

READING

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Hedge Fund Strategies

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LEARNING OUTCOMES

<i>Mastery</i>	<i>The candidate should be able to:</i>
☐	a. discuss how hedge fund strategies may be classified;
☐	b. discuss investment characteristics, strategy implementation, and role in a portfolio of <i>equity-related</i> hedge fund strategies;
☐	c. discuss investment characteristics, strategy implementation, and role in a portfolio of <i>event-driven</i> hedge fund strategies;
☐	d. discuss investment characteristics, strategy implementation, and role in a portfolio of <i>relative value</i> hedge fund strategies;
☐	e. discuss investment characteristics, strategy implementation, and role in a portfolio of <i>opportunistic</i> hedge fund strategies;
☐	f. discuss investment characteristics, strategy implementation, and role in a portfolio of <i>specialist</i> hedge fund strategies;
☐	g. discuss investment characteristics, strategy implementation, and role in a portfolio of <i>multi-manager</i> hedge fund strategies;
☐	h. describe how factor models may be used to understand hedge fund risk exposures;
☐	i. evaluate the impact of an allocation to a hedge fund strategy in a traditional investment portfolio.

INTRODUCTION

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Hedge funds form an important subset of the alternative investments opportunity set, but they come with many pros and cons in their use and application across different asset classes and investment approaches. The basic tradeoff is whether the added

fees typically involved with hedge fund investing result in sufficient additional alpha and portfolio diversification benefits to justify the high fee levels. This is an ongoing industry debate.

Some argue that investing in hedge funds is a key way to access the very best investment talent—those individuals who can adroitly navigate investment opportunities across a potentially wider universe of markets. Others argue that hedge funds are important because the alpha that may be produced in down markets is hard to source elsewhere.

The arguments against hedge funds are also non-trivial. In addition to the high fee levels, the complex offering memorandum documentation needs to be understood by investors (i.e., the limited partners). Other issues include lack of full underlying investment transparency/attribution, higher cost allocations associated with the establishment and maintenance of the fund investment structures, and generally longer-lived investment commitment periods with limited redemption availability.

In addition, each hedge fund strategy area tends to introduce different types of added portfolio risks. For example, to achieve meaningful return objectives, arbitrage-oriented hedge fund strategies tend to utilize significant leverage that can be dangerous to limited partner investors, especially during periods of market stress. Long/short equity and event-driven strategies may have less beta exposure than simple, long-only beta allocations, but the higher hedge fund fees effectively result in a particularly expensive form of embedded beta. Such strategies as managed futures or global macro investing may introduce natural benefits of asset class and investment approach diversification, but they come with naturally higher volatility in the return profiles typically delivered. Extreme tail risk in portfolios may be managed with the inclusion of relative value volatility or long volatility strategies, but it comes at the cost of a return drag during more normal market periods. In other words, some hedge fund strategies may have higher portfolio diversification benefits, while others may simply be return enhancers rather than true portfolio diversifiers.

Also, the hedge fund industry continues to evolve in its overall structure. Over the past decade, traditional limited partnership formats have been supplemented by offerings of liquid alternatives (liquid alts)—which are mutual fund, closed-end fund, and ETF-type vehicles that invest in various hedge fund-like strategies. Liquid alts are meant to provide daily liquidity, transparency, and lower fees while opening hedge fund investing to a wider range of investors. However, empirical evidence shows that liquid alts significantly underperform similar strategy hedge funds, which suggests that traditional hedge funds may be benefiting from an illiquidity premium phenomenon that cannot be easily transported into a mutual fund format.

Investors must understand the various subtleties involved with investing in hedge funds. Although secular bull market trends have arguably made “hedged” strategies less critical for inclusion in portfolio allocations than they were during the mid-to-late 2000s, the overall popularity of hedge funds tends to be somewhat cyclical. Notably, as demonstrated by the endowment model of investing, placing hedge funds as a core allocation can increase net returns and reduce risk.

This reading presents the investment characteristics and implementation for the major categories of hedge fund strategies. It also provides a framework for classifying and evaluating these strategies based on their risk profiles. Section 2 summarizes some distinctive regulatory and investment characteristics of hedge funds and discusses ways to classify hedge fund strategies. Sections 3 through 8 present investment characteristics and strategy implementation for each of the following six hedge fund strategy categories: equity-related; event-driven; relative value; opportunistic; specialist; and multi-manager strategies. Section 9 introduces a conditional factor model as a unifying framework for understanding and analyzing the risk exposures of these

strategies. Section 10 evaluates the contributions of each hedge fund strategy to the return and risk profile of a traditional portfolio of stocks and bonds. The reading concludes with a summary.

CLASSIFICATION OF HEDGE FUNDS AND STRATEGIES

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The most important characteristics of hedge funds are summarized as follows:

- 1 Legal/Regulatory Overview:** Different countries have varying requirements for investor eligibility to access hedge fund investments. These regulations are typically intended to limit access to traditional hedge funds to sophisticated investors with a minimum income or net-worth requirement, and they allow hedge fund managers to accept only a limited number of investment subscriptions. Most traditional hedge funds in the United States are offered effectively as private placement offerings. Whether the underlying fund manager must register with regulatory authorities depends on assets under management (AUM); however, regardless of AUM, all US hedge funds are subject to regulatory oversight against fraudulent conduct. Hedge funds offered in other jurisdictions—attractive, tax-neutral locales like the Cayman Islands, the British Virgin Islands, or Bermuda—are typically presented to investors as stand-alone corporate entities subject to the rules and regulations of the particular locality.

From a regulatory perspective, the advent of liquid alts has likely caused the greatest shift in the industry over the past decade. Some of the more liquid hedge fund strategies that meet certain liquidity and diversification requirements (generally long/short equity and managed futures strategies) are offered by many fund sponsors in mutual fund-type structures in the United States and in the undertakings for collective investment in transferable securities (UCITs) format in Europe and Asia. By law, these liquid alts vehicles can be more widely marketed to retail investors. Whereas traditional hedge funds typically offer only limited periodic liquidity, liquid alts funds may be redeemed by investors on a daily basis. Also, traditional hedge funds typically involve both a management fee and an incentive fee; however, liquid alts in most countries are prohibited from charging an incentive fee.

Finally, the overall regulatory constraints for hedge funds are far less than those for regulated investment vehicles—except for the liquid alts versions, which have much higher constraints to provide liquidity to investors.

- 2 Flexible Mandates—Few Investment Constraints:** Given the relatively low legal and regulatory constraints faced by hedge funds, their mandates are flexible; thus, they are relatively unhindered in their trading and investment activities in terms of investable asset classes and securities, risk exposures, and collateral. The fund prospectus (i.e., offering memorandum) will specify the hedge fund's mandate and objectives and will include constraints, if any, on investment in certain asset classes as well as in the use of leverage, shorting, and derivatives.
- 3 Large Investment Universe:** Lower regulatory constraints and flexible mandates give hedge funds access to a wide range of assets outside the normal set of traditional investments. Examples include private securities, non-investment-grade debt, distressed securities, derivatives, and more-esoteric contracts, such as life insurance contracts and even music or film royalties.

- 4 **Aggressive Investment Styles:** Hedge funds may use their typically flexible investment mandates to undertake strategies deemed too risky for traditional investment funds. These strategies may involve significant shorting and/or concentrated positions in domestic and foreign securities that offer exposure to credit, volatility, and liquidity risk premiums.
- 5 **Relatively Liberal Use of Leverage:** Hedge funds generally use leverage more extensively than regulated investment funds. Their leveraged positions are implemented either by borrowing securities from a prime broker or by using implied leverage via derivatives. In many instances, such leverage is necessary to make the return profile of the strategy meaningful. In other instances, derivatives may be used to hedge away unwanted risks (e.g., interest rate or credit risk) that may create high “notional leverage” but result in a less risky portfolio. Within long/short equity trading, leverage is most often applied to quantitative approaches in which small statistical valuation aberrations—typically over short windows of time—are identified by a manager or an algorithm. Such quant managers will typically endeavor to be market neutral but will apply high leverage levels to make the opportunities they identify meaningful from a return perspective.
- 6 **Hedge Fund Liquidity Constraints:** Limited partnership-format hedge funds involve initial lock-up periods, liquidity gates, and exit windows. These provide hedge fund managers with a greater ability to take and maintain positions than vehicles that allow investors to withdraw their investment essentially at will. It is thus not surprising that empirical evidence shows that such privately-placed hedge funds significantly outperform similar-strategy liquid alts products by approximately 100 bps–200 bps, on average, per year.
- 7 **Relatively High Fee Structures:** Hedge funds have traditionally imposed relatively high investment fees on investors, including both management fees and incentive fees. These have historically been 1% or more of AUM for management fees and 10%–20% of annual returns for incentive fees. The incentive fee structure is meant to align the interests of the hedge fund manager with those of the fund’s investors.

With this background, we now address how hedge funds are classified. One distinction is between single manager hedge funds and multi-manager hedge funds. A **single-manager fund** is a fund in which one portfolio manager or team of portfolio managers invests in one strategy or style. A **multi-manager fund** can be of two types. One type is a **multi-strategy fund**, in which teams of portfolio managers trade and invest in multiple different strategies within the same fund. The second type, a fund-of-hedge funds, often simply called a **fund-of-funds** (FoF), is a fund in which the fund-of-funds manager allocates capital to separate, underlying hedge funds (e.g., single manager and/or multi-manager funds) that themselves run a range of different strategies.

At the single manager and single strategy level, hedge fund strategies can be classified in various ways. The taxonomy is often based on some combination of:

- 1 the instruments in which the managers invest (e.g., equities, commodities, foreign exchange, convertible bonds);
- 2 the trading philosophy followed by the managers (e.g., systematic, discretionary); and
- 3 the types of risk the managers assume (e.g., directional, event driven, relative value).

Most prominent hedge fund data vendors use a combination of these criteria to classify hedge fund strategies. For example, Hedge Fund Research, Inc. (HFR) reports manager performance statistics on more than 30 strategies and divides funds into six single strategy groupings that are widely used in the hedge fund industry. HFR's six main single strategy groupings are 1) equity hedge; 2) event driven; 3) fund-of-funds; 4) macro; 5) relative value; and 6) risk parity.

Lipper TASS, another well-known data vendor, classifies funds into the following ten categories: 1) dedicated short bias; 2) equity market neutral; 3) long/short equity hedge; 4) event driven; 5) convertible arbitrage; 6) fixed-income arbitrage; 7) global macro; 8) managed futures; 9) fund-of-funds; and 10) multi-strategy.

Morningstar CISDM goes even further and separates hedge funds in its database into finer categories, like merger arbitrage and systematic futures, among others. In addition, the Morningstar CISDM Database separates fund-of-funds strategies into several different sub-categories, such as debt, equity, event driven, macro/systematic, multi-strategy, and relative value.

Eurekahedge, an important index provider with its roots in Asia, has grown to include many smaller hedge fund managers globally. Its main strategy indexes include nine categories: 1) arbitrage; 2) commodity trading adviser (CTA)/managed futures; 3) distressed debt; 4) event driven; 5) fixed income; 6) long/short equities; 7) macro; 8) multi-strategy; and 9) relative value.

A final example of a prominent hedge fund data vendor is Credit Suisse. Its Credit Suisse Hedge Fund Index is an asset-weighted index that monitors approximately 9,000 funds and consists of funds with a minimum of US\$50 million AUM, a 12-month track record, and audited financial statements. The index is calculated and rebalanced monthly, and it reflects performance net of all performance fees and expenses. Credit Suisse also subdivides managers into nine main sub-indexes for strategy areas: 1) convertible arbitrage; 2) emerging markets; 3) equity market neutral; 4) event driven; 5) fixed income; 6) global macro; 7) long/short equity; 8) managed futures; and 9) multi-strategy.

These different data providers use different methodologies for index calculation. HFR produces both the HFRX Index of equally weighted hedge funds, which includes those that are open or closed to new investment, and its HFRI index series, which tracks only hedge funds open to new investment. Because managers who have closed their funds to new investment are typically superior managers who are limited in their capacity to manage additional funds, the HFRX series regularly outperforms the HFRI series. However, the mix of managers represented by the HFRX Index would obviously not be replicable in real-time by an investor, thus limiting its usefulness. Meanwhile, the Credit Suisse Hedge Fund Index is weighted by fund size (i.e., AUM), so its overall performance is more reflective of the performance of the larger hedge funds, such as the multi-strategy managers.

Notably, less overlap exists in manager reporting to the different index providers than one might expect or is likely optimal. In fact, less than 1% of hedge fund managers self-report to all the index service providers mentioned. Clearly, no single index is all-encompassing.

Generally consistent with the above data vendor groupings and with a practice-based risk factor perspective, this reading groups single hedge fund strategies into the following six categories: 1) equity; 2) event-driven; 3) relative value; 4) opportunistic; 5) specialist; and 6) multi-manager.

- **Equity-related hedge fund strategies** focus primarily on the equity markets, and the majority of their risk profiles involve equity-oriented risk. Within this equity-related bucket, long/short equity, dedicated short bias, and equity market neutral are the main strategies that will be discussed further.

- **Event-driven hedge fund strategies** focus on corporate events, such as governance events, mergers and acquisitions, bankruptcy, and other key events for corporations. The primary risk for these strategies is event risk, the possibility that an unexpected event will negatively affect a company or security. Unexpected events include unforeseen corporate reorganization, a failed merger, credit rating downgrades, or company bankruptcy. The most common event-driven hedge fund strategies, merger arbitrage and distressed securities, will be discussed in detail.
- **Relative value hedge fund strategies** focus on the relative valuation between two or more securities. These strategies are often exposed to credit and liquidity risks because the valuation differences from which these strategies seek to benefit often are due to differences in credit quality and/or liquidity across different securities. The two common relative value hedge fund strategies to be covered further are fixed-income arbitrage and convertible bond arbitrage.
- **Opportunistic hedge fund strategies** take a top-down approach, focusing on a multi-asset (often macro-oriented) opportunity set. The risks for opportunistic hedge fund strategies depend on the opportunity set involved and can vary across time and asset classes. The two common opportunistic hedge fund strategies that are discussed in further detail are global macro and managed futures.
- **Specialist hedge fund strategies** focus on special or niche opportunities that often require a specialized skill or knowledge of a specific market. These strategies can be exposed to unique risks that stem from particular market sectors, niche securities, and/or esoteric instruments. We will explore two specialist strategies in further detail: volatility strategies involving options and reinsurance strategies.
- **Multi-manager hedge fund strategies** focus on building a portfolio of diversified hedge fund strategies. Managers in this strategy bucket use their skills to combine diverse strategies and dynamically re-allocate among them over time. The two most common types of multi-manager hedge funds are multi-strategy funds and fund-of-funds, which we will discuss in further detail.

Exhibit 1 shows the five single strategy hedge fund buckets that will be covered individually. Multi-strategy funds and fund-of funds—two types of multi-manager strategies—will also be covered. A discussion of each strategy’s contributions to portfolio risk and return will follow.

Exhibit 1 Hedge Fund Strategies by Category

Equity	Event-Driven	Relative Value	Opportunistic	Specialist	Multi-Manager
• Long/Short Equity • Dedicated Short Bias • Equity Market Neutral	• Merger Arbitrage • Distressed Securities	• Fixed Income Arbitrage • Convertible Bond Arbitrage	• Global Macro • Managed Futures	• Volatility Strategies • Reinsurance Strategies	• Multi-strategy • Fund-of-Funds

EQUITY STRATEGIES

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Equity hedge fund strategies invest primarily in equity and equity-related instruments. As mentioned previously, the alpha related to equity strategies tends to derive from the wide variety of equity investments available globally combined with astute long and short stock picking. The size and sign of equity market exposure often dictate the classification of equity hedge fund strategies. As the name suggests, long-only equity hedge fund strategies focus on holding only long positions in equities, and they sometimes use leverage. Long/short equity hedge fund strategies hold both long and short positions in equities that typically result in more-hedged, less-volatile overall portfolios. Short-biased strategies focus on strategic short selling of companies that are expected to lose value in the future (sometimes with an activist inclination, sometimes with long positions in other securities as an offset). Equity market-neutral strategies hold balanced long and short equity exposures to maintain zero (or close to zero) net exposure to the equity market and such factors as sector and size (i.e., market cap). They then focus on, for example, pairs of long and short securities whose prices are out of historical alignment and are expected to experience mean reversion. The following sections discuss long/short equity, dedicated short bias, and equity market-neutral hedge fund strategies.

3.1 Long/Short Equity

Long/short (L/S) equity managers buy equities of companies they expect will rise in value (i.e., they take long positions in undervalued companies) and sell short equities of companies they think will fall in value (i.e., they take short positions in overvalued companies). The objective of long/short equity strategies is to be flexible in finding attractive opportunities on both the long and short sides of the market and to size them within a portfolio. Depending on their specific mandates, long/short equity strategies can shift between industry sectors (e.g., from technology to consumer goods), factors (e.g., from value to growth), and geographic regions (e.g., from Europe to Asia). In practice, however, managers tend to maintain their philosophical biases and areas of focus, typically with a heavy emphasis on fundamental research.

Although market timing using “beta tilts” can play a factor in manager performance, studies have shown that most fundamental long/short equity managers offer little added alpha from such adjustments. They are typically either too net long at market highs or not net long enough at market lows. Most L/S equity managers are not known for their portfolio-level market-timing abilities, but those with such market-timing skills may be particularly valuable from a portfolio allocation perspective.

L/S equity managers also are typically able to take concentrated positions in high conviction buys or sells and can readily apply leverage to increase these positions (although higher levels of leverage are used mostly by quantitatively-oriented managers, not fundamental managers). As a result, stock selection defines manager skill for most L/S equity managers—with market-timing ability being an additive, but generally secondary, consideration. L/S equity is one of the most prevalent hedge fund strategies. It accounts for about 30% of all hedge funds.

3.1.1 Investment Characteristics

Because manager skill derives mainly from stock selection, it is not surprising that individual long/short equity managers tend to have a focus based on their own unique skill sets. As a result, many long/short equity managers specialize in either a specific geographic region, sector, or investment style. However, several key characteristics define long/short equity managers: their strategy focus, their flexibility in holding long and short positions over time, and their use of leverage. Given the specific mandate for

a long/short equity manager, his/her exposures to various equity factors can be very different from other long/short equity managers. For example, a manager focusing on small-cap growth stocks would have a positive exposure to the size factor and a negative exposure to the value factor. Conversely, a manager with a focus on large-cap value stocks would have a negative exposure to the size factor and a positive exposure to the value factor.

Given that equity markets tend to rise over the long run, most long/short equity managers typically hold net long equity positions. Some managers maintain their short positions as a hedge against unexpected market downturns. Other managers are more opportunistic; they tend to take on more short positions after uncovering negative issues with a company's management, strategies, and/or financial statements or whenever their valuation models suggest selling opportunities in certain stocks or sectors. As a result, performance during market crisis periods is important for differentiating between hedge fund managers. Given that hedge funds typically carry high fees, it is important to avoid paying such added fees just for embedded beta exposure that could be achieved more cheaply by investing in traditional long-only strategies. The goal in long/short equity investing is generally to find more sources of idiosyncratic alpha (primarily via stock picking and secondarily by market timing) rather than embedded systematic beta. Exhibit 2 presents some key aspects of this important strategy area.

Exhibit 2 Long/Short Equity—Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- Diverse opportunities globally create a wide universe from which to create alpha through astute stock picking.
- Diverse investment styles include value/growth, large cap/small cap, discretionary/quantitative, and industry specialized.
- They typically have average exposures of 40%–60% net long, composed of gross exposures of 70%–90% long, vs. 20%–50% short, but they can vary widely. Return profiles are typically aimed to achieve average annual returns roughly equivalent to a long-only approach but with a standard deviation 50% lower than a long-only approach.
- Some managers use index-based short hedges to reduce market risk, but most search for single-name shorts for portfolio alpha and added absolute return.
- Some managers are able to add alpha via market timing of portfolio beta tilt, but evidence suggests that most L/S managers do this poorly.
- This strategy can typically be handled by both limited partner and mutual fund-type vehicles.
- Attractiveness: Liquid, diverse, with mark-to-market pricing driven by public market quotes; added short-side exposure typically reduces beta risk and provides an additional source of potential alpha and reduced portfolio volatility.

Leverage Usage

- Variable: The more market-neutral or quantitative the strategy approach, the more levered the strategy application tends to be to achieve a meaningful return profile.

Exhibit 2 (Continued)**Benchmarking**

- L/S equity benchmarks include HFRX and HFRI Equity Hedge Indices; Lipper TASS L/S Equity Hedge; Morningstar/CISDM Equity L/S Index; and Credit Suisse L/S Equity Index.

3.1.2 Strategy Implementation

When long and short stock positions are placed together into a portfolio, the market exposure is the net of the beta-adjusted long and short exposures. For example, with many strong sells and a relatively large short position, the strategy could be net short for brief periods of time. Typically, most long/short equity managers end up with modest net long exposures averaging between 40%–60% net long. Many long/short equity managers are naturally sector-specific, often designing their funds around their industry specialization. Such specialist L/S fund managers analyze fundamental situations that they know well from both a top-down and bottom-up analytical perspective. Natural areas of specialization include potentially more complex sectors, such as telecom/media/technology (TMT), financial, consumer, health care, and biotechnology sectors. Conversely, generalist L/S managers search further afield, thus having flexibility to invest across multiple industry groups. Typically, these generalists avoid complex sectors; for example, they may avoid biotechnology because corporate outcomes may be deemed too binary depending on the success or failure of drug trials. Although generalist managers do take a more balanced and flexible approach, they may miss detailed industry subtleties that are increasingly important to understand in a world where news flows 24/7 and is increasingly nuanced.

Overall, long/short equity investing in most instances is a mix of extracting alpha on the long and short sides from single-name stock selection combined with some naturally net long embedded beta.

EXAMPLE 1**Long/Short Equity Investing Dilemma**

The Larson family office views L/S equity investing as a significant portion of the hedge fund universe and would like to access managers talented not only at long investing but also at short selling. However, it does not want to pay high hedge fund fees just for long-biased beta because it has access to long-biased beta at lower fees elsewhere in its portfolio. But, Larson will pay hedge fund fees for strategies that can produce strong risk-adjusted performance in a unique and differentiated fashion.

- 1 Discuss some potential hedge fund strategies the Larson family office should consider adding to its existing portfolio.
- 2 Discuss some of the problems and risks that it may encounter.

Solution to 1:

The Larson family office should consider managers focused on an L/S equity strategy with a sector-specialization as opposed to a generalist fundamental L/S strategy. Generalist L/S managers can benefit from the flexibility to scan a wide universe of stocks to find investments, but they may not be able to develop a sufficient information edge in their analysis to dependably deliver sufficient

alpha relative to their fees and natural long beta positioning. However, managers running specialist L/S equity strategies—especially in such complex sectors as technology, finance, and biotechnology/health care—are more likely to have the specialized capabilities to perform the “deep-dive” differentiated analysis required to develop more original views and stronger portfolio performance.

Solution to 2:

A key problem with selecting sector-specialist L/S equity hedge funds is that they are more difficult to analyze and assess. There are also fewer to choose from compared to generalist L/S hedge funds. Sectors can fall out of favor, risking an allocation to a good fund but in the wrong area given dynamic macroeconomic and financial market conditions. Moreover, generalist L/S strategies, by definition, can readily reallocate capital more efficiently as opportunities emerge in different sectors. Put another way, the Larson family office could potentially find itself with too much single sector, short-sided, or idiosyncratic exposure at the wrong time if it chooses a sector-specialist L/S equity fund.

3.2 Dedicated Short Selling and Short-Biased

Dedicated short-selling hedge fund managers take short-only positions in equities deemed to be expensively priced versus their deteriorating fundamental situations. Such managers may vary their short exposures only in terms of portfolio sizing by, at times, holding higher levels of cash. **Short-biased** hedge fund managers use a less extreme version of this approach. They also search for opportunities to sell expensively priced equities, but they may balance short exposure with some modest value-oriented, or possibly index-oriented, long exposure. This latter approach can potentially help short-biased hedge funds cope with long bull market periods in equities. Both types of short sellers actively aim to create an uncorrelated or negatively correlated source of return by seeking out failing business models, fraudulent accounting, corporate mismanagement, or other factors that may sour the market’s perception of a given equity. Because of the overall secular up-trend in global equity markets, especially across the past several decades, it has been very difficult to be a successful short seller. As a result, fewer such managers are in existence today than in the 1990s.

One exception is the emergence of **activist short selling**, whereby managers take a short position in a given security and then publicly present their research backing the short thesis. Typically, if the hedge fund manager has a solid reputation from its past activist short-selling forays, the release of such research causes a significant stock price plunge into which the activist short seller might cover a portion of its short position. In the United States, this practice has not been deemed to be market manipulation by securities’ regulators as long as the activist short seller is not publishing erroneous information, is not charging for such information (which might create potential conflicts of interest between subscribers and investors), and is acting only in the best interests of its limited partner investors.

3.2.1 Investment Characteristics

Short-selling managers focus on situations involving overvalued equities of companies facing deteriorating fundamentals that typically have not yet been perceived by the market. They also attempt to maximize returns during periods of market declines. If these short-selling managers can achieve success with their approaches, they can provide a unique and useful source of negatively correlated returns compared to many other strategy areas.

Short selling involves borrowing securities, selling them “high,” and then after prices have declined, buying the same securities back “low” and returning them to the lender. To borrow the securities to short sell, the manager must post collateral with the securities lender to cover potential losses. The manager must also pay interest on the securities loan, which can be high if the securities are difficult for the lender to locate. One key risk is that the lender may want the securities back at an inopportune time—such as before the expected price decline has materialized, which could be disadvantageous for the hedge fund manager.

Short selling in general is a difficult investment practice to master in terms of risk management because of the natural phenomenon that positions will grow if prices advance against the short seller but will shrink if prices decline. This is the opposite of what occurs with long-only investing, and it is more difficult to manage. Additionally, access to company management for research purposes can be blocked for fund managers who become known as active short sellers.

From a regulatory perspective, many countries limit or impose stringent rules on short selling. In the United States, the “uptick rule” states that when a stock decreases by 10% or more from its prior closing price, a short sale order can be executed only at a price higher than the current best (i.e., highest) bid. This means the stock’s price must be rising to execute the short sale. Although many emerging markets have allowed short selling, particularly to enhance market liquidity (e.g., the Saudi Stock Exchange allowed short sales beginning in 2016), there is always concern that limits could be placed on short selling during extreme market environments or that regulations could change. For example, for a brief period during the global financial crisis of 2007–2009, new short sales on a designated list of financial stocks were banned by the US SEC to lessen systematic market stress.

Given the difficult operational aspects of short selling, and because equity markets tend to secularly rise over time, successful short-selling managers typically have something of a short-term “attack and retreat” style. The return profile for a successful short-biased manager might best be characterized by increasingly positive returns as the market declines and the risk-free return when the market rises. In some idealized short-selling world, this would entail being short the market during down periods and investing in low-risk government debt when the market is not declining. But, the actual goal of a short seller is to pick short-sale stocks that can still generate positive returns even when the general market trend is up. Skillful, dedicated short-biased managers look for possible short-selling targets among companies that are overvalued, that are experiencing declining revenues and/or earnings, or that have internal management conflicts, weak corporate governance, or even potential accounting frauds. Other possible short-sale candidates are companies that may have single products under development that the short seller believes will ultimately either be unsuccessful or non-repeatable. Exhibit 3 shows some important aspects of this strategy area.

