

# Bonds

Here we are talking about **Corporate Bonds**. These are nothing more than instruments issued in public markets representing an agreement between a borrower and a lender.

The borrower is the corporation, the lender is the investor who buys the bond.

There exist a **Bond Covenant**: dictates the details of the loan. Typically it will say that the borrower is obligated to pay a certain amount of interest over a certain period of time on a certain frequency. And then at the end of that period of time to repay the principle.

Types of bonds include:

**Convertible bonds**, convertible into common or preferred stock

**Sinking fund bonds**, where the corporation is required to put a certain amount of principle away over the life of the bond so that when the bond matures there are funds to repay it.

**Inflation Adjusted Bonds**, pay a fixed interest rate of 3 percent that applies for the life of a particular bond plus a rate adjusted twice a year for inflation.

**We will be covering the vanilla flavor, the typical bond.**

Say we have a bond with a **Face Value (PAR value)** of \$1000. This is the amount that the bond issuer is required to repay at the end of the term.

Say that the **Coupon Interest Rate** is 10%.

## EXAM

Remember that in the absence of any modifier all interest rates are quoted on a per-annum (annual) basis.

Lets say the **Payment Frequency** on our bond is semi-annual (pays out 2 times a year).

And the **Maturity** is 10 years.

All of this information is included in the bond. Now the bond issuer has to prepare a prospectuses which must be reviewed by the SEC. This is a significant document, talks about the company, it's financial history, it's bond covenant, risk associated with the bond, the projection of weather the company can continue to pay the interest, the times interest earned coverage, etc. This all has to be prepared and involves CPA's, internal staff, underwriters, etc. It is a very lengthy and time consuming process. By the time the SEC reviews and approves it a lot of time has gone by. But keep in mind the company has to have the bond already printed at the beginning of this process. By the time SEC approves it the market may have changed.

**(prospectuses:** an official document giving details about something that is going to happen, for example, a stock offering, a forthcoming publication, a new business, or a proposed project)

The question now regarding this bond is: what is the **Market Value** of this bond?

In our example assume that the market rate of interest (the market rate in effect at the time the bond is issued) is 8%. Now we have a bond paying 10% and other bonds in the market are paying 8%. That means our 10% bond can now be sold for **MORE** than its face value. It is more valuable, it is going to pay more interest than the other products available on the market.

Face Value	\$	1,000
Coupon Interest Rate		10%
Payment Frequency		semi-annual
Maturity		10 years
Market Rate of Interest		8%

We need a way to calculate what the true market rate of this bond is. That is done as such...

We look at coupon payments discounted by a **Present Value Factor for an Annuity** based on market rate of interest.

The Coupon payment are going to be \$1000 times some interest rate. Now keep in mind the payment frequency is semi-annual so we will divide our coupon rate by 2 when calculating payments.

$$\text{Semi-Annual Interest Payments} = \left[ \$ 1,000 \times \frac{10\%}{2} \right] = \$50.00$$

**Present Value Factor for an Annuity** says lets find out the present value of all those payments over the next 10 years.

**Present Value:** the value right now of an amount to be received in the future. The future amount will have interest or some other earnings added to the present value, that is, the future value will be greater than the present value. Present value is the amount you would have to invest today to achieve the specified future value. Present value takes out the interest component of the future value of an investment.

We do this for each of the future payments the bond will provide. We will be receiving this \$50 payment for the next 20 periods where the period is 6 months in length.

We go to a table to find the **Present Value Factor for an Annuity**. We can find these tables in the back of the text beginning at page 858:  
(The tables assume P, F = \$1.00)

Table 1 (pg 858):

**Future Value**,  $F_n = P * (1 + r)^n$

[P = present value F = future value n = # periods till valuation r = interest rate]

Table 2 (pg 859):

**Present Value**,  $P = F_n * (1 + r)^{-n}$

[P = present value F = future value n = # periods until payment r = discount rate]

Table 3 (pg 860):

**Future Value of an Annuity of \$1 in Arrears**,  $P_F = [ (1 + r)^n - 1 ] / r$

[n = # of payments r = interest rate]

Table 4 (pg 861):

**Present Value of an Annuity of \$1 in Arrears**,  $P_A = ( [ 1 - (1 + r)^{-n} ] / r ) * \$1.00$

[n = # of payments r = discount rate]

**(Annuity:** a stream of payments for a specified period of time. Can be constant payout or growing payout. We model or investment as a constant payout.)

**(Arrears:** unpaid debts, especially debts accumulating as a result of the debtor’s failure to make regular payments)

Our \$50 semi annual return from the bond investment is a Constant Annuity.

