

READING

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Alternative Investments Portfolio Management

by Jot K. Yau, PhD, CFA, Thomas Schneeweis, PhD,
Edward A. Szado, PhD, CFA, Thomas R. Robinson, PhD, CFA, and
Lisa R. Weiss, CFA

Jot K. Yau, PhD, CFA, is at Albers School of Business and Economics, Seattle University (USA). Thomas Schneeweis, PhD, is at S Capital Management (USA). Edward A. Szado, PhD, CFA, is at Providence College (USA). Thomas R. Robinson, PhD, CFA, is at AACSB International (USA). Lisa R. Weiss, CFA, is at Regions Bank. (USA).

LEARNING OUTCOMES

Mastery	The candidate should be able to:
☐	a. describe common features of alternative investments and their markets and how alternative investments may be grouped by the role they typically play in a portfolio;
☐	b. explain and justify the major due diligence checkpoints involved in selecting active managers of alternative investments;
☐	c. explain distinctive issues that alternative investments raise for investment advisers of private wealth clients;
☐	d. distinguish among types of alternative investments;
☐	e. discuss the construction and interpretation of benchmarks and the problem of benchmark bias in alternative investment groups;
☐	f. evaluate the return enhancement and/or risk diversification effects of adding an alternative investment to a reference portfolio (for example, a portfolio invested solely in common equity and bonds);
☐	g. describe advantages and disadvantages of direct equity investments in real estate;
☐	h. discuss the major issuers and suppliers of venture capital, the stages through which private companies pass (seed stage through exit), the characteristic sources of financing at each stage, and the purpose of such financing;
☐	i. compare venture capital funds and buyout funds;
☐	j. discuss the use of convertible preferred stock in direct venture capital investment;

(continued)

LEARNING OUTCOMES

<i>Mastery</i>	<i>The candidate should be able to:</i>
☐	k. explain the typical structure of a private equity fund, including the compensation to the fund's sponsor (general partner) and typical timelines;
☐	l. discuss issues that must be addressed in formulating a private equity investment strategy;
☐	m. compare indirect and direct commodity investment;
☐	n. describe the principal roles suggested for commodities in a portfolio and explain why some commodity classes may provide a better hedge against inflation than others;
☐	o. identify and explain the style classification of a hedge fund, given a description of its investment strategy;
☐	p. discuss the typical structure of a hedge fund, including the fee structure, and explain the rationale for high-water mark provisions;
☐	q. describe the purpose and characteristics of fund-of-funds hedge funds;
☐	r. discuss concerns involved in hedge fund performance evaluation;
☐	s. describe trading strategies of managed futures programs and the role of managed futures in a portfolio;
☐	t. describe strategies and risks associated with investing in distressed securities;
☐	u. explain event risk, market liquidity risk, market risk, and "J factor risk" in relation to investing in distressed securities.

1**INTRODUCTION**

Today, many defined-benefit pension funds, endowments, foundations, and high-net-worth individuals allocate money to alternative investments in proportions comparable to those given to traditional assets, such as bonds and common equities. In doing so, such investors may be seeking risk diversification, greater opportunities to apply active management skills, or both. Portfolio managers who understand alternative investments have a substantial advantage over those who do not.

This reading presents six groups of alternative investments: real estate, private equity, commodities, hedge funds, managed futures, and distressed securities. These six diverse asset groups cover a wide spectrum of risk and return characteristics and are the major alternative asset classes in the portfolios of most institutional and individual investors.

This reading focuses on the distinguishing characteristics of alternative investments and their potential contributions in a portfolio context. Among the questions we will address in this reading are the following:

- What types of investments are available in each market, and what are their most important differences for an investor?
- What benchmarks are available to evaluate the performance of alternative investment managers, and what are their limitations?

- What investment strategies and portfolio roles are characteristic of each alternative investment?
- What should due diligence cover? (**Due diligence** is the investigation into the details of a potential investment, including the scrutiny of operations and management and the verification of material facts.)

The reading is organized as follows: Section 2 introduces and presents an overview of the field of alternative investments. In Sections 3 through 8, we present the six alternative asset groups. For each group, we discuss the market for the investments; benchmarks and historical performance, with a focus on the group's record as a stand-alone investment; the portfolio role of the investments and specific strategies; and issues in performance evaluation and reporting. The final section summarizes the reading.

ALTERNATIVE INVESTMENTS: DEFINITIONS, SIMILARITIES, AND CONTRASTS

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Alternative investments comprise groups of investments with risk and return characteristics that differ markedly from those of traditional stock and bond investments. Common features of alternative investments include the following:

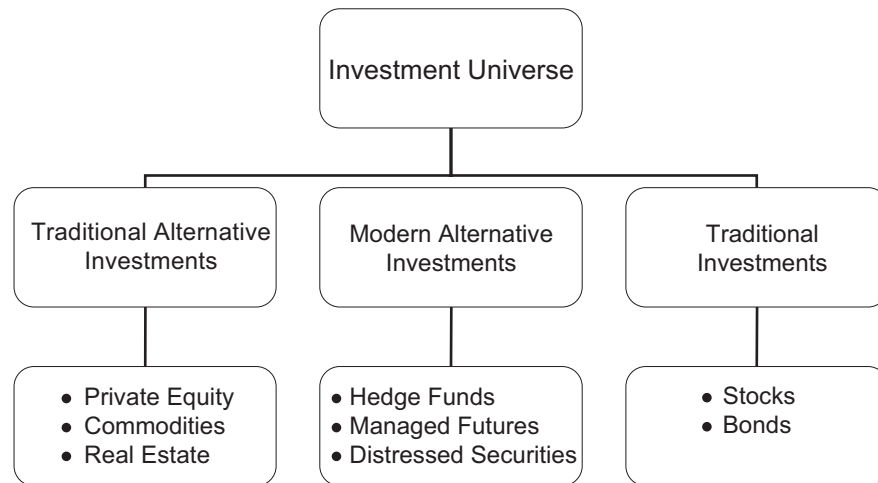
- Relative illiquidity, which tends to be associated with a return premium as compensation
- Diversifying potential relative to a portfolio of stocks and bonds
- High due diligence costs for the following reasons: Investment structures and strategies may be complex; evaluation may draw heavily on asset-class, business-specific, or other expertise; reporting often lacks transparency
- Unusually difficult performance appraisal because of the complexity of establishing valid benchmarks

In addition, many professional investors believe that alternative investment markets are informationally less efficient than the world's major equity and bond markets and offer greater scope for adding value through skill and superior information.

Historically, **real estate** (ownership interests in land or structures attached to land), **private equity** (ownership interests in non-publicly-traded companies), and **commodities** (articles of commerce such as agricultural goods, metals, and petroleum) have been viewed as the primary alternatives to traditional stock and bond investments. However, in recent years, additional investments have increasingly been considered "modern alternatives," not only to traditional investments but also to traditional *alternative* investments. These modern alternatives include **hedge funds** (relatively loosely regulated, pooled investment vehicles) and **managed futures** (pooled investment vehicles in futures and options on futures, frequently structured as limited partnerships but also frequently available directly in separate accounts). The modern alternative investments are more akin to investment or trading strategies than to asset classes. Exhibit 1 shows alternative investments grouped according to these

distinctions. In some instances, placement of an alternative investment in more than one category can be justified. For example, we discuss **distressed securities** separately as a distinct type of alternative investment, but they could be classified differently.¹

Exhibit 1 Alternative and Traditional Investments



The list of alternative investments discussed in this reading is representative but by no means exhaustive. For example, some investors invest in intangibles (such as fine art), and benchmarks and professional advisory services for these and some other alternative investments have long been available.

In addition to the traditional-or-modern distinction, we can separate alternative investments into three groups by the primary role they usually play in portfolios:

- Investments that primarily provide exposure to risk factors not easily accessible through traditional stock and bond investments. Real estate and (long-only) commodities might be included in this group.
- Investments that provide exposure to specialized investment strategies run by an outside manager. Hedge funds and managed futures might be placed in this category. Any value added by such investments is typically heavily dependent on the skills of the manager.
- Investments that combine features of the prior two groups. Private equity funds and distressed securities might be included in this group.

However we group alternative investments, success in this field requires discipline. The portfolio management process still applies. In addition, familiarity with quantitative approaches to the management of risk in alternative investing—particularly risk budgeting—and with non-traditional measures of risk can be helpful. Thus, the readings on risk management are also relevant here.

¹ Distressed securities/bankruptcy investing can be classified (1) within private equity if private debt is considered to be private equity, (2) as a subcategory of event-driven strategies under hedge funds as an alternative investment strategy, or (3) as a separate alternative investment strategy. In this reading, we introduce distressed securities/bankruptcy investing as an event-driven substrategy of hedge funds, but we discuss it separately in Section 8.

EXAMPLE 1**Alternative Investments in a Low-Return Environment**

Interest in alternative investments from institutional investors soared after the severe equity bear markets of the first years of the 21st century. The resulting investment environment for traditional investments was seen as “low return.” Return expectations for equities were widely ratcheted down from pre-bear-market and long-term historical levels. In that environment, using the revised capital market expectations and established strategic asset allocations, many investors foresaw built-in shortfalls relative to return requirements. The problem was particularly acute for defined-benefit pension funds in countries such as Canada and the United States, where such funds have traditionally had a strong equity orientation. With declining interest rates increasing the present value of liabilities, many defined-benefit plans faced severe pressures.

The experience led a number of industry leaders to question prior investment practices in areas such as strategic asset allocation and to reexamine the role of alternative investments in meeting return objectives and controlling risk. Many institutional investors made new and/or larger allocations to alternative investments. Vehicles such as hedge funds proliferated to meet the demand. This trend raised issues of capacity—that is, given the market opportunities, the ability of alternative investment managers to meet performance expectations with more assets.² In the private wealth marketplace, alternative investments also began to be packaged and marketed to new segments, such as the “mass affluent,” raising issues of suitability and appropriate due diligence processes for such investors.³

Who are the major investors in alternative investments? The list includes both high-net-worth individuals (who were among the pioneer investors in hedge funds) and institutional investors (such as endowments, foundations, and sovereign wealth funds), although some institutional investors (such as banks and insurers) may face regulatory and other restrictions on allocating assets to alternative investments. The themes already mentioned play different roles for different investors. The potential risk diversification benefits of alternative investments have broad appeal across investor types. The possibility of enhancing returns also draws many investors to seriously consider alternative investments. Illiquidity is frequently a factor that limits the size of the allocation to alternative investments for investors with short investment horizons. In contrast, investors with long investment horizons, such as endowments and some defined-benefit pension funds, may be well placed to earn illiquidity premiums and to make large allocations.

The costs of due diligence in alternative investments may be a limiting factor for smaller portfolios. Deutsche Bank’s Global Prime Finance group’s 2014 Operational Due Diligence Survey, with a range of respondents serving the institutional and private markets, was revealing. In the case of hedge funds, the survey found that the majority of respondents spend between two and eight weeks on due diligence prior to making an investment decision and 70% of respondents perform annual follow-up reviews. On average, survey respondents conducted 33 new investment reviews over the year

² See Christopher Wright, “Ripe for the Picking,” *CFA Institute Magazine* (September/October 2005): 27–35. The article’s title refers to the question it colorfully poses: Does alpha grow on trees, and if so, is it being overharvested?

³ **Mass affluent** is an industry term for a segment of the private wealth marketplace that is not sufficiently wealthy to command certain individualized services (such as separately managed accounts) at many investment counseling firms. In the United States, as of this writing, individuals with investable assets between US\$100,000 and US\$1 million would fall into this group.

surveyed, with institutional investors evaluating three times as many managers, on average, as fund-of-funds and high-net-worth investors.⁴ In alternative investments, as in traditional investments, expenses—whether management fees or trading or operational expenses—require justification and management.

For both traditional and alternative investments, selecting active managers is a process of attempting to identify those with superior skills or information. As Example 2 illustrates, the set of questions the investor needs to raise in selecting active managers in any investment field has a compellingly simple logic.

EXAMPLE 2

How One University Endowment Evaluates Alternative Investments

In 2005, the then chief investment officer (CIO) of the University of Virginia Investment Management Company UVIMCO, Christopher J. Brightman, CFA, summarized the chief points of UVIMCO's active manager selection process as follows:⁵

- 1 *Market Opportunity.* What is the opportunity, and why is it there? We start by studying capital markets and the types of managers operating within those markets. We identify market inefficiencies and try to understand their causes, such as regulatory structures or behavioral biases. We can rule out many broad groups of managers and strategies by simply determining that the degree of market inefficiency necessary to support a strategy is implausible. Importantly, we consider a past history of active returns meaningless unless we understand why markets will allow those active returns to continue into the future.
- 2 *Investment Process.* Who does this best, and what's their edge? We identify groups of managers that seek to exploit these inefficiencies. Few, if any, important opportunities are exploited by a single manager. We study investment process and identify best practices and competitive advantages among similar managers.
- 3 *Organization.* Are all the pieces in place? Is the firm well organized and stable? Are research, trading, risk management, and operations properly staffed given the investment process and scale? Is compensation fair? Has there been turnover? What is the succession plan?
- 4 *People.* Do we trust the people? We speak at length to the principals face to face. We look for experience, intelligence, candor, and integrity. Then, we do reference checks; we speak to former bosses, colleagues, and business partners as well as current and past clients. We have real conversations with people who know the managers well and are willing to speak openly and at length. We also perform general Google and LexisNexis searches.
- 5 *Terms and Structure.* Are the terms fair? Are interests aligned? Is the fund or account structured appropriately for the opportunity? How much money can or should be invested in the space? Details here vary by market, asset class, and strategy.

⁴ Deutsche Bank Global Prime Finance, "Operational Due Diligence Survey" (2014): <https://www.managedfunds.org/wp-content/uploads/2014/07/Third-Annual-Deutsche-Bank-Operational-Due-Diligence-Survey-Summer-2014.pdf>.

⁵ Based on an e-mail communication of 19 December 2005.

- 6 *Service Providers.* Who supports them? We verify lawyers, auditors, prime brokers, lenders, and so on. We investigate those with whom we are not familiar.
- 7 *Documents.* Read the documents! We read the prospectus or private placement memorandum. If we do not understand everything in the documents, we hire lawyers who do. We also read the audits.
- 8 *Write-Up.* Prior to making a manager selection decision, we produce a formal manager recommendation discussing the above steps. The write-up ensures organized thought, informs others, and formally documents the process.

Notably, the framework of questions to which UVIMCO seeks answers applies not only to alternative investments but also to active managers in general, reflecting the unity of the investment process.

Some questions in due diligence and alternative investment selection are more crucial for advisers of private wealth clients than for institutional investors. These issues include the following:

- *Tax issues.* Taxes are a pervasive issue in investing for individuals. In contrast to equities and bonds, alternative investments frequently require the adviser to deal with partnerships and other structures that have distinct tax issues.
- *Suitability.* This issue is often more complex for an adviser to an individual client or family than for an institutional investor. The adviser often addresses multistage time horizons and liquidity needs. Client-relevant facts—for example, the time horizon—may change more suddenly for an individual than for, say, a pension fund with thousands of participants. The private client adviser also may be faced with questions of emotional as well as financial needs.
- *Communication with the client.* After exploring the suitability of an alternative investment for a client as part of his or her fiduciary responsibilities, the adviser then faces the difficult problem of discussing the possible role in the portfolio (and risk) of an often complex investment with a non-professional investor.
- *Decision risk.* As defined by one authority on investing for private wealth clients, **decision risk** is the risk of changing strategies at the point of maximum loss.⁶ Many advisers to private wealth clients are familiar with the issue of clients who are acutely sensitive to positions of loss at stages prior to an investment policy's stated time horizon(s). Of course, advisers need to perform continuing evaluation of investments, but the point is that the adviser must evaluate whether an alternative investment promises not only to be rewarding over a given time horizon but also to be acceptable at all intermediate points in time.⁷ In effect, the issue relates to downside risk at all points within a time horizon and investors' reactions to that downside risk. Many alternative investments—for example, many hedge fund strategies—have complex risk characteristics. Decision risk is increased by strategies that by their nature have
 - frequent small positive returns but, when a large return occurs, are more likely to have a large negative return than a large positive one⁸ or

⁶ Brunel (2004).

⁷ Brunel (2003).

⁸ Technically, such a strategy would be said to have *negatively skewed returns*.

- extreme returns (relative to the mean return) with some unusual degree of frequency.⁹
- *Concentrated equity position of the client in a closely held company.* For some clients, ownership in a closely held company may represent a substantial proportion of wealth. The adviser needs to be particularly sensitive to an investment's effect on the client's risk and liquidity position. For example, is a private equity fund suitable for the investor? The issues of concentrated risk and illiquidity also arise for concentrated positions in public equities with built-in capital gains, although hedging and monetization strategies are available. (These strategies are discussed in the reading on monitoring and rebalancing.) Although a client's residences are often viewed separately from the client's investable portfolio, a similar issue arises in real estate investment vis-à-vis wealth represented by residences. Problems of this type combine suitability, tax, and asset allocation issues.

In discussing individual alternative investments, we will sometimes provide a perspective on what effect an alternative investment would have on the risk and expected return characteristics of a stock/bond portfolio in which some of the money is shifted to the alternative investment. In some cases, we can also refer to evidence on the effects of the addition of the new alternative investment to a portfolio that already includes stocks, bonds, and a different major alternative investment. This approach reflects the situation faced by many investors and is a type of exercise that can be informative.

In many cases, we give evidence based on data relating to the period 1996–2015.¹⁰ *Here a word of caution is appropriate:* In any forward-looking exercise, the investor needs to evaluate the differences between current or forecasted economic fundamentals and those of any selected historical period used in the analysis. In addition, the results for any relatively short period can be affected by short-term dislocations, such as currency crises.

Overall, the 1996–2015 period was a time of historically low and relatively stable interest rates and inflation in the United States and many other developed markets. The period began with an expansion in these developed countries (with the notable exception of Japan), but at least three dislocations with worldwide effects occurred.¹¹ In the United States and some other major markets, an exceptionally long equity bull market (1991–1999 inclusive) was followed by an extended bear market.¹² The year 2001 was recessionary in the United States, whereas 2002–2004 were recovery years. The years 2008 and 2009 were also recessionary in the United States and were followed by a tepid recovery. The period 2001 to 2008 covered one full business cycle for the United States and many other developed markets.

⁹ Technically, such a strategy would be said to have *high kurtosis*. To summarize using the language of statistics, many investors are presumed to want *positive skewness* and *moderate or low kurtosis* (the standard for “moderate” is the kurtosis of a normal distribution). For more details on these statistical concepts, see chapter 3 in DeFusco, McLeavey, Pinto, and Runkle (2015). In discussions of alternative investments in trade publications, as well as in outlets such as the *Financial Analysts Journal* and the *Journal of Wealth Management*, the practitioner will encounter these statistical terms, which are covered in the CFA Institute curriculum, and we will use them occasionally in this reading.

¹⁰ Hedge funds have reliable data going back only to 1990. We chose a consistent starting point for the sake of relevance and comparability across investment types.

¹¹ The dislocations were the Asian financial crisis of 1997, the Russian debt crisis of 1998, and the global financial crisis of 2007.

¹² US equities experienced a record nine-year string of positive-return years (1991–1999), including six years (1991 and 1995–1999) with returns higher than 20%. This period was followed by a string of three negative-return years (2000–2002), a post-1941 record.

EXAMPLE 3**Alternative Investments and Core–Satellite Investing**

The approach to asset allocation known as **core–satellite** seeks to define each investment's place in the portfolio in relation to specific investment objectives or roles. A traditional core–satellite perspective places competitively priced assets, such as government bonds and/or large-capitalization stocks, in the core. Because alpha is hard to obtain with such assets, the core may be managed in a passive or risk-controlled active manner. (Informally, *alpha* is the return to skill.) In the satellite ring would go investments designed to play special roles, such as to add alpha or to diminish portfolio volatility via low correlation with the core. Alternative investments would be in the satellite ring for most investors.¹³

In a 2005 paper, Leibowitz and Bova championed an approach that would place alternative investments in an “alpha core” at their maximum allowable percentages and then add stocks and bonds as “swing assets” to produce a portfolio that best reflected the desired balance between return and risk.¹⁴ The standard viewpoint takes traditional assets as the centerpiece, whereas the Leibowitz–Bova position builds the portfolio around alternative investments. The Leibowitz–Bova approach is an example of the ferment in investment thinking mentioned in Example 1.

Having provided a bird's-eye view of the field of alternative investments, we use the following sections to analyze each in detail, beginning with real estate.

REAL ESTATE**3**

As one of the earliest of the traditional alternative investments, real estate plays an important role in institutional and individual investor portfolios internationally. The focus of our discussion is *equity investments* in real estate (covered in the definition given earlier). Instruments such as mortgages, securitizations of mortgages, and hybrid debt/equity interests (e.g., mortgages in which the lender's interest includes participation in any appreciation of the underlying real estate) are not covered here.

3.1 The Real Estate Market

Both individual and institutional investors have had long-standing involvement in the real estate market. For centuries, individual investors have owned interests in real estate, primarily in the form of residential and agricultural properties. In the United States, institutional investors ventured into real estate in the late 1970s and early 1980s as they sought to diversify their portfolios and hedge against inflation. By the late 1980s, the performance of real estate had become lackluster as a result of volatile changes in US tax policies, deregulation in the savings and loan industry, and the onset of risk-based capital regulations. These events culminated in the real estate crash of the late 1980s and early 1990s. This crash was followed by a recovery and an extended period of strong growth prior to another major crash and the global

¹³ See Singleton (2005).

¹⁴ In the approach used by Leibowitz and Bova (2005), the term *alpha* in *alpha core* strictly refers not to a return to skill or risk-adjusted excess return, as in standard finance theory, but to a type of return–risk enhancement that may be available relative to a more traditional asset allocation approach.

financial crisis in the late 2000s. Since the crisis, real estate has recovered and significantly surpassed pre-crisis levels in most markets. Outside the United States as well, real estate investment is frequently an important part of both institutional and individual portfolios.

3.1.1 *Types of Real Estate Investments*

Investors may participate in real estate both directly and indirectly (indirect investment is sometimes called “financial ownership”). Direct ownership includes investment in residences, business (commercial) real estate, and agricultural land.

Indirect investment includes investing in the following:

- Companies engaged in real estate ownership, development, or management, such as homebuilders and real estate operating companies (which are in the business of owning such real estate assets as office buildings): Such companies would be in the real estate management and development subsector of the Global Industrial Classification System (GICS) and FTSE’s Industry Classification Benchmark (ICB).
- **Real estate investment trusts (REITs)**, which are publicly traded equities representing pools of money invested in real estate properties and/or real estate debt
- **Commingled real estate funds (CREFs)**, which are professionally managed vehicles for substantial commingled (i.e., pooled) investments in real estate properties
- Separately managed accounts, which are often offered by the same real estate advisers sponsoring CREFs
- **Infrastructure funds**, which, in cooperation with governmental authorities, make private investments in public infrastructure projects—such as roads, tunnels, schools, hospitals, and airports—in return for rights to specified revenue streams over a contracted period

Investments in real estate management and development subsector shares and in REITs are both made through the public stock markets. REITs, however, unlike real estate management and development shares, essentially function as conduits to investors for the cash flows from the underlying real estate holdings. Some markets in which REITs are available include Australia, Belgium, Canada, France, Japan, the Netherlands, Singapore, South Korea, and the United States.

Equity REITs own and manage such properties as office buildings, apartment buildings, and shopping centers. Shareholders receive rental income and income from capital appreciation if the property is sold for a gain. Mortgage REITs own portfolios in which more than 75% of the assets are mortgages. Mortgage REITs lend money to builders and make loan collections; shareholders receive interest income and capital appreciation income from improvement in the prices of loans. Hybrid REITs operate by buying real estate and by acquiring mortgages on both commercial and residential real estate.

REITs securitize illiquid real estate assets; their shares are traded on stock exchanges and over the counter. REITs permit smaller investors to gain real estate exposure. Exchange-traded funds, mutual funds, and traded closed-end investment companies allow investors to obtain a professionally managed, diversified portfolio of real estate securities with a relatively small outlay.

CREFs include both open-end funds and closed-end funds (i.e., funds that are closed to new investment after an initial period). Institutional and wealthy individual investors use these private real estate funds to access the expertise of a professional real estate fund manager in selecting, developing, and realizing the value of real estate properties. In contrast to open-end funds, closed-end funds are usually leveraged and

have higher return objectives; they operate by opportunistically acquiring, repositioning, and disposing of properties. Individually managed separate accounts are also an important choice for larger investors.

In an infrastructure investment, a private company or, more frequently, a consortium of private companies, designs, finances, and builds the new project (e.g., a road or hospital) for public use. The consortium maintains the physical infrastructure over a period that often ranges from 25 to 30 years. The public sector (via the government) leases the infrastructure and pays the consortium an annual fee for the use of the completed project over the contracted period. Thus, the public sector avoids the need to issue debt or raise taxes to finance infrastructure development. The public sector staffs the infrastructure and ensures safety. The projects are financed through bond issuance by the consortium as well as by an equity investment. When the consortium wants to pull its equity capital out of a project for reinvestment in other projects, it can sell its interest to investors through a variety of investment structures. Public/private infrastructure investment has been classified under real estate, under private equity, and also as a distinct alternative investment class. Infrastructure investment was pioneered in the United Kingdom in 1992 (with the Private Finance Initiative) and is a rapidly growing alternative investment segment in North America, Western Europe, and Asia. One estimate, as of mid-2014, is that in the United Kingdom alone, there were more than 700 public/private infrastructure projects underway with a total value of £50 billion.¹⁵

3.1.2 *Size of the Real Estate Market*

It has been estimated that real estate represents one-third to two-thirds of the world's wealth, although these figures are hard to document. In the United States, as of the end of 2014, real estate owned by households and non-profit organizations was valued at US\$23.7 trillion¹⁶ and represented approximately one-third of total assets (tangible and financial) of US households. In 2016, Savills estimated that global developed real estate—comprising commercial properties, residential properties, agriculture, and forestry—represents about 60% of all mainstream assets, with residential properties representing 75% of the value of all developed properties globally.¹⁷

According to the National Association of Real Estate Investment Trusts (NAREIT), the market capitalization of all publicly traded REITs in the United States was almost US\$940 billion in 2015 and the market capitalization of REITs traded in Canada was about US\$13 billion in the same year.

3.2 Benchmarks and Historical Performance

In this section, we use publicly available information to discuss the performance measurement of real estate investments. Performance of private equity in real estate may vary and does not necessarily correlate closely with the benchmarks discussed here. More importantly, it has been observed that the real estate market lags behind publicly traded real estate securities.

¹⁵ UK Trade & Investment, "Investing in UK Infrastructure" (July 2014): www.gov.uk/government/uploads/system/uploads/attachment_data/file/357135/infrastructure_pitchbook_28072014.pdf.

¹⁶ Board of Governors of the Federal Reserve System, "Households and Nonprofit Organizations; Real Estate at Market Value (HNOREMV)" (<https://fred.stlouisfed.org/series/HNOREMV>).

¹⁷ Savills, "Around the World in Dollars and Cents," Savills World Research (2016): <http://pdf.euro.savills.co.uk/global-research/around-the-world-in-dollars-and-cents-2016.pdf>.

3.2.1 Benchmarks

Exhibit 2 shows some of the popular real estate indexes for selected countries. The principal benchmark used to measure the performance of direct real estate investment in the United States is the National Council of Real Estate Investment Fiduciaries (NCREIF) Property Index. The NCREIF index is a quarterly benchmark for real estate covering a sample of commercial properties owned by large US institutions. The NCREIF index is essentially value weighted and includes sub-indexes grouped by real estate sector (e.g., apartment, industrial, office, and retail) and geographical region. Property appraisals largely determine the values in the NCREIF index because real estate properties change ownership relatively infrequently. Property appraisals are also conducted infrequently (typically once a year), so appraisal-based property values exhibit remarkable inertia. Therefore, returns calculated solely on percentage changes in the index suffer from a number of deficiencies, including the tendency to underestimate volatility in underlying values.¹⁸ However, methods have been developed to “unsmooth” the index or correct for this bias.¹⁹ A transaction-based index has been developed using NCREIF data and econometrics to address the issue of infrequent market transactions. In addition, NCREIF offers a variety of indexes focused on the returns to real estate–based mutual funds, closed-end funds, timberland funds, and separate accounts.

Exhibit 2 Selected Real Estate Benchmarks

Country	Name	Type	Begin Date	Frequency
Australia	The Property Council/IPD Australia All Property Index	Appraisal based	1998	Quarterly
Canada	REALpac/IPD Canada Quarterly Property Index	Appraisal based	1985	Quarterly
France	IPD France Annual Property Index	Appraisal based	1998	Annual
United Kingdom	IPD	Appraisal based	1980	Quarterly and monthly
United States	NCREIF Property Index	Individual properties; appraisal based	1978	Quarterly
	Transaction-Based Index (TBI) for Institutional Commercial Property Performance (MIT Center for Real Estate)	Individual properties; based on transaction prices of properties sold from the NCREIF index database	1984	Quarterly
	S&P BMI US REIT Index	REITs	1997	Daily
	NAREIT Index	REITs	1972	Real time
	MSCI US REIT Index	REITs	1996	Real time
	Wilshire real estate indexes	REITs and real estate operating companies	1978	Daily

¹⁸ For details of the deficiencies, see Geltner (2000) and Geltner and Ling (2001).

¹⁹ The approach used to unsmooth the NCREIF index is based on the assumption that real estate returns follow a first-order autoregressive process, as described in CISDM (2005b).

Exhibit 2 (Continued)

Country	Name	Type	Begin Date	Frequency
World	Dow Jones REIT indexes	REITs	1998	Real time
	FTSE EPRA/NAREIT Global Real Estate Index	REITs and real estate operating companies	1989	Daily

Sources: Schneeweis, Kazemi, and Szado (2016a); Hoesli, Lekander, and Witkiewicz (2004); <http://web.mit.edu/cre/>; www.ftse.com/indexes.

The principal benchmark used to represent indirect investment in real estate is the index compiled by NAREIT. Begun in 1972, the NAREIT Index is a real-time, market-cap-weighted index of all REITs actively traded on the New York Stock Exchange and the American Stock Exchange. NAREIT also computes a monthly index based on month-end share prices of REITs that own and manage real estate assets (equity REITs). NAREIT publishes several other indexes, including a monthly index of REITs that specialize in acquiring various types of mortgage loans on many types of properties (mortgage REITs) and a monthly index based on share prices of hybrid REITs, which operate by buying real estate and by acquiring mortgages on both commercial and residential real estate. REIT indexes are also published by various institutions, such as Standard & Poor's, Dow Jones, Wilshire Associates, and Morgan Stanley. The FTSE EPRA/NAREIT Global Real Estate Index listed in Exhibit 2 is an example of a global index of securitized real estate investments.

Both direct and indirect investments have significant measurement issues associated with them.

3.2.2 Historical Performance

In the United States, direct and indirect real estate investments, as represented by the major (unhedged) indexes, produced better risk-adjusted performance over the 1996–2015 period than did general stocks, private equity, and commodities, as shown in Exhibit 3. In Exhibit 3, the “hedged” REIT return series has been purged of its overall equity market return component, as represented by the S&P 500 Index. Such an adjustment is meaningful only for equity REITs because mortgage and hybrid REITs have different risk characteristics. However, equity REITs represent close to 95% of the composition of the index.²⁰ S&P GSCI is the Goldman Sachs Commodity Index, which is discussed further in the section on commodities.

Exhibit 3 Real Estate Performance, 1996–2015

	FTSE NAREIT	FTSE NAREIT Hedged	NCREIF Property Property	NCREIF Property Unsmoothed	S&P 500	Bloomberg Barclays US Aggregate	Private Equity	CISDM EW Hedge Fund	S&P GSCI	CISDM CTA EW
Annualized total return	10.3%	4.0%	9.9%	8.3%	8.5%	5.4%	8.2%	9.1%	−1.0%	7.2%
Annualized standard deviation	20.1%	16.3%	4.6%	16.3%	16.9%	3.5%	35.1%	9.1%	25.2%	8.1%

(continued)

²⁰ The data and methodology are described in CISDM (2005b).

Exhibit 3 (Continued)

	FTSE NAREIT	FTSE NAREIT Hedged	NCREIF Property	NCREIF Property Unsmoothed	S&P 500	Bloomberg Barclays US Aggregate	Private Equity	CISDM EW Hedge Fund	S&P GSCI	CISDM CTA EW
Mean return-to- volatility ratio	0.51	0.24	2.14	0.51	0.50	1.55	0.23	1.00	−0.04	0.90
Maximum drawdown	−64.6%	−49.5%	−23.9%	−63.4%	−45.8%	−2.4%	−75.4%	−19.2%	−79.4%	−7.9%
Correlation with NAREIT	1.00	0.81	0.20	0.50	0.59	0.03	0.54	0.47	0.25	−0.02
Correlation with NAREIT hedged	0.81	1.00	0.10	0.34	0.00	0.29	0.10	0.01	0.17	0.13
Correlation with NCREIF	0.20	0.10	1.00	0.52	0.21	−0.09	0.11	0.07	0.18	−0.01
Correlation with NCREIF unsmoothed	0.50	0.34	0.52	1.00	0.38	−0.08	0.36	0.30	0.27	−0.16

Notes: Based on quarterly returns. CTA is “commodity trading adviser” and refers to managed commodity futures. EW is “equally weighted.”
Source: Schneeweis, Kazemi, and Szado (2016a).

Note that the NCREIF index represents non-leveraged investment only. In contrast, debt often represents 50% or more of the capital structure of REITs, so REITs are a levered exposure to real estate. This contrast is important for understanding the higher standard deviation of (unhedged) REITs compared with the unsmoothed NCREIF index. The NCREIF index is most representative of the performance of private real estate funds because these funds are the major contributors of data to NCREIF.

The performance properties of direct and securitized real estate investment differ significantly. REITs exhibit a relatively high return (10.3%) and high standard deviation (20.1%), whereas appraisal-based real estate returns are slightly lower (9.9%) with low volatility (4.6%). The extremely low standard deviation of NCREIF index returns is indicative of the volatility dampening associated with the smoothing effect of stale valuations. After the correction for smoothing, the NCREIF index’s volatility more than triples to 16.3%. However, the average return decreases from 9.9% for the NCREIF index to 8.3% for the unsmoothed NCREIF index. The correlation between these two indexes is 0.52. The correlations between the unhedged NAREIT Index and the NCREIF index and the unsmoothed NCREIF index are both low (0.20 and 0.50, respectively), suggesting that securitized real estate investment is a poor substitute for direct investment.

In this period, the volatility of the hedged NAREIT Index is the same as that of the NCREIF index unsmoothed, 16.3%. Even though the hedging correction is imperfect, the hedged NAREIT Index may be a more realistic representation of the underlying real estate market.

3.2.3 Interpretation Issues

When NAREIT and NCREIF indexes are used as benchmarks for real estate investments or in asset allocation studies, the problems associated with the construction of the indexes mentioned previously must be taken into account.²¹ Importantly for performance appraisal, the NCREIF index is not an investable index.

EXAMPLE 4

Timberland and Farmland

Timberland and farmland investments represent ownership in working timberland and farms. Although these investments provide limited liquidity, they have the potential for significant income in addition to capital appreciation. Wan, Mei, Clutter, and Siry (2013) found that private equity investments in timberland provided effective hedging of expected and unexpected inflation, particularly over the long term and during boom periods. Public equity timberland investments, however, exhibited inconsistent inflation-hedging abilities.

Farmland returns are largely driven by the value of land and the prices of agricultural commodities. Timberland returns depend on land values and the price of lumber, which is driven largely by housing starts on the demand side and by environmental conditions on the supply side.²²

Timberland as an investment began to take shape in the mid-1980s with the emergence of timberland investment management organizations (TIMOs), which invested in timberland on behalf of institutional clients. Another popular method for investors to access timberland investments is through timberland REITs. As of 2014, almost 10 million acres of timberland were owned by financial investors, with TIMOs owning almost twice as much land as was owned by REITs. About one-half of timberland investments were held by public pension funds in 2014.²³

It is estimated that as of 2014, of the US\$2.5 trillion of US farmland, only US\$10 billion was owned by investment funds.²⁴

3.3 Real Estate: Investment Characteristics and Roles

Real estate accounts for a major portion of many individuals' wealth. For example, equity in primary residential property represented about 30% of the net worth in the United States in 2010.²⁵ One estimate suggests that real estate represented about 35% of household wealth in the United Kingdom over the 2010–2012 period.²⁶ Most advisers to private clients do not include the clients' residences as "marketable" in the sense of assets that the adviser includes in a strategic asset allocation.

²¹ For details, see Geltner (2000) and Geltner and Ling (2001).

²² See Corriero, Healy, and Bond (2013) for a discussion of the impact of the pine beetle and other factors influencing lumber prices.

²³ UNECE, "Forest Products Annual Market Review 2014-2015" (<https://www.unece.org/fileadmin/DAM/timber/publications/2015-FPAMR-E.pdf>).

²⁴ Liz Moyer, "More Individuals Are Looking to Invest in Farmland and Timberland," *Wall Street Journal* (18 July 2014): <http://www.wsj.com/articles/more-individuals-are-looking-to-invest-in-farmland-and-timberland-1405706090>.

²⁵ Michael Neal, "Housing Remains a Key Component of Household Wealth," *Eye on Housing*, NAHB (4 September 2013): <http://eyeonhousing.org/2013/09/housing-remains-a-key-component-of-household-wealth/>.

