

investments, we will discuss indirect investing at the end of this section. Direct investment can be divided by the time horizon of the investment. Investments in debt that have a life of less than one year are usually called *money market instruments*. These can be further divided according to whether the money market instrument is issued by a government entity or a private entity. Investments with maturities of more than one year are generally called *capital market instruments*. The latter can be divided according to whether they are debt or equity instruments, and debt instruments can be further divided according to whether they are issued by a government entity or a private entity. The final category of financial assets we discuss is derivative instruments. They are called *derivative instruments* because their payoff depends on (is derived from) the price of one of the primary assets already discussed. We will now discuss each of these categories of financial assets in turn.

Money Market Securities

Money market securities are short-term debt instruments sold by governments, financial institutions, and corporations. The important characteristic of these securities is that they have maturities when issued of one year or less. The minimum size of a transaction in a money market instrument is typically large, usually exceeding \$100,000. In addition, some market securities that we will describe are not actively traded on exchanges. Given the minimum transaction size and the inactive trading of some securities, many individuals who wish to own these instruments will do so by holding a mutual fund (money market fund). These funds are discussed later in this chapter. The major money market instruments are listed in Table 2.1.

Table 2.1 Money Market Instruments

Treasury Bills
Repurchase Agreement (Repos or RPs)
LIBOR
Negotiable Certificate of Deposit (CDs)
Bankers Acceptances
Commercial Paper
Eurodollars

2

Financial Securities

This chapter is meant to introduce the reader to the principal financial instruments, their return characteristics, and the indexes that are used to represent their return. The nature of the material means that this chapter is much more descriptive than subsequent chapters. Those readers already familiar with financial instruments and the indexes that can be used to represent their return can skip to Chapter 3. Those readers who have had a prior finance course and are familiar with financial instruments but are not familiar with the principal indexes used to represent their returns can skip to the section in this chapter titled, "The Return Characteristics of Alternative Security Types." We can think of a *security* as a legal contract representing the right to receive future benefits under a stated set of conditions. There are a large number of financial securities. When you take out a mortgage on a house or lease a car, the contract you sign is a financial security. We are going to limit the set of financial securities we deal with by selecting primarily from among those that are traded in organized markets. In fact, Chapter 3 will focus on the nature of alternative market structures for the securities described in this chapter.

In the first section of this chapter, we will describe the characteristics of a broad sample of financial securities. In the second section, we will examine the performance of a representative sample of financial assets to begin to understand the relevant characteristics of different types of securities. Finally, we will discuss indexes that are used to represent the performance of classes of securities. This later material is included because in later chapters we will often discuss market performance. We will need an indication of performance, and will use one or more of the indexes described in this chapter.

TYPES OF MARKETABLE FINANCIAL SECURITIES

There are many ways to categorize financial securities. We have found it useful to use the scheme diagrammatically shown at top of next page.

An investor can choose to purchase directly any one of a number of different securities, many of which represent a different type of claim on a private or government entity. Alternatively, an investor can invest in an intermediary (mutual fund), which bundles together a set of direct investments and then sells shares in the portfolio of financial instruments it holds. Because indirect investing involves purchasing shares of bundled direct

Table 2.1 contains a long list of securities, and we do not intend to discuss each in detail. We will discuss three securities that play a large role in later analysis in this book and briefly summarize some general characteristics of the remaining securities.

Treasury Bills U.S. Treasury bills are the least risky and the most marketable of all money market instruments. They represent a short-term IOU of the U.S. federal government. While most money market instruments are sold in minimum denominations of \$100,000, Treasury bills (T-bills) are sold in minimum denominations of \$10,000. New T-bills are issued by the federal government at frequent intervals. New 91- and 182-day T-bills are issued weekly, whereas 52-week T-bills are issued monthly. An active secondary market with very low transaction costs exists for trading T-bills. T-bills are sold at a discount from face value (*face value* is the cash payment the investor will receive at maturity) and pay no explicit interest payments. The difference between the purchase price and the face value constitutes the return the investor receives.¹

Treasury bills play a special role in financial theory. Because they are considered to have no risk of default, have very short-term maturities, have a known return, and are traded in active markets, they are the closest approximations that exist to a riskless investment. The rate on 30-day Treasury bills will be used throughout the book to approximate the monthly riskless rate of interest.