DON’T FORGET, WE ARE DOING THIS AT THE MARKET RATE OF INTEREST. WE WANT 20 PERIODS AT THE MARKET RATE OF INTEREST WHICH IS

$$8\% / 2 = 4\% \text{ per payment}$$

$$\begin{aligned} \text{Interest Payments} &= \left[ \frac{\text{Coupon Rate}}{\text{Market Rate}} \right] \times \left[ \text{PVFA} \right] \\ \text{(Market Rate Interest)} &= \left[ \$1,000 \times \frac{10\%}{2} \right] \times \left[ \text{PVFA} \right] \\ \$679.52 &= \left[ \$50.00 \right] \times \left[ 13.59033 \right] \quad \begin{array}{l} \text{[Table 4, 10 yr @ twice per yr]} \\ \text{[n=20, rate = 8\% / 2 = 4\%]} \end{array} \end{aligned}$$

This equation is calculating the per period (6 month) interest payment from the bond at the coupon rate, \$50, and scaling this amount by the PVFA which represents the present value of ALL 20 coupon rate interest payments. We find that the present value of that stream of payments is \$679.52.

Now we calculate the Present Value of the principle payment, the amount the corporation must pay back at the end of the 10 year period. Now this is only a ONE TIME PAYMENT so we do not calculate the PVFA but instead use the standard Present Value Table (table 2). Keep in mind the n term is the number of periods until we receive that payment.

$$\begin{array}{l} \text{Principle} \\ \$456.39 \end{array} = \left[ \begin{array}{l} \text{Principle} \\ \$1,000.00 \end{array} \right] \times \left[ \begin{array}{l} \text{Market Rate} \\ 0.45639 \end{array} \right] \begin{array}{l} \text{[Table 2, one time payment]} \\ \text{[n=20, rate = 8\% / 2 = 4\%]} \end{array}$$

Now we find the market value of this bond in the present day.

\$679.52	<b>Interest Payments</b> (market rate)
\$456.39	<b>Principle</b>
<u>\$1,135.91</u>	<b>Value of Bond in the marketplace</b>

\$1,135.91 is the sale price of the bond in the current market.

In this way the market is saying “I will pay more than the face value for this bond because it is paying me 5% on a semi-annual basis in a market where 4% is the going interest rate.”

Now lets do the accounting for this transaction...

At inception (issuance of the bond, sale of the bond) ...

Keep in mind we are doing the accounting from the company's perspective, from the barrowers perspective, the one who is going to owe the money at the end of the period.

We have a sale of a bond, this brings more money in the form of cash into the company. Cash is a debit account, we make a debit charge to a debit account when we increase it.

We debit cash for the sale price of the bond, the amount the investor gave us.

The bond accounting entry is a little like accounting for a stock which sells above its par value. \$1,000 credit to Bonds Payable (liability, credit a credit account to increase it) and the amount over par goes to Premium on Bonds Payable. The company is only legally required to payback \$1,000. The difference is the Premium. (the text will show the bonds payable and premium on bonds payable together, this is inaccurate).

**At Issuance**

	<u>DR</u>	<u>CR</u>
Cash	\$ 1,135.91	
Bonds Payable		\$ 1,000.00
Premium on Bonds Payable		\$ 135.91

We end up with Bonds on the liability side of the balance sheet and Premium of Discount (discount: if we had to sell the bond for less than face value due to market conditions) \$135.91. Then we calculate

Bonds Payable Net: Bonds Payable + Premium on Bonds Payable =  
 $\$1000 + \$135.91 = \$1,135.91$

Now if it were a discount we would still enter \$1,000 under bonds payable but the entry for Discount on bonds payable would be a debit entry.

**Example of Discount on Bonds Payable Entry**

	<u>DR</u>	<u>CR</u>
Cash	\$ 1,135.91	
Bonds Payable		\$ 1,000.00
Discount on Bonds Payable	\$ 135.91	

Now we must amortize the \$135.91 over its life. We have to get rid of it because at the end of 20 periods we are only going to owe \$1,000. So on our books our liability has to dwindle down to a net liability of only \$1,000. There are different ways of accomplishing this. We could write it off straight line over 20 periods but this is too easy. Instead the method we will cover is called...

**The Effective Interest Rate Method:**

This method is GAAP.

At the end of the first half we owe this money, we have to PAY out this interest, pay out the first \$50. So we know we are going to write out a check for \$50 and call it interest but we are also going to write off a portion of the discount or premium.

The way this works is we accrue interest for this period at the market rate,  $8\%/2 = 4\%$ .

<u>1st Half</u>	<u>DR</u>	<u>CR</u>
Interest Expense	\$ 45.44	
Premium on B/P	\$ 4.56	
Cash		\$ 50.00

The key to remember here is that when depreciating we are working with the market sale price (\$1135.91) and the market interest rate (8% annual, 4% semi-annual).

As a result of amortizing this initial period we will deduct that amount from the calculation next period. Meaning, we will not calculate our **Interest Expense** against the sale price but against the sale price MINUS the amount we are able to amortize this period. Remember, we work with the sale price and the market rate at time of issuance.

