

Market Value of Debt¹

Quick Sheet²

Investors and lenders of varying types loan funds to firms in an express effort to invest in the firm's future and seek some portion of the firm's future cash flows in return. Though these investors may not always be equity shareholders, they are stakeholders in the firm and seek both a "return of" and "return on" their investment. A firm's outstanding debt capital, like that of a consumer, can be assessed by the amount owed to the firm's creditors – this is synonymous with the book value of the debt as listed on the firm's balance sheet. However, in many cases a firm's debt may have a separate market value, or a value others in the market may be prepared to pay were they to purchase or take over the debt. This market value, to the extent it may be different than the book value of the debt, is a function of changes in the rate of interest the firm contractually agreed to pay when funds were loaned to the firm compared to the interest rate the firm may be required to pay were the firm to engage in similar borrowing in the market today, or the date for which the market value is being estimated. It is the conflict between these two rates, the original interest rate on the debt and the rate the firm would have to pay for similar debt today, that sets up changes in value of that debt.

Concepts & Terms

Bank Loans: a loan from an established consumer, commercial or investment bank extended to the firm in exchange for a stated interest rate, or rate of return, to be repaid over a specific period of time. Though the rate is most often fixed, adjustable rate loans do exist such that the current yield on the debt and the agreed upon interest rate may be the same. The terms of the loan are established by contract and typically include a repayment and amortization schedule, collateral requirements, and other agreed upon covenants.

Bonds: a marketable form of a firm's debt issued to the investing public for which the firm most often makes semi-annual interest payment based on the bond's coupon rate for a specific period of time (usually 10,20 or 30 years)

Book Value of Debt: the value of the firm's debt instruments as noted on the balance sheet. This is typically the outstanding balance owed the firm's creditors

Coupon Rate: the stated interest rate at which the firm pays interest to its bondholders. This rate is specified by the contract governing the firm's relationship with its bondholders (debenture) and is typically paid in equal, semi-annual, interest-only installments.

Credit Line: a flexible debt facility offering liquidity to a borrower up to a specified amount for a contracted period of time. Most credit lines are established with adjustable interest rates, require borrowers to make interest-only payments each period, and have 10-year contract duration, after which any remaining balance must be paid in full or renegotiated with the lender. The interest rate required at any point in time is the current yield in the market for that same type of debt obligation for the subject borrower.

Current Yield: the current cost of borrowing for a firm's debt capital. This is influenced by a firm's credit rating, debt-to-equity ratio, loan-to-value on collateralized assets, amount borrowed, and duration of debt.

Debt Capital: funds borrowed by the firm for the specific purpose of investing in the firm. Long-term debt, notes payable, credit lines, mortgages, bank loans, private loans and bonds are each examples of debt capital and represent funds loaned to a firm as an investment in the firm. Current Liabilities, accounts payable, wages payable, accrued liabilities are not

¹ The Market Value of Debt Quick Sheet is intended to present an abbreviated presentation of the included concepts in corporate finance and is not intended to be a full or complete representation of the concepts, models, metrics or the underlying foundations from which they are built.

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debt capital: each are offered to the firm to motivate operating transactions and may not be associated with purposeful investments made in the firm.

Face Value: the amount the borrower agrees to repay when the loan is established. In the case of a bond the face amount is most often \$1,000 and the lender purchases a quantity of bonds from the borrower in exchange for a specified rate of return (coupon rate).

Mortgage: a type of debt for which real estate is typically offered as collateral. In addition to being backed by real/tangible collateral, most mortgages are also backed by the full faith and credit of the borrower, extended for periods of 10 – 30 years, require monthly payments of principal and interest, and are paid off by the end of the agreed upon term.

N: the number of total periods for which a loan/debt compounds its interest and expects payments. For example: a 5 year loan with a monthly payment schedule would have an N equal to $5 \times 12 = 60$.

Notes Payable: a loan from a non-traditional lender such as a supplier, individual investor, or other firm stakeholder. Like bank loans, notes payable are extended to the firm in exchange for a stated interest rate, or rate of return. Though the rate is most often fixed, adjustable rate loans do exist such that the current yield on the debt and the agreed upon interest rate may be the same. The terms of the loan are established by contract and typically include a repayment and amortization schedule, collateral requirements, and other agreed upon covenants.

Periods per Year: the number of times each year the lender calculates and compounds the agreed upon interest rate on the loan. This may also be the number of times each year the lender expects to receive principal and/or interest payments, however, some loans have different compounding and payment period requirements. For example, most business and consumer lenders expect to receive monthly payments from the borrower but compound interest daily.

