21. Investing 4: Understanding Bonds

Introduction

The purpose of an investment portfolio is to help individuals and families meet their financial goals. These goals differ from person to person and change over time. For example, a student who recently graduated will have different goals than an executive who is near retirement.

In the previous chapter, you learned about stocks and how they fit into an investment portfolio. Some investors find that they need a portfolio that provides more immediate income and greater safety than a portfolio composed mainly of stocks and stock mutual funds can provide. One way to accommodate these needs for increased income and safety is to add bonds to a portfolio. This chapter will discuss some basic, helpful information about bonds.

Objectives

When you have completed this chapter, you should be able to do the following:

A. Explain the benefits, risks, terminology and types of bonds
B. Understand how bonds are valued and the costs of investing in bonds
C. Understand plans and strategies for bonds.

Explain the Benefits, Risks, Terminology and Types of Bonds

Bonds are a form of debt, and they are generally issued for longer than one year. Bonds are sold by national and local governments, municipalities, companies, and other institutions. When you buy a bond, you are lending money to the institution that is selling the bond. The seller of the bond agrees to repay the principal amount of the loan when the bond reaches maturity. For interest-bearing bonds, the seller also agrees to pay interest periodically, as specified in the loan contract.

Bonds are an important component of most investment portfolios. Bonds reduce the overall risk of a portfolio by introducing diversity. They also produce steady current income—income that investors receive each month. Bonds are relatively safe investments if they are held to maturity because it is possible to calculate exactly how much interest they will earn. Bonds are lower-risk investments than stocks; however, the returns on bonds are lower as well. Bonds are attractive options when the market anticipates lower interest rates. As interest rates drop, the value of existing bonds rises.

Although there are many advantages to investing in bonds, there are also several disadvantages. Bonds are less liquid than other types of assets: an investor may not be able to find a buyer or

seller for a bond. Another disadvantage is that bonds are often sold in large amounts—amounts that are larger than most investors can afford to invest. Bonds may also be "called," which means that the issuing company may force you to redeem your bond before you had planned to redeem it. This generally happens when current market interest rates are lower than market interest rates were when the company issued the bonds. The company will call the bonds and reissue new bonds at lower rates, which will save the company money on interest. Additionally, it may be difficult to find a good investment outlet for the interest yielded from your bonds, particularly if interest rates are declining.

Bonds and Risk: All Risk Is Not Equal

Bonds are susceptible to a number of risks, including the following:

Interest-rate risk. Interest rates may rise or fall at any time, resulting in a decline or increase in a bond's value. Rising interest rates require that future cash flows have a higher rate of return. Since future cash flows are fixed in bonds, the principal value of the bond must be decreased to compensate for a higher required return.

Inflation risk. A rise or decline in inflation may result in an increase or decrease in the value of a bond. For most bonds, a higher rate of inflation results in a less valuable bond. The inverse of this situation is also true.

Company risk. The bond price may rise or decline because of problems with the company that is offering the bond. The better the future prospects for a company, the lower the required rate of return by investors and the higher the present value of a bond. The inverse of this situation is also true.

Financial risk. Whether or not a company is viewed as a financial risk has the potential to affect the performance of the company's bonds. Companies whose cash flows are sufficient to meet their financial obligations are considered less risky and can usually borrow money at lower rates of interest; hence, these companies may have lower interest costs and likely higher earnings. The inverse is also true.

Liquidity risk. Investors take the risk that they may not be able to find a buyer or seller for a bond when they need one. Sometimes liquidity is related to current market conditions as well as the company's financial statements.

Political or regulatory risk. Unanticipated changes in the tax or legal environment may have an impact on a company. Since taxes and the legal environment affect the outlook for a company, any regulatory changes that improve a company's long-term prospects will generally result in a higher price for that company's bonds. The inverse situation is also true.

Exchange-rate risk. Changes in exchange rates may affect profitability for international companies. As exchange rates strengthen, the cost of domestically produced goods that are sold

overseas increases. The inverse is also true.

Understand Bond Terminology

To understand bonds, you must first understand the language of bonds. Below is a list of important bond terminology.

Bond Basics

Holder. The investor who owns the bond.

Issuer. The corporation or government agency that issues the bond.

Price. The price for which the bond could be sold.

Indenture. A document that outlines the terms of the loan agreement.

Par value. The face value of the bond, or the amount returned to the bond holder when the bond reaches maturity.

Coupon interest rate (interest rate). The percentage of the par value that is paid to the bond holder annually in the form of interest.

Call provision. A provision that allows the issuer to repurchase a bond before its maturity date. The price at which the bond may be repurchased is set in the indenture.

Deferred calls. A specification stating that call provisions cannot be exercised for a number of years. Deferred calls provide protection for the holder of the bond.

