

Investment Companies and Exchange-Traded Funds

LEARNING OBJECTIVES

After reading this chapter, you will understand

- the different types of investment companies: mutual funds, closed-end investment companies, and unit trusts
- how the share prices of mutual funds and closed-end funds are determined
- the structure of funds and the costs that they incur
- how investment companies can differ depending on their investment objectives
- the economic benefits that investment companies provide, including diversification and reduced costs of investing
- the meaning of a regulated investment company
- the structure of investment companies
- the taxation of mutual funds
- alternatives to mutual funds
- what exchange traded funds are
- the similarities and differences between exchange-traded funds and closed-end funds
- what separately managed accounts are

Investment companies are financial intermediaries that sell shares to the public and invest the proceeds in a diversified portfolio of securities. Each share sold represents a proportional interest in the portfolio of securities managed by the investment company on behalf of its shareholders. The type of securities purchased depends on the company's

From Chapter 7 of *Foundations of Financial Markets and Institutions*, 4/e. Frank J. Fabozzi. Franco Modigliani. Frank J. Jones.
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investment objective. Exchange-traded funds are similar to investment companies but have several advantages relative to investment companies.

TYPES OF INVESTMENT COMPANIES

There are three types of investment companies: open-end funds, closed-end funds, and unit trusts.

Open-End Funds (Mutual Funds)

Open-end funds, commonly referred to simply as **mutual funds**, are portfolios of securities, mainly stocks, bonds, and money market instruments. There are several important aspects of mutual funds. First, investors in mutual funds own a pro rata share of the overall portfolio. Second, the investment manager of the mutual fund actively manages the portfolio, that is, buys some securities and sells others (this characteristic is unlike unit investment trusts, discussed below). Third, the value or price of each share of the portfolio, called the **net asset value (NAV)**, equals the market value of the portfolio minus the liabilities of the mutual fund divided by the number of shares owned by the mutual fund investors. That is,

$$\text{NAV} = \frac{\text{Market value of portfolio} - \text{Liabilities}}{\text{Number of shares outstanding}}$$

For example, suppose that a mutual fund with 10 million shares outstanding has a portfolio with a market value of $215 million and liabilities of $15 million. The NAV is

$$\text{NAV} = \frac{\$215{,}000{,}000 - \$15{,}000{,}000}{10{,}000{,}000} = \$20$$

Fourth, the NAV or price of the fund is determined only once each day, at the close of the day. For example, the NAV for a stock mutual fund is determined from the closing stock prices for the day. Business publications provide the NAV each day in their mutual fund tables. The published NAVs are the closing NAVs. Fifth, and very importantly, all new investments into the fund or withdrawals from the fund during a day are priced at the closing NAV (investments after the end of the day or on a nonbusiness day are priced at the next day's closing NAV).

The total number of shares in the fund increases if there are more investments than withdrawals during the day, and vice versa. For example, assume that at the beginning of a day a mutual fund portfolio has a value of $1 million, with no liabilities, and there are 10,000 shares outstanding. Thus, the NAV of the fund is $100. Assume that during the day $5,000 is deposited into the fund, $1,000 is withdrawn, and the prices of all the securities in the portfolio remain constant. This means that 50 shares were issued for the $5,000 deposited (since each share is valued at $100) and 10 shares redeemed for $1,000 (again, since each share is $100). The net number of new shares issued is then 40. Therefore, at the end of the day, there will be 10,040 shares and the total value of the fund will be $1,004,000. The NAV will remain at $100.

If, instead, the prices of the securities in the portfolio change; both the total size of the portfolio and, therefore, the NAV will change. In the previous example, assume that during the day the value of the portfolio doubles to $2 million. Since deposits and withdrawals are priced at the end-of-day NAV, which is now $200 after the doubling of the portfolio's value,

the $5,000 deposit will be credited with 25 shares ($5,000/$200) and the $1,000 withdrawn will reduce the number of shares by five shares ($1,000/$200). Thus, at the end of the day there will be 10,020 shares (25 − 5 new shares) in the fund with a NAV of $200, and the value of the fund will be $2,004,000. (Note that 10,020 shares × $200 NAV equals $2,004,000, the portfolio value.)

Overall, the NAV of a mutual fund will increase or decrease due to an increase or decrease in the prices of the securities in the portfolio. The number of shares in the fund will increase or decrease due to the net deposits into or withdrawals from the fund. And the total value of the fund will increase or decrease for both reasons.

To summarize, there are three important characteristics of open-end or mutual funds. First, the number of shares of these funds increases or decreases as investors increase their investment or liquidate shares. Second, the fund company facilitates these increases or decreases by selling new shares to or buying existing shares from the investor. Third, these new investments or liquidations occur via the fund company (not an external market) at a price equal to NAV.

Closed-End Funds

The shares of a **closed-end fund** are very similar to the shares of common stock of a corporation. The new shares of a closed-end fund are initially issued by an underwriter for the fund. And after the new issue, the number of shares remains constant. After the initial issue, there are no sales or purchases of fund shares by the fund company as there are for open-end funds. The shares are traded on a secondary market, either on an exchange or in the over-the-counter market.

Investors can buy shares after the initial issue (as discussed below) only in the secondary market. Shares are sold after the initial issue only on the secondary market. The price of the shares of a closed-end fund are determined by the supply and demand in the secondary market in which these funds are traded. The secondary market is one of the stock markets. Thus, investors who transact closed-end fund shares must pay a brokerage commission at the time of purchase and at the time of sale.

The NAV of closed-end funds is calculated in the same way as for open-end funds. However, the price of a share in a closed-end fund is determined by supply and demand, so the price can fall below or rise above the net asset value per share. Shares selling below NAV are said to be "trading at a discount," while shares trading above NAV are "trading at a premium." Newspapers list quotations of the prices of these shares under the heading "Closed-End Funds."

Consequently, there are two important differences between open-end funds and closed-end funds. First, the number of shares of an open-end fund varies because the fund sponsor will sell new shares to investors and buy existing shares from shareholders. Second, by doing so, the share price is always equal to the NAV of the fund. In contrast, closed-end funds have a constant number of shares outstanding because the fund sponsor does not redeem shares and sell new shares to investors (except at the time of a new underwriting). Thus, the price of the fund shares will be determined by supply and demand in the market and may be above or below NAV, as previously discussed.

Although the divergence of the price from NAV is often puzzling, in some cases the reasons for the premium or discount are easily understood. For example, a share's price may be below the NAV because the fund has large built-in tax liabilities, and investors are discounting

the share's price for that future tax liability.[1] (We will discuss this tax liability issue later in this chapter.) A fund's leverage and resulting risk may be another reason for the share's price trading below NAV. A fund's shares may trade at a premium to the NAV because the fund offers relatively cheap access to, and professional management of, stocks in another country about which information is not readily available to small investors.

There are, however, "lifeboat provisions" in fund charters that require them to take action to reduce the discount on the share by buying back shares via a tender offer for the funds' stock, or doing an outright conversion to an open-end structure. If the fund manager does not believe it is in the best interest of the shareholders (or the fund management) to convert or tender an offer for shares, dissident shareholder groups can buy large blocks of stocks and initiate a proxy fight in order to liquidate the assets or "open-end the fund," in an attempt to increase the value of the fund to its NAV.

Under the **Investment Company Act of 1940**, closed-end funds are capitalized only once. They make an initial public offering (IPO), and then their shares are traded on the secondary market, just like any corporate stock, as discussed above. The number of shares is fixed at the IPO; closed-end funds cannot issue more shares. In fact, many closed-end funds become leveraged to raise more funds without issuing more shares.

An important feature of closed-end funds is that the initial investors bear the substantial cost of underwriting the issuance of the funds' shares. The proceeds that the managers of the fund have to invest equals the total paid by initial buyers of the shares minus all costs of issuance. These costs, which average around 7.5% of the total amount paid for the issue, normally include selling fees or commissions paid to the retail brokerage firms that distribute them to the public. The high commissions are strong incentives for retail brokers to recommend these shares to their retail customers, and also for investors to avoid buying these shares on their initial offering.[2]

The relatively new **exchange-traded funds (ETFs)**, which are discussed later in this chapter, pose a threat to both mutual funds and closed-end funds. ETFs are essentially hybrid closed-end vehicles, which trade on exchanges but which typically trade very close to NAV.

Since closed-end funds are traded like stocks, the cost to any investor of buying or selling a closed-end fund is the same as that of a stock. The obvious charge is the stockbroker's commission. The bid/offer spread of the market on which the stock is traded is also a cost.

Unit Trusts

A **unit trust** is similar to a closed-end fund in that the number of unit certificates is fixed. Unit trusts typically invest in bonds. They differ in several ways from both mutual funds and closed-end funds that specialize in bonds. First, there is no active trading of the bonds in the portfolio of the unit trust. Once the unit trust is assembled by the sponsor (usually a brokerage firm or bond underwriter) and turned over to a trustee, the trustee holds all the bonds until they are redeemed by the issuer. Typically, the only time the trustee can sell an issue in the portfolio is if there is a dramatic decline in the issuer's credit quality. As a result, the cost of operating the trust will be considerably less than costs incurred by either a mutual fund or

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[1] Harold Bierman, Jr., and Bhaskaran Swaminathan, "Managing a Closed-End Investment Fund," *Journal of Portfolio Management* (Summer 2000), p. 49.

[2] Kathleen Weiss, "The Post-Offering Price Performance of Closed-End Funds," *Financial Management* (Autumn 1989), pp. 57–67.

a closed-end fund. Second, unit trusts have a fixed termination date, while mutual funds and closed-end funds do not.[3] Third, unlike the mutual fund and closed-end fund investor, the unit trust investor knows that the portfolio consists of a specific portfolio of bonds and has no concern that the trustee will alter the portfolio. While unit trusts are common in Europe, they are not common in the United States.

All unit trusts charge a sales commission. The initial sales charge for a unit trust ranges from 3.5% to 5.5%. In addition to these costs, there is the cost incurred by the sponsor to purchase the bonds for the trust that an investor indirectly pays. That is, when the broker-age firm or bond-underwriting firm assembles the unit trust, the price of each bond to the trust also includes the dealer's spread. There is also often a commission if the units are sold.

In the remainder of this chapter, our primary focus is on open-end (mutual) funds.

Key Points That You Should Understand Before Proceeding

1. The difference between an open-end fund (mutual fund) and a closed-end fund.
2. The meaning of NAV per share.
3. The difference between a closed-end fund and a unit trust.
4. The price of a share of a closed-end fund can trade at a discount or premium to its NAV.

FUND SALES CHARGES AND ANNUAL OPERATING EXPENSES

There are two types of costs borne by investors in mutual funds. The first is the *shareholder fee*, usually called the *sales charge*. This cost is a "one-time" charge debited to the investor for a specific transaction, such as a purchase, redemption, or exchange. The type of charge is related to the way the fund is sold or distributed. The second cost is the annual fund operating expense, usually called the *expense ratio*, which covers the fund's expenses, the largest of which is for investment management. This charge is imposed annually. This cost occurs on all funds and for all types of distribution. We discuss each cost in the following text.

Sales Charge

Sales charges on mutual funds are related to their method of distribution. The current menu of sales charges and distribution mechanisms has evolved significantly and is now much more diverse than it was a decade ago. To understand the current diversity and the evolution of distribution mechanisms, consider initially the circumstances of two decades ago. At that time, there were two basic methods of distribution, two types of sales charges, and the type of the distribution was directly related to the type of sales charge.

The two types of distribution were sales force (or wholesale) and direct. *Sales-force (wholesale) distribution* occurred via an intermediary, that is, via an agent, a stockbroker, insurance agent, or other entity, who provided investment advice and incentive to the client, actively "made the sale," and provided subsequent service. This distribution approach is active; that is, the fund is typically sold by the agent, not bought by the client.

The other approach is *direct* (from the fund company to the investor), whereby, there is no intermediary or salesperson to actively approach the client, provide investment advice

[3] There are, however, exceptions. Target term closed-end funds have a fixed termination date.

and service, or make the sale. Rather, the client approaches the mutual fund company, most likely by a "1-800" telephone contact, in response to media advertisements or general information, and opens the account. Little or no investment counsel or service is provided either initially or subsequently. With respect to the mutual fund sale, this is a *passive approach*, although these mutual funds may be quite active in their advertising and other marketing activities. Funds provided by the direct approach are bought by the client, not sold by an agent or the fund company.

There is a *quid pro quo*, however, for the service provided in the sales-force distribution method. The *quid pro quo* is a sales charge borne by the customer and paid to the agent. The sales charge for the agent-distributed fund is called a **load**. The traditional type of load is called a *front-end load*, since the load is deducted initially or "up front." That is, the load is deducted from the amount invested by the client and paid to the agent/distributor. The remainder is the net amount invested in the fund in the client's name. For example, if the load on the mutual fund is 5% and the investor invests $100, the $5 load is paid to the agent and the remaining $95 is the net amount invested in the mutual fund at NAV. Importantly, only $95, not $100, is invested in the fund. The fund is, thus, said to be "purchased above NAV" (i.e., the investor pays $100 for $95 of the fund). The $5 load compensates the sales agent for the investment advice and service provided to the client by the agent. The load to the client, of course, represents income to the agent.

Let's contrast this with directly placed mutual funds. In a directly placed fund, there is no sales agent and, therefore, there is no need for a sales charge. Funds with no sales charges are called **no-load mutual funds**. In this case, if the client provides $100 to the mutual fund, $100 is invested in the fund in the client's name. This approach to buying the fund is called buying the fund "at NAV"; that is, the whole amount provided by the investor is invested in the fund.

A decade ago, many observers speculated that **load funds** would become obsolete and no-load funds would dominate because of the investor's aversion to a sales charge. Increasingly financially sophisticated individuals, the reasoning went, would make their own investment decisions and not need to compensate agents for their advice and service. But, as discussed below, the actual trend has been quite different. Why has there not been a trend away from the more costly agent-distributed funds as many expected? There are two reasons. First, many investors have remained dependent on the investment counsel and service, and, perhaps more importantly, the initiative of the sales agent. Second, sales-force distributed funds have shown considerable ingenuity and flexibility in imposing sales charges, which both compensate the distributors and appear attractive to the clients. Among the recent adaptations of the sales load are **back-end loads** and **level loads**. While the front-end load is imposed at the time of the purchase of the fund, the back-end load is imposed at the time fund shares are sold or redeemed. Level loads are imposed uniformly each year. These two alternative methods provide ways to compensate the selling agent. However, unlike with the front-end load, both of these distribution mechanisms permit clients to buy a fund at NAV, that is, not have any of their initial investment debited as a sales charge before it is invested in their account.

The back-end load currently is a **contingent deferred sales charge (CDSC)**. This approach imposes a gradually declining load on withdrawal. For example, a common "3,3,2,2,1,1,0" CDSC approach imposes a 3% load on the amount withdrawn during the first year, 3% during the second year, 2% during the third year, and so forth. The sales charge

is "deferred" because it is imposed at withdrawal and "contingent" because its level depends on how long it was held. There is no sales charge for withdrawals after the seventh year.

The third type of load is neither a front-end load at the time of investment nor a (gradually declining) back-end load at the time of withdrawal, but a constant load each year (e.g., a 1% load every year). This approach is called a level load. This type of load appeals to the types of financial planners who charge annual fees (called *fee-based* financial planners) rather than commissions, such as sales charges (called *commission-based* financial planners).

Many mutual fund families often offer their funds with all three types of loads (called "classes")—that is, front-end loads (usually called "A shares"); back-end loads (often called "B shares"); and level loads (often called "C shares")—and permit the distributor and its client to select the type of load they prefer.[4] Several other classes of load funds have also been developed. For example, the F class (also called by other letters) is available only to fee-based distributors who have a special agreement with the fund. F shares have no loads and lower expense ratios than A, B, and C shares.

As required by the National Association of Securities Dealers (NASD), the maximum allowable sales charge is 8.5%, although most funds impose lower charges. The sales charge for a fund applies to most, even very small, investments (although there is typically a minimum initial investment). For large investments, however, the sales charge may be reduced. For example, a fund with a 4.5% front-end load may reduce this load to 3.0% for investments over $250,000 and to 0% for investments of more than $1 million. There may be in addition further reductions in the sales charge at greater investments. The amount of investment needed to obtain a reduction in the sales charge is called a breakpoint; the breakpoints are $250,000 and $1 million in this example. There are also mechanisms whereby the total amount of the investment necessary to qualify for the breakpoint does not need to be invested up front, but only over time (according to a "letter of intent" signed by the investor).[5] Load funds that are placed in retirement accounts, such as 401(k)s or IRAs, typically waive the loads.

The sales charge paid by the client typically goes primarily to the individual distributor, with a small part going to the fund. How does the fund family, typically called the *sponsor* or manufacturer of the fund, cover its costs and make a profit? That is the topic of the second type of "cost" to the investor, the fund annual operating expense.

Annual Operating Expenses (Expense Ratio)

The *operating expense*, also called the *expense ratio*, is debited annually from the investor's fund balance by the fund sponsor. Operating expenses are deducted from NAV and therefore reduce the reported return. The three main categories of annual operating expenses are the management fee, distribution fee, and other expenses.

The *management fee*, also called the **investment advisory fee**, is the fee charged by the **investment advisor** for managing a fund's portfolio. If the investment advisor is a company separate from the fund sponsor, some or all of this investment advisory fee is passed onto the investment advisor by the fund sponsor. In this case, the fund manager is called a

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[4] Edward S. O'Neal, "Mutual Fund Share Classes and Broker Incentives," *Financial Analysts Journal* (September/October 1999), pp. 76–87.

[5] Daniel C. Inro, Christine X. Jaing, Michael Y. Ho, Wayne Y. Lee, "Mutual Fund Performance: Does Fund Size Matter?" *Financial Analysts Journal* (May/June 1999), pp. 74–87.

subadvisor. The management fee varies by the type of fund, specifically by the difficulty of managing the fund. For example, the management fee may increase from money market funds to bond funds, to U.S. growth stock funds, to emerging market stock funds, as illustrated by examples below.

In 1980, the SEC approved the imposition of a fixed annual fee, called the 12b-1 fee, which is, in general, intended to cover *distribution costs*, including continuing agent compensation and manufacturer marketing and advertising expenses. Such 12b-1 fees are now imposed by many mutual funds. By law, 12b-1 fees cannot exceed 1% of the fund's assets per year. The 12b-1 fee may include a service fee of up to 0.25% of assets per year to compensate sales professionals for providing services or maintaining shareholder accounts. The remaining 0.75% is used by the fund company for marketing. To be called a no-load fund, no 12b-1 fee can be imposed. The 12b-1 fees, as well as the operating expenses, are deducted from the NAV and, thus, reduce the reported return. Sales charges are not deducted from the NAV and do not reduce the reported return. The major rationale for the component of the 12b-1 fee, which accrues to the selling agent, is to provide an incentive to selling agents to continue to service their accounts after having received a transaction-based fee such as a front-end load. As a result, a 12b-1 fee of this type is consistent with sales-force-sold load funds, not with directly sold, no-load funds. The rationale for the component of the 12b-1 fee, which accrues to the manufacturer of the fund, is to provide incentive and compensate for continuing advertising and marketing costs.

Other expenses include primarily the costs of (1) custody (holding the cash and securities of the fund), (2) the transfer agent (transferring cash and securities among buyers and sellers of securities and the fund distributions, etc.), (3) independent public accountant fees, and (4) directors' fees. The sum of the annual management fee, the annual distribution fee, and other annual expenses is called the *expense ratio.* All the cost information on a fund, including selling charges and annual expenses, is included in the fund prospectus.

Table 1 shows the expense ratios from the current prospectuses of the three largest mutual funds: the Fidelity ContraFund Fund, the Vanguard S&P 500 Index Fund, and the American Growth Fund of America Fund. The first two are direct funds and the third is a sales-force fund. The Fidelity ContraFund and Vanguard S&P 500 Index funds are directly sold and, thus, have no 12b-1 distribution expenses. The American Growth Fund of America, on the other hand, is sales-force sold and has a distribution or 12b-1 fee. With respect to the management fee, index funds are easier to manage and, thus, the Vanguard S&P 500 Index fund has the lowest management fee.

Table 1 Annual Operating Expenses for Three Large Mutual Funds

Type of Expense	Fidelity ContraFund	Vanguard S&P 500 Index	American Growth Fund of America—A Shares
Management fee	0.71%	0.15%	0.27%
Distribution and/or service (12b-1) fees	0	0	0.25
Other expenses	0.18	0.03	0.12
Total	0.89%	0.18%	0.64%

Table 2 Shareholders Fees for Three Large Mutual Funds—A Shares

Type of Fee	Fidelity ContraFund	Vanguard S&P 500 Index	American Growth Fund of America—A Shares
Sales charge on purchases	0%	0%	5.75%
Sales charge on reinvested dividend	0	0	0
Redemption fee	0	0	0
Exchange fee	0	0	0

In addition to the annual operating expenses, the fund prospectus provides the fees, which are imposed only at the time of a transaction. (These shares are called A shares.) These fees are listed in Table 2 for the three large funds in Table 1. The Fidelity fund and the Vanguard fund are directly distributed and are pure no-load funds. The American fund is sales-force distributed and is a front-end load (A share) fund.

As we explained earlier, many agent-distributed funds are provided in different forms, typically the following: (1) A shares: front-end load, (2) B shares: back-end load (contingent deferred sales charge), and (3) C shares: level load. These different forms of the same fund are called *share classes*. Class B shares convert to A shares, which have lower annual expenses after the B shares back-end load period ends (typically five to seven years); C shares do not convert.

During 2006, $227 billion of new cash flowed into mutual funds with $166 billion flowing into no-load funds and $37 billion into load funds (the other $24 billion went into variable annuities). Of the amount that flowed into load funds, $51 billion flowed into front-end loads, $22 billion into level loads, and $12 billion into other loads (loads other than front, B level, and back), and there was an outflow of $49 billion from back-end loads, the fifth consecutive year of outflows from back-end load funds.

