

# U.S. TREASURY AND AGENCY SECURITIES

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U.S. Treasury securities are direct obligations of the U.S. government issued by the Department of the Treasury. They are backed by the full faith and credit of the U.S. government and therefore are considered to be free of credit risk. Agency securities, in contrast, are obligations of specific entities that are either part of or sponsored by the U.S. government. Agency securities typically do not have an explicit government backing but nevertheless are viewed as having very low credit risk. In this chapter we discuss U.S. Treasury and agency securities.

## TREASURY SECURITIES

As noted, Treasury securities are obligations of the U.S. government and thus are considered to be free of credit risk. Issuance to pay off maturing debt and raise needed funds has created a stock of marketable Treasury securities that totaled \$3.7 trillion on March 31, 2004.<sup>1</sup> The creditworthiness and supply of the securities have resulted in a highly liquid round-the-clock secondary market with high levels of trading activity and narrow bid-ask spreads.

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The views expressed in this chapter are those of the authors and not necessarily those of the Federal Reserve Bank of New York or the Federal Reserve System.

1. The stock of nonmarketable Treasury securities on the same date totaled \$3.4 trillion. Of this, \$3.0 trillion was nonpublic debt (held in government accounts), \$0.2 trillion was held by private investors in the form of U.S. Savings Bonds, and \$0.2 trillion was held in a special series by state and local governments (Monthly Statement of the Public Debt, [www.publicdebt.ustreas.gov/opd/opddload.htm](http://www.publicdebt.ustreas.gov/opd/opddload.htm)). This chapter focuses on marketable Treasury securities.

Because of their liquidity, Treasury securities are used commonly to price and hedge positions in other fixed income securities and to speculate on the course of interest rates. The securities' creditworthiness and liquidity also make them a widespread benchmark for risk-free rates. These same attributes make Treasury securities a key reserve asset of central banks and other financial institutions. Finally, exemption of interest income from state and local taxes helps to make the securities a popular investment asset to institutions and individuals.

As of September 30, 2003, foreign and international investors held 37% of the publicly held Treasury debt.<sup>2</sup> Federal Reserve Banks held an additional 17% of the debt. The remaining public debt was held by pension funds (9%), mutual funds (8%), state and local treasuries (8%), depository institutions (4%), insurance companies (4%), and other miscellaneous investors, including individuals (14%).

## Types of Securities

Treasury securities are issued as either *discount* or *coupon securities*. Discount securities pay a fixed amount at maturity, called *face value* or *par value*, with no intervening interest payments. Discount securities are so called because they are issued at a price below face value, with the return to the investor being the difference between the face value and the issue price. Coupon securities are issued with a stated rate of interest, pay interest every six months, and are redeemed at par value (or *principal value*) at maturity. Coupon securities are issued at a price close to par value, with the return to the investor being primarily the coupon payments received over the security's life.

The Treasury issues securities with original maturities of one year or less as discount securities. These securities are called *Treasury bills*. The Treasury currently issues bills with original maturities of 4 weeks (one month), 13 weeks (three months), and 26 weeks (six months), as well as cash-management bills with various maturities. On March 31, 2004, Treasury bills accounted for \$985 billion (26%) of the \$3.7 trillion in outstanding marketable Treasury securities, as shown in Exhibit 10–1.

Securities with original maturities of more than one year are issued as coupon securities. Coupon securities with original maturities of more than 1 year but not more than 10 years are called *Treasury notes*. The Treasury currently issues notes with maturities of 2 years, 3 years, 5 years, and 10 years. On March 31, 2004, Treasury notes accounted for \$2.0 trillion (53%) of the outstanding marketable Treasury securities.

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2. The publicly held debt includes marketable and nonmarketable securities held in nongovernment accounts. Figures are calculated from Table 1.41 of the *Statistical Supplement to the Federal Reserve Bulletin* and Table OFS-2 of the *Treasury Bulletin*.