²⁶ Department for Work and Pensions, "Statistics on Household Wealth" (September 2014): https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/359271/household-wealth.pdf.

3.3.1 *Investment Characteristics*

In contrast to such alternative investments as hedge funds, real estate investments may provide intrinsic benefits to individuals or businesses beyond the returns they generate. For example, an individual can receive significant benefits from his or her primary residence even if the residence generates zero capital gains. In addition, investment in commercial real estate properties includes a substantial income component through contractually fixed rental income, which increases the stability of the investment's returns.

A variety of investment characteristics affect the returns to real estate. The physical real estate market is characterized by a relative lack of liquidity, large lot sizes, relatively high transaction costs, heterogeneity, immobility (with the asset fixed at a location), and relatively low information transparency (so the seller often knows more than the buyer). Physical real estate has rarely been traded on a centralized exchange. These characteristics can create the market opportunity for relatively high risk-adjusted returns for investors who can obtain cost-efficient, high-quality information.

The lack of reliable, high-frequency transaction data for properties necessitates the use of appraisal-based valuations. Later, we will discuss the points that a quantitative analysis of the returns to real estate must cover when the data result from appraisals.

Various market and economic factors affect real estate. For instance, interest rates directly or indirectly affect a multitude of factors associated with the supply and demand for real estate, such as business financing costs, employment levels, saving habits, and the supply and demand for mortgage financing. Worldwide, the returns to real estate are positively correlated with changes in gross national product.²⁷ Population growth is, in the long term, a positive factor for real estate returns, but the real estate investor needs to research the demographics affecting the particular investment (such as migration into or out of the area and changes in the wealth profile of the locality).

Investigators have come to mixed conclusions about the inflation-hedging capabilities of real estate investment. Research suggests that inflation-hedging ability varies significantly by geographic location, market segment, and time period. In particular, the inflation-hedging potential of real estate may be more difficult to detect if the high-inflation period of the late 1970s and early 1980s is excluded from the period of study.²⁸ Bond and Seiler (1998) found that US residential real estate provided a significant inflation hedge in the 1969–94 period. Hoesli, MacGregor, Matysiak, and Nanthakumaran (1997) found that UK real estate provided a better short-term inflation hedge than bonds but a worse hedge than stocks. Stevenson and Murray (1999) did not find evidence that Irish real estate provided a significant inflation hedge. Liu, Hartzell, and Hoesli (1997) found that real estate provided a worse hedge than stocks in some countries but a comparable hedge in others. Analyzing US REITs specifically, Chatrath and Liang (1998) found some long-run but no short-run inflation-hedging ability. Similarly, Lee and Lee (2014) found no evidence of short-term inflation hedging for developed or emerging markets in Europe; however, they found that real estate exhibited long-term inflation-hedging abilities in developed European markets but not in emerging European markets.

Real estate values are affected by idiosyncratic variables, such as location. There appear to be strong continent-specific factors in real estate returns for Europe and North America.²⁹ The implication is that complete diversification in real estate can be achieved only by investing internationally. Practically, most such diversification benefits can be achieved by targeting one country from each continent.

²⁷ See Case, Goetzmann, and Rouwenhorst (2000).

²⁸ See Peyton (2011).

²⁹ See Eichholtz, Huisman, Koedijk, and Schuin (1998); Eichholtz, Mahieu, and Schotman (1999).

The following is a list of the general advantages and disadvantages of direct equity real estate investing.³⁰ Most of these advantages and disadvantages apply to both individual and institutional investors.

Advantages

- To the extent that the law allows mortgage interest, property taxes, and other expenses to be deducted from taxable income, taxable owners of real estate may benefit from tax subsidies.
- Mortgage loans permit most real estate borrowers to use more financial leverage than is commonly available in security investing.
- Direct real estate investors have direct control over their property and may take action, such as expanding or modernizing, to increase the market value of the property. In contrast, an investor who owns a small position in the equity of a publicly traded company has virtually no voice in the management of the company.
- Geographical diversification can be effective in reducing exposure to catastrophic risks (e.g., the risk of hurricanes or floods). The values of real estate investments in different locations can have low correlations; substantial geographical distance is often not necessary to achieve risk reduction benefits.

Disadvantages

- Most parcels of real estate are not easy to divide into smaller pieces. As a result, when such properties are a relatively large part of an investor's total portfolio, real estate investing may involve large idiosyncratic risks. Owners of single-family residences and large institutional investors that buy shopping centers may both experience this problem.
- The cost of acquiring information is high because each piece of real estate is unique.
- Real estate brokers charge high commissions relative to security transaction fees.
- Real estate involves substantial operating and maintenance costs (e.g., for administration, leasing, repairs, and replacements) and hands-on management expertise, which are expenses or requirements not faced by investors in securities.
- Real estate investors are exposed to the risk of neighborhood deterioration, which may be caused by conditions that are beyond the investor's control.
- Any income tax deductions from which a taxable investor in real estate may benefit are subject to political risk—that is, they may be discontinued.

3.3.2 Roles in the Portfolio

According to the 2014 MSCI Asset Owner survey, strategic allocations to real estate average about 3% of total assets in Asia, 9% in the United States, 12% in Canada, and 8% to 13% across major European countries. The range of allocations is broadly consistent with what a quantitative approach to asset allocation would suggest.³¹ Over one-half of Canadian capital and one-third of UK capital, and less than 10% of

³⁰ In part, this list reflects Francis and Ibbotson (2001).

³¹ For example, Kallberg, Liu, and Greig (1996), using a mean–variance optimization framework, found that a 9% allocation to real estate is optimal in a portfolio that includes stocks, bonds, and cash.

American and Australian capital is reportedly committed to direct investment in land and buildings. The survey also indicates a generally strong home bias in real estate investments, with over 90% domestic allocation in the United Kingdom and 79% in the United States, while the Asian domestic allocation is only 8%.

Because real estate may follow many economic fundamentals, real estate markets follow economic cycles. From a tactical asset allocation point of view, accurate forecasting of economic cycles should thus result in improved dynamic strategies for reallocating among different assets on the basis of expected stages of their respective cycles. Among the variables to focus on as systematic determinants of real estate returns are growth in consumption, real interest rates, the term structure of interest rates, and unexpected inflation.³²

The Role of Real Estate as a Risk Diversifier In addition to its potential to add value through active management, real estate has historically been viewed as an important risk diversifier because its returns are typically not highly correlated with returns to other asset classes. High-quality, income-producing commercial real estate can be a relatively stable investment, with income derived from tenants' lease payments. Thus, some real estate investments can be good income enhancers.³³

To illustrate the potential diversification benefit of real estate investments in a portfolio context, Exhibit 4 presents performance results using an approach that is also used in subsequent parts of this reading and elsewhere.³⁴ The exhibit shows statistics for a 50%/50% US stock/US bond portfolio (Portfolio A), which is a simple baseline portfolio. Then, the allocation to US stocks and bonds is reduced by 10 percentage points and a 10% allocation to the alternative investment under discussion (in this case, real estate) is added to create Portfolio B. Portfolio C is a second baseline portfolio created by reducing Portfolio A's allocation to US stocks and bonds by 25 percentage points and adding a 25% allocation to four different alternative investments (in this case, hedge funds, private equity, commodities, and managed futures). To this second baseline portfolio (Portfolio C), a 10% allocation to real estate can be added to create Portfolio D. This method of presentation provides information on the effect of holding the alternative investment under discussion in conjunction with various other asset classes that the investor might hold. A particular investor may have a different baseline portfolio, but the investor can adapt the approach shown here to his or her needs. In Section 2, we highlighted the additional concerns involved in evaluating an analysis based on a given historical sample. In real estate, data series extend much further back than 1996. We have selected 1996 as the starting point for reasons of comparability, as discussed in Section 2.

Exhibit 4 Real Estate Performance in Portfolios, 1996–2015

Portfolios	A	B	C	D
Annualized return	7.26%	7.70%	7.26%	7.69%
Standard deviation	7.83%	8.36%	8.11%	8.62%
Mean return-to-volatility ratio	0.93	0.92	0.89	0.89
Maximum drawdown	−27.11%	−31.34%	−31.11%	−34.77%
Correlation with real estate	0.60		0.61	

³² See Naranjo and Ling (1997).

³³ See Downs, Fung, Patterson, and Yau (2003).

³⁴ See Schneeweis and Spurgin (1997a); Ankrum and Hensel (1993).

Exhibit 4 (Continued)

Portfolios	A	B	C	D
Portfolio A	Equal weights S&P 500 and Bloomberg Barclays US Aggregate			
Portfolio B	90% Portfolio A and 10% real estate			
Portfolio C	75% Portfolio A and 25% managed futures/commodities/private equity/hedge funds			
Portfolio D	90% Portfolio C and 10% real estate			

Source: Schneeweis, Kazemi, and Szado (2016a).

Exhibit 4 is the first of a number of exhibits in this reading that present a simple risk-adjusted performance metric: the ratio of mean return achieved in a given time period divided by the volatility (standard deviation) of returns. Comparing Portfolio B (REITs, US equities, and US bonds) with Portfolio A (only US equities and US bonds), one can see that the addition of REITs slightly decreases the mean return-to-volatility ratio from 0.93 to 0.92. The reason for this lack of improvement despite the moderate correlation between Portfolio A and real estate (0.60) is the high volatility of the REIT returns (over 20%) in the sample period. When REITs are added to the more diversified group of assets included in Portfolio C to produce Portfolio D, similar results are observed: The mean return-to-volatility ratio is actually the same for Portfolios C and D.

Overall, for the sample period, REITs provided no diversification benefits relative to a stock/bond portfolio. This is in strong contrast to that for other alternative investments, such as hedge funds, that did provide diversification benefits when added to a stock/bond portfolio.

These results may indicate that real estate is an *ex post* redundant asset in the presence of hedge funds and other alternative assets.

Diversification within Real Estate Itself Investors also seek diversification by type and geographical location within real estate investing. Investments in different real estate sectors differ in regard to risk and return. The property types that have higher levels of embedded risk, such as large office assets, have generated lower risk-adjusted returns than other sectors and are likely to have more pronounced market cycles. Conversely, those sectors that offer higher risk-adjusted returns, such as retail real estate, appear to be less volatile and offer more defensive characteristics. As Exhibit 5 shows, unsmoothed retail offered the highest risk-adjusted returns (10.20% return and 11.05% standard deviation) and office assets showed low returns (7.63%) and high volatility (18.17%) in the 1996–2015 period. This exhibit suggests that targeting the retail sector of the commercial real estate market over these two decades would have yielded better results than simply diversifying across all sectors.

Exhibit 5 Unsmoothed Performance of Direct Real Estate Indexes, 1996–2015

	NCREIF Property Unsmoothed	NCREIF Apartment Unsmoothed	NCREIF Industrial Unsmoothed	NCREIF Office Unsmoothed	NCREIF Retail Unsmoothed
Annualized total return	8.25%	8.23%	8.91%	7.63%	10.20%
Annualized standard deviation	16.32%	16.15%	15.11%	18.17%	11.05%
Mean return-to-volatility ratio	0.51	0.51	0.59	0.42	0.92
Maximum drawdown	−63.41%	−61.17%	−54.97%	−66.94%	−33.09%
Correlation with NAREIT	0.50	0.50	0.45	0.51	0.25

(continued)

Exhibit 5 (Continued)

	NCREIF Property Unsmoothed	NCREIF Apartment Unsmoothed	NCREIF Industrial Unsmoothed	NCREIF Office Unsmoothed	NCREIF Retail Unsmoothed
Correlation with NAREIT hedged	0.34	0.40	0.32	0.36	0.09
Correlation with NCREIF	0.52	0.50	0.53	0.52	0.46
Correlation with NCREIF unsmoothed	1.00	0.92	0.89	0.92	0.73

	NCREIF Property	NCREIF Apartment	NCREIF Industrial	NCREIF Office	NCREIF Retail
Annualized total return	9.90%	9.81%	10.21%	9.84%	10.49%
Annualized standard deviation	4.62%	4.79%	4.74%	5.29%	4.18%
Mean return-to-volatility ratio	2.14	2.05	2.15	1.86	2.51
Maximum drawdown	−23.88%	−24.70%	−24.40%	−26.82%	−16.56%
Correlation with NAREIT	0.20	0.26	0.19	0.17	0.18
Correlation with NAREIT hedged	0.10	0.17	0.11	0.06	0.07
Correlation with NCREIF	1.00	0.97	0.97	0.97	0.86
Correlation with NCREIF unsmoothed	0.52	0.52	0.49	0.49	0.49

Source: Schneeweis, Kazemi, and Szado (2016a).

Exhibit 6 shows the correlation matrix of total returns for the four geographical NCREIF (unsmoothed) indexes and the combined index. The correlations are quite high for all pairs of geographical sub-indexes. This finding suggests that successful geographical diversification should take into account finer subdivisions, such as metropolitan areas or cities.

Exhibit 6 Correlation of Direct Real Estate Returns by US Geographical Region, 1996–2015

	NCREIF Property Unsmoothed	NCREIF East Unsmoothed	NCREIF Midwest Unsmoothed	NCREIF South Unsmoothed	NCREIF West Unsmoothed
NCREIF unsmoothed	1.00	0.96	0.90	0.94	0.95
NCREIF East unsmoothed		1.00	0.84	0.87	0.85
NCREIF Midwest unsmoothed			1.00	0.84	0.81
NCREIF South unsmoothed				1.00	0.88
NCREIF West unsmoothed					1.00

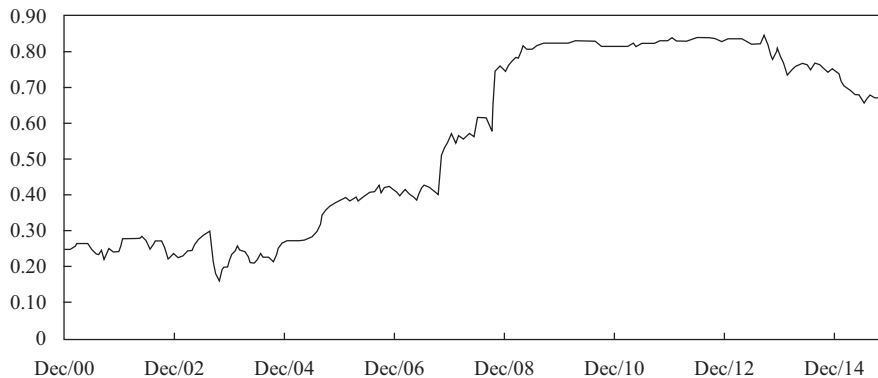
Source: Schneeweis, Kazemi, and Szado (2016a).

The characteristics of real estate return distributions are important for the portfolio manager because they provide key inputs into the asset allocation process. Many return observations in indexes of direct investment tend to be close to zero as a result of the illiquid market. In US markets and elsewhere, equity real estate returns—for both direct investments³⁵ and indirect investments³⁶—generally have been found not to follow a normal distribution. Furthermore, the direct market exhibits a high degree of persistence in returns (positive following positive and negative following negative), whereas the indirect market does not show such persistence. The explanation for these facts is a matter of continuing investigation.³⁷

Investment in Real Estate Worldwide The advantages of international real estate investment have been researched, and overall, the evidence indicates that investors may benefit from including both domestic and non-domestic investments in real estate in their portfolios.

Historically, real estate has been found to be an effective portfolio risk diversifier for seven countries (Australia, France, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States) on three continents, and including both domestic and international real estate assets increases the benefits.³⁸ The results presented in Exhibit 7 suggest that, for the United States, the correlation between REIT returns and common stock returns appears to have increased substantially since 2000 (although correlations have dropped off somewhat since 2013), indicating the possibility that real estate's diversification potential has declined.

Exhibit 7 Five-Year Rolling Correlation of S&P 500 and NAREIT, 2000–2015



Note: Based on data from 1996–2015.

Source: Schneeweis, Kazemi, and Szado (2016a).

Research has also suggested that US REITs may be an attractive addition to domestic stocks and bonds for investors from Canada and the United Kingdom.³⁹ Example 5 applies some of the facts and methods discussed in the text.

³⁵ See Young and Graff (1995); Miles and McCue (1984); Hartzell, Hekman, and Miles (1986).

³⁶ See Lizieri and Satchell (1997); Seiler, Webb, and Myer (1999); Mei and Hu (2000); Lizieri and Ward (2000).

³⁷ See Lizieri and Ward (2000).

³⁸ See Hoesli et al. (2004). This study was based on data from 1987–2001. More recent analysis was not available as of the date of this reading.

³⁹ See Mull and Soenen (1997), who studied the 1985–94 period.

EXAMPLE 5**Adding Real Estate to the Strategic Asset Allocation**

As CIO of The Annette Hansen Charitable Foundation (TAHCF), a US-based foundation supporting medical research, Maryann Dunn will present to the trustees a recommendation that they revise the foundation's strategic asset allocation to include direct investment in real estate.

- The foundation's current portfolio and strategic asset allocation is 50% common stocks/50% bonds, and 12% of the common stock allocation (6% of the total portfolio) is invested in REITs.
- The risk-free rate of interest is 2.5%.
- The forecasted inflation rate is 2%.
- TAHCF's overall investment objective is to preserve the long-run real (inflation-adjusted) purchasing power of assets. Its spending rate is 5% of 12-month average asset value.
- TAHCF's cost of earning investment returns is 20 bps per year.

Exhibit 8 shows Dunn's expectations for the current and proposed asset allocations. Dunn's expectations for direct real estate investment are based on unsmoothed NCREIF historical data adjusted for her current economic outlook.

Exhibit 8 Forecast Data

Measure	50/50	45/45/10 Stocks/Bonds/US
	Stocks/Bonds (%)	Direct Real Estate Investment (%)
Expected return	4.5	4.9
Std. dev. of return	11.8	10.8

Dunn expects opposition to her proposal to come from a trustee, Bob Enicar. Enicar has stated at a prior board meeting, "TAHCF's allocation to equity includes substantial investment in REITs. REITs typically provide risk diversification comparable to that of direct equity investments for a balanced portfolio of stocks and bonds while offering substantially more liquidity."

- 1 State and explain two financial justifications that Dunn could present for revising TAHCF's asset allocation to 45/45/10 stocks/bonds/US direct real estate investment.
- 2 State and explain one disadvantage of the proposed revised strategic asset allocation.
- 3 Contrast unsmoothed and smoothed NCREIF indexes and justify Dunn's choice of the unsmoothed NCREIF index in formulating expectations for direct real estate investment.
- 4 Draft a response to Enicar's critique.

Solution to 1:

The financial justifications for adding direct real estate investment to the strategic asset allocation include the following:

- The Sharpe ratio of the 45/45/10 stocks/bonds/US direct real estate investment portfolio, at $(4.9\% - 2.5\%)/10.8 = 0.22$, is greater than that of the current 50/50 stocks/bonds allocation, at $(4.5\% - 2.5\%)/11.8 = 0.17$.
- Direct real estate investment's inflation-hedging qualities are consistent with TAHCF's stated objective of preserving the real purchasing power of its assets.

Solution to 2:

The proposed strategic asset allocation's expected return of 4.9% falls well short of the $(1.05)(1.02)(1.0020) - 1.0 = 7.31\%$ return objective based on the description of the problem.

Solution to 3:

The NCREIF index is based on property appraisals rather than market values. Appraised values tend to be less volatile than market values because of an effect known as smoothing. As a result of smoothing, volatility and correlations with other assets will tend to be understated, leading to an overstatement of the benefits of real estate in the portfolio. Using the unsmoothed NCREIF index gives a more accurate picture of the benefits of real estate investment.

Solution to 4:

Enicar is correct that securitized real estate is more liquid than direct real estate investment. However, direct real estate's correlations with US equities and US bonds are lower than those of REITs, making direct real estate a stronger risk diversifier when added to a portfolio of stocks and bonds.

Example 5 reviewed a strategic asset allocation involving direct real estate investment that did not promise to fulfill the investor's return requirement.

3.3.3 Other Issues

Due diligence in active direct real estate investment should cover the points outlined in Example 2: market opportunity, investment process, organization, people, terms and structure, service providers, documents, and write-up. Some of these points will involve investment-specific issues, such as valuation methods, financing, legal issues (e.g., zoning, title checks), and for taxable investors especially, tax issues.

In the next section, we discuss another major type of alternative investment, private equity.

PRIVATE EQUITY/VENTURE CAPITAL

4

Private equity is an ownership interest in a private (non-publicly traded) company. The term "private equity" refers to any security that is used to raise equity capital via a private placement rather than through a public offering. As private placements, private equity securities are not registered with a regulatory body or traded on an exchange. To qualify as private placements, securities are generally offered for sale to

either institutions or high-net-worth individuals (accredited investors). Private equity investments can be made directly with the company needing financing or indirectly through private equity funds.

A variety of investment activities can take place in the investment structures known as **private equity funds**—the pooled investment vehicles through which many investors make (indirect) investments in generally highly illiquid assets. These investment activities include the financing of private businesses, leveraged buyouts of public companies, distressed debt investing, and the private financing of public infrastructure projects. Thus, many different investing activities requiring distinct expertise are often gathered under the rubric of private equity. In this section, we focus on the two historically most important fields of private equity activity: the equity financing of new or growing private companies—an activity often called **venture capital**—and the buyout of established companies via private equity funds known as buyout funds.⁴⁰ Through venture capital, a company that starts out as private may eventually become publicly owned via an initial public offering (IPO). The converse process—taking a publicly owned company private through a buyout of publicly held interests or the private purchase of a division of a public corporation—constitutes the chief sphere of activity of buyout funds, along with buyouts of established private companies. Private investments may also occur with public companies, such as private placements of equity (relatively rare) or bonds (more common).

EXAMPLE 6

Private Investment in Public Equity (PIPE)

The range of activities conducted via the structure of a private equity fund continues to evolve and grow. An example is PIPE—private investment in public equity. If the share price of a publicly traded company has dropped significantly from its value at the time of going public, the company may seek new sources of capital via a PIPE. Through a PIPE, an investor makes a relatively large investment in a company, usually at a price less than the current market value.

On 16 January 2004, Novatel Wireless, Inc., a publicly traded company, sold 1,142,855 shares of newly issued common stock to a group of private investment firms (a PIPE). The shares included warrants entitling the investors to purchase an additional 228,565 shares at a price of US\$8.833 per share. Novatel raised net capital of US\$7,525,000 in the initial transaction. On 13 February 2004, Novatel filed a registration statement with the US SEC that would entitle these private investors to sell their shares on the open market. At the time of the original transaction, Novatel's shares were trading for US\$9.00. At the time the registration statement was filed, the shares were trading for US\$16.48.

Sources: BusinessWeek (10 May 2004): 118–120; Novatel Wireless, SEC Form S-3, filed 13 February 2004.

⁴⁰ “Venture capital” is widely used to refer to early-stage financing of companies. Yet practitioners also talk of late-stage venture capital, referring to the period prior to exiting from the investment. According to Lerner et al. (2012), outside the United States, the term “venture capital” is often used as a synonym for “private equity.” Confusingly, practitioners sometimes use “private equity” to refer to investment buyout funds rather than venture capital funds. In short, terminology varies, but the reader can infer the meaning from the context.

Private equity represents an important asset class that has received much interest from pension plans, endowments, foundations, and corporations, as well as from family offices and other advisers to the private wealth market. In some countries, such as the United Kingdom and the United States, exposure to this investment type is also available through exchange-traded vehicles.

In a number of countries, including the United States, private equity is one type of alternative investment that practitioners often point to as facing serious capacity issues. The high failure rate of young businesses is an indication that the combination of winning ideas for products/services and the entrepreneurial and/or managerial skill, experience, and commitment to realize those ideas is in limited supply at any given time. The venture or business that is in a position of strength with respect to those factors will be scrutinizing the potential investor for qualities needed in a partner/collaborator as closely as the investor scrutinizes the business.

Most professional investors have broad familiarity with public equity markets. Although public and private equity investments have common elements, private equity investment makes use of distinct knowledge and experience. The contrast is greatest in the case of direct private equity investment, which often calls on the investor's skills as a businessperson, as Exhibit 9 shows.

Exhibit 9 Investment Processes of (Direct) Private Equity Investment and Investment in Publicly Traded Equities

Private Equity Investments	Publicly Traded Securities
<i>Structure and Valuation</i>	
Deal structure and price are negotiated between the investor and company management.	Price is set in the context of the market. Deal structure is standardized. Variations typically require approval from securities regulators.
<i>Access to Information for Investment Selection</i>	
Investor can request access to all information, including internal projections.	Analysts can use only publicly available information to assess investment potential.
<i>Post-Investment Activity</i>	
Investors typically remain heavily involved in the company after the transaction by participating at the board level and through regular contact with management.	Investors typically do not sit on corporate boards or make ongoing assessments based on publicly available information and have limited access to management.

Source: Prepared by Andrew Abouchar, CFA, of Tech Capital Partners.

The following section discusses some prominent characteristics of the private equity marketplace and private equity funds.

4.1 The Private Equity Market

The first question to address is why the market opportunities for private equity arise. Take the case of venture capital investment first: A closely held business is characterized by a small number of owners and is not publicly traded. Often, the owners of a closely held business are family members, but closely held businesses can also have unrelated owners. Such businesses may seek outside investors for a variety of reasons. For example, the original owners may not have adequate capital to fund growth or even current operations. Entrepreneurs frequently lack the professional managerial skills and experience to manage the enterprise they started after it reaches a certain size. Venture capital firms may be able to supply valuable assistance in the transition

to professional management.⁴¹ The original owners may also want to diversify their wealth. For an individual investor, a closely held business can represent a significant portion of his or her overall wealth. The liquidity afforded by markets for publicly traded shares allows such investors to diversify their portfolios at a lower cost. Venture capitalists also can assist in the initial public offering (IPO) of shares, which permits the original owners to eventually realize public market valuations for their holdings.⁴²

Formative-stage companies usually raise money through marketing an effective business plan to potentially interested parties. The business plan describes the intended products and/or services, the market that will be served, the business strategy, the dates of expected financial milestones (such as the achievement of profitability), the expected cash consumption by the business (“burn rate”), the additional rounds of financing that the company expects to need, and other relevant information.

In the case of funds raised through an agent, a document called a **private placement memorandum** may be used. This document should discuss a myriad of factors affecting the company. It should describe the company’s business and competitive position and discuss how it intends to use the proceeds from the offering. It should also contain financial statements—although not necessarily audited financial statements—and projections.

The Demand for Venture Capital Issuers of venture capital include the following:

- *Formative-stage companies.* This group includes newly formed companies, young companies beginning product development (“start-ups”), and companies that are just beginning to sell a product. Worldwide, probably more than a million new businesses are formed every year, but venture capitalists frequently are not interested in companies at that earliest stage. In the United States, venture capitalists that do invest in formative-stage companies might be looking for companies with, for example, projected revenues in the US\$10 million to US\$50 million range within a five-year horizon.⁴³
- *Expansion-stage companies.* This group includes young companies that need financing for expanding sales, established companies with significant revenues (middle-market companies), and companies that are preparing for an IPO of stock.

Most private companies pass through the following financing stages:⁴⁴

Early-Stage Financing

- **Seed money:** Generally, seed money is a relatively small amount of money provided to the entrepreneur to form a company and prove that an idea has a reasonable chance of commercial success.

⁴¹ As will be discussed in more detail shortly, **venture capital firms** represent dedicated pools of capital providing equity or equity-linked financing to privately held companies.

⁴² An **initial public offering** is the initial issuance of common stock registered for public trading by a formerly private corporation.

⁴³ This comment gives an idea of the stage at which venture capitalists become active; the numbers can be expected to change over time and may be different elsewhere.

⁴⁴ There is some variation in terminology. For example, after the seed and start-up stages, some practitioners distinguish Series A from Series B in reference to the series of preferred shares being issued in the transaction.

- **Start-up financing:** At the start-up stage, the company has been formed and an idea has been proven but the company needs money to bring the product or idea to commercialization. This is a pre-revenue stage.
- **First-stage financing:** If the company has exhausted its seed and start-up financing, it may seek additional funds. Obviously, the company must have made progress from earlier stages to warrant an investment at this stage.

Later-Stage Financing This is the financing of promising existing companies that need funds for expanding sales.

The Exit Because private equity is by definition not publicly traded, the exit (the liquidation or divestment of a private equity investment) is often difficult and is a major item of strategy. The investor can realize the value of the holding in several ways:

- merger with another company;
- acquisition by another company (including a private equity fund specializing in this process); or
- an IPO, whereby the company becomes publicly traded.

Of course, it is also possible that the venture will not succeed and the business will be closed without any recovery of the original investment by the equity holder. Exhibit 10 summarizes the venture capital timeline.

Exhibit 10 Venture Capital Timeline

	Formative-Stage Companies			Expansion-Stage Companies		
	Early Stage			Later Stage	Pre-IPO	
	Seed	Start-Up	First Stage	Second Stage	Third Stage	Mezzanine
Stage characteristics	Idea incorporation, hiring of first personnel, prototype development	Movement into operation, initial revenues		Revenue growth		Preparation for IPO
Stage financing (buyers of private equity)	Founders, FF&F, ^a angels, venture capital	Angels, venture capital		Venture capital, strategic partners		
Purpose of financing	Supports market research and establishment of business	Start-up financing supports product development and initial marketing First-stage financing supports such activities as initial manufacturing and sales		Second-stage financing supports the initial expansion of a company already producing and selling a product Third-stage financing provides capital for major expansion Mezzanine (bridge) financing provides capital to prepare for the IPO—often a mix of debt and equity		

^a FF&F = founder's friends and family.

Note: The sources of financing are listed in typical order of importance.

The Supply of Venture Capital Suppliers of venture capital include the following:

- **Angel investors.** An **angel investor** is an accredited individual investing chiefly in seed- and early-stage companies, sometimes after the resources of the founder's friends and family have been exhausted. Angel investors are often the first outside investors in a company, even before a company is organized or there is

a real product. The investments made by angels are relatively small. However, because they generally occur at the earliest point, such investments are among the riskiest.

- *Venture capitalists.* **Venture capital** (VC) refers broadly to the pools of capital managed by specialists known as **venture capitalists**, who seek to identify companies that have great business opportunities but need financial, managerial, and strategic support. Venture capitalists invest alongside company managers; they often take representation on the board of directors of the company and provide significant expertise in addition to capital. An individual pool is a **venture capital fund** (VC fund). An industry of investment firms sponsors series of such funds and sometimes a variety of similarly structured vehicles that take advantage of different opportunities. These firms may be private partnerships, closely held corporations, or sometimes, publicly traded corporations. In the United Kingdom, **venture capital trusts** (VCTs), which are exchange-traded, closed-end vehicles, represent an example of other opportunities that are available.
- *Large companies.* A variety of major companies invest their own money in promising young companies in the same or a related industry via corporate private equity. This activity is known as **corporate venturing**, and the investors are often referred to as “strategic partners.” Corporate venturing funds are not available to the public.

EXAMPLE 7

The IPO of Google

The IPO of Google, Inc., illustrates the timeline for private equity. Google was incorporated in 1998 with an initial investment of US\$1 million by family, friends, and angel investors. In early 1999, Google received US\$25 million in venture capital funds. The two venture capital firms that provided capital in 1999 each owned about 10.2% of the company. In April 2004, Google filed for an IPO. The IPO date was 19 August 2004, with Morgan Stanley and Credit Suisse First Boston as the lead underwriters in an unusual (for equities) Dutch auction, which affords more access to shares by smaller investors. The offering was for approximately 19.6 million shares of Class A common stock. Of that number, approximately 4.5 million shares were from selling shareholders realizing part of the cash value of their holdings, including company founders Larry Page and Sergey Brin. The offering was at US\$85 per share and raised about US\$1.2 billion for Google and US\$464 million for the selling shareholders. After the offering, about 33.6 million Class A shares and about 237.6 million privately held Class B shares were outstanding. The Class B shares, held by the founders and other executives and investors, had 10 votes per share (versus 1 vote per share for the Class A shareholders). This dual-stock structure was viewed as unusual in technology IPOs, but it had been used by media companies, such as the *New York Times*. It permitted insiders to maintain voting control over Google and, according to Google executives, protected the company from pressures felt by public companies to produce short-term performance. At the same time, the Class B shares were convertible to the registered Class A shares, so the investing group could access public markets to realize the cash values of their holdings in the future. The August 2004 IPO was oversubscribed, and the shares rose about 18% in initial trading. In September 2005, Google made a follow-on offering of about 14.2 million shares at US\$295 per share that raised US\$4.18 billion. In 2006, Google was added to the S&P 500. In 2014, a new Class C share with no

voting rights was created through a 2:1 stock split of A and B shares with the objective of protecting the voting control of Class B shareholders. In a restructuring in 2015, a holding company, Alphabet Inc., was created that included as subsidiaries Google and companies that had been purchased by Google.

Sources: Reuters; Emily Chasan, "Google's Multi-Class Stock Structure Made Alphabet Move Unique," 12 Aug 12, 2015 at <http://blogs.wsj.com/cfo>.

Most private equity investors participate through private equity funds. Among these funds, buyout funds constitute a larger segment than VC funds, as measured by either assets under management or the size of capital commitments. The capital commitments to buyout funds in many years have been two to three times the size of those to VC funds.

Buyout funds may be separated into two major groups, mega-cap buyout funds and middle-market buyout funds. **Mega-cap buyout funds** take public companies private. **Middle-market buyout funds** purchase private companies whose revenues and profits are too small to allow them to access capital from the public equity markets. Middle-market buyout funds typically purchase established businesses, such as small privately held companies (including those that may have received venture capital support) and divisions spun off from larger companies. The buyout fund manager seeks to add value by:

- restructuring operations and improving management;
- opportunistically identifying and executing the purchase of companies at a discount to intrinsic value; and
- capturing any gains from the addition of debt or restructuring of existing debt.

To further their ability to add value through restructuring operations and improving management, large buyout organizations maintain a pool of experienced operating and financial executives who can be inserted into the companies if necessary and appropriate. These organizations look to cut costs and increase revenues. As the owner/managers of companies, buyout organizations have well-developed processes for installing incentive compensation structures and management reporting systems. They have experience restructuring both supply chains and distribution channels. Buyout firms often make the argument that they add value by substituting a highly focused private governance model, in which expert owners have complete control, for a public governance model with dispersed ownership, conflicts of interest, and high regulatory compliance costs.

Buyout funds can realize value gains through a sale of the acquired company, an IPO, or a dividend recapitalization. A **dividend recapitalization** involves issuing debt to finance a special dividend to owners (and sometimes refinancing existing debt in the process). Dividend recapitalizations have at times allowed buyout funds to recoup all or most of the cash used to acquire a company within two to four years of the buyout while still retaining ownership and control of the company. However, dividend recapitalization has the potential to weaken the company as a going concern by overleveraging it.

The major investors in private equity funds are public pension funds, corporate defined-benefit pension plans, endowments, foundations, and family offices. In the United States, public pension plans are currently the most important players as

measured by dollars committed; they are followed by the other major investors in the order listed. Endowments and foundations have among the largest allocations in their policy portfolios. Family offices are a growing influence.⁴⁵

4.1.1 *Types of Private Equity Investment*

Both direct and indirect investors in private equity need to understand the basics of direct private equity investment in order to have an informed grasp of its return and risk characteristics.

Direct venture capital investment is typically structured as convertible preferred stock rather than common stock. The terms of the preferred stock require that the corporation pay cash equal to some multiple (e.g., 2×) of preferred shareholders' original investment before any cash can be paid on the common stock, which is the equity investment of the founders. Preferred stock is senior to common stock also in its claim on liquidation value. This financing structure mitigates the risk that the company will take on the venture capital investment and distributes it to the owners/founders. It also provides an incentive for the company to meet the return goals of the outside investors.

Investors in subsequent rounds usually have rights to cash flows that are senior to the rights of preferred stock issued in previous financing rounds. All else being equal, therefore, shares issued in later rounds are more valuable than shares issued in earlier rounds, which in turn are more valuable than the founders' common shares. Nevertheless, these differences may be slight and are frequently ignored in valuation. Existing shareholders also generally have the right to purchase shares in subsequent rounds to maintain their percentage ownership of the business. For convertible preferred shares issued in any round, an event such as a buyout or an acquisition of the common equity at a favorable price will trigger conversion of the preferred into the common shares of the company.

Indirect investment is primarily through private equity funds, including VC funds and buyout funds. Private equity funds are usually structured as limited partnerships or limited liability companies (LLCs) with an expected life of 7–10 years and an option to extend the life for another 1–5 years.⁴⁶ The fund manager's objective is to realize the value of all portfolio investments by the fund's liquidation date. There is typically an offering period during which capital commitments are solicited.

The limited partnership and LLC forms are attractive because income and capital gains flow through to the limited partners or (in the case of an LLC) the shareholders for tax purposes, thus avoiding the possible double taxation that can occur in the corporate form. The limited partners or shareholders do not bear any liability beyond the amount of their investments. The limited partners (or shareholders) commit to a specific investment amount that the general partner (in an LLC, the managing director) "takes down" over time in a series of capital calls to make specific investments or to pay expenses; private equity funds usually do not maintain a pool of uninvested capital. The general partner (or managing director) is the venture capitalist, the party selecting and recommending investments. The general partner may be an individual or another entity (such as a corporation or partnership) and also often commits its own capital. In this way, the interests of the outside investors and the fund manager/general partner/managing director are closely aligned.

The LLC form, available in the United States and in some other countries under different names and with different requirements, is a hybrid of the corporate and partnership forms. It provides investors with more influence over the fund's operations than does a limited partnership interest—in particular, more control over the raising

⁴⁵ See Boyer (2005).

