Primer on Bonds

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Price and Yield-to-Maturity (YTM)

Yield to maturity is the total return anticipated for a given bond with the presumption that the bond will be held until its date of maturity (Bloomenthal, 2020). Therefore, yield to maturity is a function of both the sum of all interest in all periods and the difference between a bond's purchase price and its face value at maturity. Suppose the bond was purchased at a discount, then the yield to maturity would be higher since there would be profit to be made upon bond maturity since the bond's face value will result in a profit at maturity. This is calculated by subtracting the purchase price from face value. Contrariwise, if the bond was purchased at a premium, then the yield to maturity would be lower since there is a net loss when subtracting the bond purchase price from the face value. In this case, the interest or coupon rate had better be sufficient as to make the bond's purchase worthwhile to the bondholder. And so, there is an inverse relationship between a bond's purchase price and its yield to maturity; assuming the face value remains the same, as purchase price goes up, yield to maturity goes down (Observations, 2010).

Interest Rate Risks

The fact remains, interest rates are always changing (Observations, 2010). This is why interest rate risk is always a consideration when making the decision to purchase bonds. Bonds are fairly low risk as securities go (Lumen Learning, 2021), and certainly so compared to publicly traded stocks. Many factors affect interest rates in the broad market, supply and demand, inflation, Federal monetary policy, buying and selling of previously issued government securities, and other market forces, to name a few (Heakal, 2021). As interest rates rise, bond prices fall, and thus the relationship between the two is inverse. This is because the general public will be more interested in securities that yield more, and bonds really are usually at the bottom of that list. For this reason, it is generally in the best interest of an investor to seek short-term bonds so they can attain the best coupon rate available on the market. In summation, the more long-term the bond is, the more significant the interest rate risk.

Call Provisions and Put Provisions

Ordinarily bonds' maturity dates are fixed. There are however two bond options which are of particular interest and may be available for a given bond, they are callable and puttable bonds. A bond is said to be callable or redeemable if the issuer of the bond is permitted to redeem the bond at predefined point(s) before the bond reaches the date of its maturity (Lumen, 2021). Meanwhile, a bond which is puttable, also called a put bond or a retractable bond, is one which has a put option, meaning the bondholder can demand early repayment of their principal, the bond's purchase price (Lumen, 2021). Sometimes there are predefined dates that this is possible, or it may be puttable at any time before maturity.

Callable bonds favor the issuer since it allows them to refinance their debt should the general interest rates in the market go down. Conversely, puttable bonds favor the bondholders, giving them the option to put the bond and retrieve back their principal for reinvestment in a security with a higher rate of return. Generally speaking, bonds which are callable are sold at a discount below bonds without the feature and bonds which are puttable are sold at a premium above bonds without the feature. It is equally important to note that bonds which are callable usually have higher interest rates, while bonds which are puttable have lower interest rates, in relation to bonds which have neither option (Schmidt, 2019). These bond options are desirable since investors have disparate income needs, levels of risk tolerance, needs for asset liquidity, various time constraints which apply to their capacity to invest, and are subject to different rates

of taxation (Schmidt, 2019). The more options a security offers, such as puttability or callability, the more likely it will be a fit for investors.

Coupon Rates

A lot goes into the determination of bond coupon rates, and rightfully so, bond issuers want to make their bonds appear as favorable to investors as possible so as to entice them to purchase the bonds so the issuer can raise capital. The chosen coupon rate becomes fixed and is used to determine what the bond's coupon payments will be (Chen, 2021). Beginning with the bond purchase price set to par, or equal to the bond's face value, bond issuers look at comparable bonds available on the market with similar risk and number of years to maturity and set their coupon rates pegged closely to the others. If the issuer has an increased need for capital, rates can be set a tad higher. Likewise, if the issuer is in no hurry to acquire capital, coupon rates can be set a tad lower than others (Chen, 2021). Another way governments or corporations can peg an ideal coupon rate would be to survey potential purchasers to determine the coupon rate necessary to attract them.

A factor that goes into patrons' determination to invest in a given bond is their required return. The required rate of return is what investors demand the bond coupon rate to be (Boundless Finance, 2021). If the coupon rate does not exceed the required rate, they will not invest or purchase the security. Certainly, this rate will fluctuate over time (Boundless Finance, 2021). As aforestated, investors have different factors which go into determining their required rate of return, such as their income needs, level of permissible risk tolerance, needs for asset liquidity, various constraints on their capacity to invest, and tax rate (Schmidt, 2019).