**EXHIBIT 10-1**

## Marketable U.S. Treasury Securities

| Issue Type                            | Security Type | Issues                                    | Amount Outstanding (March 31, 2004) |
|---------------------------------------|---------------|---|-------------------------------------|
| Treasury bills                        | Discount      | Cash-management, 4-week, 13-week, 26-week | \$985 billion                       |
| Treasury notes                        | Coupon        | 2-year, 3-year, 5-year, 10-year           | \$1,983 billion                     |
| Treasury bonds                        | Coupon        | (20-year), (30-year)                      | \$564 billion                       |
| Treasury inflation-indexed securities | Coupon        | 10-year, (30-year)                        | \$188 billion                       |

Note: Issues no longer offered as of April 2004 are noted by parentheses.

Source: Department of the Treasury, Monthly Statement of the Public Debt ([www.publicdebt.treas.gov/opd/opddload.htm](http://www.publicdebt.treas.gov/opd/opddload.htm)) for amounts outstanding.

Coupon securities with original maturities of more than 10 years are called *Treasury bonds*. The Treasury does not currently issue any bonds, most recently suspending issuance of 30-year bonds in October 2001. Previously issued 20- and 30-year bonds are still outstanding, however, so that bonds accounted for \$564 billion (15%) of the outstanding marketable Treasury securities on March 31, 2004. While several of the outstanding bonds are callable, the Treasury has not issued callable securities since 1984.

In January 1997, the Treasury began selling *inflation-indexed securities*. The principal of these securities is adjusted for inflation using the consumer price index for urban consumers. Semiannual interest payments are a fixed percentage of the inflation-adjusted principal, and the inflation-adjusted principal is paid at maturity. On March 31, 2004, Treasury inflation-indexed notes and bonds accounted for \$188 billion (5%) of the outstanding marketable Treasury securities. Since these securities are discussed in detail in Chapter 15, the remainder of this section focuses on nominal (or fixed-principal) Treasury securities.

### The Primary Market

Marketable Treasury securities are sold in the primary market through sealed-bid, *single-price* (or *uniform-price*) *auctions*. Each auction is announced several days in advance by means of a Treasury Department press release. The announcement

provides details of the offering, including the offering amount and the term and type of security being offered, and describes some of the auction rules and procedures.

Treasury auctions are open to all entities. Bids must be made in multiples of \$1,000 (with a \$1,000 minimum) and submitted to a Federal Reserve Bank, to the Treasury's Bureau of the Public Debt, or through an authorized financial institution. Competitive bids must be made in terms of yield and typically must be submitted by 1 p.m. Eastern time on auction day. Noncompetitive bids typically must be submitted by noon on auction day. While most tenders (or formal offers to buy) are submitted electronically, both competitive and noncompetitive tenders can be made on paper.<sup>3</sup>

All noncompetitive bids from the public up to \$1 million for bills and \$5 million for coupon securities are accepted. The lowest-yield (i.e., highest-price) competitive bids are then accepted up to the yield required to cover the amount offered (less the amount of noncompetitive bids). The highest yield accepted is called the *stop-out yield*. All accepted tenders (competitive and noncompetitive) are awarded at the stop-out yield. There is no maximum acceptable yield, and the Treasury does not add to or reduce the size of the offering according to the strength of the bids.

Historically, the Treasury auctioned securities through *multiple-price* (or *discriminatory*) *auctions*. With multiple-price auctions, the Treasury still accepted the lowest-yielding bids up to the yield required to sell the amount offered (less the amount of noncompetitive bids), but accepted bids were awarded at the particular yields bid rather than at the stop-out yield. Noncompetitive bids were awarded at the weighted-average yield of the accepted competitive bids rather than at the stop-out yield. In September 1992, the Treasury started conducting single-price auctions for the two- and five-year notes. In November 1998, the Treasury adopted the single-price method for all auctions.

Within minutes of the 1 p.m. auction deadline, the Treasury announces the auction results. Announced results include the stop-out yield, the associated price, and the proportion of securities awarded to investors who bid exactly the stop-out yield. Also announced is the quantity of noncompetitive tenders, the median-yield bid, and the ratio of the total amount bid for by the public to the amount awarded to the public (called the *bid-to-cover ratio*). For notes and bonds, the announcement includes the coupon rate of the new security. The coupon rate is set to be that rate (in increments of  $\frac{1}{8}$  of 1%) that produces the price closest to, but not above, par when evaluated at the yield awarded to successful bidders.