Table 3 provides an example of hypothetical sales charges and annual expenses of funds of different classes for an agent-distributed stock mutual fund. The sales charge

Table 3 Hypothetical Sales Charges and Annual Expenses of Funds of Different Classes for an Agent-Distributed Stock Mutual Fund

	Sales Charge			Annual Operating Expenses			
	Front	Back	Level	Management Fee	Distribution (12B-1 Fee)	Other Expenses	Expense Ratio
A	4.5%	0	0%	0.90%	0.25%	0.15%	1.30%
B	0	*	0	0.90	1.00	0.15	2.05
C	0	0	1	0.90	1.00	0.15	2.05

* 3%, 3%, 2%, 2%, 1%, 0%.

accrues to the distributor. The management fee accrues to the mutual fund manager. Other expenses, including custody and transfer fees and the fees of managing the fund company, accrue to the fund sponsor to cover expenses.

The A class of this fund has a 4.5% front-end load and an expense ratio of 1.30%. The B class has a back-end CDSC load that becomes 0% after five years and an expense ratio of 2.05%. The C class has a level load of 1% and an expense ratio of 2.05%.

For load funds with the various share classes, some periodicals provide the investment results for all the share classes and others provide the results only for the A class. In the latter case, the name of the fund is followed by an "A"; for example, "Amer Funds Growth Fund A" refers to the class A shares for the American Funds Growth Fund of America fund.

Which of these three classes of funds has the lowest total cost, sales charge plus expense ratio? The answer depends on the investor's planned holding period. For very short holding periods, such as one to two years, C class shares have the lowest total cost since they avoid the higher front-end and back-end loads of the A and B shares, respectively. For very long holding periods, such as 20 years, the A shares have the lowest total cost because the low expense ratio more than offsets the front load eventually. For intermediate time periods, such as six to 10 years, the B shares are the best because they pay no front-end load or back-end load. Exact calculations are necessary to determine which is the best share class over a given holding period. The SEC provides a mutual fund cost calculator, which permits such calculations.[6]

Multiple Share Classes

Share classes were first offered in 1989 following the SEC's approval of multiple share classes. During the 1990s, the number of share classes expanded even more quickly than the number of funds. Initially share classes were used primarily by sales-force funds to offer alternatives to the front-end load as a means of compensating brokers. Later, some of these funds used additional share classes as a means of offering the same fund or portfolio through alternative distribution channels in which some fund expenses varied by channel. Offering new share classes was more efficient and less costly than setting up two separate funds.[7] By the end of the 1990s, the average long-term sales-force fund offered nearly three share classes. Directly sold no-load mutual funds offer only one share class.

Key Points That You Should Understand Before Proceeding

1. The difference between a load and a no-load mutual fund.
2. The difference between a front-end load, a back-end load, and a level load fund.
3. The difference between a sales charge and an expense ratio.
4. The SEC Rule 12b-1 and the type of fund called a 12b-1 fund.
5. The components of the expense ratio.
6. The nature of a management fee.
7. The meaning of trading at NAV.
8. The definition of breakpoints.

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[6] www.sec.gov/investor/tools/mfcc/rate-of-return.html.

[7] Brian Reid, *The 1990s: A Decade of Expansion and Changes in the U.S. Mutual Fund Industry*, Investment Company Institute, 6, no. 3 (July 2000), p. 15.

ECONOMIC MOTIVATION FOR FUNDS

Financial intermediaries obtain funds by issuing financial claims against themselves and then investing these funds. An investment company is a financial intermediary in that it pools the funds of individual investors and uses these funds to buy portfolios of securities. Recall the special role in financial markets played by financial intermediaries. Financial intermediaries provide some or all of the following six economic functions: (1) risk reduction via diversification, (2) lower costs of contracting and processing information, (3) professional portfolio management, (4) liquidity, (5) variety, and (6) a payments mechanism. Consider these economic functions as provided by mutual funds.

Consider first the function of risk reduction through diversification. By investing in a fund, an investor can obtain broad-based ownership of a sufficient number of securities to reduce portfolio risk. Although an individual investor may be able to acquire a broad-based portfolio of securities, the degree of diversification will be limited by the amount available to invest. By investing in an investment company, however, the investor can effectively achieve the benefits of diversification at a lower cost even if the amount of money available to invest is not large.

The second economic function is the reduced cost of contracting and processing information because an investor purchases the services of a presumably skilled financial advisor at less cost than if the investor directly and individually negotiated with such an advisor. The advisory fee is lower because of the larger size of assets managed, as well as the reduced costs of searching for an investment manager and obtaining information about the securities. Also, the costs of transacting in the securities are reduced because a fund is better able to negotiate transaction costs, and custodial fees and recordkeeping costs are less for a fund than for an individual investor. For these reasons, there are said to be economies of scale in investment management.

Third, and related to the first two advantages, is the advantage of the professional management of the mutual fund. Fourth is the advantage of liquidity. Mutual funds can be bought or liquidated any day at the closing NAV. Fifth is the advantage of the variety of funds available, in general, and even in one particular funds family, as discussed below. Finally, money market funds and some other types of funds provide payment services by allowing investors to write checks drawn on the fund, although this facility may be limited in various ways.

Key Points That You Should Understand Before Proceeding

1. A mutual fund can reduce risk through portfolio diversification.
2. A mutual fund can reduce a variety of costs related to investment and management of portfolios.
3. A mutual fund can provide liquidity.

TYPES OF FUNDS BY INVESTMENT OBJECTIVE

Mutual funds have been provided to satisfy the various investment objectives of investors. In general, there are stock funds, bond funds, money market funds, and others. Within each of these categories, there are several subcategories of funds. There are also U.S.–only funds,

international funds (no U.S. securities), and global funds (both U.S. and international securities). There are also passive and active funds. Passive (or indexed) funds are designed to replicate an index, such as the S&P 500 Stock Index, the Lehman Aggregate Bond Index, or the Morgan Stanley Capital International EAFE Index (Europe, Australasia, and the Far East). Active funds, on the other hand, attempt to outperform an index and other funds by actively trading the fund portfolio. There are also many other categories of funds, as discussed below. Each fund's objective is stated in its prospectus, as required by the SEC and the "1940 Act," as discussed in the following text.

Stock funds differ by

- the average market capitalization ("market cap"—large, mid, and small) of the stocks in the portfolio
- style (growth, value, and blend)
- sector—"sector funds" specialize in one particular sector or industry, such as technology, health care, or utilities
- other ways

The categories for market cap, while not fixed over time, have recently been approximately:

- small—$0 to $2 billion
- mid—$2 billion to $10 billion
- large—more than $10 billion

With respect to style, stocks with high price-to-book and price-to-earnings ratios are considered "growth stocks," and stocks with low price-to-value and price-to-earnings ratios are considered value stocks, although other variables, such as the dividend yield, are also considered. There are also *blend stocks* with respect to style, that is, stocks midway between growth and value.

Bond funds differ by the creditworthiness of the issuers of the bonds in the portfolio (for example, U.S. government, investment-grade corporate, and high-yield corporate) and by the maturity (or duration) of the bonds (long, intermediate, and short). There is also a category of bond funds called municipal bond funds whose coupon interest is tax exempt. Municipal funds may also be single state (that is, all the bonds in the portfolio were issued by issuers in the same state) or multistate.

There are also other categories of funds such as asset allocation, hybrid, balanced, or target date funds (all of which hold both stocks and bonds), Balanced funds maintain a fixed proportion of stocks and bonds. For example, a "moderate" balanced fund may maintain a 60%/40% stock/bond mix and a "conservative" balanced fund maintain a 40%/60% stock/bond mix.

Another subcategory of the stock/bond hybrid category is the target-date funds (also **life-cycle funds**). Target-date funds are mutual funds that base their asset allocations on a specific date, the assumed retirement date for the investor, and then rebalance to a more conservative allocation as that date approaches. Target-date funds are designed to be "one-size-fits-all" portfolios for investors with a given number of years to retirement. Some investors choose not to manage their own retirement accounts and prefer a "set-it-and-forget-it" approach. The portfolio allocation varies by the number of years to retirement but not for other reasons specific to the investor. For example, in 2010, target-date funds with the following target dates might have the following stock/bond allocations.

Target Date	Stock/Bond Mix
2010	10%/90%
2020	40%/60%
2030	60%/40%
2040	90%/10%

Target-date funds are relatively recent additions to mutual funds and have grown rapidly. One reason for the growth is that target-date funds have been specified as one of the default options for the Pension Protection Act of 2006, according to which employers can direct their employee's funds if they do not make an allocation choice themselves.

The first generation of target-date funds had fairly simple asset allocations. For example, in 2010, a 30-year-old investor who planned to retire at 65 would invest in a 2045 target-date fund. A specific target-date fund might specify a 70%/30% U.S. stocks/bonds allocation. Such an allocation prompts two types of questions. First is whether 70%/30% is the optimal mix. Some observers assert that 70%/30% is too cautious for a 30-year-old—an 80%/20% might be more appropriate. Others would assert that this mix is too aggressive and a 60%/40% would be more appropriate. For example, in January 2008, the 2030 target-date funds from Fidelity, Vanguard, and T. Rowe Price were 81%, 86%, and 85%, respectively.[8] This issue could never be resolved in a "one-size-fits-all" product. To better address this issue, the risk tolerance on an individual investor basis must be considered.

There is also a category of money market mutual funds (maturities of one year or less) which provide protection against interest rate fluctuations. These funds can have some degree of credit risk (except for the U.S. government money market category). Many of these funds offer check-writing privileges. In addition to taxable money market funds, there are also tax-exempt, municipal money market funds.

Among the other fund offerings are *index funds*. Index funds, as discussed above, attempt to passively replicate an index. The number and type of index funds, and the amounts invested in them, have grown dramatically. ETFs, discussed later in this chapter, have provided significant competition to mutual fund index funds.

Several organizations provide data on mutual funds. These firms provide data on fund expenses, portfolio managers, fund sizes, and fund holdings. But perhaps most importantly, they provide performance (that is, rate of return) data and rankings among funds based on performances and other factors. To compare fund performance on an "apples-to-apples" basis, these firms divide mutual funds into several categories that are intended to be fairly homogeneous by investment objective. The Morningstar categories are shown in Table 4. By using these categories, for example, the performance of one Morningstar "large cap blend" fund can be meaningfully compared with another fund in the same category but not with a "small cap value" fund. Morningstar's ranking system, whereby each fund is rated from one star (the worst) to five stars (the best) relative to the other funds in its category, is well known.

Mutual fund data are also provided by the Investment Company Institute, the national association for mutual funds. Table 5 provides data on the assets of the major fund categories as reported by the Investment Company Institute.

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[8] Jenna Gottlieb, "Benchmarks Sought for Target-Date Funds," *Financial Week*, January 28, 2008, p. 4.

Table 4 Morningstar Fund Categories

Morningstar
LG Large Growth
LV Large Value
LB Large Blend
MG Mid Cap Growth
MV Mid Cap Value
MB Mid Cap Blend
SG Small Growth
SV Small Value
SB Small Blend
DH Domestic Hybrid
FS Foreign Stock
WS World Stock
ES Europe Stock
EM Diversified Emerging Mkt
DP Diversified Pacific Asia
PJ Pacific Asia ex-Japan
JS Japan Stock
LS Latin America Stock
IH International Hybrid
ST Technology
SU Utilities
SH Health
SC Communication
SF Financial
SN Natural Resources
SP Precious Metals
SR Real Estate

Morningstar
CS Short Term Bond
GS Short Government
GI Interm Government
CI Inter-Term Bond MT
CL Long Term Bond
GL Long Government
CV Convertibles
UB Ultrashort Bond
HY High Yield Bond
MO Multisector Bond
IB International Bond
EB Emerging Bond
ML Muni National Long
MI Muni National Interm
SL Muni Single St. Long
SI Muni Single St. Interm
SS Muni Single St. Short
MY Muni New York Long
MC Muni California Long
MN Muni New York Interm/Short
MF Muni California Interm/Short

Key Points You Should Understand Before Proceeding

1. In order to meet investor needs, mutual funds offered in the market differ by a variety of measures such as asset category (stock vs. bond, etc.); management style (active vs. passive); market segment (small cap vs. large cap in stock funds, investment grade versus speculative grade in bond funds); and other such measures.
2. Organizations such as Morningstar and Lipper provide key performance data on mutual funds in ways that facilitate meaningful comparisons among them.

Table 3: Major Fund Assets for Major Fund Categories (as of January 2008)

	Net Assets ($ billion)	% of Total Assets	Number of Mutual Funds
Stock Funds	**6,037.10**	**51.5**	**4,799**
Hybrid Funds	690.80	5.9	489
Taxable Bond Funds	**1,337.60**	**11.4**	**1,299**
Municipal Bond Funds	379.60	3.2	672
Taxable Money Market Funds	**2,804.40**	**23.9**	**556**
Tax-Free Money Market Funds	478.50	4.1	260
Total	**11,728**	**100**	**8,075**

Source: *ICI Statistics & Research, Investment Company of America, February 2008 (www.ici.org).*

THE CONCEPT OF A FAMILY OF FUNDS

A concept that revolutionized the fund industry and benefitted many investors is what the mutual fund industry calls a *family of funds*, a group of funds or a complex of funds provided by the same fund company. That is, many fund management companies offer investors a choice of numerous funds with different investment objectives in the same fund family. In many cases, investors may move their assets from one fund to another within the family at little or no cost, and with only a phone call. Of course, if these funds are in a taxable account, there may be tax consequences to the sale. Although the same policies regarding loads and other costs may apply to all the members of the family, a management company may have different fee structures for transfers among different funds under its control.

Large fund families usually include money market funds, U.S. bond funds of several types, global stock and bond funds, broadly diversified U.S. stock funds, U.S. stock funds that specialize by market capitalization and style, and stock funds devoted to particular sectors such as health care, technology, or gold companies. Well-known management companies such as American Funds, Vanguard Group, and Fidelity Investments, the three largest fund families, sponsor and manage varied types of funds in a family. Fund data provided in newspapers group the various funds according to their families. For example, all the American Funds are listed under the American Funds heading, all the Vanguard funds are listed under their name, and so on.

Key Points That You Should Understand Before Proceeding

1. The meaning of the term *family of funds.*
2. The economic benefits that a family of funds can offer to investors.

Concentration in the mutual fund industry continues to increase. The three largest fund families are the American Funds with over $1.5 trillion in funds, followed by Vanguard and then Fidelity, both with over $1 trillion. At the end of September 2007, these

three families held approximately 38% of all the U.S. mutual fund assets. And most of the new fund flows continue to go to these three. Interestingly, American Funds is a load family (with 5.75% load on its A shares), which offers only active funds; and Vanguard and Fidelity are no-load families, which offer a mix of passive and active funds. These funds seem to be growing quickly because of their strong brands and because there is believed to be economics of scale due to research costs and advertising. It becomes difficult for small and mid-sized firms to increase their expense ratios because investors and some of the mutual fund analysts like Morningstar are very expense-sensitive. Mergers and acquisitions continue to reduce the number of small and mid-sized firms. At the other end of the size spectrum, there are a number of small, niche firms that focus on one unique investing style.

INVESTMENT VEHICLES FOR MUTUAL FUNDS

Mutual funds may be included in several different investment vehicles. For example, the Vanguard S&P500 Index Fund, the Fidelity Contra Fund or the American Funds Growth Fund of America can be sold as a standard taxable investment instrument (as a no-load fund or a class A, B, C, F, or other load fund, whichever it is). This vehicle is often referred to as a *nonqualified vehicle* because it does not quality for tax advantages.

The same fund can also be included in a retirement plan such as a 401(k), Roth 401(k), IRA, or Roth IRA plan. These retirement plans are called *qualified plans* because they qualify for tax advantages. The same fund can also be included in a 529 educational plan or a variable annuity.

Each placement of these funds requires a separate portfolio on the fund family's books, but the portfolios are "look-alikes" and should have approximately the same returns.

MUTUAL FUND COSTS

Investors are very cost-sensitive. The competition among funds is very tough and costs are an important element of the competition. The Investment Company Institute (ICI) has developed a measure that combines a fund's annual expense ratio and the annualized sales charge investors pay for one-time sales loads (front and back). This measure is weighted by the assets in the funds. From 1980 to 2006, this measure declined from 2.32% to 1.07% for stock funds and from 2.05% to 0.84% for bond funds. There were three reasons for this decline. First, loads in general declined and investors have shifted, in general, to lower load funds. In addition, the use of funds in retirement plans has grown significantly and loads are usually waived on these funds. Second, the growth in no-load mutual funds, both the traditional direct sales and sales through fund supermarkets and discount brokers, also contributed to this decline. Finally, mutual fund expenses have also declined due to economies of scale and intense competition in the mutual fund industry.

The ICI provides data that permit investors to assess annual expenses independently of the sales charge or load. First, they calculate the simple average of annual expense ratios available in the market. They then calculate the average expense ratio mutual fund shareholders actually paid; this is the asset-weighted average expense ratio across all the funds. For 2006, the simple average expense ratio was 1.51% and the average expense ratio actually paid by shareholders was 0.87%. Thus, mutual fund shareholders actually paid expense ratios in the lower part of the range of the funds available in the market.

TAXATION OF MUTUAL FUNDS

Mutual funds must distribute at least 90% of their net investment income earned (bond coupons and stock dividends) exclusive of realized capital gains or losses to shareholders (along with meeting other criteria) to be considered a *regulated investment company* (RIC). If so, the fund is not required to pay taxes at the fund level prior to distributions of the returns to shareholders. Consequently, in practice funds always make these 90% distributions. Taxes are then paid on distributions only at the investor level, not the fund level. Even though many mutual fund investors choose to reinvest these distributions, the distributions are taxable to the investor, either as ordinary income or capital gains (long term or short term), whichever is relevant.

Capital gains distributions must occur annually, and typically occur late during the calendar year. The capital gains distributions may be either long-term or short-term capital gains, depending on whether the fund held the security for a year or more. Mutual fund investors have no control over the size of these distributions and, as a result, the timing and amount of the taxes paid on their fund holdings is largely out of their control. In particular, withdrawals by some investors may necessitate sales in the fund, which, in turn, cause realized capital gains and a tax liability to accrue to investors who maintain their holding.

New investors in the fund may assume a tax liability even though they have no gains. That is, all shareholders as of the date of record of the distribution receive a full year's worth of dividends and capital gains distributions, even if they have owned shares for only one day. This lack of control over capital gains taxes is regarded as a major limitation of mutual funds. In fact, this adverse tax consequence is one of the reasons suggested for a closed-end company's price selling below par value. Also, this adverse tax consequence is one of the reasons for the popularity of exchange-traded funds, to be discussed later.

Of course, the investor must also pay ordinary income taxes on distributions of income (e.g., bond interest payments). Finally, when the fund investors sell the fund, they will have long-term or short-term capital gains or losses, depending on whether they held the fund for a year or not.

Key Points You Should Understand Before Proceeding

1. Mutual funds must distribute at least 90% of their investment income in order to avoid taxation at the fund level.
2. Fund investors have no control over the size or timing of capital gains distributions, and consequently the associated tax liabilities.

REGULATION OF FUNDS

There are four major laws or acts that relate either indirectly or directly to mutual funds. The first is the Securities Act of 1933 ("the '33 Act"), which provides purchasers of new issues of securities with information regarding the issuer and, thus, helps prevent fraud. Because open-end investment companies issue new shares on a continuous basis, mutual funds must also comply with the '33 Act. The Securities Act of 1934 ("the '34 Act") is concerned with the trading of securities once they have been issued, with the regulation of exchanges, and with the regulation of broker-dealers. Mutual fund portfolio managers must comply with the '34 Act in their transactions.

All investment companies with 100 or more shareholders must register with the SEC according to the Investment Company Act of 1940 ("the '40 Act"). The primary purposes of the '40 Act are to reduce investment company selling abuses and to ensure that investors receive sufficient and accurate information. Investment companies must provide periodic financial reports and disclose their investment policies to investors. The '40 Act prohibits changes in the nature of an investment company's fundamental investment policies without the approval of shareholders. This act also provides some tax advantages for eligible RICs, as indicated below. The purchase and sale of mutual fund shares must meet the requirements of fair dealing that the SEC '40 Act and the NASD, a self-regulatory organization, have established for all securities transactions in the United States.

Finally, the Investment Advisors Act of 1940 specifies the registration requirements and practices of companies and individuals who provide investment advisory services. This act deals with registered investment advisors (RIAs). Overall, although an investment company must comply with all aspects of the '40 Act, it is also subject to the '33 Act, the '34 Act, and the Investment Advisors Act of 1940.

The SEC also extended the '34 Act in 1988 to provide protections so that advertisements and claims by mutual fund companies would not be inaccurate or misleading to investors. New regulations aimed at potential self-dealing were established in the Insider Trading and Securities Fraud Enforcement Act of 1988, which requires mutual fund investment advisors to institute and enforce procedures that reduce the chances of insider trading.

An important feature of the '40 Act exempts any company that qualifies as a "regulated investment company" from taxation on its gains, either from income or capital appreciation, as previously indicated. To qualify as an RIC, the fund must distribute to its shareholders 90% of its net income excluding capital gains each year. Furthermore, the fund must follow certain rules about the diversification and liquidity of its investments and the degree of short-term trading and short-term capital gains.

Fees charged by mutual funds are also, as noted above, subject to regulation. The foundation of this regulatory power is the government's de facto role as arbiter of costs of transactions regarding securities in general. For example, the SEC and the NASD have established rules as part of the overall guide to fair dealing with customers about the markups dealers can charge financial institutions on the sale of financial assets. The SEC set a limit of 8.5% on a fund's load but allows the fund to pass through certain expenses under the 12b-1 rule. Effective July 1, 1993, the SEC amended the rule to set a maximum of 8.5% on the total of all fees, inclusive of front-end and back-end loads as well as expenses such as advertising.