Exhibit 3 Dedicated Short Sellers and Short-Biased—Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- Dedicated short sellers: They only trade with short-side exposure, although they may moderate short beta by also holding cash.
- Short-biased managers: They are focused on good short-side stock picking, but they may moderate short beta with some value-oriented long exposure or index-oriented long exposure as well as cash.

(continued)

Exhibit 3 (Continued)

- Dedicated short sellers tend to be 60%–120% short at all times. Short-biased managers are typically around 30%–60% net short. The focus in both cases tends to be on single equity stock picking as opposed to index shorting.
- Return goals are typically less than those for most other hedge fund strategies but with a negative correlation benefit. They are more volatile than a typical L/S equity hedge fund given short beta exposure.
- Managers have some ability to add alpha via market timing of portfolio beta tilt, but it is difficult to do with consistency or added alpha.
- This strategy is typically handled best in a limited partnership because of difficult operational aspects of short selling.
- Attractiveness: Liquid, negatively correlated alpha to that of most other strategies, with mark-to-market pricing from public prices. Historic returns have been lumpy and generally disappointing.

Leverage Usage

- Low: There is typically sufficient natural volatility that short-selling managers do not need to add much leverage.

Benchmarking

- Short-biased indexes include Eurekahedge Equity Short Bias Hedge Fund Index and Lipper TASS Dedicated Short-Bias Index. Some investors also compare short-biased funds' returns to the inverse of returns on related stock indexes.

Note: Each index has different methodologies for fund inclusion. Because there are fewer short-selling managers, the construction of an acceptably diverse index is particularly difficult. The Lipper TASS Dedicated Short-Bias Index, for example, includes just four managers.

3.2.2 Strategy Implementation

Because finding strategic selling opportunities is key to dedicated short-biased strategies, stock selection is an important part of the investment process. Short-selling managers typically take a bottom-up approach by scanning the universe of potential sell targets to uncover and sell short those companies whose shares are most likely to substantially decline in value over the relevant time horizon. Managers search for, among other factors, inherently flawed business models, unsustainable levels of corporate leverage, and indications of poor corporate governance and/or accounting gimmickry. Tools that may be helpful to dedicated short-biased managers in finding potential sell candidates include monitoring single name credit default swap spreads, corporate bond yield spreads, and/or implied volatility of exchange-traded put options. Traditional technical analysis and/or pattern recognition techniques may assist the manager in the market timing of short sales. Various accounting ratios and measures, such as the Altman *Z*-score for judging a company's bankruptcy potential and the Beneish *M*-score for identifying potentially fraudulent financial statements, may also be useful. Because of the inherent difficulty and dangers of short selling, most successful short sellers do significant "deep-dive" forensic work on their short-portfolio candidates. As such, short sellers serve as a valuable resource in creating more overall pricing efficiency in the market.

EXAMPLE 2**Candidate for Short-Biased Hedge Fund Strategy**

Kit Stone, a short-biased hedge fund manager, is researching Generic Inc. (GI) for possible addition to his portfolio. GI was once a drug industry leader, but for the past 10 years its R&D budgets have declined. Its drug patents have all expired, so it now operates in the competitive generic drug business. GI has staked its future on a new treatment for gastro-intestinal disease. R&D was financed by debt, so GI's leverage ratio is twice the industry average. Early clinical trials were inconclusive. Final clinical trial results for GI's new drug are to be revealed within one month. Although the market is constructive, many medical experts remain doubtful of the new drug's efficacy. Without any further insights into the trial results, Stone reviews the following information.

Generic Inc. (GI)			Industry Average		
PE (X)	PB (X)	T12M EPS Growth	PE (X)	PB (X)	T12M EPS Growth
30	3.5	3%	20	2.5	18%

Additionally, Stone notes that GI shares are very thinly traded, with a high short-interest ratio of 60%. Stone's broker has informed him that it is expensive to borrow GI shares for shorting; they are on "special" (i.e., difficult to borrow), with a high borrowing cost of 20% per year. Moreover, there is an active market for exchange-traded options on GI's shares. Prices of one-month GI options appear to reflect a positive view of the company.

- 1 Discuss whether Stone should add GI shares to his short-biased portfolio.
- 2 Discuss how Stone might instead take advantage of the situation using GI options.

Solution to 1:

Generic Inc. appears to be substantially overvalued. Its main business relies on the competitive generic drug market; it has taken on substantial debt to fund R&D; and skepticism surrounds its new drug. GI's P/Es and P/Bs are higher than industry averages by 50% and 40%, respectively, and its trailing 12-month EPS growth is meager (3% vs. 18% industry average). However, although Stone would normally decide to add GI to his short-biased portfolio, the stock's high short-interest ratio and high cost to borrow (for shorting) are very concerning. Both factors suggest significant potential that a dangerous short-squeeze situation could develop if clinical results really do show efficacy of GI's new drug. So, based on the negative demand/supply dynamics for the stock, Stone decides not to add GI to his portfolio.

Solution to 2:

Stone might instead consider expressing his negative view on GI by simply purchasing put options. Alternatively, Stone could purchase a long put calendar spread, where he would buy a put with expiry beyond and sell a put with expiry before the expected release date of the clinical trial results. In that case, the premium received from writing the shorter tenor put would finance, in part, the cost of buying the longer tenor put. As a third possibility, Stone might even consider buying GI shares and then lending them at the attractive 20% rate. In that case, he would need to hedge this long stock position with the purchase of out-of-the-money puts, thereby creating a protective put position. As a final possibility, if out-of-the-money calls are deemed to be expensive because of

positive sentiment, Stone could sell such calls to finance the purchase of out-of-the-money puts, creating a short risk reversal that provides synthetic short exposure.

3.3 Equity Market Neutral

Equity market-neutral (EMN) hedge fund strategies take opposite (i.e., long and short) positions in similar or related equities that have divergent valuations, and they also attempt to maintain a near net zero portfolio exposure to the market. EMN managers neutralize market risk by constructing their portfolios such that the expected portfolio beta is approximately equal to zero. Moreover, managers often choose to set the betas for sectors or industries as well as for such common risk factors as market size, price-to-earnings ratio, or book-to-market ratio, which are also equal to zero. Because these portfolios do not take beta risk but do attempt to neutralize so many other factor risks, they typically must apply leverage to the long and short positions to achieve a meaningful expected return from their individual stock selections. Approaches vary, but equity market-neutral portfolios are often constructed using highly quantitative methodologies; the portfolios end up being more diverse in their holdings; and the portfolios are typically modified and adjusted over shorter time horizons. The condition of zero market beta can also be achieved with the use of derivatives, including stock index futures and options. Whichever way they are constructed, the overall goal of equity market-neutral portfolios is to capture alpha while minimizing portfolio beta exposure.

Although **pairs trading** is just one subset of equity market-neutral investing, it is an intuitively easy example to consider. With this strategy, pairs are identified of similar under- and overvalued equities, divergently valued shares of a holding company and its subsidiaries, or different share classes of the same company (multi-class stocks typically having different voting rights) in which their prices are out of alignment.

In whatever manner they are created, the pairs are monitored for their typical trading patterns relative to each other—conceptually, the degree of co-integration of the two securities' prices. Positions are established when unusually divergent spread pricing between the two paired securities is observed. Underpinning such a strategy is the expectation that the differential valuations or trading relationships will revert to their long-term mean values or their fundamentally-correct trading relationships, with the long position rising and the short position declining in value. Situations will obviously vary, but strictly quantitative EMN pairs trading, while attempting to minimize overall beta exposure, may still have effective short volatility "tail risk" exposure to abnormal market situations of extreme stress. This is less the case if a fundamental pricing discrepancy is being exploited in anticipation of a possible event that would cause that discrepancy to correct.

Another type of EMN trading is **stub trading**, which entails buying and selling stock of a parent company and its subsidiaries, typically weighted by the percentage ownership of the parent company in the subsidiaries. Assume parent company A owns 90% and 75% of subsidiaries B and C, respectively, and shares of A are determined to be overvalued while shares of B and C are deemed undervalued, all relative to their historical mean valuations. Then, for each share of A sold short, the EMN fund would buy 0.90 and 0.75 shares of B and C, respectively.

Yet another type of EMN approach may involve **multi-class trading**, which involves buying and selling different classes of shares of the same company, such as voting and non-voting shares. As with pairs trading, the degree of co-integration of returns and the valuation metrics for the multi-class shares are determined. If/when prices move

outside of their normal ranges, the overvalued shares are sold short while the undervalued shares are purchased. The goal is to gain on the change in relative pricing on the two securities as market pricing reverts to more normal ranges.

Fundamental trade setups—although not per se “equity market neutral” but still designed to be market neutral—may be created that are long or short equity hedged against offsetting bond exposures if relative pricing between the stocks and bonds is deemed to be out of alignment. Such pairs trading is referred to as capital structure arbitrage and will be discussed in the event-driven strategies section. In these situations, attractive expected outcomes are often created from relative security mispricings designed to exploit potential event situations (e.g., a potential merger or bankruptcy) that would have an impact on relative pricing. Moreover, when two bonds are positioned relative to each other (e.g., to exploit a misunderstood difference in bond covenants or a potential differential asset recovery), a market-neutral strategy can also be employed.

When building market-neutral portfolios, sometimes large numbers of securities are traded and positions are adjusted on a daily or even an hourly basis using algorithm-based models. Managers following this approach are referred to as **quantitative market-neutral** managers. The frequent adjustments implemented by such managers are driven by the fact that market prices change faster than company fundamental factors. This price movement triggers a rebalancing of the EMN portfolio back to a market neutrality. When the time horizon of EMN trading shrinks to even shorter intervals and mean reversion and relative momentum characteristics of market behavior are emphasized, quantitative market-neutral trading becomes what is known as statistical arbitrage trading. With EMN and statistical arbitrage trading, a natural push/pull occurs between maintaining an optimal beta-neutral portfolio and the market impacts and brokerage costs of nearly continuous adjusting of the portfolio. So, many EMN managers use trading-cost hurdle models to determine if and when they should rebalance a portfolio.

Overall, the main source of skill for an EMN manager is in security selection, with market timing being of secondary importance. Sector exposure also tends to be constrained, although this can vary by the individual manager’s approach. Managers that are overall beta neutral and specialize in sector rotation exposure as their source of alpha are known as market-neutral tactical asset allocators or macro-oriented market-neutral managers.

3.3.1 *Investment Characteristics*

Equity market-neutral fund managers seek to insulate their portfolios from movements in the overall market, and they can take advantage of divergent valuations by trading specific securities. As discussed, this is often a quantitatively driven process that uses a substantial amount of leverage to generate meaningful return objectives. However, many discretionary EMN managers implement their positions with significantly less leverage.

Overall, EMN managers generally are more useful for portfolio allocation during periods of non-trending or declining markets because they typically deliver returns that are steadier and less volatile than those of many other hedge strategy areas. Over time, their conservative and constrained approach typically results in less-volatile overall returns than those of managers who accept beta exposure. The exception to this norm is when the use of significant leverage may cause forced portfolio downsizing. By using portfolio margining techniques offered by prime brokers, market-neutral managers may run portfolios with up to 300% long versus 300% short exposures. Prime broker portfolio margining rules generally allow managers to maintain such levered positioning until a portfolio loss of a specified magnitude (i.e., excess drawdown) is

incurred. At the time of such excess drawdown, the prime broker can force the manager to downsize his/her overall portfolio exposure. This is a key strategy risk, particularly for quantitative market-neutral managers.

Despite the use of substantial leverage and because of their more standard and overall steady risk/return profiles, equity market-neutral managers are often considered as preferred replacements for (or at least a complement to) fixed-income managers during periods when fixed-income returns are unattractively low/and or the yield curve is flat. EMN managers are, of course, sourcing a very different type of alpha with very different risks than in fixed-income investing. EMN managers must deal with leverage risk, including the issues of availability of leverage and at what cost, and tail risk, particularly the performance of levered portfolios during periods of market stress. Exhibit 4 presents important aspects of this strategy area.

Exhibit 4 Equity Market Neutral—Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- They have relatively modest return profiles, with portfolios aimed to be market neutral, and differing constraints to other factors and sector exposures are allowed.
- They generally have high levels of diversification and liquidity and lower standard deviation of returns than many other strategies across normal market conditions.
- Many different types of EMN managers exist, but many are purely quantitative managers (vs. discretionary managers).
- Time horizons vary, but EMN strategies are typically oriented toward mean reversion, with shorter horizons than other strategies and more active trading.
- Because of often high leverage, EMN strategies typically do not meet regulatory leverage limits for mutual fund vehicles. So, limited partnerships are the preferred vehicle.
- Attractiveness: EMN strategies typically take advantage of idiosyncratic short-term mispricing between securities whose prices should otherwise be co-integrated. Their sources of return and alpha, unlike those of many other strategies, do not require accepting beta risk. So, EMN strategies are especially attractive during periods of market vulnerability and weakness.

Leverage Usage

- High: As many beta risks (e.g., market, sector) are hedged away, it is generally deemed acceptable for EMN managers to apply higher levels of leverage while striving for meaningful return targets.

Benchmarking

- Market-neutral indexes include HFRX and HFRI Equity Market Neutral Indices; Lipper TASS Equity Market Neutral Index; Morningstar/CISDM Equity Market Neutral Index; and Credit Suisse Equity Market Neutral Index.

3.3.2 Strategy Implementation

Equity market-neutral portfolios are constructed in four main steps. First, the investment universe is evaluated to include only tradable securities with sufficient liquidity and adequate short-selling potential. Second, securities are analyzed for buy and sell opportunities using fundamental models (which use company, industry, and economic data as inputs for valuation) and/or statistical and momentum-based models. Third, a portfolio is constructed with constraints to maintain market risk neutrality, whereby the portfolio's market value-weighted beta is approximately zero and there is often dollar (i.e., money), sector, or other factor risk neutrality. Fourth, the availability and cost of leverage are considered in terms of desired return profile and acceptable potential portfolio drawdown risk. The execution costs of the strategy rebalancing are also introduced as a filter for decision making as to how often the portfolio should be rebalanced. Markets are dynamic because volatility and leverage are always changing; therefore, the exposure to the market is always changing. Consequently, EMN managers must actively manage their funds' exposures to remain neutral over time. However, costs are incurred every time the portfolio is rebalanced. So, EMN managers must be very careful to not allow such costs to overwhelm the security-selection alpha that they are attempting to capture.

Note that the following is a simplified example. In reality, most EMN managers would likely not hedge beta on a stock-by-stock basis but rather would hedge beta on an overall portfolio basis. They would also likely consider other security factor attributes.

EXAMPLE 3

Equity Market-Neutral Pairs Trading:

Ling Chang, a Hong Kong-based EMN manager, has been monitoring PepsiCo Inc. (PEP) and Coca-Cola Co. (KO), two global beverage industry giants. After examining the Asia marketing strategy for a new PEP drink, Chang feels the marketing campaign is too controversial and the overall market is too narrow. Although PEP has relatively weak earnings prospects compared to KO, 3-month valuation metrics show PEP shares are substantially overvalued versus KO shares (relative valuations have moved beyond their historical ranges). As part of a larger portfolio, Chang wants to allocate \$1 million to the PEP versus KO trade and notes the historical betas and S&P 500 Index weights, as shown in the following table.

Stock	Beta	S&P 500 Index Weight
PEP	0.65	0.663
KO	0.55	0.718

Discuss how Chang might implement an EMN pairs trading strategy.

Solution:

Chang should take a short position in PEP and a long position in KO with equal beta-weighted exposures. Given Chang wants to allocate \$1 million to the trade, she would take on a long KO position of \$1 million. Assuming realized betas will be similar to historical betas, to achieve an equal beta-weighted exposure for the short PEP position, Chang needs to short \$846,154 worth of PEP shares [= $-\$1,000,000 / (0.65/0.55)$]. Only the overall difference in performance between PEP and KO shares would affect the performance of the strategy because it will

be insulated from the effect of market fluctuations. If over the next 3 months the valuations of PEP and KO revert to within normal ranges, then this pairs trading EMN strategy should reap profits.

Note: The S&P 500 Index weights are not needed to answer this question.

4

EVENT-DRIVEN STRATEGIES

Event-driven (ED) hedge fund strategies take positions in corporate securities and derivatives that are attempting to profit from the outcome of mergers and acquisitions, bankruptcies, share issuances, buybacks, capital restructurings, re-organizations, accounting changes, and similar events. ED hedge fund managers analyze companies' financial statements and regulatory filings and closely examine corporate governance issues (e.g., management structure, board composition, issues for shareholder consideration, proxy voting) as well as firms' strategic objectives, competitive position, and other firm-specific issues. Investments can be made either proactively in anticipation of an event that has yet to occur (i.e., a **soft-catalyst event-driven approach**), or investments can be made in reaction to an already announced corporate event in which security prices related to the event have yet to fully converge (i.e., a **hard-catalyst event-driven approach**). The hard approach is generally less volatile and less risky than soft-catalyst investing. Merger arbitrage and distressed securities are among the most common ED strategies.

4.1 Merger Arbitrage

Mergers and acquisitions can be classified by the method of purchase: cash-for-stock or stock-for-stock. In a cash-for-stock acquisition, the acquiring company (A) offers the target company (T) a cash price per share to acquire T. For example, assume T's share price is \$30 and A decides to purchase T for \$40 per share (i.e., A is offering a 33% premium to purchase T's shares). In a stock-for-stock acquisition, A offers a specific number of its shares in exchange for 1 T share. So, if A's share price is \$20 and it offers 2 of its shares in exchange for 1 T share, then T's shareholders would receive a value of \$40 per T share, assuming A's share price is constant until the merger is completed. Although merger deals are structured in different ways for many reasons (e.g., tax implications, corporate structure, or provisions to dissuade a merger, such as a "poison pill"¹), acquiring companies are generally more likely to offer cash for their target companies when cash surpluses are high. However, if the stock prices are high and acquiring companies' shares are considered richly valued by management, then stock-for-stock acquisitions can take advantage of potentially overvalued shares as a "currency" to acquire target companies.

4.1.1 Investment Characteristics

In a cash-for-stock acquisition, the merger-arb manager may choose to buy just the target company (T), expecting it to increase in value once the acquisition is completed. In a stock-for-stock deal, the fund manager typically buys T and sells the acquiring company (A) in the same ratio as the offer, hoping to earn the spread on successful deal completion. If the acquisition is unsuccessful, the manager faces losses if the

¹ A poison pill is a pre-offer takeover defense mechanism that gives target company bondholders the right to sell their bonds back to the target at a pre-specified redemption price, typically at or above par; this defense increases the acquirer's need for cash and raises the cost of the acquisition.

price of T (A) has already risen (fallen) in anticipation of the acquisition. Less often, managers take the view that the acquisition will fail—usually due to anti-competition or other regulatory concerns. In this case, he/she would sell T and buy A.

For most acquisitions, the initial announcement of a deal will cause the target company's stock price to rise toward the acquisition price and the acquirer's stock price to fall (either because of the potential dilution of its outstanding shares or the use of cash for purposes other than a dividend payment). The considerable lag time between deal announcement and closing means that proposed merger deals can always fail for any variety of reasons, including lack of financing, regulatory hurdles, and not passing financial due diligence. Hostile takeover bids, where the target company's management has not already agreed to the terms of a merger, are typically less likely to be successfully completed than friendly takeovers, where the target's management has already agreed to merger terms.

Approximately 70%–90% of announced mergers in the United States eventually close successfully. Given the probability that some mergers will not close for whatever reason as well as the costs of establishing a merger arbitrage position (e.g., borrowing the acquiring stock, commissions) and the risk that merger terms might be changed because of market conditions (especially in stressed market environments), merger arbitrage typically offers a 3%–7% return spread depending on the deal-specific risks. Of course, a particularly risky deal might carry an even larger spread. If the average time for merger deal completion is 3–4 months—with managers recycling capital into new deals several times a year and typically applying some leverage to their portfolio positions—then attractive return/risk profiles can be created, earning net annualized returns in the range of 7%–12%, with little correlation to non-deal-specific factors. Diversifying across a variety of mergers, deals, and industries can further help hedge the risk of any one deal failing. So overall, this strategy can be a good uncorrelated source of alpha.

When merger deals do fail, the initial price rise (fall) of the target (acquirer) company is typically reversed. Arbitrageurs who jumped into the merger situation after its initial announcement stand to incur substantial losses on their long (short) position in the target (acquirer)—often as large as negative 20% to 40%. So, the strategy thus does have left-tail risk associated with it.

Corporate events are typically binary: An acquisition either succeeds or fails. The merger arbitrage strategy can be viewed as selling insurance on the acquisition. If the acquisition succeeds (no adverse event occurs), then the hedge fund manager collects the spread (like the premium an insurance company receives for selling insurance) for taking on event risk. If the acquisition fails (an adverse event occurs), then he/she faces the losses on the long and short positions (similar to an insurance company paying out a policy benefit after an insured event has occurred). Thus, the payoff profile of the merger arbitrage strategy resembles that of a riskless bond and a short put option. The merger arbitrage investor also can be viewed as owning an additional call option that becomes valuable if/when another interested acquirer (i.e., White Knight) makes a higher bid for the target company before the initial merger proposal is completed. Exhibit 5 shows risk and return attributes of merger arbitrage investing.

Exhibit 5 Event-Driven Merger Arbitrage—Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- Merger arbitrage is a relatively liquid strategy—with defined gains from idiosyncratic single security takeover situations but occasional downside shocks when merger deals unexpectedly fail.

(continued)

Exhibit 5 (Continued)

- To the extent that deals are more likely to fail in market stress periods, this strategy has market sensitivity and left-tail risk attributes. Its return profile is insurance-like plus a short put option.
- Because cross-border merger and acquisition (M&A) usually involves two sets of governmental approvals and M&A deals involving vertical integration often face anti-trust scrutiny, these situations carry higher risks and offer wider merger spread returns.
- Some merger arbitrage managers invest only in friendly deals trading at relatively tight spreads, while others embrace riskier hostile takeovers trading at wider spreads. In the latter case, there may be expectations of a higher bid from a White Knight.
- The preferred vehicle is limited partnership because of merger arbitrage's use of significant leverage, but some low-leverage, low-volatility liquid alt merger arbitrage funds do exist.
- Attractiveness: Relatively high Sharpe ratios with typically low double-digit returns and mid–single digit standard deviation (depending on specific levels of leverage applied), but left-tail risk is associated with an otherwise steady return profile.

Leverage Usage

- Moderate to high: Managers typically apply 3 to 5 times leverage to this strategy to generate meaningful target return levels.

Benchmarking

- Sub-indexes include HFRX or HFRI Merger Arbitrage Index; CISDM Hedge Fund Merger Arbitrage Index; and Credit Suisse Merger Arbitrage Index.

4.1.2 Strategy Implementation

Merger arbitrage strategies are typically established using common equities; however, a range of other corporate securities, including preferred stock, senior and junior debt, convertible securities, options, and other derivatives, may also be used for positioning and hedging purposes. Often for a cash-for-stock acquisition, a hedge fund manager may choose to use leverage to buy the target firm. For a stock-for-stock acquisition, leverage may also often be used, but short selling the acquiring firm may be difficult due to liquidity issues or short-selling constraints, especially in emerging markets. Merger arbitrage strategies can utilize derivatives to overcome some short-sale constraints or to manage risks if the deal were to fail. For example, the manager could buy out-of-the money (O-T-M) puts on T and/or buy O-T-M call options on A (to cover the short position).

Convertible securities also provide exposure with asymmetrical payoffs. For example, the convertible bonds of T would also rise in value as T's shares rise because of the acquisition; the convertibles' bond value would provide a cushion if the deal fails and T's shares fall. When the acquiring company's credit is superior to the target company's credit, trades may be implemented using credit default swaps (CDS). In this case, protection would be sold (i.e., shorting the CDS) on the target company to benefit from its improved credit quality (and decline in price of protection and the CDS) once a merger is completed. If the pricing is sufficiently cheap, buying protection

(i.e., going long the CDS) on the target may also be used as a partial hedge against a merger deal failing. Overall market risk (that could potentially disrupt a merger's consummation) might also be hedged by using added short equity index ETFs/futures or long equity index put positions.

In sum, the true source of return alpha for a merger arbitrage hedge fund manager is in the initial decision as to which deals to embrace and which to avoid. However, once involved with a given merger situation, there may be multiple ways to implement a position depending on the manager's deal-specific perspectives.

EXAMPLE 4

Merger Arbitrage Strategy Payoffs

An acquiring firm (A) is trading at \$45/share and has offered to buy target firm (T) in a stock-for-stock deal. The offer ratio is 1 share of A in exchange for 2 shares of T. Target firm T was trading at \$15 per share just prior to the announcement of the offer. Shortly thereafter, T's share price jumps up to \$19 while A's share price falls to \$42 in anticipation of the merger receiving required approvals and the deal closing successfully. A hedge fund manager is confident this deal will be completed, so he buys 20,000 shares of T and sells short 10,000 shares of A.

What are the payoffs of the merger arbitrage strategy if the deal is successfully completed or if the merger fails?

Solution:

At current prices it costs \$380,000 to buy 20,000 shares of T, and \$420,000 would be received for short selling 10,000 shares of A. This provides a net spread of \$40,000 to the hedge fund manager if the merger is successfully completed. If the merger fails, then prices should revert to their pre-merger announcement levels. The manager would need to buy back 10,000 shares of A at \$45 (costing \$450,000) to close the short position, while the long position in 20,000 shares of T would fall to \$15 per share (value at \$300,000). This would cause a total loss of \$110,000 [= (A: +\$420,000 – \$450,000) + (T: –\$380,000 + \$300,000)]. In sum, this merger strategy is equivalent to holding a riskless bond with a face value of \$40,000 (the payoff for a successful deal) and a short binary put option, which expires worthless if the merger succeeds but pays out \$110,000 if the merger fails.

4.2 Distressed Securities

Distressed securities strategies focus on firms that either are in bankruptcy, facing potential bankruptcy, or under financial stress. Firms face these circumstances for a wide variety of reasons, including waning competitiveness, excessive leverage, poor governance, accounting irregularities, or outright fraud. Often the securities of such companies have been sold out of long-only portfolios and may be trading at a significant discount to their eventual work-out value under proper stewardship and guidance. Because hedge funds are not constrained by institutional requirements on minimum credit quality, hedge fund managers are often natural candidates to take positions in such situations. Hedge funds, generally, also provide their investors only periodic liquidity (typically quarterly or sometimes only annually), making the illiquid nature of such securities less problematic than if such positions were held within a mutual fund. Hedge fund managers may find inefficiently priced securities before, during, or after the bankruptcy process, but typically they will be looking to realize their returns somewhat faster than the longer-term orientation of private equity firms. However,

this is not always the case; for example, managers that invest in some distressed sovereign debt (e.g., Puerto Rico, Venezuela) often must face long time horizons to collect their payouts.

At times, distressed hedge fund managers may seek to own the majority or all of a certain class of securities within the capital structure, which enables them to exert creditor control in the corporate bankruptcy or reorganization process. Such securities will vary by country depending on individual bankruptcy laws and procedures. Some managers are active in their distressed investing by building concentrated positions and placing representatives on the boards of the companies they are seeking to turn around. Other distressed managers may be more “passive” in their orientation, relying on others to bear the often substantial legal costs of a corporate capital structure reorganization that may at times involve expensive proxy contests.