Redemption. The process of cashing in a bond.

Sinking fund. Money that is set aside annually by the issuer to pay off the issuer's bonds when they reach maturity.

Current yield. The total annual interest payment on a bond divided by the bond's current or market price.

Debt obligation. A term that is interchangeable with the term "bond."

Bond Maturity

Maturity date. The date on which the bond expires and the issuer must pay back the loan.

Short-term bond. A bond that matures in one year or less.

Intermediate-term bond. A bond that matures in 2 to 10 years.

Long-term bond. A bond that matures in 10 or more years.

Types of Bonds

Asset-backed bond. A bond from an issuer whose bonds are backed or collateralized by loans, leases, personal property, or receivables, but not real estate.

Bearer bond. A bond with an attached coupon that allows the bearer to claim interest payments upon surrender of the coupon.

Book-entry bond. A bond that is registered and stored electronically (similar to stocks).

Collateralized mortgage obligations (CMO). More complex, specialized versions of mortgage-backed bonds.

Debenture. A bond that is backed by the credit of the issuer and has no specific security or collateral.

Discount bond. A bond that is sold at less than its principal value or at a discount to its par value.

Junk bond (high-yield bond). A bond with a very low (or risky) bond rating, a higher interest rate, and a higher default rate. Junk bonds are almost always callable.

Mortgage-backed bond. A bond that is backed by a pool (portfolio) of mortgages that are carried by the issuer.

Zero-coupon bond. A discount bond that does not allow for a coupon payment and pays no interest until maturity.

Bonds with Conditions

Callable bond. A bond where the issuer can force the investor to redeem this type of bond before the bond's maturity date.

Convertible bond. A bond that gives the holder the option of converting the bond into company stock instead of obtaining cash repayment.

Floating-rate bond. A bond in which interest payments fluctuate according to a specific benchmark for interest rates and that varies with short-term interest rates.

Subordinated bond. A bond that will be paid only after the issuer's other loan obligations have been paid in the event of financial distress.

Bond Ratings

Bond rating. A measure of the default risk associated with a company's bonds. Ratings are done by a bond-rating company and may range from AAA for the safest bonds to D for the riskiest bonds. In general, the better the bond rating, the lower the interest rate the company will have to pay on its bonds.

Default risk. The risk that a company will be unable to repay a bond.

Bond-rating company. A private-sector company that evaluates the financial condition of a company that issues bonds—factors include the company's revenues, profits, and debts. Bond-rating companies usually rate only issues of companies and sovereign issuers that offer corporate and municipal bonds.

Downgrade. A situation in which a bond-rating company reduces the bond rating of a particular issue, usually because of a company's deteriorating financial condition. If a bond rating is downgraded, it is likely that investors who own the company's bonds will have to reduce the price of their bonds (resulting in a lower return for the holder and a higher yield for the issuer) to make up for the increased risk if the investor wants to sell.

Upgrade. A situation in which a bond-rating company improves the bond rating of a particular bond, usually because of a bond-issuing company's improving financial condition.

Describe the Major Bond Categories

While there are many different types of bonds, most can be grouped into one of six major categories: corporate bonds, U.S. Treasury debt securities, municipal bonds, agency bonds, international bonds, and U.S. Treasury savings securities. I will address the eight key areas for each of these types of bonds: issuer, par value, taxes, risk and return, ratings, trading, and call provisions.

Corporate Bonds

There are three main types of corporate bonds: secured corporate bonds, unsecured corporate bonds or debentures, and secured debt. Secured corporate bonds are bonds backed by company collateral, a mortgage, or other lien. Unsecured corporate bonds or debentures are bonds not backed by specific collateral, although the holder has the claim of a general creditor. These bonds are more risky; therefore, companies must pay a higher return on these bonds to sell them. Secured debt is debt that has claim on specific assets in the event of a default. The list below summarizes characteristics of corporate bonds:

Issuer: U.S. corporations.

Par value: $1,000 and greater.

Maturity: Varying. Generally, the maturity length on short-term corporate bonds ranges from 1 to 5 years, intermediate-term corporate bonds typically mature after 6 to 10 years, and long-term corporate bonds typically mature after 11 or more years.

Taxes: Corporate bonds offer no tax advantages to the holder and are subject to federal, state, and local taxes.

Risk and return: Riskier than government bonds, but they offer higher returns.

Ratings: Corporate bonds are generally rated by one or both of the major bond-rating companies (Standard & Poor's and Moody's).

Trading: May be purchased by brokers, either over the counter (OTC) or through an organized exchange.

Call provision: May be callable.