Some funds charge a 12b-1 fee, as authorized by the '40 Act. The 12b-1 fee may be divided into two parts. The first component is a *distribution fee*, which can be used for fund marketing and distribution costs. The maximum distribution fee is 0.75% (of net assets per year). The second is a *service fee* (or *trail commission*), which is used to compensate the sales professionals for their ongoing services. The maximum service fee is 0.25%. Thus, the maximum 12b-1 fee is 1%. While no-load funds can have 12b-1 fees, the practice has been that in order to call itself a no-load fund, its 12b-1 fee must be at most 0.25% (all of which would be a distrubution fee). In general, the distribution fee component of the 12b-1 fee is used to develop new customers while the service fee is used for servicing existing customers.

A rule called "prospectus simplification" or "Plain English Disclosure" was enacted on October 1, 1998, to improve the readability of the fund prospectus and other fund documents. According to the SEC, prospectuses and other documents were being written by

lawyers for other lawyers and not for the typical mutual fund investor. This initiative mandated that prospectuses and other documents be written from then on in "plain English" for individual investors.

A reporting change has been that the portfolio holdings must be provided to shareholders on a quarterly basis, within 45 days after the end of the quarter.

Among the recent SEC priorities that directly affect mutual funds are the following:

1. Reporting after-tax fund returns. This pending requirement would require funds to display the preliquidation and postliquidation impact of taxes on one-, five-, and 10-year returns both in the fund's prospectus and in annual reports. Such reporting could increase the popularity of tax-managed funds (funds with a high tax efficiency).
2. More complete reporting of fees, including fees in dollars-and-cents terms as well as in percentage terms.
3. More accurate and consistent reporting of investment performance.
4. Requiring fund investment practices to be more consistent with the name of a fund to more accurately reflect its investment objectives. The SEC requires that 65% of a fund's assets be invested in the type of security that its name implies (e.g., health care stocks).
5. Disclosing portfolio practices such as "window dressing" (buying or selling stocks at the end of a reporting period to include desired stocks or eliminate undesired stocks from the reports in order to improve the appeared composition of the portfolio) and "portfolio pumping" (buying shares of stocks already held at the end of a reporting period to improve performance during the period).
6. Various rules to increase the effectiveness of independent fund boards.

Key Points That You Should Understand Before Proceeding

1. The '33 Act, the '34 Act, the '40 Act, and the Investment Advisors Act of 1940.
2. The relevance of these acts to a mutual fund.
3. Important aspects of being a regulated investment company (RIC).
4. Recent SEC priorities impacting mutual funds.

STRUCTURE OF A FUND

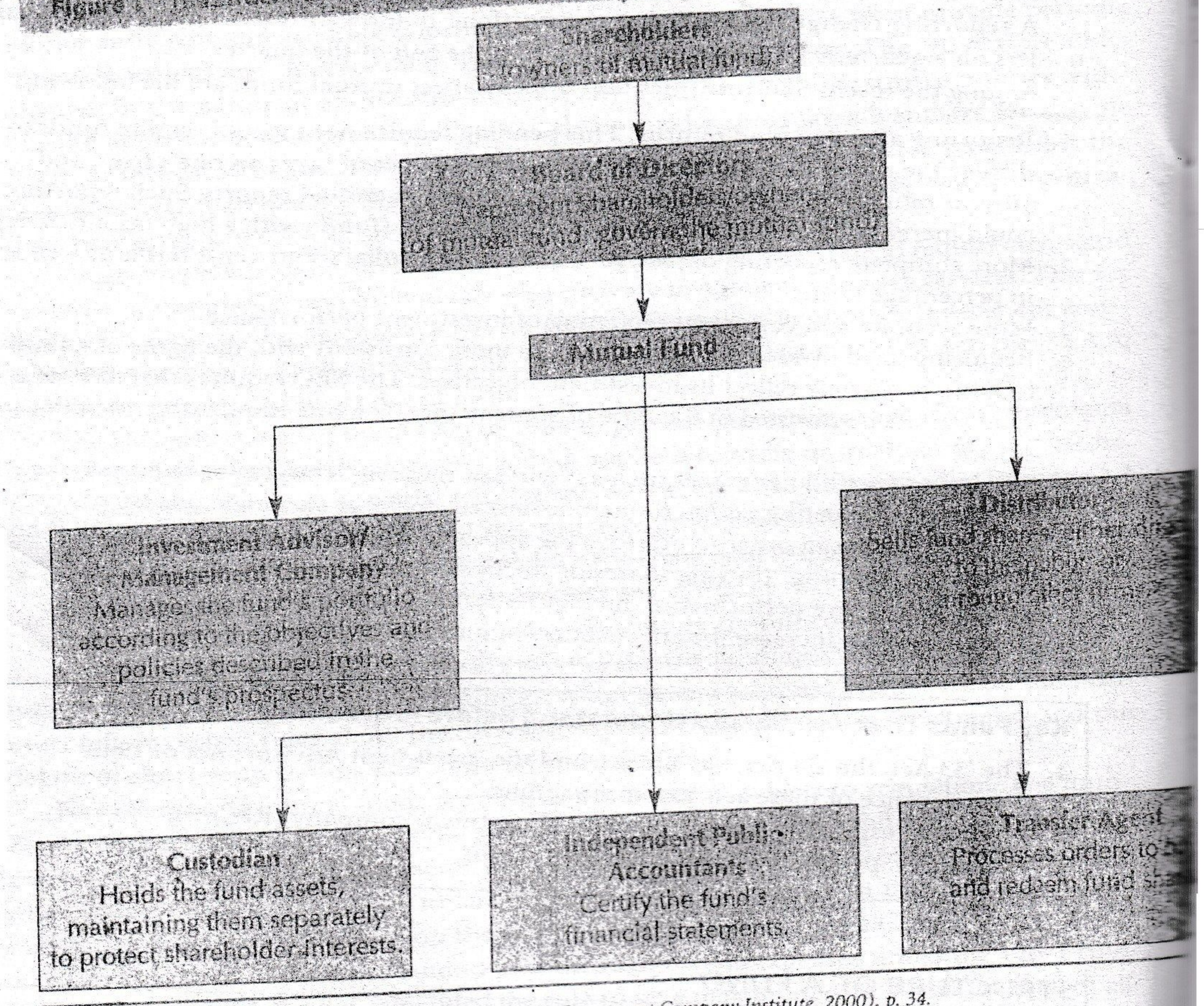
A mutual fund organization is structured as follows:

1. a *board of directors* (also called the *fund trustees*), which represents the *shareholders* who are the owners of the mutual fund
2. the mutual fund, which is an entity based on the Investment Company Act of 1940
3. an *investment advisor*, who manages the fund's portfolios and is a registered investment advisor (RIA) according to the Investment Advisor's Act of 1940
4. a *distributor* or broker-dealer, who is registered under the Securities Act of 1934
5. other service providers, both external to the fund (the independent public accountant, custodian, and transfer agent) and internal to the fund (marketing, legal, reporting, etc.)

The structure is illustrated in Figure 1.

The role of the **board of directors** is to represent the fund shareholders. The board is composed of both "interested" (or "inside") directors who are affiliated with the investment

Figure [illegible] Structure of a Mutual Fund



Source: *Mutual Fund Fact Book, 40th ed. (Washington, D.C.: Investment Company Institute, 2000), p. 34.*

company (current or previous management) and "independent" (or "outside") directors who have no affiliation with the investment company. A majority of the board must be outside directors.

The mutual fund enters into a contract with an investment advisor to manage the fund's portfolios. The *investment advisor* can be an affiliate of a brokerage firm, an insurance company, a bank, an investment management firm, or an unrelated company. The distributor, which may or may not be affiliated with the mutual fund or investment advisor, is a broker-dealer. The role of the custodian is to hold the fund assets, segregating them from other accounts to protect the shareholders' interests. The transfer agent processes orders to buy and redeem fund shares, transfers the securities and cash, collects dividends and coupons, and makes distributions. The independent public accountant audits the fund's financial statements.

Some fund families manage all their funds internally. Other fund families use external managers to manage all or a portion of their internal funds. As explained earlier in this chapter, these external advisers are called *subadvisors*. There are several reasons why a family of funds would use subadvisors. Among them are

- developing a fund in an area in which the fund family has no expertise such as international stocks or bonds or alternative assets
- improving performance
- increased assets under management
- obtaining an attractive manager at a reasonable cost

Subadvised assets have grown faster than assets managed internally: From 2003 to 2006, subadvised assets grew at an annual rate of 27% compared to 23% for internally managed funds. Over this period, the market share of subadvised assets grew to 14% from 10%.[9]

Key Points That You Should Understand Before Proceeding

1. The duties of the investment advisor of a fund.
2. The role of the board of directors.

RECENT CHANGES IN THE MUTUAL FUND INDUSTRY

There have been several significant recent changes in the mutual fund industry in addition to those discussed previously in this chapter.

Distribution Channels

As explained earlier in this chapter, at the beginning of the 1990s, there were two primary distribution channels, direct sales to investors and sales through brokers. Since then, fund companies and fund distributors developed and expanded sales channels in the 1990s beyond the two traditional channels. Fund companies' use of multiple distribution channels has resulted in a blurring of the distinction between direct and sales-force funds that had characterized funds at the beginning of the 1990s.

Fund companies and distribution companies have developed new outlets for selling mutual funds and expanded their traditional sales channels. The changes that occurred are evident in the rising share of sales through third parties and intermediaries.

Significant market trends account for these changes. In particular, many funds that had previously marketed only directly turned increasingly toward third parties and intermediaries for distribution (thereby changing from no-load fund to a load fund, called "loading the fund). The nontraditional, third-party distribution channels used by direct-market funds were mutual fund supermarkets; mutual fund wrap-account programs; fee-based advisors; variable annuities; employer-sponsored pension plans; and bank trust departments.

Like direct-market funds, funds that were traditionally sold through a sales force have moved increasingly to nontraditional sources of sales such as employer-sponsored pension plans, banks, and life insurance companies. In the following text, we describe the various nontraditional distribution channels.

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[9] Sue Asci, "Subadvisers are Grabbing a Larger Piece of the Market," *Investment News*, November 12, 2007.

Supermarkets

The introduction of the first mutual fund supermarket in 1992 marked the beginning of a significant change in the distribution of direct market funds. Specifically, during 1992, Charles Schwab & Company introduced its One Source service. With this and other supermarket programs, the organizer of the supermarket offers funds from a number of different mutual fund companies. These supermarkets allow investors to purchase funds from participating companies without investors having to contact each fund company. The organizer of the supermarket also provides the investor with consolidated record keeping and a simple account statement.

These services provide a program to provide access to multiple fund families under one roof and to help service the back-office needs of financial advisors. Through this service, investors can access many mutual fund families through one source.

On the one hand, these services make a mutual fund family more accessible to many more investors; on the other hand, they break the direct link between the mutual fund and the investor. According to these services, the mutual fund company does not know the identity of its investors through the supermarkets; only the supermarket, which distributes the funds directly to the investor, knows their identity. These supermarkets fit the needs of fee-based financial planners very well. For individual investors and planners as well, supermarkets can offer one-stop shopping, including the current "best of the breed." Currently, in addition to Schwab, there are other major mutual fund supermarkets. The investor pays the standard charge for the underlying funds plus the asset-based fee for the adviser in which the funds are wrapped, usually 1%.

While the method of charging by these supermarkets varies, a common method is as follows. The supermarket fund (call it SM) through its brokerage arm distributes mutual funds of other fund families (call them FF), both no-load and load funds. Consider first a no-load in an FF. The FF may either impose a transaction fee on the SM's customers or not, depending on an agreement between the SM with the specific FF. If the fund family chooses to impose no transaction fee, the SM conducts the transaction for its clients for the fund in the FF with no transaction fee. If the FF imposes a transaction fee, the SM will impose the transaction fee on its client and pass it through to the FF. The material provided by the FF in the SM will indicate whether or not there is a transaction fee. Load funds of other FF may also be distributed by a SM. In this case, there is no transaction fee, but the SM will impose the load depending on the share class (e.g., class A, B, C, or other) and pass it through to the FF.

Wrap Programs

Wrap accounts are managed accounts, typically mutual funds or ETFs "wrapped" in a service package. The service provided is often asset allocation counsel, that is, advice on the mix of managed funds or ETFs. Thus, wrap programs provide investors with advice and assistance for an asset-based fee rather than the traditional front-end load. Wrap products are currently offered by many fund and nonfund companies. Wrap accounts are not necessarily alternatives to mutual funds but represent a different way to package the funds.

Traditional direct-market funds as well as sales-force funds are marketed through this channel.

Fee-Based Financial Advisors

Fee-based financial advisors are independent financial planners who charge investors a fee rather than a transaction charge (a load) for investment services. These fees are typically a percentage of assets under management or alternatively an hourly fee, or a fixed retainer.

In return, they provide investment advice to their clients by selecting portfolios of mutual funds and securities. While most planners recommend mutual funds or ETFs to their clients, some recommend portfolios of planner-selected securities.

Variable Annuities

Variable annuities represent another distribution channel. Variable annuities are described as "mutual funds in an insurance wrapper." Among their insurance features are the tax deferral of investment earnings until they are withdrawn and higher charges (there is a mortality charge for the insurance provided). Variable annuities are sold through insurance agents and other distributors as well as directly through some fund companies.

Changes in the Costs of Purchasing Mutual Funds

The purchase cost of mutual funds has declined significantly. Purchase cost is measured by total shareholder costs, which includes both costs from annual fund expenses and from transaction-based sales loads. The decline in total shareholder costs occurred across all major types of funds.

In general, load funds responded to the competition of no-load funds by lowering distribution costs. Distribution cost is defined as the sum of the annualized sales load and 12b-1 fees. The distribution cost is the component of total shareholder cost that reflects the cost of advice and assistance provided by brokers and sales professionals to buyers of mutual funds.

Load funds lowered distribution costs, in part, by reducing front-end sales loads. In addition, load funds introduced alternatives to front-end loads that, depending on the investor's circumstances, could be less costly than front-end loads as a means of compensating sales professionals. One common distribution cost structure combined a 12b-1 fee with a contingent deferred sales load that would be paid by the investor when the shares were redeemed and, depending on the time the fund was held, could be zero.

The reduction in and reallocation of distribution costs since 1990 has been significant. For both equity and bond funds, the lowering of front-end loads along with the growth of alternatives to front-end loads together with more funds adopting 12b-1 fees resulted in 12b-1 fees becoming a much larger portion of distribution costs. A final element in the decline of total shareholder cost was the achievement of economies of scale by many individual costs. Some of the annual fund expenses, mainly those included in "other expenses" and those affected by breakpoints, have declined with the increase in size of some of the larger funds.

Mix and Match

Until recently, fund manufacturers distributed only their own funds; fund distributors distributed only one manufacturer's funds; and typically, employee-defined contribution plans, such as 401(k)s, offered funds from only one distributor. However, the investors' demands for choice and convenience, and also the distributors' need to appear objective, have motivated essentially all institutional users of funds and distribution organizations to offer funds from other fund families in addition to their own (that is, if they also manufacture their own funds). In addition, mutual fund supermarkets distribute funds of many fund families with considerable facility and low costs. This is called "open architecture."

The balance of power between fund manufacturers and distributors currently significantly favors distribution. That is, in general there are more funds available than distributors to sell them. Currently, in the mutual fund business, "distribution is king."

Domestic Acquisitions in the U.S. Funds Market

The merger and acquisition (M&A) business in the U.S. asset management business has been active. Just as there has been much M&A activity with fund families being both the acquirer and the acquired, there have also been many "deals" where a U.S. fund family was on one side of the deal and a nonfund U.S. asset manager was on the other. The former type of combination represents the increase in the scale of the mutual fund business, as previously discussed. The latter represents the continued homogenization of asset management in the United States; that is, there has been a consolidation among the following types of asset management:

mutual funds/variable annuities
institutional
- defined benefit
- foundation/endowment

individual/Separate Account/High Net Worth Individual

The U.S. asset management business continues to grow and consolidate across the various types of asset management.

Internationalization of the U.S. Funds Business

The combination of a U.S. fund company and an international asset manager could occur in either of two directions, that is, with either being the acquirer. But the dominant direction recently has been in the direction of an international asset manager acquiring a U.S. fund company. The reasons U.S. and international asset managers have aggressively acquired U.S. funds include the rapidly growing U.S. mutual fund business; continuing deregulation of the U.S. asset management business; and the general regulatory framework in the United States.

Key Points You Should Understand Before Proceeding

1. During the past decade, indirect sales of mutual funds through intermediaries have grown relative to direct sales.
2. The meaning of the following terms in the context of mutual funds: supermarket, wrap program, variable annuity.
3. The total shareholder costs of owning a mutual fund have decreased in recent years due to a reduction in distribution costs, and due to economies of scale in other fund expenses.

ALTERNATIVES TO MUTUAL FUNDS

Due to the success of mutual funds, investment companies have developed several alternatives to mutual funds. The major alternatives to mutual funds are exchange-traded funds and segregated accounts.

EXCHANGE-TRADED FUNDS

As discussed in this chapter, mutual funds have become very popular with individual investors since the 1980s. However, they are often criticized for two reasons. First, mutual funds shares are priced at, and can be transacted only at, end-of-the-day (closing) prices. Specifically, transactions (i.e., purchases and sales) cannot be made at intraday prices, but only at the end-of-the-day closing prices. The second issue relates to taxes and investors' control over taxes. As noted earlier in this chapter, withdrawals by some fund shareholders can cause taxable realized capital gains (or losses) for other shareholders even though they maintain their positions.

Closed-end funds, in contrast, trade all during the day on a stock exchange. However, there is often a difference, in many cases a large difference, between the NAV of the underlying portfolios and (the value of the assets in the portfolios less its liabilities) and the price of the closed-end funds that are bought and sold—this difference is called a premium (the price of the closed-end fund is greater than the NAV), or a discount in the opposite case.

Thus, both mutual funds and closed-end funds are similar in that they are instruments based on the portfolios of their securities, which have a market value, the NAV. But closed-end funds are transacted continuously throughout the day because they are traded on an exchange. For this reason, they can be shorted and traded on margin. However, because the quantity of closed-end funds is fixed, the price at which the closed-end fund instrument trades throughout the day can be greater than or less than the NAV of the underlying portfolios; that is, closed-end funds can trade at a premium or discount to the NAV of the underlying portfolios.

Mutual fund shares, on the other hand, are always exchanged at a price equal to their NAV because the mutual fund sponsor will always issue new fund shares or redeem outstanding fund shares at NAV on a daily basis. Thus, the quantity of fund shares outstanding can increase or decrease (this is why a mutual fund is called an "open-end fund"). But because the mutual fund company cannot quickly and accurately value the portfolios of most mutual fund shares, they can redeem the shares of mutual funds only once a day, at the closing price for the day, and even then for many portfolios, with a significant delay after 4:00 P.M. The 4:00 P.M. EST closing time of the New York Stock Exchange is used as the time for the closing prices of most mutual funds. All mutual fund orders received after the previous 24 hours are settled at this single closing price (for illiquid portfolios, this closing price may not be available until the evening).

Would it not be ideal, the question is often posed, if there were an investment that embodied a combination of the desirable aspects of mutual funds (open-end-funds) and also closed-end funds? The resolution to this dichotomy would require portfolios to be traded like stocks throughout the day at a price equal to the continuously known NAV (that is, the price is not at a premium or discount to its NAV). Such an investment vehicle would be, in effect, a portfolio or fund traded on an exchange, hence called an **exchange-traded portfolio** or more commonly an ETF. At a very basic level, ETFs are easily understood. Most are essentially index funds. ETFs are different than conventional index funds in the way they are bought and sold. An ETF is traded throughout the day over an exchange, just like a stock. That means you can execute the types of orders (market, limit, and stop-loss orders) for ETFs, just as with individual stocks. ETFs can also be sold short or bought on margin (i.e., with borrowed money), and it is even possible to trade options on many ETFs. Since they trade on exchanges, they all have a ticker symbol.

ETFs are like open-end funds because their number of shares outstanding can change, as discussed below.

To assure that the price of the ETF would be very close to the continuously known NAV of the portfolio, an agent could be commissioned to arbitrage between the ETF and the underlying portfolio and keep their values equal. This agent could be commissioned to conduct a profitable arbitrage whereby it would buy the cheap ETF and sell the expensive underlying portfolio (at NAV) when the price of the ETF was less than the NAV of the underlying portfolio, and vice versa. This would be a profitable arbitrage for the agent since it buys the cheap ETF and sells the expensive portfolios or vice versa. This arbitrage would tend to maintain the price of the ETF to be very close (or equal) to that of the NAV. The agent who keeps the price of the ETF equal to (or close to) the portfolio's underlying NAV is, thus, called an *arbitrageur.*

The requirement for making this arbitrage process feasible would be that the composition and the NAV of the underlying portfolio be known accurately and continuously traded throughout the trading day. An example of such a portfolio would be the S&P 500 Index portfolio. The 500 stocks in the index are very liquid and their prices and the value of the index are quoted continuously throughout the trading day.

Thus, it is no coincidence that the first ETF was based on the S&P 500 Index. It began on January 1, 1993, at the American Stock Exchange with State Street Global Advisers (SSgA) as its adviser. Its ticker symbol was SPY and it quickly became known as the "Spider." However, this process would not be feasible for the typical actively managed mutual fund because the composition of its portfolios is not known throughout the trading day. Specifically mutual funds are required to make the composition of their funds public only four times a year and then only 45 days after the date of portfolio report.

So ETFs are feasible for indexes on broad liquid security indexes but not on typical actively managed mutual funds. Sustained efforts have been made, however, to develop ETFs on actively managed funds. The status of these efforts will be developed below.

Since their advent in 1993, ETFs have grown rapidly. At the end of 2007, there were 629 ETFs with assets of $608.4 billion versus 8,031 mutual funds with assets of $12,020.1 billion and 668 closed-end funds with assets of $314.9 billion. ETFs require SEC approval. The original ETFs were based on well-known stock and bond indexes, both U.S. and international. These included the following indexes that we will discuss in later chapters in this book: the S&P 500, Dow Jones Industrial Average, Russell 2000, Lehman Aggregate Bond Index, MSCI EAFE, and MSCI Emerging Markets. These were followed by ETFs based on narrower sector indexes covering financial, health care, industrial, natural resources, precious metals, technology, utilities, real estate, and others. These were, in turn, followed by ETFs based on new and often narrow indexes, specifically designed for ETFs.