Repurchase Agreements (Repos) A repurchase agreement is an agreement between a borrower and a lender to sell and repurchase a U.S. government security. A borrower, usually a government securities dealer, will institute the Repo by contracting to sell securities to a lender at a particular price and simultaneously contracting to buy back the government security at a future date at a specified price. The difference between the two prices represents the return to the lender. The maturity of a Repo is usually very short (less than 14 days) with overnight Repos being fairly common. Longer Repos exist and have been labeled "term Repos"; they frequently have maturities of 30 days or more. The institution on the opposite side of the Repo is said to have a reverse Repo. The party doing the reverse Repo contracts to buy a security at a particular price and to sell it back at a predetermined price and time.

Repos and reverse Repos play an important role in the pricing of derivative securities because they allow short positions to be taken in bonds. The ability to use Repos will be important in the type of arbitrage arguments made in future chapters.

Other Short-Term Instruments Although all short-term instruments are considered to have very low risk, they do tend to offer slight differences in returns according to the type and even specific institution that offers them. CDs (negotiable certificates of deposit) are time deposits with a bank. Bankers' acceptances are contracts by a bank to pay a specific sum of money on a particular date. Both instruments sell at rates which depend on the credit rating of the bank that backs them, although CDs are insured by the Federal Deposit Insurance Corporation up to a limit of \$10,000. Eurodollar and Eurodollar CDs are dollar-denominated deposits backed by a foreign bank or a European branch of an American bank. Because foreign banks are often subject to less regulation than U.S. banks, instruments issued by foreign banks usually carry larger interest payments than similar instruments issued by U.S. banks. Commercial paper is a short-term debt instrument issued by large well-known corporations, and rates are determined in part by the creditworthiness of the corporations.

In a later section of this chapter, we will use data on one-month Treasury bills to represent the behavior of money market instruments. Although this will serve as an example,

¹The pricing conventions on T-bills are described in Chapter 20 on bond pricing.

keep in mind that other money market instruments will offer different returns because of both differences in maturity and differences in the risk of the issuing institutions. For example, when oil prices dropped dramatically and Texas real estate prices quickly followed, the creditworthiness of Texas banks declined, and CDs in Texas banks sold at much higher yields than did average CDs.

Before leaving this section, we will discuss an important element of money markets that is not an instrument but rather a rate.

The London Interbank Offered Rate (LIBOR) LIBOR is the rate at which large international banks in London lend money among themselves. We single it out for special mention because it is used as a base rate for setting many types of longer-term loans even in the U.S. markets. Despite the fact that it is a rate between London banks, it is usually quoted for loans expressed in dollars. It is quite common to see longer-term debt instruments having rates that change periodically (and thus have some of the characteristics of shorter-term instruments). These changing rates are usually set at either the Treasury bill rate plus a fixed amount or the LIBOR rate plus a fixed amount.

Capital Market Securities

Capital market securities include instruments with maturities greater than one year and those with no designated maturity at all. The market is generally divided according to whether the instruments contain a promised set of cash flows over time, or offer participation in the future profitability of a company. The first sector is usually referred to as the Fixed Income Market, whereas the second is the Equity Market. Preferred stock, discussed last, is an instrument that has some of the characteristics of each of the other two types.

Fixed Income Securities Fixed income securities have a specified payment schedule. Most are traditional bonds and promise to pay specific amounts at specific times.² Usually this is in the form of prespecified dates for the payment of interest and a specific date for the repayment of principal. In almost all cases, failure to meet any specific payment puts the bond into default with all remaining payments (missed interest plus principal) due immediately. Fixed income securities differ from each other in promised return because of differences which include the maturity of the bonds, the creditworthiness of the issuer, and the taxable status of the bond. We will start by examining the safest type of fixed income securities, those offered by the U.S. federal government.³

Treasury Notes and Bonds The federal government issues fixed income securities over a broad range of the maturity spectrum. Debt instruments from 1 to 10 years in maturity are called *Treasury notes*. Debt instruments with a maturity beyond 10 years are known as *Treasury bonds*. Both notes and bonds pay interest twice a year and repay principal on the maturity date. One difference between Treasury bonds and notes is that some bonds are callable before maturity (most often during the last five years of the bond's life), while notes are not callable.⁴ Callability means that the government can force the holder of the bond to sell the bond back to the government at a fixed schedule of prices before maturity. For

²The pricing and management of fixed income securities is discussed in more detail in Chapters 20 and 21.