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3. Commercial bidders, such as broker-dealers and depository institutions, are encouraged to submit tenders electronically by computer, although paper tenders are accepted. Noncommercial bidders are encouraged to submit tenders electronically by phone or Internet, although mailed-in paper tenders are accepted. Bidding procedures are described in detail on the Bureau of the Public Debt's Web site at [www.publicdebt.ustreas.gov](http://www.publicdebt.ustreas.gov).

Accepted bidders make payment on issue date through a Federal Reserve account or account at their financial institution, or they provide payment in full with their tender. Marketable Treasury securities are issued in book-entry form and held in the commercial book-entry system operated by the Federal Reserve Banks or in the Bureau of the Public Debt's *TreasuryDirect* book-entry system.

### Primary Dealers

While the primary market is open to all investors, the *primary government securities dealers* play a special role. Primary dealers are firms with which the Federal Reserve Bank of New York interacts directly in the course of its open-market operations. They include large diversified securities firms, money center banks, and specialized securities firms and are foreign- as well as U.S.-owned. Among their responsibilities, primary dealers are expected to participate meaningfully in Treasury auctions, make reasonably good markets to the Federal Reserve Bank of New York's trading desk, and supply market information and commentary to the Fed. The dealers also must maintain certain designated capital standards. The 23 primary dealers as of April 15, 2004, are listed in Exhibit 10–2.

Historically, Treasury auction rules tended to facilitate bidding by the primary dealers. In August 1991, however, Salomon Brothers, Inc., admitted deliberate and repeated violations of auction rules. While the rules preclude any bidder from being awarded more than 35% of any issue, Salomon amassed significantly larger positions by making unauthorized bids on behalf of its customers.

### EXHIBIT 10–2

#### Primary Government Securities Dealers as of April 15, 2004

|   |  |
|---|--|
| ABN AMRO Bank, N.V.,<br>New York Branch | Dresdner Kleinwort Wasserstein<br>Securities LLC |
| BNP Paribas Securities Corp.            | Goldman, Sachs & Co.                             |
| Banc of America Securities LLC          | Greenwich Capital Markets, Inc.                  |
| Banc One Capital Markets, Inc.          | HSBC Securities (USA) Inc.                       |
| Barclays Capital Inc.                   | J.P. Morgan Securities, Inc.                     |
| Bear, Stearns & Co., Inc.               | Lehman Brothers Inc.                             |
| CIBC World Markets Corp.                | Merrill Lynch Government<br>Securities Inc.      |
| Citigroup Global Markets Inc.           | Mizuho Securities USA Inc.                       |
| Countrywide Securities Corporation      | Morgan Stanley & Co. Incorporated                |
| Credit Suisse First Boston LLC          | Nomura Securities International, Inc.            |
| Daiwa Securities America Inc.           | UBS Securities LLC                               |
| Deutsche Bank Securities Inc.           |  |

Source: Federal Reserve Bank of New York ([www.newyorkfed.org/markets/pridealers\\_current.html](http://www.newyorkfed.org/markets/pridealers_current.html)).

**EXHIBIT 10-3**

## Auction Schedule for U.S. Treasury Securities

| Issue        | Auction Frequency | Offering Amount |
|--------------|-------------------|-----------------|
| 4-week bill  | Weekly            | \$8–22 billion  |
| 13-week bill | Weekly            | \$17–19 billion |
| 26-week bill | Weekly            | \$15–17 billion |
| 2-year note  | Monthly           | \$26 billion    |
| 3-year note  | Quarterly         | \$24 billion    |
| 5-year note  | Monthly           | \$16 billion    |
| 10-year note | Quarterly         | \$16 billion    |

Note: Auction frequency and offering amount are reported for regularly issued Treasury securities as of the first quarter of 2004. New 10-year notes are auctioned quarterly, but additional amounts of the notes are auctioned one month later. Offering amounts exclude amounts issued to refund maturing securities of Federal Reserve Banks.

Source: Department of the Treasury.