Since ETFs are essentially stocks that trade on a stock exchange, they have ticker symbols. The five largest ETFs as of April 1, 2008, (with their ticker symbol shown in parentheses) were SPDR S&P 500 ETF (SPY), iShares MSCI EAFE (EFA), iShares MSCI Emerging Market Index Fund (EEM), street TRACKS Gold Shares ETF (GLD), and PowerShares QQQ Nasdaq 100 (QQQQ). The size of an ETF portfolio is most likely related to its liquidity; bigger ETFs are more liquid. The change in the size of the portfolio as measured by the number of ETF units outstanding demonstrates that ETFs are an "open-end" investment structure. "Open-end" means the fund can create new shares or redeem existing shares to meet market demand. Thus, ETFs are like mutual funds and unlike closed-end funds in this regard.

On March 25, 2008, the first active ETF was launched at the American Stock Exchange: the Bear Stearns Current Yield ETF (ticker symbol: YYY). According to the fund's statement: "The fund differs from an index fund since it is actively managed by its portfolio manager who has the discretion to choose securities for the fund's portfolio consistent with its investment objective." It remains to be seen how successful active ETFs will be in attracting investors and in providing returns.

Exchange-Traded Fund Creation/Redemption Process

When investors invest in a mutual fund, they (or their advisor) purchase shares directly from the fund company at a price equal to the fund's NAV, which is calculated at the end of each trading day based on the market prices of the securities held by the fund. However, the process of buying and selling ETFs works quite differently. Rather than dealing directly with the fund company, investors buy ETF shares from another individual investor via an exchange at a price determined by supply and demand for the ETF, not the ETF's underlying NAV as is the case for mutual funds. The NAV of the underlying portfolios, however, remains calculable, and available, and is dependent on the forces in the underlying securities markets.

For ETFs, individuals do not deal directly with the provider of the ETF (such as Barclays Global Investors (BGI), State Street (SSgA), or Vanguard). That privilege is reserved for a few very large investors called **authorized participants (AP)** who are the arbitragers referred to above. When these authorized participants want to sell ETF shares, they deliver their shares to the provider and in return receive the underlying portfolio of stocks. No cash changes hands. The same process works in reverse for purchases. The authorized participant assembles a portfolio of the stocks (in the same proportion that they are held in the ETF) and delivers the portfolio to the ETF provider, who then delivers the new ETF shares to the authorized participant.

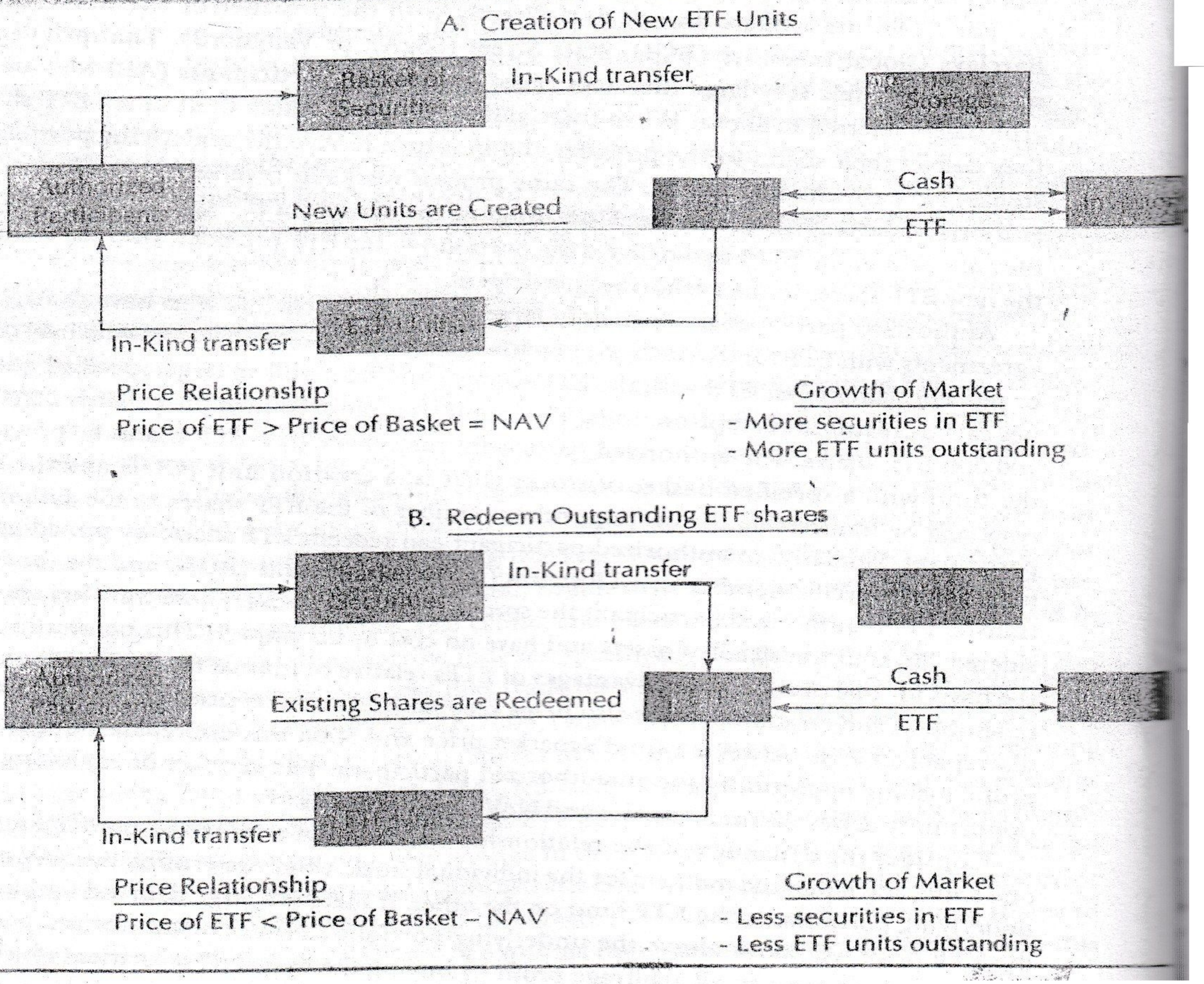
Authorized participants are mainly large institutional traders who have contractual agreements with ETF funds. Authorized participants are the only investors who may create or redeem shares of an ETF with the ETF sponsor and then only in large, specified quantities called **creation/redemption units**. These unit sizes range from approximately 50,000 to 100,000 ETF shares. The authorized participant may create new ETF shares by providing the fund with a specified basket of stocks (that is, a **creation unit** [CU]) and the fund responds by transferring the corresponding number of the ETF shares to the authorized participant. Similarly, an authorized participant can redeem ETF shares by providing the fund with a specific number of ETF shares (a **redemption unit** [RU]), and the fund will transfer to the authorized participant the specific basket of stocks. These transfers are considered "in-kind transfers" of assets and have no cost or tax impact. This tax treatment is the basis for one of the major advantages of ETFs relative to mutual funds. This "in-kind" redemption and creation process also helps keep an ETF's market price close to its NAV. If discrepancies arise between a fund's market price and NAV, this discrepancy opens up a profit-making opportunity for an authorized participant. The very act of exploiting that opportunity drives the market price and NAV closer together.

Consider the dynamics of the relationship between the authorized participants, on one hand, and either the markets for the individual stock, which determine the NAV of the underlying portfolio, or the ETF fund on the other. If there is a large demand for an ETF, the ETF price will move above the underlying portfolio's NAV. The authorized participants will then earn a small arbitrage profit by buying the basket of securities (which are

cheap relative to the ETF), and then engaging in an in-kind transfer of the basket of securities for the ETF units. There are two outcomes of this transfer. First, there are fewer securities available on the market, making the NAV increase and more ETF units available on the market, both of which make the gap between the price of the ETF and the NAV disappear and make the price of the ETF equal to the NAV. The arbitrage by authorized participants has eliminated the gap and so the ETF tracks the underlying basket of securities. Second, the ETF market has grown. There are more ETF units outstanding; the authorized participant could sell the ETFs received on the open market. And the ETF fund has more securities in its portfolios.

The case discussed previously where the ETF's price exceeds the NAV, resulting in the creation of new ETF shares, is illustrated in the top part of Figure 2. The case where the

Figure 2 The Creation/Redemption Process



ETF's price is less than the NAV, resulting in the redemption of ETF shares, is illustrated in the bottom panel of Figure 2. Both demonstrate the open-end nature of ETFs.

The role of the authorized participant is critical in meeting investor expectations. Since ETFs are based on passive indexes where value is represented by the NAV, investors in ETFs expect their return to be equal to that of the portfolio's NAV. This will be the case if the ETF price tracks the NAV perfectly, which is the authorized participant's function. However, if the ETF price does not track the NAV, the return on the ETF the investor actually experiences based on the NAV will be different, either higher or lower. This is called "tracking error." Tracking error is followed by ETF analysts and large tracking error is a negative for ETFs. The difficulty of tracking an active ETF may make such ETFs unattractive to investors.

The open-end aspect of mutual funds is direct; that is, investors invest funds directly in or withdraw funds from the mutual fund. The open-end aspect of ETFs is indirect in that the investors buy the ETF in a closed-end manner like closed-end funds and then the authorized participant arbitrages between the ETF and the underlying portfolio, providing the indirect open-end aspect of the ETF.

For this process to work effectively, the underlying securities need to be known and be liquid. If an authorized participant cannot trade the underlying securities in the exact proportions as they are in the NAV of the portfolios, the share price of an ETF and its NAV could diverge. If the composition of the underlying portfolio is not known exactly throughout the trading day, the arbitrage will be difficult. This issue is discussed below. In addition, this is also not an issue for liquid portfolios but it could be for ETFs based on less liquid portfolios. In either case, the tracking error could be significant.

Large investors are constantly monitoring the ETF market to take advantage of discounts and premiums when they develop. A high degree of transparency is required to make this process possible so that the authorized participants are always aware of what each ETF owns and what its shares are worth. Consequently, ETFs are required to publish their NAVs every 15 seconds throughout the trading day.

Exchange-Traded Fund Sponsors

Like mutual funds, ETFs require a company to sponsor them; these companies are referred to as sponsors for ETFs. The three largest ETF sponsors by size are BGI (their ETFs are called iShares), SSgA, and Vanguard. The ETF sponsor must (1) develop the index, (2) retain the authorized participants, (3) provide seed capital to initiate the ETF, (4) advertise and market the ETF to develop customer executions, and (5) engage in other activities. The authorized participants are typically large financial institutions. Retaining the authorized participants is essential because if the arbitrage between the ETF price and NAV of the portfolio is not effective, the ETF price will not track the portfolio's NAV and their returns may be different. The tracking error of an ETF depends on the liquidity of the underlying portfolios and the ability of the ETF's authorized participant.

Many ETFs employ an index previously developed by another company. The index providers are paid a commission by the sponsor for the use of their index. For example, BGI uses indexes supplied by Dow Jones, FTSE, Lehman Brothers, Morgan Stanley Capital International (MSCI), Morningstar, Russell, Standard & Poor's, and others.

Mutual Funds versus ETFs: Their Relative Advantages

ETFs have grown very rapidly since their introduction in 1993. Obviously ETFs have proved to be very attractive to investors. What are the relative advantages and disadvantages of ETFs?

First, mutual funds are priced only once a day by being redeemed or offered by the fund company at NAV. On the other hand, ETFs are traded on an exchange and so are priced continuously throughout the day. Moreover, because ETFs are traded on an exchange, their shares can be shorted and limit and stop orders can be used. ETFs can also be leveraged, while mutual fund shares cannot be.

Both passive mutual funds and ETFs (most are passive as of this writing) have low fees, but ETF fees tend to be somewhat lower. All ETFs trade on an exchange and, as a result, incur a commission ranging from a discount to a full-service commission. Mutual fund shares may be either no-load funds or load funds. For frequent, small investments (for example, monthly payroll deductions), mutual funds would most likely be better since no-load mutual funds cost nothing to trade and ETFs incur a commission cost. For infrequent, large investments, ETFs may be better because of their lower expenses.

With respect to taxes, as discussed earlier in this chapter, mutual funds may lead to capital gains taxes for investors who do not even liquidate their fund because the fund has to sell securities in their portfolio to fund the sales of shares of other investors. Because of the unique structure of ETFs, ETFs can fund redemptions by in-kind transfers without selling their holdings, which have no tax consequences. ETFs are, therefore, more tax efficient than mutual fund shares.

Mutual funds, however, may have some advantages. First, while ETFs have been exclusively passive or indexes, mutual fund families offer many types of active funds as well as passive funds. In addition, no-load mutual funds, both active and passive, permit transactions with no loads or commissions.

Table 6 provides an overall comparison of ETFs and mutuals. Table 7 compares the taxation of ETFs and mutual funds.

Key Points That You Should Understand Before Proceeding

1. ETFs overcome some of the drawbacks of investing in mutual funds.
2. Like mutual funds, ETFs have an open-end structure.
3. Like closed-end funds, ETFs are exchange traded and investors can place orders like any type of stock, short the shares, and create a leveraged position.
4. A key participant in an ETF is the authorized participant who functions to drive the ETF's price close to the NAV.
5. In an ETF, it is critical that the fund shares track the NAV; a large tracking error makes an ETF less attractive.

Separately Managed Accounts

Many high–net worth individuals object to using mutual funds because of the individual investor's lack of control over taxes, their lack of any input into investment decisions, and the absence of "high-touch" service. The use of **separately managed accounts** (SMAs) or segregated accounts responds to all these limitations of mutual funds. They are, however, more expensive. SMA are what the name indicates, managed accounts that are not

TABLE 6 Mutual Funds versus Exchange-Traded Funds

	Mutual Funds	ETFs
Variety	Wide choice.	Choices currently limited to stock indexes, but on many stock indexes.
Taxation	Subject to taxation on dividend and realized capital gains. *May have gains/losses when other investors redeem funds.* May have gains/losses when stocks in index are changed.	Subject to taxation on dividend and realized capital gain. *No gains/losses when other investors redeem funds.* May have gains/losses when stocks in index are changed.
Valuation	NAV, based on actual price.	Creations and redemptions at NAV. Secondary market price may be valued somewhat above or below NAV, but deviation typically small due to arbitrage.
Pricing	End-of-day.	Continuous.
Expenses	Low for index funds.	Low and, in some cases, even lower than for index mutual funds.
Transaction Cost	None (for no-load funds); Sales charge for load funds.	Commission or brokerage charge.
Management Fee	Depends on fund; even index funds have a range of management fees.	Depends on fund; tends to be very low on many stock index funds.

TABLE 7 Mutual Funds versus Exchange-Traded Funds

	Mutual Funds	ETFs
HOLDING/MAINTAINING		
Taxes on Dividend Income and Realized Capital Gains	Fully taxable.	Fully taxable.
Turnover of Portfolio	Withdrawal by other investors may necessitate portfolio sales and realized capital gains for holder.	Withdrawal by others does not cause portfolio sales and, thus, no realized capital for holder.
DISPOSITION		
Withdrawal of Investment	Capital gains tax on difference between sales and purchase price.	Capital gains tax on difference between sales and purchase price.
Overall	Due to some portfolio turnover, will realize capital gains.	Due to very low portfolio turnover, will not realize significant capital gains.

commingled as are mutual funds, but are separately managed for the individual investor. As a result of having a separate portfolio, the investor can instruct the manager not to take capital gains, to avoid specific stocks or sectors (perhaps because they have these stocks in their 401(k)), or provide other specific inputs.

SMAs are all actively managed, as opposed to ETFs, which have been all passive. Some SMAs have specialities such as tax efficiency. SMAs have higher annual expenses than mutual funds. The choice for the investor, thus, is whether the higher level of service is worth the higher cost.

Previously, money managers offered SMAs only for only very large portfolios, typically $1 million and more. Currently, however, many money managers have significantly decreased the minimum size of their SMAs. As a result, many investors with mid-sized portfolios are utilizing segregated, individually managed accounts provided by many companies and other investment managers.

SUMMARY

Investment companies sell shares to the public and invest the proceeds in a diversified portfolio of securities, with each share representing a proportionate interest in the underlying portfolio of securities. There are three types of investment companies: open-end or mutual funds, closed-end funds, and unit trusts. A wide range of funds with many different investment objectives is available. Securities law requires that a fund clearly set forth its investment objective in its prospectus, and the objective identifies the type or types of assets the fund will purchase and hold.

Mutual funds and closed-end funds provide two crucial economic functions associated with financial intermediaries: risk reduction via diversification and lower costs of contracting and information processing. Money market funds allow shareholders to write checks against their shares, thus providing a payments mechanism, another economic function of financial intermediaries.

Mutual funds are extensively regulated, with most of that regulation occurring at the federal level. The key legislation is the Investment Company Act of 1940. An important feature regarding regulation is that the funds are exempt from taxation on their gains if the gains are distributed to investors within a relatively short period of time. Even allowing for that special tax-free status, it is necessary to recognize that regulations apply to many features of the funds' administration, including sales fees, asset management, degree of diversification, distributions, and advertising.

There has been widespread consumer-investor acceptance of the concept of family (or group or complex) funds. That is, an investment advisory company (such as American Funds, Fidelity Investments, or Vanguard Group) manages dozens of different funds, which span the spectrum of potential investment objectives, from aggressive growth to balanced income to international diversification. The success of these fund families has led to a considerable concentration of the mutual fund industry in a few large fund groups.

The assets in mutual funds have increased significantly since 1980, particularly in stock funds. The shift from stocks to stock funds was caused by the investor need for diversification, convenience, and expert portfolio management. The growth in mutual fund assets may, however, moderate as investor allocations to stock funds have matured and competitors to mutual funds have developed. Among these competitors are variable annuities, exchange traded funds, and separately managed accounts.

ETFs were initiated in 1993 and have grown significantly due both to individual and institutional investors. ETFs have some advantages over mutual funds, such as being traded intraday on an exchange and, thus, having continuous pricing and being able to short and be traded with stop and limit orders; tax advantages, including not being subject to capital gains tax when the investor does not liquidate a position; and slightly lower fees. ETFs are based on portfolios that track an index; that is, they are passive vehicles, although active ETFs are being developed.

KEY TERMS

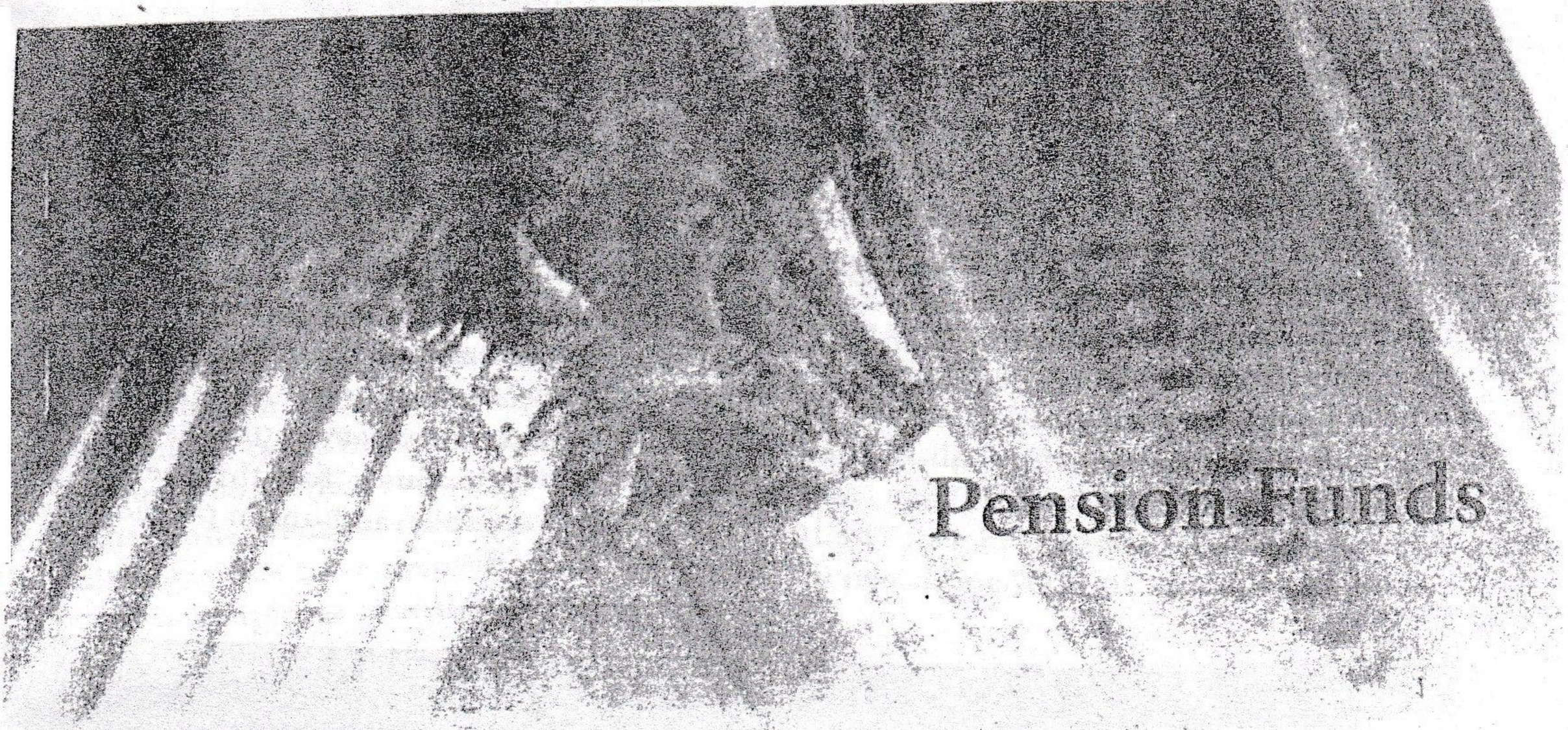
- 12b-1 fee
- Authorized Participants (AP)
- Back-end load
- Board of directors
- Breakpoint
- Creation/redemption units
- Creation unit (CU)
- Closed-end fund
- Contingent deferred sales charge (CDSC)
- Exchange-traded funds (ETFs)
- Exchange-traded portfolio
- Investment advisor
- Investment advisory fee
- Investment Company Act of 1940
- Investment objective
- Level load
- Life-cycle funds
- Load
- Load funds
- Net asset value (NAV)
- No-load mutual fund
- Open-end (mutual) funds
- Redemption unit (RU)
- Separately managed accounts (SMAs)
- Target-date funds
- Unit trust

QUESTIONS

1. An investment company has $1.05 million of assets, $50,000 of liabilities, and 10,000 shares outstanding.
   a. What is its NAV?
   b. Suppose the fund pays off its liabilities while at the same time the value of its assets double. How many shares will a deposit of $5,000 receive?
2. "The NAV of an open-end fund is determined continuously throughout the trading day." Explain why you agree or disagree with this statement.
3. What are closed-end funds?
4. Why do some closed-end funds use leverage to raise more funds rather than issue new shares like mutual funds?
5. Why might the price of a share of a closed-end fund diverge from its NAV?
6. What is the difference between a unit trust and a closed-end fund?
7. a. Describe the following: front-end load, back-end load, level load, 12b-1 fee, management fee.
   b. Is there a limit on the fees that a mutual fund may charge?
8. Why do mutual funds have different classes of shares?
9. What is an index fund?
10. a. What is meant by a target-date fund?
    b. What is the motivation for the creation of such a fund?
11. What are the costs incurred by a mutual fund?
12. Why might the investor in a mutual fund be faced with a potential tax liability arising from capital gains even though the investor did not benefit from such a gain?
13. Does an investment company provide any economic function that individual investors cannot provide for themselves on their own? Explain your answer.

