often use forward contracts to lock in interest or exchange rates or to enable their clients to do so.

Futures contracts: Tradable securities that oblige their participants to either purchase or sell a given asset at a specified price on the future settlement date of that contract. Investors might take either a long or a short position in a futures contract. Futures contracts are standardized, exchange traded and generally require maintenance of margin. Counterparty risk is minimized due to exchange and clearinghouse guarantees. Banks often use futures contracts to lock in interest or exchange rates or to enable their clients to do so.

Swap contracts: Provide for the exchange of cash flows associated with one asset, rate, or index for the cash flows associated with another asset, rate, or index. Swap contracts are useful for managing interest rate and exchange risk.

As we will discuss shortly, all of these instruments have the potential to be used for managing interest rate and exchange rate risk, and many of these instruments have variations that can be used to manage and hedge credit risk. In addition, banks make markets by trading these instruments and produce fee-based revenues by issuing them to their clients.

Loan Sales

Loans are the primary asset on most bank balance sheets. As with other assets, banks can sell their loans, to raise capital for other lending opportunities, to enhance asset liquidity, to alter their balance sheets or offload the risks associated with the loans. Regardless, the loan sale results in the loan being removed from the bank's balance sheet. A loan sale occurs when a bank, typically the originator of the loan, sells the loan to another financial institution. A loan sale might be of only a part of a larger origination, in which case the sale might be considered a loan participation or loan syndication.

Loan sales are said to occur either with or without recourse. A loan sale with recourse allows its purchaser to put the loan back to the selling bank in the event of default or other credit event, implying that the originating bank retains the risk associated with the loan. A loan sale without recourse implies that the buyer assumes the risk associated with the loan. Loans can be sold on an individual basis, in a pool or portfolio or as part of a pool or portfolio.

Securitized Instruments

Securitized instruments or *asset backed securities* (ABS) are created from pools or portfolios of debt instruments, which are restructured to be marketed as tradable instruments. Securitization can increase the participation and risk-taking by a wider range of investors in otherwise illiquid debt instruments such as mortgages, while enabling banks to liquidate such illiquid assets and more readily alter their balance sheet risk structures.

MBS

A mortgage-backed security is a securitized instrument representing claims on underlying debt instruments that are backed by mortgages. That is, a *mortgage-backed security* is a securitized instrument whose payoffs draw from instruments that are backed by a pool of mortgages. Securitization creates value for lenders by improving the liquidity of their assets, enhancing the potential for diversification and asset portfolio risk reduction and increased funding for increased mortgage lending. Securitization creates value for investors by broadening their investment opportunity sets by enabling them to invest in additional classes of securities with varying risk and return levels. These value enhancements brought by securitization increase the credit availability to borrowers.

Agency issued mortgage-backed securities are guaranteed by a government agency (e.g., GNMA) or a Government Sponsored Enterprise (e.g., FNMA). A mortgage-backed security that is not guaranteed by an agency or GSE is referred to as a non-agency or "private label" issue. Earlier, we briefly mentioned conventional-nonconforming mortgages, which do not conform to purchasing standards of the GSEs, but are securitized and perhaps guaranteed by other financial institutions. These mortgage-backed securities can be called “private-label” mortgage securities, as they are issued by private institutions such as subsidiaries of investment banks, banks and real estate investment trusts.

Non-mortgage ABS

There are many other types of debt pools underlying asset-backed securities (ABS), including student loans, auto loans, credit card receivables, trade receivables, aircraft and equipment leases and home equity loans. Other financial asset classes underlying these pools can include equities and equity indexes, commodities and currencies. More general asset types underlying securitized instruments have included real assets such as cell towers, as well as intangible assets such as tobacco settlements and celebrity bonds, the latter of which being formed from pools of royalties from music and song-writing celebrities, including most famously, *Bowie bonds*, securitized from pools of royalties on a variety of David Bowie songs.

Pass-through Instruments

A *pass-through instrument* associated with a pool of mortgages is said to “pass through” mortgage payments to secondary market investors. Essentially, the originating institution or sponsor seeks to securitize the mortgages by creating pass-through or participation certificates securities that reflect fractional ownership in the pool of mortgages. Mortgage pools are packaged and sold by the sponsor into bankruptcy-remote entities called *special purpose vehicles* (SPVs), in this case, sometimes called single-purpose entities. The SPV protects the sponsor and the pool from significant economic damage in the event of failure of the other, and pays for the securitized mortgages with the proceeds of the sale of the securities to the general public.

The sponsor arranges for servicing of the pass-through securities, whereby the *mortgage servicer*, over the lives of the mortgages in the pool, collects payments from the pool and passes

them through to the owners of the pass-through securities. Thus, servicers accept and record mortgage payments, calculate interest payments on adjustable rate loans, pay taxes and insurance as appropriate, manage escrow accounts, take corrective action in the event mortgage default and engage in the foreclosure process when necessary.

In addition, the sponsor or originating institution arranges for credit ratings and for a trustee, whose primary responsibility is to protect the rights of the purchasers and subsequent owners of the securitized instruments. Thus, pass-through instruments are created from mortgages privately issued by banks that are passed through as securities to investors.