³One should be aware that the quoted price of a fixed income security is not what the investor pays to purchase the security, rather the investor pays the quoted price plus interest accrued since the last coupon payment.

⁴Treasury bonds issued after 1985 do not contain call provisions.

example, if a bond is callable at \$101, the government has the option of buying the bond back at \$101. The government would likely exercise the option when it benefits itself, and thus this is disadvantageous to the investor. Thus callable bonds have to offer the investor a higher return to compensate for the possibility of a disadvantageous call.

Treasury instruments are generally considered to be safe from default, and thus differences in expected returns are due to differences in maturity, differences in liquidity, and the presence or absence of a call provision.⁵

Federal Agency Securities and Municipal Securities Federal agency securities are issued by various federal agencies which have been granted the power to issue debt in order to help certain sectors of the economy. For example, the Farm Credit Banks make funds available for such things as research and short-term loans to farm cooperatives. Federal agency securities are often thought of as a close substitute for Treasury securities. Although they are not backed by the full faith and credit of the federal government, investors assume that the federal government would not allow an agency to default in its payments. However, the lack of an explicit guarantee from the federal government plus the fact that markets for agencies are frequently less liquid than markets for Treasury instruments has resulted in the agency instruments selling at slightly higher yields than Treasury notes and bonds.

Municipal Securities Municipal bonds are debt instruments sold by political entities such as states, counties, cities, airport authorities, school districts, and such, other than the federal government or its agencies. They differ from agency bonds in that they can (and in rare instances do) default and that their interest is exempt from federal and usually (within the state that issues them) state taxes. The principal types of municipal bonds are general obligation bonds, which are backed by the full faith and credit (taxing power) of the issuer, and revenue bonds, which are backed either by the revenues of a particular project (e.g., a toll road) or the particular municipal agency operating the project.

Because of the tax-exempt feature of municipal bonds, they sell at lower promised yields than nonmunicipal bonds of the same risk. To find an equivalent yield one must explicitly compare the discounted value of after-tax cash flows with before-tax cash flows. It is common practice to use the following approximation to the tax equivalent yield:

$$\text{Taxable equivalent yield} = \frac{\text{Tax-exempt municipal yield}}{1 - \text{Marginal tax rate}}$$

This approximation holds exactly only if municipal bonds sell at par, the treasuries they are being compared to sell at par, and the yield curve is flat. One must be particularly careful using this approximation for municipal bonds selling below par. While the interest payment on municipal bonds is tax exempt, capital gains are subject to taxation.

Corporate Bonds Corporate bonds are generally similar to government bonds in payment pattern. They promise to pay interest at periodic intervals and to return principal at a fixed date. The major difference is that these bonds are issued by business entities and thus have a risk of default. Corporate bonds are rated as to quality by several agencies, the best known of which are Standard and Poor's and Moody's.⁶

⁵The tax implications of different coupon rates can also explain differences in yield; this will be discussed in later chapters.

⁶See Chapter 20 on bond pricing for a more detailed description of bond ratings and their impact on bond prices.

Corporate bonds differ in risk not only because of differences in the probability of default of the issuing corporations, but also because of differences in the nature of their claims on the assets and earnings of the issuing corporations. For example, secured bonds have specific collateral backing them in the event of bankruptcy, whereas unsecured corporate bonds (called debentures) do not. An additional class of bonds called subordinated debentures not only have no specific collateral, but they have a still lower priority claim on assets in the event of default than unsubordinated debentures. In an attempt to gain some protection against bankruptcy, corporate bonds typically place certain restrictions on management behavior as part of the loan agreement (called the bond indenture). Such restrictions might include limiting the payment of dividends or the addition of new debt.