⁴⁶ Anson (2006, p. 273).

of additional committed capital. The LLC is often the preferred form when raising funds from a relatively small group of substantial and knowledgeable investors who may want to be proactive.

Private equity funds of funds are also available. Such funds invest in other private equity funds. Management fees of fund-of-funds vehicles range from 0.5% to 2% of the net assets managed; these fees are on top of fees charged by the underlying funds.

In contrast to the structure of private equity funds, in venture capital, the company receiving support is organized in a corporate form because one desirable exit is a successful initial offering of shares to the public. Examples of the corporate form of publicly traded companies include the UK public limited company (PLC), the corporation in the United States, the *kabushiki kaisha* (KK) in Japan, the *sociedad anónima* in Spain, the *société anonyme* in France, and the *Aktiengesellschaft* (AG) in Germany. The European Union has developed a new structure, the European company or *societas Europaea* (SE), that will permit companies to operate throughout the EU under one set of rules and with a uniform management system.

The compensation to the fund manager of a private equity fund consists of a management fee plus an incentive fee. The management fee is usually a percentage of limited partner *commitments* to the fund. (If the investor has made a capital commitment of US\$50 million but has actually invested only US\$10 million, the investor generally pays a management fee on the US\$50 million committed.) Management fees are often in the 1.5%–2.5% range and often scale down in the later years of a partnership to reflect a reduced workload or the return of capital from exiting investments.

The fund manager's incentive fee, the **carried interest**, is the share of the private equity fund's profits that the fund manager is due once the fund has returned the outside investors' capital (which may be specified as the capital committed or the capital invested). Carried interest is usually expressed as a percentage of the total profits of the fund. A common value is 20%. In such a structure, the fund manager will receive 20% of the profits and distribute the remaining 80% of the profits to investors. In some funds, the carried interest is computed on only those profits that represent a return in excess of a hurdle rate (the hurdle rate is also known as the **preferred return**). A hurdle rate of 6% means that only the private equity fund's profits in excess of an annualized return of 6% are subject to the 20% carried interest. Because early investments by the fund may achieve high rates of return but later investments may perform poorly, private equity funds sometimes have a **clawback provision** that specifies that money paid to the fund manager be returned to investors if at the end of a fund's life investors have not received back their capital contributions and contractual share of profits.

In distributing cash flows to investors and the fund manager, a private equity fund first distributes to investors their invested capital and preferred return (if any is specified). Sometimes, the fund manager is allowed to take a small percentage of early distributions. Typically, following the period in which all or most distributions go to investors, there is a catch-up period in which the fund manager receives all or the major share of profits. After the fund manager has caught up to its specified share of profits according to the contract, subsequent profits are distributed according to the carried interest percentage—for example, 80% to investors and 20% to the fund manager. Some of the manager's profits may be put in an escrow account to satisfy any clawback liability.

The investor in a private equity fund expects to receive the benefits of the general manager's ability to select worthy investments and maintain active involvement in the investments. The fund manager's team is relied upon to shore up weaknesses in the companies' management and execute a successful exit strategy that realizes the maximum potential value of the investments.

4.1.2 Size of the Private Equity Market

A reliable estimate of direct private equity investment worldwide is hard to obtain, but as of mid-2015, approximately US\$2.4 trillion was invested in private equity VC, buyout funds, and similar strategies worldwide.⁴⁷ In the United States, a quarterly study of venture capital activity is performed through a joint effort of PricewaterhouseCoopers, Thomson Venture Economics, and the National Venture Capital Association (NVCA). Exhibit 11 presents a summary of the annual results through 2015.

Exhibit 11 US Venture Capital Activity: MoneyTree™ Survey

Year	Investment Amount (US\$)	Number of Deals
1995	8,016,523,400	1,897
1996	11,285,423,000	2,635
1997	15,071,554,600	3,232
1998	21,561,531,400	3,744
1999	54,908,597,400	5,605
2000	104,997,847,800	8,041
2001	40,938,601,200	4,596
2002	22,202,552,700	3,217
2003	19,681,635,600	3,037
2004	22,852,191,000	3,236
2005	23,245,367,700	3,302
2006	27,865,382,100	3,896
2007	32,136,712,900	4,233
2008	30,431,761,700	4,206
2009	20,334,511,300	3,181
2010	23,517,919,600	3,682
2011	29,905,393,300	4,062
2012	27,703,005,800	4,000
2013	30,282,784,000	4,300
2014	50,992,864,200	4,471
2015	59,698,500,200	4,497

Source: www.pwcmoneytree.com.

PricewaterhouseCoopers, Thomson Venture Economics, and the European Private Equity and Venture Capital Association collaborate on similar surveys of private equity activity across continental Europe and the United Kingdom. Exhibit 12 summarizes the investment activity of VC and buyout funds. As in the United States, activity dropped off after 2000. Unlike in the United States, activity subsequently peaked in 2007.

⁴⁷ See Preqin, “Preqin Global Private Equity and Venture Capital Report” (2016): https://www.preqin.com/docs/reports/2016-Preqin-Global-Private-Equity-and-Venture-Capital-Report-Sample_Pages.pdf.

Exhibit 12 Pan-European Private Equity Activity (€ billions)

Year	Venture Capital Fund Investment	Buyout Fund Investment	Total
2000	19.6	15.3	34.9
2001	13.3	11.0	24.3
2002	10.7	16.9	27.6
2003	10.7	18.4	29.1
2004	11.2	25.7	36.9
2005	15.0	32.1	47.1
2006	20.9	50.3	71.2
2007	15.7	57.2	72.9
2008	16.2	38.4	54.6
2009	12.3	12.7	25.0
2010	13.6	29.7	43.3
2011	12.5	34.5	47.0
2012	9.6	28.1	37.7
2013	10.1	28.0	38.1
2014	10.6	31.2	41.8
2015	11.1	36.3	47.4

Note: Numbers for venture capital are rounded to make venture capital activity and buyout activity sum to the reported totals.

Source: www.evca.com.

4.2 Benchmarks and Historical Performance

As with many other alternative investment types, events that indicate the market value of a private equity investment generally occur infrequently. Typical market price–revealing events include the raising of new financing, the acquisition of the company by another company, an IPO, or failure of the business. Infrequent market pricing poses a major challenge to index construction. How can returns be calculated without market transactions?

When measuring the performance of a private equity investment, investors typically calculate an internal rate of return (IRR) based on cash flows since inception of the investment and the ending valuation of the investment (the net asset value or residual value). Similarly, major venture capital benchmarks, such as Cambridge Associates', provide IRR estimates for private equity funds that are based on fund cash flows and valuations.

4.2.1 Benchmarks

Major indexes serving as benchmarks for US and European private equity include those provided by Cambridge Associates, Preqin, and LPX. These indexes often consist of an overall private equity index representing two major segments, VC funds and buyout funds, plus a number of sub-indexes. Custom benchmarks are also frequently used by private equity investors.

4.2.2 Historical Performance

Exhibit 13 gives US private equity's end-to-end returns as of 2014, net of fees, expenses, and carried interest, as compiled by the National Venture Capital Association and Cambridge Associates. In Exhibit 13, "multi-stage VC funds" are funds that make both early-stage and late-stage investments.

Exhibit 13 US Private Equity Returns as of 30 September 2014 (%)

Period	Venture Capital Funds			Growth Equity	NASDAQ	S&P 500
	Early-Stage	Late-Stage	Multi-Stage			
3 Years	15.7	13.7	15.0	17.9	23.0	23.0
5 Years	15.5	17.5	13.3	17.2	16.2	15.7
10 Years	9.3	13.2	10.0	14.0	9.0	8.1
20 Years	53.9	11.5	13.4	n/a	9.3	9.6

Source: NVCA and Thomson Venture Economics, "Venture Capital Outperformed Major Stock Indices during Third Quarter of 2014," press release (30 January 2015). <http://nvca.org/pressreleases/venture-capital-outperformed-major-stock-indices-third-quarter-2014/>

Private equity returns have exhibited a low correlation with the returns to publicly traded securities, making private equity an attractive addition to a portfolio. However, because of a lack of observable market prices for private equity, short-term return and correlation data may be subject to the smoothing effects of stale prices. Emery (2003) showed that the correlation between venture capital and NASDAQ returns increased substantially when annual or biannual (i.e., calculated every two years) data were used rather than quarterly data.⁴⁸ Emery reported that venture capital returns demonstrated a 0.69 correlation with NASDAQ returns and a 0.40 correlation with S&P 500 returns based on quarterly data. When biannual data were used, the correlation was 0.93 with the NASDAQ and 0.64 with the S&P 500.

4.2.3 Interpretation Issues

The private equity investor thinks of returns in terms of IRR calculations based, generally, on estimates of the value of the investor's interest. However, the fund manager's appraisals (usually supplied on a quarterly basis) represent estimates, not market prices. Appraised values are often slow to adjust to new circumstances (because they use stale data) and focus only on company-specific events, so the returns may be inaccurate. Furthermore, there is no generally accepted standard for appraisals.

In evaluating records of past returns of private equity funds, investors often make comparisons among funds closed in the same year (the funds' **vintage year**). This practice helps ensure that funds are compared with other funds at a similar stage in their life cycle. The effects of the vintage year on returns are known as "**vintage year effects**" and include, in addition to the effects of the life-cycle stage, the influence that economic conditions and market opportunities associated with a given vintage year may have on various funds' probabilities of success.

4.3 Private Equity: Investment Characteristics and Roles

Like public equity but to a greater degree, private equity plays a growth role in investment portfolios. On the one hand, at the company level, the highest earnings growth rates are usually achievable early on, when the markets for the company's products

⁴⁸ See Emery (2003, pp. 43–50).

may be largely untapped and competition may be slight. When a promising private company comes to market, its prospective growth may be capitalized at an above-market-average multiple. On the other hand, investment in established companies via buyout funds generally involves less risk and earlier returns. The private equity investor hopes to gauge and control the risk through appropriate due diligence processes. The following section provides more information about investment characteristics.

4.3.1 *Investment Characteristics*

The general investment characteristics of private equity investments include the following:

- *Illiquidity.* Private equity investments are generally highly illiquid. Convertible preferred stock investments do not trade in a secondary market. Private equity fund investors have more restricted opportunities to withdraw investments from the fund than do hedge fund investors. This situation is natural because the underlying investments are not liquid.
- *Long-term commitments.* Private equity investment generally requires long-term commitments. For direct VC investments, the time horizon also can be quite uncertain.
- *Higher risk than seasoned public equity investment.* The returns to private equity investments, on average, show greater dispersion than seasoned public equity investments, although they may be roughly comparable to those of publicly traded microcap shares.⁴⁹ The risk of complete loss of the investment is also higher. The failure rate for new and young businesses is high.
- *High expected IRRs are required.* Private equity investors target high rates of return as compensation for the risk and illiquidity of such investments.

For venture capital investments, the following also holds:

- *Limited information.* Because new ventures operate in product or service markets that may break new ground in some way, projections concerning cash flows are often based on limited information or make many assumptions. Although limited information is a risk factor, it is also related to the potential for unusual profits from successful ventures.

Venture capitalists often target rates of return of 25%–30% or more in individual investments. Dramatic venture capital success stories include companies such as Apple, Intel, Microsoft, and Google. However, many investments do not work out. For bearing the additional risks of private equity compared with public equity, the private equity fund investor aims to earn a substantial premium over expected public equity returns.

The illiquidity of private equity, of course, affects the value of an investor's interest. The value that is determined by using models such as the venture capital method or the discounted cash flow method may be used as the estimate of the value for a marketable controlling interest.⁵⁰ If the owner has a minority interest and the equity interest does not have a ready market, then discounts are often applied to reflect the diminished value for a minority-interest holder with a non-marketable interest. The discount for a minority interest (also called the discount for lack of control) reflects the investor's lack of control over the business and distributions. The discount for lack of marketability (marketability discount, for short) takes account of the lack of liquidity in the investment and depends on a number of factors, such as the size of the interest and the level of dividends paid. If the interest to be valued is a controlling interest,

⁴⁹ See Cochrane (2005).

⁵⁰ The venture capital method of valuation involves discounting at a high interest rate a projected future value of the company, where the projected future value assumes that the company is successful.

only the marketability discount needs to be considered. For a majority interest, the discount for lack of marketability might reflect both the cost of going public and a discount for owning a large block of shares. Example 8 illustrates the valuation of a non-marketable minority interest. A cautionary note here is that the valuation of a non-marketable minority interest can figure in the value of an estate and therefore affect the estate taxes due for a deceased private wealth client. The calculation shown is not intended as a guide to estate planning in any given jurisdiction.

EXAMPLE 8

A Non-marketable Minority Interest

Brent Smith has determined that his company will make a small investment in a private company, Clark Computing. The investment will be a non-marketable minority interest. Smith's investment banker estimates that the value of Clark equity, if it were publicly traded, would be £500 million. Smith's company's interest in Clark will be 10% of Clark's equity. Smith's investment banker determines that a minority-interest discount of 20% and a marketability discount of 25% are appropriate. What is the value of the non-marketable minority interest?

Solution:

The money amounts shown are in millions of pounds sterling.

Marketable controlling interest value: $(10\% \times 500) = 50$.

Minority-interest discount: $(20\% \times 50) = -10$.

Marketable minority interest: $(50 - 10) = 40$.

Marketability discount: $(25\% \times 40) = -10$.

Non-marketable minority interest: $(40 - 10) = 30$.

Smith's investment banker values the investment at £30 million.

VC funds and buyout funds have some expected differences in their return characteristics.⁵¹

- *Buyout funds are usually highly leveraged.* The capital raised by the fund may be 25%–40% of the capital used to purchase the equity of the target company, with the balance coming from debt collateralized by the target company's assets. The operating cash flows of the target company, typically an established company, are used to service the debt payments. In contrast, VC funds use no debt in obtaining their equity interests.
- *The cash flows to buyout fund investors come earlier and are often steadier than those to VC fund investors.* Because buyout funds purchase established companies, buyout fund investors usually realize returns earlier than VC fund investors, whose investments may still be in the cash-burning stage. The expected pattern of interim returns over the life of a successful venture capital fund has sometimes been described as a J-curve, in which early returns (e.g., over the

⁵¹ Emery (2003).

first five or six years) are negative as the portfolio of companies burns cash but later returns accelerate as companies are exited. In general, the earlier the stage at which a fund invests in companies, the greater the risk and the potential.

- *The returns to VC fund investors are subject to greater measurement error.* The interim return calculations of private equity funds depend not only on cash flow transactions with the fund but also on the valuations of the portfolio companies. These valuations are subject to much less uncertainty for buyout funds investing in established companies.

Thus, venture capital investing may be expected to involve more frequent losses than buyouts in return for higher upside potential when investments are successful.

EXAMPLE 9

An Investment in Private Equity

The Lee Foundation was established 10 years ago to provide grants to minority- and woman-owned enterprises. A well-diversified asset allocation has resulted in successful growth in the value of the foundation's investments. The trustees have thus decided to allocate US\$5 million to private equity. Their objectives are to earn significant returns on a high-growth investment and to take an active and dominant role in controlling the company in which they decide to invest. They understand that such an investment requires a high level of risk tolerance and a multi-year time horizon.

- 1 Evaluate the suitability of the following three potential investments, with specific reference to short- and long-term returns, sources of risk, and degree of investor control:
 - A Seed investment in a new medical device recently developed by three doctors
 - B A venture capital trust that invests exclusively in 15–20 start-up companies at any given time
 - C Second-stage (follow-on) investment in a company that successfully patented a new medical device two years ago and seeks to expand its manufacturing facilities
- 2 Recommend and justify the investment that is most likely to satisfy the goals of the foundation's proposed US\$5 million investment.

Solution to 1:

- A The seed investment is an investment in an early-stage company with no proven "track record" or history of revenues. Therefore, there will likely be no immediate or short-term returns because the next stage is marketing and manufacturing this new device. If the sales of this unique device are successful, however, future long-term returns could be significant. Sources of risk include the failure of the device, future competition from similar companies, lack of follow-on funds for marketing and manufacturing, and the possibility that the device will not receive a patent. Consequently, the level of risk is high. Because the foundation is likely to be the first outside investor, the likelihood of taking an active role in the company, possibly as outside board members, is high.
- B The venture capital trust is diversified over many start-up companies and is thus probably providing some current return, with the potential for additional return in the future. Although there is considerable risk

associated with start-up companies, the trust is well diversified over many companies, which should mitigate the impact of the failure of one or two of the start-ups. There is no outside investor control available because the trust makes all the decisions and is traded on a public exchange.

- The second-stage investment is most likely already showing positive cash flow and net income because it is seeking financing to expand an existing manufacturing facility. Therefore, short-term returns may be attractive and projections probably indicate potential for additional long-term returns, although the level of these returns may be muted in comparison with those of a seed or start-up investment because some of the early money has already been made. Investors at the second stage may be able to negotiate some active control, although the founders and seed/start-up investors are probably directly involved in company decisions also.

Solution to 2:

The seed company is most consistent with the foundation's objectives of earning a significant return in a high-growth opportunity and being able to take an active role in the company. Additionally, the foundation is willing to accept a high degree of risk and a longer-term outlook for future returns.

4.3.2 Roles in the Portfolio

The moderately high average correlation of private equity returns with publicly traded share returns that has been documented has a plausible economic explanation: All types of businesses have some exposure to economic and industry conditions, so correlations between public and private equity returns may be expected to be positive. Furthermore, venture capital uses public equity markets as one main exit route, so returns to VC fund investors can be expected to be higher when public equity market values are advancing.

Private equity probably can play a moderate role as a risk diversifier. However, many investors look to private equity investment for long-term return enhancement.

Given the capacity issues already mentioned and private equity's generally high illiquidity, target allocations of around 5% are commonplace. For example, in 2015, US public sector pension plans averaged allocations to private equity of 7%.⁵²

Among the issues that must be addressed in formulating a strategy for private equity investment are the following:⁵³

- *Ability to achieve sufficient diversification.* Suppose an investor's allocation to private equity is 5%. Given that institutional partnership commitments are typically not smaller than US\$5 million, a reasonably diversified portfolio (5–10 investments) means commitments totaling $5 \times \text{US\$5 million} = \text{US\$25 million}$ to $10 \times \text{US\$5 million} = \text{US\$50 million}$. These amounts imply that the assets of the institutions investing in private equity typically need to exceed US\$500 million ($= \text{US\$25 million} \div 5\%$). For smaller investors, a private equity fund of funds is a possible diversification choice, although it involves a second layer of fees.
- *Liquidity of the position.* Direct private equity investments are inherently illiquid. Consequently, private equity funds are also illiquid. Investors in funds must be prepared to have the capital tied up for 7–10 years. Although a limited

⁵² See Angela Sormani, "An Analysis of US-Based Public Pension Fund Allocations to Private Equity," Preqin Blog (11 June 2015): <https://www.preqin.com/blog/0/11528/us-public-pension-funds>.

⁵³ Andrew Abouchar, CFA, contributed to this section.

secondary market for private equity commitments exists, the investments trade at highly discounted prices, which makes selling the positions an unattractive option.

- *Provision for capital commitment.* An investor in a private equity fund makes a commitment of capital. The cash is advanced over a period of time known as the **commitment period**, which is typically five years. Therefore, the investor needs to make provisions to have cash available for future capital calls.
- *Appropriate diversification strategy.* An investor contemplating an exposure to private equity should be clear on both the stand-alone risk factors of an investment and the effect of that investment on the overall risk of the portfolio. Each private equity fund will have a different investment focus, which, when combined with other funds in the portfolio, modifies the overall risk. Diversification may be by
 - industry sector (information technology, biotechnology, alternative energy, etc.);
 - stage of company development (early stage, expansion, buyout, etc.); and
 - geographical location (locally focused, internationally focused, etc.).

The element shared by all private equity investment is the identification of promising private businesses with committed and talented owner/managers.

For the many private equity investors pursuing indirect investment, the search is for fund managers who are expert in evaluating and managing private equity investments. Indirect investment can include not only investment in newly formed private equity funds but also secondary-market private equity fund purchases from limited partners seeking liquidity.

4.3.3 Other Issues

Among the major requirements for private equity investing is careful due diligence. The framework discussed in Example 2 applies, of course; in general, due diligence items for private equity can usually be placed into one of the following three bins:

- 1 Evaluation of prospects for market success
- 2 Operational review, focusing on internal processes, such as sales management, employment contracts, internal financial controls, product engineering and development, and intellectual property management
- 3 Financial/legal review, including the examination of internal financial statements, audited financial statements, auditor's management letters, prior-year budgets, documentation of past board of directors meetings, board minutes, and corporate minute books, as well as an assessment of all legal proceedings, intellectual property positions, contracts, and contingent liabilities

Some practical details and comments are as follows:

- 1 Evaluation of prospects for market success
 - *Markets, competition, and sales prospects.* The private equity investor needs to form a judgment about the prospects for success of the company in the targeted product/service market. This review includes an evaluation of markets, competition, and sales prospects. The information in the business plan is a starting point in making such an appraisal.
 - *Management experience and capabilities.* Quality of management is often considered the single biggest factor in the success of a venture. Due diligence includes a background check on the managers and other key personnel, which should include not only references provided by the company but also independently gathered information from the investor's own sources.

The investor should use all available information in assessing the management team's acumen. Moreover, the assessment of management does not stop when the initial investment is made; it is ongoing.

- *Management's commitment.* Much of the success of a private equity company depends on its managers. Therefore, a potential investor will want to gauge how committed the managers are to the company. There are several factors to use in assessing management's commitment:
 - Percentage ownership. How much of the company is owned by the management team? Ownership of a large portion of the company is an indication of high commitment to the company.
 - Compensation incentives. If management is key to the company's success, an investor will want to ensure that the current managers' interests align with those of the shareholders through the company's compensation arrangements.
- *Cash invested.* How much cash, or "skin," has management invested in the company? Investors generally regard the fact that the managers have invested a large portion of their net worth in the company as a particularly good indicator of a highly committed management team. Conversely, if the managers have invested little of their own cash in the company, the presumption is that they are less than wholly committed to the company's success.
- *Opinion of customers.* When the company is already marketing a product or service, the investor should attempt to learn customers' opinions of the company and its product or service.
- *Identity of current investors.* Current investors can give an indication of the company's future success. For example, if a company's product is a medical device dealing with the heart, it is meaningful if several leading cardiologists have already invested in the company.

2 Operational review

- *Expert validation of technology.* If the company intends to market a new technology, the investor needs to obtain expert confirmation that the technology is valid and represents an advance.
- *Employment contracts.* Do key employees have contracts to ensure that they stay with the company? Do non-key employees have contracts with severance clauses that could burden the company's finances?
- *Intellectual property.* In many companies, the ability to succeed hinges on proprietary information (formulas, processes, designs). In such cases, an investor should determine whether the company holds (or at least has applied for) relevant patents. The intellectual property covered by these patents could be, for example, a design for a machine, a new application of an existing technology, a drug, or a medical device. Potential investors should have reasonable assurance that the company has the ability to conduct business without infringing another company's patents. Often in this area, an investor will want to consult with patent experts.

3 Financial/legal review

- *Potential for dilution of interest.* Potential investors also want to investigate the stock options that have been issued to managers and other potential means by which investor interests may be diluted and to ensure contractually that their investment will not be significantly diluted.
- *Examination of financial statements.* Early-stage companies, in particular, may not have audited financial statements to show. Thus, investors may want to ask for tax returns or conduct their own audits of financial records.

Due diligence for private equity funds includes the managers' experience, capabilities, and commitment; the compensation arrangements; and compliance of the fund with the Global Investment Performance Standards® in reporting performance. Fund selection is largely an exercise in evaluating the capabilities of the general manager's management team. Factors that should be considered include the following:

- historical returns generated on prior funds
- consistency of returns: Has the team had one successful fund or many?
- roles and capabilities of specific individuals at the fund: The investor will want to evaluate whether the fund manager has the needed human resources to effectively select and guide private equity investments.
- stability of the team: Did the current senior personnel generate the track record of the fund manager, or has there been significant personnel turnover?

As the discussion of due diligence makes clear, many characteristics—including people, structure, and costs—can differentiate among private equity investments focused on a similar market opportunity. In contrast, different examples of a commodity, such as natural gas, have highly similar characteristics. Commodity investments are the subject of the next section.

COMMODITY INVESTMENTS

5

A commodity is a tangible asset that is typically relatively homogeneous in nature. Because of their relative homogeneity, commodities lend themselves to contracts to buy and sell that have standardized terms (as in futures market contracts).⁵⁴ Commodity investments are direct or indirect investments in commodities.

The question of whether commodities represent a separate asset class has been extensively debated in both the academic and practitioner literature.⁵⁵ Practically, the question is not whether commodity investment is an asset class but whether commodity investment is appropriate for a given investor. If it is, what is the best approach for implementing the investment and what is the appropriate allocation? In some statements of strategic asset allocation, commodities may be included under the heading of “real assets” or “real assets: resources,” in which case, they may not be distinguished from such real investments as timberland.

Historically, commodity-related businesses have been the major players in the cash and futures commodity markets. Individual investors in many countries have long been active in the cash markets for precious metals. In some markets, **commodity trading advisers** (CTAs, registered advisers to managed futures funds) are another active group. Historically and currently, institutional investors have been more

⁵⁴ The relative homogeneity of commodities distinguishes them from tangible assets such as fine art and other collectibles.

⁵⁵ See Huberman (1995); Strongin and Petsch (1995); Greer (1994); Froot (1995); Schneeweis and Spurgin (1997b); Geman (2005); Erb and Harvey (2006).

active in financial futures markets than in commodity futures markets. Investment in publicly traded equities of commodity-linked businesses has probably been the most common way for both individual and institutional investors to obtain exposure, albeit indirectly, to commodities. However, only investment in commodities via cash and the derivatives markets constitutes alternative investing. Those markets are the focus of this treatment.

5.1 The Commodity Market

Investors can gain direct exposure to commodities in spot (cash) markets or in markets for deferred delivery, such as futures and forwards markets. Spot commodity trading can be traced back thousands of years, and commodity futures trading is at least as old as the rice futures trading in Japan, which began several hundred years ago.

Commodity futures markets developed as a response to an economic need on the part of suppliers and users of various agricultural and non-agricultural goods to transfer risk. Moreover, commodity futures markets tend to improve the functioning of the spot and forward markets. For instance, commodity futures may permit greater commodity production and trade because the use of futures hedges reduces the risk of holding spot inventories. By facilitating risk management and trading, commodity futures have become an essential part of the production and marketing of agricultural and non-agricultural goods. Other types of commodity derivatives include options on commodity futures and swap markets.

Commodity futures are traded on agricultural products, metals, and energy resources. A commodity futures transaction may involve physical delivery (i.e., actual delivery of the underlying commodity) or may be “cash settled,” which means that no delivery takes place but a settlement in cash occurs at maturity equal to the gain that a delivery transaction would have entailed. Although physical delivery is possible for some futures contracts, in practice, most positions in futures contracts are offset prior to maturity.

5.1.1 Types of Commodity Investments

There are two broad approaches to investing in commodities: direct and indirect.

Direct commodity investment entails the cash market purchase of physical commodities—agricultural products, metals, and crude oil—or exposure to changes in spot market values via derivatives, such as futures. Cash market purchases involve actual possession and storage of the physical commodities and incur carrying and storage costs. Thus, investors have generally preferred to use derivatives or indirect commodity investment.

Indirect commodity investment involves the acquisition of indirect claims on commodities, such as equity in companies specializing in commodity production. As mentioned previously, indirect commodity investment is historically the principal means by which most investors have obtained exposure to commodities. There is increasing evidence, however, that indirect commodity investment—in particular, equity instruments in commodity-linked companies—does not provide effective exposure to commodity price changes.⁵⁶ To the degree that companies hedge a major portion of their commodity risk, even commodity-linked companies may not be exposed to the risk of commodity price movement.⁵⁷ This fact has spurred the creation of investable commodity indexes and a current preference for gaining exposure to commodities

⁵⁶ See Schneeweis and Spurgin (1997a).

⁵⁷ See Chung (2000).

through derivatives markets. In some markets, such as the United States, even small investors can access the commodity markets via mutual funds or exchange-traded funds.

5.1.2 Size of the Commodity Market

With billions of dollars' worth of commodities recorded by so many countries in international trade over a given year, spot commodity markets are enormous in scope and value. Globally, the notional value of open interest in commodity futures across the top 10 exchanges was estimated at US\$1.2 trillion as of the fourth quarter of 2014, with energy futures (natural gas, crude oil, heating oil, and gasoline) the dominant segment.⁵⁸

5.2 Benchmarks and Historical Performance

Although the physical markets for commodities are not centralized, information about commodity prices is transmitted around the world through commodity-based financial products. Thus, the performance of commodity investments can be evaluated by using commodity indexes that form the basis for many products. The development of active markets for indexed commodity investments has been a major force in broadening investor interest in commodity investment.

5.2.1 Benchmarks

A variety of indexes based on futures prices can be used as benchmarks for the performance of futures-based commodity investments. These include the Reuters/Jefferies Commodity Research Bureau (RJ/CRB) Index, the S&P Goldman Sachs Commodity Index (GSCI), and the Bloomberg Commodity Index (BCOM).

Commodity indexes attempt to replicate the returns available to holding long positions in commodities. The S&P GSCI, the BCOM, and the RJ/CRB Index provide returns comparable to those of passive long positions in listed futures contracts. Because the cost-of-carry model ensures that the return on a fully margined position in a futures contract mimics the return on an underlying spot deliverable, futures contract returns are often used as a surrogate for cash market performance. (The cost-of-carry model relates the futures price to the current spot price and the cost of holding the spot commodity.) All of these indexes are considered investable.

The major indexes contain some common groups of underlying assets. For example, the RJ/CRB Index, the BCOM, and the S&P GSCI all include energy (oil and gas), metals (industrial and precious), grains (corn, soybeans, and wheat), and soft commodities (cocoa, coffee, cotton, and sugar). However, beyond these basic groupings, they and other commodity indexes vary greatly in their composition and weighting schemes.

A market-cap weighting scheme, so common for equity and bond market indexes, cannot be carried over to indexes of commodity futures. Because every long futures position has a corresponding short futures position, the market capitalization of a futures contract is always zero. The RJ/CRB Index, for example, groups commodities into four sectors and gives unequal fixed weights to these sectors to reflect the perceived relative importance of each. The S&P GSCI uses world-production weighting: The weights assigned to individual commodities in the S&P GSCI are based on a five-year moving average of world production. Weights are published each November and are made effective the following January.

⁵⁸ See Grégoire Naacke, Eleanor Penistone, and Tatiana Chekanova, "WFE/IOMA 2014 Derivatives Market Survey," WFE/IOMA (August 2015): <https://www.world-exchanges.org/home/index.php/files/19/Derivatives/33/2014%20IOMA%20Derivatives%20Market%20Survey.pdf>.

Commodity index providers use either arithmetic or geometric averaging to calculate the index return from the component returns. For example, the RJ/CRB Index is based on arithmetic averaging of the monthly component returns; the S&P GSCI uses an arithmetic measure of the performance of actively traded, dollar-denominated nearby commodity futures contracts. All contracts are rolled on the fifth business day of the month prior to the expiration month of the contract.

Sub-indexes of the S&P GSCI are calculated for agricultural, energy, industrial, livestock, and precious metals contracts. Three versions of the indexes are available: a total-return version, which assumes that capital sufficient to purchase the basket of commodities is invested at the risk-free rate; an “excess return” version that includes price change and roll impact; and a spot version, which tracks movements in the futures prices only.

In addition to varying the selection of contract maturities, third-generation commodity indexes also vary the commodities selected at each roll based on systematic or discretionary signals. These techniques may utilize technical or fundamental signals and may take both long and short positions.

5.2.2 Historical Performance

Exhibit 14 presents the annualized return, standard deviation of returns, mean return-to-volatility ratio, maximum drawdown, and correlation of the S&P GSCI with a sample of stock, bond, hedge fund, and other alternative indexes for the period January 1996 through December 2015.

Exhibit 14 Commodity Index and Asset Class Performance, 1996–2015

Stock, Bond, and Commodity Index Performance	S&P GSCI TR	S&P	Bloomberg Barclays US Government	Bloomberg Barclays US Aggregate	Bloomberg Barclays US Corporate High Yield
Annualized total return	−1.01%	8.51%	5.02%	5.37%	6.75%
Annualized standard deviation	22.79%	15.31%	4.08%	3.47%	9.09%
Mean return-to-volatility ratio	−0.04	0.56	1.23	1.55	0.74
Maximum drawdown	−79.44%	−50.95%	−4.64%	−3.83%	−33.31%
Correlation with commodity index		0.25	−0.10	−0.01	0.28
Alternative Investment and Commodity Index Performance	S&P GSCI TR	CISDM EW Hedge Fund	CISDM CTA EW	FTSE NAREIT	Private Equity
Annualized total return	−1.01%	9.15%	7.22%	10.32%	8.23%
Annualized standard deviation	22.79%	7.36%	8.54%	19.47%	27.17%
Mean return-to-volatility ratio	−0.04	1.24	0.85	0.53	0.30
Maximum drawdown	−79.44%	−21.71%	−11.93%	−67.89%	−80.44%
Correlation with commodity index		0.42	0.14	0.16	0.33

Source: Schneeweis, Kazemi, and Szado (2016b).

The measured performance of commodity indexes is sensitive to the time period of study as well as the choice of index. Differences in performance between commodity indexes can be explained, at least in part, by differences in the components of the

indexes and different approaches to determining the weights of individual commodity futures contracts in each index. For example, the performance of energy has played a dominant role in results for the S&P GSCI because that index's portfolio weights are based on the value of worldwide production for each included commodity. Based on that criterion, the weight of energy-related futures has exceeded two-thirds.⁵⁹ The BCOM's weights primarily reflect futures contract liquidity data, which are supplemented by production data, and the influence of energy on the BCOM's results, although important, is less than on the S&P GSCI.⁶⁰ Each index represents a somewhat distinct view of the global commodity marketplace.

On a stand-alone basis, as judged by the mean return-to-volatility ratio and raw returns, commodities have underperformed US bonds and equities as well as hedge funds, private equity, and managed futures. In terms of the maximum drawdown, the S&P GSCI registered -79.44%, which is surpassed only by private equity at -80.44%.

The correlations of the commodity indexes with the traditional asset classes are very low, indicating potential as a risk diversifier.

Exhibit 15, which presents the performance statistics for seven S&P GSCI sector sub-indexes, shows considerable variation in stand-alone risk and return among them (particularly between the S&P GSCI Energy Index and the other sub-indexes). Energy plays a major role in the high volatility of the S&P GSCI shown in Exhibit 15.

Exhibit 15 Performance of S&P GSCI Sub-indexes, 1996–2015

Performance (1996–2015)	Annualized Return	Std Dev	Mean Return-to- Volatility Ratio	Max Drawdown	Skew	Kurtosis
S&P GSCI Petroleum TR Index	2.6%	32.3%	0.08	-86.2%	-0.01	0.89
S&P GSCI Energy TR Index	-0.5%	31.9%	-0.02	-87.4%	0.06	0.83
S&P GSCI Agriculture TR Index	-4.9%	21.0%	-0.23	-69.2%	0.28	0.92
S&P GSCI Livestock TR Index	-2.9%	14.0%	-0.21	-56.0%	-0.42	0.22
S&P GSCI Grains TR Index	-6.2%	24.9%	-0.25	-77.1%	0.27	0.54
S&P GSCI Industrial Metals TR	1.8%	20.7%	0.09	-61.7%	-0.14	2.00
S&P GSCI Precious Metals TR	5.4%	17.6%	0.30	-47.6%	0.02	0.85
S&P 500	8.5%	15.3%	0.56	-50.9%	-0.64	1.03
Bloomberg Barclays US Government Bond Index	5.0%	4.1%	1.23	-4.6%	-0.10	1.21

(continued)

⁵⁹ See Erb and Harvey (2006, Table 1). As of 2016, energy-related futures continue to have such weights.

⁶⁰ Erb and Harvey (2006, Table 3) showed a weight for energy in the BCOM (formerly, the DJ-AIGCI) of less than 40% as of May 2004.

Exhibit 15 (Continued)

Performance (1996–2015)	Annualized Return	Std Dev	Mean Return-to- Volatility Ratio	Max Drawdown	Skew	Kurtosis
Bloomberg Barclays US Aggregate Bond Index	5.4%	3.5%	1.55	−3.8%	−0.27	0.98
Bloomberg Barclays US Corporate High Yield Bond Index	6.7%	9.1%	0.74	−33.3%	−1.04	8.85

Source: Schneeweis, Kazemi, and Szado (2016b).

Another implication of Exhibit 15 is that one cannot think of commodities as a homogeneous market of similar investments. In data not reported here, the average correlation of S&P GSCI commodity sector returns is low.

Performance in 2008 Exhibit 16 shows that during 2008, the S&P GSCI underperformed US equities and bonds as well as all other indexes reported, with the exception of private equity. The stand-alone comparisons with traditional asset classes appear to be time period dependent. The consistent feature in the evidence is correlation. Although the commodities' correlations with equities and high-yield bonds have gone up in comparison with the longer (1996–2015) period, the generally low correlations among commodities and traditional asset classes in Exhibit 16 are consistent with the evidence for the longer time period.