Three GSEs, Ginnie Mae, Fannie Mae and Freddie Mac have been and continue to be major participants in the mortgage pass-through business. These institutions pool and securitize mortgages that conform to their underwriting requirements. Non-comforming mortgages, that is, mortgages issued by banks that failed to meet agency underwriting standards, including many sub-prime mortgages, were pooled and securitized by a variety of commercial banks, investment banks and other financial institutions.

Collateralized Debt Obligations

A *collateralized debt obligation* (CDO) is a marketable instrument by which specified events determine the payouts associated with multiple classes of holders of debt-backed assets. Whereas pass-through securities described above represent fractional claims on interest and principal payments associated with a pool of mortgages, the CDO restructures the pool payouts differently.

Essentially, the investment bank creating the CDOs (or more specifically, in this example, *collateralized mortgage obligations*, a type of CDO) place a series of mortgage-backed securities into a trust or special purpose entity (SPV) and repackages the series into tranches (plural form of the French word for slice), each offering a series of payments that depend on terms specified by contract. For example, the contract involving three tranches might call for "Tranche 1" or the senior tranche to receive its full share of contracted payments before any other tranche is paid. Once the senior tranche is fully paid, "Tranche 2," or the mezzanine tranche, receives its full share of payments if enough money is available in the pool. Otherwise, the mezzanine tranche receives the residual of the pool after the senior tranche is paid. "Tranche 3," or the subordinate tranche, receives the residual of the pool after the first two tranches have received their full payments. In a typical securitization, the subordinate tranches, first-loss investors would absorb losses of up to roughly 3% of the value of the pool, mezzanine tranches would absorb the next roughly 5-7% and senior tranches would absorb all remaining losses. As described above, first-loss investors would absorb losses until they received nothing, then would mezzanine investors. Investors can select from these tranches securities that fulfill their own return-risk tradeoff preferences. The tranches remained backed by the real estate collateral along with any relevant federal or private mortgage insurance, but claims to the collateral in the event of default are prioritized by tranche rankings. The securities created from the repackaged pool of mortgages are then sold in secondary markets. Figure 6.1 depicts a listing of tranches and other details from securities offered on a sample pool of mortgages. Notice that tranche yields increase as ratings worsen.

The benefits to the banking system of securitization and these securitized instruments are due to the ease of banks being able to sell their mortgages, thereby releasing core capital, which facilitates being able to issue additional mortgages, and being able to convert illiquid mortgages into liquid and marketable securities. This enhanced mortgage liquidity enables banks to produce

higher turnovers on their mortgages, increasing their mortgage-related revenues, as well as offload mortgages from their mortgage portfolios. Securitization enables banks to raise capital and to transfer risk off of their balance sheets. In addition, securitization enables investors to broaden their investment opportunity sets and better select from tranches that better satisfy their return and risk preferences.

Credit enhancement of senior tranches can be enhanced by the mortgage pool sponsor several ways. First, the sponsor can over-collateralize the securities or create a reserve fund as additional protection for the senior tranches. Second, the sponsor can issue fewer senior trances along with more mezzanine and/or subordinate tranches. Finally, the sponsor can provide for insurance, surety bonds or letters of credit against credit risk for the senior tranches.

During the late 1990s and early part of this century, use of structured lending increased dramatically, much of it bolstered by favorable ratings by credit reporting agencies. So what went wrong? We know that securitization played a major role in the financial crisis of 2008. As we will elaborate in the next two chapters, banks failed to screen mortgage applicants properly in the mortgage initiation process and attracted unqualified mortgage applicants that failed to fulfill their mortgage obligations over the long term. Initiating banks securitized and offloaded the mortgages onto secondary market investors, while the favorable credit ratings issued by leading credit reporting agencies led to overvaluation and a subsequent bubble and crash. Since mortgage-issuing banks intended to offload these mortgages as quickly as possible, they had little incentive to properly screen them at application. As we will discuss in the next two chapters, post-financial crisis legislation contains requirements that banks offloading mortgages from their balance sheets retain some of the associated credit risk.

Mortgage-Backed Bonds

A *mortgage backed bond* is a debt security collateralized by a specific set of mortgages segregated by the issuing institutions. In this case, the mortgages themselves are not securitized or offloaded by the institution, but are used to back the bonds that are issued to investors as might any other bonds. Fannie Mae and Freddie Mac are major participants in the markets for mortgage-backed bonds as are a number of banking institutions. Mortgage-backed bonds are among the instruments that enable financial institutions to transform relatively illiquid mortgages into liquid instruments that can be traded in capital market, allowing mortgage originators to readily replenish their funding for lending.

Asset-Backed Commercial Paper

Asset-backed commercial paper (ABCP) is collateralized short-term borrowing evidenced by promissory notes. Typically, though not uniformly, senior tranches of asset-backed securities serve as collateral for ABCP. In a manner similar to the mortgage pools described above, institutions that issue ABCP first sell their assets to a bankruptcy-remote SPV, which then issues the ABCP that can be sold by the SPV in the over-the-counter markets.

Selected Investors in CMLTI 2006-NC2

A wide variety of investors throughout the world purchased the securities in this deal, including Fannie Mae, many international banks, SIVs and many CDOs.