By nature, distressed debt and other illiquid assets may take several years to resolve, and they are generally difficult to value. Therefore, hedge fund managers running portfolios of distressed securities typically require relatively long initial lock-up periods (e.g., no redemptions allowed for the first two years) from their investors. Distressed investment managers may also impose fund-level or investor-level redemption gates that are meant to limit the amount of money that investors (i.e., limited partners) may withdraw from a partnership during any given quarter. As for valuing distressed securities, external valuation specialists may be needed to provide an independent estimate of fair value. Valuations of distressed securities with little or no liquidity (e.g., those deemed Level 3 assets for US accounting purposes) are subject to the smoothing effect of “mark-to-model” price determination.

The bankruptcy process typically results in one or two outcomes: liquidation or firm re-organization. In a liquidation, the firm’s assets are sold off over some time period; then, based on the priority of their claim, debt- and equity-holders are paid off sequentially. In this case, claimants on the firm’s assets are paid in order of priority from senior secured debt, junior secured debt, unsecured debt, convertible debt, preferred stock, and finally common stock. In a re-organization, a firm’s capital structure is re-organized and the terms for current claims are negotiated and revised. Current debtholders may agree to extend the maturity of their debt contracts or even to exchange their debt for new equity shares. In this case, existing equity would be canceled (so existing shareholders would be left with nothing) and new equity issued, which would also be sold to new investors to raise funds to improve the firm’s financial condition.

4.2.1 *Investment Characteristics*

Distressed securities present new sets of risks and opportunities and thus require special skills and increased monitoring. As previously mentioned, many institutional investors, like banks and insurance companies, by their mandates cannot hold non-investment-grade securities in their portfolios. As a result, many such investors must sell off investments in firms facing financial distress. This situation may result in illiquidity and significant price discounting when trades do occur, but it also creates potentially attractive opportunities for hedge funds. Moreover, the movement from financial distress to bankruptcy can unfold over long periods and because of the complexities of legal proceedings, informational inefficiencies cause securities to be improperly valued.

To successfully invest in distressed securities, hedge fund managers require specific skills for analyzing complicated legal proceedings, bankruptcy processes, creditor committee discussions, and re-organization scenarios. They also must be able to anticipate market reactions to these actions. At times, and depending on relative pricing, managers may establish “capital structure arbitrage” positions: For the same distressed entity, they may be long securities where they expect to receive acceptable recoveries but short other securities (including equity) where the value-recovery prospects are dim.

Current market conditions also affect the success of distressed securities strategies. In liquidation, assets may need to be sold quickly, and discounted selling prices will lower the total recovery rate. When illiquid assets must be sold quickly, forced sales and liquidity spirals may lead to fire-sale prices. For re-organizations, current market conditions partly determine whether (and how much) a firm can raise capital from asset sales and/or from the issuance of new equity. Exhibit 6 provides some key attributes of distressed securities investing.

Exhibit 6 Distressed Securities—Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- The return profile for distressed securities investing is typically at the higher end of event-driven strategies but with more variability.
- Outright shorts or hedged positions are possible, but distressed securities investing is usually long-biased. It is subject to security-specific outcomes but still impacted by the health of the macro-economy.
- Distressed securities investing typically entails relatively high levels of illiquidity, especially if using a concentrated activist approach. Pricing may involve “mark-to-model” with return smoothing. Ultimate results are generally binary: either very good or very bad.
- Attractiveness: Returns tend to be “lumpy” and somewhat cyclical. Distressed investing is particularly attractive in the early stages of an economic recovery after a period of market dislocation.

Leverage Usage

- Moderate to low: Because of the inherent volatility and long-biased nature of distressed securities investing, hedge fund managers utilize modest levels of leverage, typically with 1.2 to 1.7 times NAV invested, and with some of the nominal leverage from derivatives hedging.

Benchmarking

- Hedge fund sub-indexes include HFRX and HFRI Distressed Indices; CISDM Distressed Securities Index; Lipper TASS Event-Driven Index; and Credit Suisse Event Driven Distressed Hedge Fund Index.

Note: Alpha produced by distressed securities managers tends to be idiosyncratic. Also, the strategy capitalizes on information inefficiencies and structural inability of traditional managers to hold such securities.

4.2.2 Strategy Implementation

Hedge fund managers take several approaches when investing in distressed securities. In a liquidation situation, the focus is on determining the recovery value for different classes of claimants. If the fund manager’s estimate of recovery value is higher than market expectations, perhaps due to illiquidity issues, then he/she can buy the undervalued debt securities in hopes of realizing the higher recovery rate. For example, assume bankrupt company X’s senior secured debt is priced at 50% of par. By conducting research on the quality of the collateral and by estimating potential cash flows (and their timing) in liquidation, the hedge fund manager estimates a recovery

rate of 75%. He/she can buy the senior secured debt and expect to realize the positive difference in recovery rates. However, even assuming the manager is correct, if the liquidation process drags on and/or market conditions deteriorate, then this premium may be only partly realized, if at all.

In a reorganization situation, the hedge fund manager's focus is on how the firm's finances will be restructured and on assessing the value of the business enterprise and the future value of different classes of claims. There are various avenues for investing in a re-organization. The manager will evaluate the different securities of the company in question and purchase those deemed to be undervalued given the likely re-organization outcome. The selection of security will also depend on whether the manager seeks a control position or not. If so, he/she will be active in the negotiating process and will seek to identify fulcrum securities that provide leverage (or even liquidation) in the reorganization. **Fulcrum securities** are partially-in-the-money claims (not expected to be repaid in full) whose holders end up owning the reorganized company. Assuming the re-organization is caused by excessive financial leverage but the company's operating prospects are still good, a financial restructuring may be implemented whereby senior unsecured debt purchased by the hedge fund manager is swapped for new shares (existing debt and equity are cancelled) and new equity investors inject fresh capital into the company. As financial distress passes and the intrinsic value of the reorganized company rises, an initial public offering (IPO) would likely be undertaken. The hedge fund manager could then exit and earn the difference between what was paid for the undervalued senior unsecured debt and the proceeds received from selling the new shares of the revitalized company in the IPO.

EXAMPLE 5

Capital Structure Arbitrage in the Energy Crisis of 2015–2016

With a sudden structural increase in US energy reserves caused by modern fracking techniques, oil prices tumbled dramatically from more than \$60/barrel in mid-2015 to less than \$30/barrel in early 2016. Debt investors suddenly became concerned about the very survivability of the smaller, highly levered exploration and production (E&P) companies if such low energy prices were to persist. Prices of many energy-related, junior, unsecured, non-investment-grade debt securities fell dramatically. However, retail equity investors generally reacted more benignly. As a result, the shares of several such E&P companies still carried significant implied enterprise value while their debt securities traded as if bankruptcy was imminent.

- 1 Discuss why such a divergence in the valuation of the debt and equity securities of these E&P companies might have occurred.
- 2 Discuss how a hedge fund manager specializing in distressed securities might take advantage of this situation.

Solution to 1:

This divergence in valuation occurred because of structural differences between the natural holders of debt and equity securities. Institutional holders of the debt likely felt more compelled, or in some cases were required by investment policy, to sell these securities as credit ratings on these bonds were slashed. Retail equity investors were likely less informed as to the potential seriousness of the impact of such a sharp energy price decline on corporate survivability. With equity markets overall still moving broadly higher, retail equityholders may have been expressing a “buy the dip” mentality. Such cross-asset arbitrage

situations represent a significant opportunity for nimble and flexible hedge fund managers that are unrestrained by a single asset class perspective or other institutional constraints.

Solution to 2:

An astute hedge fund manager would have realized three key points: 1) the junior unsecured debt securities were temporarily undervalued; 2) although bankruptcy in certain specific companies was indeed possible (depending on how long energy prices stayed low), detailed research could uncover those E&P companies for which bankruptcy was less likely; and 3) the unsecured debt securities could be purchased with some safety by shorting the still overvalued equities (or buying put options on those equities) as a hedge.

If energy prices subsequently remained low for too long and bankruptcy was indeed encountered, the equities would become worthless. However, the unsecured debt might still have some recovery value from corporate asset sales, or these securities might become the fulcrum securities that would be converted in a bankruptcy reorganization into new equity in an ongoing enterprise. Alternatively, if oil prices were to recover (as indeed transpired; oil prices closed 2017 at more than \$60/barrel), the unsecured debt securities of many of these companies would rebound far more substantially than their equity shares would rise.

In sum, a distressed securities hedge fund arbitrageur willing to take a position in the unsecured debt hedged against short equity (or long puts on the equity) could make money under a variety of possible outcomes.

RELATIVE VALUE STRATEGIES

5

We have previously described equity market-neutral investing as one specific equity-oriented relative value hedge fund approach, but other types of relative value strategies are common for hedge funds involving fixed-income securities and hybrid convertible debt. Like equity market-neutral trading, many of these strategies involve the significant use of leverage. Changes in credit quality, liquidity, and implied volatility (for securities with embedded options) are some of the causes of relative valuation differences. During normal market conditions, successful relative value strategies can earn credit, liquidity, or volatility premiums over time. But, in crisis periods—when excessive leverage, deteriorating credit quality, illiquidity, and volatility spikes come to the fore—relative value strategies can result in losses. Fixed-income arbitrage and convertible bond arbitrage are among the most common relative value strategies.

5.1 Fixed-Income Arbitrage

Fixed-income arbitrage strategies attempt to exploit pricing inefficiencies by taking long and short positions across a range of debt securities, including sovereign and corporate bonds, bank loans, and consumer debt (e.g., credit card loans, student loans, mortgage-backed securities). Arbitrage opportunities between fixed-income instruments may develop because of variations in duration, credit quality, liquidity, and optionality.

5.1.1 *Investment Characteristics*

In its simplest form, fixed-income arbitrage involves buying the relatively undervalued securities and short selling the relatively overvalued securities with the expectation that the mispricing will resolve itself (reversion back to normal valuations) within the specified investment horizon. Valuation differences beyond normal historical ranges can result from differences in credit quality (investment-grade versus non-investment-grade securities), differences in liquidity (on-the-run versus off-the-run securities), differences in volatility expectations (especially for securities with embedded options), and even differences in issue sizes. More generally, fixed-income arbitrage can be characterized as exploiting price differences relative to expected future price relationships, with mean reversion being one important aspect. In many instances, realizing a net positive relative carry over time may also be the goal of the relative security positioning, which may involve exploiting kinks in a yield curve or an expected shift in the shape of a yield curve.

Where positioning may involve the acceptance of certain relative credit risks across different security issuers, fixed-income arbitrage morphs into what is more broadly referred to as L/S credit trading. This version of trading tends to be naturally more volatile than the exploitation of small pricing differences within sovereign debt alone.

Unless trading a price discrepancy directly involves establishing a desired yield curve exposure, fixed-income arbitrageurs will typically immunize their strategies, which involve both long and short positions, from interest rate risk by taking duration-neutral positions. However, duration neutrality provides a hedge against only small shifts in the yield curve. To hedge against large yield changes and/or non-parallel yield curve movements (i.e., steepening or flattening), the manager might employ a range of fixed-income derivatives, including futures, forwards, swaps, and swaptions (i.e., options on a swap). Moreover, fixed-income securities also vary in their complexity. For example, in addition to interest rate risk, straight government debt is exposed to sovereign risk (and potentially currency risk), which can be substantial in many countries, while asset-backed and mortgaged-backed securities are subject to credit risk and pre-payment risk. Derivatives are also useful for hedging such risks.

Fixed-income security pricing inefficiencies are often quite small, especially in the more-efficient developed capital markets, but the correlation aspects across different securities is typically quite high. Consequently, it may be necessary and acceptable to utilize substantial amounts of leverage to exploit these inefficiencies. Typical leverage ratios in fixed-income arbitrage strategies can be 4 to 5 times (assets to equity). In the case of some market-neutral multi-strategy funds, where fixed-income arbitrage may form just a portion of total risk, fixed-income arbitrage leverage levels can sometimes be as high as 12 to 15 times assets to equity. Of course, leverage will magnify the myriad risks to which fixed-income strategies are exposed, especially during stressed market conditions.

Another factor that has compounded the risks of fixed-income arbitrage strategies has been the inclination of financial engineers to create tranching, structured products around certain fixed-income cash flows—particularly involving residential mortgages—to isolate certain aspects of credit risk and prepayment risk. For example, within a pool of mortgages, cash flows may be divided such that some credit tranche holders have seniority over others or so that interest-only income payments flow to one set of holders and principal-only payoffs flow to another set of holders. The risks of relative value strategies involving mortgage-related securities, which are especially relevant during periods of market stress, include negative convexity aspects of many mortgage-backed securities and some of the structured products built around them; underlying default rates potentially exceeding expectations and resulting in a high-volatility environment; balance sheet leverage of hedge funds; and hedge fund investor redemption pressures.

Globally, fixed-income markets are substantially larger in total issuance size and scale than equity markets and come in a myriad of different securities types. Away from on-the-run government securities and other sovereign-backed debt securities, which in most developed financial markets are generally very liquid, the liquidity aspects of many fixed-income securities are typically poor. This creates relative value arbitrage opportunities for hedge fund managers, but it also entails positioning and liquidity risks in portfolio management. Natural price opaqueness must often be overcome—particularly for “off-the-run” securities that may trade only occasionally. Liquidity in certain municipal bond markets and corporate debt markets, for example, can be particularly thin. Some key points of fixed-income arbitrage appear in Exhibit 7.

Exhibit 7 Fixed-Income Arbitrage—Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- The risk/return profile of fixed-income arbitrage trading derives from the high correlations found across different securities, the yield spread pick-up to be captured, and the sheer number of different types of debt securities across different markets with different credit quality and convexity aspects in their pricing. Structured products built around debt securities introduce added complexity that may result in mispricing opportunities.
- Yield curve and carry trades within the US government universe tend to be very liquid but typically have the fewest mispricing opportunities. Liquidity for relative value positions generally decreases in other sovereign markets, mortgage-related markets, and especially across corporate debt markets.
- Attractiveness: A function of correlations between different securities, the yield spread available, and the high number and wide diversity of debt securities across different markets.

Leverage Usage

- High: This strategy has high leverage usage, but leverage availability typically diminishes with product complexity. To achieve the desired leverage, prime brokers offer collateralized repurchase agreements with associated leverage “haircuts” depending on the types of securities being traded. The haircut is the prime broker’s cushion against market volatility and illiquidity if posted collateral ever needs to be liquidated.

Benchmarking

- This is a broad category that encompasses the following sub-indexes: HFRX and HFRI Fixed Income Relative Value Indices; Lipper TASS Fixed Income Arbitrage Index; CISDM Debt Arbitrage Index; and Credit Suisse Fixed Income Arbitrage Index.

Note: HFRX and HFRI also offer more granular hedge fund fixed-income, relative value indexes related to sovereign bonds trading, credit trading, and asset-backed trading.

5.1.2 Strategy Implementation

The most common types of fixed-income arbitrage strategies include yield curve trades and carry trades. Considering yield curve trades, the prevalent calendar spread strategy involves taking long and short positions at different points on the yield curve where the relative mispricing of securities offers the best opportunities, such as in a curve flattening or steepening, to profit. Perceptions and forecasts of macroeconomic conditions are the backdrop for these types of trades. The positions can be in fixed-income securities of the same issuer; in that case, most credit and liquidity risks would likely be hedged, making interest rate risk the main concern. Alternatively, longs and shorts can be taken in the securities of different issuers—but typically ones operating in the same industry or sector. In this case, differences in credit quality, liquidity, volatility, and issue-specific characteristics would likely drive the relative mispricing. In either case, the hedge fund manager aims to profit as the mispricing reverses (mean reversion occurs) and the longs rise and shorts fall in value within the targeted time frame.

Carry trades involve going long a higher yielding security and shorting a lower yielding security with the expectation of receiving the positive carry and of profiting on long and short sides of the trade when the temporary relative mispricing reverts to normal. A classic example of a fixed-income arbitrage trade involves buying lower liquidity, off-the-run government securities and selling higher liquidity, duration matched, on-the-run government securities. Interest rate and credit risks are hedged because long and short positions have the same duration and credit exposure. So, the key concern is liquidity risk. Under normal conditions, as time passes the more (less) expensive on- (off-) the-run securities will decrease (increase) in price as the current on-the-runs are replaced by a more liquid issue of new on-the-run bonds that then become off-the-run bonds.

The payoff profile of this fixed-income arbitrage strategy resembles a short put option. If the strategy unfolds as expected, it returns a positive carry plus a profit from spread narrowing. But, if the spread unexpectedly widens, then the payoff becomes negative. Mispricing of government securities is generally small, so substantial leverage would typically be used to magnify potential profits. But, with highly levered positions, even a temporary negative price shock can be sufficient to set off a wave of margin calls that force fund managers to sell at significant losses. Such a scenario in the wake of the 1997 Asian Financial Crisis and the 1998 Russian Ruble Crisis led to the collapse and subsequent US Federal Reserve-supervised bailout of legendary hedge fund Long-Term Capital Management. It is important to note that there are far more complex relative value fixed-income strategies beyond just yield curve trades, carry trades, or relative credit trades.

EXAMPLE 6

Fixed-Income Arbitrage: Treasuries vs. Inflation Swap + TIPS

Guernsey Shore Hedge Fund closely monitors government bond markets and looks for valuation discrepancies among the different issues.

Portfolio manager Nick Landers knows that Treasury Inflation-Protected Securities (TIPS) pay a coupon (i.e., real yield) while accruing inflation into the principal, which is paid at maturity. This insulates the TIPS owner from inflation risk.

Landers also understands that because the US government issues both TIPS and Treasuries that have the same maturity, they should trade at similar yields after adjusting for inflation. Landers knows that by using OTC inflation swaps, the inflation-linked components of TIPS can be locked in, thereby fixing all payments to be similar to those of a Treasury bond.

After accounting for expected inflation in normal periods, global investors often prefer Treasuries to inflation-indexed bonds. This may be because market participants do not fully trust the way inflation may be measured over time. As such, inflation-hedged TIPS (as a package with the associated offsetting inflation swap) have typically yielded about 25 bps to 35 bps more than similar maturity Treasuries.

During a period of extreme market distress, in November 2XXX, Landers keenly observed that TIPS were particularly mispriced. Their yields, adjusted for inflation, were substantially higher than straight Treasuries, while inflation swaps were priced as if outright deflation was imminent. Landers notes the information on the relative pricing of these different products and considers whether to implement the follow trade:

November 2XXX	Fixed Rate	Inflation Rate	Cost
Buy 5-year TIPS	Receive 3.74%	Receive inflation	–1,000,000
Short 5-year Treasuries	Pay 2.56%	—	+1,000,000
Inflation swap: receive fixed rate and pay inflation index	Receive 1.36%	Pay inflation	0
Net of three trades	Receive 2.54%	—	0

Discuss whether Landers has uncovered a risk-free arbitrage, and if so, discuss some of the risks he may still face with its execution.

Solution:

The situation observed by Landers occurred during a period of extreme market stress. In such turbulent times, instances of very attractive, near risk-free arbitrage can occur, as in this case. Often these periods are characterized by a fear of deflation, so straight Treasury bonds are in high demand for flight-to-quality reasons. But there would be some operational hurdles to overcome. For Landers to short the expensive Treasuries and buy the more attractive TIPS, Guernsey Shore would need access as a counterparty to the interbank repurchase market to borrow the Treasury bonds. Bank credit approval [via an International Swaps and Derivatives Association (ISDA) relationship] would also be required for accessing the inflation swap market for yield enhancement and to lock in the inflation hedge. Unfortunately, during periods of extreme market distress, credit lines to hedge funds typically shrink (or are withdrawn), not expanded. Moreover, there is potential for “losing the borrow” on the short Treasuries (i.e., the lender demanding return of his/her Treasuries), which makes the trade potentially difficult to maintain. Assuming Guernsey Shore met these operational requirements, Landers would need to act quickly to capture the fixed-income arbitrage profit of 2.54%. Such extreme levels of arbitrage rarely persist for very long.

5.2 Convertible Bond Arbitrage

Convertible bonds are hybrid securities that can be viewed as a combination of straight debt plus a long equity call option with an exercise price equal to the strike price times the conversion ratio (also known as conversion value). The conversion ratio is the number of shares for which the bond can be exchanged. The bond’s

current conversion price is the current stock price times the conversion ratio. If the bond's current conversion price is significantly below the conversion value, the call is out-of-the-money and the convertible bond will behave more like a straight bond. Conversely, if the conversion price is significantly above the conversion value, the call is in-the-money and the convertible bond will behave more like the underlying equity.

5.2.1 *Investment Characteristics*

Convertible securities are naturally complex and thus generally not well understood. They are impacted by numerous factors, including overall interest rate levels, corporate credit spreads, bond coupon and principal cash flows, and the value of the embedded stock option (which itself is influenced by dividend payments, stock price movements, and equity volatility). Convertibles are often issued sporadically by companies in relatively small sizes compared to straight debt issuances, and thus they are typically thinly-traded securities. Moreover, most convertibles are non-rated and typically have fewer covenants than straight bonds. Because the equity option value is embedded within such thinly-traded, complex securities, the embedded options within convertibles tend to trade at relatively low implied volatility levels compared to the historical volatility level of the underlying equity. Convertibles also trade cyclically relative to the amount of new issuance of such securities in the overall market. The higher the new convertible issuance that the market must absorb, the cheaper their pricing and the more attractive the arbitrage opportunities for a hedge fund manager.

The key problem for the convertible arbitrage manager is that to access and extract the relatively cheap embedded optionality of the convertible, he/she must accept or hedge away other risks that are embedded in the convertible security. These include interest rate risk, credit risk of the corporate issuer, and market risk (i.e., the risk that the stock price will decline and thus render the embedded call option less valuable). Should the convertible manager desire, all these risks can be hedged using a combination of interest rate derivatives, credit default swaps, and short sales of an appropriate delta-adjusted amount of the underlying stock. The purchase of put options can also be a stock-sale substitute. The use of any such hedging tools may also erode the very attractiveness of the targeted convertible holding.

Convertible managers who are more willing to accept credit risk may choose to not hedge the credit default risk of the corporate issuer; instead, they will take on the convertible position more from a credit risk perspective. Such managers are known as credit-oriented convertible managers. Other managers may hedge the credit risk but will take a more long-biased, directional view of the underlying stock and then underhedge the convertible's equity exposure. Yet other managers may overhedge the equity risk to create a bearish tilt with respect to the underlying stock, thus providing a more focused exposure to increased volatility. These managers are referred to as volatility-oriented convertible managers. In sum, several different ways and styles can be utilized to set up convertible arbitrage exposures. Exhibit 8 presents some key aspects of convertible bond arbitrage.

Exhibit 8 Convertible Bond Arbitrage—Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- Convertible arbitrage managers strive to extract and benefit from this structurally cheap source of implied volatility by delta hedging and gamma trading short equity hedges against their long convertible holdings.

Exhibit 8 (Continued)

- Liquidity issues surface for convertible arbitrage strategies in two ways: 1) naturally less-liquid securities because of their relatively small issue sizes and inherent complexities; 2) availability and cost to borrow underlying equity for short selling.
- Attractiveness: Convertible arbitrage works best during periods of high convertible issuance, moderate volatility, and reasonable market liquidity. It fares less well in periods of acute credit weakness and general illiquidity, when the pricing of convertible securities is unduly impacted by supply/demand imbalances.

Leverage Usage

- High: Because of many legs needed to implement convertible arbitrage trades (e.g., short sale, CDS transaction, interest rate hedge), relatively high levels of leverage are used to extract a modest ultimate gain from delta hedging. Managers typically run convertible portfolios at 300% long vs. 200% short, the lower short exposure being a function of the delta-adjusted equity exposure needed from short sales to balance the long convertible.

Benchmarking

- Sub-indexes include HFRX and HFRI FI-Convertible Arbitrage Indices; Lipper TASS Convertible Arbitrage Index; CISDM Convertible Arbitrage Index; and Credit Suisse Convertible Arbitrage Index.

Note: Convertible bond arbitrage is a core hedge fund strategy area that is run within many multi-strategy hedge funds together with L/S equity, merger arbitrage, and other event-driven distressed strategies.

5.2.2 Strategy Implementation

A classic convertible bond arbitrage strategy is to buy the relatively undervalued convertible bond and take a short position in the relatively overvalued underlying stock. The number of shares to sell short to achieve a delta neutral overall position is determined by the delta of the convertible bond. For convertible bonds with high bond conversion prices relative to the conversion value, the delta will be close to 1. For convertibles with low bond conversion prices relative to the conversion value, the delta will be closer to 0. The combination of a long convertible and short equity delta exposure would create a situation where for small changes in the equity price, the portfolio will remain essentially balanced. As the underlying stock price moves further, however, the delta hedge of the convertible will change because the convertible is an instrument with the natural positive convexity attributes of positive gamma. Because stock gamma is always zero, the convertible arbitrage strategy will leave the convertible arbitrageur “synthetically” longer in total equity exposure as the underlying security price rises and synthetically less long as the equity price falls. This added gamma-driven exposure can then be hedged at favorable levels with appropriate sizing adjustments of the underlying short stock hedge—selling more stock at higher levels and buying more stock at lower levels. The convertible arbitrage strategy will be profitable given sufficiently large stock price swings and proper periodic rebalancing (assuming all else equal). If realized equity volatility exceeds the implied volatility of the convertible’s embedded option (net of hedging costs), an overall gain is achieved by the arbitrageur.

Several circumstances can create concerns for a convertible arbitrage strategy. First, when short selling, shares must be located and borrowed; as a result, the stock owner may subsequently want his/her shares returned at a potentially inopportune time, such as during stock price run-ups or more generally when supply for the stock is low or demand for the stock is high. This situation, particularly a short squeeze, can lead to substantial losses and a suddenly unbalanced exposure if borrowing the underlying equity shares becomes too difficult or too costly for the arbitrageur (of course, initially locking in a “borrow” over a “term period” can help the arbitrageur avoid short squeezes, but this may be costly to execute). Second, credit issues may complicate valuation given that bonds have exposure to credit risk; so when credit spreads widen or narrow, there would be a mismatch in the values of the stock and convertible bond positions that the convertible manager may or may not have attempted to hedge away. Third, the strategy can lose money because of time decay of the convertible bond’s embedded call option during periods of reduced realized equity volatility and/or from a general compression of market implied volatility levels.

Convertible arbitrage strategies have performed best when convertible issuance is high (implying a wider choice among convertible securities and generally cheaper prices), general market volatility levels are moderate, and the liquidity to trade and adjust positions is ample. On the other hand, extreme market volatility also typically implies heightened credit risks; given that convertibles are naturally less-liquid securities, convertible managers generally do not fare well during such periods. The fact that hedge funds have become the natural market makers for convertibles and they typically face significant redemption pressures from investors during crises implies further unattractive left-tail risk attributes to the strategy during periods of market stress.

EXAMPLE 7

Convertible Arbitrage Strategy

Cleopatra Partners is a Dubai-based hedge fund engaging in convertible bond arbitrage. Portfolio manager Shamsa Khan is considering a trade involving the euro-denominated convertible bonds and stock of QXR Corporation. She has assembled the following information:

QXR Convertible Bond

Price (% of par)	120	—
Coupon (%)	5.0	—
Remaining maturity (years)	1.0	
Conversion ratio	50	—
S&P Rating	BBB	—

QXR Inc.