U.S. Treasury Debt Securities

The U.S. Treasury issues three main types of debt securities: Treasury bills, Treasury notes, and Treasury bonds. Treasury bills are short-term debt obligations; these bonds are issued at a discounted price and may be redeemed at par value upon maturity in 3, 6, or 12 months. Treasury notes are intermediate-term debt obligations that are issued at or near par value; interest is paid semiannually on Treasury notes. Treasury bonds are long-term debt obligations that are issued at or near par value; interest is paid semiannually on Treasury bonds. The list below summarizes characteristics of U.S. Treasury debt securities:

Issuer: The U.S. government.

Par value: Treasury notes are issued in amounts ranging from $1,000 to $5,000, and Treasury bonds are issued in amounts ranging from $10,000 to $1,000,000.

Maturity: Maturity length for U.S. Treasury debt securities ranges from three months (for Treasury bills) to more than 30 years (for Treasury bonds).

Taxes: Exempt from state and local taxes but not federal.

Risk and return: U.S. Treasury debt securities are government securities, so they are considered default-risk-free. However, because the risk on these bonds is lower, the returns are also lower.

Ratings: U.S. Treasury debt securities are issued by the federal government; therefore, they are not rated.

Trading: Newly issued bonds are traded at auction at the Federal Reserve. Outstanding

bonds are traded by brokers over the counter.

Call provision: U.S. Treasury debt securities are generally not callable.

Municipal Bonds

There are two major types of municipal bonds ("munis"): revenue bonds and general obligation bonds. Revenue bonds are backed by the revenues of a specific municipal project. General obligation bonds are backed by the taxing power of the issuer. The list below summarizes characteristics of municipal bonds.

Issuer: State and local governments.

Par value: $5,000 and greater.

Maturity: Varying. Generally, short-term municipal bonds mature in 1 to 5 years, intermediate-term municipal bonds mature in 6 to 10 years, and long-term municipal bonds mature in 11 or more years.

Taxes: Exempt from federal taxes but not necessarily from state and local taxes. Municipal bonds may be exempt from state and local taxes if the holder lives in the state where the bond was issued.

Risk and return: Returns may be higher than those on government bonds to compensate for increased risk, as government bonds are essentially default-free. However, returns are generally lower for municipal bonds than corporate bonds because municipal bonds are exempt from federal taxes.

Ratings: Most are rated by bond-rating companies.

Trading: Traded through brokers and over the counter.

Call provision: Sometimes callable.

Agency Bonds

Agency bonds (agencies) are issued by various federal, state, and local agencies that are authorized by Congress to do so. Examples of agencies that are authorized to sell bonds include the Federal National Mortgage Association (FNMA, also called Fannie Mae), the Federal Home Loan Mortgage Corporation (FHLMC, or Freddie Mac), and the Government National Mortgage Association (GNMA, or Ginnie Mae). The list below summarizes the characteristics of agency bonds.

Issuer: Various federal, state, and local agencies. These institutions have all received congressional authorization to sell agency bonds.

Par value: Generally issued in amounts of $25,000 and greater. Agency bonds usually require a higher minimum investment than other types of bonds do.

Maturity: Varying. Generally, short-term agency bonds mature in 1 to 5 years, intermediate-term agency bonds mature in 6 to 10 years, and long-term agency bonds mature in 11 or more years.

Taxes: Agency bonds offered by Ginnie Mae, Fannie Mae, and Freddie Mac are taxable.

Risk and return: Agency bonds are only somewhat more risky than Treasury bonds and consequently pay higher returns.

Ratings: Some agency bonds are rated by bond-rating companies.

Trading: Traded through brokers and over the counter but also directly through banks.

Call provision: Not callable.

International Bonds

There are three types of international bonds: international bonds, Yankee bonds, and Eurobonds. International bonds are issued by international companies and sold in various countries and currencies. Yankee bonds are issued by international companies and sold in the United States in U.S. dollars. Eurobonds are issued by U.S. companies and sold outside of the United States in U.S. dollars. The list below summarizes characteristics of international bonds.

Issuer: U.S. or international corporations.

Par value: $1,000 and greater. The par value may be in different currencies.

Maturity: Varying. Generally, short-term international bonds mature in 1 to 5 years, intermediate-term international bonds mature in 6 to 10 years, and long-term international bonds mature in 11 or more years.

Taxes: Subject to federal, state, and local taxes. Depending on where they are issued, international bonds may also be subject to foreign taxes.

Risk and return: Risk and return varies depending on the type of international bond. International bonds may be more risky than government and corporate bonds, depending on the issuer. However, they typically offer higher returns than those offered by corporate bonds because investors may also be susceptible to exchange rate or currency risk.

Ratings: Bond-rating companies rate both U.S. companies and large international companies.

Trading: International bonds are either traded by brokers over the counter or in an exchange. These bonds may also be traded in domestic bond markets of foreign countries, as well as in the Euromarkets (markets outside the United States where securities are traded in U.S. currency).