	Tranche	Original Balance (MILLIONS)	Original Rating[1]	Spread[2]	Selected Investors
SENIOR 78%	A1	$154.6	AAA	0.14%	Fannie Mae
	A2-A	$281.7	AAA	0.04%	Chase Security Lendings Asset Management; 1 investment fund in China; 6 investment funds
	A2-B	$282.4	AAA	0.06%	Federal Home Loan Bank of Chicago; 3 banks in Germany, Italy and France; 11 investment funds; 3 retail investors
	A2-C	$18.3	AAA	0.24%	2 banks in the U.S. and Germany
MEZZANINE 21%	M-1	$39.3	AA+	0.29%	1 investment fund and 2 banks in Italy; Cheyne Finance Limited; 3 asset managers
	M-2	$44.0	AA	0.31%	Parvest ABS Euribor; 4 asset managers; 1 bank in China; 1 CDO
	M-3	$14.2	AA-	0.34%	2 CDOs; 1 asset manager
	M-4	$16.1	A+	0.39%	1 CDO; 1 hedge fund
	M-5	$16.6	A	0.40%	2 CDOs
	M-6	$10.9	A-	0.46%	3 CDOs
	M-7	$9.9	BBB+	0.70%	3 CDOs
	M-8	$8.5	BBB	0.80%	2 CDOs; 1 bank
	M-9	$11.8	BBB-	1.50%	5 CDOs; 2 asset managers
	M-10	$13.7	BB+	2.50%	3 CDOs; 1 asset manager
	M-11	$10.9	BB	2.50%	NA
EQUITY 1%	CE	$13.3	NR		Citi and Capmark Fin Grp
	P, R, Rx: Additional tranches entitled to specific payments				

[1] Standard & Poor's.

[2] The yield is the rate on the one-month London Interbank Offered Rate (LIBOR), an interbank lending interest rate, plus the spread listed. For example, when the deal was issued, Fannie Mae would have received the LIBOR rate of 5.32% plus 0.14% to give a total yield of 5.46%.

SOURCES: Citigroup; Standard & Poor's; FCIC calculations

Figure 6.1: Tranches in a Sample Mortgage Pool, Financial Crisis Inquiry Commission (2011), p. 116

Credit Derivatives

Credit derivatives are tradable contracts created to transfer credit risk between contracting participants. Credit derivatives are used by banks to manage their credit exposure. A key component of the contract defines what constitutes a credit event that will trigger a credit default payment.

Credit Default Swaps (CDS)

Perhaps the best known of credit derivatives is the *credit default swap* (CDS), which is a tradable contract that provides for one party to pay a fixed premium or series of premiums in return for protection against a specified credit event (e.g., default) or events. More generally, a *swap* is a contract between two counterparties to exchange specified periodic cash flows in the future based on some underlying index, price or rate. In the case of a CDS, a lender might contract with a counterparty to reimburse the lender in the event of a borrower default. To provide this credit enhancement or insurance, the counterparty accepts a premium or series of premiums for acting as counterparty.

The resolution of CDS when a borrower defaults is not always a simple matter. Defaults, debt restructurings, bankruptcies and their associated costs often take years to resolve. The International Swaps and Derivatives Association (ISDA) process speeds up and governs the manner in which borrower defaults are handled with respect to the many types of CDS contracts. Essentially, the ISDA provides for definitions of credit events, the declaration of a default and the setting and design of a bond or debt auction process. This auction can provide for the physical settlement of bonds, in which impaired bonds can be liquidated and prices can be discovered. This auction process provides the basis for an appropriate cash flow from short to long CDS position holders.

Interest Rate Derivatives

Interest rate derivatives are used by banks and other institutions to manage their interest rate exposure and to generate fee revenues. In the section on credit derivatives, we discussed the use of derivatives primarily to manage credit risk, though the total return swap can be used to manage all sources of risk associated with a credit instrument. Here, we discuss three types of interest rate derivative products that are used to manage interest rate risk.

Total Return Swaps

A *total return swap* is a tradable contract that provides for one party to make a payment based on the total economic performance of a specified asset in exchange for some other fixed or variable cash flow. That is, in the context here, the payments between contracting parties to a total return swap are based upon changes in the market valuation or rate related to a specific credit instrument, irrespective of whether a credit event has occurred. A total return swap in effect provides for exchanging an obligation to pay interest at a specified fixed or floating rate for payments representing the total return on a loan (interest and principal value changes) of a specified amount.

Suppose, for example, that a bank enters into a one-year total return swap in which the client pays the Secured Overnight Financing Rate (SOFR) on the notional amount of $1,000,000 in exchange for a fixed rate of 5%. Suppose that after one year the SOFR is 4%. The payment is netted at the end of the swap term with the bank making a payment of $10,000 = ($1,000,000 ×

(5% - 4%).[3] While this illustration focused on the interest rate component of a total return swap, a contract could have been devised to focus on the credit component or some combination of the two.

Caps

A cap is a call option or a series of call options on interest rates that grants its owner the right to receive a payment or payments at the end of each period in which the interest rate exceeds the striking price (cap rate). If the relevant market interest rate were to rise above the cap rate, the writer of the cap compensates the option owner by the notional amount times the difference between the market rate and the cap rate. If the relevant market interest rate does not exceed the cap rate, the writer of the cap pays nothing to the cap owner. The option writer receives an up-front cap premium from the cap purchaser in return for providing this option. The cap can provide for a maximum interest rate that a variable rate borrower would have to pay on a loan.