Industry Average

Price (per share)	30	--
P/E (x)	30	20
P/BV (x)	2.25	1.5
P/CF (x)	15	10

Additional Information:

- It costs €2 to borrow each QXR share (paid to the stock lender) to carry the short position for a year.
 - The stock pays a €1 dividend.
- 1 Discuss (using only the information in the table) the basic trade setup that Khan should implement.
 - 2 Demonstrate (without using the additional information) that potential profits earned are the same whether QXR's share price falls to €24, rises to €36, or remains flat at €30.
 - 3 Discuss (using also the additional information) how the results of the trade will change.

Solution to 1:

QXR's convertible bond price is €1,200 [$= €1,000 \times (120/100)$], and its conversion ratio is 50; so, the conversion price is €24 ($€1,200/50$). This compares with QXR's current share price of €30. QXR's share valuation metrics are all 50% higher than its industry's averages. It can be concluded that in relative terms, QXR's shares are overvalued and its convertible bonds are undervalued. Thus, Khan should buy the convertibles and short sell the shares.

Solution to 2:

By implementing this trade and buying the bond at €1,200, exercising the bond's conversion option, and selling her shares at the current market price, Khan can lock in a profit of €6 per share under any of the scenarios mentioned, as shown in the following table:

QXR Share Price	Profit on:		
	Long Stock via Convertible Bond	Short Stock	Total Profit
24	0	6	6
36	12	-6	6
30	6	0	6

Solution to 3:

The €2 per share borrowing costs and the €1 dividend payable to the lender together represent a €3 per share outflow that Khan must pay. But, the convertible bond pays a 5% coupon or €50, which equates to an inflow of €1 per share equivalent ($€50 \text{ coupon}/50 \text{ shares per bond}$). Therefore, the total profit outcomes, as indicated in the table, would each be reduced by €2. In sum, Khan would realize a total profit of €4 per each QXR share.

OPPORTUNISTIC STRATEGIES

6

Opportunistic hedge fund strategies seek to profit from investment opportunities across a wide range of markets and securities using a variety of techniques. They invest primarily in asset classes, sectors, regions, and across macro themes and multi-asset relationships on a global basis (as opposed to focusing on the individual security level). So, broad themes, global relationships, market trends, and cycles affect their returns.

Although opportunistic hedge funds can sometimes be difficult to categorize and may use a variety of techniques, they can generally be divided by 1) the type of analysis and approach that drives the trading strategy (technical or fundamental), 2) how trading decisions are implemented (discretionary or systematic), and 3) the types of instruments and/markets in which they trade. Fundamental-based strategies use economic data as inputs and focus on fair valuation of securities, sectors, markets, and intra-market relationships. Technical analysis utilizes statistical methods to predict relative price movements based on past price trends.

Discretionary implementation relies on manager skills to interpret new information and make investment decisions, and it may be subject to such behavioral biases as overconfidence and loss aversion. Systematic implementation is rules-based and executed by computer algorithms with little or no human intervention; however, it may encounter difficulty coping with new, complex situations (not seen historically). As the absolute size of systematic trend-following funds has increased in significance, so too has the issue of negative execution slippage caused by the simultaneous reversal of multiple trend-following models that sometimes create a “herding effect.” Such effects can temporarily overwhelm normal market liquidity and at times temporarily distort fundamental market pricing of assets (i.e., trend-following “overshoots” caused by momentum-signal triggers). We now discuss the two most common hedge fund strategies: global macro and managed futures.

6.1 Global Macro Strategies

Global macro strategies focus on global relationships across a wide range of asset classes and investment instruments, including derivative contracts (e.g., futures, forwards, swaps, and options) on commodities, currencies, precious and base metals, and fixed-income and equity indexes—as well as on sovereign debt securities, corporate bonds, and individual stocks. Given the wide range of possibilities to express a global macro view, these strategies tend to focus on certain themes (e.g., trading undervalued emerging market currencies versus overvalued US dollar using OTC currency swaps), regions (e.g., trading stock index futures on Italy’s FTSE MIB versus Germany’s DAX to capitalize on differences in eurozone equity valuations), or styles (e.g., systematic versus discretionary spread trading in energy futures). Global macro managers typically hold views on the relative economic health and central bank policies of different countries, global yield curve relationships, trends in inflation and relative purchasing power parity, and capital trade flow aspects of different countries (typically expressed through relative currency or rate-curve positioning).

Global macro managers tend to be anticipatory and sometimes contrarian in setting their strategies. Some macro managers may try to extract carry gains or ride momentum waves, but most have a tendency to be early in their positioning and then benefit when some rationality eventually returns to relative market pricing. This can make an allocation to global macro strategies particularly useful when a sudden potential reversal in markets is feared. For example, many global macro managers sensed the developing sub-prime mortgage crisis in the United States as early as 2006. They took on long positions in credit default swaps (CDS) (i.e., they purchased protection) on mortgage bonds, on tranches of mortgage structured products, or simply on broader credit indexes that they deemed particularly vulnerable to weakening credit conditions. Although they had to wait until 2007–2008 for these CDS positions to pay off, some global macro managers performed spectacularly well as market conditions morphed into the global financial crisis. Including global macro managers with significant subprime mortgage-focused CDS positions within a larger portfolio turned out to be a very valuable allocation.

It is important to note that because global macro managers trade a wide variety of instruments and markets and typically do so by different methods, these managers are fairly heterogeneous as a group. Thus, global macro funds are not as consistently dependable as a source of short alpha when compared to pure systematic, trend-following managed futures funds that typically attempt to capture any significant market trend. But, as noted earlier, global macro managers tend to be more anticipatory (compared to managed futures managers), which can be a useful attribute.

6.1.1 Investment Characteristics

Global macro managers use fundamental and technical analysis to value markets, and they use discretionary and systematic modes of implementation. The view taken by global macro portfolio managers can be directional (e.g., buy bonds of banks expected to benefit from “normalization” of US interest rates) or thematic (e.g., buy the “winning” companies and short sell the “losing” companies from Brexit). Because of their heterogeneity, added due diligence and close attention to the current portfolio of a macro manager may be required by an allocator to correctly anticipate the factor risks that a given global macro manager will deliver.

Despite their heterogeneity, a common feature among most global macro managers is the use of leverage, often obtained through the use of derivatives, to magnify potential profits. A margin-to-equity ratio typically of 15% to 25% posted against futures or forward positions allows a manager to control face amounts of assets up to 6 to 7 times a fund’s assets. The use of such embedded leverage naturally allows the global macro manager ease and flexibility in relative value and directional positioning.

Generally, the key source of returns in global macro strategies revolves around correctly discerning and capitalizing on trends in global markets. As such, mean-reverting low volatility markets are the natural bane of this strategy area. Conversely, steep equity market sell-offs, interest rate regime changes, currency devaluations, volatility spikes, and geopolitical shocks caused by such events as trade wars and terrorism are examples of global macro risks; however, they can also provide some of the opportunities that global macro managers often attempt to exploit. Of course, the exposures selected in any global macro strategy may not react to the global risks as expected because of either unforeseen contrary factors or global risks that simply do not materialize. Thus, macro managers tend to produce somewhat lumpier and uneven return streams than other hedge fund strategies, and generally higher levels of volatility are associated with their returns.

Notably, the prevalence of quantitative easing since the global financial crisis of 2007–2009 resulted in generally benign market conditions for most of the subsequent decade, which was an especially imperfect environment for global macro managers. Although equity and fixed-income markets generally trended higher during this period, overall volatility levels across these and many other markets, such as currencies and commodities, were relatively low. In some cases, central bankers intervened to curtail undesirable market outcomes, thereby preventing certain global macro trends from fully materializing. Because such intervention substantially moderates the trendiness and the volatility of markets, which are the lifeblood of global macro strategies, some hedge fund allocators began avoiding these strategies. This may be shortsighted, however, because such opportunistic strategies as global macro can be very useful over a full market cycle in terms of portfolio diversification and alpha generation.

6.1.2 Strategy Implementation

Global macro strategies are typically top-down and employ a range of macroeconomic and fundamental models to express a view regarding the direction or relative value of an asset or asset class. Positions may comprise a mix of individual securities, baskets of securities, index futures, foreign exchange futures/forwards, precious or base metals futures, agricultural futures, fixed-income products or futures, and derivatives or

options on any of these. If the hedge fund manager is making a directional bet, then directional models will use fundamental data regarding a specific market or asset to determine if it is undervalued or overvalued relative to history and the expected macro trend. Conversely, if the manager's proclivity is toward relative value positioning, then that manager will consider which assets are under- or overvalued relative to each other given historical and expected macro conditions.

For example, if currencies of the major ASEAN block countries (i.e., Indonesia, Malaysia, Philippines, Singapore, and Thailand) are depreciating against the US dollar, a directional model might conclude that the shares of their key exporting companies are undervalued and thus should be purchased. However, further investigation might signal that the public bonds of these exporters are cheap relative to their shares, so the bonds should be bought and the shares sold short. This situation might occur in the likely scenario that the share prices react quickly to the currency depreciation and bond prices take longer to react to the trend.

Successful global macro trading requires the manager to have both a correct fundamental view of the selected market(s) and the proper methodology and timing to express tactical views. Managers who repeatedly implement a position too early/unwind one too late or who choose an inappropriate method for implementation will likely face redemptions from their investors. Given the natural leverage used in global macro strategies, managers may be tempted to carry many (possibly too many) positions simultaneously; however, the diversification benefits of doing so are typically less than those derived from more idiosyncratic long/short equity strategies. This is because of the nature of "risk-on" or "risk-off" market conditions (often caused by central bank policies) that impact a variety of asset classes in a correlated manner.

EXAMPLE 8

Global Macro Strategy

Consider the following (hypothetical) macroeconomic scenario: Emerging market (EM) countries have been growing rapidly (in fact, overheating) and accumulating both historically large government budget deficits and trade deficits as expanding populations demand more public services and foreign goods. EM central banks have been intervening to support their currencies for some time, and electoral support for candidates promoting exorbitant business taxes and vast social welfare schemes in many EM countries has risen dramatically. These trends are expected to continue.

Melvin Chu, portfolio manager at Bermuda-based Global Macro Advisers (GMA), has been considering how to position his global macro hedge fund. After meeting with a senior central banker of a leading EM country, GMA's research director informs Chu that it appears this central bank may run out of foreign exchange reserves soon and thus may be unable to continue its supportive currency intervention.

Discuss a global macro strategy Chu might implement to profit from these trends by using options.

Solution:

Assuming this key EM country runs out of foreign currency reserves, then it is likely its currency will need to be devalued. This initial devaluation might reasonably be expected to trigger a wave of devaluations and economic and financial market turbulence in other EM countries in similar circumstances. So, Chu should consider trades based on anticipated EM currency depreciation (maybe even devaluation) as well as trades benefitting from rising interest rates, downward pressure on equities, and spikes in volatility in the EM space.

A reasonable way for Chu to proceed would be to buy put options. If his expectations fail to materialize, his losses would then be capped at the total of the premiums paid for the options. Chu should consider buying puts on the following: a variety of EM currencies, EM government bond futures, and EM equity market indexes. He should buy in-the-money puts to implement his high conviction trades and out-of-the money puts for trades where he has a lower degree of confidence. Moreover, to take advantage of a possible flight-to-safety, Chu should consider buying call options on developed market (DM) reserve currencies as well as call options on bond futures for highly-rated DM government issuers.

6.2 Managed Futures

Managed futures, which gained its first major academic backing in a classic paper by John Lintner in 1983, is a hedge fund strategy that focuses on investments using futures, options on futures, and sometimes forwards and swaps (primarily on stock and fixed-income indexes) and commodities and currencies. As futures markets have evolved over time and in different countries—gaining in size (i.e., open interest) and liquidity—some managers have also engaged in trading sector and industry index futures as well as more exotic contracts, such as futures on weather (e.g., temperature, rainfall) and derivatives contracts on carbon emissions.

6.2.1 Investment Characteristics

The uncorrelated nature of managed futures with stocks and bonds generally makes them a potentially attractive addition to traditional portfolios for improved risk-adjusted return profiles (i.e., improved efficient frontiers in a mean–variance framework). The value added from managed futures has typically been demonstrated during periods of market stress; for example, in 2007–2009 managers using this strategy benefitted from short positions in equity futures and long positions in fixed-income futures at a time when equity indexes were falling and fixed-income indexes were rising. Put another way, managed futures demonstrated natural positive skewness that has been useful in balancing negatively-skewed strategies.

The return profile of managed futures tends to be very cyclical. Between 2011 and 2018, the trendiness (i.e., directionality) of foreign exchange and fixed-income markets deteriorated, volatility levels in many markets dissipated, and periods of acute market stress temporarily disappeared. Except for equity markets in some developed countries, many markets became range-bound or mean-reverting, which hurt managed futures performance. The diversification benefit of trend following strong equity markets is also (by definition) less diversifying to traditional portfolios than if such trends existed in other non-equity markets.

In a world where sovereign bonds have approached the zero-yield boundary, the correlation benefit of managed futures has also changed. The past practice of trend following the fixed-income markets as they get higher may likely not be as repeatable going forward. Assuming managed futures managers begin to trend follow fixed-income markets as they get lower (i.e., as developed market interest rates “normalize”), then positive returns may still be realized—although with a very different type of correlation behavior to equity markets (i.e., not as valuable). Also, given the upward sloping nature of most global yield curves, less natural fixed-income “carry” contribution may occur from trend following the fixed-income markets to the downside (i.e., higher interest rates and lower prices).

Managed futures strategies are typically characterized as highly liquid, active across a wide range of asset classes, and able to go long or short with relative ease. High liquidity results from futures markets being among the most actively traded

markets in the world. For example, the E-mini S&P 500 futures contract on the Chicago Mercantile Exchange has 3 to 4 times the daily dollar volume of the SPDR S&P 500 ETF (SPY), the world's most actively traded equity index fund. Futures contracts also provide highly liquid exposures to a wide range of asset classes that can be traded across the globe 24 hours a day. Because futures contracts require relatively little collateral to take positions as a result of the exchanges' central clearinghouse management of margin and risk, it is easier to take long and short positions with higher leverage than traditional instruments.

For example, futures contracts require margin from 0.1% to 10% of notional value for both long and short positions, as compared to standard equity market margin levels in the United States of 50%. Thus, the capital efficiency of futures contracts makes it easier for managed futures managers to be dynamic in both their long and short exposures. A traditional long-only portfolio is levered by borrowing funds to purchase additional assets. Futures portfolios do not own assets; they acquire asset exposures based on the notional value of the futures contracts held. The majority (typically 85% to 90%) of capital in a managed futures account is invested in short-term government debt (or other highly liquid collateral acceptable to the futures clearing house). The remainder (10% to 15%) is used to collateralize long and short futures contracts.

6.2.2 Strategy Implementation

Highly liquid contracts allow managed futures funds the flexibility to incorporate a wide range of investment strategies. Most managed futures strategies involve some "pattern recognition" trigger that is either momentum/trend driven or based on a volatility signal. Managers trade these signals across different time horizons, often with short-term mean reversion filters imposed on top of their core longer-term models. For example, a manager might have traded using a long-term horizon model that suggested gold prices would trend lower; as a result, the manager established a short position in gold futures some time ago. A short-term moving average of gold prices crossing below a longer-term moving average could have triggered this view. But later, that manager might also trade using a second, shorter time horizon model, which suggests that the downside momentum in gold prices has temporarily subsided and a mean-reverting bounce is likely. The results of these two models would be weighted and combined into an adjusted net position, typically with the longer-term model weighted more heavily than the shorter-term filter.

Such fundamental factors as carry relationships or volatility factors are often added to the core momentum and breakout signal methodologies, and they can be particularly useful regarding position sizing. Many managed futures managers implement their portfolios' relative position sizing by assessing both the volatility of each underlying futures position as well as the correlation of their return behaviors against one another. Generally, the greater the volatility of an asset, the smaller its portfolio sizing; and the greater its correlation to other futures being positioned, the smaller its portfolio sizing. Being attentive to correlation aspects between different futures contracts would then become a second step of analysis for most managed futures traders as a portfolio sizing risk constraint.

Besides core position sizing and sizing adjustments for volatility and correlation, managed futures managers will have either a price target exit methodology, a momentum reversal exit methodology, a time-based exit methodology, a trailing stop-loss exit methodology, or some combination thereof. A key to successful managed futures strategies is to have a consistent approach and to avoid overfitting of a model when backtesting performance across different markets and time periods. The goal is to have a model that performs well in a future "out of sample" period. Of course, trading models have a natural tendency to degrade in effectiveness over time as more and more managers use similar signals and the market opportunity being exploited consequently diminishes. Managed futures traders are thus constantly searching for new

and differentiated trading signals. In today's world, many new signals are increasingly being developed using nontraditional, unstructured data and other types of "big data" analysis.

Apart from this accelerating search for more unique nonprice signals, the most common type of managed futures approach is typically referred to as **time-series momentum** (TSM) trend following. Momentum trading strategies are driven by the past returns of the individual assets. Simply put, managers go long assets that are rising in price and go short assets that are falling in price. TSM strategies are traded on an absolute basis, meaning the manager can be net long or net short depending on the current price trend of an asset. Such TSM strategies work best when an asset's (or market's) own past returns are a good predictor of its future returns.

A second, less common approach is using **cross-sectional momentum** (CSM) strategies, which are implemented with a cross-section of assets (generally within an asset class) by going long those that are rising in price the most and by shorting those that are falling the most. Such CSM strategies generally result in holding a net zero or market-neutral position. CSM strategies work well when a market's out- or underperformance relative to other markets is a reliable predictor of its future performance. However, CSM may be constrained by limited futures contracts available for a cross section of assets at the asset class level.

Global macro strategies and managed futures strategies often involve trading the same subset of markets but in different ways. It is important to understand the respective attributes of these two strategies. Exhibit 9 provides such a comparison.

Exhibit 9 Managed Futures and Global Macro Strategies—Comparison of Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- Both global macro and managed futures strategies are highly liquid but with some crowding aspects and execution slippage in managed futures as AUM have grown rapidly. Being more heterogeneous in approaches used, global macro strategies face less significant execution crowding effects.
- Typically, managed futures managers tend to take a more systematic approach to implementation than global macro managers, who are generally more discretionary in their application of models and tools.
- Returns of managed futures strategies typically exhibit positive right-tail skewness in periods of market stress, which is very useful for portfolio diversification. Global macro strategies have delivered similar diversification in such stress periods but with more heterogeneous outcomes.
- Despite positive skewness, managed futures and global macro managers are somewhat cyclical and at the more volatile end of the spectrum of hedge fund strategies (with volatility positively related to the strategy's time horizon). In addition, macro managers can also be early and overly anticipatory in their positioning.

Leverage Usage

- High: High leverage is embedded in futures contracts. Notional amounts up to 6 to 7 times fund assets can be controlled with initial margin-to-equity of just 10%–20% (with individual futures margin levels being a function of the volatility of the underlying assets). Active use of options by many global macro managers adds natural elements of leverage and positive convexity.

(continued)

Exhibit 9 (Continued)**Benchmarking**

- Managed futures are best tracked by such sub-indexes as HFRX and HFRI Macro Systematic Indices; CISDM CTA Equal-Weighted Index; Lipper TASS Managed Futures Index; and Credit Suisse Managed Futures Index.
- Global macro strategies are best tracked by HFRX and HFRI Macro Discretionary Indices; CISDM Hedge Fund Global Macro Index; Lipper TASS Global Macro Index; and Credit Suisse Global Macro Index.

EXAMPLE 9**Cross-Sectional and Time-Series Momentum**

An institutional investor is considering adding an allocation to a managed futures strategy that focuses on medium-term momentum trading involving precious metals. This investor is evaluating two different managed futures funds that both trade precious metals futures, including gold, silver, platinum, and palladium futures. Of the two funds being considered, one is run using a cross-sectional momentum (CSM) strategy, and the other is managed using a time-series momentum (TSM) strategy. Both funds use trailing 6-month returns for developing their buy/sell signals, and they both volatility-weight their futures positions to have equal impact on their overall portfolios.

Explain how the CSM and TSM strategies would work and compare their risk profiles.

Solution:

For the CSM strategy, each day the manager will examine the returns for the four metals in question and then take a long position in the two metals futures with the best performance (i.e., the top 50%) in terms of trailing 6-month risk-adjusted returns and a short position in the two metals contracts with the worst performance (i.e., the bottom 50%) of returns. According to this strategy, the top (bottom) 50% will continue their relative value out- (under-) performance. Note that it is possible for metals contracts (or markets more generally) in the top (bottom) 50% to have negative (positive) absolute returns—for example, during bear (bull) markets. The CSM strategy is very much a relative momentum strategy, with the established positions acting as a quasi-hedge relative to each other in terms of total sector exposure. This CSM-run fund would likely deliver an overall return profile with somewhat less volatility than the TSM strategy.

For the TSM strategy, each day the manager will take a long position in the precious metals futures with positive trailing 6-month returns and sell short those metals contracts with negative trailing 6-month returns. According to this TSM strategy, the metals futures (or markets, more generally) with positive (negative) returns will continue to rise (fall) in absolute value, resulting in an expected profit on both long and short positions. However, by utilizing a TSM strategy, the fund might potentially end up with long positions in all four metals contracts or short positions in all these precious metals futures at the same time.

Consequently, the CSM strategy typically results in a net zero market exposure during normal periods, while the TSM strategy can be net long or net short depending on how many metal (or markets, generally) have positive and negative absolute returns. The return profile of the TSM managed fund is

thus likely to be more volatile than that of the CSM managed fund and also far more sensitive to periods when the precious metals sector is experiencing strong trends (i.e., directionality).

SPECIALIST STRATEGIES

7

Specialist hedge fund strategies require highly specialized skill sets for trading in niche markets. Two such typical specialist strategies are volatility trading and reinsurance/life settlements.

7.1 Volatility Trading

Over the past several decades, volatility trading has become an asset class unto itself. Niche hedge fund managers specialize in trading relative volatility strategies globally across different geographies and asset classes. For example, given the plethora of structured product offerings in Asia with inexpensive embedded options that can be stripped out and resold (usually by investment banks), volatility pricing in Asia is often relatively cheap compared to the more expensive implied volatility of options traded in North American and European markets. In these latter markets, there is a proclivity to buy out-of-the-money options as a protective hedge (i.e., insurance). The goal of **relative value volatility arbitrage** strategies is to source and buy cheap volatility and sell more expensive volatility while netting out the time decay aspects normally associated with options portfolios. Depending on the instruments used (e.g., puts and calls or variance swaps), these strategies may also attempt to extract value from active gamma trading adjustments when markets move.

7.1.1 Investment Characteristics and Strategy Implementation

The easiest way to understand relative value volatility trading is through a few examples. Throughout the 1980s and 1990s, options on the Japanese yen consistently traded at lower volatility levels within Asian time zones than similar options were traded in London, New York, or Chicago (i.e., IMM futures market). Capturing the volatility spread between these options is a type of relative value volatility trading known as time-zone arbitrage—in this case of a single underlying fungible global asset, the Japanese yen. As a second arbitrage example, managers in today's markets may periodically source Nikkei 225 implied volatility in Asia at cheaper levels than S&P 500 implied volatility is being traded in New York, even though the Nikkei 225 typically has realized volatility higher than that of the S&P 500. This type of relative value volatility trading is known as cross-asset volatility trading, which may often involve idiosyncratic, macro-oriented risks.

Of course, another simpler type of volatility trading involves outright long volatility traders who may trade against consistent volatility sellers. Equity volatility is approximately 80% *negatively* correlated with equity market returns. Otherwise stated, volatility levels tend to go up when equity markets fall, with options pricing skew reflecting such a tendency. Clearly, this makes the long volatility strategy a useful potential diversifier for long equity investments, albeit at the cost to the option premium paid by the volatility buyer. Selling volatility provides a volatility risk premium or compensation for taking on the risk of providing insurance against crises for holders of equities and other securities.

In the United States, the most liquid volatility contracts are short-term VIX Index futures contracts, which track the 30-day implied volatility of S&P 500 Index options as traded on the Chicago Board Options Exchange (CBOE). Because volatility is

non-constant but high levels of volatility are difficult to perpetuate over long periods of time (markets eventually calm down after sudden jump shifts), VIX futures are often prone to mean reversion. Given this fact and the fact that VIX futures prices typically slide down a positively sloped implied volatility curve as expiration approaches, many practitioners prefer trading simple exchange-traded options, over-the-counter (OTC) options, variance swaps, and volatility swaps. The general mean-reverting nature of volatility still impacts these products, but it does so in a less explicit fashion than with the futures.

Multiple paths can be taken to implement a volatility trading strategy. If a trader uses simple exchange-traded options, then the maturity of such options typically extends out to no more than approximately two years. In terms of expiry, the longer-dated options will have more absolute exposure to volatility levels (i.e., vega exposure) than shorter-dated options, but the shorter-dated options will exhibit more delta sensitivity to price changes (i.e., gamma exposure). Traders need to monitor the following: the term structure of volatility, which is typically upward sloping but can invert during periods of crisis; the volatility smile across different strike prices, whereby out-of-the-money options will typically trade at higher implied volatility levels than at-the-money options; and the volatility skew, whereby out-of-the-money puts may trade at higher volatility levels than out-of-the-money calls. Volatility traders strive to capture relative timing and strike pricing opportunities using various types of option spreads, such as bull and bear spreads, straddles, and calendar spreads.

To extract an outright long volatility view, options are purchased and delta hedging of the gamma exposure is required. How the embedded gamma of the long options position is managed is also important. For example, one could have a positive view of a volatility expansion but then fail to capture gains in a volatility spike during an adverse market move by poorly managing gamma exposure. Conversely, some managers may use options to extract a more intermediate-term, directional insurance protection-type view of both price and volatility and not engage in active delta hedging.

A second, similar path might be to implement the volatility trading strategy using OTC options. Then the tenor and strike prices of the options can be customized, and the tenor of expiry dates can be extended beyond what is available with exchange-traded options. However, by utilizing OTC options, the strategy is subject to counterparty credit risk as well as added illiquidity risk.

Migrating to the use of VIX Index futures (or options on VIX futures) can more explicitly express a pure volatility view without the need for constant delta hedging of an equity put or call for isolating the volatility exposure. However, as just mentioned, volatility pricing tends to be notoriously mean reverting. Also, an abundant supply of traders and investors typically are looking to sell volatility to capture the volatility premium and the volatility roll down payoff. Roll down refers to the fact that the term structure of volatility tends to be positively sloped, so the passage of time causes added option price decay. In other words, the theta of a long option position is always negative, and if shorter-dated options have a lower implied volatility, then the passage of time increases the rate of natural theta decay.

A fourth path for implementing a volatility trading strategy would be to purchase an OTC volatility swap or a variance swap from a creditworthy counterparty. A volatility swap is a forward contract on future realized price volatility. Similarly, a variance swap is a forward contract on future realized price variance, where variance is the square of volatility. In both cases, at inception of the trade the strike is typically chosen such that the fair value of the swap is zero. This strike is then referred to as fair volatility or fair variance, respectively. At expiry of the swaps, the receiver of the floating leg pays the difference between the realized volatility (or variance) and the agreed-on strike times some prespecified notional amount that is not initially exchanged. Both volatility and variance swaps provide “pure” exposure to volatility alone—unlike standardized options in which the volatility exposure depends on the price of the underlying asset

and must be isolated and extracted via delta hedging. These swaps can thus be used to take a view on future realized volatility, to trade the spread between realized and implied volatility, or to hedge the volatility exposure of other positions. These OTC products also offer the advantage of longer-dated, tailored maturities and strikes.