<u>1st Half</u>	Market Value	\$1,135.91	
	interest rate for period $8\% / 2 = 4\%$	x 4%	
	1st half accrued interest at market rate	<b>\$45.44</b>	Interest Expense
	Market Value	\$1,135.91	
	1st half accrued interest at market rate	<b>\$45.44</b>	Interest Expense
	Less Payment	\$ (50.00)	
	Ending Balance	\$1,131.35	forward to next half

The difference between the payment we are making and the accrued interest for the period is the amount amortized:

1st half accrued interest at market rate	<b>\$45.44</b>	Interest Expense
Less Payment	\$ (50.00)	
	-\$4.56	Amortized this period

Now the accounting entries

**1st Half**

	<u>DR</u>	<u>CR</u>
Interest Expense	\$ 45.44	
Premium on B/P	\$ 4.56	
Cash		\$ 50.00

Cash is credited because it is paid out, decreased. Interest Expense, a debit account, is increased (because we paid it out). If we look at just the entries for Int Exp and Cash above we see there is an in-balanced entry. Something else must be debited.

Premium on B/P is debited out of the revenue credit account???

Now on to the second half...

The second half is based on the ending balance of the first half. We will accrue interest at 4% (the market rate for the period). This gives us \$45.25 of accrued interest.

<b>2nd Half</b>	1st 1/2 End Balance	\$1,131.35
	x	4%
		<u>\$45.25</u>

This leads to the new ending balance (which will be the starting point for period 3) of:

Market Value	\$1,131.35	
2nd half accrued interest at market rate	\$45.25	Interest Expense
Less Payment	<u>\$ (50.00)</u>	
Ending Balance	\$1,126.60	forward to next half

And the amortization amount for this period”

2nd half accrued interest at market rate	\$45.25	Interest Expense
Less Payment	<u>\$ (50.00)</u>	
	-\$4.75	Amortized this period

(We see that the amount we can amortize increases each period).

The accounting entries are then:

**2nd Half**

	<u>DR</u>	<u>CR</u>
Interest Expense	\$ 45.25	
Premium on B/P	\$ 4.75	
Cash		\$ 50.00

THE DIFFERENCE BETWEEN THE INTEREST EXPENSE AND THE CASH ENTRY IS  
THE DEBIT AGAINST THE PREMIUM ON B/P.

Of course, if the company sells the bond below face value they will be dealing with a discount entry which, I assume, means the difference becomes a credit?

# Pensions

## [ THIS MATERIAL, PENSIONS, IS NOT ON THE EXAM ]

Looking at Pensions from the companies standpoint. There are basically two kinds (one of the other):

- 1) Defined Contribution Plan
- 2) Defined Benefit Plan

Defined Contribution Plans are plans which define how much the company is going to contribute for each employee to the pension.

Defined Benefit Plans define how much of a benefit the company will provide for each employee at the time of their retirement.

Say we put \$100 a month into a Defined Contribution Plan per each employee for each year they work.

The Defined Benefit Plan says I'm going to take the highest of their last 3 years earnings and come up with an average wage. For every year that they worked with the company they get 2% of that average wage. If they worked 20 years they will get 40% of their highest 3 years average wage. Ex., if their highest average wage was \$50,000 and they worked 20 years and get 2% per year they might get  $40\% * \$50,000 = \$20,000$  per year defined benefit.

Depending on which of the two plans the company has an estimate of how much the company is required to come up with to fund the pension plan is made by an actuarial.

By the end of the year the company has to make an accrual which debits the pension expenses and credits a liability, Pension Liability.

On a financial statement Pension Liability represents the unfunded portion of the companies pension liability. When the company makes a check and gives it to the trustee of the plan (a third party trustee) who holds the money for the benefit of the employee, then the company can take it off it's books. Credit Cash and debit the Pension Liability. The liability which was previously unfunded now is reduced to show only the remaining unfunded portion.

The trustee is charged with having sufficient money management skills and recourses to keep the money safe until the employee retires.

A company which has a lot of unfunded pension liabilities has a problem. If that company goes out of business and they haven't funded the pension plan liability to the third party trustee that money could be lost.

That's the short and long of pension liabilities as reported in financial statements.

When the money is transferred to the trustee it is no longer on the companies books. Meaning no one can sue the company for funds which have already been transferred to the trustee.

(**actuarial**: relating to the statistical calculation of risk or life expectancy for insurance purposes)

**Homework:**

Ch 9 pb 28 & 29 pg 524

\$8,000,000 of bonds being issued. 8% is an annual rate but the coupon payment frequency is semi-annual. Will have to divide the 8% in half. The maturity is 20 years, that's 40 periods. The market rate of interest is 6% which is compounded semi-annually so that means 3% per 6 month period.

Come up with the market value of the bond and determine the journal entries at issuance and in the first and second half.

Do the same for # 29. Same stuff we did in class.

Pb 29 has different fact pattern, we will end up with a premium on one and a discount on the other.