Suppose, for example, a bank client borrows $1,000,000 for two years at a variable rate. A bank enters a two-year cap agreement with this client in which the bank accepts a premium of 0.5% on the notional amount ($1,000,000) for each of the two years. Thus, the cap agreement has a notional value of $1 million. Assume that the agreement is for a cap rate of 5% with payments settled once a year based on year-end interest rates.

Now suppose that the relevant interest rate rises to 6% at the end of the first year and 7% at the end of the second year. In this event, the writer of the cap (the bank) owes the cap owner (the client) $10,000 = ((6% -5%)×$1,000,000) at the end of the first year and $20,000 = ((7% - 5%)×$1,000,000) at the end of the second year. If the cap premium were .5% of the $1,000,000 notional amount for each of the two years, the capped first year cost of the loan to the client would be a maximum of 5.5% for each of the two years, or $55,000 = ($60,000-10,000+5,000). The cap owner would have paid a $5,000 (0.5%) premium for interest rate protection in each of the two years, for net savings of $5,000 in the first year and $15,000 in the second year. The first year cost and savings to the client is depicted in Figure 6.2. Essentially, a cap is similar to an insurance contract against an increase in interest rates above the cap rate. For each year, the net payoff from the cap agreement itself is MAX [-Premium, Market Rate - Cap Rate - Premium]. Thus, if the first-year market rate is 6%, the net payoff percent from the cap is MAX[-.5%, 6%-5%-0.5%] = 0.5% as depicted in Figure 6.2 for the loan payoff structure. A cap can have one or more than one exercise dates, as the one described here has two.

[3] For a period containing a fraction of a year, the swap payoff would be (Notional Amount × (#Days in Contract/360) × (Fixed Rate - Market Rate).

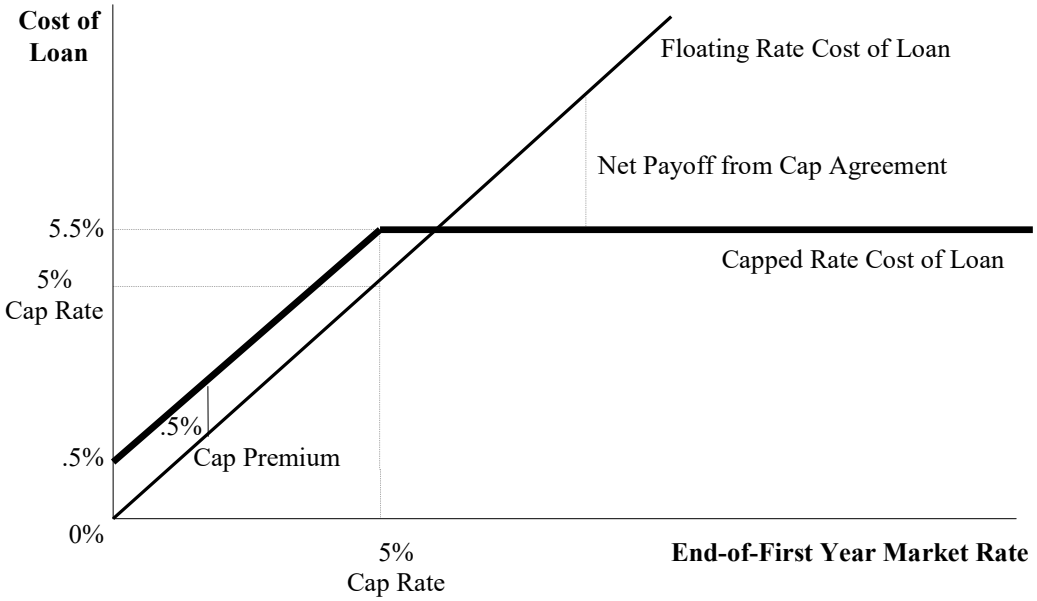

Figure 6.2: First Year Cost of Floating Rate and Capped Rate Loans

Floors

A floor is a put option or a series of put options on interest rates that grants its owner the right to receive a payment or payments at the end of each period in which the relevant market interest rate is exceeded by the striking price (floor rate). If the relevant market interest rate were to drop below the floor rate, the writer of the floor compensates the option owner. If the relevant market interest rate is not below the cap rate, the writer of the floor pays nothing to the floor owner. The floor writer receives an up-front floor premium in return for providing this floor option. The floor can provide for a minimum interest rate that a variable rate lender would receive on a loan.

Now, suppose that a bank's client lends $1,000,000 to a third party for two years at a variable rate. The client might wish for some interest rate protection against the rate dropping. The bank enters a two-year floor agreement with this client in which the client pays the bank a premium of 0.5% on the notional amount ($1,000,000) for each of the two years. Thus, the floor agreement has a notional value of $1 million. The bank has written a put against interest rates and receives a premium from the client. Assume that the agreement is for a floor (minimum) rate of 5% with payments settled once a year based on year-end market interest rates.