For the five-year note auctioned on February 21, 1991, for example, Salomon bid for 105% of the issue (including two unauthorized customer bids) and was awarded 57% of the issue. Rule changes enacted later that year allowed any government securities broker or dealer to submit bids on behalf of customers and facilitated competitive bidding by nonprimary dealers.<sup>4</sup>

**Auction Schedule**

To minimize uncertainty surrounding auctions and thereby reduce borrowing costs, the Treasury offers securities on a regular, predictable schedule, as shown in Exhibit 10-3. Four-, 13-, and 26-week bills are offered weekly. Four-week bills typically are announced for auction on Monday, auctioned the following Tuesday, and issued the following Thursday. Thirteen- and 26-week bills typically are announced for auction on Thursday, auctioned the following Monday, and issued the following Thursday (one week after they are announced for auction). Cash-management bills are issued when required by the Treasury's short-term cash-flow needs and not on a regular schedule.

Two- and five-year notes are offered monthly. Two-year notes usually are announced for auction on a Monday, auctioned the following Wednesday, and issued on the last day of the month. Five-year notes usually are auctioned on a

4. For further information on the auction violations and subsequent rule changes, see the *Joint Report on the Government Securities Market*, published by the Department of the Treasury, the Securities and Exchange Commission, and the Board of Governors of the Federal Reserve System in January 1992.

Wednesday, announced several days before that, and issued on the fifteenth of the month.

Three- and 10-year notes are issued as a part of the Treasury's *quarterly refunding* in February, May, August, and November. The Treasury holds a press conference on the first Wednesday of the refunding month (or on the last Wednesday of the preceding month) at which it announces details of the upcoming auctions. The auctions then typically take place on the following Tuesday (3-year) and Thursday (10-year), with issuance on the fifteenth of the refunding month.

While the Treasury seeks to maintain a regular issuance cycle, its borrowing needs change over time. The improved fiscal situation in the late 1990s reduced the Treasury's borrowing needs, resulting in decreased issuance and a declining stock of outstanding Treasury securities. To maintain large, liquid issues, the Treasury suspended issuance of 3-year notes in 1998 and 52-week bills and 30-year bonds in 2001. More recently, the worsened fiscal situation has increased the Treasury's borrowing needs, resulting in increased issuance and a rising stock of outstanding Treasury securities. The three-year note thus was reintroduced in 2003.

In addition to maintaining a regular issuance cycle, the Treasury tries to maintain a stable issue size for issues of a given maturity. As shown in Exhibit 10–3, public offering amounts as of the first quarter of 2004 were \$8 billion to \$22 billion for 4-week bills, \$17 billion to \$19 billion for 13-week bills, \$15 billion to \$17 billion for 26-week bills, \$26 billion for 2-year notes, \$24 billion for 3-year notes, and \$16 billion for 5- and 10-year notes. Issue sizes also have changed in recent years in response to the government's changing funding needs. Issue sizes for 2-year notes, for example, declined from over \$18 billion in 1996 to \$10 billion in late 2000, before increasing to \$26 billion in early 2004.

### Reopenings

While the Treasury regularly offers new securities at auction, it often offers additional amounts of outstanding securities. Such additional offerings are called *reopenings*. Current Treasury practice is to reopen 10-year notes one month after their initial issuance, in March, June, September, and December. Moreover, shorter-term bills typically are fungible with previously issued and outstanding bills so that every 13-week bill is a reopening of a previously issued 26-week bill and every 4-week bill is a reopening of a previously issued 13- and 26-week bill. The Treasury also reopens securities on an *ad hoc* basis from time to time.

### Buybacks

To maintain the sizes of its new issues and to help manage the maturity of its debt, the Treasury launched a debt buyback program in January 2000. Under the program, the Treasury redeems outstanding unmatured Treasury securities by purchasing them in the secondary market through reverse auctions. Buyback operations are announced one day in advance. Each announcement contains

details of the operation, including the operation size, the eligible securities, and some of the operation rules and procedures.