Exhibit 16 Commodity Index Performance in 2008

Stock, Bond, and Commodity Index Performance	S&P GSCI TR	S&P 500	Bloomberg Barclays US Government	Bloomberg Barclays US Aggregate	Bloomberg Barclays US Corporate High Yield
Total return	−46.49%	−37.00%	12.39%	5.24%	−26.16%
Standard deviation	42.85%	21.02%	6.14%	6.09%	21.68%
Mean return-to-volatility ratio	−1.08	−1.76	2.02	0.86	−1.21
Maximum drawdown	−62.16%	−37.66%	−2.48%	−3.83%	−32.46%
Correlation with commodity index		0.52	−0.34	−0.02	0.56
Alternative Asset Performance	S&P GSCI TR	CISDM EW Hedge Fund	CISDM CTA EW	FTSE NAREIT	Private Equity
Total return	−46.49%	−19.16%	21.76%	−37.34%	−64.15%
Standard deviation	42.85%	11.04%	10.64%	43.40%	38.07%
Mean return-to-volatility ratio	−1.08	−1.74	2.04	−0.86	−1.69
Maximum drawdown	−62.16%	−19.92%	−4.42%	−49.20%	−64.15%
Correlation with commodity index		0.73	0.13	0.39	0.63

Source: Schneeweis, Kazemi, and Szado (2016b).

5.2.3 Interpretation Issues

The use of commodity indexes as benchmarks assumes that commodities are approved in the investor's investment policy statement as a distinct asset class in which the investor may invest. If commodities do not receive separate treatment but are included within some broader asset class, such as real assets, evaluation of performance should be based on a customized benchmark that reflects the other assets included in the asset class.

In interpreting historical results, such as those presented here, the investor should also be sensitive to differences in economic conditions between the historical period and current and forecasted future periods.

5.3 Commodities: Investment Characteristics and Roles

Some experts are now advising investors to afford commodities a larger allocation in their portfolios than they have previously had. (Allocations to commodities in most institutional and individual portfolios have typically been well under 5%.) In the following sections, we discuss the characteristics of commodities as investments.

For the reasons discussed earlier, for most investors, direct investment in commodities will be via the futures markets. For investors seeking passive exposure to commodities, the liquidity of the market for futures contracts on a given commodity index will be a major consideration. The three most widely used futures contracts are those based on the S&P GSCI, the BCOM, and the RJ/CRB Index, with the S&P GSCI representing the overwhelming majority of the combined open interest of these contracts as of the time of this writing.

5.3.1 Investment Characteristics

The discussion of the historical performance of commodities highlighted the need for active investors to understand the investment characteristics of commodities on a sector or individual commodity level. However, there are some common themes. The chief two relate to characteristics that affect the use of commodities in managing portfolio risk and hedging inflation.

Special Risk Characteristics With some consistency, commodities have tended to have correlations with equities and bonds that are unusually low even in the realm of alternative investments. But the risk characteristics of commodities are more nuanced than simple correlation statistics can reveal and indicate several attractive features of commodities. In periods of financial and economic distress, commodity prices tend to rise, potentially providing valuable diversification benefits in such times. Long-term growth in world demand for certain commodities in limited supply (such as petroleum-related commodities) may be a factor in their long-term trend growth.

Nevertheless, commodities are generally sensitive to the business cycle. The reason commodities behave differently under different economic conditions has to do with the sources of their returns. The determinants of commodity returns include the following:

- 1 *Business cycle-related supply and demand.* Commodity prices are determined by the supply and demand of the underlying commodities. Because these supply and demand conditions are determined by different economic fundamentals from those affecting stocks and bonds, commodity prices are expected to be sensitive to the business cycle but to have little or even negative correlation with stocks and bonds. For example, the variation in spot and futures prices of industrial metals has a strong business-cycle component.⁶¹ Anson (2006)

⁶¹ See Fama and French (1988); Schneeweis and Spurgin (1997b); CISDM (2005a).

suggested three reasons commodity returns have been weakly correlated with stock and bond returns. First, commodities correlate positively with inflation whereas stocks and bonds are negatively correlated with inflation. Second, commodity prices and stock/bond prices react differently in different phases of the business cycle. Commodity futures prices are more affected by short-term expectations, whereas stock and bond prices are affected by long-term expectations. Third, commodity prices tend to decline during periods of weakness in the economy.

- 2 *Convenience yield.* The theory of storage splits the difference between the futures price and the spot price into three components: the forgone interest from purchasing and storing the commodity, storage costs, and the commodity's convenience yield.⁶² Convenience yield reflects an embedded consumption-timing option in holding a storable commodity. Furthermore, the theory predicts an inverse relationship between the level of inventories and convenience yield: At low inventory levels, convenience yields are high, and vice versa. A related implication is that the term structure of forward price volatility generally declines with the **time to expiration** of the futures contract—a phenomenon known as the Samuelson effect. This effect is caused by the expectation that, although at shorter horizons mismatched supply and demand forces for the underlying commodity increase the volatility of cash prices, these forces will fall into equilibrium at longer horizons.
- 3 *Real options under uncertainty.* Oil futures markets are often backwardated; in these markets, futures prices are often below the current spot price. This situation may be caused by the existence of real options under uncertainty.⁶³ A **real option** is an option involving decisions related to tangible assets or processes. In other words, producers are holding valuable real options—options to produce or not to produce—and will not exercise an option to produce unless spot prices start to climb. Production occurs only if discounted futures prices are below spot prices, and **backwardation** results if the riskiness of future prices is sufficiently high. A major consequence of a downward-sloping term structure of futures prices is the opportunity to capture a positive roll return as investment in expiring contracts is moved to cheaper new outstanding contracts.

The role of commodities in regard to protecting portfolio value against unexpected inflation has been a continuing theme of the discourse on commodities as investments. Among the reasons for including commodities in a portfolio are that they are:⁶⁴

- “natural” sources of return (i.e., related to economic fundamentals) over the long term, as discussed above, and
- providers of protection for a portfolio against unexpected inflation.

The premise that investments in physical commodities may hedge inflation is natural. The prices of some commodities, such as crude oil, may have significant links to the component costs of official price indexes, and certain commodities, such as gold, have been traditionally demanded as stores of value by investors during inflationary times.

Correlations of Sub-indexes Exhibit 17 provides correlations for S&P GSCI sub-indexes.

⁶² See Kaldor (1939); Working (1948, 1949); Telser (1958).

⁶³ See Litzenberger and Rabinowitz (1995).

⁶⁴ See Strongin and Petsch (1995), who also included pricing inefficiencies (opportunities for active management), a feature that is particularly relevant to managed futures investing, which is discussed later.

Exhibit 17 Correlations, 1996–2015

Correlation	S&P GSCI Energy TR	S&P GSCI Agriculture TR	S&P GSCI Livestock TR	S&P GSCI Grains TR	S&P GSCI Industrial Metals TR	S&P GSCI Precious Metals TR	Average Correlation
S&P 500	0.19	0.26	0.02	0.23	0.44	0.08	0.20
Bloomberg Barclays US Government Bond Index	−0.08	−0.01	−0.09	0.04	−0.23	0.17	−0.03
Bloomberg Barclays US Aggregate Bond Index	0.00	0.08	−0.07	0.11	−0.09	0.22	0.04
Bloomberg Barclays US Corporate High Yield Bond Index	0.22	0.24	0.02	0.20	0.42	0.16	0.21

Source: Schneeweis, Kazemi, and Szado (2016b).

The commodity sub-indexes generally exhibit very low or negative correlations with bonds and moderate correlations with equity and high-yield bonds. Storable commodities directly related to the intensity of economic activity exhibit positive correlations with equities and high-yield bonds (e.g., 0.44 and 0.42, respectively, for industrial metals).

5.3.2 Roles in the Portfolio

The principal roles that have been suggested for commodities in the portfolio are:

- as a portfolio risk diversifier and
- as an inflation hedge, providing an expected offset to the losses on such assets as conventional debt instruments, which typically lose value during periods of unexpected inflation.⁶⁵

There is support both in the historical record and in economics for these roles. Research also indicates a link between the two roles, which suggests that most investable commodity indexes provide diversification advantages to stock and bond investments primarily during periods of unexpected changes in inflation.⁶⁶ To the degree that inflation is already incorporated into the yield structure of bonds and the cash flow of companies—that is, inflation is fully anticipated—the economy may have periods of high or increasing commodity prices together with positive stock and bond returns. Halpern and Warsager (1998) observed that commodity indexes add the most value as inflation hedges in traditional stock and bond portfolios during periods of unexpected changes in inflation. However, a number of researchers have found that the inflation-hedging characteristics of commodities may have disappeared since the global financial crisis as a result of the financialization of commodities.⁶⁷

More ambiguous is the role of passive long-only commodity futures investments in increasing the expected return vis-à-vis a portfolio of traditional and other alternative investments. Erb and Harvey (2006) claimed that the average historical excess returns of individual commodity futures is approximately zero. They suggested that

⁶⁵ See Bodie (1983); Greer (1978); Halpern and Warsager (1998); Becker and Finnerty (2000).

⁶⁶ See, for example, Halpern and Warsager (1998).

⁶⁷ See, for example, Büyüksahin, Haigh, and Robe (2010); Zaremba (2015).

the measured positive excess return of portfolios of these futures for some time periods is the result not of a risk premium but of the portfolio weighting selected and the rebalancing to it.

Long-term investors with liabilities indexed to inflation, such as defined-benefit plans, may be able to improve their risk–return trade-off by including commodities in the portfolio.⁶⁸ For university endowments, which support the inflation-sensitive costs of operating a university, commodities can serve as a good risk diversifier in a portfolio that needs inflation protection.

Below, using the methodology familiar from the section on real estate, we provide some quantitative information on the *ex post* role of commodities as a risk diversifier.

In Exhibit 18, the benefits of commodity investment are examined by using the S&P GSCI (a long-only, futures-based, investable commodity index) in combination with equities, bonds, private equity, real estate, managed futures, and hedge funds in various weights for the period January 1996 through December 2015.

Exhibit 18 Commodities Performance in Portfolios, 1996–2015

Portfolios	A	B	C	D
Annualized return	7.26%	6.65%	7.92%	7.22%
Standard deviation	7.83%	7.91%	8.38%	8.50%
Mean return-to-volatility ratio	0.93	0.84	0.94	0.85
Maximum drawdown	–27.11%	–30.13%	–32.08%	–34.31%
Correlation with hedge funds	0.24		0.29	
Portfolio A	Equal weights S&P 500 and Bloomberg Barclays US Aggregate Bond Index			
Portfolio B	90% Portfolio A and 10% commodity index			
Portfolio C	75% Portfolio A and 25% CTA/hedge funds/private equity/real estate			
Portfolio D	90% Portfolio C and 10% commodity index			

Source: Schneeweis, Kazemi, and Szado (2016b).

As Exhibit 18 shows from a stand-alone perspective, whether risk-adjusted or not, commodities underperformed US bond and equity markets during this sample period. The low or negative correlations of S&P GSCI returns with returns to the S&P 500 (0.25), the Bloomberg Barclays US Government Bond Index (–0.10), and the Bloomberg Barclays US Aggregate Bond Index (–0.01) suggest diversification benefits from including commodities, as well as the potential for improvement in the mean return-to-volatility ratio. However, the results for the period under study do not support those conclusions.

Exhibit 19 examines the evidence for a shorter time period. When added to a portfolio of US stocks and bonds, the S&P GSCI slightly increases the standard deviation of the portfolio from 7.54% (Portfolio A) to 7.81% (Portfolio B). Additionally, risk-adjusted performance (mean return-to-volatility ratio) decreases from 0.74 (Portfolio A) to 0.61 (Portfolio B). Similarly, when added to a portfolio of stocks, bonds, and alternatives, the S&P GSCI slightly increases volatility from 8.45% (Portfolio C) to 8.68% (Portfolio D) and decreases the mean return-to-volatility ratio from 0.74 to 0.62.

⁶⁸ See Nijman and Swinkels (2003, pp. 1–36).

Exhibit 19 Commodities Performance, 2001–2015

Portfolios	A	B	C	D
Annualized return	5.54%	4.77%	6.24%	5.39%
Standard deviation	7.54%	7.81%	8.45%	8.68%
Mean return-to-volatility ratio	0.74	0.61	0.74	0.62
Maximum drawdown	–27.11%	–30.13%	–32.08%	–34.31%
Correlation with commodity index	0.30		0.34	
Portfolio A	Equal weights S&P 500 and Bloomberg Barclays US Aggregate Bond Index			
Portfolio B	90% Portfolio A and 10% commodity index			
Portfolio C	75% Portfolio A and 25% CTA/hedge funds/private equity/real estate			
Portfolio D	90% Portfolio C and 10% commodity index			

Source: Schneeweis, Kazemi, and Szado (2016b).

This discussion has focused on passive long-only exposures. Commodities also offer potential for active management that may involve short as well as long positions. For example, research for the United States has indicated that the benefits to adding commodity futures, particularly metals and agricultural futures (both managed and unmanaged), to a portfolio occur almost exclusively when the US Federal Reserve (the central bank) is following a restrictive monetary policy.⁶⁹ Such results suggest an active strategy based on central bank actions and monetary conditions. As another example, an investor who believes that a commodity's price will revert to the underlying production costs might implement an active long–short commodity program based on divergences from production cost value. Many current active programs involve momentum strategies that typically go long after recent prior returns have been positive and short after recent prior returns have been negative.

Active programs may be executed within a separately managed account or a private commodity pool. Private commodity pools will be the focus of the section on managed futures programs, later in the reading.

In the next section, we discuss one of the most important types of alternative investments, the hedge fund.

HEDGE FUNDS

6

Hedge funds as a group have become an important segment of the alternative investment market, with appeal to many segments of the private wealth and institutional investor markets. The impact of hedge funds has been broad in scope. The trading activity of hedge funds constitutes a substantial portion of trading volume in a number of traditional investment markets. Services to hedge funds, known as “prime brokerage” have become an important and actively contested revenue source among major sell-side investment firms.⁷⁰ The competition from hedge funds has caused an increasing number of equity and bond mutual funds to seek approval from

⁶⁹ See Jensen, Mercer, and Johnson (2002).

⁷⁰ **Prime brokerage** (or prime brokering) is a suite of services that is often specified to include support in accounting and reporting, leveraged trade execution, financing, securities lending (related to short-selling activities), and start-up advice (for new entities).

shareholders to make increased use of derivative strategies and short selling.⁷¹ The number of mutual funds that follow option-based investment strategies has grown significantly, particularly since 2005.⁷²

The first hedge fund was established in the late 1940s as a long–short hedged equity vehicle. More recently, institutional investors—corporate and public pension funds, endowments and trusts, and bank trust departments—have included hedge funds as one segment of a well-diversified portfolio.

There is no precise legal or universally accepted definition of a hedge fund, and hedge funds can take many forms. Originally, hedge funds were private partnerships that took long and short equity positions to reduce net market exposure in exchange for accepting a lower rate of investment return. In other words, they were “hedged” funds. Today, the term “hedge fund” is much broader. Rather than indicating the use of hedging in the portfolio, a hedge fund is defined by its organizational characteristics and structural characteristics of its portfolio.

Traditionally, hedge funds intentionally adopted structures that permitted them to be loosely regulated pooled investment vehicles, although the Dodd–Frank Act of 2010 eliminated the private adviser exemption for many hedge fund advisers.⁷³ The nature of hedge funds as private pools has permitted this investment vehicle to avoid certain reporting and other requirements, as well as some restrictions on incentive fees, that apply to many other investment vehicles. For example, unlike traditional mutual funds, most hedge fund vehicles can take aggressive long or short positions and use substantial leverage.

Managed futures are now frequently classified as hedge funds. However, this reading will discuss managed futures in a separate section to give them adequate coverage.

Each hedge fund strategy is constructed to take advantage of certain market opportunities. Hedge funds use different investment strategies and thus are often classified according to investment style. There is substantial diversity in risk attributes and investment opportunities among styles, which reflects the flexibility of the hedge fund format. In general, this diversity benefits investors by increasing the range of choices among investment attributes. However, additional due diligence is required to fully understand the risk and opportunities associated with each manager’s investment approach. We will explain the diversity in more detail.

6.1 The Hedge Fund Market

The hedge fund market experienced fast growth from 1996 to 2015 and keeps evolving. The market has witnessed a proliferation of hedge funds and products offered by hedge funds. As more hedge funds with similar strategies entered the market, returns on their once-unique strategies started to shrink. Liquidity and capacity constraints have affected some hedge funds and driven some of them to become—voluntarily or involuntarily—defunct. Some have been able to return the money to their investors, but others, unfortunately, could not and did not. Nevertheless, new hedge funds continue to be established to try their new strategies, with the successful ones being mimicked by imitators. Although many hedge funds maintain that their strategies seek “absolute returns” that require no benchmark, some institutional investors that invest in hedge funds are asking for relative performance evaluation, which requires some benchmarking.

⁷¹ See Laise (2006, pp. D1, D2).

⁷² See Black and Szado (2016).

⁷³ See SEC, “Advisers to Hedge Funds and Other Private Funds” (<https://www.sec.gov/spotlight/dodd-frank/hedgefundadvisers.shtml>).

6.1.1 Types of Hedge Fund Investments

Many style classifications of hedge funds exist; the following classification of hedge fund styles will be the basis for most of our discussion. Keep in mind that industry usage applies the term “arbitrage” somewhat loosely to mean, roughly, a “low-risk” rather than a “no-risk” investment operation.

- *Equity market neutral*: Equity market-neutral managers attempt to identify overvalued and undervalued equity securities while neutralizing the portfolio's exposure to market risk by combining long and short positions. Portfolios are typically structured to be market, industry, sector, and dollar neutral. This result is accomplished by holding long and short equity positions with roughly equal exposure to the related market or sector factors. The market opportunity for equity market-neutral programs comes from (1) their ability to take short as well as long positions in securities without regard to the securities' weights in a benchmark and (2) the existence of pockets of inefficiencies (i.e., mispricing relative to intrinsic value) in equity markets, particularly as related to overvalued securities. Because many investors face constraints relative to shorting stocks, situations of overvaluation may be slower to correct than those of undervaluation.
- *Convertible arbitrage*: Convertible arbitrage strategies attempt to exploit anomalies in the prices of corporate convertible securities, such as convertible bonds, warrants, and convertible preferred stock. Managers in this category buy or sell these securities and then hedge part or all of the associated risks. The simplest example is buying convertible bonds and hedging the equity component of the bonds' risk by shorting the associated stock. The cash proceeds from the short sale remain with the hedge fund's prime broker but earn interest, and the hedge fund may earn an extra margin through leverage when the bonds' current yield exceeds the borrowing rate of money from the prime broker. The risks include changes in the price of the underlying stock, changes in the expected volatility of the stock, changes in the level of interest rates, and changes in the credit standing of the issuer. In addition to collecting the coupon on the underlying convertible bond, convertible arbitrage strategies typically make money if the expected volatility of the underlying asset increases or if the price of the underlying asset increases rapidly. Depending on the hedge strategy, convertible arbitrage will also make money if the credit quality of the issuer improves.
- *Fixed-income arbitrage*: Managers dealing in fixed-income arbitrage attempt to identify overvalued and undervalued fixed-income securities, primarily on the basis of expectations of changes in the term structure of interest rates or the credit quality of various related issues or market sectors. Fixed-income portfolios are generally neutralized against directional market movements because the portfolios combine long and short positions. For example, a credit long-short strategy takes long and short exposures to credit-sensitive fixed-income securities based on credit analysis of the securities and underlying issuers, incorporating credit market forecasts.
- *Distressed securities*: Portfolios of distressed securities are invested in both the debt and equity of companies that are in or near bankruptcy. Distressed debt and equity securities are fundamentally different from non-distressed securities. Most investors are unprepared for the legal difficulties and negotiations with creditors and other claimants that are common with distressed companies. Traditional investors prefer to transfer those risks to others when a company is in danger of default. Furthermore, many investors are prevented by charter

from holding securities that are in default or at risk of default. Because of the relative illiquidity of distressed debt and equity, short sales are difficult, so most funds are long.

- *Merger arbitrage*: Merger arbitrage, also called “deal arbitrage,” seeks to capture the price spread between current market prices of corporate securities and their value upon successful completion of a takeover, merger, spin-off, or similar transaction involving more than one company. In merger arbitrage, the opportunity typically involves buying the stock of a target company after a merger announcement and shorting an appropriate amount of the acquiring company’s stock.
- *Hedged equity*: Hedged equity strategies attempt to identify overvalued and undervalued equity securities. Portfolios are typically not structured to be market, industry, sector, and dollar neutral, and they may be highly concentrated. For example, the value of short positions may be only a fraction of the value of long positions and the portfolio may have a net long exposure to the equity market. Hedged equity is the largest of the various hedge fund strategies in terms of assets under management and number of funds.⁷⁴
- *Global macro*: Global macro strategies primarily attempt to take advantage of moves in major financial and non-financial markets through trading in currencies, swaps, futures, and option contracts, although they may also take major positions in traditional equity and bond markets. For the most part, they differ from traditional hedge fund strategies in that they concentrate on major market trends rather than on individual security opportunities. Many global macro managers use derivatives, such as swaps, futures, and options, in their strategies. Managed futures are sometimes classified under global macro as a result. Global macro strategies may be systematic or discretionary. Systematic strategies are often algorithmic trend-following or mean reversion–based strategies driven by computer models. In contrast, discretionary strategies rely on manager skill and analysis for market timing and security selection.
- *Emerging markets*: These funds focus on the emerging and less mature markets. Because short selling is not permitted in most emerging markets and because futures and options are not available, these funds tend to be long. Such investments may be focused on emerging market equity, debt, or a combination of the two. Currency exposure may also be part of the strategy.
- *Fund of funds*: A **fund of funds** (FOF) is a fund that invests in a number of underlying hedge funds. A typical FOF invests in 10–30 hedge funds, and some FOFs are even more diversified. FOF investors can achieve diversification among hedge fund managers and strategies and sometimes gain access to funds that are closed to new money, but they have to pay two layers of fees—one to the hedge fund managers and another to the manager of the FOF.⁷⁵

The compensation structure of hedge funds consists of a percentage of net asset value (NAV) as a management fee plus an incentive fee. The management fee is also known as an “assets under management” fee, or **AUM fee**. The management fee generally ranges from 1% to 2%. The incentive fee is a percentage of profits as specified by the terms of the investment. It has traditionally been 20% but as of early 2016 averaged approximately 18%. At the same time, roughly 70% of hedge funds were using a

⁷⁴ As of April 2016, long–short equity strategies made up 21% of the AUM and 33% of the number of hedge funds in the Morningstar hedge fund database.

⁷⁵ Returns on FOFs have been found to be more positively correlated with equity markets than are returns on individual hedge funds; see Kat (2005, pp. 51–57).

management fee of 1% to 2%, combined with an incentive fee of 20%.⁷⁶ As a general rule, the more common the strategy (e.g., hedged equity), the lower the management fee and sometimes the incentive fee.

The great majority of funds have a high-water-mark provision that applies to the payment of the incentive fee. A **high-water mark** (HWM) is a specified net asset value level that a fund must exceed before performance fees are paid to the hedge fund manager. Once the first incentive fee has been paid, the highest month-end NAV establishes a high-water mark. If the NAV then falls below the HWM, no incentive fee is paid until the fund's NAV exceeds the HWM; then the incentive fee for a "1 plus 20" structure (a 1% management fee plus a 20% incentive fee) is 20% of the positive difference between the ending NAV and the HWM NAV. The new, higher NAV in turn establishes a new HWM, and so on. A minority of funds also specify that no incentive fee is earned until a specified minimum rate of return (hurdle rate) is achieved.

The purpose of a HWM provision is to ensure that the hedge fund manager earns an incentive fee only once for a given gain. For the hedge fund manager, the HWM is like a call option on a fraction of the increase in the fund's NAV. Many hedge fund managers depend on earning the incentive fee. Given a 15% gain, a 1 and 20 fund would earn about 4% of net assets versus 1% if no incentive fee were earned.

Hedge fund investors also often take the opportunities offered to them to withdraw capital from a fund on a losing streak. A hedge fund far under its HWM is frequently dissolved because earning an incentive fee appears unlikely. According to Credit Suisse/Tremont, more than 20% of hedge funds were liquidated in 2003, after a year in which more than 70% of hedge funds in that database failed to earn an incentive fee.

In their second layer of expenses, FOFs impose management fees and incentive fees. A "1.5 plus 10" structure is not uncommon.

Much debate has surrounded the fee structures of hedge funds. One perspective is that because a hedge fund investor is not paying for "beta" (exposure to systematic risk), as the investor might do with a traditional long-only mutual fund, a higher fee structure is warranted. Another rationale is that to the extent that a hedge fund contributes to controlling a portfolio's downside risk, somewhat like a protective put, the fund manager should earn a premium, similar to an insurance premium.

All else being equal, given two similarly sized hedge funds following the same strategy, the expectation is that the fund charging the lower management fee will deliver superior performance, unless the higher-fee manager can make a convincing case that he or she can deliver superior investment performance in the future. Not uncommonly, hedge fund managers with superior track records ask for and obtain higher-than-average fees (such as 3 and 30 or even higher). For these kinds of fees, investors need to ask themselves whether the hedge fund manager will continue to be a substantial winner.

Hedge funds also prescribe a minimum initial holding or **lock-up period** for investments during which no part of the investment can be withdrawn or withdrawn without penalty. A hard lock-up strictly prohibits early withdrawal. In contrast, a soft lock-up allows funds to be redeemed early if a redemption fee penalty is paid. Lock-up periods of one to three years are common, depending on the strategy. Thereafter, the fund will redeem the investments of investors only within specified exit windows—for example, quarterly after the lock-up period has ended—and possibly up to specific maximum amounts (called "gates"). The rationale for these provisions is that the hedge fund manager and remaining investors should be insulated against the unfavorable unwinding of positions. FOFs usually do not impose lock-up periods and may permit more frequent investor exits. However, to offer that additional liquidity, the FOF manager must hold a cash buffer that may reduce expected returns.

⁷⁶ Based on Morningstar hedge fund data as of early 2016, excluding managed futures and funds of funds.

6.1.2 Size of the Hedge Fund Market

According to AIMA, approximately 8% of pension funds and 25% of endowments and foundations had allocations to hedge funds in 2013.⁷⁷ It is estimated that assets under management for hedge funds grew from less than US\$200 billion in 1995 to approximately US\$2.8 trillion in 2014, while the number of hedge funds increased from fewer than 2,400 to more than 10,000.⁷⁸

6.2 Benchmarks and Historical Performance

Many investors are concerned that hedge funds do not provide a means for monitoring and tracking these investments that are available for other, more traditional investments.⁷⁹ In the traditional stock and bond markets, Morningstar and Lipper provide active manager-based benchmarks of mutual fund performance. Similarly, in the alternative investment industry, Morningstar, Hedge Fund Research (HFR), Credit Suisse, Bloomberg, BarclayHedge, and many others provide monthly or daily indexes that track the performance of active manager-based benchmarks of hedge fund performance.

Research has also focused on developing indexes for strategies (e.g., tracking portfolios) that try to separate the contribution to performance of the strategy from the contribution to performance of the manager's specific talent.⁸⁰ In most cases, evidence exists for abnormal returns based on such indexes. However, investors should be cautioned that abnormal returns simply reflect the fact that the reference benchmark is not a complete tracking portfolio for hedge funds, so the abnormal returns are merely the result of additional, non-measured risks.

6.2.1 Benchmarks

Hedge fund benchmarks include both monthly and daily series. A sample of monthly hedge fund indexes includes the following (in alphabetical order):

- *CISDM*. The CISDM hedge fund and managed futures indexes are based on managers' reporting to the CISDM hedge fund and managed futures databases. The indexes cover a broad set of hedge fund and managed futures trading strategies. Publication of returns in each style classification began in 1994, with data beginning in 1990. The broadest CISDM hedge fund index is equally weighted—the CISDM Equal Weighted Hedge Fund Index.
- *Credit Suisse*. These indexes cover more than 10 strategies. The Credit Suisse Hedge Fund Index discloses its construction methods and identifies all the funds within it. Credit Suisse accepts only funds (not separate accounts) with a minimum of US\$50 million under management, a one-year record, and an audited statement. The Credit Suisse Hedge Fund Index was launched in 1999 with data beginning in 1994 and is asset weighted (i.e., weights depend on assets under management).
- *Hedge Fund Intelligence*. Hedge Fund Intelligence supplies a wide range of hedge fund indexes, including the EuroHedge and AsiaHedge series of equally weighted indexes. The EuroHedge series consists of hedge funds that are at least 50% managed in developed European countries or that are solely invested in

⁷⁷ See AIMA Investor Steering Committee, "Beyond 60/40: The Evolving Role of Hedge Funds in Institutional Investor Portfolios," AIMA (May 2013); <http://www.aima.org/en/document-summary/index.cfm/docid/77A589A0-3BEA-4559-B0F0EE38CF21B1CF>.

⁷⁸ See Schneeweis, Kazemi, and Bird (2016).

⁷⁹ Siegel (2003) found it surprising, given that the inherent nature of hedge fund investing is hostile to benchmarking, that hedge funds or their clients would need benchmarks.

⁸⁰ See Schneeweis and Kazemi (2001).

developed European countries. The series began in 2002. The AsiaHedge series contains hedge funds that are at least 50% managed in the Asia-Pacific area or that are solely invested in the Asia-Pacific area. The series began in 1998.

- *HedgeFund.net*. Acquired by eVestment in 2011, the HedgeFund.net (HFN) indexes cover more than 40 strategies. They are equally weighted indexes based on the HFN database.
- *HFR*. This company provides the HFRI asset-weighted and equally weighted composite hedge fund indexes and equally weighted hedge fund sub-indexes based on managers' reporting to the HFR database of hedge fund returns. FOFs are not included in the composite index but are covered in a separate index. The indexes were launched in 1994, with data beginning in 1990. Funds are assigned to categories based on the descriptions in their offering memoranda. HFRX daily indexes are also available from HFR. These indexes are based on managers' reporting to HFR. The indexes cover a number of categories and subcategories and were launched in 2003.
- *Morningstar MSCI*. These indexes are classified according to five basic categories and include a composite index. Within each category, indexes are segregated on the basis of asset class and geographical region. Funds included need to have a minimum of US\$15 million in AUM, although there is no restriction on whether a fund is open or closed. The indexes are supported by a platform that allows subscribers to access the data at a more detailed level (industry focus, fund size, open versus closed, etc.). Indexes are equally weighted except at higher levels of aggregation, where both equally weighted and asset-weighted versions are available.

Comparison of Major Manager-Based Hedge Fund Indexes The various hedge fund index series are generally distinguished by whether they report monthly or daily, are investable or non-investable, and list the actual funds used in benchmark construction. Of the major current indexes, only HFR provides a daily return series. Daily indexes are generally constructed from the managed accounts of an asset manager rather than from the funds themselves.

For the monthly return series, the HFR, Hedge Fund Intelligence, and HedgeFund.net indexes have many different classifications and sub-classifications, whereas Credit Suisse, Morningstar MSCI, and CISDM have relatively few classifications.

It is natural to want to express the performance of hedge funds with a single number. However, defining the hedge fund universe is a difficult and unproductive exercise. There is no general agreement among institutional investors regarding which investment strategies should be considered hedge fund strategies and what weights should be given to each strategy.

There are many variations in the construction of the major manager-based hedge fund indexes. Principal differences are as follows:

- *Selection criteria*. Decision rules determine which hedge funds are included in the index. Examples of selection criteria include length of track record, AUM, and restrictions on new investment. For example, Morningstar MSCI has a very specific rule-based process for manager selection.
- *Style classification*. Indexes have various approaches to how each hedge fund is assigned to a style-specific index and different rules about whether or not a fund that fails to satisfy the style classification methodology is excluded from the index.

- *Weighting scheme.* Indexes have different schemes to determine how much weight a particular fund's return is given in the index. Common schemes are equal weighting and dollar weighting on the basis of AUM. Many indexes report both equal-weighted and asset-weighted versions.
- *Rebalancing scheme.* Rebalancing rules determine when assets are reallocated among the funds in an equally weighted index. For example, some indexes are rebalanced monthly; others use annual rebalancing.
- *Investability.* An index may be directly or only indirectly investable. The majority of monthly manager-based hedge fund indexes are not investable, whereas most of the daily hedge fund indexes are investable.

Alpha Determination and Absolute Return Investing Performance appraisal has emerged as a major issue in the hedge fund industry. Hedge funds have often been promoted as absolute return vehicles. **Absolute return vehicles** have been defined as investments that have no direct benchmark portfolios; they are presented as seeking to produce positive returns. Estimates of alpha, however, must be made relative to a benchmark portfolio.⁸¹ Problems in alpha determination have been widely discussed; for example, differences in the selected benchmark can result in large differences in reported alpha.⁸² One perspective is that all active management is about performance relative to some investable benchmark.⁸³ Another important issue in evaluating claims of alpha is whether account is being taken of all sources of systematic risk the fund may be exposed to. Alpha is the residual after returns to systematic risks have been removed. Simple models for systematic risk that have been applied to long-only equity portfolios may not be relevant for a hedge fund strategy.

The lack of a clear hedge fund benchmark, however, is not indicative of an inability to determine comparable returns for a hedge fund strategy. Hedge fund strategies within a particular style often trade similar assets with similar methodologies and are sensitive to similar market factors. Two principal means of establishing comparable portfolios are (1) using a single-factor or multifactor methodology and (2) using optimization to create tracking portfolios with similar risk and return characteristics.

6.2.2 Historical Performance

In this section, we provide summary information about the performance of various hedge fund strategies. Exhibit 20 shows the performance of a number of assets and combinations of assets (traditional assets and hedge funds) over the period 1996–2015. These include CISDM's Hedge Fund Composite Index and several measures of US and global stock and bond performance.

Exhibit 20 Hedge Fund Performance, 1996–2015

Measure	Hedge Funds	S&P 500	Bloomberg Barclays US Aggregate	Commodities	CISDM CTA EW	Real Estate	Private Equity
Annualized return	9.15%	8.51%	5.37%	−1.01%	7.22%	10.32%	8.23%
Annualized std. dev.	7.36%	15.31%	3.47%	22.79%	8.54%	19.47%	27.17%

⁸¹ Alpha is defined as the return relative to an investment's expected return given a benchmark portfolio and the investment's beta with respect to the benchmark.

⁸² Refer to the reading on evaluating portfolio performance for the alpha determination in traditional investments; see Schneeweis (1998) for alpha determination in hedge funds.

⁸³ See Waring and Siegel (2005).

Exhibit 20 (Continued)

Measure	Hedge Funds	S&P 500	Bloomberg Barclays US Aggregate	Commodities	CISDM CTA EW	Real Estate	Private Equity
Mean return-to-volatility ratio	1.24	0.56	1.55	−0.04	0.85	0.53	0.30
Maximum drawdown	−21.71%	−50.95%	−3.83%	−79.44%	−11.93%	−67.89%	−80.44%
Correlation with hedge funds	1.00	0.74	0.00	0.25	−0.05	0.57	0.75

Source: Schneeweis, Kazemi, and Bird (2016).

For the entire period, hedge funds had superior return performance relative to the other asset classes, with the exception of real estate. The maximum drawdown for hedge funds for the entire period, at −21.71%, represents a smaller loss than those of the S&P 500, commodities, real estate, and private equity. Hedge funds had a higher mean return-to-volatility ratio than any of the other reported assets, with the exception of bonds. Note that hedge funds' correlation of 0.74 with the S&P 500 is consistent with substantial net long equity market exposure as well as the modest potential for risk diversification benefits (because the correlation is below 1).

Exhibit 21 shows the performance of hedge funds and other asset classes in 2008. Although hedge funds outperformed the S&P 500, commodities, real estate, and private equity, hedge funds exhibited a relatively high correlation with US equities and other asset classes during the financial crisis. Thus, the diversification benefits that many investors may have expected from hedge funds were not apparent in the financial crisis.

Exhibit 21 Hedge Fund Performance in 2008

Measure	Hedge Funds	S&P 500	Bloomberg Barclays US Aggregate	Commodities	CISDM CTA EW	Real Estate	Private Equity
Total return	−19.16%	−37.00%	5.24%	−46.49%	21.76%	−37.34%	−64.15%
Standard deviation	11.04%	21.02%	6.09%	42.85%	10.64%	43.40%	38.07%
Maximum drawdown	−19.92%	−37.66%	−3.83%	−62.16%	−4.42%	−49.20%	−64.15%
Correlation with hedge funds	1.00	0.82	0.38	0.73	−0.02	0.57	0.67

Source: Schneeweis, Kazemi, and Bird (2016).

The risk and return benefits of a wide range of hedge fund indexes and their correlations with stock and bond indexes are presented in Exhibit 22. As the dispersion of the mean return-to-volatility ratios and of correlations of hedge fund styles with stocks and bonds in Exhibit 22 shows, in 1996–2015, there was considerable variation in the risk and return characteristics among styles. As expected, those hedge fund groups whose strategies call for eliminating stock or bond market risk (e.g., equity market neutral or fixed-income arbitrage) have low correlations with, respectively, stock or bond indexes. Those hedge fund strategies with equity exposure (e.g., event driven and hedged equity) have moderate correlations with the S&P 500.