Call provision: Sometimes callable.

U.S. Treasury Savings Securities

U.S. Treasury savings securities come in many forms: the most common types are EE bonds and I bonds. EE and I bonds are sold at face value, and interest is paid at maturity. Both securities have variable interest rates. The list below summarizes characteristics of U.S. Treasury savings securities.

Issuer: The U.S. government. These bonds are not marketable (i.e., they cannot be resold to others), but they can be redeemed at local banks.

Par value: Issued in amounts of $25, $50, $100, $1,000, and $10,000. They can be purchased online at www.treasurydirect.gov without transactions costs.

Maturity: U.S. Treasury savings securities that are redeemed within five years usually charge a three-month interest penalty. Investors can hold U.S. Treasury savings securities for up to 30 years.

Taxes: U.S. Treasury savings securities are registered as bearer bonds, which are exempt from state and local taxes. Another benefit of this type of security is that the interest is completely tax-free if it is used to pay for qualified educational expenses. Other taxes are deferred until maturity.

Risk and return: Minimal risk. The return on EE bonds is variable and changes every six months. The return on I bonds is also variable: the rate of return changes every six months to account for a guaranteed return over inflation for six months, as well as a real-return component. The real-return component is a guaranteed return amount over and above the return on inflation.

Ratings: Not rated because they are government securities.

Trading: Cannot be traded. They can be purchased online and can be redeemed at local banks.

Call provision: Not callable.

Explain How Bonds Are Valued and the Costs of Investing in Bonds

Bonds are valued in a number of ways. Generally, the value of a bond is determined by the

present value of the bond's cash flow, which includes periodic interest payments and the repayment of principal. Three key factors affect a bond's price: the par value, the market interest rate and length of maturity, and the investor's discount rate.

Par Value

When a bond is sold for less than its par value, it is being traded at a discount; when a bond is sold for more than its par value, it is being traded at a premium. The terms "premium" and "discount" in this situation refer to the bond's current market value. For example, suppose the market interest rate is four percent and the coupon interest rate on a bond is six percent. Because this bond pays more interest than the market average, investors will be willing to pay a higher price for this bond; thus, the bond will trade at a premium.

Market Interest Rate and Maturity

A bond's value fluctuates according to changes in the market interest rate. A bond's coupon interest rate and par value are fixed over the life of the bond. If the market interest rate increases, the value of the bond will decrease because investors will require a higher return on the bond to make up for the fact that coupon payments are lower than the market return rate. Investors will pay less for the bond to make up for the lower expected return. If the market interest rate decreases, the value of the bond will increase.

The price of a bond is also affected by the bond's maturity length. The longer a bond takes to mature, the greater the impact of fluctuations in the market interest rate.

Investor's Required Rate of Return and Price

The value of a bond is related to the investor's required rate of return, which is the rate of return an investor requires to hold or invest in a bond. If the investor's required rate increases, the investor will require a higher rate of return on all cash flows. Since the interest rate on bond coupons is generally fixed, the only way an investor can increase a bond's cash flow is by paying a lower price for the bond. The less an investor is willing to pay for a bond, the more the value of the bond decreases. The reverse is also true. An investor's required rate of return can change for many reasons:

The investor perceives a change in the risk associated with the issuer of the bond. As perceived risk of an issuer increases, investors require a higher discount rate to invest in the issuer's bond.

The investor perceives a change in the general market interest rate. As the market interest rate increases, investors require a higher discount rate to invest in any bond.

The investor perceives a change in overall market risk. As the perceived riskiness of the market increases, investors require a higher discount rate to invest in all asset classes.

Note that the investor's discount rate will vary from one investor to another.

Bond Yields

The bond yield is the total return on a bond investment; it is not the same as the coupon interest rate. The bond yield is affected by the bond price, which may be more or less than par value. The bond yield can be calculated in many ways; however, three common ways to calculate it are the current yield, the yield to maturity, and the equivalent taxable yield.

Current yield is the total annual interest payment divided by the bond's current market price.

Yield to maturity is the promised yield the holder receives if the bond is held to maturity; when this yield is calculated, it is assumed that all interest payments can be reinvested at the same interest rate as the coupon rate. Since this calculation involves cash flow, it is best solved with a financial calculator.

Equivalent taxable yield (ETY) is the yield you must receive from a taxable security to get the same return you would make on a tax-advantaged security. To solve for the equivalent taxable yield, use the following formula:

ETY = tax-free yield / (1 – marginal tax rate)

Remember, the marginal tax rate is a combination of both state and local taxes. To effectively calculate after-tax returns, you must know the tax benefits of each type of bond (for example, you must know that municipal bonds are free from federal taxes, and Treasury debt securities are free from state and local taxes). For help with calculating after-tax returns and equivalent taxable yields, see After-Tax, ETY, and Other After-Inflation Returns (LT26).