Consider the effect of the relevant interest rate dropping to 4% at the end of the first year and 3% at the end of the second year. In this event, the writer of the floor agreement (the bank) owes the floor owner (the client) $10,000 = ((5% - 4%)×$1,000,000) at the end of the first year and $20,000 = ((5% - 3%)×$1,000,000) at the end of the second year. If the floor premium were .5% of the $1,000,000 loan amount for each of the two years, the first year net revenue (interest receipts and floor payments less the premium) would be a minimum of 4.5% for each of the two years, or $45,000. The floor owner (the client) would have paid a $5,000 (0.5%) premium for interest rate protection in each of the two years, for net revenue of $5,000 in the first year and $15,000 in the second year. The first year cost and savings to the client is depicted in Figure 6.3. Essentially, a floor is similar to an insurance contract against a decrease in interest rates below the floor rate. For each year, the net payoff from the floor agreement itself is MAX [-Premium,

Floor Rate - Market Rate - Premium]. Thus, if the first-year market rate is 4%, the net payoff from the cap is MAX[-.5%, 5%-4%-0.5%] = 0.5%. See Figure 6.3 for the loan payoff structure. A floor can have one or more than one exercise dates, as the one described here has two.

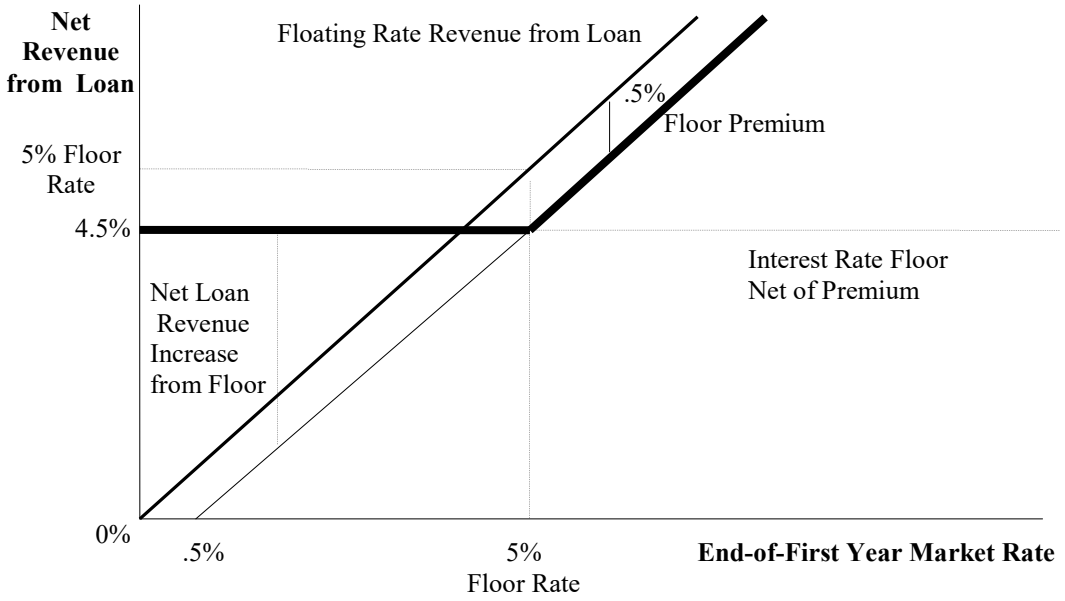

Figure 6.3: First Year Revenue from Floating Rate Loan and Loan with a Rate Floor

Collars

A collar is essentially the combination of a long position in a cap (a call on the market rate) along with a short position in a floor (a put on the market rate). In effect, the institution implementing the interest rate collar writes or sells a floor on a given interest rate, which requires her to make a payment if interest rates drop below the floor rate. The premium proceeds, which are positive to the floor writer, from the floor sale are used to finance the purchase of a call on the relevant market interest rate. Should the market interest rate increase above the rate of the cap, the cap owner will have the option to purchase the underlying instrument (take a payment) at the exercise price (essentially, the market rate minus the cap rate). No payment is associated with the floor. However, if the market rate drops below the collared rate, the floor writer would make a payment to the floor purchaser.

Suppose, for example, that a bank enters a two-year collar agreement with its client. The collar agreement has a notional value of $1 million at a rate of 5% with payments settled once a year based on year-end interest rates. The bank is short on the collar (short on the cap, long on the floor); the client has a long position on the collar (long on the cap and short on the floor). If the relevant market rate were to drop to 4% at the end of the first year and 3% at the end of the second year, the bank would receive from its client $10,000 = ((5% -4%)×$1,000,000) at the end of the first year and $20,000 = ((5% - 3%)×$1,000,000) at the end of the second year. If the relevant interest rate were to rise to 6% at the end of the first year and 7% at the end of the second year, the bank would owe its client $10,000 = ((6% -5%)×$1,000,000) at the end of the first year and $20,000 = ((7% - 5%)×$1,000,000) at the end of the second year. Essentially, the collar locks interest paid by its client on a variable rate loan at a fixed rate of 5%. See Figure 6.4 for the collared loan payoff structure. We assume here that the cap premium paid by the client

and the floor premium paid by the bank offset each other. A collar can have one or more than one exercise dates.