Exhibit 22 Performance of Hedge Fund Strategies and Traditional Assets, 1996–2015

	Annualized Return	Standard Deviation	Mean Return-to-Volatility Ratio	Maximum Drawdown	Correlation with			
					Hedge Funds	S&P 500	Bloomberg Barclays US Aggregate	Bloomberg Barclays US Corp High Yield
CISDM Equal Weight Hedge Fund Index	9.15%	7.36%	1.24	−21.71%	1.00	0.74	0.00	0.64
CISDM Equity Market Neutral Index	7.38%	2.21%	3.35	−2.79%	0.62	0.40	0.08	0.34
CISDM Convertible Arbitrage Index	8.03%	5.00%	1.61	−22.47%	0.62	0.45	0.19	0.71
CISDM Distressed Securities Index	8.70%	5.70%	1.53	−21.22%	0.83	0.60	0.01	0.70
CISDM Event Driven Multi-Strategy Index	8.83%	5.84%	1.51	−20.19%	0.87	0.71	−0.05	0.70
CISDM Merger Arbitrage Index	7.12%	3.26%	2.19	−5.71%	0.71	0.58	0.02	0.51
CISDM Equity Long/Short Index	8.88%	7.47%	1.19	−17.21%	0.95	0.75	−0.06	0.54
CISDM Global Macro Index	6.29%	3.93%	1.60	−3.87%	0.59	0.39	0.22	0.29
S&P 500 Total Return Index	8.51%	15.31%	0.56	−50.95%		1.00	−0.01	0.62
Bloomberg Barclays US Aggregate Bond Index	5.37%	3.47%	1.55	−3.83%			1.00	0.18
Bloomberg Barclays US Corp High Yield Bond Index	6.75%	9.09%	0.74	−33.31%				1.00

Source: Schneeweis, Kazemi, and Bird (2016).

Research has shown that the actual performance of hedge fund strategies depends on the market conditions affecting that strategy. As shown in Exhibit 23, equity-based hedge fund strategies are correlated with several equity and bond market factors. Credit-sensitive hedge fund strategies (e.g., distressed securities) and credit-sensitive bond instruments are correlated with similar factors (e.g., high-yield debt returns). Because relative value strategies (e.g., equity market neutral) are sensitive to different return factors from those to which hedged equity strategies and the S&P 500 are sensitive, they are expected to have low correlations with the S&P 500 and may be considered as more effective risk diversifiers. Because equity hedge funds load on similar return factors as the S&P 500, they offer less diversification than many relative value strategies and can be more rightly considered return enhancers to a long-only program.

Exhibit 23 Correlations, 1996–2015

Hedge Fund	S&P 500	Bloomberg Barclays US Aggregate Bond	Bloomberg Barclays US Corporate High Yield	S&P 500 Volatility	Bloomberg Barclays US Aggregate Volatility
CISDM Equal Weight Hedge Fund Index	0.74	0.00	0.64	−0.42	−0.12
CISDM Equity Market Neutral Index	0.40	0.08	0.34	−0.28	−0.10
CISDM Convertible Arbitrage Index	0.45	0.19	0.71	−0.34	−0.21
CISDM Distressed Securities Index	0.60	0.01	0.70	−0.55	−0.19
CISDM Event Driven Multi-Strategy Index	0.71	−0.05	0.70	−0.51	−0.22
CISDM Merger Arbitrage Index	0.58	0.02	0.51	−0.31	−0.11
CISDM Equity Long/Short Index	0.75	−0.06	0.54	−0.39	−0.10
CISDM Global Macro Index	0.39	0.22	0.29	−0.13	−0.09

Notes: Stock and bond volatility was measured as monthly volatility of daily returns of the S&P 500 and the Bloomberg Barclays US Aggregate Bond index, respectively.

Source: Schneeweis, Kazemi, and Bird (2016).

The different sensitivities of various hedge fund strategies to various market factors result in different correlations among hedge fund strategies themselves. The correlations between various hedge fund strategies are given in Exhibit 24. Diversification among hedge fund strategies should therefore also reduce the volatility of hedge fund–based investment portfolios.

EXAMPLE 10**Liquid Alternatives**

The term “liquid alternatives” (or liquid alts) refers to a variety of hedge fund–like investment strategies such as those offered in the United States through the Investment Company Act of 1940 fund structures (mutual funds, closed-end funds, and ETFs). Unlike hedge funds, liquid alternatives provide the daily liquidity and transparency characteristic of “40 Act funds.” Liquid alts also typically have more attractive fee structures and are available to a wider range of investors than corresponding hedge funds. It is estimated that the liquid alt market consisted of 53 funds with \$240 billion in assets under management at the end of 2014.⁸⁴ Some of the strategies followed by liquid alts are outlined below:

⁸⁴ See Prequin, “Liquid Alternatives: Investor and Fund Manager Outlook” (April 2015): <https://www.prequin.com/docs/reports/Prequin-Special-Report-Liquid-Alternatives-April-2015.pdf>.

Exhibit 24 Correlations between Hedge Fund Strategies, 1996–2015

	CISDM EW Hedge Funds	CISDM Equity Market Neutral	CISDM Convertible Arbitrage	CISDM Event Driven	CISDM Merger Arbitrage	CISDM Distressed Securities	CISDM Equity Long/ Short	CISDM Global Macro	S&P 500	Bloomberg Barclays US Aggregate	Bloomberg Barclays US Corporate High Yield
CISDM Hedge Funds	1.00	0.62	0.62	0.87	0.71	0.83	0.95	0.59	0.74	0.00	0.64
CISDM Equity Market Neutral		1.00	0.39	0.57	0.52	0.45	0.63	0.54	0.40	0.08	0.34
CISDM Convertible Arbitrage			1.00	0.67	0.51	0.72	0.50	0.27	0.45	0.19	0.71
CISDM Event Driven				1.00	0.80	0.87	0.85	0.48	0.71	−0.05	0.70
CISDM Merger Arbitrage					1.00	0.68	0.73	0.47	0.58	0.02	0.51
CISDM Distressed Securities						1.00	0.77	0.43	0.60	0.01	0.70
CISDM Equity Long/ Short							1.00	0.60	0.75	−0.06	0.54
CISDM Global Macro								1.00	0.39	0.22	0.29
S&P 500									1.00	−0.01	0.62
Bloomberg Barclays US Aggregate Bond										1.00	0.18
Bloomberg Barclays US Corporate High Yield											1.00

Source: Schneeweis, Kazemi, and Bird (2016).

Equity Long–Short. This strategy typically selects stocks based on top-down or bottom-up fundamental analysis and hedges market exposure with short equity or long put exposure. Liquid alts equity long–short strategies correspond to hedge fund equity long–short strategies.

Event Driven. This strategy takes equity or debt positions in firms involved in a corporate event such as a merger or restructuring. Corresponding hedge fund strategies include merger arbitrage, distressed, and credit long–short.

Relative Value. This strategy takes both long and short positions to benefit from relative mispricing between similar or related securities. Corresponding hedge fund strategies include convertible arbitrage and equity market neutral.

Macro. Macro strategies are systematic or discretionary strategies that take long or short positions in a variety of asset classes (equities, bonds, currencies, commodities) based on macroeconomic conditions. They often utilize trend-following or mean-reverting signals and correspond to global macro hedge fund strategies or managed futures strategies.

6.2.3 Interpretation Issues

Hedge fund indexes often have meaningfully different performance within a given time period, raising the challenging question of which index is most appropriate for the investor's purposes.

Despite the differences in returns, comparable hedge fund indexes appear to be sensitive to the same set of risk factors. The return differences among indexes often reflect differences in the weights of different strategy groups.

The hedge fund investor should be aware of the following issues in selecting and using hedge fund indexes.

Biases in Index Creation The use of manager-based hedge fund indexes in performance appraisal and asset allocation is based on the premise that the indexes neutrally reflect the underlying performance of the strategy. A primary concern is that most databases are self-reported; that is, the hedge fund manager chooses which databases to report to and provides the return data. Although the correlations among hedge fund indexes based on similar strategies are generally moderately high (i.e., above 0.80) in the period covered by Exhibit 24, in certain cases, the correlations fall below 0.30. There are several possible explanations for low correlations between “similar strategy” indexes. One is the restrictions on size and years of performance that some indexes impose. Another may be the weighting schemes.

Value weighting may cause a particular index to take on the return characteristics of the best-performing hedge funds in a particular time period: As top-performing funds grow through new inflows and high returns and poorly performing funds are closed, the top-performing funds represent an increasing share of the index. Fung and Hsieh (2001) pointed out that the indexes that are value weighted may reflect a given style's popularity with investors because the asset values of the various funds change as a result of asset purchases and price changes. Popularity may reflect the most recent results, creating a momentum effect in returns. Correctly interpreting an index subject to such momentum is problematic for investors.

Equal-weighted indexes may reflect potential diversification of hedge funds better than value-weighted indexes. For funds designed to track equal-weighted indexes, however, the costs of rebalancing to index weights make it difficult to create an investable form.⁸⁵

A number of hedge fund indexes have been created that are investable. Some such indexes have the express goal of tracking a comparable but non-investable index. Exhibit 25 provides a comparison of return and risk characteristics of investable (HFRX) and non-investable (CISDM) indexes. As the exhibit shows, investable indexes tend to provide lower returns and often higher risk than the corresponding non-investable indexes. The creation of a single, all-encompassing hedge fund index that reflects some natural, market-based equilibrium assumption as to the proper holdings of hedge funds and that is appropriate for all purposes does not appear to be feasible. Therefore, many hedge fund investors use custom or negotiated benchmarks.

Exhibit 25 Comparison between Investable and Non-Investable Hedge Fund Indexes, 1996–2015

Performance and Correlations (1996–2015)	Annualized Return	Standard Deviation	Mean Return- to-Volatility Ratio	Maximum Drawdown
CISDM Equal Weight Hedge Fund Index	9.15%	7.36%	1.24	–21.71%
HFRX Equal Weighted Strategies Index	3.80%	4.81%	0.79	–23.55%
CISDM Equity Market Neutral Index	7.38%	2.21%	3.35	–2.79%
HFRX Equity Market Neutral Index	1.34%	3.83%	0.35	–14.93%
CISDM Convertible Arbitrage Index	8.03%	5.00%	1.61	–22.47%
HFRX Convertible Arbitrage Index	1.02%	10.88%	0.09	–60.39%
CISDM Distressed Securities Index	8.70%	5.70%	1.53	–21.22%
HFRX Distressed Securities Index	2.30%	7.08%	0.33	–39.10%
CISDM Event Driven Multi-Strategy Index	8.83%	5.84%	1.51	–20.19%
HFRX Event Driven Index	4.21%	6.71%	0.63	–25.80%
CISDM Merger Arbitrage Index	7.12%	3.26%	2.19	–5.71%
HFRX Merger Arbitrage Index	5.46%	3.42%	1.60	–5.46%
CISDM Equity Long/Short Index	8.88%	7.47%	1.19	–17.21%
HFRX Equity Hedge Index	5.30%	8.09%	0.66	–29.52%

An appropriate benchmark reflects the particular style of an investment manager and can serve as a surrogate for the manager in studies of risk and return performance and asset allocation. Of great concern for investors is whether an index reflects the actual relative sensitivity of hedge funds to various market conditions, so that the index provides information on the true diversification benefits of the underlying hedge fund strategies. Many studies have used both single-factor and multifactor models in identifying market factors and option-like payoffs that describe the sources of hedge fund returns.⁸⁶ However, the sensitivity of various hedge fund indexes to these economic factors may change over time, so an index's changing styles and changing assets under management (if the index is asset weighted) may make historical results relative to that index conditional at best.

⁸⁵ See the HFRX strategy benchmarks at <https://www.hedgefundresearch.com>.

⁸⁶ See Fung and Hsieh (1997a); Schneeweis and Pescatore (1999).

Relevance of Past Data on Performance The usefulness of historical hedge fund data is a topic of controversy. Research has shown that the volatility of returns is more persistent through time than the level of returns.⁸⁷ This evidence indicates that the best forecast of future returns is one that is consistent with prior volatility, not one that is consistent with prior returns.⁸⁸ Interpreting the results of such studies, however, involves a host of methodological concerns.

The composition of hedge fund indexes also changes greatly over time, so the past returns of an index reflect the performance of a different set of managers from today's or tomorrow's set. This issue may be a more severe problem for value-weighted indexes than for equal-weighted indexes because value-weighted indexes are more heavily weighted in the recent best-performing fund(s).

Survivorship Bias Survivorship bias is often raised as a major concern for investors in hedge funds. **Survivorship bias** results when managers with poor track records exit the business and are dropped from the database whereas managers with good records remain. If survivorship bias is large, then the historical return record of the average surviving manager is higher than the average return of all managers over the test period. Because a diversified portfolio would have likely consisted of funds that were destined to fail as well as funds destined to succeed, studying only survivors results in overestimation of historical returns. It is estimated that this bias is in the range of at least 1.5%–3% per year.⁸⁹

Survivorship bias varies among hedge fund strategies. For instance, survivorship bias is minor for event-driven strategies, is higher for hedged equity, and is considerable for currency funds. More importantly, for the largest hedge fund group, equity hedge funds, overestimation of historical performance because of survivorship bias has been previously reported to range from 1.5% to 2%. However, the bias may be concentrated in certain periods (e.g., the period following the August 1998 Long-Term Capital Management crisis). Thus, the levels of survivorship bias exhibited in past data may, depending on economic conditions and strategy, over- or underestimate future bias. Finally, data for US equity hedge funds indicate that for particular hedge fund strategies, although the relative return performance of the “dead” funds was lower than that of the “alive” funds, the survivorship bias may vary greatly among funds, with some non-survivor funds showing no return bias.

Moreover, the problem of survivorship bias may be reduced by conducting superior due diligence. For instance, one explanation for the proliferation of FOFs is that managers of these funds may be able to avoid managers destined to fail, thereby mitigating the survivorship bias problem. Investors may be willing to bear an additional layer of management fees to reduce exposure to the ill-fated managers. As a result, once the FOFs have screened funds, survivorship bias may be reduced significantly.

Stale Price Bias In some asset markets, lack of security trading may lead to what is called **stale price bias**. For securities with stale prices, measured correlations may be lower than expected and, depending on the time period chosen, measured standard deviation may be higher or lower than it would be if actual prices existed.

⁸⁷ See Schneeweis (1998); Park and Staum (1998).

⁸⁸ The ability of historical data to classify managers into similar trading strategies is still an open question. Fung and Hsieh (1997a) and others have used various factor analytic programs to group managers. In contrast, many fund management companies place managers into relevant groups on the basis of direct evaluation. Future research is required to see which of the relevant methods provides the least bias.

⁸⁹ See Brown, Goetzmann, and Ibbotson (1999); Fung and Hsieh (2000).

Even in traditional asset markets, prices are often computed from factor models, appraisal values, and so on, so that reported prices do not reflect current market prices. In fact, for some CTAs and hedge fund strategies, reported prices reflect market-traded prices to a greater extent than in many traditional asset portfolios. There is little evidence that stale prices cause a significant bias in hedge fund returns.

Backfill Bias (Inclusion Bias) Backfill bias can result when missing past return data for a component of an index are filled in at the discretion of the component (e.g., a hedge fund, in the case of a hedge fund index) when it joins the index. As with survivorship bias, backfill bias can make results look too good because only components with good past results will be motivated to supply them.⁹⁰ The issue of this bias has been raised particularly with respect to certain hedge fund indexes.⁹¹

EXAMPLE 11

Hedge Fund Benchmarks

CBA, a large charitable organization, is planning to make an investment in one or more hedge funds. Alex Carr, CIO of CBA, is evaluating information prepared by the organization's senior analyst, Kim Park, CFA.

Carr asks Park why a particular US-focused market-neutral long–short hedge fund CBA is considering has resisted accepting a US equity index as a benchmark.

- 1 Prepare a response to Carr's question to Park.
- 2 Recommend an alternative to using a stock index benchmark for a market-neutral long–short hedge fund.
- 3 Discuss the impact the following factors have on index creation with respect to hedge funds:
 - A survivorship bias
 - B value-weighted indexes
 - C stale price bias

Solution to 1:

Market-neutral long–short hedge funds consider themselves to be absolute return vehicles, in that their performance should not be linked to that of the stock market. Such a fund is often presumed to have effectively zero systematic risk.

Solution to 2:

For those hedge funds using absolute return strategies that are indifferent to the direction of the market, a minimum return hurdle rate may be used as a standard for performance.

Solution to 3:

- A Survivorship bias occurs when returns of managers who have failed or exited the market are not included in the data analyzed over a specific time frame. This situation results in overestimation of historical returns in the range of 1.5%–3.0% per year. Survivorship bias may be concentrated in certain economic periods, which further complicates analysis of the

⁹⁰ See Malkiel and Saha (2005) and references therein. Another bias the authors identified is end-of-life bias, which arises from the option a hedge fund has to stop reporting results. One might expect that predominantly poorly performing hedge funds would choose to do that.

⁹¹ See Malkiel and Saha (2005).

persistence of returns over shorter time frames. A manager's investment performance reflects not only skill but also the starting point of market opportunities and valuation levels: Such factors constitute age (or vintage) effects in hedge fund performance. Over a long horizon, the starting point should generally decrease in importance. However, many hedge funds have average track records of only two to five years. Age effects make it difficult to compare the performance of hedge funds that have track records of different lengths.

- B** Indexes that are value weighted, as opposed to equally weighted, may take on the return characteristics of the best-performing hedge funds over a given period. These indexes thus reflect the weights of popular bets by hedge fund managers and popular styles among investors, because the asset values of the various funds change as a result of asset purchases as well as price appreciation.
- C** Lack of security trading leads to stale prices for those securities and can cause measured standard deviation to be over- or understated, depending on the time period being studied. As a result, measured correlations may be lower than expected. This issue is not a significant concern in the creation of hedge fund indexes because monthly data are used, and for many hedge fund strategies, the underlying holdings are relatively liquid, so positions reflect market-traded prices.

6.3 Hedge Funds: Investment Characteristics and Roles

Hedge funds have been described as skill-based investment strategies. Skill-based investment strategies obtain returns primarily from the firm's competitive advantages in information or its interpretation. To the extent that a hedge fund's returns derive primarily from an individual manager's skill or superior depth of information, those returns may be uncorrelated or weakly correlated with the long-term returns of the traditional stock and bond markets.

The investor needs to keep in mind, however, that the flip side of skill in producing investment success is market opportunity. The supply of market opportunities can and does vary for particular investment strategies as conditions in the investment industry, the economy, and the financial market evolve. To take an obvious example, the opportunities for merger arbitrage hedge funds are heavily influenced by the size, frequency, and regulatory conditions of corporate merger activities.

6.3.1 *Investment Characteristics*

A number of empirical studies have directly assessed the return drivers of traditional and alternative investments. For instance, a common set of factors has been used to explain traditional stock and bond returns.⁹² Similarly, academic research indicates that for hedge funds, a common set of return drivers based on trading strategy factors (e.g., option-like payoffs) and location factors (e.g., payoffs from a buy-and-hold policy) help to explain the returns of each strategy.⁹³

Results show that, as for traditional "long-bias" stock and bond investments, the returns of some long-bias equity-based and fixed income-based hedge fund strategies are affected primarily by changes in the risk and return of the underlying stock and bond markets. These strategies should therefore be regarded less as portfolio risk diversifiers than as portfolio return enhancers. Hedge fund strategies that attempt

⁹² See Fama and French (1996).

⁹³ See Fung and Hsieh (1997a); Getmansky, Lee, and Lo (2015).

to be less affected by the direction of the underlying stock and bond markets (e.g., equity market neutral and bond arbitrage) may be regarded more as risk diversifiers for traditional stock and bond portfolios.

Studies that used direct replication of underlying strategies also support the role of market factors and option-like payoff variables (e.g., put options) in describing certain hedge fund strategies.⁹⁴ The bottom line is that analysis of the underlying factors used in trading strategies is important, given the investor's economic forecast and market expectations, when deciding which hedge funds to include in a portfolio. Investors may consider allocation to various strategies warranted by economic factors directly driving hedge fund returns and may even consider allocations to new strategies based on new economic conditions that are expected to benefit these new strategies.

6.3.2 Roles in the Portfolio

Hedge funds constitute a diverse set of strategies. Because the strategies are skill based, most investors will accord great importance to manager selection. Investors put varying emphasis on style selection. For a given portfolio, the diversification benefits of adding hedge funds in different style groups can be variable.

FOFs have been popular as entry-level investments because they essentially delegate individual manager selection to the FOF manager and provide professional management. They also reduce the due diligence process to a single manager. FOFs may be diversified funds composed of various hedge fund strategies, or they may be "style pure." A significant consideration is that FOF investing involves two layers of management and incentive fees.

Research indicates that an equally weighted diversified portfolio of five to seven randomly selected equity securities will result in a portfolio standard deviation similar to that of the investment population from which it is drawn. Similarly, for hedge funds, a randomly selected equal-weighted portfolio of five to seven hedge funds has a standard deviation similar to that of the population from which it is drawn.⁹⁵ Thus, as is true for equity portfolios, multi-manager hedge fund portfolios may have risk levels similar to those of a larger population of hedge funds. Also important is that a portfolio of randomly selected hedge funds has a correlation in excess of 0.90 with a typical hedge fund benchmark. Therefore, a smaller subset of hedge funds can represent the performance of a hedge fund composite index, just as a smaller portfolio of stocks or mutual funds can represent the performance of the S&P 500 or a mutual fund index, respectively.

The Role of Hedge Funds as Diversifiers A first caution is that, as discussed in detail in the reading on asset allocation, the allocations produced by mean–variance optimization (MVO) are sensitive to errors in return estimates. The fact that historical index returns vary among index providers suggests that basing allocations on historical hedge fund index returns in MVO may be unreliable.⁹⁶ Hedge fund strategies often have option characteristics that present a further challenge when relying on MVO.

The use of hedge fund indexes in overall asset allocation is based, in part, on the assumption that FOFs created to track certain hedge fund strategies perform similarly to the benchmarks used in asset allocation analysis. In short, there are a number of issues involved in portfolio creation both within and among strategies. These issues

⁹⁴ See, for example, Hasanhodzic and Lo (2007); Bollen and Fisher (2013).

⁹⁵ See Henker (1998).

⁹⁶ It is important to note that the use of historical returns in optimization modeling may not reflect expected risk and return relationships. If factor-based regression models are used to forecast expected rates of return, then the consistency of the sensitivities of various index models to factors is an issue of concern.

include (1) persistence in historical performance, (2) portfolio rebalancing, and (3) the impact of return distribution features beyond mean and standard deviation—that is, “higher moments.”

If one assumes that a portfolio tracks the performance of a particular index, then an investor may use hedge fund indexes together with traditional indexes to improve risk–return trade-offs.

Historical Performance The benefit of including hedge funds in diversified portfolios is illustrated in Exhibit 26. For the 2001–2015 period, when hedge funds are added to US stocks, bonds, or a portfolio of US stocks and bonds, the risk-adjusted return improves. For instance, the mean return-to-volatility ratio of a balanced portfolio of US stocks and bonds, 0.74 (Portfolio A), increases to 0.77 when hedge funds are added (Portfolio B). Similarly, when hedge funds are added to a diversified portfolio of equities, bonds, and alternative assets (Portfolio C), the mean return-to-volatility ratio increases from 0.65 to 0.69 (Portfolio D). The correlation between hedge funds and the US stock/bond portfolio (Portfolio A) is 0.78; the correlation between hedge funds and the stock/bond/alternatives portfolio (Portfolio C) is 0.84.

Exhibit 26 Hedge Fund Performance in Portfolios, 2001–2015

Portfolios	A	B	C	D
Annualized return	5.54%	5.63%	5.71%	5.77%
Standard deviation	7.54%	7.29%	8.72%	8.38%
Mean return-to-volatility ratio	0.74	0.77	0.65	0.69
Maximum drawdown	–27.11%	–26.55%	–33.96%	–32.79%
Correlation with hedge funds	0.78	0.82	0.84	0.86
Portfolio A	Equal weights S&P 500 and Bloomberg Barclays US Aggregate Bond Index			
Portfolio B	90% Portfolio A and 10% hedge funds			
Portfolio C	75% Portfolio A and 25% CTAs/commodities/private equity/real estate			
Portfolio D	90% Portfolio C and 10% hedge funds			

Source: Schneeweis, Kazemi, and Bird (2016).

The data in Exhibit 26 indicate that the inclusion of hedge funds can provide mean–variance improvements to portfolios. On the other hand, researchers such as Amin and Kat (2003) have shown that including hedge funds frequently leads to lower skewness and higher kurtosis, which are exactly opposite to the attributes (positive skewness and moderate kurtosis) that investors are presumed to want.⁹⁷

⁹⁷ See, for example, Dan diBartolomeo, “Understanding the Distribution of Hedge Fund Returns,” Northfield Asia Seminars (October 2014): <http://www.northinfo.com/documents/627.pdf>.

EXAMPLE 12**Skewness and Hedge Funds**

In 2002, the S&P 500 dropped by more than 20% and distressed debt hedge funds as a group achieved poor returns. Equity market-neutral funds also achieved poor returns, a result that was explained as relating to lower market liquidity.⁹⁸

- 1 Explain why distressed debt hedge funds might have performed poorly in 2002.
- 2 Explain how lower market liquidity might have negatively affected long-short market-neutral hedge funds.

Solution to 1:

Major declines in equity markets lead to widening credit spreads and, all else being equal, to capital losses on high-yield bonds. Distressed debt hedge funds are exposed to the risk of increased credit spreads; these considerations could explain why such funds fared poorly in 2002.

Solution to 2:

Maintaining market neutrality requires dynamic portfolio adjustments. Declines in market liquidity increase the cost of shorting equity markets.

The following are techniques that a portfolio manager might consider for neutralizing negative skewness in a portfolio resulting from hedge fund positions:⁹⁹

- Adopt a mean-variance, skewness- and kurtosis-aware approach to hedge fund selection. An example is given by Kat (2005), who discussed combining global macro and equity market-neutral hedge strategies with traditional assets. Global macro funds have tended to have positive skewness and only moderate correlation with equities but relatively high kurtosis and volatility; equity market-neutral strategies tend to act as volatility and kurtosis reducers in the portfolio. In other words, smart hedge fund selection may be able to reduce the problem of negative skewness.
- Invest in managed futures. Managed futures programs are generally trend following in nature, which tends to produce skewness characteristics that are opposite to those of many hedge funds.

6.3.3 Other Issues

In addition to market factors that affect a broad range of investment vehicles, individual fund factors may affect the expected performance of hedge funds. Academic and practitioner research has tested various fund-specific factors—such as onshore/offshore, age, and size—for their impact on manager performance. Results from this research support the following conclusions: (1) Young funds outperform old funds on a total-return basis, or at least old funds do not outperform young ones; and (2) on average, large funds underperform small funds; and (3) returns of FOFs may provide a closer approximation to the actual experience of hedge fund investors than do the returns of hedge fund indexes.¹⁰⁰

⁹⁸ This discussion draws on Kat (2005), who also discussed a program of buying and rolling over out-of-the-money stock index put options, which tend to deliver positively skewed returns.

⁹⁹ This discussion is based on Kat (2005).

¹⁰⁰ See Howell (2001); Liang (2000); Fung and Hsieh (2002).

Unfortunately, as in any test of fund effects, one has the problem of disaggregating effects for a large number of funds with different strategies, starting periods, and so on. In fact—although it is not the purpose of this reading to conduct a detailed analysis of each of these effects—the following discussion indicates that simple relationships between hedge fund returns and each of the aforementioned fund factors must be analyzed closely before final conclusions can be made.

- *Performance fees and lock-up impacts.* Periods of severe drawdown (e.g., 1998) may influence funds to dissolve rather than face the prospect of not earning the incentive fees because of HWM provisions. There is some evidence of an impact of lock-up periods on hedge fund performance. In the case of US hedge funds, funds with quarterly lock-ups have higher returns than similar-strategy funds with monthly lock-ups.
- *Funds of funds.* FOF performance may differ from overall hedge fund performance because of various issues, including a less direct impact of survivorship bias on FOFs because hedge funds that dissolve are included in the returns of the FOFs. (There still is some survivorship bias, in that FOFs may remove themselves from datasets because of poor performance, for example.) FOFs may thus offer a more accurate prediction of future fund returns than that provided by the more generic indexes.

However, classification and style drift are issues with FOFs. A number of FOFs reported as diversified by category differ greatly not only in their correlation with standard indexes but also in their sensitivity to general economic factors. Investors must use factors to test for “style drift” in generic FOFs.

FOFs that change over time in response to rebalancing may not fit well into strict asset allocation modeling. For instance, new FOFs (US diversified FOFs) starting in the years 1992 onward were found to have lower correlations with FOFs starting in 1991 or earlier, but as time progressed, the correlations increased. This finding indicates that new FOFs are constructed differently from old FOFs, as expected. New FOFs may be more flexible in fund or style selection. As time passes, however, older FOFs can redistribute cash or funds in such a way that they resemble the new FOFs. Thus, simple averaging across FOFs without taking the year of origination into account may not be appropriate.

Over time, hedge fund correlations with hedged equity have risen and hedge fund correlations with global macro strategies have fallen, indicating a possible increase in FOFs’ use of hedged equity and a decrease in the use of global macro. These results suggest that FOFs may be style timing and that FOFs have become less useful in asset allocation strategies because of changes in their factor sensitivity and composition—in contrast to more style-pure hedge fund indexes or strategies.

- *Effect of fund size.* On the one hand, there are potential advantages for a hedge fund to having a large asset base. A large fund may be able to attract and retain more talented people than a small fund and may receive more attention from, for example, its prime broker. On the other hand, a smaller fund may be more nimble. With smaller positions, the market impact cost of its trades may be lower. Depending on the particular strategies pursued, there may be an optimal size for the fund in relation to market opportunities available for its strategy at a given time. The investor should, following the paradigm for due diligence illustrated in Example 2, examine the current market opportunities in relation to the fund’s size.

Research has generally supported the conclusion that, overall, larger funds earn lower mean returns and lower risk-adjusted returns than small funds. However, this relationship of performance to fund size has been found to have exceptions

depending on hedge fund strategy. Because market opportunities and assets under management in a strategy change, the best advice may be to evaluate the effect of fund size on a case-by-case basis. The investor should also investigate differences in mortality rates among hedge funds by size within the strategy.

- *Age (vintage) effects.* The usual performance statistics hide the time dimension of hedge fund performance. Investors should be sensitive to the fact that because of vintage effects, it may be difficult to compare the performance of funds with track records of different lengths. Comparisons with the performance of the median manager of the same vintage in a hedge fund's style group can be revealing.

Hedge Fund Due Diligence Hedge funds have historically been loosely regulated entities without the mandated and often standardized disclosure requirements of other investment vehicles, such as unit trusts in the United Kingdom and mutual funds in the United States. Although hedge funds typically provide an annual audited financial statement and performance review, they rarely disclose their existing portfolio positions. Possible concerns that arise from this lack of disclosure (see Anson 2006) include the following:

- The authenticity of the hedge fund manager's performance is uncertain if investors cannot independently verify the performance data because of the opacity of the fund's holdings and related pricing.
- Risk monitoring and management are difficult for investors without disclosure of trading and portfolio positions by the hedge fund manager. Without full disclosure of the fund's holdings, investors cannot aggregate risk across their entire investment program to understand the implications at the portfolio level.

Because hedge fund operations and/or strategies may also be somewhat opaque, reducing risk in hedge fund investing starts with due diligence.

Again, the framework for due diligence presented in Example 2—covering market opportunity, investment process, organization, people, terms and structure, service providers, documents, and write-ups—applies here. The investor may interview the hedge fund manager and/or submit a questionnaire. The Alternative Investments Management Association (AIMA) provides the following due diligence checklist as a guide for investors evaluating hedge fund managers.¹⁰¹ Investors should try to learn the following information:

I. Structure of the hedge fund

- a Legal entity: type and ownership structure
- b Name and address of hedge fund manager
- c Domicile: onshore or offshore
- d Branch offices or other locations (and their functions)
- e Regulatory registrations (e.g., investment adviser or commodity trading adviser)
- f Personnel: responsible officers and employees (including their biographies)
- g Auditors, legal counsel, and prime broker information

II. Strategy of the hedge fund

- a Style (e.g., event driven, global macro)
- b Instruments used under each strategy (e.g., which derivatives)

¹⁰¹ See www.aima.org.

- c Benchmark, hurdle rate, high-water mark, etc.
 - d Competitive niche or any unique aspects of the fund
 - i. The source of investment ideas or strategy
 - ii. How the strategy works under different market conditions
 - iii. Market conditions under which the strategy works best
 - iv. Any capacity constraint for the strategy
 - e Current investments: types and positions
- III. Performance data
- a List of all funds and performance since inception
 - b Information on the performance of the funds with explanations
- IV. Risk
- a What are the risks and how are they measured and managed? Which personnel are involved in risk management?
 - b Specific risk-control measures, if any (e.g., position limits, derivatives, counterparty credit limits)
 - c Past, current, and future use of leverage
- V. Research
- a Any change in strategy in the past resulting from research findings
 - b Efforts put into research for investment/trading ideas
 - c Budget and personnel (internal and external) for research
- VI. Administration
- a Lawsuits, litigations, regulatory actions against the fund or its managers
 - b Significant employees and employee turnover
 - c Personnel arrangement for the account: responsible account executive
 - d Disaster recovery plan
- VII. Legal
- a Fee structure: management and incentive fees (Is a high-water mark applicable?)
 - b Lock-up
 - c Subscription amount: maximum and minimum
 - d Clawback provision
- VIII. References
- a Professional: auditor, prime broker, legal counsel
 - b Existing investors

EXAMPLE 13

An Investor Does Due Diligence on a Hedge Fund

Alois Winkelmann is conducting due diligence on a US-based hedge fund, Tricontinent Investors, for the Malvey Charitable Trust (MCT). Among the facts Winkelmann gathers are the following:

Structure

The fund employs three people—the two principals, Bryce Smith and Henrietta Duff, and an administrative assistant. Smith's prior work experience includes 10 years as an equity analyst at North Country Trust Company and, prior to that, 3 years as an associate in a Syracuse, New York, law firm. He holds a BBA and an LLB. Duff worked for three years as an equity growth fund manager at a medium-size mutual fund complex. Prior to that, she was a corporate finance associate at a leading investment bank. Duff holds an AB in English and an MBA with a concentration in finance. The fund's relationship with its prime broker extends back two years. The fund has used only one prime broker since it was formed. The prime broker is a prestigious firm ranked number two among prime brokerage businesses.

Hedge Fund Strategy

- The fund invests in both fixed-income and equity markets.
- The fund buys US 10-year Treasury notes and borrows short term abroad in markets that have particularly low interest rates to earn, currently, a positive spread.
- The fund conducts merger arbitrage involving the securities of the target and the acquirer.

Legal

The fund has a 1 and 20 fee structure and a two-year lock-up period.

Using only the information supplied, identify and discuss the risk factors in this hedge fund investment.

Solution:

- The firm is a small shop with limited management and research resources.
- The hedge fund has only a two-year track record available for evaluation.
- Neither principal has prior experience in either fixed-income investing or merger arbitrage, although Duff's investment banking background and Smith's legal experience may be relevant.
- The fixed-income strategy could become unprofitable if the US dollar weakens against the currencies of the markets in which Tricontinent is borrowing short term.
- The fixed-income strategy could become less profitable or unprofitable if the spread between long-term and short-term interest rates decreases.
- Given the liquidity of the underlying assets, a two-year lock-up may be considered excessive.

6.4 Performance Evaluation Concerns

The reading on evaluating portfolio performance covers the basic concepts of performance evaluation, including the components of performance measurement, performance attribution, and performance appraisal. This section provides further comments and illustrations in the context of hedge funds. In reviewing the performance of a hedge fund, some factors an investor needs to consider are

- the returns achieved;
- volatility (not only standard deviation but also downside volatility);

- what performance appraisal measures to use;
- correlations (to gain information on diversification benefits in a portfolio context);
- skewness and kurtosis (because these affect risk and may qualify the conclusions drawn from a performance appraisal measure); and
- consistency (including the period specificity of performance).

Returns Hedge funds typically report data to hedge fund data providers monthly, and the default compounding frequency for hedge fund performance evaluation and reporting is monthly. The rate of return reported by hedge funds is the nominal monthly holding-period return, computed as follows:

$$\text{Rate of return} = \frac{[(\text{Ending value of portfolio}) - (\text{Beginning value of portfolio})]}{(\text{Beginning value of portfolio})}$$

These returns are typically compounded over 12 monthly periods (or 4 periods if the data are reported quarterly) to obtain the annualized rate of return. The reporting and compounding frequency can materially affect hedge funds' apparent performance for a number of reasons, including the following:

- Many hedge funds allow entry into or exit out of their funds quarterly or even less frequently.
- In calculating drawdowns, no compounding is typically applied to the loss.

The issues of leverage and derivatives in return calculation also arise in hedge fund performance evaluation. The calculation convention followed in the hedge fund industry is to “look through” the leverage as if the asset were fully paid. Thus, as the beginning value in the above equation for rate of return, the return on a levered position is based on the amount actually paid plus any borrowing used to fund the purchase. The ending value is, of course, calculated on a consistent basis. Thus, leverage affects the weighting of an asset in the portfolio but not the return on the individual asset. The same principle of deleveraging applies to the computation of the rate of return when derivatives are included in the hedge fund portfolio.¹⁰²

Investors sometimes examine the rolling returns to a hedge fund. The **rolling return**, RR , is simply the moving average of the holding-period returns for a specified period that matches the investor's time horizon (e.g., a calendar year). For example, if the investor's time horizon is 12 months, the rolling return would be calculated using

$$RR_{n,t} = (R_t + R_{t-1} + R_{t-2} + \dots + R_{t-(n-1)})/n$$

so

$$RR_{12,t} = (R_t + R_{t-1} + R_{t-2} + \dots + R_{t-11})/12$$

Rolling returns provide some insight into the characteristics of returns. In particular, they show how consistent the returns are over the investment period and identify any cyclicalities in the returns.