Another notable feature of corporate bonds is that they are most often callable, which means that corporations can force the holder of the bond to surrender them at a fixed price (usually above the price at which the bonds were initially sold) during a set period of time. Corporations usually call bonds at a time when interest rates are below those that existed when the bond was first sold. Thus, the bondholder risks reinvesting his or her proceeds from a call at lower rates than the interest rate of the bond at the time of issuance.

Not So Fixed Income Securities It is evident from the preceding discussion that fixed income securities do not always pay the security holder the promised payment (because of calls or default). This leads to variability in cash flows received by the investor. Two classes of fixed income securities have even greater variability in cash flows: preferred stocks and mortgage-backed securities. In both cases, variability in cash flows is expected, and variability does not result in the holder's right to force bankruptcy.

Preferred Stock Preferred stock at first blush resembles an infinite life bond. It promises to pay to the holder periodic payments like coupons, but called dividends rather than interest. There is no return of principal in this case because preferred stock is almost always infinite in life. Preferred stock is not really a fixed payment instrument, however, in that failure to pay the promised dividend does not result in bankruptcy. Usually when a firm fails to pay dividends these dividends are cumulated and all unpaid preferred stock dividends must be paid off before any common stock dividends can be paid.

Preferred stock occupies a middle position between bonds and common stock in terms of priority of payment of income and in terms of return on capital if the corporation is liquidated. In addition, most preferred stock does not actually have an infinite life, because the issues are frequently callable and many of the issues may be converted into common stock at the discretion of the holder. Of course, a combination of callability and convertibility allows the issuer to force conversion. These features affect the risk and reward from holding preferred stocks.

Mortgage-Backed Securities The last "not so fixed income" security type that is most often classified as a fixed income security is mortgage-backed securities, which represent a share in a pool of mortgages. The best known mortgage-backed security is the Ginnie Mae (GNMA), which are issues of the Government National Mortgage Association. These instruments are backed by the full faith and credit of the U.S. government, so the investor bears no default risks. However, the investor is subject to considerable interest rate risk. These instruments are "pass through" securities, which means that all interest and principal payments on the individual mortgages making up the pool backing a particular GNMA certificate are paid (passed through) to the holder of a GNMA. The stated maturity in GNMA's may be as high as 40 years, but the average life is considerably shorter. The pass-through feature means that the holder will receive a very uncertain stream of future payments,

because it's dependent on how fast mortgage holders pay off their mortgages. Furthermore, to the extent that mortgages are paid off when interest rates are low, the investor receives funds at the time when investment opportunities have expected returns below the promised return on the original GNMA. The added element of risk is compensated for by GNMA's selling at a higher promised return than government securities of similar expected life.

Mortgage-backed securities are also issued by several other government agencies and by financial institutions. These securities carry additional risk, since they may be backed by the credit of the issuing body or simply by the pool of mortgages themselves.

Common Stock (Equity) Common stock represents an ownership claim on the earnings and assets of a corporation. After holders of debt claims are paid, the management of the company can either pay out the remaining earnings to stockholders in the form of dividends or reinvest part or all of the earnings in the business.

The unique feature of common stock (unlike simply owning the business) is that the holder of common stock has limited liability. If a company goes bankrupt, all that the holder of common stocks can lose is his or her original investment in the stock. The creditor cannot look to the general assets of stockholders to finance his claims.

Despite limited liability, because of the residual nature of its claim to earnings and assets, common stock as a class is the riskiest of the securities discussed to this point.⁷

Derivative Instruments

Derivative instruments are securities whose value derives from the value of an underlying security or basket of securities. The instruments are also known as contingent claims, since their values are contingent on the performance of underlying assets. The most common contingent claims are options and futures. An option on a security gives the holder the *right* to either buy (a call option) or sell (a put option) a particular asset or bundle of assets at a future date or during a particular period of time for a specified price. The buyer pays a price for this option, but is free not to exercise this option if prices move in the wrong direction. A future is the *obligation* to buy a particular security or bundle of securities at a particular time for a stated price. A future is simply a delayed purchase of a security. Futures and options are securities that represent side bets on the performance of individual or bundles of securities. There is always a buyer and a seller of an option or future, and the profit (or loss) to the seller is exactly equal to the loss (or profit) of the buyer. The action of the buyer or seller of options or futures does not affect the cash flows to the corporation, nor does it result in a change in the number or type of securities the corporation has outstanding.

