Fixed Income Understanding

Mark Bergh

2023-03-02

What are Bonds?

Bonds are financial instruments that represent a collection of future cashflows. These cashflows will be $N \geq 0$ "coupon payments" and one payment of the principle or "par" value. For example, should an investor purchase a 5 year \$100 5% Treasury bond "at par value", and suppose the bond pays coupons semi-annually, she would be entitled to receive 10 coupon payments of \$2.5 every six months and one payment of \$100 at the end of 5 years.

Bond Valuation

Assuming no credit risk, the price of a bond is the sum of the present values of its future cashflows. The present value of a cashflow is the value of that cashflow, discounted at a given rate. In such fashion we can calculate the price P of a bond with coupon payments c and principle M as:

$$P = \sum_{i=1}^{n} \frac{c}{(1+r_i)^i} + \frac{M}{(1+r_n)^n}$$

where r_i is the periodic discount rate for the i'th cashflow.

Payment Frequency

Care should be taken to ensure that analysts understand the implications when coupons are paid multiple times per annum. Some things to keep in mind * If a bond with par value P has a coupon of X% with quarterly payments, the payments will be $\$\frac{X \times P}{4 \times 100}$ *

Yield

The yield to maturity of a bond is the annual discount rate that you would need to use in order for the present value of the bond's cashflows to equal the market price of the bond. From the equation for bond valuation, we can see that there is an inverse relationship between the price of a bond and its yield, all else being equal.

Duration

Convexity