A long volatility strategy utilizing OTC volatility or variance swaps, options, or swaptions requires finding undervalued instruments. This is accomplished by being in frequent contact with options dealers around the world in a variety of asset classes. Once implemented, positions are held until they are either exercised, sold during a volatility event, actively delta hedged (in the case of a long options position), or expire. A long volatility strategy is a convex strategy because the movement of volatility pricing is typically asymmetric and skewed to the right. Also, strike prices of options may be set such that the cost of the options is small, but their potential payoffs are often many multiples of the premiums paid for the options.

Long volatility strategies are potentially attractive but also come with key challenges and risks for implementation. Given that OTC options, as well as volatility and variance swaps, are not exchange-traded, they must be negotiated. These contracts are typically structured under ISDA documentation; they are subject to bilateral margin agreements (as negotiated within an ISDA Credit Support Annex document), but they still carry more counterparty risk and liquidity risk to both establish and liquidate than instruments traded on an exchange. Also, smaller hedge funds may not even be able to access ISDA-backed OTC derivatives with banking counterparts until surpassing a minimum AUM threshold, generally \$100 million. Above all, although the purchase of volatility assets provides positively convex outcomes, it almost always involves some volatility curve roll down risk and premium expense. Key aspects of volatility trading are presented in Exhibit 10.

Exhibit 10 Volatility Trading Strategies—Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- Long volatility positioning exhibits positive convexity, which can be particularly useful for hedging purposes. On the short side, option premium sellers generally extract steadier returns in normal market environments.
- Relative value volatility trading may be a useful source of portfolio return alpha across different geographies and asset classes.
- Liquidity varies across the different instruments used for implementation. VIX Index futures and options are very liquid; exchange-traded index options are generally liquid, but with the longest tenors of about two years (with liquidity decreasing as tenor increases); OTC contracts can be customized with longer maturities but are less liquid and less fungible between different counterparties.

Leverage Usage

- The natural convexity of volatility instruments typically means that out-sized gains may be earned at times with very little up-front risk. Although notional values appear nominally levered, the asymmetric nature of long optionality is an attractive aspect of this strategy.

Benchmarking

- Volatility trading is a niche strategy that is difficult to benchmark.

(continued)

Exhibit 10 (Continued)

- CBOE Eurekahedge has the following indexes:

Long (and Short) Volatility Index, composed of 11 managers with a generally long (short) volatility stance; Relative Value Volatility Index (composed of 35 managers); and Tail Risk Index (composed of 8 managers), designed to perform best during periods of market stress.

EXAMPLE 10**Long Volatility Strategy Payoff**

Consider the following scenario: Economic growth has been good, equity markets have been rising, and interest rates have been low. However, consumer debt (e.g., subprime mortgages, credit card debt, personal loans) has been rising rapidly, surpassing historic levels. In mid-January, Serena Ortiz, a long volatility hedge fund manager, purchased a basket of long-dated (one-year), 10% out-of-the-money put options on a major stock index for \$100 per contract at an implied volatility level of 12%.

As of mid-April, consumer debt is still at seemingly dangerous levels and financial markets appear ripe for a major correction. However, the stock index has risen another 20% above its mid-January levels, and volatility is low. So, Ortiz's options are priced even more cheaply than before, at \$50 per contract.

Now jump forward in time by another three months to mid-July, when a crisis—unexpected by many participants—has finally occurred. Volatility has spiked, and the stock index has fallen to 25% below its April level and 10% below its starting January level. Ortiz's put options are now trading at an implied volatility pricing of 30%.

- 1 Discuss the time, volatility, and price impact on Ortiz's long volatility exposure in put options as of mid-July.
- 2 Discuss what happens if the market subsequently moves broadly sideways between July and the January of the next year.

Solution to 1:

Despite an initial 50% mark-to-market loss on her put exposure as of mid-April, Ortiz likely has substantial unrealized profits by mid-July. As six months passed (other things being equal), Ortiz would have suffered some time decay loss in her long put position, but her options have also gone from being 10% out-of-the-money to now being at-the-money. Implied volatility has increased 2.5 times (from 12% to 30%), which on a six-month, at-the-money put will have a significant positive impact on the option's pricing (the closer an option is to being at-the-money, the greater the impact that changes in implied volatility will have on its price). So, as of mid-July, Ortiz will likely have a significant mark-to-market gain.

Solution to 2:

If the market subsequently moves broadly sideways until January of the next year, Ortiz's at-the-money option premium will slowly erode because of time decay. Assuming the puts remain at-the-money, their volatility value will eventually dissipate; Ortiz will ultimately lose all of her original \$100 investment per contract unless she has nimbly traded against the position with active delta hedging.

of the underlying stock index futures. This would entail buying and selling the index futures over time to capture small profitable movements to offset the time decay and volatility erosion in the puts.

7.2 Reinsurance/Life Settlements

Although still somewhat nascent, hedge funds have also entered the world of insurance, reinsurance, life settlements, and catastrophe reinsurance. Underlying insurance contracts provide a payout to the policyholder (or their beneficiaries) on the occurrence of a specific insured event in exchange for a stream of cash flows (periodic premiums) paid by the policyholder. Common types of insurance contracts sold by insurance providers include vehicle and home insurance, life insurance, and catastrophe insurance, which covers damage from such events as floods, hurricanes, or earthquakes. The insurance market encompasses a wide range of often highly specific and detailed contracts that are less standardized than other financial contracts. As a result, insurance contracts are generally not liquid and are difficult to sell or purchase after contract initiation.

Although the primary market for insurance has existed for centuries, the secondary market for insurance has grown substantially in the last several decades. Individuals who purchased whole or universal life policies and who no longer want or need the insurance can surrender their policies to the original insurance issuer. However, such policyholders are increasingly finding that higher cash values (i.e., significantly above surrender value) are being paid for their policies by third-party brokers, who, in turn, offer these policies as investments to hedge funds. Hedge funds may formulate a differentiated view of individual or group life expectancy; if correct, investment in such life policies can provide attractive uncorrelated returns.

Reinsurance of catastrophe risk has also increasingly attracted hedge fund capital. These new secondary markets have improved liquidity and enhanced the value of existing insurance contracts. For insurance companies, the reinsurance market allows for risk transfer, capital management, and solvency management. For hedge funds, the reinsurance market offers a source of uncorrelated return alpha.

7.2.1 *Investment Characteristics and Strategy Implementation*

Life insurance protects the policyholder's dependents in the case of his/her death. The secondary market for life insurance involves the sale of a life insurance contract to a third party—a **life settlement**. The valuation of a life settlement typically requires detailed biometric analysis of the individual policyholder and an understanding of actuarial analysis. So, a hedge fund manager specialized in investing in life settlements would require such expert knowledge and skills or would need to source such knowledge from a trusted partner/actuarial adviser.

A hedge fund strategy focusing on life settlements involves analyzing pools of life insurance contracts being offered for sale, typically being sold by a third-party broker who purchased the insurance contracts from the original policyholders. The hedge fund would look for the following policy characteristics: 1) the surrender value being offered to an insured individual is relatively low; 2) the ongoing premium payments to keep the policy active are also relatively low; and, yet, 3) the probability is relatively high that the designated insured person is indeed likely to die within a certain period of time (i.e., earlier than predicted by standard actuarial methods).

On finding the appropriate policy (or, more typically, a pool of policies), the hedge fund manager pays a lump sum (via a broker) to the policyholder(s), who transfers the right to the eventual policy benefit to the hedge fund. The hedge fund is then responsible for making ongoing premium payments on the policy in return for receiving the future death benefit. This strategy is successful when the present value of the future benefit payment received by the hedge fund exceeds the present value of intervening

payments made by the hedge fund. The two key inputs in the hedge fund manager's analysis are the expected policy cash flows (i.e., up-front, lump-sum payment to buy the policy; ongoing premium payments to the insurance company; and the eventual death benefit to be received) and the time to mortality. Neither of these factors has anything to do with the overall behavior of financial markets. Thus, this strategy area is unrelated and uncorrelated with other hedge fund strategies.

Catastrophe insurance protects the policyholder in case of such events as floods, hurricanes, and earthquakes, which are highly idiosyncratic and also unrelated and uncorrelated with financial market behavior. Insurance companies effectively reinsure portions of their exposure (typically above a given threshold and for a limited amount) with reinsurance companies, who, in turn, deal with hedge funds as a source of capital. An attractive and uncorrelated return profile may be achieved if by making such reinsurance investments a hedge fund can do the following: 1) obtain sufficient policy diversity in terms of geographic exposure and type of insurance being offered; 2) receive a sufficient buffer in terms of loan loss reserves from the insurance company; and 3) receive enough premium income.

Valuation methods for catastrophe insurance may require the hedge fund manager to consider global weather patterns and make forecasts using sophisticated prediction models that involve a wide range of geophysical inputs. But, more generally, assumptions are made as to typical weather patterns; the worst-case loss potentials are made from different reinsurance structures. These assumptions are then weighed against the reinsurance income to be received. If a catastrophic event does occur, then hedge fund managers hope to have enough geographic diversity that they are not financially harmed by a single event, thereby continuing to benefit when insurance premiums are inevitably increased to cover future catastrophic events.

Organized markets for catastrophe bonds and catastrophe risk futures continue to develop. These bonds and financial futures can be used to take long positions or to hedge catastrophe risk in a portfolio of insurance contracts. Their issuance and performance tend to be seasonal. Many such catastrophe bonds are issued before the annual North American hurricane season begins (May/June) and may perform particularly well if a given hurricane season is benign.

EXAMPLE 11

Investing in Life Settlements

Mikki Tan runs specialty hedge fund SingStar Pte. Ltd. (SingStar), based in Singapore, that focuses on life settlements. SingStar is staffed with biometric and actuarial science experts who perform valuation analysis on pools of life insurance policies offered for sale by insurance broker firms. These intermediaries buy the policies from individuals who no longer need the insurance and who want an up-front cash payment that is higher than the surrender value offered by their insurance companies.

Tan knows that Warwick Direct has been buying many individuals' life insurance policies that were underwritten by NextLife, an insurance company with a reputation in industry circles for relatively weak underwriting procedures (i.e., charging low premiums for insuring its many relatively unhealthy policyholders) and for paying low surrender values. Tan is notified that Warwick Direct is selling a pool of life settlements heavily weighted with policies that were originated by NextLife. Parties wishing to bid will be provided with data covering a random sample of the life insurance policies in the pool.

Tan asks SingStar's experts to analyze the data, and they report that many of the policies in the pool were written on individuals who have now developed early-onset Alzheimer's and other debilitating diseases and thus required the

up-front cash for assisted living facilities and other special care. Moreover, the analysts indicate that early-onset Alzheimer's patients have a life expectancy, on average, that is 10 years shorter than persons without the disease.

Discuss how Tan and SingStar's team might proceed given this potential investment.

Solution:

SingStar's financial, biometric, and actuarial experts need to work together to forecast expected cash flows from this potential investment and then value it using an appropriate risk-adjusted discount rate. The cash flows would include the following:

- The ongoing premium payments that SingStar would need to make to the originating insurance companies (in this case, mainly to NextLife) to keep the policies active. The low premiums NextLife is known to charge as well as the shorter average life expectancy of many individuals represented in the pool are important factors to consider in making this forecast.
- The timing of future benefit payments to be received by SingStar on the demise of the individuals (the formerly insured). The prevalence of early-onset Alzheimer's disease and other debilitating diseases as well as the shorter average life expectancy of many individuals in the pool are key factors to consider in formulating this forecast.

Once an appropriate discount rate is decided on—one that compensates for the risks of the investment—then its present value can be determined. The difference between the PV and any minimum bid price set by Warwick Direct, as well as Tan's perceptions of the competition in bidding, will determine Tan's proposed purchase price. If SingStar ultimately buys the pool of life settlement policies and the forecasts (e.g., biometric, actuarial, and financial) of Tan's team are met or exceeded, then this investment should yield attractive returns to SingStar that are uncorrelated to other financial markets.

MULTI-MANAGER STRATEGIES

8

The previous sections examined individual hedge fund strategies. In practice, most investors invest in a range of hedge fund strategies. Three main approaches are used to combine individual hedge fund strategies into a portfolio: 1) *creating one's own mix of managers* by investing directly into individual hedge funds running different strategies; 2) *fund-of-funds*, which involves investing in a single fund-of-funds manager who then allocates across a set of individual hedge fund managers running different strategies; and 3) *multi-strategy funds*, which entails investing in a single fund that includes multiple internal management teams running different strategies under the same roof. Of course, approaches (1) and (2) are not specific to combinations of strategies; they apply to individual strategies too.

8.1 Fund-of-Funds

Fund-of-funds (FoF) managers aggregate investors' capital and allocate it to a portfolio of separate, individual hedge funds following different, less correlated strategies. The main roles of the FoF manager are to provide diversification across hedge fund strategies; to make occasional tactical, sector-based reallocation decisions; to engage in underlying manager selection and due diligence; and to perform ongoing portfolio

management, risk assessment, and consolidated reporting. FoF managers can provide investors with access to certain closed hedge funds, economies of scale for monitoring, currency hedging capabilities, the ability to obtain and manage leverage at the portfolio level, and such other practical advantages as better liquidity terms than would be offered by an individual hedge fund manager.

Disadvantages of the FoF approach include a double layer of fees the investor must pay; a lack of transparency into individual hedge fund manager processes and returns; the inability to net performance fees on individual managers; and an additional principal–agent relationship. Regarding fees, in addition to management and incentive fees charged by the individual hedge funds (with historical norms of 1%–2% and 10%–20%, respectively) in which the FoF invests, investors in a fund-of-funds historically paid an additional 1% management fee and 10% incentive fee (again, historical norms) on the performance of the total FoF portfolio. As the performance of funds of funds has generally waned, fees have become more negotiable; management fees of 50 bps and incentive fees of 5% (or simply just a 1% flat total management fee) are becoming increasingly prevalent.

Occasionally, liquidity management of FoF can result in liquidity squeezes for FoF managers. Most FoFs require an initial one-year lock-up period, and then they offer investors monthly or quarterly liquidity thereafter, typically with a 30- to 60-day redemption notice also being required. However, the underlying investments made by the FoF may not fit well with such liquidity needs. Some underlying managers or newer underlying investments may have their own lock-up provisions or liquidity (i.e., redemption) gates. So, the FoF manager must stagger his/her underlying portfolio investments to create a conservative liquidity profile while carefully assessing the probability and potential magnitude of any FoF-level redemptions that he/she might face. FoFs may also arrange a reserve line of credit as an added liquidity backstop to deal with the potential mismatch between cash flows available from underlying investments and cash flows required to meet redemptions.

8.1.1 *Investment Characteristics*

FoFs are important hedge fund “access vehicles” for smaller high-net-worth investors and smaller institutions. Most hedge funds require minimum initial investments that range from \$500,000 to \$5,000,000 (with \$1,000,000 being the most typical threshold). To create a reasonably diversified portfolio of 15–20 managers, \$15–20 million would be required, which is a large amount even for most wealthy families and many small institutions. Selecting the 15–20 different hedge fund managers would itself require substantial time and resources that most such investors may lack. In addition, investors may potentially face substantial tax reporting requirements for each separate hedge fund investment owned. By comparison, a high-net-worth investor or small institution can typically start FoF investments with just \$100,000, effectively achieving a portfolio that includes a diversified mix of talented hedge fund managers. Through their network of relationships and their large scale, FoFs may also provide access to successful managers whose funds are otherwise closed to new investment. Overall, FoFs may thus be considered convenient for access, diversification, liquidity, and operational tax reporting reasons.

But FoFs are also designed to provide other attractive features, even for such institutional investors as endowments, foundations, and pension plans. Such institutional clients may initially turn to FoFs as their preferred path to navigate their way into the hedge fund space. FoFs offer expertise not only in individual manager selection and due diligence but also in strategic allocation, tactical allocation, and style allocation into individual hedge fund strategies. The FoF strategic allocation is the long-term allocation to different hedge fund styles. For example, a FoF may have a strategic allocation of 20% to long/short equity strategies, 30% to event-driven strategies, 30% to relative value strategies, and 20% to global macro strategies. Tactical allocations

include periodically overweighting and underweighting different hedge fund styles across different market environments depending on the level of conviction of the FoF manager. The overall capital or risk exposure can also be geared up or down to reflect the opportunity set in different market conditions.

Through their prime brokerage services, commercial banks provide levered capital to FoFs. Such leverage is typically collateralized by the existing hedge fund assets held in custody by these banks. Because hedge funds often deliver full funds back to redeeming investors with some substantial time lag (a 10% holdback of the total redemption amount until audit completion is typical), access to leverage can often be useful from a bridge loan point of view. In this way, capital not yet returned can be efficiently redeployed for the benefit of remaining investors.

Another attractive aspect of larger FoFs is that by pooling smaller investor assets into a larger single investment commitment, the FoF may be able to extract certain fee breaks, improved liquidity terms, future capacity rights, and/or added transparency provisions from an underlying hedge fund. The FoF may also be able to secure a commitment from the underlying fund to receive the best terms that might subsequently be offered to any future investor. These can all be valuable concessions that a smaller investor would most likely be unable to obtain by investing directly. Some FoFs have argued that these concessions made at the underlying fund manager level can be worth more than the added layering of fees by the FoF.

Overall, by combining different and ideally less correlated strategies, a FoF portfolio should provide more diversification, less extreme risk exposures, lower realized volatility, and generally less single manager tail risk than direct investing in individual hedge fund strategies. FoFs may also achieve economies of scale, manager access, research expertise, potential liquidity efficiencies, useful portfolio leverage opportunities, and potentially valuable concessions from the underlying funds.

8.1.2 *Strategy Implementation*

Implementing a FoF portfolio is typically a multi-step process that transpires over several months. First, FoF managers will become acquainted with different hedge fund managers via the use of various databases and introductions at prime broker-sponsored capital introduction events, where hedge fund managers present their perceived opportunity sets and qualifications to potential investors. Then, the FoF manager must decide the desired strategic allocation of the portfolio across the different hedge fund strategy groupings.

Next, with both quantitative and qualitative top-down and bottom-up approaches, the formal manager selection process is initiated. For each strategy grouping, the FoF manager screens the available universe of hedge funds with the goal to formulate a select “peer group” of potential investment candidates. This is followed by direct interviews of each hedge fund manager as well as a review of their relevant materials, such as presentation booklets, Alternative Investment Management Association Due Diligence Questionnaires (AIMA DDQs), recent quarterly letters and risk reports, as well as past audits. Typically, FoF managers will meet with prospective hedge fund managers on several different occasions (with at least one onsite visit at their offices). FoF managers will have an increasingly granular focus not only on the hedge fund managers’ investment philosophy and portfolio construction but also on the firms’ personnel, operational, and risk management processes.

Once an individual hedge fund is deemed a true candidate for investment, the fund’s Offering Memorandum and Limited Partnership Agreement will be fully reviewed. The fund’s service providers (e.g., auditor, legal adviser, custodian bank, prime broker) will be verified and other background checks and references obtained. At some larger FoF firms, these more operational aspects of the due diligence process will be performed by a dedicated team of specialists who validate the original FoF team’s investment conclusions or cite concerns that may need to be addressed prior to an allocation. At

this point, the FoF manager may endeavor to obtain certain concessions, agreed to in “side letters,” from the hedge fund manager entitling the FoF to reduced fees, added transparency provisions, capacity rights to build an investment in the future, and/or improved redemption liquidity provisions. The larger the potential investment, the greater the FoF’s negotiation advantage.

After a hedge fund is approved and the strategy is included in the FoF portfolio, then the process moves into the ongoing monitoring and review phases. The main concerns are monitoring for performance consistency with investment objectives and for any style drift, personnel changes, regulatory issues, or other correlation/return shifts that may transpire when compared to other managers both within the portfolio and when compared to similar hedge fund peers.

8.2 Multi-Strategy Hedge Funds

Multi-strategy hedge funds combine multiple hedge fund strategies under the same hedge fund structure. Teams of managers dedicated to running different hedge fund strategies share operational and risk management systems under the same roof.

8.2.1 *Investment Characteristics*

A key advantage to this approach is that the multi-strategy manager can reallocate capital into different strategy areas more quickly and efficiently than would be possible by the FoF manager. The multi-strategy manager has full transparency and a better picture of the interactions of the different teams’ portfolio risks than would ever be possible for the FoF manager to achieve. Consequently, the multi-strategy manager can react faster to different real-time market impacts—for example, by rapidly increasing or decreasing leverage within different strategies depending on the perceived riskiness of available opportunities. Teams within a multi-strategy manager also can be fully focused on their respective portfolios because the business, operational, and regulatory aspects of running the hedge fund are handled by other administrative professionals. Many talented portfolio managers decide to join a multi-strategy firm for this reason.

The fees paid by investors in a multi-strategy fund can be structured in many ways, some of which can be very attractive when compared to the FoF added fee layering and netting risk attributes. Conceptually, the FoF investor always faces netting risk, whereby he/she is responsible for paying performance (i.e., incentive) fees due to winning underlying funds while suffering return drag from the performance of losing underlying funds. Even if the FoF’s overall performance (aggregated across all funds) is flat or down, FoF investors must still pay incentive fees due to the managers of the winning underlying funds.

The fee structure is more investor-friendly at multi-strategy hedge funds where the general partner absorbs the netting risk arising from the divergent performances of his/her fund’s different strategy teams. This is an attractive outcome for the multi-strategy fund investor because 1) the GP is responsible for netting risk; and 2) the only investor-level incentive fees paid are those due on the total fund performance after netting the positive and negative performances of the various strategy teams. Although beneficial to investors, this structure can at times cause discord within a multi-strategy fund. Because the GP is responsible for netting risk, the multi-strategy fund’s overall bonus pool may shrink; thus, high-performing strategy teams will be disaffected if they do not receive their full incentive amounts, which ultimately results in personnel losses.

However, some multi-strategy hedge fund firms operate with a “pass-through” fee model. Using this model, they may charge no management fee but instead pass through the costs of paying individual teams (inclusive of salary and incentive fees earned by each team) before an added manager level incentive fee is charged to the investor on total fund performance. In this instance, the investor does implicitly pay

for a portion of netting risk between the different teams (in place of a management fee), while the multi-strategy fund's GP bears a portion of that netting risk (via the risk that the total fund-level incentive fee may not cover contractual obligations that the GP is required to pay individual teams).

The main risk of multi-strategy funds is that they are generally quite levered: Position transparency is closely monitored in-house, and fee structures are typically tilted toward performance (due to high costs of the infrastructure requirements). Leverage applied to tight risk management is usually benign, but in market stress periods, risk management miscalibrations can certainly matter. The left-tail, risk-induced implosions of prominent multi-strategy funds, such as Ritchie Capital (2005) and Amaranth Advisors (2006), are somewhat legendary. Moreover, the operational risks of a multi-strategy firm, by definition, are not well diversified because all operational processes are performed under the same fund structure. Finally, multi-strategy funds can be somewhat limited in the scope of strategies offered because they are constrained by the available pool of in-house manager talent and skills (and are often staffed by managers with similar investment styles and philosophies).

8.2.2 Strategy Implementation

Multi-strategy funds invest in a range of individual hedge fund strategies. As mentioned, the breadth of strategies they can access is a function of the portfolio management skills available within the particular multi-strategy fund. Similar to a FoF manager, a multi-strategy fund will engage in both strategic and tactical allocations to individual hedge fund strategies. Given that multi-strategy fund teams manage each strategy directly and operate under the same fund roof, compared FoF managers, they are more likely to be well informed about when to tactically reallocate to a particular strategy and more capable of shifting capital between strategies quickly. Conversely, multi-strategy funds may also be less willing to exit strategies in which core expertise is in-house. Common risk management systems and processes are also more likely to reveal interactions and correlations between the different strategies run by the various portfolio management teams. Such nuanced aspects of risk might be far harder to detect within a FoF structure.

Exhibit 11 compares some key attributes of fund-of-funds and multi-strategy funds that investors must consider when deciding which of these two multi-manager types best fits their needs.

Exhibit 11 Fund-of-Funds and Multi-Strategy Funds—Comparison of Risk, Liquidity, Leverage, and Benchmarking

Risk Profile and Liquidity

- FoF and multi-strategy funds are designed to offer steady, low-volatility returns via their strategy diversification. Multi-strategy funds have generally outperformed FoFs but with more variance and occasional large losses often related to their higher leverage.
- Multi-strategy funds offer potentially faster tactical asset allocation and improved fee structure (netting risk handled at strategy level) but with higher manager-specific operational risks. FoFs offer a potentially more diverse strategy mix but with less transparency and slower tactical reaction time.
- Both groups typically have similar initial lock-up and redemption periods, but multi-strategy funds also often impose investor-level or fund-level gates on maximum redemptions allowed per quarter.

(continued)

Exhibit 11 (Continued)**Leverage Usage**

- Multi-strategy funds tend to use significantly more leverage than most FoFs, which gravitate to modest leverage usage. Thus, multi-strategy funds are somewhat more prone to left-tail blow-up risk in stress periods. Still, better strategy transparency and shorter tactical reaction time make multi-strategy funds overall more resilient than FoFs in preserving capital.

Benchmarking

- FoFs can be tracked using such sub-indexes as HFRX and HFRI Fund of Funds Composite Indices; Lipper/TASS Fund-of-Funds Index; CISDM Fund-of-Funds Multi-Strategy Index; and the broad Credit Suisse Hedge Fund Index as a general proxy for a diversified pool of managers.
- Multi-strategy managers can be tracked via HFRX and HFRI Multi-Strategy Indices; Lipper/TASS Multi-Strategy Index; CISDM Multi-Strategy Index; and CS Multi-Strategy Hedge Fund Index.

Note: The FoF business model has been under significant pressure since 2008 because of fee compression and increased investor interest in passive, long-only investing and the advent of liquid alternatives for retail investors. Conversely, multi-strategy funds have grown as many institutional investors prefer to invest directly in such funds and avoid FoF fee layering.

EXAMPLE 12**Fund-of-Funds: Net-of-Fee Returns**

Squaw Valley Fund of Funds (SVFOF) charges a 1% management fee and 10% incentive fee and invests an equal amount of its assets into two individual hedge funds: Pyrenees Fund (PF) and Ural Fund (UF), each charging a 2% management fee and a 20% incentive fee. For simplicity in answering the following questions, please ignore fee compounding and assume that all fees are paid at year-end.

- 1 If the managers of both PF and UF generate 20% gross annual returns, what is the net-of-fee return for an investor in SVFOF?
- 2 If PF's manager earns a gross return of 20% but UF's manager loses 5%, what is the net-of-fee return for an investor in SVFOF?

Solution to 1:

Incentive fees are deducted only from gross gains net of management fees and expenses. Thus, the answer becomes:

Net of Fees Return for PF and UF Investor = $(20\% - 2\% - 3.6\%) = 14.4\%$,
where $3.6\% = 20\% \times (20\% - 2\%)$;

Net of Fees Return for SVFOF Investor = $(14.4\% - 1\% - 1.34\%) = 12.06\%$,
where $1.34\% = 10\% \times (14.4\% - 1\%)$.