The corporation can issue contingent claims, however, and in this case the value of the corporation is often impacted by the action of holders of its contingent claims. Corporate-issued contingent claims include rights and warrants, which allow the holder to purchase common stocks from the corporation at a set price for a particular period of time, and convertible securities (bonds and preferred stocks), which allow the holder to convert an instrument into common stock under specified conditions. Although these corporate contingent claims have many features in common with other derivative instruments, they differ in that if the holders exercise them, it results in a change in the attributes of the corporation (e.g., the receipt of cash and or change in the nature and size of capital). This means that these contingent claims are more difficult to analyze than those not issued by the corporation.

⁷Common stock issued by some companies can be less risky than some high-risk debt issues.

Indirect Investing

While an investor can purchase any of the instruments described here (and several we haven't touched on), the investor can instead choose to invest indirectly by purchasing the shares of investment companies (mutual funds). A mutual fund holds a portfolio of securities, usually in line with a stated policy and objective. Mutual funds exist which hold only a small set of securities (e.g., short-term tax-free securities or stocks in a particular industry or sector), or broad classes of securities (such as stocks from major stock exchanges around the world, or a broad representation of American stocks and bonds).

Mutual funds come in two flavors: open-end funds and closed-end funds. Open-end fund shares are purchased (and sold) directly from (and to) the mutual fund. They are purchased (and sold) at the value of the net assets standing behind each share, where the net asset value is determined once a day, at a stated time. As a first approximation, if you own 1/100 of the shares outstanding in a mutual fund, your shares are worth 1/100 of the market value of the total portfolio of securities that the fund owns. The reason we say first approximation is that some mutual funds charge a fee when the investor buys a fund (front-end load) and some charge additional fees (back-end load) when an investor sells shares in a fund. For example, in the case of an 8% front-end load you only purchase assets with 92% of the money you put up. Similarly, in the case of a 6% back-end load, you will receive only 94% of the value of the assets your shares represent when you sell the fund. Very often back-end loads decrease as a function of the amount of time the investor holds the fund.

Closed-end funds differ from open-end funds in that they initially sell a predetermined number of shares in the fund. They then take the proceeds (minus costs) from the sale of fund shares and invest in stocks or stock and bonds. Shares in the fund are then traded on an exchange and take on a life of their own. Owning a share in a closed-end fund is like owning a share in any corporation, but the assets of the corporation are stocks and bonds.⁸ Unlike open-end funds, the shares of a closed-end mutual fund can sell at a discount or a premium to their net asset value. Premiums and discounts are related to the perceived quality of management and certain tax liabilities. In fact, most closed-end funds sell at a discount from net asset value. The clear exceptions are funds such as the Korean funds, where the only way an American investor can own stocks in Korea is through buying a closed-end fund. These funds sell at a monopoly premium.

Mutual funds may offer the investor special services such as check-writing privileges or the ability to switch between mutual funds (types of investment) in the same family of funds at no costs. Although most offer liquidity, diversification, and "professional management," they do not offer these qualities without a cost. Investors pay a pro rata share of the expenses and management fees charged by the mutual fund company. In addition (for "open-end" funds), investors may pay a sales charge and/or a special charge known as a 12b-1 fee, which is a fee charged to the customer of a fund to compensate the fund for the cost of promoting (e.g., advertising) the fund. We will examine additional attributes of mutual funds in Chapter 24.

THE RETURN CHARACTERISTICS OF ALTERNATIVE SECURITY TYPES

When describing securities in the previous section, we alluded to risk and return. One of the basic tenets of this book is that investors like high return, but don't like high risk. Although we will be much more specific about measuring risk and return in future chapters, it is

⁸There is a difference in that income, if paid out to fund shareholders, is not subject to corporate taxes provided certain conditions are met by the fund.

useful to become familiar with the risk and return characteristics of some of the securities we have discussed.