Volatility and Downside Volatility As in traditional investments, the standard deviation of returns is a common measure of risk in hedge fund performance. The standard deviation of hedge fund returns is computed in the usual fashion and is typically

¹⁰² Because derivatives require only a good faith deposit, which is interest yielding, there is minimal real capital investment involved. The computed rate of return under the assumption that the full value of the derivatives constitutes the investment base is, at best, a pseudo rate of return. Yau, Savanayana, and Schneeweis (1990) examined the impact of different rates of return of derivative investments based on differing computations of the rates of return and found significantly different results in portfolio optimization and hedging programs.

based on monthly returns. The annualized standard deviation is usually computed as the standard deviation of the monthly return times the square root of 12, making the assumption of serially uncorrelated returns. The use of the standard deviation of monthly returns as a measure of risk also makes the implicit assumption that returns follow a normal distribution, at least to a close approximation. As already mentioned, however, hedge funds appear to have more instances of extremely high and extremely low returns than would be expected with a normal distribution (i.e., positive excess kurtosis), and some funds also display meaningful skewness. When those conditions hold, standard deviation incorrectly represents the actual risk of a hedge fund's strategy.

Downside deviation, or semideviation, is an alternative risk measure that mitigates one criticism of standard deviation, namely, that it penalizes high positive returns. Downside deviation computes deviation from a specified threshold (i.e., below a specified return, r^*); only the negative deviations are included in the calculation. The threshold can be zero (separating gains from losses) or the prevailing short-term rate or any rate chosen by the user. Semideviation uses the average monthly return as the threshold. Once the threshold is determined, the computation resembles that of the standard deviation. Using downside deviation instead of standard deviation recognizes a distinction between good and bad volatility:

$$\text{Downside deviation} = \sqrt{\frac{\sum_{t=1}^n [\min(r_t - r^*, 0)]^2}{n - 1}}$$

where $\min(A, B)$ means “A or B, whichever is smaller.”

Another popular risk measure relates to drawdowns. As discussed in the reading on risk management, a drawdown in the field of hedge fund management is the difference between a portfolio's point of maximum net asset value for the period (its high-water mark) and any subsequent low point (until new “high water mark” is reached). *Maximum* drawdown is the largest difference between a high-water point and a subsequent low.¹⁰³ A portfolio may also be said to be in a position of drawdown during the period between a decline from a high-water mark and the point at which a new high-water mark is reached. How long this period lasts is relevant to evaluating a hedge fund's performance—in particular, its record of recovering from losses.

Performance Appraisal Measures The most extensively used industry measure to date has been the Sharpe ratio, which measures the average amount of return in excess of the risk-free rate per unit of standard deviation of return. The reading on evaluating portfolio performance gives a definition and a discussion, but we may present the Sharpe ratio as follows, with reference to the *ex post* performance in a given year:

$$\text{Sharpe ratio} = \frac{\text{Annualized rate of return} - \text{Annualized risk-free rate}}{\text{Annualized standard deviation}}$$

In this application, a one-year T-bill yield is usually used to represent the annualized risk-free rate.

The Sharpe ratio has a number of limitations that the hedge fund investor needs to understand:

- The Sharpe ratio is time dependent; that is, the overall Sharpe ratio increases proportionally with the square root of time. An annual Sharpe ratio will therefore be $\sqrt{12}$ bigger than a monthly Sharpe ratio if returns are serially uncorrelated.¹⁰⁴

¹⁰³ See Lhabitant (2002, p. 254).

¹⁰⁴ See Lhabitant (2004).

- It is not an appropriate measure of risk-adjusted performance when the investment has an asymmetrical return distribution, with either negative or positive skewness.¹⁰⁵
- Illiquid holdings bias the Sharpe ratio upward.
- Sharpe ratios are overestimated when investment returns are serially correlated (i.e., when returns trend), which causes a lower estimate of the standard deviation. This occurs with certain hedge fund strategies that may have a problem with stale pricing or illiquidity. Distressed and emerging market securities may be examples.
- The Sharpe ratio is primarily a risk-adjusted performance measure for stand-alone investments and does not take into consideration the correlations with other assets in a portfolio.
- The Sharpe ratio has not been found to have predictive ability for hedge funds in general. Being a “winner” according to the Sharpe ratio over a past period cannot be relied on to predict future success.
- The Sharpe ratio can be gamed; that is, the reported Sharpe ratio can be increased without the investment really delivering higher risk-adjusted returns. Specifically, Spurgin (2001) demonstrated the following means of gaming the Sharpe ratio:
 - 1 Lengthening the measurement interval. This will result in a lower estimate of volatility; for example, the annualized standard deviation of daily returns is generally higher than the weekly, which, in turn, is higher than the monthly.
 - 2 Compounding the monthly returns but calculating the standard deviation from the uncompounded monthly returns.
 - 3 Writing out-of-the-money puts and calls on a portfolio. This strategy can potentially increase the return by collecting the option premium without paying off for several years. Strategies that involve taking on default risk, liquidity risk, or other forms of catastrophe risk have the same ability to report an upwardly biased Sharpe ratio. (Examples are the Sharpe ratios of market-neutral hedge funds before and after the 1998 liquidity crisis.) This approach is similar to trading negative skewness for a greater Sharpe ratio by improving the mean or standard deviation of the investment.¹⁰⁶
 - 4 Smoothing returns. Using certain derivative structures, infrequent marking to market of illiquid assets, and pricing models that understate monthly gains or losses can reduce reported volatility.
 - 5 Getting rid of extreme returns (best and worst monthly returns each year) that increase the standard deviation. Operationally, this strategy entails a total-return swap: One pays the best and worst returns for one’s benchmark index each year, and the counterparty pays a fixed cash flow and hedges the risk in the open market. If swaps are not available, one can execute this strategy directly with options.

¹⁰⁵ A number of researchers insist that the Sharpe ratio should be interpreted together with the higher moments of the return distribution. For example, Brooks and Kat (2002) found that high Sharpe ratios tend to go together with negative skewness and high kurtosis.

¹⁰⁶ See Spurgin (2001) and Anson (2006) for theoretical proofs and examples.

The **Sortino ratio** replaces standard deviation in the Sharpe ratio with downside deviation. Instead of using the mean rate of return to calculate the downside deviation, this approach typically uses the investor's minimum acceptable return (some practitioners use the risk-free rate instead). The reading on risk management has further comments on this measure. The Sortino ratio is calculated as follows:

$$\text{Sortino ratio} = (\text{Annualized rate of return} - \text{Annualized minimum acceptable return}) / \text{Downside deviation}$$

The **gain-to-loss ratio** measures the ratio of positive returns to negative returns over a specified period of time. The higher the gain-to-loss ratio (in absolute value), the better:

$$\text{Gain-to-loss ratio} = (\text{Number of months with positive returns} / \text{Number of months with negative returns}) \times (\text{Average up-month return} / \text{Average down-month return})$$

In addition, two major appraisal measures based on drawdowns as indicators of risk, the Calmar ratio and the Sterling ratio, have been applied to hedge fund analysis.¹⁰⁷

Correlations Correlations provide information about portfolio diversification. However, correlations are most meaningful when assets' or strategies' returns are normally distributed. This fact is an additional reason to consider skewness and kurtosis.

Skewness and Kurtosis To review, skewness is a measure of asymmetry in the distribution of returns. A symmetrical distribution has a skewness of zero; all else being equal, a positive value of skewness is desirable. Kurtosis measures the relative incidence of returns clustered near the mean return versus returns extremely far away from the mean. If one investment has higher kurtosis than another, it tends to have more instances of extreme returns.

Consistency Another element in evaluating hedge funds is consistency of results. Consistency analysis is most relevant when comparing funds of the same style or strategy. It is important to look at the number of months that the strategy has had positive (or negative) returns, the number of months that the strategy has had positive (negative) returns when the market is up (down), and the average monthly returns in up and down markets. For consistency, a fund should have a greater percentage of positive returns and a lower percentage of negative returns than the benchmark in all market conditions. We will illustrate this concept with the data given in Exhibit 27. In computing the rolling returns, the relevant holding period for the investor is assumed to be six months. This assumption is simply for illustration purposes. In practice, the rolling returns should match the investor's investment horizon.

¹⁰⁷ The **Calmar ratio** is the compound annualized rate of return over a specified time period divided by the absolute value of maximum drawdown over the same time period. Frequently, the time horizon is set at three years (36 months), but if three years of data are not available, the available data are used. The **Sterling ratio** is the compound annualized rate of return over a specified time period divided by the average yearly maximum drawdown over the same time period less an arbitrary 10%. To calculate this average yearly drawdown, the data period is divided into 12-month periods, the maximum drawdown is calculated for each, and the results are averaged. The convention for the time horizon follows that of the Calmar ratio.

Exhibit 27 Hypothetical Hedge Fund Consistency Data

Month	Hedge Fund Return (%)	Index Return (%)	(HF Return – Hurdle Rate) ²	(Index Return – Hurdle Rate) ²	1+ HF Return	1+ Index Return	Rolling Six-Month Return of HF	Rolling Six-Month Return of Index
January	2.5	1.0	0.0000	0.0000	1.0250	1.0100		
February	1.5	1.3	0.0000	0.0000	1.0150	1.0130		
March	–1.0	–1.6	2.0070	4.0671	0.9900	0.9840		
April	–1.2	–2.4	2.6137	7.9338	0.9880	0.9760		
May	–1.0	–4.2	2.0070	21.3139	0.9900	0.9580		
June	0.9	2.0	0.0000	0.0000	1.0090	1.0200	0.0028	–0.0065
July	–1.0	2.5	2.0070	0.0000	0.9900	1.0250	–0.0030	–0.0040
August	0.7	–2.1	0.0000	6.3338	1.0070	0.9790	–0.0043	–0.0097
September	1.1	2.0	0.0000	0.0000	1.0110	1.0200	–0.0008	–0.0037
October	2.1	0.5	0.0000	0.0000	1.0210	1.0050	0.0047	0.0012
November	1.5	3.1	0.0000	0.0000	1.0150	1.0310	0.0088	0.0133
December	1.5	0.2	0.0000	0.0470	1.0150	1.0020	0.0098	0.0103
Sum	7.6	2.3	8.6347	39.6956				
Mean	0.63	0.19					0.0026	0.0001
Product					1.0777	1.0203		

Notes: The hurdle rate is 5% per year or 0.4167% per month. Deviation from the hurdle rate squared is computed if the fund/index return is less than the hurdle rate; otherwise, it will be equal to zero. The rolling six-month return is computed as $RR_t = (R_t + R_{t-1} + \dots + R_{t-5})/6$.

Exhibit 28 shows the computation of the performance statistics of a hypothetical hedge fund for 12 months from the data given in Exhibit 27.

Exhibit 28 Return and Risk Calculations

	Hedge Fund	Index
1. Return		
Total fund return = $[(1 + r_1)(1 + r_2)\dots(1 + r_{12})] - 1 = 1.0777 - 1 = 0.0777$		
Total index return = $1.0203 - 1 = 0.0203$		
Geometric mean per year:		
Fund = $(1.0777^{1/12} - 1) \times 12 = 7.51\%$		
Index = $(1.0203^{1/12} - 1) \times 12 = 2.01\%$		
Rolling six-month returns mean = $(RR_{6,1} + RR_{6,2} + RR_{6,3} + RR_{6,4} + RR_{6,5} + RR_{6,6} + RR_{6,7})/7$		
where $RR_{6,t} = (R_t + R_{t-1} + R_{t-2} + R_{t-3} + R_{t-4} + R_{t-5})/6$		
Fund = $(0.0028 - 0.0030 - 0.0043 - 0.0008 + 0.0047 + 0.0088 + 0.0098)/7 = 0.0026$		
Index = $(-0.0065 - 0.0040 - 0.0097 - 0.0037 + 0.0012 + 0.0133 + 0.0103)/7 = 0.0001$		
Rolling six-month returns (max)		
Rolling six-month returns (min)		
2. Risk		

(continued)

Exhibit 28 (Continued)

	Hedge Fund	Index
Annualized standard deviation	4.62%	7.87%
Annualized downside deviation:		
Hurdle rate = 5% per year		
Fund = $\sqrt{8.6348/(12-1)} \times \sqrt{12} = 3.07$		
Index = $\sqrt{39.6955/(12-1)} \times \sqrt{12} = 6.58$	3.07%	6.58%
3. Appraisal		
Sharpe ratio (per year) = (Return – 5%)/Standard deviation:		
Fund = $(7.5 - 5)/4.62 = 0.54$		
Index = $(2.02 - 5)/7.87 = -0.38$	0.54	-0.38
Sortino ratio (per year) = (Return – 5%)/Downside deviation:		
Fund = $(7.5 - 5)/3.07 = 0.81$		
Index = $(2.02 - 5)/6.58 = -0.45$	0.81	-0.45
Gain/Loss:		
Fund = $(1.475/-1.05) \times (8/4) = -2.81$		
Index = $(1.575/-2.575) \times (8/4) = -1.22$	-2.82	-1.22
4. Consistency		
Number of months	12	12
Number of positive months	8	8
Percentage of positive months	66.67%	66.67%
Average return in up-months	1.48%	1.58%
Number of negative months	4	4
Percentage of negative months	33.33%	33.33%
Average return in down-months	-1.05%	-2.58%
Average monthly return in index up-months:		
Fund = $(2.5 + 1.5 + 0.9 - 1.0 + 1.1 + 2.1 + 1.5 + 1.5)/8 = 1.263$.		
Index = $(1.0 + 1.3 + 2.0 + 2.5 + 2.0 + 0.5 + 3.1 + 0.2)/8 = 1.575$.	1.26%	1.58%
Average monthly return of hedge fund in index down-months = $(-1.0 - 1.2 - 1.0 + 0.7)/4 = -0.625$.	-0.63%	-2.58%
5. Correlation between Fund and Index Returns—12 Months		0.53

Note: The arithmetic means used in the computation of standard deviation were computed as 0.63% and 0.19% for, respectively, the fund and the index.

7

MANAGED FUTURES

Managed futures have been an investment alternative since the late 1960s. More recently, such institutional investors as corporate and public pension funds, endowments, trusts, and bank trust departments have been including managed futures as one segment of a well-diversified portfolio.

Managed futures are private pooled investment vehicles or separate accounts that can invest in the futures markets for the benefit of their investors and have the ability to use leverage in a wide variety of trading strategies. Like hedge funds, managed futures programs are actively managed. Similar to hedge funds, with which they are often grouped, managed futures programs are often structured as limited partnerships open only to accredited investors (institutions and high-net-worth individuals) but can be offered as separate accounts. Compensation arrangements for managed futures programs are also similar to those of hedge funds. The primary difference between hedge funds and managed futures is that, for the most part, managed futures trade exclusively in derivatives markets (futures or options on futures markets) whereas hedge funds tend to be more active in spot markets while using futures markets for hedging. Because hedge funds often trade in individual securities whereas managed futures programs trade market-based futures and options on futures contracts on broader or more generic baskets of assets, hedge funds can be viewed as concentrating on inefficiencies in micro (security) stock and bond markets whereas managed futures look for return opportunities in macro (index) stock and bond markets. In addition, in some jurisdictions, managed futures programs have been historically more highly regulated than hedge funds or have different legal and tax standards.

7.1 The Managed Futures Market

Managed futures programs are an industry comprising specialist professional money managers. In the United States, such programs are run by general partners known as commodity pool operators (CPOs), who either serve as or have hired professional commodity trading advisers to manage money in the pool. CTAs can also offer strategies via separate accounts. In the United States, both CPOs and CTAs are registered with the US Commodity Futures Trading Commission (CFTC) and the National Futures Association (NFA, a self-regulatory body).

7.1.1 Types of Managed Futures Investments

Managed futures have been described as skill-based investment strategies. Skill-based strategies obtain returns from the unique skill or insight of the trader. Like hedge funds, managed futures have also been described as absolute return strategies.

In addition to private commodity pools, managed futures programs are also available in separately managed accounts (sometimes known as “CTA managed accounts”). Publicly traded commodity funds open to smaller investors are also available. Managed futures programs may use a single manager or multiple managers.

Managed futures funds share the compensation structure of hedge funds, consisting of a management fee plus an incentive fee, with a 2 plus 20 arrangement the most common structure.

Managed futures are often classified into subgroups on the basis of investment style (e.g., systematic or discretionary), markets traded (e.g., currency or financial), or trading strategy (e.g., trend following or contrarian). Managed futures are at times viewed as a subset of global macro hedge funds, in that they also attempt to take advantage of systematic moves in major financial and non-financial markets, primarily through trading futures and related option contracts.

The trading strategies of managed futures include the following:

- *Systematic trading strategies* primarily follow a rule-based trading model, usually based on past prices. Most systematic CTAs invest by using a trend-following program, although some trade according to a contrarian, or counter-trend, program. In addition, trend-following CTAs may concentrate on short-term trends, medium-term trends, long-term trends, or a combination thereof.
- *Discretionary trading strategies* trade financial, currency, and commodity futures and related options. Unlike systematic strategies, they involve portfolio manager judgment. Discretionary trading models include those based on quantitative fundamental economic data and on trader beliefs. Traders often use multiple criteria in making trading decisions.

Managed futures programs may be classified according to the markets emphasized in trading:

- *Financial* (financial futures/options and currency futures/options)
- *Currency* (currency futures/options)
- *Diversified* (financial futures/options, currency futures/options, and physical commodity futures/options)

A market classification can also be used to distinguish subcategories of systematic and discretionary trading strategies.

7.1.2 Size of the Managed Futures Market

Worldwide, the managed futures industry has grown from less than US\$1 billion under management in 1980 to approximately US\$327 billion under management in 2015.¹⁰⁸ To put this last figure in perspective, consider that the managed futures industry is probably close to 10% the size of the hedge fund industry as judged by assets under management.

7.2 Benchmarks and Historical Performance

The benchmarks for managed futures are similar to those for hedge funds, in that indexes represent the performance of a group of managers with a similar trading strategy or style.

7.2.1 Benchmarks

Investable benchmarks for actively managed derivative strategies exist. Such indexes replicate the return to a mechanical, trend-following strategy in a number of financial and commodity futures markets. For example, the Mount Lucas Management Index takes both long and short positions in a number of futures markets based on a technical (moving-average) trading rule that is, in effect, an active momentum strategy.

The BarclayHedge and CISDM CTA trading strategy benchmarks are examples of benchmarks based on peer groups of CTAs. The equal-weighted CISDM CTA Equal Weighted Index reflects manager returns for all reporting managers in the CISDM CTA database. The Barclay Traders indexes include indexes for systematic and discretionary strategies and for groups based on market emphasis (financial/metals, currency, agricultural, diversified). For example, the Barclay Systematic Traders Index may include financial/metals, currency, agricultural, and diversified systematic CTAs.

¹⁰⁸ These figures do not include the large number of funds traded through hedge funds (e.g., global asset allocators) or proprietary trading desks of large investment houses, insurance companies, and banks that use strategies similar to those of independent CTAs. The estimate is from Barclays Trading Group.

7.2.2 Historical Performance

The performance of managed futures on an individual basis and as a group is of interest. As Exhibit 29 shows, on a portfolio basis, for the 1996–2015 period, the volatility of the CISDM CTA index (8.5%) was less than that of the S&P 500 (15.3%) but greater than that of the Bloomberg Barclays US Aggregate Bond Index (3.5%). The mean return-to-volatility ratio for the CTA index was better than that of equities but not better than that of bonds. Exhibit 30 shows the performance of CTAs in 2008, during the global financial crisis. While the CTA index exhibited large positive returns in 2008 with a moderate standard deviation, the other indexes (with the exception of bonds) exhibited large negative returns and generally very high volatility. It is worth noting that the correlations of the CISDM CTA index with the equity, private equity, and real estate indexes were very negative in 2008.

Exhibit 29 CTA Performance, 1996–2015

Stock, Bond, and CTA Performance	S&P	Bloomberg Barclays US Aggregate	CISDM CTA EW	
Annualized total return	8.2%	5.3%	7.2%	
Annualized standard deviation	15.3%	3.5%	8.5%	
Mean return-to-volatility ratio	0.53	1.54	0.85	
Maximum drawdown	–50.9%	–3.8%	–11.9%	
Correlation with CTA index	–0.06	0.27	1.00	
Alternative Asset Performance	Commodities	Hedge Fund	Real Estate	Private Equity
Annualized total return	–1.0%	9.2%	10.3%	8.2%
Annualized standard deviation	22.8%	7.4%	19.5%	27.2%
Mean return-to-volatility ratio	–0.04	1.24	0.53	0.30
Maximum drawdown	–79.4%	–21.7%	–67.9%	–80.4%
Correlation with CTA index	0.14	0.74	0.02	–0.06

Source: Schneeweis, Kazemi, and Tolivaisa (2016).

Exhibit 30 CTA Performance in 2008

Stock, Bond, and CTA Performance	S&P 500	Bloomberg Barclays US Aggregate	CISDM CTA EW
Total return	–37.0%	5.2%	21.8%
Standard deviation	21.0%	6.1%	10.6%

(continued)

Exhibit 30 (Continued)

Stock, Bond, and CTA Performance	S&P 500	Bloomberg Barclays US Aggregate	CISDM CTA EW	
Maximum drawdown	−37.7%	−3.8%	−4.4%	
Correlation with CTA index	−0.50	−0.12	1.00	
Alternative Asset Performance	Commodities	Hedge Fund	Real Estate	Private Equity
Total return	−46.5%	−19.2%	−37.3%	−64.1%
Standard deviation	42.9%	11.0%	43.4%	38.1%
Maximum drawdown	−62.2%	−19.9%	−49.2%	−64.1%
Correlation with CTA index	0.13	−0.02	−0.49	−0.40

Source: Schneeweis, Kazemi, and Tolivaisa (2016).

Exhibit 31 displays the correlations among CTA investment strategies, which range from moderate to highly positive. The correlation of systematic with discretionary is among the lowest at 0.48. In general, the correlations among CTA strategies appear to be influenced by the degree to which the strategies are systematic or discretionary. The overall CTA equal-weighted index is highly correlated with diversified, financial, and systematic strategies and distinctly less correlated with currency and discretionary strategies.

Exhibit 31 Correlations of CISDM CTA Universe Strategies, 1996–2015

Correlations	CTA Index (EW)	Currency	Diversified	Financials	Discretionary	Systematic	Average Correlations
CISDM CTA Equal Weighted Index	1.00	0.59	0.96	0.85	0.53	0.96	0.78
Barclay CTA Asset Weighted Currency Index	0.59	1.00	0.55	0.61	0.30	0.62	0.53
Barclay CTA Asset Weighted Diversified Index	0.96	0.55	1.00	0.83	0.55	0.98	0.77
Barclay CTA Asset Weighted Financials Index	0.85	0.61	0.83	1.00	0.43	0.88	0.72
Barclay CTA Asset Weighted Discretionary Index	0.53	0.30	0.55	0.43	1.00	0.48	0.46
Barclay CTA Asset Weighted Systematic Index	0.96	0.62	0.98	0.88	0.48	1.00	0.78
Average Correlations	0.78	0.53	0.77	0.72	0.46	0.78	
S&P 500 Total Return Index	−0.06	0.03	−0.12	−0.08	0.05	−0.10	−0.05
Bloomberg Barclays US Aggregate Bond	0.27	0.16	0.25	0.39	0.03	0.29	0.23
Bloomberg Barclays US Corporate High Yield	−0.09	−0.03	−0.14	−0.10	−0.04	−0.13	−0.09

Source: Schneeweis, Kazemi, and Tolivaisa (2016).

Exhibit 32 complements the information provided in Exhibits 29 and 30 by adding performance information on investable CTA indexes, including correlations with US equity and bond indexes. Across investable CTA indexes, correlations with US equities and US bonds are low and in some instances negative.

Exhibit 32 Performance of CISDM CTA Universe Strategies and Traditional Assets, 2004–2015

2004–2015		Mean Return to Volatility					Correlation with			
Performance and Correlations	Annualized Return	Deviation	Ratio	Maximum Drawdown	Skew	Kurtosis	CISDM	S&P 500	Bloomberg	Bloomberg
							CTA EW		Barclays US Aggregate	
CISDM CTA Equal Weighted Index	5.66%	8.03%	0.71	−0.12	0.49	−0.03	1.00	0.05	0.13	−0.06
Credit Suisse/Tremont Investable Managed Futures Index	3.98%	11.11%	0.36	−0.17	0.00	−0.86	0.92	0.09	0.18	−0.04
MLM Index monthly total return	2.32%	5.68%	0.41	−0.09	0.70	4.76	0.58	−0.28	0.06	−0.36

Source: Schneeweis, Kazemi, and Tolivaisa (2016).

7.2.3 Interpretation Issues

In evaluating historical managed futures return data, the investor should be aware of the upward bias that survivorship can impart. Research has found return differences on the order of 3.5% between the surviving CTAs and the full sample that includes defunct CTAs.¹⁰⁹ The differential performance between survivor and non-survivor samples (on an absolute basis and on a risk-adjusted basis) comes chiefly from differences in return performance in the months just prior to CTA dissolution. The ability of investment professionals to forecast which managers may not survive could result in dramatic differences in investment results.¹¹⁰

7.3 Managed Futures: Investment Characteristics and Roles

Similar to hedge funds, managed futures are active skill-based strategies that investors can evaluate for the potential to improve a portfolio's risk and return characteristics. In the following sections, we present more details on these investments.

¹⁰⁹ See Fung and Hsieh (1997b); McCarthy, Schneeweis, and Spurgin (1996).

¹¹⁰ For research in the area of manager default, see Diz (1999).

7.3.1 *Investment Characteristics*

This discussion of investment characteristics will focus on the market opportunities that may be exploited by CTAs. Derivatives markets are zero-sum games.¹¹¹ As a result, the long-term return to a passively managed, unlevered futures position should be the risk-free return on invested capital less management fees and transaction costs. For derivatives-based investment strategies like managed futures to produce excess returns, on average, there must be a sufficient number of hedgers or other users of the markets who systematically earn less than the risk-free rate. (Hedgers, for example, may pay a risk premium to liquidity providers for the insurance they obtain.) If that condition is met, managed futures as a whole may be able to earn positive excess returns (i.e., be the winning side in the zero-sum transactions).

The zero-sum nature of derivatives markets also does not restrict CTAs from attempting to conduct arbitrage when relationships are out of equilibrium. Institutional characteristics and differential carrying costs among investors may permit managed futures traders to take advantage of short-term pricing differences between theoretically identical stock, bond, futures, options, and cash market positions. CTAs may also attempt to take advantage of the opportunity to trade in trending markets.

Most actively managed futures traders follow momentum strategies. In equity markets, research has begun to support the notion that short-term momentum-based strategies may be able to produce excess returns; the evidence related to the opportunities in futures markets is less well developed.¹¹² Government policy intervention in interest rate and currency markets may cause trending in currency and fixed-income markets. Some corporate risk management approaches may result in trading that creates short-term trending. Trading techniques based on capturing these price trends, whatever the source, may be profitable. There is also evidence that momentum trading imparts the desirable characteristic of positive skewness to managed futures returns.

Because of the ease with which futures traders take short positions, these traders can attempt to earn positive excess returns in falling as well as rising markets. Some of the most impressive periods of CTA performance have been during periods of poor performance in the equity markets (e.g., October 1987). Access to options markets permits managed futures and hedge fund traders to create positions that attempt to exploit changes in the market volatility of the underlying asset (volatility being one of the determinants of option value). Such strategies are not available to investors who are restricted to using cash markets.

Because managed futures can replicate many strategies available to a cash market investor at a lower cost—and permit strategies that are unavailable to cash investors—factor models for this group must include the factors that may be unique to managed futures and hedge fund trading opportunities.¹¹³ To the degree that managed futures returns and stock/bond returns are explained by different factors, managed futures may provide investors with exposure to unique sources of return. The presence of such risk factors also provides an economic rationale for managed futures' diversification capabilities when added to a portfolio of equities and bonds.

7.3.2 *Roles in the Portfolio*

As for the other alternative investments, we now offer historical evidence on the potential of managed futures as part of a portfolio. Managed futures appear to be useful in diversifying risk even in a diversified portfolio of stocks, bonds, and hedge funds.

¹¹¹ The term “zero sum” refers to the fact that derivatives markets reallocate uncertain cash flows among market participants without enhancing aggregate cash flows in any way. See Gastineau and Kritzman (1999).

¹¹² See Lee and Swaminathan (2000) and references therein for the evidence on momentum strategies in US equity markets.

¹¹³ For a discussion of whether managed futures returns are the natural result of market forces or are based primarily on trader skill, see Schneeweis and Spurgin (1996).

Exhibit 33 shows that, for the period 1996–2015, managed futures would have been a valuable addition to a stock/bond/hedge fund portfolio in relation to both US and global stocks and bonds. The mean return-to-volatility ratios of Portfolios B and D, which include a 10% investment in managed futures, dominate those of the portfolios invested only in stocks, bonds, and alternative investments.

Exhibit 33 Managed Futures Performance in Portfolios, 1996–2015

Portfolio	A	B	C	D
Annualized return	7.1%	7.2%	7.35%	7.41%
Standard deviation	7.8%	7.1%	8.9%	8.1%
Mean return-to-volatility ratio	0.91	1.01	0.83	0.92
Maximum drawdown	–27.1%	–22.9%	–36.0%	–31.3%
Correlation with CTA index	0.00	0.12	0.02	0.13
Portfolio A	Equal weights S&P 500 and Bloomberg Barclays US Aggregate Bond Index			
Portfolio B	90% Portfolio A and 10% CISDM CTA EW Index			
Portfolio C	75% Portfolio A and 25% hedge funds/commodities/private equity/real estate			
Portfolio D	90% Portfolio C and 10% CISDM CTA EW Index			

Source: Schneeweis, Kazemi, and Tolivaisa (2016).

The performance of managed futures has also been examined in the peer-reviewed literature. The conclusions appear to be investment vehicle dependent and, to some extent, time period and strategy dependent. On the one hand, a number of studies found that publicly traded commodity funds have been poor investments, whether on a stand-alone basis or as part of a diversified portfolio.¹¹⁴ On the other hand, some research has concluded that private commodity pools and CTA-based managed accounts do have value as stand-alone investments, as part of a portfolio, or in both roles.¹¹⁵ Note that many CTAs prefer not to offer their services through public or private pools, so distinctions as to investment vehicle matter in interpreting these results.¹¹⁶

It appears that an investor can fairly closely track the performance of a CTA-based managed futures index by using a small random selection of CTAs. Henker and Martin (1998) provided empirical evidence that a naively (e.g., randomly) chosen CTA portfolio replicates comparison CTA benchmark indexes. They showed that a portfolio of randomly selected CTAs has a correlation in excess of 0.90 with that of a commonly cited benchmark (the Managed Account Reports dollar-weighted CTA index). Henker and Martin also showed that, as for equity securities, a randomly selected equally weighted portfolio of 8–10 CTAs has a standard deviation similar to that of the population from which it is drawn.

These results, taken as a whole, suggest that the forecasted returns to a CTA-based managed futures index can be useful for determining the optimal asset allocation to managed futures when the investor will invest with a relatively limited number of

¹¹⁴ See, for example, Elton, Gruber, and Rentzler (1987, 1990); Edwards and Park (1996).

¹¹⁵ See Edwards and Park (1996); Edwards and Liew (1999); McCarthy, Schneeweis, and Spurgin (1996).

¹¹⁶ The value of commodity funds, in contrast to investing directly with CTAs, has been questioned by Schneeweis (1996). Schneeweis, however, also concludes that the results are strategy and time period dependent. Given that commodity funds are often multi-manager in form, the benefit of commodity fund investment relative to multiple CTA investment is primarily a function of the fee structure.

CTAs.¹¹⁷ Henker and Martin also concluded, as did Billingsley and Chance (1996), that fewer than 10 CTAs are needed to achieve most of the benefits of including CTAs in an existing stock and bond portfolio.

7.3.3 Other Issues

Performance persistence in CTA managers has been actively debated in the academic community.¹¹⁸ Although there is little evidence that a strategy of investing in winners and avoiding losers will be successful over time, there is some evidence of performance persistence. McCarthy et al. (1996) showed that the relative riskiness of a CTA—the CTA's beta with respect to an index of CTAs—is a good predictor of future relative returns.¹¹⁹ Thus, past CTA performance may be valuable in forecasting CTAs' and multi-adviser CTA portfolios' return and risk parameters, especially at the portfolio level. In terms of public policy, public disclosure of individual CTAs as well as benchmark information may be of benefit to potential investors who want to forecast the expected risk-adjusted performance of public commodity funds.

Because managed futures frequently use derivatives and leverage in their strategies, investors should conduct the same due diligence as described in the hedge fund section. Particular attention should be paid to the risk management practices of the CTA.

EXAMPLE 14

Adding Managed Futures to the Strategic Asset Allocation

Andrew Cassano, CIO of a large charitable organization, is meeting with his senior analyst, Lori Wood, to discuss managed futures. Wood presents Cassano with information taken from Exhibit 33.

Excerpt of Exhibit 33 Managed Futures Performance in Portfolios, 1996–2015

Measure	Portfolio A	Portfolio C	Portfolio D
Annualized return	7.1%	7.35%	7.41%
Annualized standard deviation	7.8%	8.9%	8.1%
Mean return-to-volatility ratio	0.91	0.83	0.92
Maximum drawdown	–27.1%	–36.0%	–31.3%
Correlation with CTA index	0.00	0.02	0.13
Portfolio A	50% S&P 500, 50% Bloomberg Barclays US Aggregate Bond		

¹¹⁷ See also Park and Staum (1998).

¹¹⁸ See Brown and Goetzmann (1995).

¹¹⁹ Similar results were reported by Brorsen (1998).

(Continued)

Measure	Portfolio A	Portfolio C	Portfolio D
Portfolio C	75% Portfolio A, 25% hedge funds/commodities/private equity/ real estate		
Portfolio D	90% Portfolio C, 10% CISDM CTA EW Index		

Source: Schneeweis, Kazemi, and Tolivaisa (2016).

- 1 Using data from this exhibit, determine whether the addition of managed futures to a portfolio comprising US equities, US bonds, and alternative investment strategies would improve the risk/return profile of that portfolio. Justify your response with reference to two statistics provided in the exhibit.

Cassano addresses Wood as follows: “Are there other statistics besides those given that could be potentially useful as predictors of the persistence of performance of CTA managers?”

- 2 With respect to Cassano’s question, recommend another statistic that research has shown to be a useful predictor of persistence of performance among CTAs.

Cassano states: “If managed futures are a subset of hedge funds, including them in the portfolio may be redundant if we also invest in other hedge funds. We won’t gain any diversification benefits.”

- 3 Critique Cassano’s statement and justify your response with reference to data in the exhibit.

Solution to 1:

The mean return-to-volatility ratio for Portfolio D, which incorporates an allocation of 10% to managed futures, improves on the mean return-to-volatility ratio of Portfolio C. Therefore, managed futures appear to be valuable when added to a portfolio of US equities, US bonds, and alternative investment strategies. Standard deviation and maximum drawdown are superior for Portfolio D as well.

Solution to 2:

Research has indicated that the relative riskiness of a CTA (i.e., the commodity trading adviser’s beta with respect to an index of CTAs) is a good predictor of future relative returns. Thus, past CTA performance may be valuable in forecasting CTA and multi-adviser CTA portfolio return and risk parameters, especially at the portfolio level.

Solution to 3:

The correlation of the hedge fund composite with the CISDM CTA composite is demonstrated in the low correlations of Portfolios A and C with the CTA index (shown in Exhibit 33), which indicates that the trading strategies of managed futures may provide unique sources of return when compared with hedge fund strategies that have relatively high exposure to traditional equity and bond markets.

The next section discusses investment strategies based on the equity and debt of distressed companies.

8

DISTRESSED SECURITIES

Distressed securities are the securities of companies that are in financial distress or near bankruptcy. In the United States, investing in distressed securities involves purchasing the claims of companies that have already filed for Chapter 11 (protection for reorganization) or are in immediate danger of doing so.¹²⁰ Under Chapter 11 protection, companies try to avoid Chapter 7 (protection for liquidation) through an out-of-court debt restructuring with their creditors.

Debt and equity are traditional asset classes. Yet, because of the special characteristics and risks of the debt and equity of distressed companies and the strategies that use them, distressed securities are widely viewed as an alternative investment. Contributing to this perspective is the fact that among the most active investors in the field are hedge funds and private equity funds.

8.1 The Distressed Securities Market

Distressed securities investing has a long history—in the United States, dating back at least to the 1930s, when Max L. Heine formed an investment firm specializing in selectively acquiring the debt and real estate of bankrupt railroads. Through the 1980s and early 1990s, individual professional investors, private buyout funds, and others became increasingly active in the securities (and sometimes the real assets) of troubled and bankrupt companies in many industries. With the explosive growth in hedge funds, with their ability to take short and long positions across all markets, and an abundant supply of troubled companies, by the 2000s, distressed securities investing had become well established as a set of skill-based strategies. The market opportunities for such strategies increase with higher default rates on speculative-grade bonds (which have historically averaged about 5% per year in the United States) and decrease with increases in the number of distressed debt investors competing for mispriced securities.

8.1.1 Types of Distressed Securities Investments

Investors may access distressed securities chiefly through two structures:

- *Hedge fund structure.* This is the dominant type. For the hedge fund manager, this structure offers the advantage of being able to take in new capital on a continuing basis. The AUM fee and incentive fee arrangement, particularly when there is no hurdle rate associated with the incentive fee, may be more lucrative than with other structures. Investors generally enjoy more liquidity (that is, they can withdraw capital more easily) than with other structures.
- *Private equity fund structure.* Private equity funds have a fixed term (i.e., a mandated dissolution date) and are closed end (they close after the offering period has closed). This structure has advantages in cases where the assets are highly illiquid or difficult to value. An NAV fee structure may be problematic when it is difficult to value assets. When assets are illiquid, offering hedge fund–style redemption rights may be inappropriate.