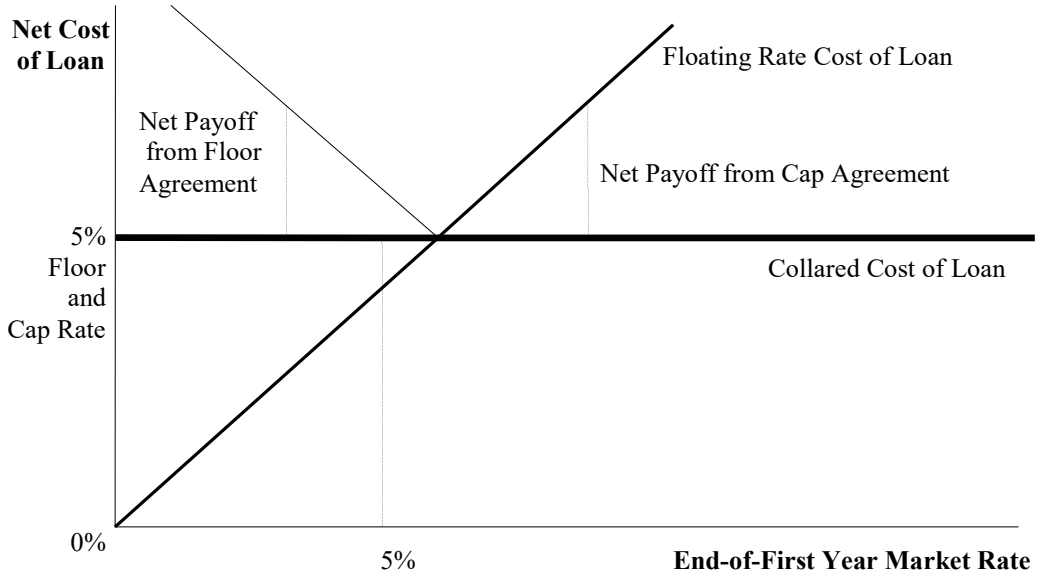

Figure 6.4: First Year Cost of Floating Rate and Collared Loans

D. Eurocurrency Issues

Eurodollars are freely convertible dollar-denominated time deposits and financial instruments created outside the United States.[4] The banks maintaining deposits can be non-U.S. banks, overseas branches of U.S. banks or International Banking Facilities, none of which are subject to reserve requirements and other U.S banking regulation. Eurodollars are not a currency issued by any government, they are deposits and other instruments denominated in dollars outside of the U.S. When the term Euro was combined with dollars and used in this context, it simply meant offshore, and the early primary locations for these deposits were in European cities, most importantly, London. Roberts and Arnander (2001) suggest that the term Eurodollar derives from EUROBANK, the telex address of Banque Commerciale pour l'Europe du Nord, where the Soviet Union maintained its dollar deposits, though this accounting is not certain.

A Brief History of Eurodollar Markets

Eurodollar markets began after World War II when the Marshall Plan increased the dollar flow into Europe and when practically all currencies other than the U.S. dollar were perceived as unstable or otherwise unsuitable for trade. Thus, most of the rapidly growing foreign trade activity between countries was denominated in U.S. dollars. However, the Soviet Union and Eastern European institutions had concerns that their dollars held in U.S. banks might be frozen or attached by U.S. residents in litigation with these countries. For example, after Yugoslavia placed assets for safekeeping in the U.S. prior to WWII, the U.S. froze these assets after the war

[4] It is important to note that Eurodollars (dollar-denominated instruments issued outside the U.S.) and Eurocurrencies (currency issues issued outside their countries of origin) are not euro, the currency used in countries of the Eurozone.

in order to settle claims pending by a number of immigrants from Yugoslavia. These concerns were heightened after the U.S. froze Chinese assets in the U.S. in retaliation for China entering the Korean conflict. Thus, the Soviet bloc began to deal with debits and credits denominated in dollars, but not with actual U.S. dollars obtained from and placed in U.S. banks. These debits and credits were maintained by European banks, and were referred to as Eurodollars. Eurodollar payments owed to Soviet and Soviet bloc countries were simply offset by Eurodollar monies that they owed. In a sense, they dealt with "fake" dollars, but since their trading partners did as well, and their accounts tended to "zero out" over time, this did not create significant problems. These Eurodollars were maintained and traded by Western European banks and became a major currency for trade.

Eurodollar markets grew in the late 1950s and 1960s due to fears concerning U.S. current account deficits, capital outflows and the declining importance of the British pound to global trade. During the 1960s and 1970s, Eurodollar markets thrived due to regulations imposed by the U.S. government such as *Regulation Q* (interest rate ceilings first imposed during the Great Depression), *Regulation M* (reserve requirements) and FDIC fees. Such restrictions encouraged dollar deposits to move outside the U.S. as investors sought higher dollar returns available in less restrictive markets. Similarly, Eurodollar market lending rates tended to be somewhat lower than U.S. domestic lending rates due to these and other restrictions. Hence, Eurodollar spreads were tighter than corresponding dollar spreads. The Interest Equalization Tax imposed beginning in 1963 to tax interest payments on foreign debt sold in the U.S., reduce the outflow of dollars from the U.S., along with restrictions placed on the use of domestic dollars outside the U.S. both contributed to the growth in Eurodollar markets (See Schenk (1998) and Williams (2009)).

