Bond Pricing

When a company decides to issue bonds, it must price them so that they are attractive to potential investors in the market. In order to do this the company must decide on the face value (maturity value), coupon payment, coupon rate, and yield rate (return on bond). The market value or bond price is the present value of the future cash flows from the bond.

Bonds are typically issued with a face value, or value at maturity, of $1000. The coupon payment varies among bonds and therefore affects the market value of the bond, the higher the coupon the higher the market value. The number of periods and consequently the number of payments also affects the market value of the bond. The yield is the rate of return that investors require in order to invest in the bonds.

Present Value Equation

$$\boxed{V_B = \sum_{t=1}^{n} \frac{r_c M}{(1+r_D)} + \frac{M}{(1+r_D)^n}}$$

V_B = Market Value
M = Maturity Value
r_c = Coupon Rate
r_D = Required Rate of Return
n = number of periods to maturity

Example:

JonesCo has decided to issue bonds to raise additional financing for future growth. How much capital will it raise if it issues 1,000 ten year bonds with a maturity of $1000 and an annual coupon rate of 10% that is paid semiannually. JonesCo has also determined that investors require an annual return rate of 12%.

$$V_B = \frac{5\% * 1000}{(1+6\%)^1} + \frac{1\% * 1000}{(1+6\%)^2} + \frac{5\% * 1000}{(1+6\%)^3} + \frac{5\% * 1000}{(1+6\%)^4} + \frac{5\% * 1000}{(1+6\%)^5} + \frac{5\% * 1000}{(1+6\%)^6} + \frac{5\% * 1000}{(1+6\%)^7} + \frac{5\% * 1000}{(1+6\%)^8}$$

$$+ \frac{5\% * 1000}{(1+6\%)^9} + \frac{5\% * 1000}{(1+6\%)^{10}} + \frac{5\% * 1000}{(1+6\%)^{11}} + \frac{5\% * 1000}{(1+6\%)^{12}} + \frac{5\% * 1000}{(1+6\%)^{13}} + \frac{5\% * 1000}{(1+6\%)^{14}} + \frac{5\% * 1000}{(1+6\%)^{15}} + \frac{5\% * 1000}{(1+6\%)^{16}} + \frac{5\% * 1000}{(1+6\%)^{17}}$$

$$+ \frac{5\% * 1000}{(1+6\%)^{18}} + \frac{5\% * 1000}{(1+6\%)^{19}} + \frac{5\% * 1000}{(1+6\%)^{20}} + \frac{1000}{(1+6\%)^{20}}$$

$$= 47.16 + 44.49 + 41.98 + 39.60 + 37.36 + 35.24 + 33.25 + 31.37 + 29.59 + 27.91 + 26.33 + 24.84 + 23.44 + 22.11 +$$

$$20.86 + 19.68 + 18.56 + 17.51 + 16.52 + 15.59 + 311.80$$

$$= 885.30$$

$$(1+6\%)^{18} \quad (1+6\%)^{19} \quad (1+6\%)^{20} \quad (1+6\%)^{20}$$

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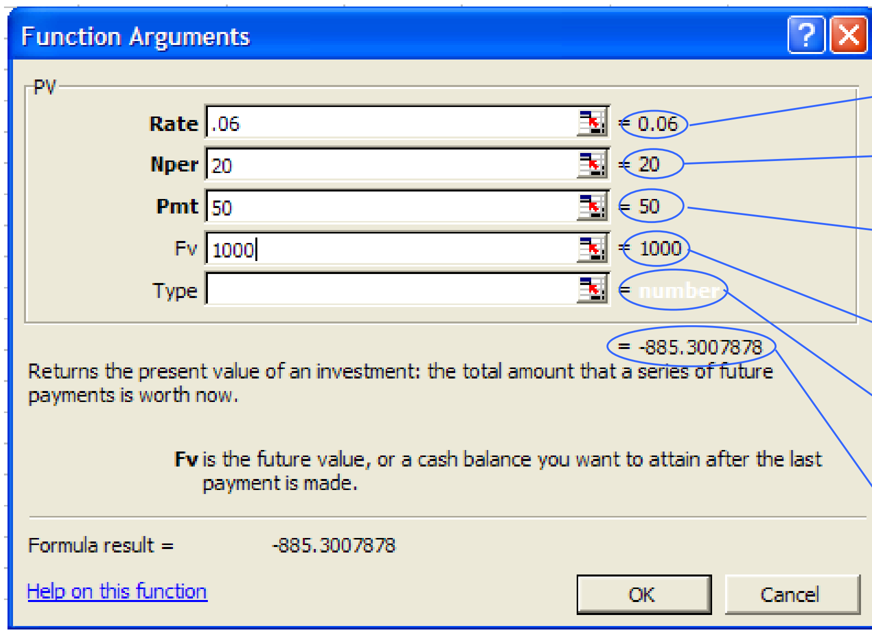
$$20.86 + 19.68 + 18.56 + 17.51 + 16.52 + 15.59 + 311.80$$
$$= 885.30$$

The market value for the bond is 885.30 or in other words the present value of the future cash flows is 885.30. If JonesCo issues 1,000 of these bonds they will raise approximately $885,300 dollars.

Bond Valuation Using Excel

Bonds can be easily calculated using the Present Value function in Excel. This function is labeled PV and stored under the financial category. The inputs are similar to a financial calculator.



Rate is the yield of the bond per period. In the case of this bond it has a annual yield of 12% and a semiannual yield of 6%.

Nper is the total number of periods. This is a 10 year bond compounded semiannually, therefore there are 20 periods.

Pmt is the coupon payment per period. This bond has an annual coupon payment of 10% or $100 and a semiannual coupon of 5% or $50.

Fv is the future value or face value of the bond. This bond has a face value of $1000.

Type is used to define the timing of the payments. If the payments are made at the beginning of the period enter 1. If the payments come at the end of the period leave blank or enter 0. Coupon payments typically come at the end of the period.

Note that the present value is negative while the payment and future values are positive. The present value is negative because this is a payment for the bond, and the future value and payments are positive because these are payments you receive.