There are also structures that are hybrids of the hedge fund and private equity fund structures. In addition, distressed securities investing may be conducted in traditional investment structures, such as separately managed accounts, and even in open-end

¹²⁰ “Chapter” in this context refers to a section of the US Bankruptcy Code.

investment companies (mutual funds).¹²¹ As a result of this variety, the investor can find information about distressed securities investing through hedge fund and private equity sources and elsewhere.

Distressed securities managers may themselves invest or trade in many types of assets, including the following:

- Publicly traded debt and equity securities of the distressed company
- Newly issued equity of a company emerging from reorganization that appears to be undervalued (**orphan equity**)
- Bank debt and trade claims—because banks and suppliers owed money by the distressed company may want to realize the cash value of their claims. When the company is in reorganization, these instruments are bankruptcy claims.
- “Lender of last resort” notes (debt factoring)
- Various derivative instruments for hedging purposes—in particular, for hedging the market risk of a position

8.1.2 *Size of the Distressed Securities Market*

The appropriate measure of the size of the distressed securities marketplace is elusive because the market value of these securities is often very different from the original issued value. One measure would aggregate all the assets under management related to distressed securities regardless of the investment structure in which such assets are managed. Nevertheless, the size of the high-yield bond market can give an indication of the potential supply of opportunities, because distressed debt is one part of that market—in particular, the highest-risk part. Based on a maximum quality rating of Ba1 (as determined by Moody’s Investors Service), the size of the US high-yield market was US\$1.3 trillion as of December 2015.¹²² This figure can be compared with the market size of only US\$69 billion at face value as of the end of 1991.

8.2 Benchmarks and Historical Performance

Hedge fund industry data are the chief source for evaluating modern distressed securities investing.

8.2.1 *Benchmarks*

In the context of hedge funds, distressed securities investing is often classed as a sub-style of event-driven strategies. All the major hedge fund indexes that we discussed in the hedge fund section have a sub-index for distressed securities; for example, the Credit Suisse, CISDM, and HFR indexes all have distressed securities sub-indexes. In the United States, returns to the Altman-Kuehne/NYU Salomon Center Defaulted Bond and Bank Loan databases provide information a comparison point for evaluating a long-only value strategy in distressed debt.

8.2.2 *Historical Performance*

The returns on distressed securities investing can be quite rewarding. Exhibit 34 presents historical performance data for distressed securities and high-yield fixed-income securities. Using the investable monthly HFRX Distressed/Restructuring Index for the period January 1998–December 2015, Exhibit 34 shows that the return distribution for

¹²¹ In such traditional structures as mutual funds, long-only investing would be expected.

¹²² See Heather Rupp, “The High Yield Market: Market Size, Ownership, Funds, and Opportunities,” AdvisorShares (8 March 2016): <http://alphabaskets.com/the-high-yield-market-market-size-ownership-funds-and-opportunities/>.

distressed securities is non-normal. In particular, the distribution reflects significant downside risk, with a negative skewness of -0.30 . The negative skewness indicates that for distressed securities, large negative returns are more likely than large positive returns. Hence, there is a bias to the downside. In addition, the monthly return distribution displays excess kurtosis (1.29). This finding indicates that these securities are exposed to large outlier events. The two statistics together indicate significant downside risk. Consequently, risk and risk-adjusted return measures that are based on a normal distribution assumption, such as the Sharpe ratio and mean return-to-volatility ratio, may not capture the complete risk–return trade-off of distressed securities investing.

Exhibit 34 Monthly Returns of High-Yield and Distressed Securities, 1998–2015

Statistic	HFRX Fixed Income-Credit Index	HFRX Distressed/Restructuring Index
Mean monthly return	0.63%	0.43%
Monthly standard deviation	4.46%	0.99%
Skew	-0.64	-0.30
Kurtosis	1.09	1.29

Source: www.hedgefundresearch.com.

The monthly return distribution of the HFRX Fixed Income-Credit Index debt displays risk characteristics similar to those of the distressed securities index, with a negative skewness of -0.64 and an excess kurtosis of 1.09. Overall, high-yield debt investing, although producing favorable returns over the period, was subject to considerable credit risk and, probably, event risk. These risks were greater, however, than those observed for distressed securities investing.

Exhibit 35 shows that for the same period, distressed securities underperformed stock and bond investments, albeit with a lower standard deviation than the S&P 500 and high-yield bonds. The mean return-to-volatility ratio for the HFRX Distressed/Restructuring Index is 0.33, which is lower than the ratios for all the other assets. While the maximum drawdown of the distressed index is better than that of the S&P 500, it is worse than either of the bond indexes. Low correlation with stock and bond investments suggests that adding distressed securities to a portfolio of stocks and bonds might provide significant diversification benefits. Because returns of distressed securities display negative skewness and high kurtosis (see Exhibit 34), however, risk as represented by standard deviation is probably understated.

Exhibit 35 Distressed Securities Performance, 1998–2015

Measure	HFRX Distressed/Restructuring Index	S&P 500	Bloomberg Barclays US Aggregate Bond	Bloomberg Barclays US Corp High Yield Bond
Annualized return	2.30%	6.54%	5.23%	6.18%
Annualized standard deviation	7.08%	15.44%	3.41%	9.51%
Mean return-to-volatility ratio	32.52%	55.61%	154.75%	74.25%
Maximum drawdown	-39.10%	-50.95%	-3.83%	-33.31%

Exhibit 35 (Continued)

Measure	HFRX Distressed/ Restructuring Index	S&P 500	Bloomberg Barclays US Aggregate Bond	Bloomberg Barclays US Corp High Yield Bond
Correlation with S&P 500	0.46	1.00	−0.08	0.62
Correlation with Bloomberg Barclays US Aggregate Bond	−0.09	−0.08	1.00	0.16

Sources: www.hedgefundresearch.com; CISDM.

In terms of performance, this strategy depends a great deal on the business cycle and how well the economy is doing. When the economy is not doing well, bankruptcies increase and this strategy has many investment opportunities. However, an important risk factor that may not be captured by the performance data is event risk. The ability to correctly predict whether an event will occur would ensure the success of the strategy.

8.2.3 Interpretation Issues

In estimating the size of the distressed securities market, we gave figures for the high-yield debt market. Non-investment-grade or high-yield bonds are not necessarily on the brink of default; thus, they should not be considered distressed. Distressed bonds constitute the highest-credit-risk segment of the high-yield bond market.¹²³ Furthermore, distressed securities include distressed equities and strategies based on these instruments.

8.3 Distressed Securities: Investment Characteristics and Roles

Although certain types of distressed securities investing may be considered for their risk diversification potential, some of the typical risks of distressed securities are not well captured by such measures as correlation and standard deviation, which are usually the guideposts in portfolio optimization. Investors look to distressed securities investing primarily for the possibility of high returns from security selection (exploiting mispricing), activism, and other factors.

8.3.1 Investment Characteristics

The market opportunity that distressed securities investing offers to some investors arises from the problems that corporate distress poses to other investors. Many investors are barred either by regulations or by their investment policy statements from any substantial holdings in below-investment-grade debt. These investors must sell any debt that has crossed the threshold from investment grade to high yield (so-called **fallen angels**). Banks and trade creditors may prefer to convert their claims to cash rather than participate as creditors in a possibly long reorganization process. Failed leveraged buyouts have also been a source of distressed securities opportunities.¹²⁴ Distressed securities investing opportunities require additional legal experience and resources that may be costly. The impulse of some investors to off-load distressed debt creates opportunities for bargain hunters.

¹²³ Distressed debt has sometimes been defined arbitrarily as bonds trading at spreads of 1,000 bps or more above government bonds. See Yago and Trimbath (2003).

¹²⁴ See Anson (2002) for a detailed discussion of leveraged buyouts and this type of opportunity.

Old equity claims may be wiped out in a reorganization, replaced by new shares issued to creditors, and sold to the public as the company emerges from reorganization. These shares may be shunned by investors and analysts and thus may be mispriced. Distressed securities may offer a fertile ground for experts in credit analysis, turnarounds, business valuation, and bankruptcy proceedings to earn returns based on their skill and experience.

A common theme in distressed securities investing is that it often demands access to specialist skills and deep experience in credit analysis and business valuation. Distressed companies are potentially near the end of their life as going concerns. The investor needs to assess not only potential outcomes for the company as a going concern but also the bare-bones liquidation value of the company. The investor needs to understand the sources of the company's problems, its core business, and its financing structure. A distressed securities fund's abilities in this regard are one element of due diligence.

For a private or institutional investor investing indirectly via a hedge fund or other vehicle, this type of investment inherits the liquidity characteristics specified in the structure of the vehicle. A discussion of the types of risk involved in distressed securities investing follows an overview of strategies in the next section.

8.3.2 Roles in the Portfolio

According to the 2015 Commonfund Benchmarks Study of US educational endowments, overall allocation to distressed debt among the institutions surveyed was 2% for the 2015 fiscal year.¹²⁵

From the perspective of the direct investor in distressed securities, there are a number of different strategies that may be adopted. As we discuss them, the reader should be aware that hedge fund and private equity businesses and benchmark vendors use a variety of classifications and that there are some differences in definitions. The aim here is to convey the gist of what the various approaches involve.

Long-Only Value Investing The simplest approach involves investing in perceived undervalued distressed securities in the expectation that they will rise in value as other investors see the distressed company's prospects improve. When the distressed securities are public debt, this approach is **high-yield investing**. When the securities are orphan equities, this approach is **orphan equities investing**.

Distressed Debt Arbitrage **Distressed debt arbitrage** (or distressed arbitrage) involves purchasing the traded bonds of bankrupt companies and selling the common equity short. The hedge fund manager attempts to buy the debt at steep discounts. If the company's prospects worsen, the value of the company's debt and equity should decline, but the hedge fund manager hopes that the equity, in which the fund has a short position, will decline to a greater degree. Indeed, as a residual claim, the value of equity may be wiped out. If the company's prospects improve, the portfolio manager hopes that the debt will appreciate at a higher rate than the equity because the initial benefits to a credit improvement accrue to bonds as the senior claim in the capital structure. Typically, the company will have already suspended any dividends, but debtholders will receive accrued interest. Distressed debt arbitrage has been popular with hedge funds.

Private Equity Private equity has also been called an "active" approach because it involves corporate activism. It has, in fact, a number of variations. The investor usually first becomes a major creditor of the target company to obtain influence on the board of directors or, if the company is already in reorganization or liquidation, on the creditor committee. The investor buys the debt at deep discounts, then influences and assists in

¹²⁵ See Commonfund, "2015 NACUBO-Commonfund Study of Endowments Results Released," press release (27 January 2016): <https://www.commonfund.org/2016/01/27/2015-nacubo-commonfund-study-of-endowments/>.

the recovery or reorganization process. The objective of this focused active involvement is to increase the value of the troubled company by deploying the company's assets more efficiently than in the past or by helping to gain access to markets that may be hard to penetrate. If the investor obtains new shares in the company as part of the reorganization, the investor hopes to sell them subsequently at a profit.

A variation of the active approach is converting distressed debt to private equity in a **prepackaged bankruptcy**.¹²⁶ This type of operation is typically conducted by private equity firms. The firm (or team of firms, because the capital commitment may be major) takes a dominant position in the distressed debt of a public company. Working with the company and other creditors, the firm seeks to arrange a prepackaged bankruptcy in which the firm becomes the majority owner of a private company on favorable terms (the previous public equityholders losing their complete stake in the company).¹²⁷ After restoring the company to better health, the firm has a company that can be sold to private or public investors. An example discussed by Anson (2002) is the conversion in 2001 of Loews Cineplex Entertainment Corporation from a public to a private company by two buyout firms. (The buyout firms sold their interest in 2004.) Loews subsequently merged with AMC Entertainment in 2005.

Distressed securities investors following an active approach will be proactive and aggressive in protecting and increasing the value of their claims.¹²⁸ Practitioners of the private equity approach are often referred to as “vulture” investors, and their funds, as “vulture funds” or “vulture capital.” Nevertheless, if the company is turned around, other parties and society at large may ultimately benefit, and the vultures are bearing risk that other investors presumably wish to transfer to them.

EXAMPLE 15

Turnaround Partners

Often, distressed securities investors solicit the help of experienced executives to manage the troubled companies. In the case of the WorldCom/MCI bankruptcy, one such investor was quoted in the *Wall Street Journal*—when the investor urged Michael D. Capellas, the former chairman and CEO of Compaq Corporation, to join Worldcom Inc.—as saying, “You run the business and we’ll run the bankruptcy process.”¹²⁹

Investors need to assess the risks that a particular distressed securities strategy may entail. Such strategies may be subject to one or more of the following risks:

- **Event risk.** Any number of unexpected company-specific or situation-specific risks may affect the prospects for a distressed securities investment. Because the event risk in this context is company or industry specific, it has a low correlation with the general stock market.

¹²⁶ The term “prepackaged bankruptcy” refers to the case in which the debtor seeks agreement from creditors on the terms of a reorganization before filing formally for a Chapter 11 reorganization. More details are given later in this reading.

¹²⁷ See Anson (2002). Another operation Anson discusses is private equity firms making a cash bid for the assets of a company in reorganization at a discount to perceived value.

¹²⁸ See Branch and Ray (2007).

¹²⁹ *Wall Street Journal* (16 April 2004).

- *Market liquidity risk.* Market liquidity in distressed securities is significantly less than in other securities, although the liquidity has improved. Also, market liquidity, dictated by the supply and demand for such securities, can be highly cyclical in nature. The lack of a liquid market is a major risk in distressed securities investing.
- *Market risk.* The economy, interest rates, and the state of equity markets are not as important as the liquidity risks.
- *J factor risk.* Barnhill, Maxwell, and Shenkman (1999) referred to the judge's track record in adjudicating bankruptcies and restructurings as "**J factor risk.**" The judge's involvement in the proceedings and the judgments will decide the outcome of investing in bankruptcy. Branch and Ray (2007) noted that the judge factor is also an important variable in determining which securities, debt or equity, of a Chapter 11–protected company to invest in.

Other risks may also be present. Some are associated with the legal proceedings of a reorganization: The actions of the trustees as well as the identity of creditors can affect the investment outcome. The distressed securities investor may lack information about the other investors and their motivations. Tax issues may arise in reorganizations.¹³⁰

A normality assumption is not appropriate in evaluating this class of strategies. It has become quite well known that the returns from a distressed securities strategy are not normally distributed (they have negative skewness and positive excess kurtosis); if a normal distribution is assumed, risk measurement tends to underestimate the likelihood of downside returns.

Distressed securities are illiquid and almost non-marketable at the time of purchase. If the companies turn around, the values of the distressed securities may go up gradually and liquidity may improve. Typically, it takes a relatively long time for this strategy to play out; thus, valuing the holdings may be a challenge. It is difficult to estimate the true market values of distressed securities, and stale pricing is almost inevitable. Recall that stale valuations make distressed securities appear less risky. Therefore, the risk of this strategy is probably understated and its Sharpe ratio overstated.

Whether a distressed securities investment will be successful or not depends on many factors. The outcome depends heavily on the legal process, which may take years. However, the vulture investor's time frame is often months, not years. The role played by vulture investors has a significant bearing on the outcome. If vulture investors do not participate in the restructuring, or if they decide to sell prior to the final settlement, the flood of shares into the market will create further downward pressure on the stock price. Such outcomes may have a significant impact on the whole industry. Because any move by vulture investors may be heeded by other investors, they take great care not to divulge their intentions.

Thus, investing in distressed securities/bankruptcies requires legal, operational, and financial analysis. From an investment perspective, the relevant analysis involves an evaluation of the source of distress. The source could be the company's operations, finances, or both. This analysis is a complex task, and each distressed situation requires a unique approach and solution. As a result, distressed securities investing requires careful company selection. In this reading, we focus on the legal aspects.

8.3.3 Other Issues

In this section, we describe the bankruptcy process, primarily in the United States, in order to highlight how the process may affect the investment outcome and the issues that investors need to consider.

¹³⁰ See Branch and Ray (2007) and Feder and Lagrange (2002) for more information.

Bankruptcy in the United States versus Other Countries¹³¹ For all practical purposes, the relevant legislation for distressed securities investment in the United States is the Bankruptcy Reform Act of 1978, which applies to all bankruptcies filed since 1 October 1979. Of particular interest to distressed securities investors are Chapters 7 and 11, which provide specific treatments for, respectively, liquidations and reorganizations.

Branch and Ray (2007) pointed out that a US Chapter 7 bankruptcy is *conceptually* similar to the bankruptcy procedures followed in most other countries. That is, when a person seeks protection under Chapter 7, that person's assets are collected and liquidated and the proceeds are distributed to creditors by an appointed bankruptcy trustee. The debtor is normally discharged of the debts that were incurred prior to bankruptcy. As in most other countries, under Chapter 7, rehabilitation of the debtor is not especially important. It is in this sense that Chapter 7 in the United States is conceptually similar to the procedures in other countries.

In contrast, Chapter 11 emphasizes rehabilitation of the debtor and provides an opportunity for the reorganization (restructuring) of the debtor. This provision is the distinctive feature of US bankruptcy law that separates it from that of most of the rest of the world (although a similar code exists in Canada called the Companies' Creditors Arrangement Act, or CCAA). Chapter 11 is where opportunity arises for distressed debt investors. In Chapter 11, the debtor (a business seeking relief and protection) retains control of its assets (which will immediately pass into a bankruptcy estate under the supervision of the court) and continues its operations. While under this protection, the debtor, now known as a "debtor-in-possession," seeks to pay off creditors (often at a discount) over a period of time according to a plan approved by the bankruptcy court. Some of the liabilities may be discharged. By filing Chapter 11, a debtor can protect its productive assets from being seized by creditors and gain time to plan the turnaround of the business.

A plan of reorganization is submitted to the court for approval. The plan is typically proposed by the debtor with the agreement of its creditors, especially the senior creditors. This plan details how much and over what period of time the creditors will be paid. Prospective distressed securities investors should pay attention to the exclusivity period. During this time, only the debtor can file a plan of reorganization. After the exclusivity period expires, any party with an interest in the bankruptcy can file a plan proposing how the estate's creditors are to be paid under Chapter 11. Creditors and shareholders of the debtor eventually must approve the plan and have it confirmed by the bankruptcy judge. The judge can overrule some dissenting creditors, however, on economic grounds or for other considerations, such as social or legal reasons. Such an action of overruling is commonly referred to as the "cram-down." Thus, a cram-down is basically a court-ordered arrangement between the debtor and certain classes of creditors when those parties cannot come to an agreement on the reorganization plan; a cram-down may result in losses for certain creditors.

In this way, an approved reorganization plan created by the court of law may be costly to distressed securities investing. The uncertain nature of the outcome of legal proceedings makes analysis of such investment challenging, and the analysis must be accompanied by extensive due diligence.¹³²

¹³¹ We do not intend to provide a complete treatment of the bankruptcy process; rather, we offer an overview of the process so that investors can recognize the complexities involved and make intelligent investment decisions without being confused by the legal technicalities. For a detailed treatment, see Branch and Ray (2007).

¹³² According to Branch and Ray (2007), only one out of eight companies that file for Chapter 11 is able to reorganize successfully in the United States.

Absolute Priority Rule In many jurisdictions, a reorganization or liquidation plan must follow the rule of priority with respect to the order of claims by the debtor's security holders. In general, claims from senior secured debtholders (typically, bank loans) will be satisfied first. The debtor's bondholders come next. The distribution may be split between senior and subordinated bondholders. Last on the list are the debtor's shareholders.

Relationship between Chapter 7 and Chapter 11 Why must distressed securities investors pay attention to Chapter 7 filings? Chapter 11 reorganization can start from a Chapter 7 filing, whether voluntarily or involuntarily. A debtor against whom an involuntary Chapter 7 is filed has a right to convert the case to a Chapter 11 proceeding. Similarly, a Chapter 7 debtor that filed a voluntary petition can convert the case to a Chapter 11, unless the case started as a Chapter 11. In addition, the court can convert a Chapter 11 case to Chapter 7 or dismiss the case for cause (e.g., the inability of the debtor to carry out a plan) at any point in the proceedings. The latter uncertainty adds much risk to bankruptcy investing.

Prepackaged Bankruptcy Filing In a prepackaged bankruptcy filing, the debtor agrees in advance with its creditors on a plan or reorganization before it formally files for protection under Chapter 11. Creditors usually agree to make concessions in return for equity in the reorganized company. This arrangement is tantamount to obtaining advance approval of an exchange offer of public debt with less stringent requirements than those found in the public indenture. In this way, a debtor expedites the bankruptcy process to emerge as a new organization.

EXAMPLE 16

Distressed Securities Investing

Gloria Richardson is CIO of a multi-billion-dollar home office for the Nelson family. She is discussing the revision of the governing investment policy statement to permit the investment in distressed securities. Susan Nelson represents the family in policy matters.

Nelson states: "Distressed securities sound like a very high-risk investment strategy because the strategy focuses on companies in bankruptcy. Is that why few investors choose to invest in distressed securities? What are the origins of distressed securities, and how are investors involved? Who researches these situations?"

- 1 Discuss the suitability of investing in distressed securities for buy-side (institutional) investors, and evaluate the participation of sell-side analysts in researching distressed securities.

Nelson is still concerned about the downside risk of investing in distressed securities. Nelson states: "I'm a patient investor, and I want our family's philanthropic contributions to extend into perpetuity, but it seems that the strategy of investing in distressed securities has higher risk in every aspect than investing in traditional equities and bonds."

- 2 Judge the suitability of investing in distressed securities for the home office. Justify your response with reference to time horizon and Nelson's statement regarding risk.

Solution to 1:

Some buy-side investors, such as pension plans, are unable or unwilling to hold below-investment-grade securities because of the securities' relatively high risk in comparison with other asset classes. However, results suggest that institutional investors with higher risk tolerances and long time horizons may receive stable returns from distressed securities with relatively low risk in the long run.

As a result of the inability of some institutional investors to allocate funds to distressed securities, few sell-side analysts cover this area of the market. Given this limited following of distressed securities, undercovered and undervalued market opportunities exist that knowledgeable investors can exploit to earn high returns.

Solution to 2:

Given Nelson's statement, investing in distressed securities could provide a potentially attractive strategy for the family's home office. Because the investment time horizon is long, there should be no inherent obstacle regarding the amount of time it may take for a distressed securities investment to pay off. Additionally, Nelson is incorrect in stating that distressed securities are riskier than traditional asset classes in all respects. Although long-term distressed securities investments show negative monthly returns for 20% of all months studied, the maximum 1-month and 12-month drawdowns are smaller for distressed securities than for US and world equities and bonds. If Nelson understands and accepts these risks, such investments may be appropriate.

SUMMARY

Alternative investments have become a significant portion of the portfolios of both individual and institutional investors. This reading presented six groups of alternative investments: real estate, private equity, commodities, hedge funds, managed futures, and distressed securities.

- Common features of alternative investments include relative illiquidity, which tends to be associated with a return premium as compensation; diversifying potential relative to a portfolio of stocks and bonds; high due diligence costs; and the difficulty of performance evaluation.
- Due diligence for alternative investment selection should cover market opportunity, investment process, organization, people, terms and structure, service providers, documents, and write-up.
- Special concerns for advisers to private wealth clients include tax issues, suitability, communication with the client, decision risk (the risk of changing strategies at the point of maximum loss), and potentially concentrated equity positions of the client in a closely held company.
- The physical real estate market is characterized by a relative lack of liquidity, large lot size, and high transaction costs.
- Real estate investments can be viewed in terms of direct ownership and indirect ownership. Direct ownership includes investment in residences, business real estate, and agricultural land. Indirect ownership includes investment in vehicles such as REITs.

- Advantages to real estate investment include tax benefits, the use of leverage, control over property, diversification, potential as an inflation hedge, and low volatility of returns.
- Disadvantages to real estate investment include the inability to subdivide real estate investments, high information costs, high commissions, maintenance and operating costs, location risk, and political risk related to tax deductions.
- Private equity investments are highly illiquid, and investors must be willing to hold these securities for long periods.
- Private equity investments include start-up companies, middle-market private companies, and private investment in public entities.
- Private equity investors include angel investors, venture capitalists, and larger companies in the same industry.
- There are two broad approaches to investing in commodities: direct and indirect. Direct commodity investment entails purchasing the physical commodities or using derivatives with direct exposure to changes in spot prices. In contrast, indirect investment in commodities involves the acquisition of indirect claims on commodities.
- The inflation-hedging ability of commodity investing appears to vary according to the commodity.
- Hedge funds are skill-based investment strategies in various forms, including limited partnerships. The funds use various investment strategies and thus are often classified according to investment style. Within each style category, hedge funds are classified according to the underlying markets traded or the unique trading style—for example, relative value, event driven, hedged equity, and global macro.
- Within each style classification, there are a number of subgroups. For instance, within the hedge fund relative value style classification, subgroups include market-neutral long–short equity, convertible hedging, and fixed-income arbitrage (or bond hedging).
- Hedge funds can provide both return and diversification benefits, but the risks are not usually well represented by standard deviation.
- Managed futures are actively managed investment vehicles that share many features of hedge funds (e.g., compensation arrangements). However, managed futures programs primarily trade futures and option contracts, whereas hedge funds typically are more active in cash markets.
- Managed futures programs include systematic trading strategies (based on trading rules applied to price data and often managed and traded by computers) and discretionary trading strategies (which incorporate manager judgment and fundamental data considerations).
- Distressed securities are securities of companies that are in financial distress or near bankruptcy. The securities could be equity, debt, trade claims, or other claims.
- Distressed securities investment exploits the fact that many investors are unable to hold below-investment-grade securities. Furthermore, few analysts cover the distressed securities market.
- Risks of distressed securities investing include event risk, J (for “judge”) factor risk, liquidity risk, market risk, and other risks.

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PRACTICE PROBLEMS

- 1 Compare the relative liquidity characteristics of direct versus indirect investment in real estate. Discuss three factors that affect the liquidity of both forms of investment.

The following information relates to Questions 2–3

Real Estate Performance 1990–2004¹

Measure	NAREIT Index	NAREIT Index Hedged	NCREIF Index	NCREIF Index Unsmoothed	S&P 500	Bloomberg Barclays Aggregate Bond Index
Annualized return	12.71%	8.96%	6.14%	7.27%	10.94%	7.70%
Annualized std. dev.	12.74%	11.93%	3.37%	8.95%	14.65%	3.91%
Sharpe ratio	0.66	0.39	0.55	0.33	0.45	0.87
Minimum quarterly return	−14.19%	−10.16%	−5.33%	−18.55%	−17.28%	−2.87%
Correlation w/NAREIT	1.00	0.94	−0.001	0.21	0.35	0.18
Correlation w/NAREIT hedged	0.94	1.00	0.00	0.24	0.00	0.14
Correlation w/NCREIF	0.00	0.00	1.00	0.71	0.01	−0.18
Correlation w/NCREIF unsmoothed	0.21	0.24	0.71	1.00	−0.01	−0.27

Source: CISDM (2005a).

- 2 **A** Summarize the major categories of direct and indirect investment in real estate.
- B** Using the data in the table, evaluate the historical relative diversification benefits of both forms of investment when added to a 50 percent stock/50 percent bond portfolio. Use the NCREIF Index unsmoothed to represent direct investment and the NAREIT Index to represent indirect investment.
- 3 The board trustees of Elite Corporation's US\$50 million pension fund are meeting to discuss a presentation they recently received from their pension consultant, who is recommending that they diversify their current 50/50 stock/bond asset allocation to include a 10 percent allocation to real estate. Although the trustees would like to reduce portfolio risk without sacrificing a significant amount of return, the trustees have previously been reluctant to change the asset allocation because they are concerned about "making a mistake we can't easily fix" if the economic environment changes.

¹ As of the implied date of the question, what are now known as the Bloomberg Barclays bond series in this and other questions were known under the name of Lehman.

One trustee, Maya Semyonova, makes reference to the table above and some notes that provide an overview of how the various indexes are constructed. Semyonova states: “To address our stated risk and return objectives and given the superior historical benefits of direct investing in real estate, represented by the unsmoothed NCREIF Index, I recommend that we reallocate 10 percent from our bond investments indexed to the Bloomberg Barclays Aggregate to a direct real estate asset.”

A second trustee, John Pearson, responds with a different recommendation: “I believe we should reallocate 10 percent from the 50 percent S&P 500 allocation to REITs to achieve our goals.”

- A** Critique Semyonova’s recommendation with reference to the return, risk, diversification, and liquidity characteristics of the two asset classes that Semyonova is referring to.
- B** Critique Pearson’s recommendation with reference to the return, risk, diversification, and liquidity characteristics of the two asset classes that Pearson is referring to.
- C** Of the reallocation scenarios suggested by Semyonova and Pearson, choose the one most appropriate for Elite Corporation’s pension fund based on the trustees’ objectives. Justify your choice with reference to returns, risks, and issues concerning construction of real estate and REIT indexes.

- 4** Capital market analysts John Lake and Julie McCoy are reviewing the information in the following table.

Commodity Index Performance 1990–2004

Measure	GSCI	S&P 500	Bloomberg Barclays Gov./ Credit Bond	MSCI World Equity	Bloomberg Barclays Global Bond
Annualized return	7.08%	10.94%	7.77%	7.08%	8.08%
Annualized std. dev.	19.26%	14.65%	4.46%	14.62%	5.23%
Sharpe ratio	0.15	0.45	0.78	0.19	0.72
Minimum monthly return	−14.41%	−14.46%	−4.19%	−13.32%	−3.66%
Correlation with GSCI	1.00	−0.08	0.03	−0.06	0.06

Source: CISDM (2005b).

Lake and McCoy note that the Sharpe ratio for the GSCI is significantly lower than that of the S&P 500 and the Bloomberg Barclays Government/Corporate Bond indexes. They also note that the minimum monthly returns for the GSCI and S&P 500 are similar.

Lake states to McCoy: “Based on the historical record, I don’t understand why we would invest in the GSCI when the annualized return for the GSCI is lower than that of the S&P 500 and Bloomberg Barclays Government/Corporate indexes, the minimum monthly return is similar to that of the S&P 500, and the Sharpe ratio is significantly lower than either of the domestic equity or bond asset classes. The risk measure in the Sharpe ratio should completely capture a commodity index’s risk.”

- A** Critique Lake’s statement.

McCoy shows Lake the table below and suggests that these more recent data, which show a significant outperformance of commodity returns versus domestic and international equities and bonds, make a much stronger case for investing in commodities. McCoy also states that the low correlations of commodities with the other asset classes indicate that inclusion of commodities will provide significant diversification benefits to the portfolio.

Recent Commodity Index Performance 2000–2004

Measure	GSCI	S&P 500	Bloomberg Barclays Gov./ Credit Bond	MSCI World Equity	Bloomberg Barclays Global Bond
Annualized return	13.77%	−2.30%	8.00%	−2.05%	8.47%
Annualized std. dev.	22.10%	16.35%	4.76%	15.62%	6.02%
Sharpe ratio	0.50	−0.31	1.11	−0.30	0.96
Minimum monthly return	−14.41%	−10.87%	−4.19%	−10.98%	−3.66%
Correlation with GSCI	1.00	−0.05	0.05	0.00	0.10

Source: CISDM (2005b).

- B** Judge the validity of McCoy's conclusions regarding returns and correlations of the various asset classes.
- 5** Explain the practical effects of the following possible characteristics of a hedge fund index:
- A** survivorship bias.
 - B** value weighting.
 - C** stale price bias.
- 6** Ian Parkinson, as chief pension officer of a large defined-benefit plan, is considering presenting a recommendation that the pension plan make its first investments in three different types of hedge funds: 1) market neutral, 2) convertible arbitrage, and 3) global macro.

An analyst who works for Parkinson comes by with the table given below and makes the following comment: "The returns for global macro are very impressive. In fact, there are other strategies that have significantly outperformed the S&P 500, equity market-neutral, and convertible arbitrage over the past 15 years. I think that, based on their returns, we should focus specifically on the other strategies."

Performance of Hedge Fund Strategies and Traditional Assets 1990–2004

Fund or Asset	Annual Return (%)	Annual Standard Deviation (%)	Sharpe Ratio	Minimum Monthly Return (%)	Correlation with S&P 500	Correlation with Bloomberg Barclays Gov./ Credit Bond
HFCI	13.46	5.71	1.61	6.92	0.59	0.17
Event driven	13.46	5.59	1.64	−9.37	0.59	0.07
Equity hedge	15.90	9.34	1.24	−9.70	0.64	0.10
Equity market neutral	9.24	2.50	1.98	−1.07	0.09	0.24

(Continued)

Fund or Asset	Annual Return (%)	Annual Standard Deviation (%)	Sharpe Ratio	Minimum Monthly Return (%)	Correlation with S&P 500	Correlation with Bloomberg Barclays Gov./ Credit Bond
Merger/risk arbitrage	9.07	4.86	0.99	−8.78	0.48	0.10
Distressed	15.28	6.07	1.81	−9.71	0.42	0.04
Fixed-income arbitrage	7.62	3.61	0.92	−6.61	0.06	−0.06
Convertible arbitrage	10.23	3.96	1.50	−3.42	0.19	0.13
Global macro	16.98	8.38	1.51	−5.41	0.26	0.34
Short selling	−0.61	19.39	−0.25	−14.62	−0.76	−0.01
S&P 500	10.94	14.65	0.45	−14.46	1.00	0.13
Bloomberg Barclays Gov./ Credit Bond	7.77	4.46	0.78	−4.19	0.13	1.00
MSCI World	7.08	14.62	0.19	−13.32	0.86	0.09
Bloomberg Barclays Global Bond	8.09	5.23	0.73	−3.66	0.11	0.74

Note: HFCI is the Hedge Fund Composite Index and was constructed by equally weighting the EACM 100, the HFR Fund Weighted Composite Index, and Credit Suisse/Tremont Hedge Fund Index.

Source: CISDM (2005c).

- A** Describe the three alternative strategies that Parkinson is considering, and evaluate each with respect to their level of market risk and credit risk. Interpret their correlations with the S&P 500 and the Bloomberg Barclays Government/Corporate Bond indexes as presented in the table above.
- B** Critique the analyst's statement.
- 7** Interpret a "1 and 20" fee structure with reference to high-water marks and drawdowns.
- 8** Susan DiMarco is evaluating a hedge fund that has a high level of portfolio turnover and a short investment record. The hedge fund makes a contractual stipulation with limited partners regarding a lock-up period that is quite common in the hedge fund industry. A colleague, Jane Farkas, who has reviewed the fund, makes the following statement to DiMarco: "Well, if we're unhappy with performance, we can always fire the hedge fund manager. If they trade frequently, as indicated by their high portfolio turnover, our investment must have high liquidity." Judge the validity of Farkas's statement.
- 9** Jane Farkas tells Susan DiMarco that she has seen exciting data on the performance of market-neutral, convertible arbitrage, and global macro hedge funds. Farkas states: "The Sharpe ratios of all of these hedge fund strategies are much higher than for traditional equities or bonds, which means they have a great risk/return profile. We should definitely plan a major investment in hedge funds."
- DiMarco responds: "There are several reasons that the Sharpe ratio may be misleading."

- A** Discuss the situations that could cause an upward bias in the calculation of the Sharpe ratio.
- B** Evaluate the reasons that statistically indicate that the Sharpe ratio is not the most appropriate measure of risk for hedge funds.

The following information relates to Questions 10–11

Monthly Returns of a Hedge Fund and an Index

Month	Hedge Fund Returns (%)	Index Returns (%)
January	3.50	−2.40
February	4.00	−4.00
March	−2.00	−1.60
April	−2.00	3.00
May	−1.00	−4.20
June	0.90	2.00
July	−1.00	2.50
August	1.70	−2.10
September	2.70	−2.00
October	3.70	0.50
November	0.40	3.10
December	−3.20	0.20

- 10 A** Calculate the average rolling returns for the hedge fund if the investor's investment horizon is nine months.
 - B** Explain how rolling returns can provide additional information about the hedge fund's performance.
 - 11 A** Compute the annualized downside deviations for the hedge fund and the index, and contrast them to the standard deviation. The annualized standard deviations for the hedge fund and the index are, respectively, 8.64 percent and 9.19 percent. Assume a hurdle rate of 5% per year.
 - B** Compute the Sortino ratio and, based on this statistic, evaluate the performance of the hedge fund against the performance of the index portfolio.
-
- 12** Andrew Cassano, CIO of a large charitable organization, is meeting with his senior analyst, Lori Wood, to discuss managed futures. Cassano believes that it would be beneficial to evaluate this alternative investment category before making a final decision with respect to hedge fund investment.
- Wood states: "Although managed futures are sometimes considered a subset of hedge funds, there are some differences that make them worthy of consideration."

- A Determine which absolute-return hedge fund strategy to which managed futures are mostly closely related (i.e., managed futures are often considered a subgroup of this hedge fund strategy).
 - B Briefly discuss a primary similarity and a primary difference between managed futures and many other hedge fund strategies.
 - C Contrast the characteristics of two managed futures styles: systematic and discretionary.
- 13 Cassano asks: “If managed futures strategies are often momentum based, how do they achieve excess returns differently from traditional stock or bond investment vehicles?” Formulate an answer to Cassano’s question.
 - 14 List and discuss the sources of return available to managed futures programs through the use of derivative trading strategies.
 - 15 Contrast “fallen angels” to high-yield debt.
 - 16 Evaluate the role of investors in both the private equity and relative-value strategies—specifically, with respect to investing in distressed securities.
 - 17 Formulate a description of the results of a prepackaged bankruptcy with reference to a) “prebankruptcy” creditors of the company, b) “prebankruptcy” shareholders, and c) vulture investors.
 - 18 Critique the following statement: “When the economy has been faltering and may be going into recession, it is typically a good time to invest in distressed securities.”