There are a number of costs you should be aware of before you invest in bonds. The costs of investing in bonds can be divided into three categories: explicit costs, implicit costs, and hidden costs.

Explicit Costs

Explicit costs are the costs you see (or should see) on your brokerage account statement. These costs include commission costs, markup, and custody fees.

All bond trades incur commission costs, which are fees that are paid to the broker who arranged a purchase or trade. Some newly issued bonds may be sold to the investor without commission costs if the issuer absorbs the commission costs; however, most trades incur commission costs. Costs can either be fixed (e.g., $15 per trade) or a percentage of the purchase or sale amount (e.g., 15 basis points, or .15 percent of the trade).

Custody fees (annual fees) are charged by the brokerage house to hold bonds in your account. These fees may be a specific amount for small accounts (e.g., $15 per year). For larger accounts, the custody fee may either be assessed as a specific charge per holding (e.g., 8 basis points per security, or .08 percent) or a percentage of your assets (e.g., 25 basis points per security).

Implicit Costs

Implicit costs are those you may not see until months after you sell a security. The most common implicit cost is taxes. It is critical that you account for taxes when you are valuing the true return of your portfolio. Implicit costs such as taxes are not noted on your monthly report, and most investors do not think about them until they have to pay them. Understand taxes before you begin paying them.

The interest you receive from bonds each period is taxed at your ordinary income rate. Interest is an expensive type of income.

The amount of your capital gains is equal to the difference between what you paid for a bond, or the principal, and what you sold the bond for. In other words, capital gains are the difference between what you paid for a bond and the par value of that bond if it is held to maturity. Short-term capital gains are made when you sell bonds you have owned less than one year, and they are taxed at your marginal tax rate. Long-term capital gains are made when you sell bonds you have held for more than one year. Long-term capital gains are taxed at between 0 and 27.6 percent, depending on your income level and how long you have held the bond (see Figure 1).

Hidden Costs

In addition to understanding explicit and implicit costs, you should be aware of the hidden costs involved in investing in bonds, including the following:

Account transfer fees: Costs for moving assets in or out of an existing account.

Account maintenance fees: Fees for maintaining your account.

Inactivity fees: Fees for not having any account activity over a certain period of time.

Minimum balance fees: Feeds for failing to maintain the required minimum balance in your account. Make sure you know what the minimum balance on your account is.

Interest on margin loans: Interest charged on money you borrow to buy securities.

Selling charges (loads): Commissions paid to a broker for helping you purchase certain securities, mainly load mutual funds.

Understand Plans and Strategies for Bonds

Following are a few ideas for your plans and strategies for bonds and bond mutual funds. These will be include in your Investment Plan. The numbers refer to specific parts of your Investment Plan (LT05A).

Plans and Strategies for Bonds
Overall Investment Plan

- We will invest in bonds/bond funds which are great at doing what they do well, adding stability to the portfolio
- We will always have a diversified portfolio that includes bonds, realizing that bonds generally will not give us the returns needed to grow your portfolio much above inflation
- We will compare our bond/bond funds to the Barclay's Aggregate Index (or other bond benchmark of your choice). Note that there are different benchmarks for the different bond asset classes, i.e., short-term, intermediate-term, long-term bonds, treasuries, etc.

General Investing

- While risk of individual bonds can be high, we will reduce that risk considerably by buying no-load and low cost bond mutual/index funds with different maturities
- We will invest at our risk level, which is doable due to the many different types of bonds and bond asset classes
- As we get closer to retirement, we will increase our allocation to bonds as they offer more stability of principle and income, and are generally less volatile than equities
- We will follow the principles of successful investing.

Summary

Some investors find that they need a portfolio that provides more current income and greater safety than a portfolio composed mainly of stocks and stock mutual funds can provide. One way to accommodate these needs for increased income and safety is to add bonds to a portfolio.

Bonds are a form of debt, and they are generally issued for periods of time longer than one year. When you buy a bond, you are lending money to the institution that is selling the bond. The seller of the bond agrees to repay the principal amount of the loan when the bond reaches maturity. For interest-bearing bonds, the seller also agrees to pay interest periodically, as specified in the loan contract.

Bonds are an important component of most investment portfolios. Bonds reduce the overall risk of a portfolio by introducing diversity. They produce steady current income—income that investors receive each month. This steady stream is important to some investors, depending on their current needs. Bonds are lower-risk investments than stocks; however, the returns on bonds are lower as well. Bonds are attractive options when the market offers low interest rates. As interest rates drop, bond values rise.