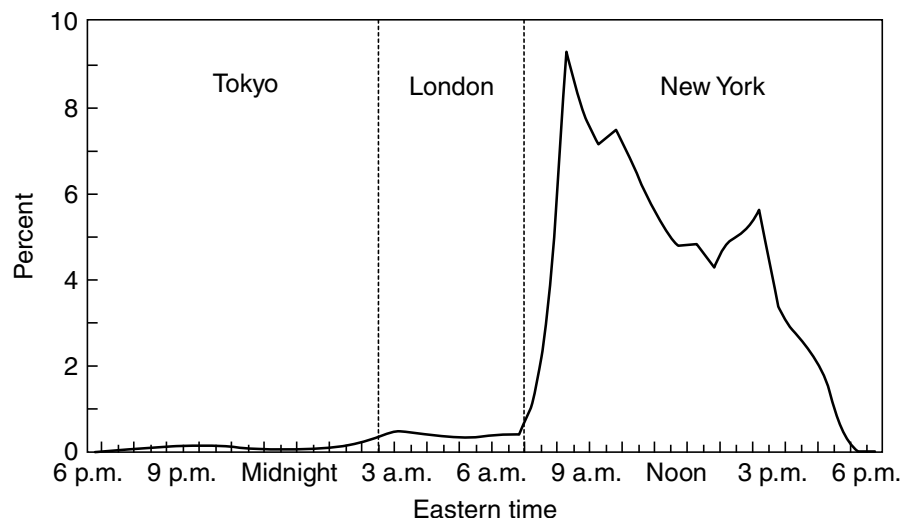
The Treasury conducted 45 buyback operations between March 2000 and April 2002 (as of April 2004, there were no operations since April 2002). Operation sizes ranged from \$750 million par to \$3 billion par, with all but three between \$1 billion and \$2 billion. The number of eligible securities in the operations ranged from 6 to 26 but more typically was in the 10 to 13 range. Eligible securities were limited to those with original maturities of 30 years, consistent with the Treasury's goal of using buybacks to prevent an increase in the average maturity of the public debt.

## The Secondary Market

Secondary trading in Treasury securities occurs in a multiple-dealer over-the-counter market rather than through an organized exchange. Trading takes place around the clock during the week from the three main trading centers of Tokyo, London, and New York. As shown in Exhibit 10–4, the vast majority of trading takes place during New York trading hours, roughly 7:30 a.m. to 5 p.m. Eastern time. The primary dealers are the principal market makers, buying and selling securities from customers for their own accounts at their quoted bid and ask prices.

### EXHIBIT 10–4

Trading Volume of U.S. Treasury Securities by Half Hour



Note: Mean half-hourly trading volume as a percent of mean daily trading volume is plotted for April 4 to August 19, 1994. The times on the horizontal axis indicate the beginning of intervals.

Source: Chart 2 in Michael J. Fleming, "The Round-the-Clock Market for U.S. Treasury Securities," Federal Reserve Bank of New York *Economic Policy Review* (July 1997).



For the first quarter of 2004, primary dealers reported daily trading activity in the secondary market that averaged \$482 billion per day.<sup>5</sup>

### Interdealer Brokers

In addition to trading with their customers, the dealers trade among themselves through *interdealer brokers*. The brokers offer the dealers proprietary electronic screens or electronic trading platforms that post the best bid and offer prices of the dealers, along with the associated quantities bid or offered (minimums are \$5 million for bills and \$1 million for notes and bonds). The dealers execute trades by notifying the brokers (by phone or electronically), who then post the resulting trade price and size. In compensation for their services, the brokers charge a small fee.

Interdealer brokers thus facilitate information flows in the market while providing anonymity to the trading dealers. For the most part, the brokers act only as agents and serve only the primary dealers and a number of nonprimary dealers. The brokers include BrokerTec, Cantor Fitzgerald/eSpeed, Garban-Intercapital, Hilliard Farber, and Tullett Liberty.

### Federal Reserve

The Federal Reserve is another important participant in the secondary market for Treasury securities by virtue of its security holdings, open market operations, and surveillance activities. The Federal Reserve Banks held \$656 billion in Treasury securities as of September 30, 2003, or 17% of the publicly held stock. The Federal Reserve Bank of New York buys and sells Treasury securities through open market operations as one of the tools used to implement the monetary policy directives of the Federal Open Market Committee (FOMC). Finally, the New York Fed follows and analyzes the Treasury market and communicates market developments to other government agencies, including the Federal Reserve Board and the Treasury Department.

