

Topics covered in this Data Finder:

- Bond Pricing and Yield to Maturity
- Finding Treasuries with Bloomberg Professional
- Corporate Bonds
- Advanced Bond Functions in Bloomberg

How are Bonds Priced?

Just like stocks, bond prices are determined by the market. Determining the price of any financial instrument requires an estimate of (i) the expected cash flows, and (ii) the appropriate required yield. The required yield reflects the yield for financial instruments with comparable risk, or alternative investments.

All required yields are based off yields offered by Treasury securities, therefore one of the most important factors in determining a bond price is the level of prevailing interest rates in the economy.

Calculating a Bond's Yield to Maturity

The yield to maturity is the interest rate that will make the present value of the cash flows equal to the price (or initial investment). For a semiannual pay bond, the yield to maturity is found by first computing the periodic interest rate, y , which satisfies the relationship:

$$P = \frac{C}{(1+y)} + \frac{C}{(1+y)^2} + \frac{C}{(1+y)^3} + \dots + \frac{C}{(1+y)^n} + \frac{M}{(1+y)^n}$$

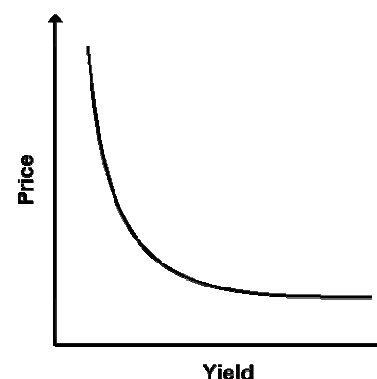
where P = price of the bond, C = semiannual coupon interest (in dollars), M = maturity value (in dollars), and n = number of periods (number of years x 2). The yield calculated from this relationship is also called the **internal rate of return**. It is implicit in this computation that all coupons can be reinvested at the same rate.

Solving for the yield (y) requires a trial-and-error (iterative) procedure. The objective is to find the yield that will make the present value of the cash flows equal to the price. Keep in mind that the yield computed is the yield for the period. That is, if the cash flows are semiannual, the yield is a semiannual yield. If the cash flows are monthly, the yield is a monthly yield. To compute the *simple* annual interest rate, the yield for the period is multiplied by the number of periods in the year.

Price-Yield Relationship

A bond's price changes in the opposite direction from the change in the required yield. The reason is that the price of the bond is the present value of the cash flows.

When yields in the marketplace rise above the coupon rate at a *given point in time*, the price of the bond falls so that an investor buying the bond can realize capital appreciation. When a bond sells below its par value, it is said to be selling at a discount. A bond whose price is above its par value is said to be selling at a premium.

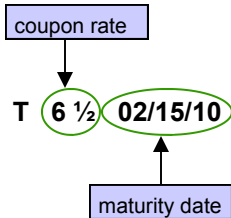


Source: Fabozzi, *Bond Markets, Analysis, and Strategies*. 5th Edition.

Looking up a US Treasury with Bloomberg Professional

(NOTE: Available only in the Cutler Center and Horn Library - [click here for Bloomberg page on the Library site](#))

The first step is to find a bond that you would like to look up info about. To look at a list of US Treasuries that have been issued, enter the following on the command line:



T GOVT GO

The Treasuries are listed by coupon rate in ascending order. Once you choose a security that is still on the market. For this *Data Finder* we use the US Treasury below, which can be accessed by typing

T 6 1/2 02/15/10 GOVT GO

SECURITY	BID	ASK	YTM	DUR	RISK	PSRC
US TREASURY N/B 6 1/2 2/15/10	112-15+	112-17+	3.99	4.76	5.37	BGN

Prices are quoted in the market using fractions. The number following the dash is the amount of 32nds in the price. If there is a plus sign (+) following the number as shown above, then the security can be traded in 64ths and you add 1/64 to the price. By looking at the ask price of 112-17+, we see that the price the seller is willing to accept for this security is 112.5468 ($112 + 17/32 + 1/64 = 112 + 35/64$). This is known as the **clean price** since it does not include accrued interest. We also see the Yield-to-Maturity (YTM) is 3.99, which is the rate that all the future cash flows must be discounted by in order to make the present value equal to the price. **Since the bond is trading at a premium, we know the YTM will be less than the coupon rate of 6.5%.**

By entering the command **DES <Go>**, you can view information about the security such as the coupon frequency, coupon type, and date issued.