Although many of the banking restrictions were eased in the late 1970s and 80s, Middle Eastern nations were often reluctant to hold assets in the U.S. during the oil crises of these periods. The U.S. alliance with Israel contributed to this reluctance and friction as did the Iranian revolution, hostage crisis and related asset freezes during 1978-80 and the aftermath. Largely because its use does not increase bank reserve requirements, U.S. banks often use Eurodollars for domestic funding and use of the Eurodollar has grown substantially as a mechanism for overnight funding. In fact, Eurodollar overnight funding is now used in greater volume than overnight borrowing in the federal funds markets.

Eurodollar Instruments

Eurocredits (e.g., Eurodollar Credits) are bank loans denominated in currencies other than those of the country where the loan is extended. They are attractive due to very low interest rate spreads, which are possible due to the large size of the loans and the lack of reserve, FDIC and other requirements directly or indirectly with domestic loans and deposits. Their rates are generally tied to LIBOR (the London Interbank Offered Rate) and U.S. rates. Loan terms are usually less than five years, typically for six months.

Euro-commercial paper refers to short-term (usually less than six months) notes issued by large, particularly "credit-worthy" institutions. Most commercial paper is not underwritten, and often does not involve a bank in its origination. The notes are generally very liquid and most are denominated in dollars. *Euro-Medium Term Notes* (EMTN's), unlike Eurobonds, are usually issued in installments. They are usually pure discount instruments.

Euro CDs are Eurodollar denominated time deposits in non-U.S. banks or non-U.S. branches of U.S. banks. They can range in maturities to 20 years and some will have floating rates. Euro CDs tend to be less liquid than NCDs. be less affected by reserve requirements and

FDIC regulations and insurance, which usually implies that they often are issued at higher interest rates than NCDs.

Eurobonds are generally underwritten, bearer bonds denominated in currencies other than that of the country where the loan is extended. Eurobonds often have call and sinking fund provisions as well as other features found in bonds publicly traded in American markets. Some are floating rate instruments, historically reset relative to the LIBOR or other benchmark rates.

Euro-Medium Term Notes (EMTNs) are interest-bearing instruments usually issued in installments, and typically range in maturity around 5 years. As with other Eurocurrency instruments, they are denominated in currencies other than the countries from which they are issued. Most are not underwritten, making them easier and less expensive to issue than underwritten issues. EMTNs can be issued with a variety of features, including collateralized, with floating or fixed rates and with amortized payment structures.

Eurocurrencies

More generally, Eurocurrencies are loans or deposits denominated in currencies other than that of the country where the loan or deposit is created, and normally freely convertible on the London Interbank Market. Roughly 65% of Eurocurrency loans are denominated in dollars. More important Eurocurrencies in addition to the Eurodollar include Eurosterling, Euroyen, Eurofranc and Euroeuro deposited in banks and loaned outside the U.K., Japan, Switzerland and the Eurozone. Eurocurrencies may or may not have any connection to Europe, though European country institutions are frequently parties to Eurocurrency transactions.

Exercises

1. What are the differences between forward and futures contracts?

2. Suppose that the Fed plans to auction of $12.5 billion in 91-day T-Bills, where the bids (based on yields to maturity) by financial institution are given as follows:

Morgan Stanley	$3.0 billion at 1.15%
Wells Fargo	$4.5 billion at 1.20%
UBS	$5.5 billion at 1.25%
Deutsche Bank	$2.5 billion at 1.30%
JP MorganChase	$5.5 billion at 1.35%
Bank of America	$6.5 billion at 1.40%

   Further suppose that individual investors have placed noncompetitive bids totaling $4.5 billion. What is the bid-to-cover ratio in this auction? What is the stop-out price? Which bids will be satisfied?

3. Does the creation of a Commercial Paper Funding Facility (CPFF) to support the orderly functioning of the commercial paper market have the potential to exacerbate the moral hazard in commercial paper markets?

4. a. Briefly describe the role of GNMA in mortgage markets.
   b. Does GNMA originate, buy, sell or own mortgages or other loans?
   c. Do FNMA and FHLMC originate mortgages?
   d. Do FNMA and FHLMC purchase and guarantee mortgages?
   e. What is the main difference between GNMA and FNMA/FHLMC mortgage-backed security guarantees?

5. What is the key activity in the creation of asset tranches that enables mortgage securities of distinct risk classes to be created from a single mortgage pool?

6. While primary markets for commercial paper tends to be robust, secondary markets tend to be inactive. Why are commercial paper secondary markets so inactive?

7. Transformation (maturity, risk, size) is an important function of corporate banking. The issue of asset-backed commercial paper (ABCP) can be considered a form of bank asset transformation. How might the issue of ABCP constitute asset transformation?

