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zero-coupon bonds. The buyer of zero-coupon bonds receives one, and only one payment, at the bond's maturity. In contrast, coupon-bearing bonds make a series of periodic coupon payments to the buyer, as well as paying par value at maturity. The differences in cash flows are illustrated in Table 1.

In the United States, three types of zero-coupon bonds have appeared. For many years, the US Treasury has issued Treasury bills. These are zero-coupon securities with maturities up to 52 weeks. The Treasury issues 13-week and 26-week bills every week and 52-week bills every fourth week. Each of these issues is quite large, typically five to ten billion dollars. The total amount of bills outstanding is in the hundreds of billions of dollars. The market for these bills is very active and Treasury bills are highly liquid.

lying bond has a greater value than the portfolio of STRIPS, arbitragers will rebundle STRIPS into underlying bonds until the prices are driven into equality.

There is a special tax treatment of zeroes. The difference between the price and par is called the discount, which the buyers must then amortize as taxable income over the life of the bond. Corporations are allowed to amortize the discount as interest expense, although no cash payments of interest are made.

Zero-coupon bonds appeal to investors who want to lock-in a fixed sum of money at a future date. Purchases of zeroes for retirement or educational expenses of children are common. Pension funds and insurance companies with known or actuarially predictable cash outflows find zeroes useful investment vehicles.

Table 1

	0	1	2	3	maturity
Zero-coupon bonds	BOND PRICE				PAR
Coupon-bearing bonds	BOND PRICE	C	C	C	C + PAR

where C = periodic coupon.

A number of corporations and municipalities have issued zero-coupon bonds with maturities running up to 15 or 20 years. The total amount issued has been relatively small, compared to Treasury bills. These corporate and municipal zeroes are relatively thinly traded and illiquid securities. Corporate zeroes may have unusual features. Some are convertible into stock. Others have unusual call features.

In recent years, a large market has developed for Treasury STRIPS. These are zero-coupon bonds created from coupon-bearing treasury securities. Strippers – bond dealers and large banks – decompose a coupon-bearing bond into its parts. The parts then trade individually as STRIPS. For example, a bond with 20 coupons and a par value can be decomposed into 21 parts. By convention, the minimum size of each part is \$1000. STRIPS may also be rebundled into underlying bonds.

If there is a disparity between the prices of underlying bonds and a portfolio of STRIPS with the same pre-tax cash flows, arbitragers will enter the market and drive the prices into equality. For example, if an underlying bond has a market price of \$100 and the portfolio of STRIPS has a price of \$102, strippers will buy underlying bonds and sell them as STRIPS for a profit of \$2. Repeated arbitrage transactions will force the prices into equality. If the under-

The prices of zero-coupon bonds are very sensitive to changes in interest rates. The instantaneous percentage change in price for a zero equals the change in yield times the maturity. For example, the percentage price change of a 20-year zero-coupon bond is approximately 20 times as large as the change in the yield.

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See also BOND MARKETS; BONDS; DURATION AND IMMUNIZATION; INFLATION HEDGES; STRIPPED BONDS; TREASURY BILL MARKET.

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zone franc. See FRANC ZONE.

zoos. See FINANCIAL ZOOS.