To see technical details about this bond, we can access the following screen by typing: **YA** GO

YIELD ANALYSIS			CUSIP	912827521
US TREASURY N/B	T 6 1/2 02/15/10	112-15+ /112-17+	(4.00 /99) BGN	@11.04
PRICE	112-17+	SETTLEMENT DATE	6/28/2004	
YIELD CALCULATIONS		MATURITY	CASHFLOW ANALYSIS	
		2/15/2010	To 2/15/2010 WORKOUT, 1000M FACE	
STREET CONVENTION		3.989	PAYMENT INVOICE	
TREASURY CONVENTION		3.988	PRINCIPAL[RND(Y/N)]	
TRUE YIELD		3.987	134 DAYS ACCRUED INT	
EQUIVALENT 1/YEAR COMPOUND		4.029	TOTAL	
JAPANESE YIELD (SIMPLE)		3.797	INCOME	
PROCEEDS/MMKT EQUIVALENT			REDEMPTION VALUE	
			1000000.00	
REPO EQUIVALENT		5.593	COUPON PAYMENT	
EFFECTIVE @ 3.989 RATE(%)		3.989	INTEREST @ 3.989%	
TAXED: INC 39.60% CG 28.00%		2.410	TOTAL	
			1435761.04	
			RETURN	
			GROSS PROFIT	
			286363.72	
			RETURN	
			3.989	
SENSITIVITY ANALYSIS			FURTHER ANALYSIS	
DUR DURATION(YEARS)			HIT 1 <GO> COST OF CARRY	
ADJ/MOD DURATION			HIT 2 <GO> PRICE/YIELD TABLE	
RISK			HIT 3 <GO> TOTAL RETURN	
CONVEXITY				
DOLLAR VALUE OF A				
YIELD VALUE OF A				

NOTE: Government securities are usually settled the next business day (commonly referred to as "T+1") and corporate bonds are usually settled 3 business days out ("T+3").

The following are certain highlights (circled above) of important information available on this screen:

→ **Settlement Date:** If you were to purchase this security today, the Settlement Date is the day it will be delivered.

Street Convention Yield: The yield calculated according to the market price for the bond. For descriptions of the other yields, refer to the help menu by pressing the F1 key.

US Treasuries in Bloomberg (Cont.)

Duration and Modified Duration: Bloomberg calculates these common measurements of a bond's sensitivity to changes in yield. The higher the number, the more risky the bond is.

Dollar Value of an 01: A similar measurement and common term, this tells the effect a 1 basis point change in yield would have on the bond's price.

Payment Invoice Section: This shows the calculation which would determine the **full price** (also known as **dirty price**) you would have to pay for the bond if you were to purchase it today. This calculation includes the amount of **accrued interest** you would be responsible for compensating the current owner since the last coupon payment.

$$\text{Dirty Price} = \text{Clean Price} + \text{Accrued Interest}$$


Corporate Bonds in Bloomberg

Similar to finding Treasuries, you can search for a company's public debt in Bloomberg by typing:

{ticker symbol}  

In this example we searched for Time Warner (ticker: TWX) and got the following results:

CORPORATE SECURITIES					for ticker TWX		Page 1/ 2	
Sort by 1 Coupon		Exclude 1		Exclude mtrd/called bonds		Found 29		
Cpn Type 0 All Coupon Types		Mty Type 0 All Maturity Types						
ISSUER	COUPON	MATURITY	SERS	RTNG	FREQ	MTY TYPE	CNTRY/CURR	
1) AMERICA ONLINE	0	12/ 6/19		BBB	S/A	CNV/PUT/CALL	US /USD BGN	
2) AOL TIME WARNER	5 ⁸ / ₈	5/ 1/05		BBB+	S/A	CALLABLE	US /USD BGN	
3) AOL TIME WARNER	6 ¹ / ₈	4/15/06		BBB+	S/A	CALLABLE	US /USD BGN	
4) AOL TIME WARNER	6.15	5/ 1/07		BBB+	S/A	CALLABLE	US /USD BGN	
5) TIME WARNER INC	6 ⁵ / ₈	5/15/29		BBB+	S/A	CALLABLE	US /USD BGN	
6) AOL TIME WARNER	6 ³ / ₄	4/15/11		BBB+	S/A	CALLABLE	US /USD BGN	
7) TIME WARNER INC	6.85	1/15/26		BBB+	S/A	PUTTABLE	US /USD BFV	
8) AOL TIME WARNER	6 ⁷ / ₈	5/ 1/12		BBB+	S/A	CALLABLE	US /USD BGN	
9) TIME WARNER INC	6 ⁷ / ₈	6/15/18		BBB+	S/A	NORMAL	US /USD BGN	
10) TIME WARNER INC	6.95	1/15/28		BBB+	S/A	NORMAL	US /USD BGN	
11) TIME WARNER ENT	7 ¹ / ₄	9/ 1/08		BBB+	S/A	NORMAL	US /USD BGN	
12) TIME WARNER INC	7 ¹ / ₄	10/15/17		BBB+	S/A	NORMAL	US /USD BGN	
13) TIME WARNER INC	7.48	1/15/08		BBB+	S/A	NORMAL	US /USD BFV	