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14. Why might a family of funds hire subadvisors for some of its funds?
15. a. How can a fund qualify as a regulated investment company?
    b. What is the benefit in gaming this status?
16. What is an ETF?
17. What are the advantages of an ETF relative to open-end and closed-end investment companies?
18. Explain the role of the authorized participant in an ETF.
19. Why is tracking error important for an ETF?
20. Comment on the following statement: "Exchange-traded funds are typically actively managed funds."
21. Briefly describe the following in the context of mutual funds:
    a. supermarket
    b. wrap program
    c. segregated managed accounts
    d. family of funds



Pension Funds

LEARNING OBJECTIVES

After reading this chapter, you will understand

- what a pension plan sponsor does
- the different types of pension plans, including defined-contribution plans, defined-benefit plans, and a hybrid plan, the cash balance plan
- what a 401(k) plan is
- what an insured plan is
- the principal provisions of the Employee Retirement Income Security Act (ERISA) of 1974
- what the Pension Benefit Guaranty Corporation does
- who the managers of pension funds are
- the various financial services provided to pension funds
- the role of mutual funds in contemporary pension plans

Pension funds, which exist in some form in all developed economies, are major institutional investors and participants in the financial markets. Pension funds have become important for several reasons. First, income and wealth have grown steadily over the post-World War II period, leaving households more money for long-term savings. Second, people are living longer and can expect more financial needs for longer retirement periods. Third, pensions represent compensation to employees that is free of tax liability to the employee until after the workers retire and their income from employment ceases, and employer contributions are tax deductible to the employer. This chapter discusses pension plans and provides an overview of pension fund management.

From Chapter 8 of *Foundations of Financial Markets and Institutions, 4/e.* Frank J. Fabozzi. Franco Modigliani. Frank J. Jones.
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INTRODUCTION TO PENSION PLANS

A pension plan is a fund that is established for the eventual payment of retirement benefits. The entities that establish pension plans, called **pension plan sponsors**, may be private business entities acting for their employees (called *corporate* or *private plans*); federal, state, and local entities on behalf of their employees (called *public plans*); unions on behalf of their members (called *Taft Hartley plans*); and individuals for themselves (called *individually sponsored plans*). The 10 largest corporate, public, and union pension funds as of September 30, 2007 are shown in Table 1.

Table 1 Ten Largest Corporate, Public, and Union Defined-Benefit Plans as of September 30, 2007

Ten Largest Corporate Pension Funds	Total (in millions)
1. General Motors	$133,835
2. AT&T	$117,537
3. General Electric	$88,237
4. IBM	$87,481
5. Boeing	$81,079
6. Verizon	$74,780
7. Ford Motor	$57,517
8. Lockheed Martin	$51,436
9. Alcatel–Lucent	$48,498
10. Northrop Grumman	$37,564
Total	**$777,964**

Ten Largest Public Pension Funds	Total (in millions)
1. California Public Employees	$254,627
2. California State Teachers	$176,270
3. New York State Common	$164,363
4. Florida State Board	$142,519
5. New York City Retirement	$127,945
6. Texas Teachers	$114,878
7. New York State Teachers	$106,042
8. Wisconsin Investment Board	$91,615
9. Ohio Public Employees	$84,349
10. New Jersey	$83,968
Total	**$777,964**

Ten Largest Union Funds	Total (in millions)
1. Teamsters, Western Conference	$32,600
2. Teamsters, Central States	$21,388
3. National Electric	$14,500
4. Operating Eng. International	$10,353
5. T1999EIU National	$9,964
6. I.A.M. National	$9,302
7. Boilermaker–Blacksmith	$9,296
8. Electrical Ind., Joint Board	$7,484
9. UMWA Health and Retirement	$7,045
10. UFCW Industry	$6,941
Total	**$122,873**

Source: *Pensions & Investments, January 1, 2008.*

Pension funds are financed by contributions by the employer. In some plans, employer contributions are matched to some degree by employees. The great success of private pension plans is somewhat surprising because the system involves investing in an asset—the pension contract—that for the most part is very illiquid. It cannot be used, not even as collateral, until retirement. The key factor in explaining pension fund growth is that the employer's contributions and a specified amount of the employee's contributions, as well as the earnings of the fund's assets, are tax exempt. In essence, a pension is a form of employee remuneration for which the employee is *not taxed until funds are withdrawn.* This tax exemption results from meeting many federal requirements. Such plans are called *qualified pension plans,* which means that if the plan meets certain requirements, it qualifies for tax exemptions. Pension funds have also traditionally served to discourage employees from quitting, since the employee, until vested, could lose at least the accumulation resulting from the employer contribution.

Before Proceeding

1. The role of the sponsor of a pension plan.
2. The importance of tax exemption to the structure and popularity of pension plans.

TYPES OF PENSION PLANS

There are two basic and widely used types of pension plans: defined-benefit plans and defined-contribution plans. In addition, a recently developed hybrid type of plan called a cash balance plan combines features of both these types.

Defined-Benefit Plan

In a **defined-benefit plan,** the plan sponsor agrees to make specified dollar payments annually to qualifying employees beginning at retirement (and some payments to beneficiaries in case of death before retirement). These payments typically occur monthly. The retirement payments are determined by a formula that usually takes into account the length of service of the employee and the employee's earnings. The pension obligations are effectively a debt obligation of the plan sponsor. The plan sponsor, thereby, assumes the risk of having insufficient funds in the plan to satisfy the regular contractual payments that must be made to retired employees.

A plan sponsor establishing a defined-benefit plan can use the payments made into the fund to purchase an annuity policy from a life insurance company. Defined-benefit plans that are guaranteed by life insurance products are called **insured benefit plans.** An insured plan is not necessarily safer than a noninsured plan, since it depends on the ability of the life insurance company to make the contractual payments, whereas the uninsured plan depends on the ability of the plan sponsor. Whether a private pension plan is insured or noninsured, a federal agency, the **Pension Benefit Guaranty Corporation (PBGC),** which was established in 1974 by the ERISA legislation, insures the vested benefits of participants, as discussed in the following text.

Benefits become vested when employees reach a certain age and complete enough years of service so that they meet the minimum requirements for receiving benefits upon retirement.

The payment of benefits is not contingent upon a participant's continuation with the employer or union.

Firms in recent years have not adopted defined-benefit plans. Major firms that have them have been freezing their plans. For example, Verizon Communications froze its plan in 2005, and IBM froze its plan in 2006. One of the reasons for IBM's freezing of its plan, which is a fully funded plan, is that it is too costly and makes it difficult for IBM to compete with its competitors that do not offer a defined-benefit plan. Microsoft, for example, does not offer a defined-benefit plan. Verizon Communications competes with Internet firms that do not offer such plans. Beyond competitive reasons, there is the problem of managing the assets to be able to satisfy liabilities and the implications for financial reporting. We will discuss this later in this chapter when we look at the crisis in the pension fund area.

Defined-Contribution Plan

In a **defined-contribution plan**, the plan sponsor is responsible only for making specified contributions into the plan on behalf of qualifying participants, not specified payments to the employee after retirement. The amount contributed is typically either a percentage of the employee's salary and/or a percentage of the employer's profits. The plan sponsor does not guarantee any specific amount at retirement. The payments that will be made to qualifying participants upon retirement depend on the growth of the plan assets. That is, retirement benefit payments are determined by the investment performance of the funds in which the assets are invested and are not guaranteed by the plan sponsor. The plan sponsor gives the participants various options as to the investment vehicles in which they may invest. Defined-contribution pension plans come in several legal forms: 401(k) plans, money purchase pension plans, and employee stock ownership plans (ESOPs).

By far, the fastest-growing sector of the defined-contribution plan is the **401(k) plan**, or its equivalent in the nonprofit sector, the *403(b) plan*, and in the public sector, the *457 plan*. To the firm, this kind of plan offers the lowest costs and the least administrative problems. The employer makes a specified contribution to a specific plan/program, and the employee chooses how it is invested. To the employee, the plan is attractive because it offers some control over how the pension money is managed. In fact, plan sponsors frequently offer participants the opportunity to invest in one or more of a family of mutual funds. Over half of all defined-contribution plans (in public institutions such as state governments as well as private firms) use mutual funds, and the percentage of private corporations that use this approach is even higher.

Regulations issued by the U.S. Department of Labor require firms to offer their employees a set of distinctive choices, a development that has encouraged pension plans to select mutual funds as the investment vehicle of choice because families of mutual funds can readily provide investment vehicles offering different investment objectives.

There are several fundamental differences between defined-benefit plans and defined-contribution plans. In the defined-benefit plan, the plan sponsor: (1) guarantees the retirement benefits, (2) makes the investment choices, and (3) bears the investment risk if the investments do not earn enough to fund the guaranteed retirement benefits. In contrast, in a defined-contribution plan, the employer does not guarantee any retirement benefits. However, the employer may agree to make specified contributions to the employee's account. The employee selects the investment options, and the employee has for retirement only the return on the investment portfolio (plus, of course, the employee and employer contributions).

According to *Pension & Investments*, the largest public sponsor of a defined-contribution plan as of September 30, 2008, is the Federal Retirement Thrift ($233 billion). The Federal Retirement Thrift is an independent agency established by the Federal Employees' Retirement System Act of 1986 to provide federal employees the opportunity to save additional amounts in retirement and is similar to the 401(k) plan in the private sector. The four largest corporate sponsors of defined-contribution plans are AT&T ($41 billion), Boeing ($31 billion), IBM ($31 billion), and General Electric ($28 billion).

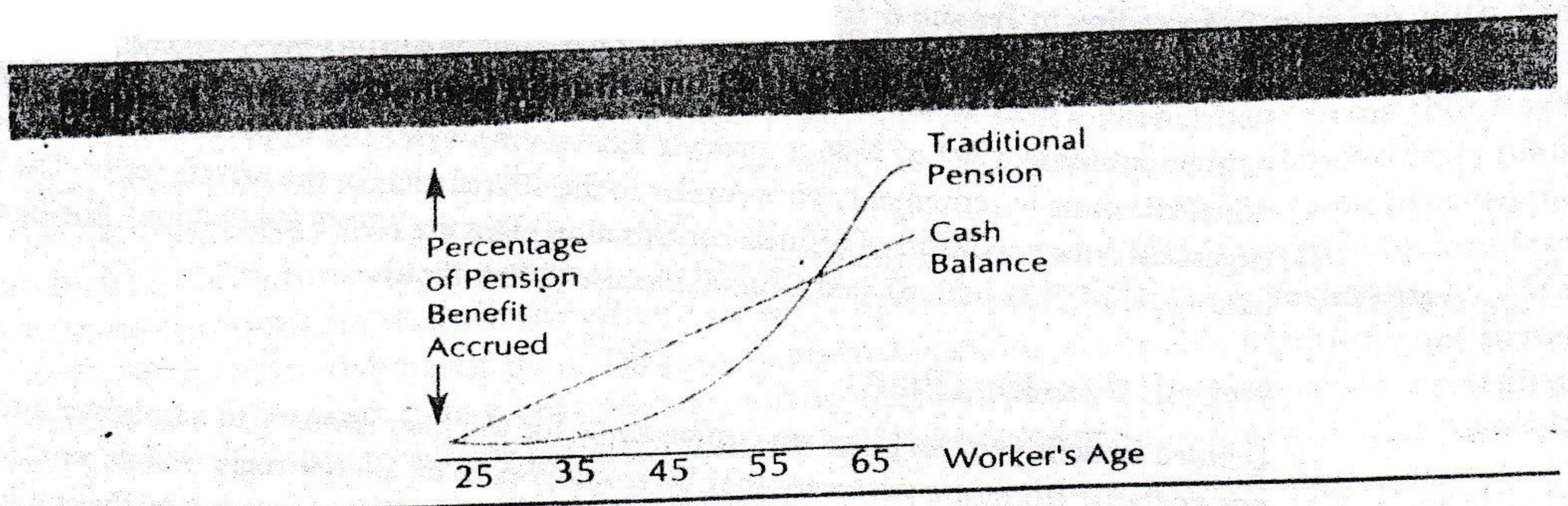
Hybrid Pensions Plans

Defined-benefit pension plans are cumbersome for the plan sponsor to administer and are not portable from one job to another by employees in an increasingly mobile workforce. Defined-contribution plans put the investment choices and investment risk on the employee. In response to these and other limitations, new forms of **hybrid pension plans**, that is, combinations of defined-benefit and defined-contribution plans, have been developed.

Although there are several types of hybrid plans, including pension equity, floor-offset, and others, the most common hybrid form is the cash balance plan. A **cash balance plan** is basically a defined benefit that has some of the features of a defined-contribution plan. A cash balance plan is a defined-benefit plan in that it defines future pension benefits, not employer contributions. Retirement benefits are based on a fixed-amount annual employer contribution and a guaranteed minimum annual investment return. Each participant in a cash balance plan has an account that is credited with a dollar amount that resembles an employer contribution and is generally determined as a percentage of pay. Each participant's account is also credited with interest linked to some fixed or variable index such as the consumer price index (CPI). The plan usually provides benefits in the form of a lump-sum distribution in an annuity. Interest is credited to the employee's account at a rate specified in the plan and is unrelated to the investment earnings of the employer's pension trust. The employee's benefit does not vary based on the interest credit. The promised benefits are fixed, and the investment gains or losses are borne by the employer. However, as in a defined-contribution plan, an individual employee can monitor his or her cash balance plan "account" in a regular statement.

Also like a defined-contribution plan and important to today's job-changing workforce, many cash balance plans allow the employee to take a lump-sum payment of vested benefits when terminating, which can be rolled over into an individual retirement plan (IRA) or to the new employer's plan. That is, cash balance plans are portable from one job to another. Table 2 summarizes the features of a cash balance plan that are similar to defined-benefit and defined-contribution plans.

Defined-Benefit Like Features	Defined-Contributions Like Features
Investment responsibility is borne by the employer.	Vested assets may be taken as a lump sum and rolled into an IRA or another qualified plan when the employee terminates employment.



Source: *Cerulli Associates*

A cash balance plan is similar to some types of defined-contribution plans, particularly money purchase plans and profit sharing plans, according to which the employer contributes at a fixed rate but does not guarantee benefits. Since traditional defined-contribution plans are back-ended (i.e., most of the benefit is accrued during the past 10 years of a 20- to 30-year career with a company), younger workers often undervalue the benefit of a pension plan. Cash balance formulas provide for an earlier, more uniform accumulation of retirement pension benefits that can be enjoyed by employees who do not commit their entire careers to one company. Figure 1 shows the buildup of retirement benefits over time for defined-benefit and defined-contribution plans and cash balance plans. As shown, in a traditional plan benefits based on a combination of age and service build up sharply toward the end of the employee's career. In a cash balance plan, benefits build more uniformly each year.

Key Points to Should Understand Before Proceeding

1. In a qualified pension plan, contributions (up to some extent) and earnings thereof are tax-exempt.
2. The difference between a defined-benefit pension plan and a defined-contribution pension plan.
3. The cash balance pension plan is a new hybrid plan that combines features of the defined-benefit plan and the defined-contribution plan.

INVESTMENTS

The aggregate asset mix of the 1,000 top defined-benefit and defined-contribution pension plans as of September 30, 2007, is summarized in Table 3 and Table 4. As indicated, the asset allocations for corporate and public defined-benefit plans are very similar, with approximately 65% of their assets in U.S. stocks and bonds. Corporate and public defined-benefit funds also have approximately 20% of their assets in international equity and fixed income.

The major difference between union plans and the other two types of plans is the small weight in union plans to international investments, only approximately 10% relative to 20% in corporate and public. There are no federal restrictions on investing in non–U.S. investments. The sponsors of a fund, however, are free to restrict the allocation of the

DEFINED-BENEFIT PENSION FUNDS

	Corporate	Public	Union
Domestic equity	39.4%	40.7%	46.3%
Domestic fixed income	25.6	23.3	23.9
International equity	17.3	19.8	8.6
International fixed income	2.4	1.3	0.8
Cash	1.6	1.5	2.3
Private equity	3.8	5.0	2.0
Real estate equity	2.9	5.1	6.4
Mortgage	0.1	0.5	0.4
Other	6.9	2.8	9.3
Total	100.0%	100.0%	100.0%

DEFINED-CONTRIBUTION PENSION FUNDS

	Corporate	Public	Union
[illegible]	40.5%	0%	0%
Other U.S. equity	31.1	47.3	30.4
[illegible]	[illegible]	8.7	6.7
Fixed income	5.2	21.1	22.2
[illegible]	2.6	2.2	2.7
Stable value	13.3	19.1	10.2
Other	[illegible]	5.2	27.1
Total*	100.0%	100.0%	100.0%

*Subject to rounding errors

Source: *Pensions & Investments, January 21, 2008.*

Asset Class	Corporate	Public	Union
[illegible]	25.00%	[illegible]0%	25.60%
Domestic fixed income	25.90	25.20	34.60
[illegible]	[illegible]0	[illegible]0	[illegible]0
International fixed income	1.50	1.60	0.70
[illegible]	[illegible]0	[illegible]0	2.20
Private equity	3.90	3.70	1.00
[illegible]	[illegible]0	[illegible]0	[illegible]0
Mortgages	0.30	0.70	1.00
[illegible]	[illegible]7	[illegible]0	[illegible]0
Total	100.00%	100.00%	100.00%

Source: *Pensions & Investments, http://www.pionline.com*

fund's assets to domestic investments. It is not uncommon for union-sponsored pension funds, however, to prohibit non–U.S. investments in their portfolios. Most corporate and public funds invest in international assets.

Qualified pension funds are exempt from federal income taxes. Thus, fund assets can accumulate tax free. Consequently, pension funds do not invest in assets that have the advantage of being largely or completely tax exempt.

Key Points That You Should Understand Before Proceeding:

1. The largest share of both defined-benefit and defined-contribution pension fund assets is invested in common stocks, often a U.S. stock index.
2. Qualified pension plans rarely invest in tax-exempt assets.

REGULATION

Because pension plans are so important for U.S. workers, Congress passed comprehensive legislation in 1974 to regulate pension plans. This leg slation, the **Employee Retirement Income Security Act of 1974 (ERISA)**, is fairly technical in its details. For our purposes, it is necessary only to understand its major provisions.

First, ERISA established *funding standards* for the minimum contributions that a plan sponsor must make to the pension plan to satisfy the actuarially projected benefit payments. Prior to the enactment of ERISA, many corporate plan sponsors followed a "pay-as-you-go" funding policy. That is, when an employee retired, the corporate plan sponsor paid for the necessary retirement benefits out of current cash flow. Under ERISA, such a practice is no longer allowed; rather, the program must be funded. That is, regular contributions to an investment pool along with investment earnings are sufficient to pay the employee retirement benefits.

Second, ERISA established fiduciary standards for pension fund trustees, managers, and advisors. Specifically, all parties responsible for the management of a pension fund are guided by the judgment of what is called a "prudent man" in seeking to determine which investments are proper. Because a trustee is responsible for other people's money, it is necessary to make sure that the trustee takes the role seriously. To fulfill their responsibilities, trustees must act as reasonably prudent people to acquire and use the information that is pertinent to making investment decisions.

Third, ERISA establishes minimum vesting standards. For example, the law specifies that, after five years of employment, a plan participant is entitled to 25% of accrued pension benefits. The percentage of entitlement increases to 100% after 10 years. There are also other vesting requirements.

Finally, ERISA created the Pension Benefit Guaranty Corporation (PBGC) to insure vested pension benefits. The insurance program is funded from annual premiums that must be paid by pension plans.

Responsibility for administering ERISA is delegated to the Department of Labor and the Internal Revenue Service. To ensure that a pension plan is in compliance with ERISA, periodic reporting and disclosure statements must be filed with these government agencies. It is important to recognize that ERISA does not require that a corporation establish a pension plan. If a corporation does establish a defined-benefit plan, however, it must comply with the numerous and complex regulations set forth in ERISA.