First, we should discuss what we mean by return. We will in most instances use return to indicate the return on an investment over a particular span of time called *holding period return*. Return will be measured by the sum of the change in the market price of a security plus any income received over a holding period divided by the price of a security at the beginning of the holding period. Thus, if a stock started the year at \$100, paid \$5 in dividends at the end of the year, and had a price of \$105 at the end of the year, the return would be 10%.⁹

In describing securities, we mentioned several factors that should affect risk. These included

1. The maturity of an instrument (in general the longer the maturity the more risky it is).
2. The risk characteristic and creditworthiness of the issuer or guarantor of the investment.
3. The nature and priority of the claims the investment has on income and assets.
4. The liquidity of the instrument and the type of market in which it is traded.¹⁰

If risk is related to these elements, then measures of risk such as the variability of returns should be related to these same factors.

In Figure 2.1, for example, we have plotted the history of annual returns over the 1946–2000 period for short-term Treasury bills, long-term Treasury bonds, and common

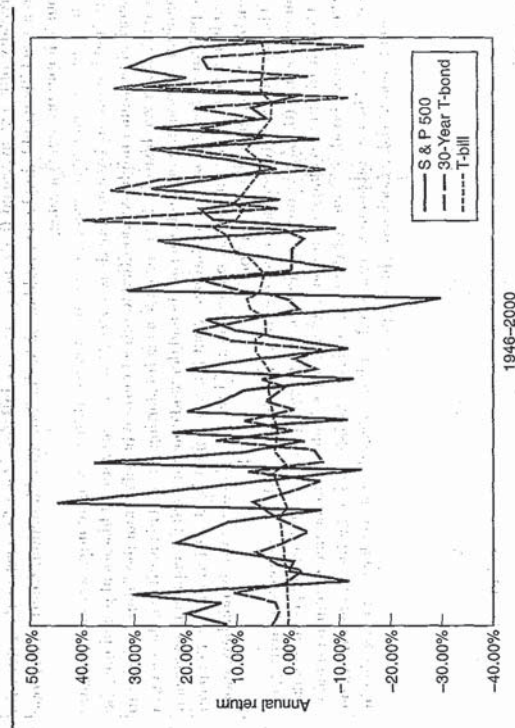


Figure 2.1 Rates of returns versus time for major security types.

⁹If dividends or other income is received during the period of time over which return is computed, an assumption must be made about the rate at which the cash flow is reinvested until the end of the period.

¹⁰This will be discussed in Chapter 3.

stock. Examination of the graph makes it clear that Treasury bonds have a more variable return pattern than Treasury bills due to the longer maturity of the claim. Common stocks show even more variability because the issuer has a higher risk and because the claims on income and earnings are more junior in nature.

Although we won't introduce formal measures of risk until Chapter 4, let us just state at this time that a widely accepted measure of risk (metric for capturing the type of variability shown in Figure 2.1) is called the standard deviation. The standard deviations of the return series on several instruments, including the securities shown in Figure 2.1, together with the average return for each series, are shown in Table 2.2.

As you can see, the ranking of standard deviation is consistent with the ranking you perceived by simply looking at the graph. We've added three more categories to the three assets graphed in Figure 2.1.

One of the major tenets of this book is that returns (over long periods of time) should be consistent with risk. In fact, the average historical returns presented earlier are broadly consistent with this.

An examination of historical returns on security types such as those presented earlier is frequently used as a starting point for preparing forecasts of the return expected from broad classes of assets.

For example, a forecaster might start with a forecast of the inflation rate over the next year. Economists argue that Treasury bills over long periods of time should compensate investors for any loss in purchasing power (inflation) plus the time value of money (giving up the use of funds for a short period of time). From Table 2.2 we see that the return on Treasury bills has averaged 0.5% per year over inflation. One forecast of the return for Treasury bills would simply be to add 0.5% to the forecast of inflation. Alternatively, one could simply use current rates.