### Trading Activity

While the Treasury market is extremely active and liquid, much of the activity is concentrated in a small number of the roughly 175 issues outstanding. The most recently issued securities of a given maturity, called *on-the-run securities*, are particularly active. Analysis of 1998 data from GovPX, Inc., a firm that tracks interdealer trading volume, shows that on-the-run issues account for 70% of trading activity. Older issues of a given maturity are called *off-the-run securities*.

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5. Federal Reserve Bank of New York ([www.newyorkfed.org/markets/statrel.html](http://www.newyorkfed.org/markets/statrel.html)). Since the data are collected from all the primary dealers but no other entities, trades between primary dealers are counted twice, and trades between nonprimary dealers are not counted at all. The figure excludes financing transactions, such as repurchase agreements and reverse repurchase agreements.

**EXHIBIT 10-5**

## Daily Trading Volume of U.S. Treasury Securities

| Issue        | When-Issued | On-the-Run | Off-the-Run |
|--------------|-------------|------------|-------------|
| 13-week bill | 627         | 1,265      | 160         |
| 26-week bill | 441         | 919        | 79          |
| 2-year note  | 2,093       | 7,320      | 97          |
| 3-year note  | 1,743       | 2,529      | 71          |
| 5-year note  | 1,095       | 6,629      | 18          |
| 10-year note | 584         | 4,538      | 7           |

Note: Mean daily interdealer trading volume is reported by issue for when-issued, on-the-run, and off-the-run Treasury securities. The when-issued figures are estimated only over days on which the securities traded when-issued. The off-the-run figures are per-security averages, estimated over all off-the-run securities of a given issue. Figures are in millions of dollars.

Source: Authors' calculations, based on 1998 data from GovPX.

While nearly all Treasury securities are off-the-run, they account for only 24% of interdealer trading.

The remaining 6% of interdealer trading occurs in *when-issued securities*. When-issued securities are securities that have been announced for auction but not yet issued. When-issued trading facilitates price discovery for new issues and can serve to reduce uncertainty about bidding levels surrounding auctions. The when-issued market also enables dealers to sell securities to their customers in advance of the auctions and thereby bid competitively with relatively little risk. While most Treasury market trades settle the following day, trades in the when-issued market settle on the issue date of the new security.

There are also notable differences in trading activity by issue type, as shown in Exhibit 10-5. According to 1998 data from GovPX, on-the-run Treasury notes are the most actively traded securities, with average daily trading of \$7.3 billion for the 2-year, \$6.6 billion for the 5-year, and \$4.5 billion for the 10-year notes.<sup>6</sup> Trading activity in when-issued securities is similarly concentrated in the notes, with average daily trading of \$2.1 billion for the 2-year, \$1.7 billion for the 3-year, and \$1.1 billion for the 5-year notes. In contrast, off-the-run trading is concentrated in the more frequently issued shorter-term issues, with the most active being the 3-month bill (\$160 million per issue), the 2-year note (\$97 million per issue), and the 26-week bill (\$79 million per issue). Trading in longer-term off-the-run securities is

6. GovPX tracks trading activity among several of the interdealer brokers and thus covers much, but not all, of the interdealer market. Total interdealer trading volume therefore exceeds the figures given in the text and Exhibit 10-5 (particularly for longer-term securities).

extremely thin, with mean daily per-issue trading of just \$18 million for the 5-year note and \$7 million for the 10-year note.

### Quoting Conventions for Treasury Bills

The convention in the Treasury market is to quote bills on a discount rate basis. The rate on a discount basis is computed as

$$Y_d = \frac{(F - P)}{F} \times \frac{360}{t}$$

where

$Y_d$  = rate on a discount basis

$F$  = face value

$P$  = price

$t$  = number of days to maturity

For example, the 26-week bill auctioned April 5, 2004, sold at a price  $P$  of \$99.479 per \$100 face value  $F$ . At issue, the bill had 182 days to maturity  $t$ . The rate on a discount basis then is calculated as

$$Y_d = \frac{(\$100 - \$99.479)}{\$100} \times \frac{360}{182} = 1.03\%$$

Conversely, given the rate on a discount basis, the price can be computed as

$$P = F - \left( F \times Y_d \times \frac{t}{360} \right)$$

For our example,

$$P = \$100 - \left( \$100 \times 1.03\% \times \frac{182}{360} \right) = \$99.479$$

The discount rate differs from more standard return measures for two reasons. First, the measure compares the dollar return to the face value rather than to the price. Second, the return is annualized based on a 360-day year rather than a 365-day year. Nevertheless, the discount rate can be converted to a bond-equivalent yield (as discussed in Chapter 5), and such yields are often reported alongside the discount rate.