While there are many different types of bonds, most bonds can be grouped into one of six major categories: corporate bonds, U.S. Treasury debt securities, municipal bonds, agency bonds, international bonds, and U.S. Treasury savings securities.

Bonds are valued in a number of ways. Generally, the value of a bond is determined by the price an investor is willing to pay for the bond. Three key factors affect a bond's price: the par value, the market interest rate and length of maturity, and the investor's discount rate.

Assignments

Financial Plan Assignments

Continue to work on your Investment Plan. As you do, it your assignment is to review the history of both short-term and long-term bonds over the past 5, 10, 25, 50, and 75 years. How have bonds performed overall? What do bonds add to a portfolio? What disadvantages do bonds have? How can you minimize the disadvantages of bonds, while at the same time enjoying the advantages bonds offer?

Benchmarks: What are the major benchmarks or indexes that correspond with bonds? (See Possible Benchmarks for Investment Plans (LT15). It is likely you will include bonds in your diversified portfolio, so it is important you select the major benchmarks you will follow to help you understand how bonds perform.

Volatility: Generally, investors consider bonds less risky than stocks. To graphically see the volatility of bonds versus other asset classes, open Expected Return Simulation and Benchmarks (LT27). Go to the *Asset Class Data* tab and use the light-blue drop-down boxes to select your asset classes (or you can just use the asset classes listed). Use the dark-blue drop-down boxes to select your time period. Then go to the *Charts* tab. Push the *F9* button to see the impact of standard deviation.

This worksheet builds random portfolios with the expected return and standard deviation of the period and asset class chosen. It then assumes that each asset class builds 10 different portfolios and that those portfolios are run for 20 years. The differences between the 10 different portfolios are shown in the same colored lines. The more the lines move together, i.e., the more each of the random portfolios move together, the less risky or less volatile the asset class. The more the same colored lines diverge, the more risk or more volatile the asset class.

Returns: To see what the returns have been for various types of bonds, go to Expected Return Simulation and Benchmarks (LT27)**.** Go to the tab labeled *Returns and Risk*. Look for the 1-, 5-, 10-, 25-, 50-, 75- and 85-year returns for Treasury bonds (long-term government bonds with maturity of more than 10 years) and Treasury bills (short-term government bonds with maturities less than one year). How have these assets performed compared to equity or stock returns?

Learning Tools

The following Learning Tools may be helpful as you prepare your Personal Investment Plan:

Possible Benchmarks for Investment Plans (LT15)
: This document shows possible benchmarks for most of the major asset classes.

Historical Return Simulation for Asset Classes (LT23)
: This spreadsheet shows the impact of various investment strategies and the volatility for different asset classes. This spreadsheet will also show you the historical impact of different asset allocation decisions for several asset classes.

After-Tax, ETY, and Other After-Inflation Returns (LT26)
: This spreadsheet calculates the after-tax return, equivalent taxable yield, and after-inflation return on various assets.

Expected Return Simulation and Benchmarks (LT27)
: This spreadsheet shows a historical perspective on returns and standard deviation (risk) for the major asset classes over the last 1, 5, 10, 25, 50, 75, and 85 years. The spreadsheet also includes recommended benchmarks for some of the major asset classes.

Review Materials

Terminology Review

Account maintenance fees. These are fees for maintaining your account.
Account Transfer Fees. These are charges for moving assets either into our out of an existing account.
Agency bonds. Bonds issued by government agencies which were authorized by Congress including the Federal National Mortgage Association (FNMA), Federal Home Loan Banks (FHLB), and Government National Mortgage Association (GNMA).
Asset backed bonds. Bonds backed by specific holdings of the issuing company, such as equipment or real estate.
Baby bonds. A bond with a par value of less than $1,000.
Bearer bonds. Bonds with coupons attach that pay interest only to the bearer upon surrender of the coupons.
Bond rating companies. A private sector company that evaluates the financial condition of the bond issuing company, its revenues, profits, debt, and other critical areas, and gives the company a rating which indicates the relative safety of the bond. They only rate corporate and municipal bonds. They include: Standard & Poor's, Moody's, and Fitch's.
Bond ratings. Bond ratings are measures of the riskiness of a company. Ratings run from "AAA" (Standard & Poor's) or "aaa" (Moody's) for the safest to "D" for the extremely risky. Ratings categorize bonds by default risk, the risk of the company being unable to repay the bond
Book-entry bonds. Bonds which are registered and stored electronically, similar to stock purchases.
Business risk. Risk that the bond's value will decline due to problems with the company's business.