Solution to 2:

Net of Fees Return for PF Investor = $(20\% - 2\% - 3.6\%) = 14.4\%$;

Net of Fees Return for UF Investor = $(-5\% - 2\% - 0\%) = -7.0\%$;

Gross Return for SVFOF Investor = $(0.5 \times 14.4\% + 0.5 \times -7.0\%) = 3.7\%$;

Net of Fees Return for SVFOF Investor = $(3.7\% - 1\% - 0.27\%) = 2.43\%$,
where $0.27\% = 10\% \times (3.7\% - 1\%)$.

In conclusion, if both PF and UF managers generate gross returns of 20%, then the net-of-fee return for SVFOF's investor is 12.06%, with fees taking up 39.7% of the total gross investment return $[(2\% + 3.6\% + 1\% + 1.34\%)/20\% = 39.7\%]$ and the remainder going to the SVFOF investor.

But, if PF's manager earns a 20% gross return and UF's manager loses 5%, then the net-of-fee return for the SVFOF investor is a meager 2.43%. In this case, most (67.6%) of the original gross return of 7.5% $[= 20\% \times 0.50 + (-5\% \times 0.50)]$ goes to PF, UF, and SVFOF managers as fees. Note that $\{[0.50 \times (2\% + 3.6\% + 2\% + 0\%)] + (1\% + 0.27\%)\}/7.5\%$ equals 67.6%. This is an example of fee netting risk that comes with investing in FoFs.

EXAMPLE 13

Fund-of-Funds or Multi-Strategy Funds—Which to Choose?

The Leonardo family office in Milan manages the €435 million fortune of the Da Vinci family. Mona, the family's matriarch, trained as an economist and worked at Banca d'Italia for many years. She is now retired but still monitors global financial markets. The portfolio that Leonardo manages for the Da Vinci family consists of traditional long-only stocks and bonds, real estate, private equity, and single manager hedge funds following distressed securities and merger arbitrage strategies.

Mona believes global financial markets are about to enter a prolonged period of heightened volatility, so she asks Leonardo's senior portfolio manager to sell some long-only stocks and the merger arbitrage hedge fund and then buy a multi-manager hedge fund. Mona's objectives are to increase the portfolio's diversification, flexibility, and transparency while maximizing net-of-fees returns during the volatile period ahead.

Discuss advantages and disadvantages that Leonardo's portfolio manager should consider in choosing between a FoF and a multi-strategy fund.

Solution:

Leonardo's portfolio manager understands that both multi-strategy funds and FoFs are designed to offer steady, low-volatility returns via their strategy diversification.

However, digging deeper he sees that multi-strategy funds have generally outperformed FoFs. This may be because of such key advantages as their enhanced flexibility and the fast pace of tactical asset allocation (important in dynamic, volatile markets) given that the different strategies are executed within the same fund structure. Another advantage of this set-up of multi-strategy funds is increased transparency regarding overall positions and exposures being carried. Moreover, many multi-strategy funds have an investor-friendly fee structure, in which fee netting risk is handled at the strategy level and absorbed (or partially absorbed) by the general partner of the multi-strategy fund. As for disadvantages, Leonardo's portfolio manager should consider that multi-strategy funds entail

higher manager-specific operational risks, so detailed due diligence is important; moreover, they tend to use relatively high leverage, which may increase the variance of returns.

The main advantages of FoFs are that they offer a potentially more diverse strategy mix with lower leverage (and somewhat less return variance), and they have less operational risk (i.e., each separate underlying hedge fund is responsible for its own risk management). Leonardo's portfolio manager realizes that FoFs also entail reduced transparency into the portfolio decisions made at the underlying hedge funds as well as a slower tactical reaction time. Another key disadvantage is that FoFs require a double layer of fees to be paid, with netting risk borne by the investor, which imposes a substantial drag on net-of-fees returns.

9

ANALYSIS OF HEDGE FUND STRATEGIES

From the foregoing discussion, it is reasonable to conclude the following: L/S equity and event-driven managers tend to be exposed to some natural equity market beta risk; arbitrage managers often are exposed to credit spread risk and market volatility tail risk; opportunistic managers tend to have risk exposures to the trendiness (or directionality) of markets; and relative value managers do not expect trendiness but are typically counting on mean reversion. Each strategy has unique sources of factor exposures and resulting vulnerabilities. Moreover, risk factor exposures in many strategies arise from simply holding financial instruments whose prices are directly impacted by those risk factors. That is, long and short exposures to a given risk factor in different securities are not equal, thereby giving rise to a non-zero *net* exposure. Following a practice-based risk factor perspective, this reading uses a conditional linear factor model to uncover and analyze hedge fund strategy risk exposures. While this is just one way to go about explaining hedge fund strategies' risks and returns, it is representative of the widely used risk factor approach.

One may ask why it is necessary to use such a model to investigate hedge fund strategies. It is because a linear factor model can provide insights into the intrinsic characteristics and risks in a hedge fund investment. Moreover, given the dynamic nature of hedge fund strategies, a conditional model allows for the analysis in a specific market environment to determine, for example, whether hedge fund strategies are exposed to certain risks under abnormal market conditions. A conditional model can show whether hedge fund risk exposures (e.g., to credit or volatility) that are insignificant during calm market periods may become significant during turbulent market periods. The importance of using a conditional factor model is underscored by the fact that the hedge fund industry is dynamic; for example, it experienced a huge decline in AUM during the global financial crisis. Specifically, after recording more than a 25% CAGR (compound annual growth rate) in assets between 2000 and 2007, the global hedge fund industry's aggregate AUM declined by 17% CAGR between 2007 and 2009 (the period of the global financial crisis) from a high of more than \$2.6 trillion. Moreover, global AUM did not surpass the 2007 high until 2014. In short, thousands of hedge funds were shuttered during this time as performance plunged when many managers were caught off guard by their funds' actual risk exposures during the crisis period and in its aftermath.

9.1 Conditional Factor Risk Model

A simple conditional linear factor model applied to a hedge fund strategy's returns can be represented as:

$$(\text{Return on HF})_t = \alpha_i + \beta_{i,1}(\text{Factor 1})_t + \beta_{i,2}(\text{Factor 2})_t + \dots + \beta_{i,K}(\text{Factor } K)_t + D_t\beta_{i,1}(\text{Factor 1})_t + D_t\beta_{i,2}(\text{Factor 2})_t + \dots + D_t\beta_{i,K}(\text{Factor } K)_t + (\text{error})_{i,t}, \text{ where}$$

- $(\text{Return on HF})_t$ is the return of hedge fund i in period t ;
- $\beta_{i,1}(\text{Factor 1})_t$ represents the exposure to risk factor 1 (up to risk factor K) for hedge fund i in period t during normal times;
- $D_t\beta_{i,1}(\text{Factor 1})_t$ represents the *incremental* exposure to risk factor 1 (up to risk factor K) for hedge fund i in period t during financial crisis periods, where D_t is a dummy variable that equals 1 during financial crisis periods (i.e., June 2007 to February 2009) and 0 otherwise;
- α_i is the intercept for hedge fund i ; and
- $(\text{error})_{i,t}$ is random error with zero mean and standard deviation of σ_i .

Each factor beta represents the expected change in hedge fund returns for a one-unit increase in the specific risk factor, holding all other factors (independent variables) constant. The portion of hedge fund returns not explained by the risk factors is attributable to three sources: 1) alpha, the hedge fund manager's unique investment skills; 2) omitted factors; and 3) random errors. The starting point for building this model is the identification of a comprehensive set of asset class and macro-oriented, market-based risks, including the behavior of stocks, bonds, currencies, commodities, credit spreads, and volatility. Following Hasanhodzic and Lo (2007) and practice, the model starts with the following six factors:

- **Equity risk (SNP500):** monthly total return of the S&P 500 Index, including dividends.
- **Interest rate risk (BOND):** monthly return of the Bloomberg Barclays Corporate AA Intermediate Bond Index.
- **Currency risk (USD):** monthly return of the US Dollar Index.
- **Commodity risk (CMDTY):** monthly total return of the Goldman Sachs Commodity Index (GSCI).
- **Credit risk (CREDIT):** difference between monthly seasoned Baa and Aaa corporate bond yields provided by Moody's.
- **Volatility risk (VIX):** first-difference of the end-of-month value of the CBOE Volatility Index (VIX).

Once these potentially relevant macro risk factors were identified for analysis, the next consideration was the appropriateness of using them together in the model. To address the issue of highly correlated risk factors and to avoid potential multicollinearity problems, a four-step "stepwise regression" process was used to build a conditional linear factor model that is less likely to include highly correlated risk factors. This process is described briefly in the accompanying sidebar.

Practical Steps for Building Hedge Fund Risk Factor Models

The following four-step procedure describes a stepwise regression process that can help build linear conditional factor models that are less likely to include highly correlated risk factors, thereby avoiding multi-collinearity issues.

Step 1: Identify potentially important risk factors.

Step 2: Calculate pairwise correlations across all risk factors. If two-state conditional models are used, calculate correlations across all risk factors for both states—for example, during normal market conditions (state 1) and during market crisis conditions (state 2). For illustration purposes, risk factors A and B can be assumed to be highly correlated if the correlation coefficient between them exceeds 60%.

Step 3: For highly correlated risk factors A and B, regress the return series of interest (e.g., hedge fund returns) on all risk factors excluding factor A. Then, regress the same returns on the all risk factors, but this time exclude factor B. Given the adjusted R^2 for regressions without A and without B, keep the risk factor that results in the highest adjusted R^2 .

Step 4: Repeat step 3 for all other highly correlated factor pairs, with the aim of eliminating the least useful (in terms of explanatory power) factors and thereby avoiding multi-collinearity issues.

To address the multi-collinearity problem, the stepwise regression procedure was implemented using two of the hedge fund databases mentioned previously: Lipper TASS (TASS) and Morningstar Hedge/CISDM (CISDM). The accompanying sidebar provides useful background for practitioners on these two important sources of hedge fund information.

Hedge Fund Databases

The analysis in this reading uses two well-known hedge fund databases to evaluate hedge fund strategies: Lipper TASS (TASS) and Morningstar Hedge/CISDM (CISDM) databases. These databases are among the ones most widely used for hedge fund research.

The analysis covers the period of 2000–2016. Each database is separated into “live” (operating/open), “defunct” (non-operating/shut down or operating/closed to new investment or operating/delisted and relisted with another database), and “all” funds (live + defunct) groups. Hedge fund return data are filtered to exclude funds that 1) do not report net-of-fee returns; 2) report returns in currencies other than US dollar; 3) report returns less frequently than monthly; 4) do not provide AUM or estimates; and 5) have less than 36 months of return data. TASS and CISDM databases have a total of 6,352 and 7,756 funds, respectively. Importantly, 82% (18%) and 80% (20%) of all TASS and CISDM funds, respectively, are defunct (live). This is consistent with the relatively high attrition rate of hedge funds and the relatively short life of a typical hedge fund.

Databases that include defunct funds can be highly useful for asset allocators because the historical track record of managers that may be starting new funds might be found to include defunct funds. Then, further analysis could be conducted to determine if such funds became defunct because of the managers’ poor performance and/or excessive redemptions, so they were shut down, or because of the managers’ initial success, such that an overabundance of inflows caused subsequent investment capacity issues. From a data analysis point of view, including defunct funds also helps to appropriately adjust for database survivorship bias that might otherwise yield incorrect analytical conclusions.

Live, Defunct, and All Funds in TASS Database from 2000–2016

Grouping	TASS Primary Categories	Number of Live Funds	Number of Defunct Funds	Total Number of Funds
Equity	Dedicated short bias	4	38	42
Equity	Equity market neutral	38	270	308
Equity	Long/short equity hedge	350	1,705	2,055
Event driven	Event driven	87	465	552
Relative value	Convertible arbitrage	17	162	179
Relative value	Fixed income arbitrage	42	167	209
Opportunistic	Global macro	59	266	325
Opportunistic	Managed futures	1	2	3
Multi-manager	Fund of funds	454	1,711	2,165
Multi-manager	Multi-strategy	100	414	514
Total		1,152	5,200	6,352

Live, Defunct, and All Funds in CISDM Database from 2000–2016

Grouping	CISDM Categories	Number of Live Funds	Number of Defunct Funds	Total Number of Funds
Equity	Asia/Pacific long/short equity	31	203	234
Equity	Bear market equity	2	36	38
Equity	Equity market neutral	40	272	312
Equity	Europe long/short equity	47	161	208
Equity	Global long/short equity	86	406	492
Equity	US long/short equity	218	849	1,067
Equity	US small-cap long/short equity	67	171	238
Event driven	Merger arbitrage	22	16	38
Event driven	Distressed securities	46	159	205
Event driven	Event driven	63	228	291
Relative value	Convertible arbitrage	25	125	150
Relative value	Debt arbitrage	32	141	173
Opportunistic	Global macro	84	380	464
Opportunistic	Systematic futures	182	518	700
Multi-manager	Fund of funds – debt	20	97	117
Multi-manager	Fund of funds – equity	104	592	696
Multi-manager	Fund of funds – event	10	124	134
Multi-manager	Fund of funds – macro/systematic	30	163	193

(continued)

(Continued)

Grouping	CISDM Categories	Number of Live Funds	Number of Defunct Funds	Total Number of Funds
Multi-manager	Fund of funds – multi-strategy	164	789	953
Multi-manager	Fund of funds – relative value	12	83	95
Multi-manager	Multi-strategy	111	395	506
Specialist	Volatility	28	30	58
Specialist	Long/short debt	115	279	394
Total		1,539	6,217	7,756

Using TASS and CISDM datasets, the stepwise regression procedure resulted in both BOND and CMDTY factors being dropped from the final conditional linear risk model because of multi-collinearity issues. This is because retaining CREDIT and SNP500 factors produced higher adjusted R^2 s compared to retaining BOND and CMDTY factors.

Exhibit 12 provides useful information for interpreting the effects of the factor exposures included in the conditional risk model on hedge fund strategy returns. For both normal and crisis periods, it shows the four risk factors, the typical market trend during these periods, the hedge fund manager's desired position (long or short), and the desired factor exposure for benefitting from a particular market trend.

Exhibit 12 Interpretation of Conditional Risk Factor Exposures

Period/Risk Factor	Typical Market Trend	Desired Position	Desired Factor Exposure	Comments
Normal				
SNP500	Equities Rising	Long	Positive	Aims to add risk, increase return
CREDIT	Spreads Flat/Narrowing	Long	Positive	Aims to add risk, increase return
USD	USD Flat/Depreciating	Short	Negative	Sells USD to boost returns
VIX	Volatility Falling	Short	Negative	Sells volatility to boost returns
Crisis				
DSNP500	Equities Falling Sharply	Short	Negative	Aims to reduce risk
DCREDIT	Spreads Widening	Short	Negative	Aims to reduce risk
DUSD	USD Appreciating	Long	Positive	USD is haven in crisis periods
DVIX	Volatility Rising	Long	Positive	Negative correlation with equities

9.2 Evaluating Equity Hedge Fund Strategies

Using data from the CISDM and TASS databases from 2000 to 2016, this section discusses key return and risk characteristics for hedge funds pursuing equity-related strategies. More specifically, the conditional factor model is used to assess average risk exposures (during both normal and crisis market periods) for all “live” funds in each of the equity-related categories in these databases. Finally, the heterogeneity among funds, which is masked in the average exposures, is then revealed in an analysis showing the percentage of all hedge funds in each category that have significant factor exposures (positive and negative) during normal and crisis periods.

Note that the results of such a risk factor analysis may vary somewhat based on the hedge fund database used, the time period examined, and the specification of the factor model. However, the key takeaway is that such an analysis can uncover unintended adverse risk exposures to a hedge fund—stemming from the strategy it pursues—that may assert themselves only during turbulent market periods. As mentioned previously, unintended adverse risk exposures that revealed themselves during the global financial crisis resulted in the demise of literally thousands of hedge funds worldwide. Thus, understanding how to interpret the results of such a risk factor analysis is a key practical competency for any practitioner involved in advising on the strategies followed by hedge funds or in managing or owning the hedge funds themselves. First, we describe how the factor model can be used to understand risk exposures of equity-related hedge fund strategies. Then, we turn to understanding risks of multi-manager strategies.

The key return characteristics are shown for equity-related hedge fund strategies by category in Exhibit 13. In addition to the Sharpe ratio, we calculate the Sortino ratio.² The Sortino ratio replaces standard deviation in the Sharpe ratio with downside deviation, so it concentrates on returns below a specified threshold. For example, if the threshold return is zero, then the Sortino ratio uses downside deviation based on losses. Because hedge funds potentially invest in illiquid securities (which artificially smooth returns, thus lowering the measured standard deviation), besides measuring risk and return one should also investigate the autocorrelation of returns. Rho is a measure of first order serial autocorrelation, the correlation between a fund’s return and its own lagged returns. High Rho signals smoothed returns and thus is an indicator of potential liquidity issues (specifically, illiquidity and infrequent trading) in the underlying securities.

Exhibit 13 shows that L/S Equity Hedge (TASS) has the highest mean return (11.30%) but also the highest standard deviation (22.86%). Among categories with more than four funds, EMN (TASS) has the highest Sharpe ratio; notably, despite having the highest standard deviation, L/S Equity Hedge (TASS) also has the highest Sortino ratio; and Global L/S Equity (CISDM) shows the largest Rho. Overall, these results indicate that by accepting some beta and illiquidity exposure, L/S equity managers generally outperform equity market-neutral managers in terms of total returns delivered. Returns of L/S equity managers, however, are also more volatile than those of EMN managers and so produce lower Sharpe ratios. Intuitively, these results are in line with expectations.

² In addition to Sharpe and Sortino ratios, other performance measures can be used, such as the Treynor ratio, information ratio, return on VaR, Jensen’s alpha, M^2 , maximum drawdown, and gain-to-loss ratio.

Exhibit 13 Key Return Characteristics for Equity Hedge Fund Strategies (2000–2016)

Database	Category	Sample Size	Annualized Mean (%)		Annualized Sharpe Ratio		Annualized Sortino Ratio		Rho (%)	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
TASS	Dedicated short bias	4	2.91	14.75	2.27	4.36	1.35	1.07	20.0	45.7
CISDM	Bear market equity	2	2.04	7.37	0.29	1.18	0.70	1.47	9.15	1.79
TASS	Equity market neutral	38	7.81	10.20	0.83	0.56	0.80	0.53	9.3	15.8
CISDM	Equity market neutral	40	7.48	8.82	0.79	0.81	0.65	0.92	16.29	8.88
TASS	Long/short equity hedge	350	11.30	22.86	0.62	0.64	1.33	1.04	11.0	13.5
CISDM	Global long/short equity	86	8.83	16.93	0.44	0.57	0.76	1.09	17.43	15.63
CISDM	Asia/Pacific long/short equity	31	8.87	20.27	0.45	0.36	0.73	0.57	16.72	10.49
CISDM	Europe long/short equity	47	7.05	11.59	0.56	0.37	0.69	1.08	13.92	10.53
CISDM	US long/short equity	218	9.41	17.50	0.62	0.46	0.60	0.55	12.76	8.98
CISDM	US small cap long/short equity	67	9.88	19.60	0.65	0.48	1.14	0.86	11.71	7.44

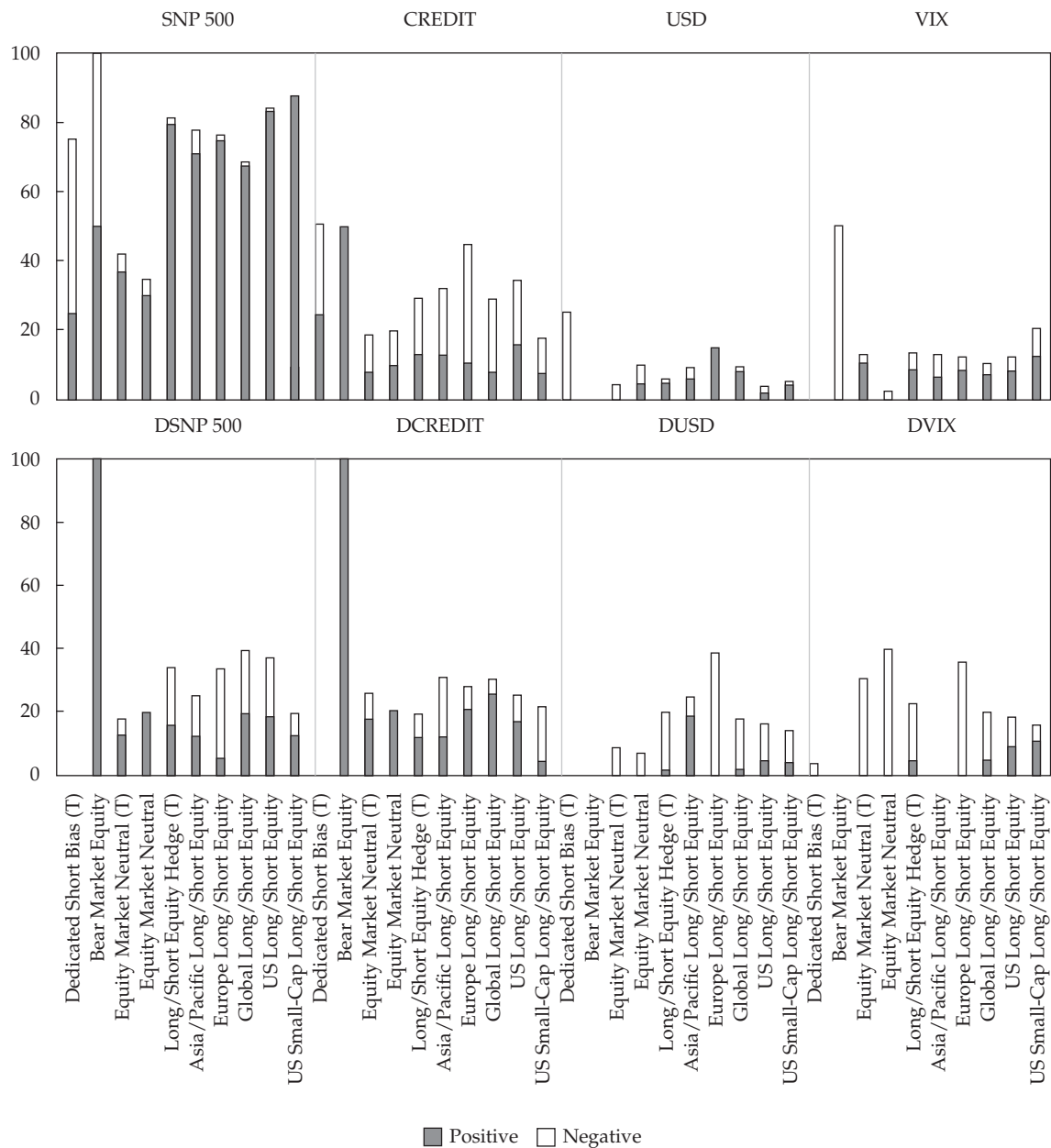
Taking a more granular view of factor risks, Exhibit 14 presents average risk exposures (equity, credit, currency, and volatility) for equity-related hedge fund strategies using the conditional risk factor model from 2000 to 2016. The crisis period is from June 2007 to February 2009, and crisis period factors are preceded by the letter “D” (e.g., the crisis period equity factor is DSNP500). Light (dark) shaded coefficients have *t*-statistics greater than 1.96 (1.67) and are significant at the 5% (10%) level.

Exhibit 14 Risk Exposures for Equity Hedge Funds Using the Conditional Risk Factor Model (2000–2016)

Strategy	Dedicated Short Bias	Bear Market Equity	Equity Market Neutral	Equity Market Neutral	Asia/ Pacific Long/ Short Equity	Europe Long/ Short Equity	Global Long/ Short Equity	US Long/ Short Equity	US Small Cap Long/ Short Equity	Long/ Short Equity Hedge
Database	TASS	CISDM	TASS	CISDM	CISDM	CISDM	CISDM	CISDM	CISDM	TASS
Sample Size	4	2	38	40	31	47	86	218	67	350
Normal Times Exposures										
Intercept	−0.02	0.00	0.01	0.01	0.01	0.01	0.02	−0.01	0.01	0.01
SNP500	−0.28	−0.46	0.11	0.09	0.42	0.24	0.52	0.58	0.58	0.41
USD	−0.13	−0.07	−0.02	0.00	−0.02	0.06	−0.01	−0.03	−0.01	−0.04
CREDIT	1.24	0.22	−0.12	−0.07	−0.26	−0.23	−0.77	0.63	−0.09	−0.20
VIX	0.04	−0.05	0.01	0.00	−0.01	0.02	−0.01	−0.03	0.03	0.07
Crisis Times Exposures (Incremental)										
DSNP500	0.04	0.11	0.04	0.05	−0.02	−0.14	−0.04	0.03	−0.02	−0.03
DUSD	−0.08	−0.06	−0.17	−0.02	0.15	−0.42	−0.07	−0.07	−0.09	−0.17
DCREDIT	0.02	0.05	0.06	0.10	−0.01	0.07	0.16	0.03	−0.20	0.07
DVIX	0.00	−0.02	−0.06	−0.04	−0.04	−0.09	−0.04	0.02	−0.02	−0.02

On average, funds following EMN strategies maintain low exposure to equity market risk (0.11, significant at 10%) as well as a neutral exposure to the other risk factors in the model in both normal and crisis periods. L/S equity strategies maintain significant (at the 5% level) average beta loadings to equity risk during normal periods. The equity risk betas range from 0.24 for Europe L/S Equity to 0.58 for both US and US Small Cap L/S Equity strategies. Although there are no significant incremental (i.e., additional) exposures to equity risk (DSNP500) during crisis periods, total exposures during crisis periods (normal + crisis) are positive and significant for all L/S equity strategies. For example, the total equity exposure in crisis times for US L/S Equity is 0.61 (= 0.58 + 0.03). Because they show average exposures across all live funds in the given strategy category, these results mask significant heterogeneity between funds in their exposures to the four risk factors.

Exhibit 15 highlights this heterogeneity by presenting the percentage of funds experiencing significant (at the 10% level or better) factor exposures within each strategy category. The (T) indicates funds from the TASS database, and all other funds are from CISDM; gray (white) bars signify positive (negative) factor exposures. The y-axis indicates the percentage of funds within each strategy category that experienced the significant risk exposures.

Exhibit 15 Significant Positive and Negative Factor Exposures for Funds by Equity Hedge Strategy During Normal and Crisis Periods (2000–2016)

For example, with the exception of dedicated short-biased funds, most equity-related hedge funds have significant positive exposure to equity risk during normal market periods (30%+ for EMN funds and 70%+ for L/S equity funds). However, during crisis periods, less than 40% of L/S equity funds have any significant incremental equity exposure; for those that do, their added exposure is mixed (negative and positive). This suggests that managers were able to decrease adverse crisis period effects on their returns—likely by deleveraging, outright selling of stock (short sales, too) and equity index futures, and/or by buying index put options. This also indicates that although they did not reduce long beta tilting by much, on average L/S equity managers did not make things worse by trying to aggressively “bottom pick” the market. Finally, these results are consistent with the average incremental equity exposure during crisis periods of approximately zero, as seen in the previous exhibit.