Treasury bill discount rates typically are quoted to two decimal places in the secondary market, so a quoted discount rate might be 1.18%. For more active issues, the last digit is often split into halves, so a quoted rate might be 1.175%.

Typical bid-ask spreads in the interdealer market for the on-the-run bills are 0.5 basis points, as shown in Exhibit 10–6. A basis point equals one one-hundredth of a percentage point, so quotes for a half basis point spread might be 1.175%/1.17%. Exhibit 10–6 also shows that spreads vary with market conditions, ranging from 0 to about 2 basis points most of the time. A zero spread

**EXHIBIT 10-6****Bid-Ask Spreads for U.S. Treasury Securities**

| <b>Issue</b> | <b>Median Spread</b> | <b>95% Range</b>   |
|--------------|----------------------|--------------------|
| 4-week bill  | 0.5 basis points     | 0–2.5 basis points |
| 13-week bill | 0.5 basis points     | 0–2.0 basis points |
| 26-week bill | 0.5 basis points     | 0–1.5 basis points |
| 2-year note  | 1/128 point          | 0–1/64 point       |
| 3-year note  | 1/128 point          | 0–3/128 point      |
| 5-year note  | 1/128 point          | 0–1/32 point       |
| 10-year note | 1/64 point           | 0–2/32 point       |

Note: Statistics for the spread between the best bid and the best offer in the interdealer market are reported for the on-the-run securities of each issue. Bill spreads are reported in yield terms in basis points, and coupon spreads are reported in price terms in points.

Source: Authors' calculations, based on 2003 (for bills) and 1998 (for notes) data from GovPX.

is called a *locked market* and can persist in the interdealer market because of the transaction fee paid to the broker who mediates a trade. Bid-ask spreads typically are wider outside the interdealer market and for less active issues.

### Quoting Conventions for Treasury Coupon Securities

In contrast to Treasury bills, Treasury notes and bonds are quoted in the secondary market on a price basis in points, where one point equals 1% of par.<sup>7</sup> The points are split into units of thirty-seconds, so a price of 97-14, for example, refers to a price of 97 and  $\frac{14}{32}$ , or 97.4375. The thirty-seconds are themselves split by the addition of a plus sign or a number, with a plus sign indicating that half a thirty-second (or  $\frac{1}{64}$ ) is added to the price and a number indicating how many eighths of thirty-seconds (or 256ths) are added to the price. A price of 97-14+ therefore refers to a price of 97 and  $14\frac{1}{2}$  thirty-seconds, or 97.453125, whereas a price of 97-142 refers to a price of 97 and  $14\frac{2}{8}$  thirty-seconds, or 97.4453125. The yield to maturity, discussed in Chapter 5, typically is reported alongside the price.

Typical bid-ask spreads in the interdealer market for the on-the-run coupon issues range from  $\frac{1}{128}$  point for the 2-year note to  $\frac{1}{64}$  point for the 10-year note, as shown in Exhibit 10-6. A 2-year note thus might be quoted as 99-082/99-08+, whereas a 10-year note might be quoted as 95-23/95-23+. As with bills, the spreads vary with market conditions and usually are wider outside the interdealer market and for less active issues.

7. Notes and bonds are quoted in yield terms in when-issued trading because coupon rates for new notes and bonds are not set until after these securities are auctioned.

## Zero-Coupon Treasury Securities

*Zero-coupon Treasury securities* are created from existing Treasury notes and bonds through coupon stripping (the Treasury does not issue them). *Coupon stripping* is the process of separating the coupon payments of a security from the principal and from one another. After stripping, each piece of the original security can trade by itself, entitling its holder to a particular payment on a particular date. A newly issued 10-year Treasury note, for example, can be split into its 20 semiannual coupon payments (called *coupon strips*) and its principal payment (called the *principal strip*), resulting in 21 individual securities. Since the components of stripped Treasury securities consist of single payments (with no intermediate coupon payments), they are often called *zero coupons* or *zeros* as well as strips.