Key Points That You Should Understand Before Proceeding

1. The scope of ERISA legislation.
2. The meaning of the "prudent man" concept.

MANAGERS OF PENSION FUNDS

A plan sponsor chooses one of the following to manage the defined-benefit pension assets under its control: (1) use in-house staff to manage all the pension assets itself, (2) distribute the pension assets to one or more money management firms to manage, or (3) combine alternatives (1) and (2). Public pension funds typically manage a good portion of their assets internally.

In the case of a defined-contribution pension plan, the plan sponsor typically allows participants to select how to allocate their contributions among funds managed by one or more fund groups.[1]

Insurance companies have been involved in the pension business through their issuance of GICs and annuities. Insurance companies also have subsidiaries that manage pension funds. The trust departments of commercial banks, affiliates of investment banks and broker/dealers, and independent money management firms (that is, firms that are not affiliated with an insurance company, bank, investment bank, or broker-dealer) also manage pension funds. Foreign entities are also permitted to participate in the management of pension funds. In fact, several foreign financial institutions have acquired interests in U.S. money management firms in order to enter the pension fund money management business.

Managers of pension fund money obtain their income from managing the assets by charging a fee. The annual fee can range from 0.75% of assets under management to as little as 0.01%. Some plan sponsors have entered into management fee contracts based on performance rather than according to a fixed percentage of assets under management.

In addition to money managers, advisors called plan sponsor *consultants* provide other advisory services to pension plan sponsors. Among the functions that consultants provide to plan sponsors are

- developing plan investment policy and asset allocation among the major asset classes
- providing actuarial advice (liability modeling and forecasting)
- designing benchmarks against which the fund's money managers will be measured
- measuring and monitoring the performance of the fund's money managers
- searching for and recommending money managers to pension plans
- providing specialized research

Key Points That You Should Understand Before Proceeding

1. Who manages pension fund assets.
2. The types of service advisors provide to pension sponsors.

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[1] Keith Ambachtsheer, Ronald Capelle, and Tom Scheibelhut, "Improving Pension Fund Performance," *Financial Analysts Journal* (November/December 1998), pp. 15 ff. Francis Gupta, Eric Stubbs, and Yogi Thambiah, "U.S. Corporate Pension Plans," *The Journal of Portfolio Management* (Summer 2000), pp. 65 ff.

Defined-Benefit Plan Crisis[2]

Today, the crisis facing defined-benefit pension plans threatens the solvency of corporations, cities, states, and even the U.S. government. The magnitude of pension underfunding suggests that it poses the greatest financial danger since the S&L crisis. At the end of 2003, corporations' pension underfunding or deficit (i.e., the amount by which the fair value of the liabilities exceeds the value of the assets) was close to $250 billion, officially. Other commentators estimate that if pension liabilities were assigned market values, as they properly should be, then the U.S. corporate pension deficit would probably be double that.[3] Nor does the pension crisis exist only for corporate defined-benefit plans. According to Wilshire Associates, the "official" deficit for state pension funds amounts to $94 billion. But here, too, if the liabilities were properly valued, the deficit would swell—to more than $1 trillion in the case of all state and local funds, according to estimates by Morgan Stanley.

In essence, corporate and public plan sponsors, abetted by regulators and accountants, have systematically underestimated pension liabilities, producing the crisis we find ourselves in today. At the root of the problem is the accounting and actuarial treatment of pensions, which can inspire perverse behavior by sponsors of corporate defined-benefit plans. In making pension-funding decisions, corporations have often failed to take into consideration the liability structure of the plan. (The liability structure is the amount and timing of the projected payments to be made to the plan beneficiaries.) Their primary concern, naturally, is with the impact on the earnings, and because pension contributions show up as an expense on the income statement, corporations seek to minimize or even eliminate them. Offsetting the pension cost is the assumed **return on pension assets (ROA)**. And that is where the problem begins.

Generally accepted accounting principles (GAAP) allow corporations to forecast pension ROA a year in advance. If a corporation knows what its pension expense will be a year out, they can perform a simple calculation to determine what ROA it will need to forecast to wash out this troublesome expense. Even better, if management predicts an ROA that exceeds this pension-cost breakeven point, they could create pension "income" rather than expenses, resulting in enhanced earnings. Consequently, forecast ROA can lead to a distortion of economic value.

A 2002 study by Zion and Carcache of Credit Suisse First Boston estimated that if the companies included in the Standard & Poor's 500 index had replaced the ROA projections for their pension plans with the plans' actual performance, the companies' aggregate reported earnings would have declined 69% in 2001 and 10% in 2000.[4] That's amazing! Basically, if pension expenses were properly accounted for in 2001, aggregate reported earnings would have been only 31% of what was reported. In addition, Zion and Carcache found that for 14 industry groups and for 82 S&P 500 companies, 2001 earnings would have been halved; for nine of the 14 industry groups and 41 of those companies, earnings would have gone from a profit to a loss! Thirty of the S&P 500 companies would have seen their 2001 earnings reduced by more than $1 billion and seven would have experienced a drop of more than $5 billion.

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[2] This section draws from Frank J. Fabozzi and Ronald J. Ryan, "Redefining Pension Plans," *Institutional Investor* (January 2005), pp. 84–89.

[3] Fabozzi and Ryan, "Redefining Pension Plans," p. 84.

[4] A 2002 study by Zion and Carcache of Credit Suisse First Boston, "The Magic of Pension Accounting," by Credit Suisse First Boston analysts David Zion and Bill Carcache.

Zion and Carcache further estimated that the aggregate return on equity for S&P 500 companies in 2001 would have been only 2%, rather than the 8% figure arrived at using GAAP. For 40 of the 360 S&P 500 companies with defined-benefit plans, 2001 return on equity would have gone from positive to zero or negative.

But there is a check on ROA-forecast abuses. Pension-accounting rules permit corporations to make rosy ROA predictions for stocks and most other assets, provided that external auditors validate those estimates on the basis of historical returns for those asset classes. The only exception is bonds, for which the forecast ROA is based on current yields to maturity, not historical returns. This begets further complications. Modest bond yields can undercut a pension's overall forecast ROA, threatening pension income and thus placing a potential drag on corporate earnings. No wonder companies continually reduced their bond allocations in the late 1990s and early 2000s as interest rates declined to historical lows. Concurrently, according to *Pension & Investments*' annual asset allocation survey, companies were allocating a bigger proportion of their pension portfolios to equities as well as to hedge funds and other alternative investments, whose historical returns, or subjective market values (in the case of private equity and real estate), justified higher ROA forecasts.

Starting in about 1990, the yield of 10-year Treasuries fell below 8%. Yet according to a 2003 study by Zion and Carcache, the median forecast ROA for the S&P 500 companies exceeded 9% for every year from the early 1990s until 2001, falling 8.75% in 2002 alone.[5] Hence, the assumed return on bonds was less than that of most companies' forecast ROA.

Pension funds that increased their bond allocations would just subject their other assets to more stress to rationalize their forecast ROA, giving them less wiggle room for earnings enhancement. Consultants soon ceased to promote bonds to pension funds in their asset allocation models. If anything, the gap between bond yields and forecast ROA has grown wider since 1990. The yield on 10-year Treasuries has ranged from 3.11% to 5.52% since 2000. By contrast, Zion and Carcache note that the median forecast ROA for the pension plans of S&P 500 companies was 8.75% for 2002, 9.20% for 2001, and 9.36% for 2000.

What happens if the actual ROA differs from the forecast one? The difference gets amortized, usually over the life of the pension plan—typically, 15 years. The accountants' label for this adjustment on the income statement is "actuarial gain/loss." An actuarial gain from pension income increases corporate earnings; an actuarial loss reduces corporate earnings. The accounting profession invented this smoothing exercise to accommodate companies worried about excessive earnings volatility, which alarms investors.

On the surface, this approach sounds perfectly reasonable. However, the actuarial gain/loss adjustment had been blown out of proportion by the gulf that developed between companies' forecast and actual ROAs. The declining stock market from 2000 to 2002 deserves much of the blame, but corporate sponsors' inclination to forecast overly optimistic ROAs is an important contributing factor.

Ryan and Fabozzi estimate, based on the typical asset allocation, that the average actual ROA for S&P 500 companies was −2.50% in 2000, −5.40% in 2001, and −1.41% in 2002.[6] This is quite a contrast to the forecast ROAs used by corporate sponsors. The impact of this

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[5] Zion and Carcache, "The Magic of Pension Accounting, Part II."

[6] Ronald J. Ryan and Frank J. Fabozzi, "Pension Fund Crisis Revealed," *Journal of Investing* (Fall 2003), pp. 43–48 and Ronald J. Ryan and Frank J. Fabozzi, "Rethinking Pension Liabilities and Asset Allocation," *Journal of Portfolio Management* (Summer 2002), pp. 7–15.

gap has been dramatic. In their 2003 study, Zion and Carcache showed that S&P 500 companies' cumulative unrecognized actuarial gains of $144 billion as of the end of 2000 had been transformed into a cumulative actuarial loss of $357 billion by the end of 2002. General Motors Corp. announced in the summer of 2003 that its cumulative actuarial loss amortization would cost the automaker $1.7 billion per year out of earnings for the next 20 years.

In selecting the discount rates, corporate sponsors of defined-benefit plans are concerned not only with the accounting implications but with Internal Revenue Service (IRS) regulations. Regulations by the IRS determine the actual amount of funding required (i.e., cash that must be paid into the fund). Corporate plan sponsors are inclined to employ as their discount rate for pension liabilities the highest interest rate that will pass muster with the IRS (for funding purposes) and also with their external accounting GAAP (for accounting purposes). (As explained in the next chapter, the higher the discount rate, the lower the present value.) Traditionally, GAAP accounting has relied on a corporate bond index that has numerous limitations.[7] Since the corporate bond index rate used is higher than the rate on U.S. Treasury securities, this means using a higher discount rate, resulting in a lower present value for the projected liabilities of the fund.

The bottom line is that the failure to properly value pension liabilities because of the use of an inappropriate discount rate and the impact it had on the allocation decision among major asset classes to justify a high forecast ROA were the two major contributing factors to this financial crisis.

The accounting profession has proposed a solution to rectify the accounting issue. With respect to funding, in April 2004, the Pension Funding Equity Act was passed. The purpose of the act was to give U.S. companies some "relief" from burdensome pension contributions and, as the act's summary stated, "protect the retirement benefits of millions of American workers and help ensure that their pension benefits will be there when they retire." The relief came in the form of a higher permissible discount rate, the critical number for valuing pension liabilities and therefore funding requirements. Under the applicable formula, a higher rate was permitted by the act. This permitted lower pension contributions. The formula for determining the appropriate discount rate under the act made little economic sense, although it was touted by high-level officials in the Treasury Department, as well as industry groups representing corporate sponsors of defined-benefit plans. The result is that the act was a short-term boon to companies, but, unfortunately, it solves none of the serious problems plaguing pension funding—and it may have created new ones. Corporations with defined-benefit plans will not be required to provide adequate information about the financial health of their pension plans. And critically, the act promotes reliance on the wrong standard for determining liabilities, guaranteeing that for private pension plans they will continue to be understated. Many companies no doubt felt that they needed relief from onerous pension contributions. But by permitting the incorrect valuation of pension liabilities to persist, Congress avoided the real issue.

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[7] These limitations are explained in Fabozzi and Ryan, "Redefining Pension Plans."

PENSION PROTECTION ACT OF 2006

The Pension Protection Act of 2006 (PPA) contains two major parts. It provides significant changes in the operations of private pension plans and also extends some tax incentives for retirement savings.

The first part modifies ERISA, which provided the foundation of the current defined-benefit retirement system. The changes of this type in the PPA deal with the underfunding of these traditional retirement plans. The major changes, in general, were as follows:

- It required underfunded plans to pay additional premiums to the PBGC.
- It extended the requirement for companies terminating their pension plans to provide extra funding to the pension system.
- It closed loopholes that allowed underfunded plans to skip pension payments.
- It raised the caps on the amount that companies can contribute to their pension plans (which provide a tax shield) so they can contribute more during prosperous times.
- It required that companies measure their pension plan obligations more accurately.
- It prevented companies with underfunded pension plans from providing extra benefits to their workers without paying for these benefits up front.

While the protections for the employee provided by the PPA are obvious, some claim that the resulting restrictions and costs imposed on the plan sponsors may accelerate the decline in defined-benefit plans.

The second part of the PPA relates primarily to individuals' use of defined-contribution plans. Prior to the PPA, individuals did not optimize their retirement savings either because they did not enroll in their employers' 401(k) plan or they did not have a prudent asset allocation. According to the PPA, employers can automatically enroll their employees in a defined-contribution plan. In addition, before the PPA if the employee did not make an election on how to invest their funds, their funds were often invested in a money market account by the employer. The PPA permits employers to choose default options on behalf of the plan participants who do not make an election on how to invest their funds. The most common default option has been target-date funds. Of course, employees can still choose to opt out of the plan or choose their own investment options.

In addition, the PPA enables employees to obtain more investment advice for their employers by removing the fiduciary liability based on the perceived conflict of interest of self-interested investment advice provided by the employer. In doing so, the PPA provided employers with a safe harbor from certain parts of ERISA. According to the PPA, these employees can receive personalized investment advice from their employers, although with a few limitations.

The PPA also requires that defined-contribution plans must meet some diversification requirements with regard to employer stocks, thus addressing the common problem of employees being overconcentrated in their own company's stock.

There are also several other significant, but more narrow, elements of the PPA that are not covered in this chapter.

SUMMARY

A pension plan is a fund that is established by private employers, governments, or unions for the payment of retirement benefits. Pension plans have grown rapidly, largely because of favorable tax treatment. Qualified pension funds are exempt from federal income taxes, as are employer contributions. The two types of pension funds are defined-benefit plans and defined-contribution plans. In a defined-benefit plan, the sponsor agrees to make specified (or defined) payments to qualifying employees at retirement. In a defined-contribution plan, the sponsor is responsible only for making specified (or defined) contributions into the plan on behalf of qualifying employees but does not guarantee any specific amount at retirement. Recently, some hybrid plans blending features of both basic types of plans have appeared, the most prominent of which is the cash balance plan.

There is federal regulation of pension funds, as embodied in the ERISA. ERISA sets minimum standards for employer contributions, establishes rules of prudent management, and requires vesting in a specified period of time. Also, ERISA provides for insurance of vested benefits.

Pension funds are managed by the plan sponsor and/or by management firms hired by the sponsor. Management fees may reflect the amount of money being managed or the performance of the managers in achieving suitable rates of return for the funds. In addition, consulting firms provide assistance in the planning, administration, and evaluation of the funds.

KEY TERMS

- 401(k) plan
- Cash balance plan
- Defined-benefit plan
- Defined-contribution plan
- Employee Retirement Income Security Act of 1974 (ERISA)
- Hybrid pension plan
- Insured benefit plan
- Pension Benefit Guaranty Corporation (PBGC)
- Pension plan
- Pension plan sponsor
- Pension Protection Act of 2006 (PPA)
- Return on pension assets (ROA)

QUESTIONS

1. What is a plan sponsor?
2. How does a defined-benefit plan differ from a defined-contribution plan?
3. Why have some corporations frozen their defined-benefit plans?
4. a. What is a cash balance plan?
   b. Discuss the resemblance of a cash balance plan to a defined-benefit and a defined-contribution plan.
5. a. What is an insured pension plan?
   b. What is the function of PBGC?
6. What role do mutual funds play in 401(k) plans?
7. Can and do pension plans invest in foreign securities or tax-exempt securities?
8. a. What is the major legislation regulating pen funds?
   b. Does the legislation require every corporation t establish a pension fund?
9. Discuss ERISA's "prudent man" rule.
10. Who are plan sponsor consultants and what is their role?

11. In 2001, investor Warren Buffett had this to say about pension accounting:

> Unfortunately, the subject of pension [return] assumptions, critically important though it is, almost never comes up in corporate board meetings. . . . And now, of course, the need for discussion is paramount because these assumptions that are being made, with all eyes looking backward at the glories of the 1990s, are so extreme.

a. What does Mr. Buffett mean by the "pension return assumption"?

b. Why is the pension return assumption important in pension accounting in accordance with generally accepted accounting principles?

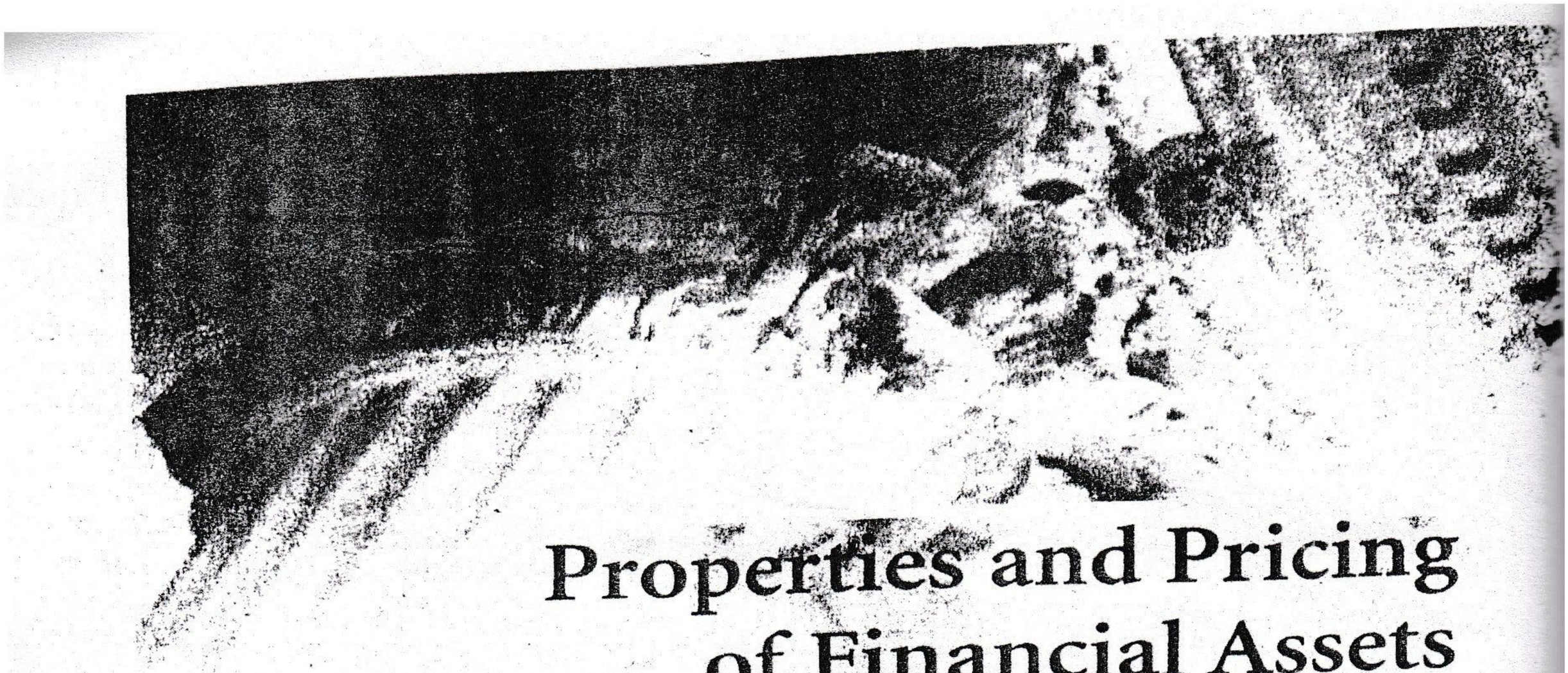
c. Why is the pension return assumption important in pension accounting in accordance with Internal Revenue rules?

d. Mr. Buffet went on to warn that too high an assumed return on pension assets risks litigation for a company's chief financial officer, its board, and its auditors. Why?

B.Fabozzi 4th-12(A)

Properties and Pricing of Financial Assets

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Properties and Pricing of Financial Assets

LEARNING OBJECTIVES

After reading this chapter, you will understand

- the many key properties of financial assets: moneyness; divisibility and denomination; reversibility; cash flow and return; term to maturity; convertibility; currency; liquidity; return predictability or risk; complexity; and tax status
- the components of an asset's discount rate or required rate of return
- what is meant by a basis point
- how the discount rate is structured to encompass the components of an asset's risk
- the principles of valuing complex financial assets
- the inverse relationship between an asset's price and its discount rate
- the principles that reveal how the properties of an asset affect its value, either through the discount rate or through its expected cash flow
- what factors affect the price sensitivity of a financial asset to changes in interest rates
- what duration means, and how it is related to the price sensitivity of an asset to a change in interest rates

Financial assets have certain properties that determine or influence their attractiveness to different classes of investors and issuers. The chapter provides the basic principles of the valuation or pricing of financial assets and illustrates how several of the properties of financial assets affect their value. Because the valuation of financial assets requires an understanding of present value, this concept is explained in the appendix to this chapter available online at www.pearsonhighered.com/fabozzi.

PROPERTIES OF FINANCIAL ASSETS

The 11 properties of financial assets are (1) **moneyness**, (2) *divisibility and denomination*, (3) *reversibility*, (4) *cash flow*, (5) *term to maturity*, (6) *convertibility*, (7) *currency*, (8) *liquidity*, (9) *return predictability*, (10) *complexity*, and (11) *tax status*.[1]

Moneyness

Some financial assets are used as a medium of exchange or in settlement of transactions. These assets are called *money*. In the United States, money consists of currency and all forms of deposits that permit check writing. Other assets, although not money, are very close to money in that they can be transformed into money at little cost, delay, or risk. They are referred to as *near money*. In the case of the United States, these include time and savings deposits and a security issued by the U.S. government called a Treasury bill. Moneyness is clearly a desirable property for investors.