Yield to Maturity or YTM: the periodic Current Yield on a debt. For example: if a loan has a stated interest rate or coupon rate of 6% and expected semi-annual payments, YTM is the rate divided by the periods or $\frac{.06}{2} = .03$.

Market Value of Bond Equation

$$\text{Market Value of a Bond} = C \frac{\left[1 - \frac{1}{(1+YTM)^N}\right]}{YTM} + \frac{F}{(1+YTM)^N}$$

$$C = \frac{F * \text{Coupon Rate}}{\text{Periods per year}}$$

$$YTM = \frac{\text{Current Market Yield}}{\text{Periods per year}}$$

$$N = \text{Years to Maturity} \times \text{Periods Per Year}$$

$$F = \text{Face Value}$$

Example: Suppose a firm issues a bond at a \$1,000 face value, coupon rate of 7%, for a period of 30 years on 1/1/2000 and expects to provide semi-annual payments to the investors. If today's date were 1/1/2020 the bonds would have 10 years before they reached maturity the bonds were issued. Assume the Current Yield on similar debt for the firm in today's market would require an interest rate of 6%.

$$\begin{aligned} \text{Market Value of a Bond} &= C \frac{\left[1 - \frac{1}{(1+YTM)^N}\right]}{YTM} + \frac{F}{(1+YTM)^N} \\ &= \frac{1,000 \times .07}{2} \frac{\left[1 - \frac{1}{\left(1 + \frac{.06}{2}\right)^{(10 \times 2)}}\right]}{\frac{.06}{2}} + \frac{1,000}{\left(1 + \frac{.06}{2}\right)^{(10 \times 2)}} \\ &= 35 \frac{\left[1 - \frac{1}{(1.03)^{20}}\right]}{.03} + \frac{1,000}{(1.03)^{20}} \\ &= 520.71 + 553.68 = 1,074.39 \end{aligned}$$

Market Value of Bond Calculation using the HP10bII+ Calculator

This calculation requires the use of the calculator's top line Time Value of Money Functions: N, I/YR, PV, PMT and FV, plus the P/YR setting (which must be set before any of the other items are entered into the calculator). Given the example above, the calculator inputs are as follows:

$$P/YR = 2$$

$$N = 20$$

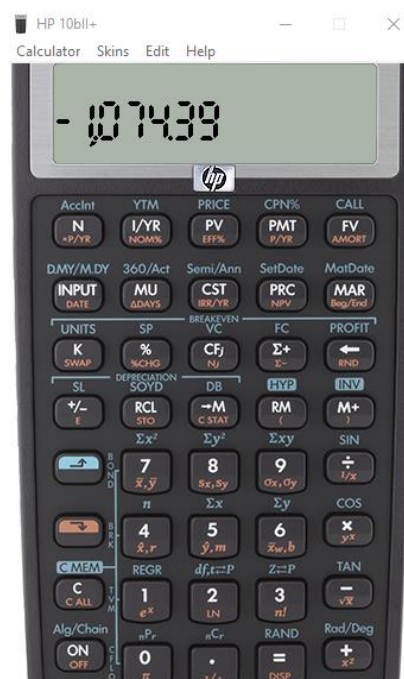
$$I/YR = 6$$

$$PV = \text{solve}$$

$$PMT = 35$$

$$FV = 1,000$$

$$\text{Solve for PV} = -1,074.39$$



Recall that the calculator works on an input/outflow architecture such that payments an investor may receive are positive while any amount the investor may have to make are negative. In this case an investor may be required to pay \$1,074.39 (negative) for a bond providing \$35 semi-annual payments and a lump sum payment at maturity (both positive).

Calculating the Market Value of a Firm's Outstanding Bonds

Market Value of a Firm's Outstanding Bonds: Market Value per Bond x Number of Bonds

$$\text{Number of Bonds} = \frac{\text{Book Value of Bonds}}{\text{Face Value per Bond}}$$

Given the example above, if the firm shows the bonds on the balance sheet at \$10,000,000 the value of the bond portfolio is calculated as follows:

$$\text{Number of Bonds} = \frac{\text{Book Value of Bonds}}{\text{Face Value per Bond}} = \frac{10,000,000}{1,000} = 10,000$$

$$\text{Market Value per Bond} = 1,074.39$$

$$\text{Market Value of Outstanding Bonds} = 10,000 \times 1,074.39 = 10,743,900$$