Since they make no intermediate payments, zeros sell at discounts to their face value and frequently at deep discounts owing to their often long maturities. On March 26, 2004, for example, the closing bid price for the February 2031 principal strip was just \$26.50 (per \$100 face value). Since zeros have known cash values at specific future dates, they enable investors to closely match their liabilities with Treasury cash flows and thus are popular with pension funds and insurance companies. Zeros also appeal to speculators because their prices are more sensitive to changes in interest rates than coupon securities with the same maturity date.

The Treasury introduced its Separate Trading of Registered Interest and Principal Securities (STRIPS) program in February 1985 to improve the liquidity of the zero-coupon market. The program allows the individual components of eligible Treasury securities to be held separately in the Federal Reserve's book-entry system. Institutions with book-entry accounts can request that a security be stripped into its separate components by sending instructions to a Federal Reserve Bank. Each stripped component receives its own cusip (or identification) number and then can be traded and registered separately. The components of stripped Treasury securities remain direct obligations of the U.S. government. The STRIPS Program was limited originally to new coupon security issues with maturities of 10 years or longer but was expanded to include all new coupon issues in September 1997.

Since May 1987, the Treasury also has allowed the components of a stripped Treasury security to be reassembled into their fully constituted form. An institution with a book-entry account assembles the principal component and all remaining interest components of a given security and then sends instructions to a Federal Reserve Bank requesting the reconstitution.

As of March 31, 2004, \$177 billion of fixed-rate Treasury notes and bonds were held in stripped form, representing 7% of the \$2.5 trillion in eligible fixed-rate coupon securities.<sup>8</sup> There is wide variation across issue types and across

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8. Figures are from Table V of the Treasury's Monthly Statement of the Public Debt ([www.publicdebt.treasury.gov/opd/opddload.htm](http://www.publicdebt.treasury.gov/opd/opddload.htm)).

issues of a particular type in the rate of stripping. As of March 31, 2004, 32% of eligible bonds were stripped, but only 1% of eligible notes were stripped. Among the notes, one issue was 21% stripped, whereas 34 eligible note issues were not stripped at all. On a flow basis, securities were stripped at a rate of \$16.4 billion per month in the first quarter of 2004 and reconstituted at a rate of \$14.8 billion per month.

## AGENCY SECURITIES

Agency securities are direct obligations of federal government agencies or government-sponsored enterprises. *Federal agencies* are entities of the U.S. government, such as the Tennessee Valley Authority. *Government-sponsored enterprises* are publicly chartered but privately owned and operated entities, such as the Federal National Mortgage Association (“Fannie Mae”), the Federal Home Loan Mortgage Corporation (“Freddie Mac”), the Federal Home Loan Banks, and the Farm Credit Banks. The agencies issue debt securities to finance activities supported by public policy, including home ownership, farming, and education.<sup>9</sup>

Agency securities typically are not backed by the full faith and credit of the U.S. government, as is the case with Treasury securities. Agency securities therefore are not considered to be risk-free instruments but rather trade with some credit risk. Nevertheless, agency securities are considered to be of very high credit quality because of the strong fundamentals of their underlying businesses and because of the agencies’ government affiliation. Several of the agencies have authority to borrow directly from the Treasury. Additionally, there is a perception among some market participants that the government implicitly backs the agency issues and would be reluctant to let an agency default on its obligations. Agency issues are also attractive to investors because their interest income is exempt from state and local taxation for many of the issuers (albeit not for Fannie Mae or Freddie Mac issues).

### Types of Securities

Agency securities are issued in a variety of types and maturities. *Discount notes* are short-term obligations issued at a discount from par with maturities ranging from one day to 365 days. *Medium-term notes* are fixed- or floating-rate coupon securities and are offered with a range of maturities. More generally, the agencies offer a wide variety of securities with various attributes, including callable and noncallable securities; fixed-rate, floating-rate, indexed, and zero-coupon securities; and securities denominated in U.S. dollars or in other currencies.

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9. Several of the agencies also guarantee and/or issue asset-backed securities. Agency mortgage-backed securities are discussed in Chapter 22.