Divisibility and Denomination

Divisibility relates to the minimum size in which a financial asset can be liquidated and exchanged for money. The smaller the size, the more the financial asset is divisible. A financial asset such as a deposit is typically infinitely divisible (down to the penny), but other financial assets have varying degrees of divisibility depending on their denomination, which is the dollar value of the amount that each unit of the asset will pay at maturity. Thus, many bonds come in $1,000 denominations, commercial paper in $25,000 units, and certain types of certificates of deposit in $100,000 or more. In general, divisibility is desirable for investors but not for borrowers.

Reversibility

Reversibility refers to the cost of investing in a financial asset and then getting out of it and back into cash again. Consequently, reversibility is also referred to as **turnaround cost** or *round-trip cost*.

A financial asset such as a deposit at a bank is obviously highly reversible because usually there is no charge for adding to or withdrawing from it. Other transactions costs may be unavoidable, but these are small. For financial assets traded in organized markets or with **market makers**, the most relevant component of round-trip cost is the so-called **bid–ask spread**, to which might be added commissions and the time and cost, if any, of delivering the asset. The spread charged by a market maker varies sharply from one financial asset to another, reflecting primarily the amount of risk the market maker is assuming by "making" a market.

This market-making risk can be related to two main forces. One is the variability of the price as measured, say, by some measure of dispersion of the relative price over time. The greater the variability, the greater the probability of the market maker incurring a loss in excess of a stated bound between the time of buying and reselling the financial asset. The variability of prices differs widely across financial assets. Treasury bills, for example,

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[1] Some of these properties are taken from James Tobin, "Properties of Assets," undated manuscript, Yale University, New Haven.

have a very stable price, for the reason explained at the end of this chapter, while a speculative stock will exhibit much larger short-run variations.

The second determining factor of the bid–ask spread charged by a market maker is what is commonly referred to as the **thickness of the market**: by this is meant essentially the prevailing rate at which buying and selling orders reach the market maker (that is, the frequency of transactions). A **thin market** is one that has few trades on a regular or continuing basis. Clearly, the greater the frequency of order flows, the shorter the time that the security will have to be held in the market maker's inventory, and hence the smaller the probability of an unfavorable price movement while held.

Thickness, too, varies from market to market. A three-month U.S. Treasury bill is easily the thickest market in the world. In contrast, trading in stock of small companies is not thick but thin. Because Treasury bills dominate other instruments both in price stability and thickness, their bid–ask spread tends to be the smallest in the market. A low turnaround cost is clearly a desirable property of a financial asset, and as a result thickness itself is a valuable property. This explains the potential advantage of larger over smaller markets (economies of scale), along with a market's tendency to standardize the instruments offered to the public.

Cash Flow

The return that an investor will realize by holding a financial asset depends on all the cash distributions that the financial asset will pay its owners; this includes dividends on shares and coupon payments on bonds. The return also considers the repayment of principal for a debt security and the expected sale price of a stock. In computing the expected return, noncash payments, such as stock dividends and options to purchase additional stock, or the distribution of other securities must also be accounted for.

In a world of nonnegligible inflation, it is also important to distinguish between **nominal expected return** and **real expected return**. The expected return that we described above is the nominal expected return. That is, it considers the dollars that are expected to be received, but does not adjust those dollars to take into consideration changes in their purchasing power. The net real expected return is the nominal expected return after adjustment for the loss of purchasing power of the financial asset as a result of anticipated inflation. For example, if the nominal expected return for a one-year investment of $1,000 is 6%, then at the end of one year the investor expects to realize $1,060, consisting of interest of $60 and the repayment of the $1,000 investment. However, if the inflation rate over the same period of time is 4%, then the purchasing power of $1,060 is only $1,019.23 ($1,060 divided by 1.04). Thus, the return in terms of purchasing power, or the real return, is 1.923%. In general, the expected real return can be approximated by subtracting the expected inflation rate from the expected nominal return. In our example, it is approximately 2% (6% to 4%).

Term to Maturity

Term to maturity is the length of the period until the date at which the instrument is scheduled to make its final payment, or the owner is entitled to demand liquidation. Instruments for which the creditor can ask for repayment at any time, such as checking accounts and many

savings accounts, are called *demand instruments*. Maturity is an important characteristic of financial assets such as bonds, and can range from one day to a few decades. In the United Kingdom, there is one well-known type of bond that promises to pay a fixed amount per year indefinitely and not to repay the principal at any time; such an instrument is called a **perpetual**, or a *consul*. Many other instruments, including equities, have no maturity and are thus a form of perpetual.

It should be understood that even a financial asset with a stated maturity may terminate before its stated maturity. This may occur for several reasons, including bankruptcy or reorganization, or because of **call provisions** entitling the debtor to repay in advance, usually at some penalty and only after a number of years from the time of issuance. Sometimes the investor may have the privilege of asking for early repayment. This feature is called a **put option**. Some assets have maturities that may be increased or extended at the discretion of the issuer or the investor. For example, the French government issues a six-year *obligation renouvelable du Trésor*, which allows the investor, after the end of the third year, to switch into a new six-year debt. Similar bonds are issued by the British government. All these features regarding maturity are discussed in later chapters.

Convertibility

As the preceding discussion shows, an important property of some assets is that they are **convertible** into other assets. In some cases, the conversion takes place within one class of assets, as when a bond is converted into another bond. In other situations, the conversion spans classes. For example, a corporate *convertible bond* is a bond that the bondholder can change into equity shares. Preferred stock may be convertible into common stock. It is important to note that the timing, costs, and conditions for conversion are clearly spelled out in the legal descriptions of the convertible security at the time it is issued.

Currency

We have noted throughout our discussion that the global financial system has become increasingly integrated. In light of the freely floating and often volatile exchange rates among the major currencies, this fact gives added importance to the currency in which the financial asset will make cash flow payments. Most financial assets are denominated in one currency, such as U.S. dollars or yen or euros, and investors must choose them with that feature in mind.

Some issuers, responding to investors' wishes to reduce **currency** risk, have issued *dual-currency securities*: For example, some Eurobonds pay interest in one currency but principal or redemption value in a second. U.S. dollars and yen are commonly paired in these cases. Furthermore, some Eurobonds carry a currency option that allows the investor to specify that payments of either interest or principal be made in either one of two major currencies.

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Liquidity

This is an important and widely used notion, although there is at present no uniformly accepted definition of liquidity. A useful way to think of liquidity and illiquidity, proposed by Professor James Tobin,[2] is in terms of how much sellers stand to lose if they wish to sell immediately as against engaging in a costly and time-consuming search.

An example of a quite illiquid financial asset is the stock of a small corporation or the bond issued by a small school district. The market for such a security is extremely thin, and one must search for one of a very few suitable buyers. Less suitable buyers, including speculators and market makers, may be located more promptly, but they will have to be enticed to invest in the illiquid financial asset by an appropriate discount in price.

For many other financial assets, liquidity is determined by contractual arrangements. Ordinary deposits, for example, are perfectly liquid because the bank has a contractual obligation to convert them at par on demand. Financial contracts representing a claim on a private pension fund may be regarded on the other hand as totally illiquid because these can be cashed only at retirement.

Liquidity may depend not only on the financial asset but also on the quantity one wishes to sell (or buy). Although a small quantity may be quite liquid, a large lot may run into illiquidity problems. Note that liquidity is again closely related to whether a market is thick or thin. Thinness always has the effect of increasing the turnaround cost, even of a liquid financial asset. But beyond some point, thinness becomes an obstacle to the formation of a market, and it has a direct effect on the illiquidity of the financial asset.

Return Predictability

Return predictability is a basic property of financial assets, in that it is a major determinant of their value. Assuming investors are risk averse, the riskiness of an asset can be equated with the uncertainty or unpredictability of its return. But whatever measure of volatility is used,[3] it is obvious that volatility varies greatly across financial assets. There are several reasons for this.

First, as illustrated later in this chapter, the value of a financial asset depends on the cash flow expected and on the interest rate used to discount this cash flow. Hence, volatility will be a consequence of the uncertainty about future interest rates and future cash flow. Now the future cash flow may be contractual, in which case the sole source of its uncertainty is the reliability of the debtor with regard to fulfilling the obligation. The cash flow may be in the nature of a residual equity claim, as is the case for the payments generated by the equity of a corporation. The cash flows from U.S. government securities are the only cash flows generally regarded as altogether riskless. Corporate debt and corporate stock cash flows are generally riskier than cash flows of U.S. government securities. Corporate equities represent a wide range of risk, from public utilities to highly speculative issues.

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[2] Tobin, "Properties of Assets."

[3] Proxy measures for volatility include the standard deviation of expected returns or the range within which the outcome can be expected to fall with some stated probability.

As for a change in interest rates, it will in principle affect all prices in the opposite direction, but the effect is much larger in the case of the price of a financial asset with a long maturity than one with a short remaining life, as illustrated later in this chapter. Thus, on this account also, short-term U.S. government securities such as Treasury bills tend to be the safest assets, except for cash (if properly insured). For individual stocks the interest effect is generally swamped by cash flow uncertainty, although movements in interest rates have the characteristic of affecting all stocks in the same direction, while change in expected cash flow is largely dependent on a firm's particular financial situation. In general, uncertainty about returns and future prices can be expected to increase as the investment horizon lengthens.

What has been said so far relates to the predictability of nominal returns, although the relevant measure, of course, is real returns—returns corrected for gains or losses of purchasing power attributable to inflation. Of course, if inflation is absent or small, the determinants of real and nominal uncertainty and risk coincide. But in the presence of highly unpredictable inflation (which is usually the case with high inflation), real returns may be drastically harder to predict than nominal returns.

Complexity

Some financial assets are complex in the sense that they are actually combinations of two or more simpler assets. To find the true value of such an asset, one must break it down into its component parts and price each separately. The sum of those prices is the value of the complex asset. A good example of a complex asset is the **callable bond,** that is, a bond whose issuer is entitled to repay the debt prior to the maturity date. When investors buy such a bond, they in effect buy a bond and sell to the issuer an option that allows the issuer to redeem the bond at a set price prior to the issue's scheduled maturity. The correct or true price of a callable bond, therefore, is equal to the price of a similar noncallable bond less the value of the issuer's right to retire the bond early.

A complex asset may be viewed as a bundle or package of cash flows and options belonging to either the issuer or the holder, or both. Other examples of a complex asset include a convertible bond, a bond that has payments that can be made in a different currency at the option of the bondholder, and a bond that can be sold back to the issuer at a fixed price (that is, a **putable bond**).

In some cases, the degree of complexity is large: Many convertible bonds are also callable, and some bonds give their issuers the right either to extend the asset's maturity or to redeem it early. Also, some Japanese firms have issued bonds that are convertible into Japanese stock (denominated in yen, of course) but that are sold for, and make coupon and principal payments in, another currency, such as U.S. dollars.

Tax Status

An important feature of any asset is its **tax status.** Governmental regulations for taxing the income from the ownership or sale of financial assets vary widely, if not wildly. Tax rates differ from year to year, from country to country, and even among municipal units within a country (as with state and local taxes in the United States). Moreover, tax rates may differ from financial asset to financial asset, depending on the type of issuer, the length of time the asset is held, the nature of the owner, and so on. For example, in the United States,

pension funds are exempt from income taxes, and coupon payments on municipal bonds are generally free of taxation by the federal government.

Key Points That You Should Understand Before Proceeding

1. A financial asset has many properties, and each affects the asset's value in a distinctive and important way.
2. Some properties are intrinsic to the asset, such as its maturity or promised cash flow.
3. Other properties are features of the market for the asset, such as the costs of trading the asset.
4. Still other properties reflect decisions by government about the asset's tax status.
5. A complex asset is one that provides options for the issuer or the investor, or both, and so represents a combination of simpler assets.

PRINCIPLES OF PRICING OF FINANCIAL ASSETS

The fundamental principle of finance is that the true or correct price of an asset equals the present value of all cash flows that the owner of the asset expects to receive during its life. In general, the correct price for a financial asset can be expressed as follows:

$$P = \frac{CF_1}{(1 + r)^1} + \frac{CF_2}{(1 + r)^2} + \frac{CF_3}{(1 + r)^3} + \ldots + \frac{CF_N}{(1 + r)^N}$$

where

P = the price of the financial asset
CF_t = the cash flow in year t ($t = 1, \ldots, N$)
N = maturity of the financial asset
r = appropriate discount rate

The Appropriate Discount Rate

The appropriate discount rate, r, is the return that the market or the consensus of investors requires on the asset. A convenient (but approximate) expression for the appropriate discount rate is this:

$$r = RR + IP + DP + MP + LP + EP$$

where

RR = the real rate of interest, which is the reward for not consuming and for lending to other users
IP = the inflation premium, which is the compensation for the expected decline in the purchasing power of the money lent to borrowers
DP = the default risk premium, which is the reward for taking on the risk of default in the case of a loan or bond or the risk of loss of principal for other assets
MP = the maturity premium, which is the compensation for lending money for long periods of time
LP = the liquidity premium, which is the reward for investing in an asset that may not be readily converted to cash at a fair market value

EP = the **exchange-rate risk premium**, which is the reward for investing in an asset that is not denominated in the investor's home currency.

Obviously, the price of an asset is inversely related to its discount rate: If the discount rate rises, the price falls; and if the rate declines, the price increases.

Illustration

Let us construct a simple example to illustrate the pricing of a financial asset. We can then use the hypothetical financial asset to illustrate some of the properties explained earlier in this chapter.

Suppose a bond has a maturity of four years and pays annual interest of $50 at the end of each year plus a principal of $1,000 at the conclusion of the fourth year. Since this bond pays $50 per $1,000 of principal, the periodic coupon rate is 5%. This rate is commonly and simply referred to as the **coupon rate**. Thus, using the previous notation,

$$N = 4 \quad CF_1 = \$50 \quad CF_2 = \$50 \quad CF_3 = \$50 \quad CF_N = \$1{,}050$$

Furthermore, assume that the market thinks the real rate is 2.5%, the inflation premium is 3%, the bond's default risk justifies a premium of 2%, the maturity premium is 0.5%, and the liquidity premium is 1%. Since the cash flows are denominated in U.S. dollars, the foreign-exchange rate premium is zero. That is,

$$RR = 2.5\% \quad IP = 3.0\% \quad DP = 2.0\% \quad MP = 0.5\% \quad LP = 1.0\% \quad EP = 0\%$$

Thus, we have this value for the discount rate:

$$r = 2.5\% + 3.0\% + 2.0\% + 0.5\% + 1.0\% + 0\% = 9.0\% \text{ or } 0.09$$

Using the formula for price, the price of this bond is

$$P = \frac{\$50}{(1.09)^1} + \frac{\$50}{(1.09)^2} + \frac{\$50}{(1.09)^3} + \frac{\$1{,}050}{(1.09)^4}$$
$$= \$870.41$$

Price and Asset Properties

We can use this hypothetical financial asset to illustrate the effect of some of the properties of financial assets on price or asset value. First, it should be clear that the price of a financial asset changes as the appropriate discount rate, r, changes. More specifically, the price changes in the opposite direction to the change in the appropriate discount rate. An illustration of this principle appears in Table 1, which shows the price of our hypothetical financial asset for various discount rates.

Let's look at how reversibility affects an asset's value. Suppose a **broker's commission** of $35 is imposed by brokers to buy or sell the bond. The price of the four-year bond is then

$$P = -\$35 + \frac{\$50}{(1.09)^1} + \frac{\$50}{(1.09)^2} + \frac{\$50}{(1.09)^3} + \frac{\$1{,}050 - \$35}{(1.09)^4}$$
$$= \$810.62$$

Notice that the initial commission of $35 is subtracted on an undiscounted basis because that payment is made at the time of purchase.

Table 1 Prices of a Four-Year, 5% Yield Bond

Cash flow:			
$CF_1 = \$50$	$CF_2 = \$50$	$CF_3 = \$50$	$CF_4 = \$1{,}050$
Appropriate Discount Rate (%)			Price ($)
4			1,036.30
5			1,000.00
6			965.35
7			932.26
8			900.64
9			870.41
10			841.51
11			813.85
12			787.39
13			762.04
14			737.77

Suppose also a government entity imposes a transfer tax of $20 on each transaction. Because this rise in the cost of reversing an investment diminishes its reversibility to some extent, the present value of all cash flows associated with owning the bond now looks like this:

$$P = -\$35 - \$20 + \frac{\$50}{(1.09)^1} + \frac{\$50}{(1.09)^2} + \frac{\$50}{(1.09)^3} + \frac{\$1{,}050 - \$35 - \$20}{(1.09)^4}$$

$$= \$776.45$$

The change in price is significant and demonstrates why financial markets adjust so sharply (and rapidly) when governments impose restrictions on, or raise the cost of, capital market transactions.

To see how default risk affects the price of an asset, assume that, right before you bought the bond, a news story convinced investors that this bond is less risky than they had thought. So, the *default risk premium* falls from 2% to 1%, and the appropriate discount rate thus declines from 9% to 8%. Ignoring commissions and transfer fees, Table 1 shows that the price would increase from $870.41 to $900.64.

What about liquidity? Suppose immediately after the purchase of this bond, factors in the market for this bond cause its liquidity to decline. An investor buying this asset would plan for such a possibility by raising the liquidity premium. Assume that the liquidity premium increases from 1% to 3%. The appropriate discount rate then increases from 9% to 11%. Ignoring the commission and the transfer fee, Table 1 shows that the price would be $813.85. The fall in price, from the original $870.41 to $813.85, shows how important liquidity can be.

Now, let's tackle the notion of complexity by assuming that the bond is convertible into a fixed number of shares of common stock of the company that issued the bond. The price of our four-year bond would then be greater than $870.41 by an amount equal to the value that the market assigns to the right to convert the bond into common stock. For example, suppose we observe that the price of our hypothetical bond with the conversion privilege is $1,000.41. This means that the conversion privilege is valued by the market at $130.

The unresolved question is whether or not the $130 is a fair value for this conversion privilege. Valuation techniques to determine the fair value of any type of option such as a conversion privilege are available. For now, it is sufficient to understand why a knowledge of how to value an option is important. Because many financial assets have options embedded in them, failure to assess the options properly may lead to the mispricing of financial assets.

Now, let's turn our attention to currency. Suppose that this bond was issued by a U.S. corporation and that all payments are in euros. The cash flow in U.S. dollars that a U.S. investor will receive is uncertain because the dollar-euro exchange rate will fluctuate over the four years. Suppose that the market assigns an exchange premium of 3%. This means that the appropriate discount rate increases from 9% to 12% and the price would be $787.39 (see Table 1). To continue with the effect of currency risk, suppose that immediately after the purchase of this bond the market expects that the exchange rate between the U.S. dollar and the euro will become more volatile. The market will adjust for this by increasing the foreign currency risk premium, which, in turn, increases the appropriate discount rate and decreases the price.

To illustrate the impact of taxes. Suppose that our bond is granted a favorable tax treatment such that the interest and any capital gain from this bond would not be taxed. Suppose that the marginal tax rate on otherwise equivalent taxable bonds is 33.33% and the appropriate discount rate is 9%. This means that the after-tax discount rate would be approximately 6%, as shown below:

$$\text{Pretax discount rate} \times (1 - \text{marginal tax rate})$$
$$0.09 \times (1 - 0.3333) = 6\%$$

Since our hypothetical bond is free of taxes, the appropriate discount rate would be adjusted to compensate for this feature. The discount rate that would be used is 6%, because it is the equivalent of a 9% discount rate and a 33.33% marginal tax rate. From Table 1, we see that the price of the bond would be $965.35.

Continuing with the importance of tax features to the price of a financial asset, suppose that immediately after the purchase of this bond, the market comes to expect that the U.S. Congress will raise the marginal tax rate. This expectation would increase the value of the tax-exempt feature by decreasing the discount rate based on the anticipated rise in the marginal tax rate. The opposite would occur if the market came to expect that the U.S. Congress would lower the marginal tax rate.

Although we have used a single discount rate to discount each cash flow, there are theoretical reasons that suggest this is inappropriate. Specifically, we will look at the relationship between a bond's maturity and yield. In addition, we will see that a financial asset should be viewed as a package of cash flows. Each cash flow should be treated as if it is an individual asset with only one cash flow and that cash flow has its own discount rate that depends upon when it will be received. Consequently, a more general formula for pricing a financial asset would be

$$P = \frac{CF_1}{(1 + r_1)^1} + \frac{CF_2}{(1 + r_2)^2} + \frac{CF_3}{(1 + r_3)^3} + \cdots + \frac{CF_N}{(1 + r_N)^N}$$

where r_t is the discount rate appropriate for period t.

Key Points That You Should Understand Before Proceeding

1. An asset's price is the present value of its expected cash flows, discounted at an appropriate rate.
2. The appropriate discount rate for an asset's cash flows depends upon the properties of the asset.
3. The appropriate discount rate can often be approximated as the sum of rewards for the various risks an asset poses to its buyer.
4. The price of an asset moves in the opposite direction of a change in its discount rate.
5. The price of a complex asset is the sum of the prices of its component parts.

PRICE VOLATILITY OF FINANCIAL ASSETS

As Table 1 makes clear, a fundamental principle is that a financial asset's price changes in the opposite direction of the change in the required rate of return. We refer to the required rate of return as the *required* **yield**. This principle follows from the fact that the price of a financial asset is equal to the present value of its cash flow. An increase (decrease) in the yield required by investors decreases (increases) the present value of the cash flow and, therefore, the financial asset's price.

The price sensitivity of a financial asset to a change in the required yield will not be the same for all assets. For example, an increase in the required yield of one percentage point may result in a decline in one asset's price of 20%, but only 3% for another. In this section, we will see how the characteristics of a financial asset and the level of interest rates affect the price responsiveness of a financial asset to a change in the required yield. We also present a measure that can be used to gauge the approximate price sensitivity of a financial asset to changes in the required yield.

It is important to note that the analysis in this section applies fully and directly to bonds and other financial assets that have known expected cash flows and known expected maturities. An analysis of the price sensitivity of other major financial assets, such as preferred stock and common stock (which are perpetuals and have uncertain cash flows), must be postponed to a later chapter.