Call provision. A provision that allows the issuer to repurchase the bonds before the maturity date. Deferred calls provide more protection.
Callable bonds. Bonds which can be called, i.e. redeemed, before maturity at the option of the issuer.
Capital Gains. This is the difference between what you paid for the bond and what you sold it for, or the par value if you held the bond to maturity.
Collateralized mortgage obligations (CMOS). More complex and specialized versions of mortgage backed bonds.
Commission costs. These are the cost associated with trading of bonds. While all bond trades incur commission costs, some newly issued bonds are sold without commission cost as the issuer absorbs the costs. Most trades however, incur commission costs, which are paid to the broker who arranged the trade.
Convertible bond. Bond which gives the holder the right to convert the bond to company stock instead of getting the cash repayment.
Corporate Bonds. Bonds secured corporate debts by collateral or real property liens.
Coupon interest rate (or interest rate). The percentage of the par or face value that will be paid annually to the holder in the form of interest.
Current Yield. It is the ratio of annual interest payments to the bond's market price.
Custody (or annual) fees. These are fees the brokerage house charges to hold the bonds in your account. May be a minimum amount for small accounts ($15 per year), a specific charge per holding (8 basis points per security), or a percentage of assets for large accounts (25 basis points on assets under management)
Debenture. A long-term unsecured bond. It can have a hierarchy of payment, with unsubordinated and subordinated debentures. These are bonds backed by the credit of the issuing company.
Discount bonds. A bond that is sold at a discount to its par value. Generally, upon maturity the accrued interest and original investment add to the bond's par value.
Downgrade. A situation where a bond rating company reduces the bond rating of a bond generally due to a deterioration in the company's financial condition.
Equivalent taxable yield (ETY). This is the yield that must be offered on a taxable bond to give the same after-tax yield on a tax-exempt bond.
Euro Bonds. Bonds issued by U.S. companies and sold outside of the U.S. in U.S. dollars.
Exchange rate risk. Risk that changes in exchange rates will impact profitability for firms working internationally.
Financial risk. How the firm raises money could affect the financial performance of the firm and the value of the bonds.
Floating rate bond. Bond whose interest payments fluctuate according to a specific benchmark interest rate.
General Obligation bonds. Bonds backed by the taxing power of the issuer.
Inactivity/Minimum balance fees. These are fees imposed because you did not trade or have account activity during the period or because you failed to keep a minimum balance in your account.
Indenture. A document that outlines the terms of the loan agreement.
Inflation risk. Risk that a rise (decline) in inflation will result in a decrease (increase) in the bond's value.
Interest rate risk. Risk that a rise (fall) in interest rates will result in a decline (rise) in the bond's value.

Interest. Interest is the coupon payment received each period. These are taxed at your marginal tax (MTR).
Intermediate-term bonds. Bonds with a maturity of 2 to 10 years.
International Bonds. Bonds issued by international companies and sold internationally in various currencies.
Issuer. The corporation or government agency that issues the bond.
Junk Bonds. Bonds with very low bond ratings, a higher interest rate and default rate, and are almost always callable.
Liquidity risk. Risk that investors will be unable to find a buyer or seller for a bond when they need to sell or buy.
Long-term bonds. Bonds with a maturity of greater than 10 years.
Long-term Capital Gains. These are gains made in selling bonds held for more than 1 year. These are taxed at 0-20% depending on how long you have held the assets and your taxable and adjusted gross income.
Markup. This is the difference between the buying price and the calculated selling price.
Maturity date. The date when the bond expires and the loan must be paid back.
Mortgage-backed bonds. Bonds backed up by a pool of mortgages.
Par value. The face value or amount returned to the holder of the bond at maturity.
Political or regulatory risk. Unanticipated changes in the tax or legal environment will have an impact on a company's bonds.
Price. The price that the bond sells for.
Redemption. The process of redeeming a callable bond before its maturity date.
Revenue bonds. Bonds backed by the revenues of a specific project.
Risk of Downgrading. Should a bond's rating be downgraded, the seller would need to reduce the price of the bond (resulting in a lower yield to the seller and a higher yield to the buyer) to make up for the increased risk.
Short-term bonds. Bonds with maturity usually a year or less.
Short-term capital gains. These are gains made in selling bonds owned less than 1 year. They are taxed at your MTR.
Sinking fund. Money set aside annually to pay off the bonds at maturity.
Subordinated bond. Bond that will be paid after the other loan obligations of the issuer are paid.
Taxes. Taxes must be taken into account to get the true return of your portfolio but which are not noted on your monthly reports.
Term or Bond Maturity. The maturity of the bond.
Treasury Bills. A short-term debt obligation issued at a discount and redeemed at face value upon maturity in 3, 6, or 12 months.
Treasury Bonds. A long-term debt obligation issued at or near par and interest is paid semiannually.
Treasury Notes. An intermediate-term debt obligation issued at or near par and interest paid semiannually.
Unsecured corporate debts. Bonds not secured by collateral, and pay a higher return.
Upgrade. A situation where a bond rating company improves the bond rating of a bond due generally to an improving financial condition.
US Savings EE Bonds. Savings bonds issued by the US government that pay a fixed rate of interest with is reset every 6 months.
US Savings I bonds. Bonds issued by the U.S. government, and tax deferred until maturity. They are not marketable, but can be redeemed from local banks. bonds sold at face value, with interest