By clicking on a desired bond (we chose line  12, the 7.25% coupon bond with a maturity date of 10/15/17), then

SECURITY DESCRIPTION				Page 1/ 1	
TIME WARNER INC TWX7 '4 10/15/17 108.0048/108.4926 (6.35/6.30) BGN MATRIX					
ISSUER INFORMATION			IDENTIFIERS		1) Additional Sec Info 2) Identifiers 3) Ratings 4) Prospectus 5) Sec. Specific News 6) Involved Parties 7) Custom Notes 8) Issuer Information 9) ALLQ 10) Pricing Sources 11) Related Securities 12) Issuer Web Page 13) Par Cds Spreads
Name TIME WARNER COS INC			CUSIP 887315BJ7		
Type Multimedia			ISIN US887315BJ73		
Market of Issue US DOMESTIC			BB number DD1135787		
SECURITY INFORMATION			RATINGS		
Country US Currency USD			Moody's Baa1		
Collateral Type DEBENTURES			S&P BBB+		
Calc Typ(1) STREET CONVENTION			Fitch BBB+		
Maturity 10/15/2017 Series			ISSUE SIZE		
NORMAL			Amt Issued		
Coupon 7 '4 FIXED			USD 500,000.00 (M)		
S/A 30/360			Amt Outstanding		
Announcement Dt 10/ 3/97			USD 500,000.00 (M)		
Int. Accrual Dt 10/ 8/97			Min Piece/Increment		
1st Settle Date 10/ 8/97			1,000.00/ 1,000.00		
1st Coupon Date 4/15/98			Par Amount 1,000.00		
Iss Pr 98.5870			BOOK RUNNER/EXCHANGE		
HAVE PROSPECTUS DTC			ML		65) Old DES
			TRACE		66) Send as Attachment

Corporate Bonds (cont.)

The Description screen contains important background information such as the credit rating, issue date and size of issue. You can also access the Prospectus and more detailed credit rating from this screen.

In addition to the Yield Analysis function we spoke about earlier, another valuable function is the ability to look up Historical Prices:

TWX HP

Using this function you can track the historical price of the bond on a daily, weekly, or monthly basis.

BGN/CLOSE/MID/YTM									
TIME WARNER INC TWX7 '4 10/15/17 107.9863/108.4741 (6.35/6.30) BGN MATRIX									
Range 12/26/03 to 6/18/04 Source BGN HI 117.3920 ON 3/12/04									
Period Weekly AVE 112.48									
Market Mid/Last LOW 106.6314 ON 5/14/04									
DATE	Price	YIELD	DATE	Price	YIELD	DATE	Price	YIELD	
JUN 6/18	107.678	6.384	MAR 3/26	116.724	5.483	DEC 12/26	113.856	5.777	
6/11	106.799	6.479	3/19	117.314	5.429				
6/ 4	106.986	6.460	3/12	117.392	5.423				
			3/ 5	116.694	5.491				
MAY 5/28	108.145	6.336	FEB 2/27	115.491	5.607				
5/21	106.961	6.464	2/20	114.622	5.693				
5/14	106.631	6.500	2/13	115.083	5.649				
5/ 7	106.971	6.465	2/ 6	114.408	5.716				
APR 4/30	109.898	6.156	JAN 1/30	114.027	5.755				
4/23	110.717	6.073	1/23	115.220	5.640				
4/16	112.026	5.941	1/16	115.810	5.585				
4/ 9	113.760	5.769	1/ 9	115.056	5.659				
4/ 2	114.187	5.728	1/ 2	112.000	5.959				

Useful Advanced Bond Functions

- CRPR - Historical ratings for a security or issuer
- TRA - Analyze weighted total returns using different assumptions
- RV - See a bond's value relative to different various curves
- ISSD - Review the financial details of your chosen issuer
- DURA - Help analyze the bond's sensitivity to interest rate changes
- PFC1 - Cash flow analysis of coupon and terminal payments with custom variables

Finding Generic Government Rates

The term "generic" government bond refers to the synthetic yield history that is created by piecing together observed closing yields for benchmark bonds of a given maturity. This information can be used to gauge interest rate levels over time. You can also download this data in Excel using the History Table Wizard - part of Bloomberg's **API functionality**.

To look up Generic Government Rates, type: **GGR** and choose the applicable country.

For generic US Treasury Bills, use:

- GBM** - for the 1 Month Bill
- GB3** - for the 3 Month Bill
- GB6** - for the 6 Month Bill

For generic US Treasury Notes/Bonds, use:

- GT2** - for the 2 Year Note
- GT5** - for the 5 Year Bond
- GT10** - for the 10 Year Bond
- GT30** - for the 30 Year Bond

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Please visit the Cutler Center's website at <http://www3.babson.edu/cutlercenter/> for additional information about the Center, investment management research guides, and recommended internet links.

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