In our discussion, we will refer to changes in the required yield. It is convenient to measure a change in yield in terms of what market participants refer to as a **basis point** rather than in terms of a percentage change. One basis point is defined as 0.0001, or equivalently, 0.01%. Therefore, 100 basis points is equal to one percentage point, and a yield change from 9% to 10% represents a 100 basis point change in yield. A yield change from 7% to 7.5% is a 50 basis point change, and a yield change from 6% to 8.35% is a 235 basis point change in yield.

The Effect of Maturity

An asset's maturity is a factor that affects its price sensitivity to a change in yield. In fact, a bond's price sensitivity to a change in the discount rate is positively related to the bond's maturity. Consider the case of two bonds that have the same coupon rate and the same required yield but different maturities. If the required rate were to change, the price sensitivity of the bond with the longer maturity would be greater than that of the bond with the shorter maturity.

An illustration of this link between maturity and price change appears in Table 2, which shows the price of a bond that pays $50 annually and $1,000 at maturity—a 5% coupon rate—for various maturities and discount rates. Table 3, which is based on Table 2, shows the differences across maturities in a bond's dollar price decline and percentage price decline for an increase in the discount rate of 100 basis points. For example, if the discount rate rises from 9% to 10%, the price of a four-year bond falls from $870.41 to $841.51, which represents a price decline of $28.90 and a percentage price decline of 3.32%. In contrast, a similar rise in the discount rate causes the price of a 20-year bond to fall considerably more, from $634.86 to $574.32, which represents a price decline of $60.54 and a percentage price decline of 9.54%.

The Effect of the Coupon Rate

A bond's coupon rate also affects its price sensitivity. More specifically, for two bonds with the same maturity and with the same required yield, the lower the coupon rate, the greater the price responsiveness for a given change in the required yield.

To illustrate this, consider a 5% coupon bond and a 10% coupon bond, each of which has a maturity of 15 years and a principal of $1,000. If the required yield for both bonds is 9%, the price of the 5% coupon bond would be $677.57, and the price of the 10% coupon bond would be $1,080.61. If the required yield increases by 100 basis points, from 9% to 10%, the price of the 5% coupon bond will fall to $619.70, while the price of the 10% coupon bond would fall to $1,000. Thus, the 5% coupon bond's price declines by $57.87 or 8.5% ($57.87/$677.57), while the 10% coupon bond's price declines by $80.61 or by 7.5% ($80.61/$1,080.61). Although the dollar price change is greater for the higher-coupon bond, the percentage price change is less.

A special type of bond, one with no coupon rate, is called a **zero-coupon bond**. The investor who purchases a zero-coupon bond receives no periodic interest payment. Instead, the investor purchases the bond at a price below its principal and receives the principal at the maturity date. The difference between the principal and the price at

	Number of years to maturity			
Discount Rate (%)	4	10	15	20
4%	$1,036.30	$1,081.11	$1,111.18	$1,135.90
5	1,000.00	1,000.00	1,000.00	1,000.00
6	965.35	926.40	902.88	885.30
7	932.26	859.53	817.84	788.12
8	900.64	798.70	743.22	705.46
9	870.41	743.29	677.57	634.86
10	841.51	692.77	619.70	574.32
11	813.85	646.65	568.55	522.20
12	787.39	604.48	523.24	477.14
13	762.04	565.90	483.01	438.02
14	737.77	530.55	447.20	403.92

Price Change

Discount Rate Changes from	Number of years to maturity			
	4	10	15	20
4% to 5%	–$36.30	–$81.11	–$111.18	–$135.91
5 to 6	–34.65	–73.60	–97.20	–114.70
6 to 7	–33.09	–66.87	–85.04	–97.11
7 to 8	–31.62	–60.83	–74.62	–82.66
8 to 9	–30.23	–55.41	–65.65	–70.60
9 to 10	–28.90	–50.52	–57.87	–60.54
10 to 11	–27.66	–46.12	–51.15	–52.12
11 to 12	–26.40	–42.17	–45.13	–45.06
12 to 13	–25.35	–38.58	–40.23	–39.12
13 to 14	–24.27	–35.35	–35.81	–34.12

Percentage Price Change

Discount Rate Changes from	Number of years to maturity			
	4	10	15	20
4% to 5%	–3.50%	–7.50%	–10.01%	–11.96%
5 to 6	–3.47	–7.36	–9.71	–11.47
6 to 7	–3.43	–7.22	–9.42	–10.98
7 to 8	–3.39	–7.08	–9.12	–10.49
8 to 9	–3.36	–6.94	–8.83	–10.01
9 to 10	–3.32	–6.80	–8.54	–9.54
10 to 11	–3.29	–6.66	–8.25	–9.08
11 to 12	–3.25	–6.52	–7.97	–8.63
12 to 13	–3.22	–6.38	–7.69	–8.20
13 to 14	–3.18	–6.25	–7.41	–7.79

which the zero-coupon bond is purchased represents interest earned by the investor over the bond's life. For example, consider a zero-coupon bond with a principal of $1,000 and a maturity of 15 years. If the required yield is 9%, the price of this bond would be $274.54.[4] The difference between the principal of $1,000 and the price of $274.54 is the interest that the investor realizes at the maturity date.

A zero-coupon bond will have greater price sensitivity than a bond with a coupon rate selling at the same required yield and with the same maturity. For example, consider once again the 15-year zero-coupon bond. If the required yield increases from 9% to 10%, the price of this bond would fall to $239.39, a percentage price decline of 12.8% ($35.15/$274.54). This percentage change is greater than the declines in price for the 15-year maturity 5% coupon and 15-year 10% coupon bonds.

[4] The price is the present value of $1,000 15 years from now discounted at 9%.

The Effect of the Level of Yields

Tables 2 and 3 also bring out another interesting property about asset prices. Notice that, for a given maturity, the dollar price change and the percentage price change are higher for the lower initial discount rates than at the higher initial discount rates. For example, consider the 15-year bond when the discount rate is 5%. The price of the bond falls from $1,000 to $902.88 when the discount rate increases from 5% to 6%, a price decline of $97.20 and a percentage price decline of 9.72%. In contrast, a rise in the discount rate of 100 basis points from 13% to 14% reduces the same bond's price by $35.81 (from $483.01 to $447.20) and by the percentage of 7.41%.

The implication is that the lower the level of yields, the greater the effect a change in interest rates will have on the price of a financial asset.

Measuring Price Sensitivity to Interest Rate Changes: Duration

From our discussion thus far, we see that three factors affect the price sensitivity of an asset to changes in interest rates: the maturity, the coupon rate, and the level of interest rates. In managing the price sensitivity of a portfolio, market participants seek a measure of the sensitivity of assets to interest rate changes that encompasses all three factors.

A useful way to approximate an asset's price sensitivity to interest rate changes is to examine how the price changes if the yield changes by a small number of basis points. To do this, we will use the following notation:

Δy = change in yield (in decimal)
P_0 = initial price of the asset
P_- = asset's price if the yield is decreased by Δy
P_+ = asset's price if the yield is increased by Δy

Then, for a small decrease in yield, the percentage price change is

$$\frac{P_- - P_0}{P_0}$$

The percentage price change per basis point change is found by dividing the percentage price change by the number of basis points (Δy times 100). That is,

$$\frac{P_- - P_0}{P_0(\Delta y)100}$$

Similarly, the percentage price change per basis point increase in yield is

$$\frac{P_0 - P_+}{P_0(\Delta y)100}$$

The percentage price change for an increase and decrease in interest rates will not be the same. Consequently, the average percentage price change per basis point change in yield can be calculated. This is done as follows:

$$\frac{1}{2}\left[\frac{P_- - P_0}{P_0(\Delta y)100} + \frac{P_0 - P_+}{P_0(\Delta y)100}\right]$$

or equivalently,

$$\frac{P_- - P_+}{2P_0(\Delta y)100}$$

The approximate percentage price change for a 100 basis point change in yield is found by multiplying the previous formula by 100:

$$\frac{P_- - P_+}{2P_0(\Delta y)}$$

For example, the price of a 5% coupon bond with a principal of $1,000 and a maturity of 15 years is $677.57. If the yield is increased by 50 basis points from 9% to 9.5%, the price would be $647.73. If the yield is decreased by 50 basis points from 9% to 8.5%, the price would be $709.35. Then, we have these values:

$\Delta y = 0.005$
$P_0 = \$677.57$
$P_- = \$709.35$
$P_+ = \$647.73$

The application of the foregoing formula provides this number:

$$\frac{\$709.35 - \$647.73}{2(\$677.57)(0.005)} = 9.09$$

This measure of price sensitivity is popularly referred to as **duration**. Table 4 shows how the duration is determined for a 5% coupon bond with different maturities when the interest rate is initially at 9%.

Table 5 shows the duration for three coupon bonds with different maturities, under the assumption of different initial yields. As can be seen from this table, the relative magnitude of duration is consistent with the properties we described earlier. Specifically, (1) for bonds with the same coupon rate and the same yield, the longer the maturity the greater the duration; (2) for bonds with the same maturity and at the same yield, the lower the coupon rate the greater the duration; and (3) the lower the initial yield, the greater the duration for a given bond. Thus, duration picks up the effect of all three factors: maturity, coupon rate, and initial level of yield.

Duration is related to the price sensitivity as follows:

Approximate percentage change in a financial asset's price =
$-$ Duration $\times$ (Yield change in decimal form) $\times$ 100

Table 4 Calculation of Duration for a 5% Coupon Bond

	Number of years to maturity			
	4	10	15	20
Price at 9% (P_0)	870.41	743.29	677.57	634.86
Price at 9.5% (P_+)	855.80	717.45	647.73	603.44
Price at 8.5% (P_-)	885.35	770.35	709.35	668.78
Duration	3.40	7.12	9.09	10.29

$$\text{Duration} = \frac{P_- - P_+}{2(P_0)(0.005)}$$

Coupon Rate	Yield	Number of years to maturity 4	10	15	20
5%	5%	3.55	7.73	10.39	12.48
5	9	3.40	7.12	9.09	10.29
5	12	3.29	6.67	8.16	8.79
10	5	3.36	6.93	9.15	10.95
10	9	3.21	6.30	7.91	8.97
10	12	3.10	5.85	7.05	7.69
0	5	3.81	9.53	14.30	19.08
0	9	3.67	9.18	13.77	18.38
0	12	3.57	8.93	13.40	17.88

For example, suppose that the required yield on the 5% coupon, 15-year bond increases from 9% to 10% (0.01 in decimal form). Then, since this bond's duration is 9.09:

$$\text{Approximate percentage change in price} = -9.09 \times (0.01) \times 100 = -9.09\%$$

We showed earlier that the actual percentage change in price if the required yield increases from 9% to 10% would be a fall of 8.5%. Thus, duration is a close approximation of the percentage price change. The approximation is better for smaller changes in the required yield. For example, if the required yield changes by 20 basis points (0.002 in decimal form) from 9% to 9.20% rather than 100 basis points, then based on duration the approximate percentage change in price would be –1.82%. The actual price if the required yield increased by 20 basis points is $665.41, a decline of $12.16 from the price of $677.57 at 9%. The actual percentage price change is therefore –1.79%(–$12.16/$677.57). Duration did an excellent job of approximating the percentage price change in this case.

In general, one can interpret duration as follows: *the approximate percentage change in price for a 100 basis point change in interest rates around the prevailing yield.* Duration does a good job of approximating the price change for a small change in yield on the order of 50 basis points in either direction. The larger the yield change, the poorer the approximation that duration provides.

Although we have developed duration in the context of bonds, we want to note that the basic principle applies equally to other financial assets. For example, consider a financial asset whose cash flow is as follows:

Year	Cash Flow
1	$ 30
2	75
3	120
4	140
5	200
6	250
7	300

Suppose that the appropriate discount rate is 7%. Then the price of this financial asset would be $794.31. If the yield is decreased by 50 basis points to 6.5%, the price would be $812.82. If the yield is increased by 50 basis points to 7.5%, the price would be $776.36. Thus, for this financial asset we know

$$\Delta y = 0.005$$
$$P_0 = \$794.31$$
$$P_- = \$812.82$$
$$P_+ = \$776.36$$

The duration is then 4.59, as follows:

$$\frac{\$812.82 - \$776.36}{2(\$794.31)(0.005)} = 4.59$$

Although we have focused on the price sensitivity of individual financial assets to changes in interest rates, we can extend the principle to a portfolio of financial assets. The duration of a portfolio of assets is simply the weighted average of the duration of the individual assets. The weight used for each asset is its market value in the portfolio.

Moreover, the principle can be extended to a liability stream. A liability can be viewed as a financial asset with a negative cash flow. The present value of the cash outlays is equal to the value or price of the liability stream. When interest rates change, the value of the liability stream changes. A duration for a liability stream can be calculated in the same way as the duration of a financial asset.

Importance of Measuring Price Sensitivity to Interest Rate Changes

The importance of being able to measure the sensitivity of an individual asset, a portfolio of assets, and a liability cannot be overemphasized. To control interest rate risk, it is necessary to be able to measure it. An investor with a portfolio of assets wants to be able to measure her exposure to interest rate changes in order to assess whether or not the exposure is acceptable. If it is not, she can alter the exposure. Various instruments that we describe later in this book provide a means for doing so. Financial institutions manage assets against liabilities. The interest rate risk exposure of a financial institution is the difference between the duration of its assets and the duration of its liabilities.

From our discussion, it may seem simple to calculate the duration of an asset. Unfortunately, this is not the case. The reason is that for most assets, the cash flow can change when interest rates change. In our illustrations, we have assumed that when interest rates change, the cash flows are unchanged. However, as we describe the various financial instruments in later chapters, we will see that as interest rates change either the issuer or the investor can alter the cash flow. Consequently, if a change in the cash flow is not considered when interest rates change, the duration calculation can be misleading.

When a duration is calculated under the assumption that the cash flows do not change when interest rates change, the resulting duration is called **modified duration**. In contrast, a duration calculated assuming that the cash flow changes when interest rates change is called **effective duration**. The difference between modified duration and effective duration for some assets can be quite dramatic. For example, with some of the more complex financial instruments discussed later in this book, the modified duration could be four while the effective duration could be 25! This means that an investor might believe that the price of

the asset will change by approximately 4% for a 100 basis point change in interest rates (modified duration) when, in fact, it would change by approximately 25% for a 100 basis point change in interest rates (effective duration).

Macaulay Duration

The term *duration* was first used in 1938 by Frederick Macaulay as a measure of the weighted average time to maturity of a bond.[5] It can be shown that the measure Macaulay developed is related to the price sensitivity of a bond to interest rate changes. Unfortunately, too many market participants interpret duration as some measure of average life instead of a measure of price sensitivity to interest rate changes. This misinterpretation has been a key factor in several financial blunders. For example, for some complex financial assets, the effective duration is greater than the **Macaulay duration**. Market participants who interpret duration as a measure of the average life of an asset find this difficult to believe.

Consequently, when you hear the term *duration* used, interpret it as a measure of price sensitivity to rate changes, not some measure of the asset's average life. In addition, understand what type of duration measure is being used, effective duration or modified duration. Effective duration is the appropriate measure. Finally, if someone thinks that Macaulay duration means something for managing a portfolio or the asset/liability position of a financial institution, photocopy this page and tell them to review this discussion!

Key Points That You Should Understand Before Proceeding

1. Assets have different degrees of price sensitivity to a change in the discount rate or required yield.
2. Factors that influence an asset's price sensitivity include its maturity, its coupon rate, and the initial level of the required yield.
3. The longer an asset's maturity, the greater its price sensitivity to a change in the discount rate, other things being constant.
4. The larger an asset's coupon rate, the lower its price sensitivity to a change in the discount rate, if all else is the same.
5. The lower the initial discount rate, the greater the price sensitivity of most assets to a change in that rate.
6. Duration is a measure of price sensitivity that incorporates maturity, coupon, and level of yield; it provides an approximation of the percentage price change for small changes in yield.
7. It is important to be able to measure the price sensitivity of an asset or liability to interest rate changes, and the appropriate measure is the effective duration.

SUMMARY

In this chapter, we have introduced some key properties of financial assets: moneyness, divisibility and denomination, reversibility, cash flow, term to maturity, convertibility, currency, liquidity, return predictability or risk, complexity, and tax status. These properties,

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[5] Frederick R. Macaulay, *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields, and Stock Prices in the United States Since 1865* (New York: National Bureau of Economic Research, 1938).

which determine much of an asset's appeal and value to different classes of investors, are discussed in greater detail in later chapters. Furthermore, we have illustrated how various properties fit into the theory and practice of pricing assets. We presented a number of illustrations of the way to compute the prices of assets. The illustrations rely on the basic financial principle that price is the present value of expected future cash flows and that the discount rate contains rewards for accepting various features of the asset. Many properties, such as risk of default or term to maturity, influence prices through the required rate of return, which is inversely related to price. Other properties, such as reversibility and tax status, may affect the price of an asset through its expected cash flow.

Because it is so important to contemporary finance and to much of the material in this book, we decided that this first chapter on prices was the right place to introduce the concept of complexity in financial assets. Many assets contain rights, which are, in fact, options for issuers or investors to do something important with the assets. Options are valuable, and they affect the price of the assets that carry them. Later chapters provide extensive and detailed developments of the theme and notion of complexity.

The price of a financial asset will change in the opposite direction of the change in the discount rate or required yield. There are two characteristics of a financial asset that affect its price sensitivity: maturity and coupon rate (in the case of a bond). All other factors constant, the longer the maturity of a financial asset, the greater its price sensitivity to a change in the required yield. All other factors constant, the lower the coupon rate, the greater the price sensitivity to a change in the required yield. The level of interest rates or yields is another factor that affects price sensitivity to interest rate changes: the lower the yield level, the greater the price sensitivity.

Duration is a measure of the approximate price sensitivity of a financial asset to interest rate changes. In general, duration is the approximate percentage price sensitivity of a financial asset to a 100 basis point change in interest rates around some initial level of required yield.

KEY TERMS

- Basis point
- Bid–ask spread
- Broker's commission
- Call provision
- Callable bond
- Convertible
- Coupon rate
- Currency
- Default risk premium
- Discount rate
- Divisibility
- Duration
- Effective duration
- Exchange-rate risk premium
- Inflation premium
- Liquidity premium
- Macaulay duration
- Market maker
- Maturity premium
- Modified duration
- Moneyness
- Nominal expected return
- Perpetual
- Predictability
- Present value
- Put option
- Putable bond
- Real rate of interest
- Real expected return
- Reversibility
- Tax status
- Term to maturity

- Thickness of the market
- Thin market
- Turnaround cost
- Yield
- Zero-coupon bond

QUESTIONS

1. Your broker is recommending that you purchase U.S. government bonds. Here is the explanation: Listen, in these times of uncertainty, with many companies going bankrupt, it makes sense to play it safe and purchase long-term government bonds. They are issued by the U.S. government, so they are risk free.
   How would you respond to the broker?
2. You just inherited 30,000 shares of a company you have never heard of, ABD Corporation. You call your broker to find out if you have finally struck it rich. After several minutes, she comes back on the telephone and says: "I don't have a clue about these shares. It's too bad they are not traded in a financial market. That would make life a lot easier for you." What does she mean by this?
3. Suppose you own a bond that pays $75 yearly in coupon interest and that is likely to be called in two years (because the firm has already announced that it will redeem the issue early). The call price will be $1,050. What is the price of your bond now, in the market, if the appropriate discount rate for this asset is 9%?
4. Your broker has advised you to buy shares of Hungry Boy Fast Foods, which has paid a dividend of $1.00 per year for 10 years and will (according to the broker) continue to do so for many years. The broker believes that the stock, which now has a price of $12, will be worth $25 per share in five years. You have good reason to think that the discount rate for this firm's stock is 22% per year, because that rate compensates the buyer for all pertinent risks. Is the stock's present price a good approximation of its true financial value?
5. You have been considering a zero-coupon bond, which pays no interest but will pay a principal of $1,000 at the end of five years. The price of the bond is now $712.99, and its required rate of return is 7.0%. This morning's news contained a surprising development. The government announced that the rate of inflation appears to be 5.5% instead of the 4% that most people had been expecting. (Suppose most people had thought the real rate of interest was 3%.) What would be the price of the bond, once the market began to absorb this new information about inflation?
6. State the difference in basis points between each of the following:
   a. 5.5% and 6.5%
   b. 7% and 9%
   c. 6.4% and 7.8%
   d. 9.1% and 11.9%
7. a. Does a rise of 100 basis points in the discount rate change the price of a 20-year bond as much as it changes the price of a four-year bond, assuming that both bonds have the same coupon rate and offer the same yield?
   b. Does a rise of 100 basis points in the discount rate change the price of a 4% coupon bond as much as it changes the price of a 10% coupon bond, assuming that both bonds have the same maturity and offer the same yield?
   c. Does a rise of 100 basis points in the discount rate change the price of a 10-year bond to the same extent if the discount rate is 4% as it does if the discount rate is 12%?
8. During the early 1980s, interest rates for many long-term bonds were above 14%. In the early 1990s, rates on similar bonds were far lower. What do you think this dramatic decline in market interest rates means for the price volatility of bonds in response to a change in interest rates?
9. a. What is the cash flow of a 6% coupon bond that pays interest annually, matures in seven years, and has a principal of $1,000?

b. Assuming a discount rate of 8%, what is the price of this bond?
c. Assuming a discount rate of 8.5%, what is the price of this bond?
d. Assuming a discount rate of 7.5%, what is the price of this bond?
e. What is the duration of this bond, assuming that the price is the one you calculated in part (b)?
f. If the yield changes by 100 basis points, from 8% to 7%, by how much would you approximate the percentage price change to be using your estimate of duration in part (e)?
g. What is the actual percentage price change if yield changes by 100 basis points?

10. Why is it important to be able to estimate the duration of a bond or bond portfolio?
11. Explain why you agree or disagree with the following statement: "Determining the duration of a financial asset is a simple process."
12. Explain why the effective duration is a more appropriate measure of a complex financial instrument's price sensitivity to interest rate changes than is modified duration.