paid at maturity, with the interest rate set to inflation with a fixed component.
Yankee Bonds. Bonds issued by international companies and sold in the U.S. in U.S. dollars.
Yield to Maturity. This is the true yield received if the bond is held to maturity, which assumes that all interest payments can be reinvested at the same rate as the bond itself.
Yield. The annual interest on a bond divided by its price.
Zero-coupon bonds. A discount bond which pays no interest until maturity.

Review Questions

1. How do bonds reduce the overall risk of a portfolio?
2. What seven risks are bonds susceptible to?
3. What is a bond rating? What does a high rating mean? What is Standard & Poor's highest bond rating? Lowest bond rating?
4. What are the six major categories of bonds?
5. How are bond values determined? What three things affect bond prices?

Case Studies

Case Study 1

Data

Bill is considering purchasing a bond with a 5 percent coupon interest rate, a par value of $1,000, and a market price of $990. The bond will mature in nine years.

Calculations

A. What is the bond's current yield?
B. Calculate the bond's yield to maturity using your financial calculator.

Case Study 1 Answer

Excel Financial Calculator (LT12)		
The Interest Rate is 5.14%		
Present Value =	PV	($990)
Years/Periods* =	N	9.00
Payments/Year =	P/Yr	1
(Compounding: Ann. = 1, Mon. = 12, Qrtly. = 4)		
Annual Interest =	I_{real}	5.14%
Ann. Nom. Rate =	I_{nom}	5.14%
Ann. Inflation =	I_{infl}	
1 Period Rate =		5.14%
Future Value =	FV	$1,000
Payments =	PMT	$50.00

A. The bond's current yield is the annual interest payments divided by the market price. The annual interest payments are the coupon interest multiplied by the par value—0.05 * 1,000, or $50. The price of the bond is $990, so the yield is $50 / $990, or 5.05%.
B. To calculate the yield to maturity, first clear the memories of the calculator and set it to annual payments. Set your present value as negative, what you would pay for the bond (PV = –990), your interest payments as your payment (PMT = 50), your future value as your par value (FV = 1,000), and your number of years as nine (N = 9). Then solve for your interest rate (I = 5.14%).
Note: Since Bill paid less for the bond than par, and his coupon interest rate was 5 percent, this would increase his YTM above your coupon interest rate.

Case Study 2

Data

Three friends—Kimberly, Natalie, and Clinton—are from Nevada, where there is no state income tax. They have asked you to determine the equivalent taxable yield on a municipal bond. This municipal bond is from the same state as your friends and is exempt from state and local taxes for interest. The bond's coupon yield is 3.75 percent with five years left until maturity, and it is selling at par. Kim is in the 15 percent tax bracket, Natalie is in the 28 percent tax bracket, and Clinton is in the 35 percent tax bracket. Calculate the equivalent taxable yield for your three friends.

Calculations

Assuming a similar AAA corporate bond yields 5.0 percent, which of your friends should purchase the municipal bond?

Case Study 2 Answers

Kimberly is in the 15% federal marginal tax bracket, so the equivalent taxable yield is 4.41%, or 3.75% / (1 – .15).

Natalie is in the 28% federal marginal tax bracket, so the equivalent taxable yield is 5.21%, or 3.75% / (1 – .28).

Clinton is in the 35% federal marginal tax bracket, so the equivalent taxable yield is 5.77%, or 3.75% / (1 – .35).

Assuming a corporate bond yields 5.0%, only Kimberly should purchase the corporate bond.

Case Study 3

Data

You paid $1,000 for a Boston Scientific bond at the end of the previous year. At the end of last year, the bond was worth $1,050. You are in the 25 percent federal marginal tax rate, and you live in a state that has no state income tax. Over the course of last year, you received $40 in coupon interest payments.

Calculations

A. What was your before-tax return for the bond?

B. What is your after-tax return, assuming you did not sell the bond?

Case Study 3 Answers

Calculations

A. You only pay taxes on realized income, not unrealized income. Your before-tax return is:

($1,050 – 1,000 + 40) / 1,000, or 9.0%

B. Your after-tax return would include the unrealized capital gains and the interest after you paid taxes. Since this is interest income, it is taxed at your marginal tax rate of 25% (there is no state tax). The after-tax return is:

(1,050 – 1,000 + [40 * (1 - .25)]) / 1,000 = 8.0%.

Of the $40 coupon, you pay $10 in taxes and keep the remaining amount.