Previously, we studied applying the Capital Asset Pricing Model (CAPM) to calculate the required rate of return to invest (Tracy, 2021). The CAPM formula is A=R+B(M-R), where 'A', the required rate of return to invest is set equal to 'R', the rate of return for a risk-free security, plus the product of 'B', the beta (a measure of volatility), and the difference of 'M-R', where 'M' is the broad market's expected rate of return, and 'R' (Tracy, 2021). This had more applicability to stocks where the required rate was much more variable given the beta or volatility of the stock. With bonds, the required rate will be a lot closer to that of 'R', the rate of return for a risk-free security. Using the CAPM method today in quarter three of 2021, a good value for 'R' would be 2.24% which is presently the yield of risk-free treasury bonds (Goldberg, 2021). Meanwhile, a good value for the variable 'M', the broad market's expected rate of return, would be 10%, since that is the average annual return for the S&P 500 (Maverick, 2021).

Selling Prices of Bonds

Quite simply, bonds are used by governments and corporations to raise capital, either to reinvest at a higher rate than they are paying out or to fund a project. As aforestated, issuers begin with setting the coupon rate with the bond purchase price set to par, in other words, in alignment with the face value. Using the method prescribed in the previous paragraphs, the coupon rate is set to be attractive to prospective purchasers. As time progresses, the bonds will be sold either at a premium or a discount in response to market interest rates. As market rates rise, the bond will have to be sold at a discount from par to attract investors. Contrariwise, as market rates decrease, the bond can be sold at a premium above par because even when purchased at the premium rate, the coupon rate should be worth it to both issuer and investor.

Yield to maturity is an expression of the profit to be made by the investor at the bond's maturity (Bloomenthal, 2020). Yield to maturity has two essential factors. The first is the gain or

loss in the difference between a bond's face value and purchase price (Observations, 2010). The second is the profit made per period over the life of the bond from its coupon rate (Observations, 2010). At the onset of a bond's availability to investors, the purchase price is fixed to the bond value, and since the bond is said to be sold at par, there is no gain or loss in this respect at maturity and the profitability is found solely in the bond's coupons and interest rate. As market rates rise and the bond's sale price lowers to be priced at a discount below par to be more attractive to investors, the investor's gain (the difference between the price at which the bond is purchased and its face value) contributes positively to yield to maturity. On the contrary, as market rates decrease and the bond begins to be sold at a premium because the issuer can price it at a premium and still sell bonds, then the investor's loss at purchase ultimately lowers the yield to maturity and total profitability.

Current Yield and Yield To Maturity (YTM)

A bond's current yield is the annual return on the bond, given the amount of the annual coupon payments and the bond's purchase price. The formula, Y=C/P is Yield 'Y', set equal to cumulative annual Coupon payments 'C', divided by the bond's purchase price 'P' (Strategic CFO, 2021). As an example, suppose an investor bought a bond for $100 with a bi-annual coupon payment of $2.50, applying the formula would reveal a current yield for the bond of 5%. This is different from the bond's yield to maturity (YTM) as the yield to maturity of a bond represents the annual rate of return for the entire life of the bond, making the assumption that the investor will hold the bond to maturity, and that all interest payments will be reinvested at the same rate. Yield to maturity represents the time value of money and its formula uses the bond's purchase price, face value, length of time until maturity, coupon rate (interest rate), and the number of coupon payments per year (Strategic CFO, 2021).

A few things can be learned in comparing the bond's yield to maturity and current yield. If the yield to maturity is greater than its current yield then the bond is selling at a discount less than par. If the yield to maturity is less than its current yield then the bond is selling at a premium above par. Finally, if the yield to maturity is equal to its current yield, then the bond is selling at par. Yield to maturity can be found using the following formula (Strategic CFO, 2021):

Bond Price = Coupon Payment * 1/YTM (1 – (1/((1+YTM)^Time Periods)) + Future Value/((1 + YTM)^Time Periods)

Because calculating yield to maturity is such a complicated algebraic process, yield to maturity is often estimated using a bond yield table or using a financial calculator. A financial calculator permits the user to define four out of five of the relevant variables, to wit; purchase price, face value, length to bond maturity, coupon payment amount, and yield to maturity (Strategic CFO, 2021). The yield to maturity of a bond is important because it represents the annual rate of return for the entire life of the bond

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