In a similar manner we can note that the historic difference in returns between Treasury bills and long-term Treasury bonds is 1.7%. However, as with all historical premiums, the historical premium might be modified to reflect current beliefs about the future, relative to the past. However, historical data provide a useful starting place. This is often called a term premium. Although it depends on supply and demand conditions to the capital markets and the pattern of longer-term expectations about the movement in short-term rates, the term premium also depends on the risk preferences of investors. Longer-term bonds have more variable returns than short-term bonds.

The difference between long-term corporate bonds rates and the rate on long-term government bonds (0.5%) is compensation for the greater risk of default of corporate bonds.

The rate of return on large common stocks is 6.4% higher than the rate of return on long-term corporate bonds because of the greater risk associated with the future cash flows on large stocks. The rate on small stocks is 5.3% higher than the rate on larger stocks, due in part to the added risk associated with small stocks.

Table 2.2 Return and Risk for Selected Types of Securities in Percent Per Year

	Average Return	Standard Deviation
Treasury Bills	3.8	3.2
Treasury Bonds	5.5	9.3
Common Stock (Large Stocks)	13.3	20.1
Inflation	3.2	4.5
Corporate Bonds	5.9	8.7
Small Stocks	17.6	33.6

The type of building blocks approach to rates of return on security types presented earlier is frequently used to forecast rates of return in the future. That is, starting with either forecasts of inflation or the Treasury bill rate, management will modify historic differentials in order to estimate the expected returns on categories of securities. Modifications of the past differentials for forecasting are based on forecasts of supply and demand conditions in different capital markets as well as on forecasts of general economic activity.

We have indicated the return performance of some broad classes of securities. In doing so we have used a set of performance indexes without actually describing the indexes. Since we will often talk about indexes of general performance and "the market" in this book, it is worthwhile spending a short amount of time reviewing some widely used indexes.

STOCK MARKET INDEXES

The oldest continuously quoted index of stock price performance in the United States is the Dow Jones Industrial Average Index (DJIA); this index has been computed since 1896. Since 1928, it has consisted of a price-weighted average of 30 large "blue chip" stocks. When the index was originally constructed it contained 20 stocks and the value of the index was found by adding together the prices of the 20 stocks (assuming the investor bought one share of each stock). Today the average is computed by adding together the price of 30 stocks and dividing by an adjustment factor.¹¹ Despite the fact that this index is the most widely quoted stock market index it has some flaws. First of all, 30 stocks, particularly 30 stocks that are among the largest, represent at best a very narrow definition of the market.

Second and perhaps most important, the implicit price weighting in the index assumes that an investor is equally likely to buy one share of any stock. Another way to view this is that the investor is more likely to place a dollar in a share of stock if it sells at a higher price. The "market" represents the aggregate of the action of all investors. All investors in aggregate must hold all stocks in proportion to the fraction that the aggregate market value of any stock represents of the total market value of all stocks. This is clearly different than the Dow Jones index, which weighs each stock by the price of that stock relative to the sum of the market value of one share of each stock in the index. The absurdity to which this weighting can lead is evident by what happens if a stock splits. In a two for one stock split the weighting of the split stock after the split would be one half of the weighting before the split.

Despite these defects in the methodology used in computing this index, the Dow Jones Industrial Average continues to be widely employed and mimicked. For example, one of the most widely used indexes of the Japanese stock market, the Nikkei 225, is computed in the same manner as the Dow Jones index. The index does allow the rate of price increase to be computed for a well-defined strategy: buy one share of each stock in the index, selling off any additional shares received due to stock splits or stock dividends while reallocating the proceeds among all shares in the index. To compute the rate of price appreciation from this strategy one simply takes the change in the index over a certain period of time and divides by the value of the index at the beginning of the period. Note that this only provides a rate of price appreciation, not a total rate of return, for dividends are ignored in computing the index.

¹¹The adjustment factor is computed so as to correct for discontinuities in the index caused when a stock is substituted for one previously in the index or when a stock in the index has a stock split or dividend.