As one might intuitively expect, most L/S equity managers do not have significant exposure to CREDIT. Only about one-third of L/S equity funds have significant exposure to CREDIT—mainly negative exposure, indicating that they are unlikely to benefit from moderating credit risk (spreads narrowing, credit upgrades). Interestingly, for the 25% of funds with significant incremental crisis period CREDIT exposure, these exposures become more positive, which would tend to hurt returns as spreads widen and credit downgrades accelerate during market sell-offs. Similarly, exposures to USD and VIX for L/S equity funds are marginal during normal times, with few funds having any significant exposures. However, in most cases during crisis periods, any significant additional exposures are mainly negative. For example, about 40% of Europe L/S Equity funds show significant negative exposure to USD—perhaps expecting a crisis-induced flight to quality into the euro or Japanese yen as opposed to USD. Again, nearly 40% of these funds show negative added VIX exposure (i.e., short volatility) during crisis times. Returns of some high-profile hedge funds have been hurt by being unexpectedly short volatility during crisis periods, which underscores why understanding the heterogeneity of factor exposures is important to understanding risk profiles of hedge funds.

EXAMPLE 14**Dedicated Short-Biased Hedge Fund**

Bearish Asset Management (BAM) manages a short-biased hedge fund that varies its portfolio's short tilt depending on perceived opportunities. Using the fund's monthly returns for the past 10 years, which include periods of financial market crisis, a conditional risk factor model was estimated. The following table provides factor beta estimates with corresponding *t*-statistics [dark (light) shaded are significant at the 5% (10%) level].

Interpret the factor loadings. Also, what can you infer about BAM's overall risk exposure during crisis periods?

Coefficient	Estimate	t-Statistic
Normal Times Exposures		
Intercept	0.005	1.10
USD	0.072	0.72
CREDIT	−0.017	−0.07
SNP500	−0.572	−9.65
VIX	−0.164	−2.19
Crisis Times Exposures (Incremental)		
DUSD	0.456	1.31
DCREDIT	−0.099	−0.40
DSNP500	0.236	1.74
DVIX	0.105	1.03

Solution:

BAM's fund has highly significant negative loadings on equity risk (SNP500) and volatility risk (VIX). The negative equity risk exposure is as expected for a short-biased strategy. But the negative VIX loading is consistent with short volatility exposure. This suggests that BAM's manager may be selling puts against some of its short exposures, thereby attempting to also capture a volatility premium. During crisis periods, the equity beta rises from −0.572 to −0.336 ($= -0.572 + 0.236 = -0.336$). This negative exposure is still significant and suggests that

despite being a short-biased fund, BAM had less negative equity risk exposure during crisis periods. In this case, the manager may be purposefully harvesting some of its short exposure into market weakness.

9.3 Evaluating Multi-Manager Hedge Fund Strategies

It is important to understand the risks of multi-manager hedge fund strategies. Exhibit 16 shows that multi-strategy hedge funds outperform funds-of-funds: They have higher mean returns (7.85%/TASS and 8.52%/CISDM) and among the highest Sharpe ratios and Sortino ratios. Multi-strategy funds have higher Rho (more than 20%) compared to FoF, indicating relatively high serial autocorrelation. This is reasonable because multi-strategy funds may be simultaneously running strategies using less liquid instruments, such as convertible arbitrage, fixed-income arbitrage, and other relative value strategies. That is why, unlike FoFs, they often impose investor-level or fund-level gates on maximum quarterly redemptions.

Exhibit 16 Key Return Characteristics for Multi-Manager Hedge Fund Strategies (2000–2016)

Database	Category	Sample Size	Annualized Mean (%)		Annualized Sharpe Ratio		Annualized Sortino Ratio		Rho (%)	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
CISDM	Fund of funds – debt	20	6.52	7.94	0.89	0.66	0.68	1.17	13.89	4.24
CISDM	Fund of funds – equity	104	4.69	9.15	0.41	0.28	0.44	0.91	12.27	10.61
CISDM	Fund of funds – event	10	4.59	4.99	0.75	0.51	0.56	1.19	13.76	6.71
CISDM	Fund of funds – macro/systematic	30	5.09	10.16	0.39	0.39	0.57	0.60	8.15	3.52
CISDM	Fund of funds – multi-strategy	164	4.47	7.18	0.54	1.84	1.34	1.43	12.43	9.31
CISDM	Fund of funds – relative value	12	5.31	8.58	0.70	0.42	1.31	0.63	15.86	13.77
TASS	Fund of funds	454	5.73	10.03	0.38	0.71	0.52	0.62	19.9	18.1
CISDM	Multi-strategy	111	8.52	11.01	0.89	1.36	1.32	1.58	20.09	16.24
TASS	Multi-strategy	100	7.85	11.51	0.86	1.40	1.00	1.05	22.7	24.3

Exhibit 17 presents average risk exposures for multi-manager hedge fund strategies using the conditional risk factor model. The crisis period is from June 2007 to February 2009, and light (dark) shaded betas have *t*-statistics of more than 1.96 (1.67).

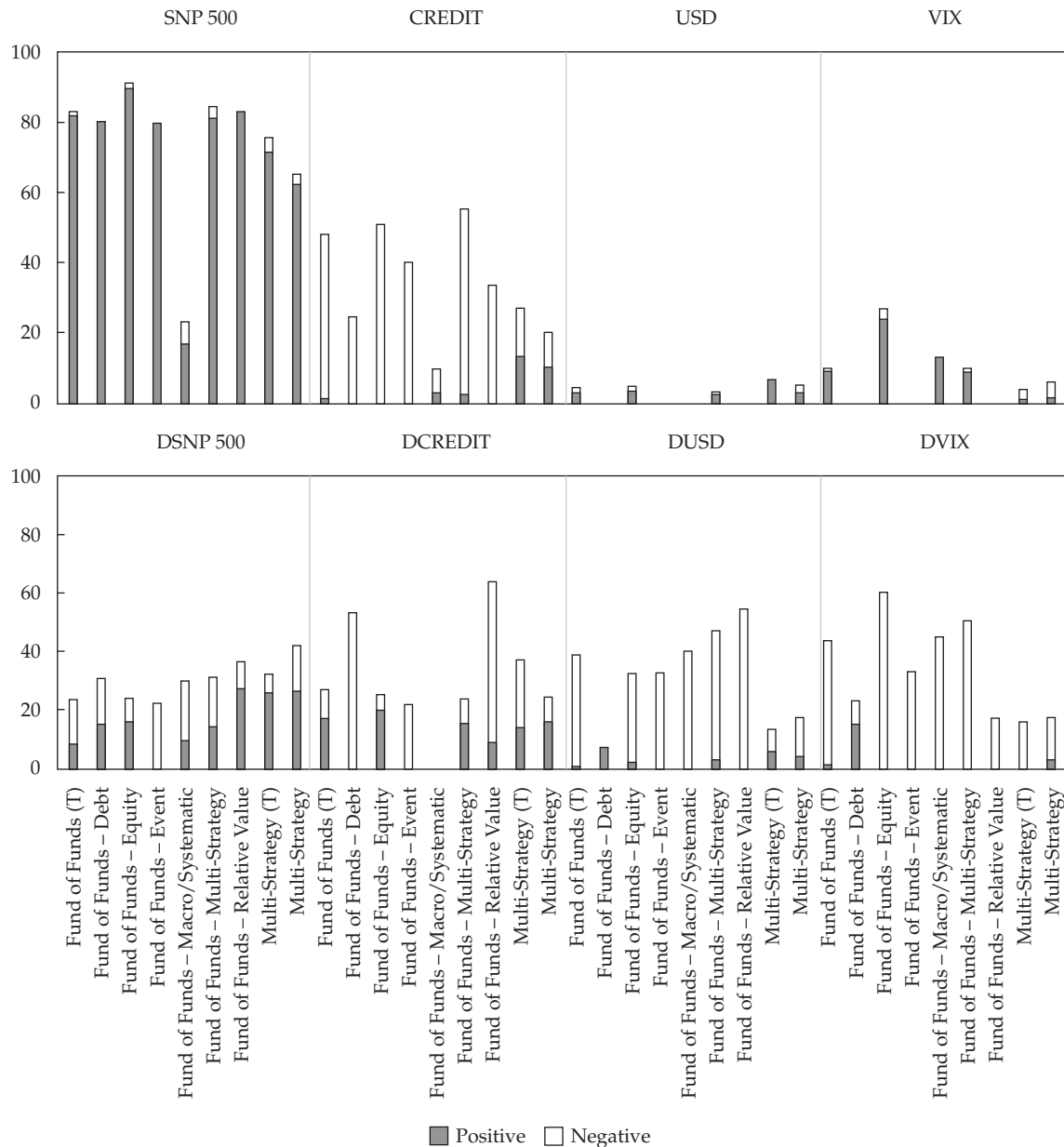
Exhibit 17 Risk Exposures for Multi-Manager Hedge Funds Using the Conditional Risk Factor Model (2000–2016)

Strategy	Fund of Funds – Debt	Fund of Funds – Equity	Fund of Funds – Event	Fund of Funds – Macro/Systematic	Fund of Funds – Multi-Strategy	Fund of Funds – Relative Value	Fund of Funds	Multi-Strategy	Multi-Strategy
Database	CISDM	CISDM	CISDM	CISDM	CISDM	CISDM	TASS	CISDM	TASS
Sample Size	20	104	10	30	163	12	454	111	100
Normal Times Exposures									
Intercept	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.10	0.01
SNP500	0.16	0.33	0.14	–0.02	0.21	0.12	0.24	–0.14	0.22
USD	–0.01	0.01	0.01	–0.07	0.00	0.01	0.01	–0.41	–0.01
CREDIT	–0.36	–0.43	–0.22	–0.10	–0.28	–0.14	–0.45	–5.71	–0.03
VIX	0.00	0.03	0.00	0.04	0.01	0.02	0.01	–0.03	0.01
Crisis Times Exposures (Incremental)									
DSNP500	–0.02	0.02	–0.01	–0.01	0.00	0.02	0.00	0.05	0.06
DUSD	0.03	–0.09	–0.19	–0.21	–0.20	–0.27	–0.05	–0.05	–0.05
DCREDIT	–0.10	0.09	–0.13	0.01	0.03	–0.10	0.09	0.07	–0.05
DVIX	0.03	–0.09	–0.03	–0.05	–0.07	–0.06	–0.05	–0.02	–0.05

Results show that all FoF strategies (except macro/systematic) have significant positive exposure to equity risk (ranging from 0.14 to 0.33) for the full period. The finding for macro/systematic is consistent with results presented earlier for opportunistic hedge funds, which show they tend not to be exposed to equity risks in aggregate. Interestingly, multi-strategy funds have significant equity exposure but differing signs—negative (positive) for CISDM (TASS)—which highlights the heterogeneity between the two databases.

Multi-manager funds as a group do not appear to provide significant hedging benefits (via diversification) in crisis times. If they did, then significant negative exposures to DSNP500 would be observed. This is consistent with the research findings that in the 2007–2009 global financial crisis, diversification across hedge fund strategies did not decrease total portfolio risk. These researchers conclude that during crises, simple diversification is insufficient; rather, it is important to focus on such other risks as liquidity, volatility, and credit—particularly because these risks may be magnified by the application of leverage.

Exhibit 18 tells a different story when individual funds are studied. The majority of multi-manager funds have significant positive exposure to the equity factor, but around 30% of funds show a mix of negative and positive incremental exposures (DSNP 500) to equities during the crisis period. This suggests that at least some funds (ones with negative loadings) were able to shield their investors from substantial market declines by either deleveraging, selling equity pre-crisis, and/or short selling. About 40% of all multi-manager funds have significant, mostly negative, exposure to CREDIT, indicating that they generally were not positioned to benefit from improving credit spreads. In crisis times, they took on additional (mostly negative) CREDIT exposure. For example, about 50% of FoF-Debt and FoF-Relative Value funds experienced incremental negative CREDIT exposure during turbulent periods, which hedged them from deteriorating credit conditions.

Exhibit 18 Significant Positive and Negative Factor Exposures for Multi-Manager Hedge Funds During Normal and Crisis Periods (2000–2016)

For the full period, multi-manager funds have minimal exposures to USD and VIX. Notably, these exposures increase dramatically, becoming significantly negative during financial crises. For example, only 2% of FoF-Equity have negative exposure to VIX overall. But, 60% of these funds show additional significant negative VIX exposure in crisis times. A similar pattern is revealed for USD exposure. Such negative exposures would seem undesirable during times when volatility is spiking and the USD is likely appreciating. Natural embedded leverage may be a partial explanation for these seemingly undesirable exposures during crisis times. In sum, as crisis periods generate potentially unexpected exposures to systematic risks, it is essential to use conditional factor models to understand risks of hedge fund strategies.

PORTFOLIO CONTRIBUTION OF HEDGE FUND STRATEGIES

10

This section examines the return and risk contributions of the hedge fund strategies previously covered when added to a traditional 60% stock/40% bond investment portfolio.

10.1 Performance Contribution to a 60/40 Portfolio

For each hedge fund strategy category that has been discussed, we now consider an equal-weighted portfolio of the individual funds in that category. We examine the impact of a 20% allocation to such a hedge fund strategy portfolio when combined with a traditional investment portfolio consisting of 60% stocks and 40% bonds. The S&P500 Total Return Index and the Bloomberg Barclays Corporate AA Intermediate Bond Index are used to proxy the 60%/40% portfolio. When the hedge fund strategy portfolio is added to the traditional portfolio, the resulting allocations for the combined portfolio are 48% stocks, 32% bonds, and 20% in the particular hedge fund strategy portfolio. Please note this exercise is for illustrating the portfolio performance contribution of hedge fund strategies; practically speaking, it is unlikely an investor would hold an allocation (here 20%) that included an equal weighting of all live funds in one particular hedge fund strategy category.

Exhibit 19 provides performance and risk metrics for the combined portfolios from 2000 to 2016. It shows that when added to a traditional 60%/40% portfolio (with a mean return of 6.96%), a 20% allocation to the US Small Cap L/S Equity strategy generates the highest mean return (7.53%) of all the combined portfolios—an improvement of 57 bps. Adding a 20% allocation of an equal-weighted portfolio of funds in any of the following hedge fund categories to the traditional portfolio produces average annual returns of more than 7.30%: fixed-income arbitrage, distressed securities, or systematic futures. Adding a 20% allocation of any of the hedge fund strategies shown in Exhibit 19 to the traditional portfolio almost always decreases total portfolio standard deviation while increasing Sharpe and Sortino ratios (and also decreasing maximum drawdown in about one-third of the combined portfolios). These results demonstrate that hedge funds act as both risk-adjusted return enhancers and diversifiers for the traditional stock/bond portfolio.

Exhibit 19 Performance and Risk of 48/32/20 Portfolio, Where 20% Allocation Is to an Equal-Weighted Portfolio for Each Hedge Fund Strategy Category (2000–2016)

Category	Type	Database	Mean Return (%)	SD (%)	Sharpe Ratio	Sortino Ratio	Maximum Drawdown (%)
60% Stocks/40% Bonds	Traditional Portfolio	—	6.96	8.66	0.62	1.13	14.42
Long/Short Equity Hedge	Equity	TASS	7.22	8.29	0.68	1.45	21.34
Global Long/Short Equity	Equity	CISDM	7.06	8.17	0.67	1.22	22.51
U.S. Long/Short Equity	Equity	CISDM	7.17	8.22	0.68	1.24	16.77
U.S. Small Cap Long/ Short Equity	Equity	CISDM	7.53	8.75	0.68	1.23	27.02
Asia/Pacific Long/Short Equity	Equity	CISDM	6.44	8.12	0.60	1.07	21.74

(continued)

Exhibit 19 (Continued)

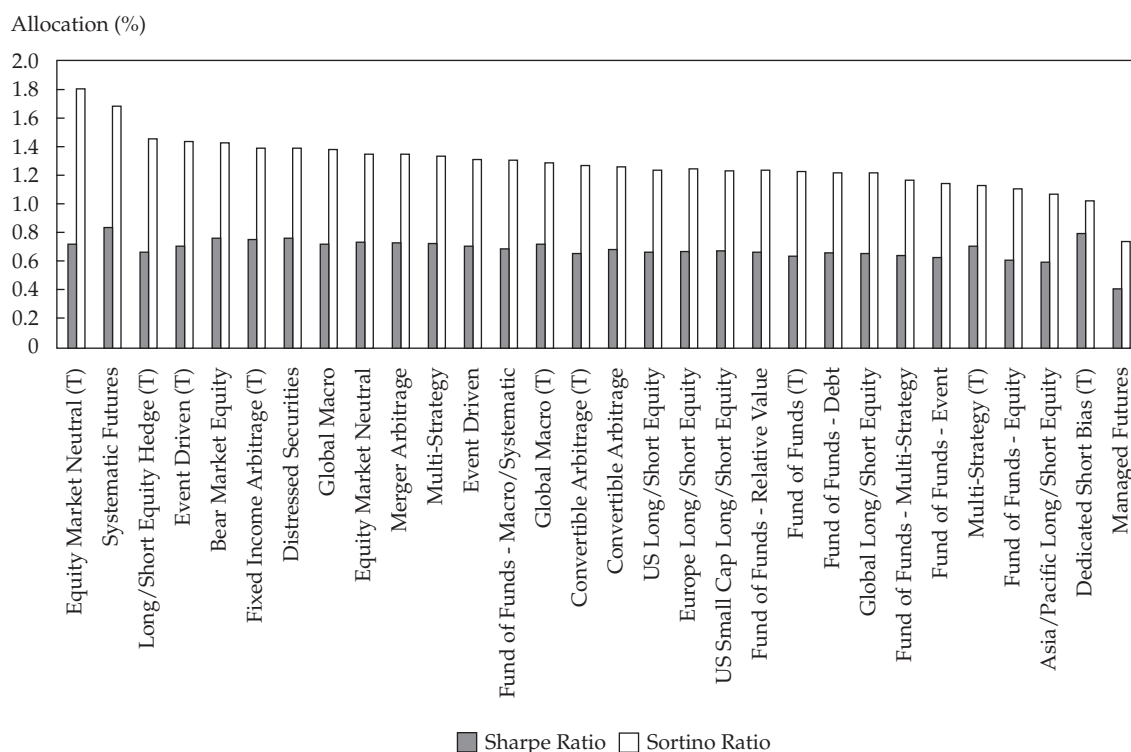
Category	Type	Database	Mean Return (%)	SD (%)	Sharpe Ratio	Sortino Ratio	Maximum Drawdown (%)
Europe Long/Short Equity	Equity	CISDM	6.79	7.69	0.67	1.24	15.20
Dedicated Short Bias	Equity	TASS	6.02	5.59	0.79	1.02	16.06
Bear Market Equity	Equity	CISDM	5.97	5.68	0.77	1.43	16.62
Equity Market Neutral	Equity	TASS	6.81	7.17	0.73	1.80	10.72
Equity Market Neutral	Equity	CISDM	6.79	7.13	0.73	1.36	4.99
Event Driven	Event Driven	TASS	7.13	7.76	0.71	1.44	20.96
Event Driven	Event Driven	CISDM	7.19	7.83	0.71	1.31	20.57
Distressed Securities	Event Driven	CISDM	7.40	7.67	0.75	1.38	20.00
Merger Arbitrage	Event Driven	CISDM	6.85	7.22	0.73	1.35	5.60
Convertible Arbitrage	Relative Value	TASS	6.76	7.75	0.66	1.27	31.81
Fixed-Income Arbitrage	Relative Value	TASS	7.50	7.82	0.75	1.39	12.68
Convertible Arbitrage	Relative Value	CISDM	6.91	7.68	0.69	1.25	27.91
Global Macro	Opportunistic	TASS	6.96	7.36	0.73	1.29	5.14
Global Macro	Opportunistic	CISDM	6.97	7.29	0.74	1.38	5.19
Systematic Futures	Opportunistic	CISDM	7.34	6.94	0.83	1.68	8.04
Fund of Funds	Multi- Manager	TASS	6.43	7.53	0.64	1.23	18.92
Multi-Strategy	Multi- Manager	TASS	6.98	7.57	0.71	1.13	17.35
Fund of Funds – Debt	Multi- Manager	CISDM	6.56	7.40	0.67	1.22	17.77
Fund of Funds – Equity	Multi- Manager	CISDM	6.39	7.76	0.62	1.11	21.63
Fund of Funds – Event	Multi- Manager	CISDM	6.35	7.48	0.63	1.15	21.37
Fund of Funds - Macro/ Systematic	Multi- Manager	CISDM	6.47	7.05	0.69	1.31	10.65
Fund of Funds – Multi-Strategy	Multi- Manager	CISDM	6.36	7.41	0.64	1.17	18.17
Fund of Funds - Relative Value	Multi- Manager	CISDM	6.46	7.22	0.67	1.23	17.16
Multi-Strategy	Multi- Manager	CISDM	7.00	7.47	0.72	1.34	13.83

The Sharpe ratio measures risk-adjusted performance, where risk is defined as standard deviation, so it penalizes both upside and downside variability. The Sortino ratio measures risk-adjusted performance, where risk is defined as downside deviation, so it penalizes only downside variability below a minimum target return. For hedge fund strategies with large negative events, the Sortino ratio is considered a better performance measure. The combined portfolio with the highest Sharpe ratio (0.83)

includes a 20% allocation to systematic futures hedge funds. High Sharpe ratios are also achieved from allocations to distressed securities, fixed-income arbitrage, and global macro or equity market-neutral strategies. Adding allocations of 20% consisting of hedge funds from equity market-neutral (TASS), systematic futures, L/S equity hedge, or event-driven (TASS) categories to the traditional portfolio produces combined portfolios with by far the best Sortino ratios.

Exhibit 20 plots the Sharpe and Sortino ratios for 48/32/20 portfolios, where the 20% allocation is to an equal-weighted portfolio of the funds in each hedge fund strategy category. As a point of reference, the Sharpe and Sortino ratios for the 60/40 portfolio are 0.62 and 1.13, respectively. This graphic visually demonstrates that adding allocations of systematic futures, equity market-neutral, global macro, or event-driven hedge fund strategies, among others, to the traditional portfolio is effective in generating superior risk-adjusted performance—as evidenced by their relatively high Sharpe and Sortino ratios. Moreover, the implication is that despite the flexibility to invest in a wide range of strategies, fund-of-funds and multi-manager funds do not enhance risk-adjusted performance very much.

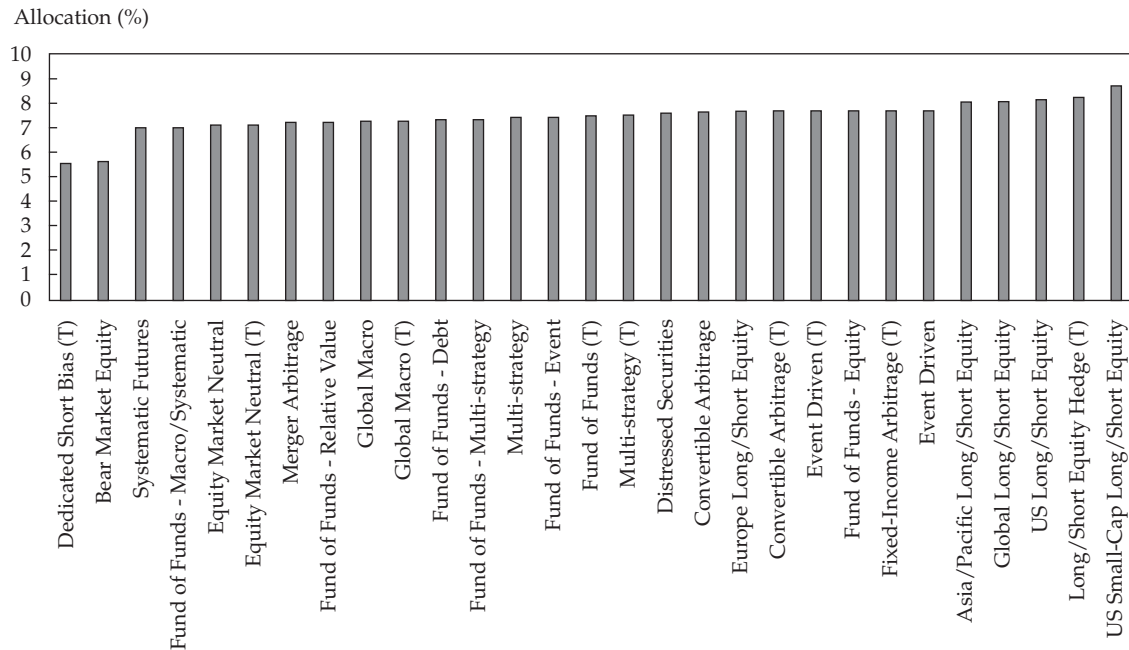
Exhibit 20 Sharpe and Sortino Ratios for 48/32/20 Portfolios, Where 20% Allocation Is to an Equal-Weighted Portfolio for Each Hedge Fund Strategy Category



10.2 Risk Metrics

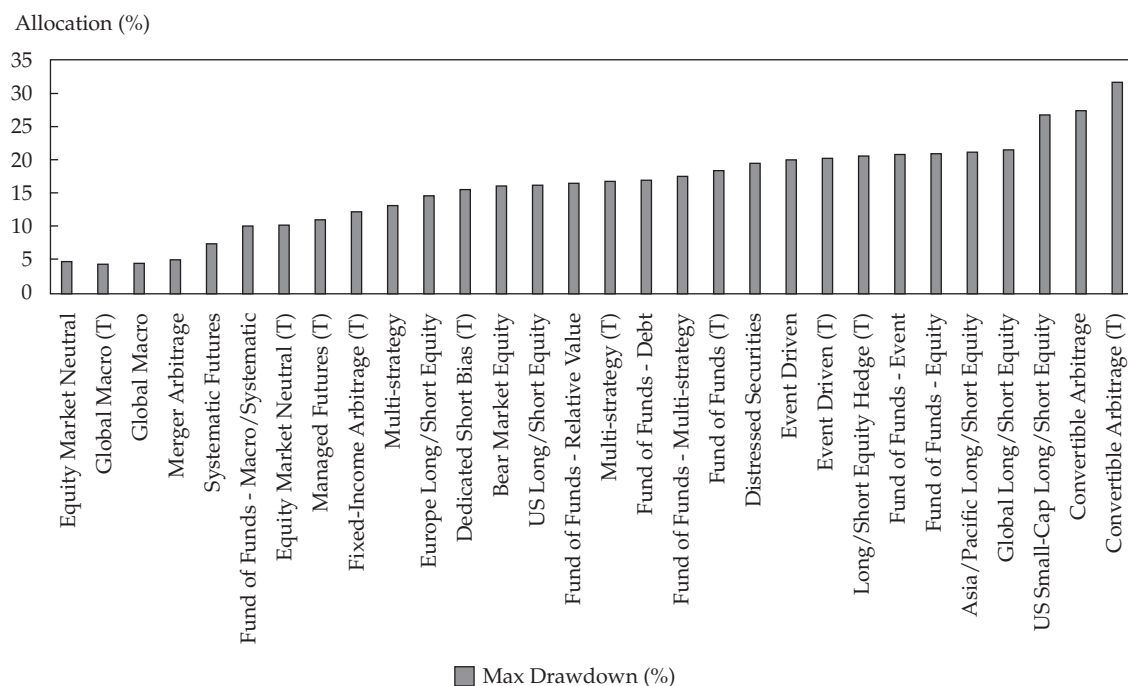
Considering the different risk exposures and investments that hedge fund strategies entail, many investors consider these strategies for portfolio risk reduction or risk mitigation. Exhibit 21 illustrates which strategies may be most effective in reducing risk in a traditional portfolio (with standard deviation of 8.66%). The exhibit presents the standard deviation of returns for 48/32/20 portfolios, where the 20% allocation is to an equal-weighted portfolio for each hedge fund strategy category.