The following information relates to Questions 19–24

Franciszek Magerski is a portfolio manager who specializes in alternative investments. He recently joined Harman, Klyde, and Palson (HKP), private wealth managers. Although he has managed institutional portfolios, Magerski has no experience with private wealth clients. A partner at HKP tells Magerski: “Alternative investing and due diligence for private wealth clients is similar to that for institutional clients. Private clients have the same issues of time horizon, but different liquidity needs.”

Magerski is assigned to modify a portfolio having a current allocation of 50 percent equity and 50 percent fixed income. The equity portion consists of common stocks from the S&P 500 and is benchmarked to that index. The fixed-income portion consists of high-grade US corporate bonds and US Treasury securities and closely tracks the Bloomberg Barclays Aggregate Bond Index.

Magerski intends to improve the risk-return profile of the portfolio by including alternative investments. Some recent characteristics of equities, fixed-income securities, US treasury bills, and four potential alternative asset classes are shown in Exhibit 1. Magerski will use the Sharpe ratio to initially select three alternative investments for the portfolio.

Exhibit 1 Characteristics of Asset Classes

Asset Class	Annual Return (%)	Standard Deviation of Returns (%)	Correlation with US Stocks	Correlation with US Bonds
US Common Stocks	11.0	15.0	1.00	0.12
US Bonds	7.5	4.0	0.12	1.00

(continued)

Exhibit 1 (Continued)

Asset Class	Annual Return (%)	Standard Deviation of Returns (%)	Correlation with US Stocks	Correlation with US Bonds
Real Estate–NCREIF–unsmoothed	8.0	9.0	−0.01	−0.27
Hedge Funds–market neutral	6.0	2.5	0.09	0.21
Commodities–GSCI	7.0	19.0	−0.06	0.04
Private Equity	20.0	22.0	0.50	0.30
US Treasury Bills	3.5	—	—	—

Although the new equity and fixed-income allocation will form the passive core of the portfolio, the alternative segment allows for active management, alpha generation, and additional diversification benefits. Magerski's associate, Julio Chavez, states that diversification is improved by adding real estate to an equity/fixed-income portfolio and points to the correlations between real estate and bonds and stocks as shown in Exhibit 1. Magerski expresses some concern with the real estate data because it refers to the NCREIF–unsmoothed index. Chavez states that the unsmoothed index provides a better indication of the benefits of real estate investment than the NCREIF (smoothed) Index.

Chavez also mentions that because the Sharpe ratios for hedge funds are generally higher than for traditional equities or bonds, a substantial allocation should be made to hedge funds. Magerski disagrees with Chavez and responds that the Sharpe ratio for a hedge fund may be biased and not always an appropriate performance measure for risk-adjusted return.

Magerski also tells Chavez there are several issues to consider when selecting hedge fund investments, including fee structure and liquidity. The hedge fund under consideration is an equity market-neutral fund with a fee structure consisting of a 2 percent management fee and a 15 percent incentive fee. The fund's initial amount of assets under management and the initial high-water mark are \$100 million. When performance fees are paid, the incentive fee will, as is the standard industry practice, apply to the entire amount under management. Also, the lock-up period is five years and the long period is very beneficial to private wealth investors in the fund.

Magerski has received a research report recommending a large commodity allocation to manage portfolio risk and serve as an inflation hedge. The report notes, however, that some commodities are not effective as inflation hedges. Magerski is considering following this recommendation and continues reading the report so as to better understand which specific commodities would serve as the best inflation hedge.

- 19 Is the HKP partner's statement regarding differences between private clients and institutional clients correct?
 - A Yes.
 - B No, because their time horizon issues are different.
 - C No, because their liquidity needs are not different.
- 20 Using the Sharpe ratio, which of the following alternative investments has the *most* beneficial risk profile?
 - A Real Estate.
 - B Hedge Funds.
 - C Private Equity.
- 21 Chavez's preference for the unsmoothed version of the NCREIF Index instead of the smoothed version is most likely because the:

- A smoothed version includes the effect of leverage on returns.
 - B smoothed version is based on actual unreliable market values.
 - C bias arising from infrequent appraisals is corrected in the unsmoothed version.
- 22 Magerski's concern about a biased Sharpe ratio for hedge funds is most likely because:
- A eliminating extreme returns reduces the standard deviation of returns.
 - B smoothing returns can overstate true gains and losses and calculated volatility.
 - C lengthening the measurement interval from weekly data to monthly data increases the estimate of annualized standard deviation of returns.
- 23 Is Magerski's statement regarding the hedge fund incentive fee and the benefit of the lock-up period correct?
- A No regarding both the incentive fee and the lock-up period.
 - B No regarding the incentive fee, and yes regarding the lock-up period.
 - C Yes regarding the incentive fee, and no regarding the lock-up period.
- 24 The report's comment about some commodities being ineffective as inflation hedges most likely relates to:
- A livestock.
 - B changes, rather than levels, of inflation.
 - C storable commodities directly related to the level of economic activity.
-

The following information relates to Questions 25–29

The board of trustees of Cochran Corporation's US\$150 million pension fund is meeting with a consultant, Ferdinand Clyburn. They plan to discuss altering the fund's current asset allocation of 50 percent equity and 50 percent bonds to include investments such as real estate, private equity, and commodities. The portfolio is currently invested in funds indexed to the S&P 500 Index and the Bloomberg Barclays US Aggregate Index. The board gives Clyburn the following investment policy mandate:

Select an asset allocation that will increase the expected return on the portfolio without reducing liquidity.

Before Clyburn's presentation begins, Esme Howard, a trustee, asks the following question:

"What are the return-distribution characteristics associated with alternative investment strategies that reduce downside risk?"

Clyburn begins his presentation with a discussion of real estate investing. He states that if the board decides to invest *directly* in real estate, then the optimal asset allocation should be based on either the National Council of Real Estate Investment Fiduciaries (NCREIF) Index (without correction) or the NCREIF Index (unsmoothed). He recommends the NCREIF (unsmoothed) because the NCREIF (without correction) historically suffers from a bias.

He further states that if the board decides to invest *indirectly* in real estate, the optimal asset allocation should be based on the National Association of Real Estate Investment Trusts (NAREIT) Index.

Based on the expected return data in Exhibit 1, Clyburn provides the board with alternative asset allocation strategies that include real estate. The potential asset allocations under consideration are displayed in Exhibit 2.

Exhibit 1 Expected Returns for Selected Indexes

Asset Class	Expected Annualized Return (%)
NAREIT Index	9.87
NCREIF Index (unsmoothed)	9.90
S&P 500 Index	11.16
Bloomberg Barclays US Aggregate Index	7.70

Exhibit 2 Asset Allocation Strategies That Include Real Estate

Allocation Strategy	Stock Allocation (%)	Bond Allocation (%)	Real Estate Allocation
Strategy 1	40	50	10% invested in the NAREIT Index
Strategy 2	40	40	20% invested in the NAREIT Index
Strategy 3	40	40	20% invested directly based on the NCREIF Index (unsmoothed)

Clyburn then provides an overview of private equity investing, with a primary focus on venture capital and buyout funds. In response to the presentation, trustee Rex Bolger asks the following question for clarification:

Bolger question #1 “What are the common features of private equity investing?”

Finally, Clyburn reviews the implications of investing in commodities on the risk-return profile of the pension fund’s portfolio. He states that a major reason for including commodities in a portfolio is to provide protection against unexpected inflation. Bolger then asks another question:

Bolger question #2 “Historically, have all types of commodity investments been equally effective in protecting a portfolio against inflation?”

25 Which of the following is the *most* appropriate response to Howard’s question?

- A Positive skewness and low kurtosis.
- B Positive skewness and high kurtosis.
- C Negative skewness and high kurtosis.

26 The real estate index bias indicated by Clyburn is *most likely* an:

- A overestimation of the return volatility.
- B underestimation of the return volatility.
- C overweighting of residential real estate.

- 27 Given the board's investment policy mandate and Exhibits 1 and 2, the *most* appropriate asset allocation is:
- A Strategy 1.
 - B Strategy 2.
 - C Strategy 3.
- 28 Which of the following is the *least* appropriate response to Bolger's first question?
- A High due diligence costs.
 - B Limited diversification potential.
 - C Complexity of valuation and assessment.
- 29 Which of the following is the *most* appropriate response to Bolger's second question?
- A Yes.
 - B No, indirect commodity investments have been the most effective.
 - C No, direct commodity investments that are related to the intensity of economic activity have been the most effective.
-

The following information relates to Questions 30–35

Guy Northrup is an investment advisor with Stoneford Partners, a private wealth management firm. The advisors at Stoneford Partners are considering adding several hedge funds to their investment list. Northrup and his colleague, Sasha Slate, meet with their supervisor to discuss hedge fund investing.

Hedge Fund Characteristics

During the meeting Northrup comments: "Although fund of funds have lock-up periods similar to other hedge funds, investors in fund of funds typically pay lower fees overall."

Northrup reviews information about a hedge fund, Peeble Creek. Northrup notes they have \$400 million under management and a 1.5 plus 20 fee structure without a high-water mark provision. Slate explains that a high-water mark caps the annual fee to the fund manager.

Performance Evaluation

The group's discussion changes to focus on evaluating the performance of hedge funds. During the discussion Northrup makes two observations:

- Observation 1 As top-performing funds grow from new inflows and poorly performing funds close, value weighting the components of a hedge fund index will cause an index to have return characteristics similar to those of its best-performing funds over a given time period.
- Observation 2 Transaction costs do not affect the ability to rebalance an investable, equally weighted hedge fund index.

The supervisor comments that the presence of some attributes may indicate the manager is trying to “game” the hedge fund’s Sharpe ratio. Northrup notes the following changes in investment and reporting attributes for three hedge funds shown in Exhibit 1.

Exhibit 1 Three Hedge Funds and Attributes That May Affect Sharpe Ratio

Attributes	Fund A	Fund B	Fund C
Change in the length of measurement interval	From monthly to quarterly	From monthly to quarterly	From quarterly to monthly
Percent of assets subject to stale pricing	Increase from 5% to 10%	Decrease from 10% to 5%	Increase from 5% to 10%
Option trading	Write out-of-money calls	Buy out-of-money calls	Write in-the-money calls

Managed Futures

After the meeting, Northrup tells his supervisor that the firm should consider managed futures as a diversification tool for client portfolios. His supervisor replies: “That may be a good idea because there are possibilities to earn positive excess returns using managed futures:

- First, hedgers may pay a risk premium to liquidity providers, such as Commodity Trading Advisors (CTA), for the insurance that the hedgers obtain.
- Second, CTAs are more likely to be able to conduct profitable arbitrage trades between stock, bond, futures, options, and cash markets because of differential carrying costs between investors.”

- 30 Are Northrup’s comments about fund of funds’ lock-up periods and lower fees *most likely* correct?
- A No.
- B Yes, for lower fees only.
- C Yes, for lock-up periods only.
- 31 Which of the following *best* describes Peeble Creek’s fee structure? Peeble Creek receives:
- A a one-time fee of 1.5 percent of the investor’s commitment and receives 20 percent of annual profits.
- B an annual compensation of 1.5 percent of the fund’s assets and an additional 20 percent of the fund’s annual profits.
- C an annual compensation of 1.5 percent of the investor’s commitment and an additional 20 percent of the fund’s cumulative returns at portfolio liquidation.
- 32 Is Slate’s explanation about high-water marks correct?
- A Yes.
- B No, because the high-water mark provides a minimum fee to the manager.
- C No, because the high-water mark determines if this period’s incentive fee is paid.
- 33 Are Northrup’s observations about value weighting and transaction costs for hedge funds indexes correct?

- A No.
 - B Yes, for value weighting only.
 - C Yes, for transaction costs only.
- 34 Which of the hedge funds in Exhibit 1 has attributes that provide the greatest opportunity to game its Sharpe ratio?
- A Fund A.
 - B Fund B.
 - C Fund C.
- 35 Are both of the supervisors' explanations of excess returns in managed futures investing correct?
- A Yes.
 - B No, only the first statement is correct because differential carrying costs do not exist between CTAs and other investors.
 - C No, only the second statement is correct because CTAs, seeking liquidity, pay a premium to hedgers.
-

The following information relates to Questions 36–41

The University Endowment Fund is considering making an investment in hedge funds. Its investment committee is meeting to decide which of the following four hedge funds should be selected:

- COE Fund, a “fund of funds;”
- Savior Capital, an “equity market neutral” fund;
- Alphameric Advisors, a “distressed debt arbitrage” fund;
- MarketView LLC, a “long-only value investing in distressed securities” fund.

During the meeting, committee members made the following statements:

- Statement 1 “The Sharpe ratio is not the best performance measure for hedge funds because it is based on the assumption of normality of returns.”
- Statement 2 “Alphameric Advisors’ investment style involves selling the traded debt of the distressed company under consideration, and buying the debt of non-distressed companies.”
- Statement 3 “It is better to use an equally weighted hedge fund index to reflect the potential diversification of hedge funds rather than a value-weighted index. This is because value weighting may result in the index taking on the return characteristics of the best-performing hedge funds, creating a momentum effect in returns.”
- Statement 4 “The Sortino ratio is the best means to examine the consistency of hedge fund returns.”

One of the investment committee members noted that MarketView LLC has a “2 and 20 fee structure with a high-water mark provision,” and wondered what that meant.

- 36 Given the hedge funds’ investment styles, which of the following is *most likely* to display negative skewness and high kurtosis in its investment returns?

- A Savior Capital.
 - B MarketView LLC.
 - C Alphameric Advisors.
- 37 Given the hedge funds' investment styles, which of the following would be *most likely* to reduce the beta of the endowment fund's equity portfolio if the hedge fund investment replaces average-beta equity assets?
- A COE Fund.
 - B Savior Capital.
 - C MarketView LLC.
- 38 Statement 1 is:
- A correct.
 - B incorrect, because the Sharpe ratio accommodates a skewed distribution.
 - C incorrect, because the Sharpe ratio takes into account distributions with high kurtosis.
- 39 Statement 2 is:
- A correct.
 - B incorrect, because this investment style involves a long position in the distressed company's traded debt and a short position in its equity.
 - C incorrect, because this investment style involves a long position in the distressed company's traded debt and a short position in non-distressed companies' debt.
- 40 Statement 3 is:
- A correct.
 - B incorrect, because the higher survivorship bias of an equally weighted index will lead it to understate historical returns.
 - C incorrect, because changes in the index's composition tend to affect an equally weighted index less than a value-weighted index.
- 41 Statement 4 is:
- A correct.
 - B incorrect, because it would be better to use rolling returns.
 - C incorrect, because it would be better to use the downside deviation.

SOLUTIONS

- 1 Direct (physical) investments in real estate tend to be much less liquid than investments in REITs (which are indirect investments). Reasons for the illiquidity of direct investments include the following:
 - The large transaction sizes when buying/selling commercial/industrial buildings and land or residential apartment buildings is in contrast to the flexibility of trading small amounts in REITs on public exchanges.
 - The lack of availability and timeliness of information with respect to direct real estate investment results in extensive valuation and due diligence issues, whereas REITs are exchange traded in real time on a daily basis, and information about them is readily available and accessible.
 - The high transaction costs of direct investments in terms of broker commissions and the financing costs of buying physical assets require long-term investment horizons. Exchange-traded REITs have low transaction costs, and reallocation of funds is easy.
- 2 **A** Direct investment in real estate includes individual residences, agricultural land, and commercial real estate. The category of commercial real estate can be subdivided into industrial, office, retail, and apartment complexes. Indirect investment is achieved via REITs, which can be subdivided into equity, mortgage, and hybrid (a combination of first two) investment trusts.

B Using the unsmoothed NCREIF Index as a benchmark for direct investment in commercial real estate indicates that the long-term (1990–2004) correlation of direct real estate investment with the S&P 500 is slightly negative; the correlation of direct real estate investment with bonds (the Bloomberg Barclays Aggregate Bond Index) is significantly negative, indicating that adding physical real estate to a 50 percent stock/50 percent bond portfolio would have provided very substantial diversification benefits.

The correlations of the NAREIT Index with both the S&P 500 and bonds were both moderately positive for the period examined. This fact indicates that indirect investment in real estate had diversification benefits relative to a 50/50 stock bond portfolio, but that the diversification benefits were not as large as those resulting from direct real estate investment.
- 3 **A** Semyonova's recommendation can be critiqued along the following dimensions:
 - *Return:* The long-term returns for bonds and direct investment in real estate (unsmoothed NCREIF) are similar (7.70 percent and 7.27 percent); therefore, reallocating 10 percent of bond investments to direct real estate investment would not sacrifice much return.
 - *Risk:* a) The standard deviation for the unsmoothed NCREIF Index is more than twice that for the Bloomberg Barclays Aggregate; therefore, this reallocation does not reduce risk as measured by standard deviation. b) Downside volatility, as represented in this table by the minimum quarterly return, is much greater for real estate than for bonds. c) The NCREIF Index is a compilation of many types of real estate, whereas the trustees would have to choose a specific asset, possibly incurring higher risk than indicated by the NCREIF data.
 - *Diversification:* The correlation between the Bloomberg Barclays Aggregate and the unsmoothed NCREIF Index is significantly negative, which would indicate good potential for diversification.

- *Liquidity:* Investment in physical real estate is the least liquid of the asset classes shown in the table. A transaction could probably not be reversed quickly or easily.
- B** Pearson's recommendations can be criticized along the following dimensions:
- *Return:* The unhedged return of REITs is almost 2 percentage points greater than the return of the S&P 500, whereas the hedged return is about 2 percentage points less than the S&P. Therefore, taking into account the equity return component of the NAREIT Index, this reallocation could represent a slight sacrifice in return.
 - *Risk:* The standard deviation of the NAREIT Index and the hedged NAREIT Index was approximately 2 and 3 percentage points below that of the S&P 500, respectively. Thus no matter which index we use to represent indirect real estate investment, the reallocation would satisfy the objective of risk reduction, based on historical experience. Additionally, downside risk (as measured by the minimum quarterly return) was much less for REITs than for the S&P 500, so the reallocation could reduce downside risk as well.
 - *Diversification:* The correlation between the S&P 500 and the hedged NAREIT Index is zero, indicating that REITs have sources of return that are different from those for large-cap equities, which would enhance diversification.
 - *Liquidity:* REITs and S&P 500 equities are exchange traded and, therefore, are both liquid.
- C** The second scenario—that is, reallocation of 10 percent of large-cap equities to REITs—is the best choice to fulfill the trustees' stated goals for the following reasons:
- *Return:* Using the long-term data provided in the table, the first scenario (based on unsmoothed NCREIF data) would have a mean return of $10.94\% \times 0.5 + 7.70\% \times 0.4 + 7.27\% \times 0.1 = 9.28\%$, whereas the second scenario (using hedged NAREIT) would yield 9.12 percent. If the unhedged NAREIT returns are used in the calculation, the expected return rises to 9.5 percent. Therefore, a 10 percent investment in REITs (even those least correlated with equities—e.g., mortgage REITs) and corresponding 10 percent reduction in S&P 500 stocks would represent a return similar to that of the first scenario.
 - *Risk:* The second scenario is superior in terms of risk reduction because it maintains a higher allocation to bonds, which show a much lower correlation with unhedged REITs than does the S&P 500. Additionally, the minimum quarterly return is worst (most negative) for the unsmoothed NCREIF Index and the S&P 500. Therefore, the second scenario would reduce allocation to an asset class with high downside risk and reallocate money to REITs, which have a lower downside risk. Finally, REITs are highly liquid and can be easily divested, whereas physical real estate necessitates a long-term commitment and entails high transaction costs.
- Note:* Although bonds have a negative correlation with the NCREIF Index (the first scenario), which suggests a superior reduction in risk through diversification, the three points provided here indicate that the reallocation from equities to REITs more closely fulfills the stated objectives of the trustees.

- *Index construction:* The choice of real estate index is pertinent to the assumptions used in calculating expected results for asset allocation decisions. The use of the unsmoothed NCREIF Index can be substantiated because more frequent, market-based (transaction) data are more timely and accurate than the smoothed, annually calculated, appraisal-based data. This method suggests higher expected returns—and significantly greater risk.

The use of the hedged NAREIT Index could be justified by the concept of eliminating double counting (the equity return component in equity REITs). Additionally, the use of mortgage and hybrid REITs would reduce the redundancy of the more highly correlated equity REITs. Nevertheless, equity REITs compose about 95 percent of the NAREIT Index, so the unhedged data show a significant increase in return with less risk, as demonstrated by the high Sharpe ratio of the NAREIT Index relative to most other asset classes.

- 4 A Two points can be made that relate to the value of the GSCI as a risk diver-sifier and the interpretation of the Sharpe ratio. First, the negative correla-tion of the GSCI with the S&P 500 and the low positive correlation of the GSCI with the Bloomberg Barclays Government/Corporate Bond Index suggest good risk reduction benefits when the GSCI is added to a portfolio of US stocks and bonds. Second, in interpreting the low Sharpe ratio for the GSCI, account must be taken of the appropriateness of the Sharpe ratio for measuring commodity returns. The validity of standard deviation as a mea-sure of risk in the denominator of the Sharpe ratio is compromised when returns are skewed and/or have high kurtosis. Because the data presented does not address skewness or kurtosis, Lake's statement on standard devia-tion is speculative.
- B McCoy is evaluating a short time series. Because investment performance depends on the time period studied, the high returns generated by commod-ities in 2000–2004 may not be representative of long-term performance. In fact, we know this is the case when the data are compared with data for the longer period documented in Problem 4. This does not necessarily suggest that investment in commodities is not appropriate. However, it raises a caveat about comparing expectations of future returns for a period when the economic environment may be different from that of the short-term period that generated the results in the table given. This information also suggests that commodities may provide benefits as a tactical asset class.
- The same concerns with respect to the short timeframe covered by the table can be expressed for the correlation data. However, the values are virtually the same for the longer-term data, which suggests that commodity returns are not correlated with the other asset classes; as a result, inclusion of com-modities in the portfolio could provide both long-and short-term diversifi-cation benefits.
- 5 A Survivorship bias occurs when returns of managers who have failed or exited the market are not included in the data analyzed over a specific timeframe. This results in overestimation of historical returns in the range of 1.5–3.0 percent per year. The timing of survivorship bias may be con-centrated during certain economic periods, further complicating analysis of persistence of returns over short timeframes. Additionally, age (vin-tage) effects make it difficult to compare performance of hedge funds that have track records of different lengths. This is especially important when researching hedge funds, which have average track records of two to five years.

- B** Indexes that are value weighted as opposed to equally weighted may take on the return characteristics of the best-performing hedge fund in them over a given period. These indexes thus reflect the weights of popular bets by hedge fund managers, because the asset values of the various funds change as a result of asset purchases as well as price appreciation.
 - C** Lack of security trading leads to stale price bias and can cause measured standard deviation to be over- or understated, depending on the time period being studied. This could result in measured correlations being lower than expected. This issue is not a significant concern in the creation of hedge fund indexes because monthly data are used. Furthermore, the underlying holdings in many hedge fund strategies are relatively liquid; therefore, positions reflect market prices.
- 6 A** Equity market-neutral strategies identify over- and undervalued stocks while neutralizing the fund's exposure to market risk by combining long and short positions with similar exposure to related market or sector factors. Therefore, as their name suggests, they have little or no market risk. They also have low credit risk because their long-short positions result in net low leverage. As expected, there is virtually no correlation between funds using this strategy and the S&P 500.

Convertible arbitrage strategies exploit anomalies in the prices of corporate convertible bonds, warrants, and preferred stock. The convertible arbitrage funds buy or sell these securities and then hedge the risk of changes in price and volatility of the underlying securities, changes in interest rates, and changes in the issuers' credit ratings. The many small, individual positions taken, and hedging of these risks, result in low market exposure. However, this strategy also increases credit risk considerably because hedging via derivative instruments creates high leverage exposure. Convertible arbitrage strategies have a relatively low correlation with the S&P 500 or the Bloomberg Barclays Government/Corporate Bond Index because hedging the risks mitigates underlying market exposure.

Global macro strategies trade on systematic moves in major financial and nonfinancial markets by using futures and options contracts. They may also take positions in traditional equity and fixed-income markets. Because they tend to make large bets on the direction of currencies, commodities, or stock and bond markets globally, they have high market exposure. Given their extensive use of leverage via futures and options, they are also exposed to significant credit (leverage) risk. Because of their large positions with regard to anticipated changes in market levels, the correlation of global macro with the S&P 500 and Bloomberg Barclays Government/Corporate Bond Index tends to be greater than those of the first two strategies discussed here.

- B** The usefulness of historical hedge fund data continues to be controversial. Research has shown that the volatility of returns is more persistent through time than the level of returns. Issues such as survivorship and backfill bias have a significant impact on historical tests of performance persistence. Additionally, lock-up periods, restrictions on redemptions/withdrawals, and the relatively short track record of many hedge funds complicate the extrapolation of past performance to expected (future) performance of hedge funds.
- 7** The fee structures charged by hedge fund managers often have two components: management fees and incentive fees. The "1 and 20" refers to a 1 percent per year management fee based on net asset value plus a 20 percent incentive,

or profit-sharing, fee that is earned only if assets exceed a specified value. This value may be the high-water mark of the fund—that is, the highest previous NAV. Typically, drawdowns (declines/losses in net asset value) must be recouped before any incentive fees are charged.

- 8 Farkas's statement is not valid because the hedge fund has a lock-up period. During this time, the investor cannot redeem any part of the investment. Additionally, once the lock-up period has expired, redemption rights may be limited to a quarterly or semiannual schedule and the investor generally must give advance notice, ranging from 30 to 90 days, of an intention to redeem.
- 9 A Any of the following reasons could cause an upward bias in the Sharpe ratio:
- Lengthening the measurement interval: This will result in a lower estimate of volatility. For example, the annualized standard deviation of daily returns is generally higher than of weekly returns, which is, in turn, higher than of monthly returns.
 - Compounding the monthly returns but calculating the standard deviation from the (not compounded) monthly returns.
 - Writing out-of-the-money puts and calls on a portfolio: This strategy can potentially increase the return by collecting the option premium without paying off for several years. Strategies that involve taking on default risk, liquidity risk, or other forms of catastrophe risk have the same ability to report an upwardly biased Sharpe ratio. (An example is the Sharpe ratios of market-neutral hedge funds before and after the 1998 liquidity crisis.) This is akin to trading negative skewness for a greater Sharpe ratio by improving the mean or standard deviation of the investment.
 - Smoothing of returns: Using certain derivative structures, infrequent marking to market of illiquid assets, or using pricing models that understate monthly gains or losses can reduce reported volatility.
 - Eliminating extreme returns: Because such returns increase the reported standard deviation of a hedge fund, a manager may choose to attempt to eliminate the best and the worst monthly returns each year to reduce the standard deviation. Operationally, this entails a total-return swap, in which one pays the best and worst returns for one's benchmark index each year and the counterparty pays a fixed cash flow and hedges the risk in the open market. If swaps are not available, one can do it directly with options.
- B Because of the option-like payoff characteristics of many hedge fund strategies, their returns are not normally distributed, but normality is an assumption inherent in the computation of standard deviation in the denominator of the Sharpe ratio. Hedge fund returns, on average, display some skewness (asymmetry of the return distribution), as well as high kurtosis (relatively frequent extreme returns). These effects are not captured by standard deviation, the risk measure used in the Sharpe ratio. Also, Sharpe ratios are overestimated when investment returns are serially correlated (i.e., returns trend), which causes a lower estimate of the standard deviation. This occurs with certain momentum (trend-following) hedge fund strategies and those that may have a problem with stale pricing or illiquidity (e.g., distressed securities).
- 10 A The hedge fund's average nine-month rolling return:

$$RR_{9,1} = (2.7 + 1.7 - 1 + 0.9 - 1 - 2 - 2 + 4 + 3.5)/9 = 0.7556\%$$

$$RR_{9,2} = 0.7778\%$$

$$RR_{9,3} = 0.3778\%$$

$$RR_{9,4} = 0.2444\%$$

$$\text{Average} = (0.7556 + 0.7778 + 0.3778 + 0.2444)/4 = 0.54\%$$

- B** Rolling returns can show how consistent the returns are over the investment period and whether there is any cyclicality in the returns.
- 11 A** A hurdle rate of 5% per year equates to a monthly hurdle rate of $5\%/12 = 0.4167\%$.

$$\text{The downside deviation for the hedge fund}$$

$$= \sqrt{28.78/(12 - 1)} \times \sqrt{12} = 5.60\%.$$

$$\text{The downside deviation for the index} = \sqrt{65.04/(12 - 1)} \times \sqrt{12} = 8.42\%.$$

The downside deviation is lower than the standard deviation because downside deviation takes into account only the deviations on the downside. The downside deviation of the hedge fund is lower than that of the index in this case.

- B** Annualized return for the hedge fund = $0.6133\% \times 12 = 7.360\%$.
 Annualized return for the index = $-0.449\% \times 12 = -5.388\%$.
 The Sortino ratio for the hedge fund = $(7.36 - 5)/5.6 = 0.42$.
 The Sortino ratio for the index = $(-5.39 - 5)/8.42 = -1.23$.
 The Sortino ratio of the hedge fund is much higher than that of the index, indicating that it provides greater return per unit of downside risk.
- 12 A** Managed futures are often considered a subgroup of global macro hedge funds because both strategies attempt to take advantage of systematic moves in major financial and nonfinancial markets.
- B** The primary similarity between managed futures and absolute-return hedge fund strategies is that they seek positive returns regardless of market direction. Managed futures strategies invest exclusively in the forward and derivatives markets on a leveraged basis by trading futures and options contracts in the financial, commodity, and currency markets. In contrast, other hedge fund strategies invest in underlying markets; some, depending on their strategies, also use derivatives.
- C** Systematic trading strategies are rule based and frequently trend following. Discretionary trading strategies rely on portfolio manager judgment rather than rules and include strategies based on fundamental economic data and trader beliefs.
- 13** The theory of market efficiency suggests that news is simultaneously available to all market participants and is quickly incorporated into market prices. However, research in behavioral finance indicates that investors may systematically underreact to information; consequently, security prices may trend, particularly in traditional investment vehicles (stocks and bonds). Actively managed derivative strategies that follow momentum, or trend-based, models have been shown to be profitable by capturing these trends.
- 14** Similarly to market-neutral funds, managed futures programs can replicate many strategies available to cash market investors at lower transaction costs and can also trade on strategies by using derivatives that are unavailable to cash market investors. Research has shown that when returns are segmented according to whether the stock/bond markets rose or fell, managed futures have a negative correlation with cash market portfolios when cash market portfolios

post significant negative returns and are positively correlated when cash portfolios reported significant positive returns. Therefore, managed futures may offer unique asset allocation characteristics in different market environments.

Also, hedging demands of cash market participants may create investment situations where hedgers are required to offer derivative investors a risk premium, or positive return, for holding open long or short offsetting positions. Option traders may be able to create positions that offer this “risk premium” for holding various option contracts when cash market participants increase purchases of options to protect themselves in markets with trending prices or volatility. This return (i.e., the convenience yield) can be earned simply by buying and holding a derivatives portfolio.

- 15 The term “fallen angels” refers to debt securities that were originally deemed investment grade when issued by financially healthy companies but have subsequently been downgraded to below investment grade. In contrast, companies with high risk profiles and existing senior debt issues can seek additional (subordinated) financing via originally issued high-yield securities.
- 16 The private equity approach of investing is considered an active approach. New investors in the debt and/or equity of a troubled company (distressed securities) participate on creditor committees and assist in the recovery or reorganization process to maximize their return on investment. Under the relative-value approach, passive investors buy the distressed securities and either hold them until they appreciate to the desired level or trade them within a relatively short period of time.
- 17 The results of a prepackaged bankruptcy have different effects on the various parties involved:
 - A In a prepackaged bankruptcy, the prebankruptcy creditors of the company have already agreed in advance with the debtor company on a plan or reorganization before the debtor company actually files for bankruptcy. This may involve the creditors making concessions in return for equity of the reorganized company.
 - B Prebankruptcy shareholders do not have nearly as much leverage as the creditors. The prebankruptcy shareholders typically lose their entire stake in the company because in a prepackaged bankruptcy, a private equity firm (the vulture investor) seeks to become a majority owner of a new private company.
 - C The vulture investor is bearing a lot of risk in a transaction like this but may come out with a substantial profit if things work out well. The vulture investor hopes to end up with a healthy company that can be sold to private or public investors.
- 18 The statement is correct. When the economy is in a downturn, there are more bankruptcies, thereby increasing the supply of distressed securities at relatively low (or falling) prices.
- 19 B is correct. Private clients have different time horizon issues compared to institutional investors such as pension funds. The partner is correct in stating that private clients have different liquidity needs than institutional investors.
- 20 B is correct. Using the data in Exhibit 1, the Sharpe ratio for hedge funds = $(6 - 3.5)/2.5 = 1.0$. For real estate the ratio is $(8 - 3.5)/9 = 0.50$, and for private equity it is $(20 - 3.5)/22 = 0.75$.
- 21 C is correct. Unsmoothing the data corrects bias in returns calculated from infrequent appraisals and property transactions.

- 22 A is correct. Magerski's concern relates to the potential for the Sharpe ratio to be gamed. Standard deviation of returns is reduced when extreme returns are eliminated. Smoothing returns understates gains and losses and reduces volatility. Lengthening the measurement interval generally decreases the estimate of annualized standard deviation of returns.
- 23 A is correct. The incentive fee applies to the difference between the ending period net asset value and the net assets at the high water mark, not to the entire amount under management. Five years is an exceedingly long lock-up period during which investors will not be able to withdraw any funds.
- 24 A is correct. Commodity classes such as livestock and agriculture exhibit negative correlation with unexpected inflation as measured by monthly changes in the inflation rate. Thus they are poor inflation hedges. Storable commodities directly linked to economic activity exhibit positive correlation with changes in inflation and have superior inflation-hedging properties.
- 25 A is correct. The two characteristics of the returns distribution associated with alternative investment strategies that reduce downside risk are positive skewness and low kurtosis.
- 26 B is correct. The returns on the NCREIF Index are based on appraisals that underestimate the volatility in underlying values.
- 27 B is correct. Strategy 2 (40% stock/40% bonds/20% NAREIT Index) satisfies the board's mandate because:
- the expected portfolio return of 9.52% ($0.4 \times 11.16\% + 0.4 \times 7.70\% + 0.2 \times 9.87\%$) is greater than the current allocation's expected return of 9.43% ($0.5 \times 11.16\% + 0.5 \times 7.70\%$), and
 - indirect investments in real estate via REITs would not result in reduced liquidity because REITs are very liquid.
- 28 B is correct. One of the common features of private equity investing is the high level of diversification potential due to low correlations with traditional investment classes.
- 29 C is correct. Historically, direct commodity investments that are (directly) related to the intensity of economic activity have had significant, positive return correlations with inflation.
- 30 A is correct. Contrary to Northrup's comment, fund of funds usually do not impose lock-up periods (or minimum initial holding period) and their fees are higher as investors pay two layers of fees: one to the FOF and the other to the underlying hedge fund managers.
- 31 B is correct. 1.5 plus 20 refers to a 1.5 percent management fee for assets under management (AUM) plus a 20% incentive fee for the managers; without a high-water mark provision, managers receive 20% of annual profits.
- 32 C is correct. The high-water mark is a specified net asset value level that a fund must exceed before performance/incentive fees are paid to the hedge fund manager. Once the first incentive fee has been paid, the highest month-end NAV establishes a high-water mark.
- 33 B is correct. Value weighting may result in a particular index taking on the return characteristics of the best-performing hedge funds in a particular time period. The second observation is incorrect as the transaction costs make it difficult to rebalance an equally weighted index.
- 34 A is correct. Use of a longer measurement interval will help to lower annualized volatility estimates; illiquid assets or stale prices bias the Sharpe ratio upward; use of out-of-the-money options can potentially increase returns by collecting premiums now while paying off at a later time.

- 35 A is correct. Both statements are correct. Hedgers may pay a risk premium to liquidity providers for the insurance they obtain so managed futures may be able to earn positive excess returns. Differential carrying costs among investors may permit managed fund traders to take advantage of short-term pricing differences between theoretically identical stock, bond, futures, options, and cash market positions.
- 36 B is correct. The historical returns of (a long-only position in) distressed securities have been shown to have negative skewness and high kurtosis.
- 37 B is correct. Equity market-neutral portfolios are supposed to have no systematic risk as a result of holding both long and short positions in stocks.
- 38 A is correct. The Sharpe ratio is based on a normality assumption, and hedge fund returns typically have negative skewness and high kurtosis.
- 39 B is correct. In distressed debt arbitrage the investor buys the distressed company's debt at steep discount and shorts its equity. Therefore, if the situation worsens and the debt is discounted further, the short position in equity will fall relatively more than the debt.
- 40 A is correct. As strategies become popular, more money flows into them causing those to become overweighted in a value-weighted index. On the other hand, in an equally weighted index, as a result of rebalancing, the overweighting is not a major issue.
- 41 B is correct. Rolling returns can provide an understanding into the consistency and cyclicity of hedge fund returns.