Most stock price indexes are weighted by market capitalization. The next most popular index of the U.S. stock market is the Standard and Poor's Composite 500 stock index (S&P 500). In calculating this index, the price of each of the 500 stocks is multiplied by the market value of the company's shares outstanding, divided by the aggregate market value of all 500 companies. We can think of this index as reporting the price performance of a portfolio where the investor buys the same percentage of the total outstanding stock (in market value) of each company. Note that stock splits and dividends do not affect the index, since they have no effect on the total market value of the outstanding stock.¹²

The reader should note that the Standard and Poor's index does not include dividends; thus, using it directly allows the computation of a rate of price appreciation and not a rate of return. A crude adjustment for dividends (to get total return) can be achieved by splitting the Standard and Poor's Price index with the dividend yield index published by Standard and Poor. In recent years, however, a number of sources, most notably the Center for Research in Security Prices (CRSP), have computed a version of the S&P index corrected for dividends. This is the index we used in the previous section to represent common stocks (large stocks).¹³

In recent years the number of indexes measuring common stock performance here and abroad has proliferated. Large populations of stocks are represented in the United States by, among others, the New York Stock Exchange index (including all stocks listed on NYSE), the Amex index, the Wilshire 5000 stock index (NYSE, American Stock Exchange, actively traded over-the-counter stocks), and such. They are all market-weighted indexes, though they do not include dividends. CRSP has available a number of return indexes for different groups of stocks on the New York, American, and over-the-counter markets. These are calculated on a market-weighted basis and include return from reinvestment of dividends.

Finally, a number of international stock market indexes are market weighted and are computed with dividends. For example, Morgan Stanley International computes indexes for more than 20 countries as well as for different geographical sectors of the world and an Aggregate World index.

BOND MARKET INDEXES

Although almost all of the major stock market indexes exclude dividends and thus are not total return indexes, the major bond indexes are total return indexes, for they include interest payments as well as capital gains.¹⁴ The best known bond indexes are constructed by Lehman Brothers, Merrill Lynch, and Salomon Brothers. They are all market-weighted total return indexes including all issues above a certain size. Furthermore, subindexes exist covering different parts of the bond market by maturity as well as by type of issuer.

Perhaps the use of market weighting and the inclusion of cash flows (interest) in the indexes reflects the fact that bond indexes were constructed more recently than stock indexes, when the concepts of market weighting and total return were better understood.

¹²The stock split could affect expectations about the future cash flows of the firm and its market value.

¹³The monthly version of the CRSP index treats all dividends paid on a stock as reinvested at the end of the month. The assumption is implicitly made that cash payments earn no return during the remainder of the month in which they are paid.

¹⁴Lehman Brothers and Salomon Brothers compute their indexes on a monthly basis and assume any interest paid during a month is reinvested at the end of the month. Merrill Lynch computes their indexes on a daily basis and reinvests paid interest at the end of the day. All prices used in computing these indexes are quoted price plus accrued interest. This is the price an investor would have to pay for the bond.

One caution on using these indexes is that a number of issues in the indexes are not actively traded. The prices of these issues represent price estimates based on issues that are traded; this estimation process can be a source of inaccuracy.

The set of bond indexes with the longest history are those compiled by Ibbotson and Associates. Ibbotson reports monthly returns from the beginning of 1926 to the present for Treasury bills, long-term government bonds, intermediate-term government bonds, and long-term corporate bonds. These series are excellent for gaining perspective on the major bond markets because of their long history. However, the user of these series should be aware that the number of bonds included in each of the series are not the same. For example (a) the long-term corporate bond series currently includes nearly all Aaa and Aa rated corporate bonds, whereas (b) the long-term government bond series is based on a single government bond of approximately 20 years maturity selected at the start of each year.¹⁵

The indexes mentioned earlier compiled by Merrill Lynch, Salomon, and Lehman both cover more bonds and include indexes for more sectors than the Ibbotson indexes; however, they are only available for a much shorter period of time.

CONCLUSION

We have described the attributes of a broad representation of financial assets in this chapter. We've looked at some indexes that are used to measure the performance of broad classes of assets, and we've examined in risk and return terms the characteristics of a representative set of assets. We have not discussed the markets these assets trade on nor the impact of market structure on the characteristics of assets; these will be discussed in Chapter 3.

¹⁵See Ibbotson annual yearbooks for a detailed description of the construction of each of the bond series.