8. a. Suppose that a bank enters into a one-year total return swap in which its client pays the Secured Overnight Financing Rate (SOFR) on the notional amount of $5,000,000 in exchange for a fixed rate of 4%. Suppose that after one year the SOFR is 5%. What payments follow at the end of the year between the bank and its client?
   b. Following part a, suppose instead a bank's client borrows $5,000,000 for one year at a variable rate. The bank enters a one-year cap agreement with this client in which the bank accepts a premium of 0.6% on the notional amount ($5,000,000). Assume that the

agreement is for a cap rate of 4% with payments settled at year-end based on year-end interest rates. Suppose that after one year the market rate is 5%. What is the premium payment on the cap agreement? What payments follow at the end of the year between the bank and its client on the cap agreement? What interest payment does the client make on its loan?

c. Continue to follow part a, where the bank's client borrows $5,000,000 for one year at a variable rate, but ignore part b. The bank enters a one-year floor agreement with this client in which the bank pays a premium of 0.6% on the notional amount ($5,000,000). Assume that the agreement is for a floor of 4% with payments settled at year-end based on year-end interest rates. Suppose that after one year the market rate is 5%. What is the premium payment on the floor agreement? What payments follow at the end of the year between the bank and its client on the floor agreement? What interest payment does the client make on its loan?

d. Continue to follow part a, where the bank's client borrows $5,000,000 for one year at a variable rate. The bank enters a one-year collar agreement with this client in which no premium is paid, leaving the client long on the cap and short on the floor, both at a rate of 4%, settled at year-end based on year-end interest rates. Suppose that after one year the market rate is 5%. What payments follow at the end of the year between the bank and its client based on the collar agreement? What interest payment does the client make on its loan?

9. What exchange rate risks do investors in Eurodollars face? How do these risks compare to exchange rate risks faced by investors in U.S. dollars?

Solutions

1. Forward contracts are often individually negotiated in bank-to-bank markets. Futures contracts are standardized, exchange traded and generally require maintenance of margin. Counterparty risk is minimized due to exchange and clearinghouse guarantees.

2. The bid-to-cover ratio in this illustration is $27.5 billion/$12.5 billion = 2.2. To determine the stop-out price, the $4.5 billion in noncompetitive bids will be subtracted from the $12.5 billion total. The stop-out price here is $8 billion. Bids will be satisfied from the lowest yield (highest price) until $8 billion in bills have been allocated to the competitive bidders. The stop-out price will be at a yield of 1.25% and all winners (Morgan Stanley, Wells Fargo and UBS and noncompeting bidders) will pay this same price. Noncompeting bidders will be allocated $4.5 billion and UBS will be allocated $0.5 billion.

3. Yes: A market backstop has the potential to encourage financial institutions to issue higher-risk commercial paper and commercial paper for which markets could be very limited. It is the function of the CPFF to make markets and enhance liquidity for paper with limited markets.

4. a. GNMA guarantees securities created from pools of mortgages originated by approved issuers and insured by government administrative units such as FHA.
   b. No
   c. No
   d. Yes
   e. GNMA guarantees have the full faith and credit backing of the U.S. federal government. Ignoring guarantee issues related to the conservatorship of these two institutions, implicit FNMA/FHLMC guarantees might or might not exist on their securities.

5. Prioritization of payments to the different tranches is the key to creating distinct multiple risk classes associated with a pool of mortgages. Enhancing the credit of one tranche improves it relative to other tranches. This is accomplished through prioritization or the attachment of appropriate credit derivatives
   .
6. Secondary markets for commercial paper tend to be inactive because original purchasers often hold these short-term instruments until they mature. In addition, commercial paper is very heterogeneous in nature, further weakening secondary markets as it is difficult to build a liquid and active market for many short-term securities that are very different from one another. If commercial paper holders are anxious to cash out their positions, they then to sell the instruments back to their dealers.

7. The issue of ABCP can be considered to be a form of maturity transformation. Most of the loans in the ABS collateral portfolio are likely to be of long-term (e.g., securitized

from 5-20 year mortgages) while the commercial paper is likely to have maturities ranging from 1 to 270 days.

8. a. The payment is netted at the end of the swap term with the client making a payment of $50,000 = ($5,000,000 × (5% - 4%).
b. The beginning-of-year fixed payment or premium from the client to the bank is $30,000 = $1,000,000 × 0.6%. The end-of-year payment from the bank to the client is $50,000 = ($5,000,000 × (5% - 4%). The interest payment made by the client on its loan is $250,000 = $5,000,000 × 5%, or $200,000 net of the cap payment by the bank: ($250,000 - $50,000), or $220,000 net of both the cap payment by the bank and the cap premium paid by the client.
c. The beginning-of-year fixed payment or premium from the bank to the client is $30,000 = $1,000,000 × 0.6%. The end-of-year payment from the client to the bank is zero because the market rate exceeded the floor rate. The interest payment made by the client on its loan is simply $250,000, or $220,000 net of the floor premium received by the client.
d. The beginning-of-year fixed payment or premium from the bank to the client is zero because the floor payment offsets the cap payment. The end-of-year payment from the client to the bank is zero because the market rate exceeded the floor rate. The end-of-year payment from the bank to the client is $50,000 = ($5,000,000 × (5% - 4%) because the market rate exceeded the collared rate. The interest payment made by the client on its loan is $250,000 = $5,000,000 × 5%, or $200,000 net of the cap payment by the bank: ($250,000 - $50,000).

9. Exchange rate risks faced by investors in Eurodollars are the same as those faced by investors in U.S. dollars. One Eurodollar always has the same value as one U.S. dollar. However, other risks, such as interest rate risk might be different because of regulations and other factors affecting the instruments differently.

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