Exhibit 21 Standard Deviations for 48/32/20 Portfolios, Where 20% Allocation Is to an Equal-Weighted Portfolio for Each Hedge Fund Strategy Category



Besides dedicated short-biased and bear market-neutral strategies—for which there are only 6 live funds in total—it can be seen that among the hedge fund strategies that produce the lowest standard deviations of returns in the combined portfolios are systematic futures (6.94%) and FoF-macro/systematic and equity market neutral (a little more than 7.0%). These strategies appear to provide significant risk-reducing diversification benefits; and as discussed previously, they are also the same categories of hedge funds that enhance risk-adjusted returns when added to the traditional 60/40 portfolio. It is evident that standard deviations are relatively high for combined portfolios with event-driven/distressed securities and relative value/convertible arbitrage strategies, indicating they provide little in the way of risk-reduction benefits. This may be attributed to the binary, long-biased nature of most event-driven/distressed securities investing and the typical leverage downsizing/liquidity issues of relative value/convertible arbitrage during periods of market stress.

A drawdown is the difference between a portfolios' highest value (i.e., high-water mark) for a period and any subsequent low point until a new high-water mark is reached. Maximum drawdown is the *largest* difference between a high-water mark and a subsequent low point. The results for maximum drawdown for the 48/32/20 portfolios are shown in Exhibit 22.

Exhibit 22 Maximum Drawdowns for 48/32/20 Portfolios, Where 20% Allocation Is to an Equal-Weighted Portfolio for Each Hedge Fund Strategy Category


The graphic shows that when combined with the traditional stock and bond portfolio (with a maximum drawdown of 14.42%), the hedge fund strategy portfolios that generate the smallest maximum drawdowns are the opportunistic strategies—specifically, global macro and systematic futures as well as merger arbitrage and equity market-neutral strategies. Notably, the conditional risk model showed that these strategies did not have much exposure to high equity or credit risk during crisis periods. In addition, they also tend to be the strategies with the lowest serial autocorrelation, signaling good liquidity. This suggests that these types of strategies provide risk mitigation for traditional assets because they are not exposed to the same risks, are relatively opportunistic, and are liquid even during periods of market stress. On the other side of the spectrum, L/S equity strategies, event-driven/distressed securities strategies, and relative value/convertible arbitrage strategies show high maximum drawdowns when combined with the traditional portfolio. This is unsurprising because the conditional risk model showed that these event-driven and relative value strategies tended to hold equity risk and that their credit risk also became significant during crisis periods.

EXAMPLE 15
Combining a Hedge Fund Strategy with a Traditional Portfolio

DIY Investment Advisors is a “CIO in a box.” Its clients are mainly small institutions and local college endowments. Evergreen Tech, a private 4-year college, is a client with a \$150 million endowment and an enrollment of 3,000 students. The endowment’s portfolio, which supports 5% of Evergreen’s current annual spending needs, has a traditional asset allocation of 60% stocks/40% bonds. Evergreen plans to dramatically increase enrollment to 4,000 students over the next 5 years.

Patricia Chong, principal of DIY, wants to recommend to Evergreen's investment committee (IC) that it add alternative investments to the endowment's portfolio, specifically a 20% allocation to a hedge fund strategy. The IC has indicated to Chong that Evergreen's main considerations for the combined portfolio are that any hedge fund strategy allocation should a) maximize risk-adjusted returns; b) limit downside risk; and c) not impair portfolio liquidity. The IC is also sensitive to fees and considers it important to avoid layering of fees for any hedge fund allocation.

At Chong's request, DIY's hedge fund analysts perform due diligence on numerous hedge funds and assemble the following information on several short-listed funds, showing their past performance contribution to a 48% stocks/32% bonds/20% hedge fund strategy portfolio. Finally, Chong believes historical returns are good proxies for future returns.

Category	Type	Mean Return (%)	SD (%)	Sharpe Ratio	Sortino Ratio	Maximum Drawdown (%)
60% Stocks/40% Bonds	Traditional Portfolio	6.96	8.66	0.62	1.13	14.42
US small-cap long/ short equity	Equity	7.53	8.75	0.68	1.23	27.02
Event driven	Event driven	7.19	7.83	0.71	1.31	20.57
Sovereign debt fixed- income arbitrage	Relative value	7.50	7.82	0.75	1.39	12.68
Fund-of-funds – equity	Multi-manager	6.39	7.76	0.62	1.11	21.63

Use the information provided to answer the following questions.

- 1 Discuss which hedge fund strategy Chong should view as *least* suitable for meeting the considerations expressed by Evergreen's IC.
- 2 Discuss which hedge fund strategy Chong should view as *most* suitable for meeting the considerations expressed by Evergreen's IC.

Solution to 1:

Based on the IC's considerations, Chong should view a 20% allocation to the fund-of-funds equity hedge fund strategy as least suitable for Evergreen's endowment portfolio. Such an allocation offers no improvements in the combined portfolio's Sharpe and Sortino ratios (to 0.62 and 1.11, respectively). The substantially higher maximum drawdown (50% higher at 21.63%) indicates much more downside risk would be in the combined portfolio. Portfolio liquidity may also be impaired due to two levels of redemption lock-ups and liquidity gates. Finally, given the FoF structure for this strategy allocation, Evergreen would need to pay two layers of fees and would also likely face fee netting risk.

Solution to 2:

Based on the IC's considerations, Chong should view a 20% allocation to the sovereign debt fixed-income arbitrage hedge fund strategy as most suitable for Evergreen's endowment portfolio. Such an allocation would result in significant increases in the combined portfolio's Sharpe and Sortino ratios (to 0.75 and 1.39, respectively), the highest such ratios among the strategies presented. Besides the improvement in Sortino ratio, the lower maximum drawdown (12.68%) indicates less downside risk in the combined portfolio than with any of the other strategy choices. Portfolio liquidity would also likely not be impaired as this strategy

focuses on sovereign debt, which typically has good liquidity for most developed market issuers. Finally, similar to the other non-FoF strategies shown, Evergreen would pay only one layer of fees and would also not face any fee netting risk.

SUMMARY

- Hedge funds are an important subset of the alternative investments space. Key characteristics distinguishing hedge funds and their strategies from traditional investments include the following: 1) lower legal and regulatory constraints; 2) flexible mandates permitting use of shorting and derivatives; 3) a larger investment universe on which to focus; 4) aggressive investment styles that allow concentrated positions in securities offering exposure to credit, volatility, and liquidity risk premiums; 5) relatively liberal use of leverage; 6) liquidity constraints that include lock-ups and liquidity gates; and 7) relatively high fee structures involving management and incentive fees.
- Hedge fund strategies are classified by a combination of the instruments in which they are invested, the trading philosophy followed, and the types of risks assumed. Some leading hedge fund strategy index providers are Hedge Fund Research; Lipper TASS; Morningstar Hedge/CISDM; Eurekahedge; and Credit Suisse. There is much heterogeneity in the classification and indexes they provide, so no one index group is all-encompassing.
- This reading classifies hedge fund strategies by the following categories: equity-related strategies; event-driven strategies; relative value strategies; opportunistic strategies; specialist strategies; and multi-manager strategies.
- Equity L/S strategies take advantage of diverse opportunities globally to create alpha via managers' skillful stock picking. Diverse investment styles include value/growth, large cap/small cap, discretionary/quantitative, and industry specialization. Some equity L/S strategies may use index-based short hedges to reduce market risk, but most involve single name shorts for portfolio alpha and added absolute return.
- Equity L/S strategies are typically liquid and generally net long, with gross exposures at 70%–90% long vs. 20%–50% short (but they can vary).
- Equity L/S return profiles are typically aimed to achieve average annual returns roughly equivalent to a long-only approach but with standard deviations that are 50% lower. The more market-neutral or quantitative the strategy approach, the more levered the strategy application to achieve a meaningful return profile.
- Dedicated short sellers only trade with short-side exposure, but they may moderate short beta by also holding cash. Short-biased managers are focused on short-side stock picking, but they typically moderate short beta with some value-oriented long exposure and cash.
- Dedicated short strategies tend to be 60%–120% short at all times, while short-biased strategies are typically around 30%–60% net short. The focus in both cases is usually on single equity stock picking, as opposed to index shorting, and using little if any leverage.

- Dedicated short-selling and short-biased strategies have return goals that are typically less than most other hedge fund strategies but with a negative correlation benefit. Returns are more volatile than a typical L/S equity hedge fund given short beta exposure.
- Equity market-neutral (EMN) strategies take advantage of idiosyncratic short-term mispricing between securities. Their sources of return and alpha do not require accepting beta risk, so EMN strategies are especially attractive in periods of market vulnerability/weakness. There are many types of EMN managers, but most are purely quantitative managers (vs. discretionary managers).
- As many beta risks (e.g., market, sector) are hedged away, EMN strategies generally apply relatively high levels of leverage in striving for meaningful return targets.
- Equity market-neutral strategies exhibit relatively modest return profiles. Portfolios are aimed at market neutrality and with differing constraints to other factor/sector exposures. Generally high levels of diversification and liquidity with lower standard deviation of returns are typical due to an orientation toward mean reversion.
- Merger arbitrage is a relatively liquid strategy. Defined gains come from idiosyncratic, single security takeover situations, but occasional downside shocks can occur when merger deals unexpectedly fail.
- Cross-border M&A usually involves two sets of governmental approvals. M&A deals involving vertical integration often face antitrust scrutiny and thus carry higher risks and offer wider merger spread returns.
- Merger arbitrage strategies have return profiles that are insurance-like, plus a short put option, with relatively high Sharpe ratios; however, left-tail risk is associated with otherwise steady returns. Merger arbitrage managers typically apply moderate to high leverage to generate meaningful target return levels.
- Distressed securities strategies focus on firms in bankruptcy, facing potential bankruptcy, or under financial stress. Hedge fund managers seek inefficiently priced securities before, during, or after the bankruptcy process, which results in either liquidation or reorganization.
- In liquidation, the firm's assets are sold off and securities holders are paid sequentially based on priority of their claims—from senior secured debt, junior secured debt, unsecured debt, convertible debt, preferred stock, and finally common stock.
- In re-organization, a firm's capital structure is re-organized and terms for current claims are negotiated and revised. Debtholders either may agree to maturity extensions or to exchanging their debt for new equity shares (existing shares are canceled) that are sold to new investors to improve the firm's financial condition.
- Outright shorts or hedged positions are possible, but distressed securities investing is usually long-biased, entails relatively high levels of illiquidity, and has moderate to low leverage. The return profile is typically at the higher end of event-driven strategies, but it is more discrete and cyclical.
- For fixed-income arbitrage, the attractiveness of returns is a function of the correlations between different securities, the yield spread pick-up available, and the high number and wide diversity of debt securities across different markets, each having different credit quality and convexity aspects in their pricing.

- Yield curve and carry trades within the US government space are very liquid but have the fewest mispricing opportunities. Liquidity for relative value positions generally decreases in other sovereign markets, mortgage-related markets, and across corporate debt markets.
- Fixed-income arbitrage involves high leverage usage, but leverage availability diminishes with trade and underlying instrument complexity.
- Convertible arbitrage strategies strive to extract “underpriced” implied volatility from long convertible bond holdings. To do this, managers will delta hedge and gamma trade short equity positions against their convertible positions. Convertible arbitrage works best in periods of high convertible issuance, moderate volatility, and reasonable market liquidity.
- Liquidity issues may arise from convertible bonds being naturally less-liquid securities due to their relatively small issue sizes and inherent complexities as well as the availability and cost to borrow underlying equity for short selling.
- Convertible arbitrage managers typically run convertible portfolios at 300% long vs. 200% short. The lower short exposure is a function of the delta-adjusted exposure needed from short sales to balance the long convertibles.
- Global macro strategies focus on correctly discerning and capitalizing on trends in global financial markets using a wide range of instruments. Managed futures strategies have a similar aim but focus on investments using mainly futures and options on futures, on stock and fixed-income indexes, as well as on commodities and currencies.
- Managed futures strategies typically are implemented via more systematic approaches, while global macro strategies tend to use more discretionary approaches. Both strategies are highly liquid and use high leverage.
- Returns of managed futures strategies typically exhibit positive right-tail skewness during market stress. Global macro strategies generally deliver similar diversification in stress periods but with more heterogeneous outcomes.
- Specialist hedge fund strategies require highly specialized skill sets for trading in niche markets. Two such typical specialist strategies—which are aimed at generating uncorrelated, attractive risk-adjusted returns—are volatility trading and reinsurance/life settlements.
- Volatility traders strive to capture relative timing and strike pricing opportunities due to changes in the term structure of volatility. They try to capture volatility smile and skew by using various types of option spreads, such as bull and bear spreads, straddles, and calendar spreads. In addition to using exchange-listed and OTC options, VIX futures, volatility swaps, and variance swaps can be used to implement volatility trading strategies.
- Life settlements strategies involve analyzing pools of life insurance contracts offered by third-party brokers, where the hedge fund purchases the pool and effectively becomes the beneficiary. The hedge fund manager looks for policies with the following traits: 1) The surrender value being offered to the insured individual is relatively low; 2) the ongoing premium payments are also relatively low; and 3) the probability is relatively high that the insured person will die sooner than predicted by standard actuarial methods.
- Funds-of-funds and multi-strategy funds typically offer steady, low-volatility returns via their strategy diversification. Multi-strategy funds have generally outperformed FoFs, but they have more variance due to using relatively high leverage.

- Multi-strategy funds offer potentially faster tactical asset allocation and generally improved fee structure (netting risk between strategies is often at least partially absorbed by the general partner), but they have higher manager-specific operational risks. FoFs offer a potentially more diverse strategy mix, but they have less transparency, slower tactical reaction time, and contribute netting risk to the FoF investor.
- Conditional linear factor models can be useful for uncovering and analyzing hedge fund strategy risk exposures. This reading uses such a model that incorporates four factors for assessing risk exposures in both normal periods and market stress/crisis periods: equity risk, credit risk, currency risk, and volatility risk.
- Adding a 20% allocation of a hedge fund strategy group to a traditional 60%/40% portfolio (for a 48% stocks/32% bonds/20% hedge funds portfolio) typically decreases total portfolio standard deviation while it increases Sharpe and Sortino ratios (and also often decreases maximum drawdown) in the combined portfolios. This demonstrates that hedge funds act as both risk-adjusted return enhancers and diversifiers for the traditional stock/bond portfolio.

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PRACTICE PROBLEMS

- 1 Bern Zang is the chief investment officer of the Janson University Endowment Investment Office. The Janson University Endowment Fund (the “Fund”) is based in the United States and has current assets under management of \$10 billion, with minimal exposure to alternative investments. Zang currently seeks to increase the Fund’s allocation to hedge funds and considers four strategies: dedicated short bias, merger arbitrage, convertible bond arbitrage, and global macro.

At a meeting with the Fund’s board of directors, the board mandates Zang to invest only in event-driven and relative value hedge fund strategies.

Determine, among the four strategies under consideration by Zang, the two that are permitted given the board’s mandate. **Justify** your response.

- i. Dedicated short bias
- ii. Merger arbitrage
- iii. Convertible bond arbitrage
- iv. Global macro

Determine, among the four strategies under consideration by Zang, the two that are permitted given the board’s mandate. (circle two)

Justify your response.

Dedicated short bias

Merger arbitrage

Convertible bond arbitrage

Global macro strategies

The following information relates to Questions 2 and 3

Jane Shaindy is the chief investment officer of a large pension fund. The pension fund is based in the United States and currently has minimal exposure to hedge funds. The pension fund’s board has recently approved an additional investment in a long/short equity strategy. As part of Shaindy’s due diligence on a hedge fund that implements a long/short equity strategy, she uses a conditional linear factor model to uncover and analyze the hedge fund’s risk exposures. She is interested in analyzing several risk factors, but she is specifically concerned about whether the hedge fund’s long (positive) exposure to equities increases during turbulent market periods.

- 2 **Describe** how the conditional linear factor model can be used to address Shaindy’s concern.

During a monthly board meeting, Shaindy discusses her updated market forecast for equity markets. Due to a recent large increase in interest rates and geopolitical tensions, her forecast has changed from one of modestly rising equities to several

periods of non-trending markets. Given this new market view, Shaindy concludes that a long/short strategy will not be optimal at this time and seeks another equity-related strategy. The Fund has the capacity to use a substantial amount of leverage.

- 3 **Determine** the *most appropriate* equity-related hedge fund strategy that Shaindy should employ. **Justify** your response.

- 4 Gunnar Patel is an event-driven hedge fund manager for Senson Fund, which focuses on merger arbitrage strategies. Patel has been monitoring the potential acquisition of Meura Inc. by Sellshom, Inc. Sellshom is currently trading at \$60 per share and has offered to buy Meura in a stock-for-stock deal. Meura was trading at \$18 per share just prior to the announcement of the acquisition.

The offer ratio is 1 share of Sellshom in exchange for 2 shares of Meura. Soon after the announcement, Meura's share price jumps to \$22 while Sellshom's falls to \$55 in anticipation of the merger receiving required approvals and the deal closing successfully.

At the current share prices of \$55 for Sellshom and \$22 for Meura, Patel attempts to profit from the merger announcement. He buys 40,000 shares of Meura and sells short 20,000 shares of Sellshom.

Calculate the payoffs of the merger arbitrage under the following two scenarios:

- i. The merger is successfully completed.
- ii. The merger fails.

- 5 John Puten is the chief investment officer of the Markus University Endowment Investment Office. Puten seeks to increase the diversification of the endowment by investing in hedge funds. He recently met with several hedge fund managers that employ different investment strategies. In selecting a hedge fund manager, Puten prefers to hire a manager that uses the following:

- Fundamental and technical analysis to value markets
- Discretionary and systematic modes of implementation
- Top-down strategies
- A range of macroeconomic and fundamental models to express a view regarding the direction or relative value of a particular asset

Puten's staff prepares a brief summary of two potential hedge fund investments:

Hedge Fund 1: A relative value strategy fund focusing only on convertible arbitrage.

Hedge Fund 2: An opportunistic strategy fund focusing only on global macro strategies.

Determine which hedge fund would be *most appropriate* for Puten. **Justify** your response.

- 6 Yankel Stein is the chief investment officer of a large charitable foundation based in the United States. Although the foundation has significant exposure to alternative investments and hedge funds, Stein proposes to increase the foundation's exposure to relative value hedge fund strategies. As part of Stein's due diligence on a hedge fund engaging in convertible bond arbitrage, Stein asks his investment analyst to summarize different risks associated with the strategy.

Describe how each of the following circumstances can create concerns for Stein's proposed hedge fund strategy:

- i. Short selling
- ii. Credit issues

- iii. Time decay of call option
- iv. Extreme market volatility

**Describe how each of the following
circumstances can create concerns for Stein's
proposed hedge fund strategy:**

Short selling
Credit issues
Time decay of call option
Extreme market volatility

The following information relates to Questions 7 and 8

Sushil Wallace is the chief investment officer of a large pension fund. Wallace wants to increase the pension fund's allocation to hedge funds and recently met with three hedge fund managers. These hedge funds focus on the following strategies:

- Hedge Fund A: Specialist—Follows relative value volatility arbitrage
- Hedge Fund B: Multi-Manager—Multi-strategy fund
- Hedge Fund C: Multi-Manager—Fund-of-funds

7 Describe three paths for implementing the strategy of Hedge Fund A.

After a significant amount of internal discussion, Wallace concludes that the pension fund should invest in either Hedge Fund B or C for the diversification benefits from the different strategies employed. However, after final due diligence is completed, Wallace recommends investing only in Hedge Fund B, noting its many advantages over Hedge Fund C.

8 Discuss two advantages of Hedge Fund B relative to Hedge Fund C with respect to investment characteristics.

9 Kloss Investments is an investment adviser whose clients are small institutional investors. Muskogh Charitable Foundation (the "Foundation") is a client with \$70 million of assets under management. The Foundation has a traditional asset allocation of 65% stocks/35% bonds. Risk and return characteristics for the Foundation's current portfolio are presented in Panel A of Exhibit 1.

Kloss' CIO, Christine Singh, recommends to Muskogh's investment committee that it should add a 10% allocation to hedge funds. The investment committee indicates to Singh that Muskogh's primary considerations for the Foundation's portfolio are that any hedge fund strategy allocation should: a) limit volatility, b) maximize risk-adjusted returns, and c) limit downside risk.

Singh's associate prepares expected risk and return characteristics for three portfolios that have allocations of 60% stocks, 30% bonds, and 10% hedge funds, where the 10% hedge fund allocation follows either an equity market-neutral, global macro, or convertible arbitrage strategy. The risk and return characteristics of the three portfolios are presented in Panel B of Exhibit 1.

Exhibit 1

Hedge Fund Strategy	SD (%)	Sharpe Ratio	Sortino Ratio	Maximum Drawdown (%)
Panel A: Current Portfolio				
N/A	8.75	0.82	1.25	16.2
Panel B: Three Potential Portfolios with a 10% Hedge Fund Allocation				
Equity market neutral	8.72	0.80	1.21	15.1
Global macro	8.55	0.95	1.35	15.0
Convertible arbitrage	8.98	0.83	1.27	20.2

Discuss which hedge fund strategy Singh should view as most suitable for meeting the considerations expressed by Muskogh's investment committee.

SOLUTIONS

1

Determine, among the four strategies under consideration by Zang, the two that are permitted given the board's mandate. (circle two)

Justify your response.

Dedicated short bias

A dedicated short bias hedge fund strategy is an example of an equity hedge fund strategy, not an event-driven or relative value strategy. Equity hedge fund strategies focus primarily on the equity markets, and the majority of their risk profiles contain equity-oriented risk. Dedicated short bias managers look for possible short selling targets among companies that are overvalued, that are experiencing declining revenues and/or earnings, or that have internal management conflicts, weak corporate governance, or even potential accounting frauds.

Merger arbitrage

A merger arbitrage hedge fund strategy is an example of an event-driven strategy, which is permitted under the board's mandate. Event-driven hedge fund strategies focus on corporate events, such as governance events, mergers and acquisitions, bankruptcy, and other key events for corporations. Merger arbitrage involves simultaneously purchasing and selling the stocks of two merging companies to create "riskless" profits.

Convertible bond arbitrage

A convertible bond arbitrage hedge fund strategy is an example of a relative value strategy, which is permitted under the board's mandate. Relative value hedge fund strategies focus on the relative valuation between two or more securities. Relative value strategies are often exposed to credit and liquidity risks because the valuation differences from which these strategies seek to benefit are often due to differences in credit quality and/or liquidity across different securities. A classic convertible bond arbitrage strategy is to buy the relatively undervalued convertible bond and take a short position in the relatively overvalued underlying stock.

Global macro

A global macro hedge fund strategy is an example of an opportunistic hedge fund strategy, not an event-driven or relative value strategy. Opportunistic hedge fund strategies take a top-down approach, focus on a multi-asset opportunity set, and include global macro strategies. Global macro managers use both fundamental and technical analysis to value markets as well as discretionary and systematic modes of implementation.

- 2 A linear factor model can provide insights into the intrinsic characteristics and risks in a hedge fund investment. Since hedge fund strategies are dynamic, a conditional model allows for the analysis in a specific market environment to determine whether hedge fund strategies are exposed to certain risks under abnormal market conditions. A conditional model can show whether hedge fund risk exposures to equities that are insignificant during calm periods become significant during turbulent market periods. During normal periods when equities are rising, the desired exposure to equities (S&P 500 Index) should be long (positive) to benefit from higher expected returns. However, during crisis periods when equities are falling sharply, the desired exposure to equities should be short (negative).

- 3 Shaindy should employ an equity market-neutral (EMN) equity strategy. Overall, EMN managers are more useful for portfolio allocation during periods of non-trending or declining markets. EMN hedge fund strategies take opposite (long and short) positions in similar or related equities having divergent valuations while attempting to maintain a near net zero portfolio exposure to the market. EMN managers neutralize market risk by constructing their portfolios such that the expected portfolio beta is approximately equal to zero. Moreover, EMN managers often choose to set the betas for sectors or industries as well as for common risk factors (e.g., market size, price-to-earnings ratio, and book-to-market ratio) equal to zero. Since these portfolios do not take beta risk and attempt to neutralize many other factor risks, they typically must apply leverage to the long and short positions to achieve a meaningful return profile from their individual stock selections.

EMN strategies typically deliver return profiles that are steadier and less volatile than those of many other hedge strategy areas. Over time, their conservative and constrained approach typically results in a less dynamic overall return profile than those of managers who accept beta exposure. Despite the use of substantial leverage and because of their more standard and overall steady risk/return profiles, equity market-neutral managers are often a preferred replacement for fixed-income managers during periods when fixed-income returns are unattractively low.

- 4
- i. At the current share prices of \$55 for Sellshom and \$22 for Meura, Patel would receive \$1,100,000 from short selling 20,000 shares of Sellshom and would pay \$880,000 to buy 40,000 shares of Meura. This provides a net spread of \$220,000 to Patel if the merger is successfully completed.
 - ii. If the merger fails, then prices should revert back to their pre-merger announcement levels of \$18 per share for Meura and \$60 per share for Sellshom. The manager would need to buy back 20,000 shares of Sellshom at \$60 per share, for a total of \$1,200,000, to close the short position. Patel would then sell the long position of 40,000 shares of Meura at \$18 per share for a total of \$720,000. This net loss would be \$260,000, calculated as: (Sellshom: \$1,100,000 – \$1,200,000 = –\$100,000) + (Meura: –\$880,000 + \$720,000 = –\$160,000).
- 5 Hedge Fund 2 would be most appropriate for Puten because it follows a global macro strategy, which is consistent with Puten's preferences. Global macro managers use both fundamental and technical analysis to value markets, and they use discretionary and systematic modes of implementation. The key source of returns in global macro strategies revolves around correctly discerning and capitalizing on trends in global markets.

Global macro strategies are typically top-down and employ a range of macro-economic and fundamental models to express a view regarding the direction or relative value of a particular asset or asset class. Positions may comprise a mix of individual securities, baskets of securities, index futures, foreign exchange futures/forwards, fixed-income products or futures, and derivatives or options on any of the above. If the hedge fund manager is making a directional bet, then directional models will use fundamental data regarding a specific market or asset to determine if it is undervalued or overvalued relative to history and the expected macro-trend.

Hedge Fund 1 follows a relative value strategy with a focus on convertible arbitrage, which is not aligned with Puten's preferences. In a convertible bond arbitrage strategy, the manager strives to extract "cheap" implied volatility by buying the relatively undervalued convertible bond and taking a short position

in the relatively overvalued common stock. Convertible arbitrage managers are typically neither using fundamental and technical analysis to value markets nor employing top-down strategies to express a view regarding the direction or relative value of an asset.

6

	Describe how each of the following circumstances can create concerns for Stein's proposed hedge fund strategy:
Short selling	Since Hedge Fund 1 employs a convertible arbitrage strategy, the fund buys the convertible bond and takes a short position in the underlying security. When short selling, shares must be located and borrowed; as a result, the stock owner may want his/her shares returned at a potentially inopportune time, such as during stock price run-ups or when supply for the stock is low or demand for the stock is high. This situation, particularly a short squeeze, can lead to substantial losses and a suddenly unbalanced exposure if borrowing the underlying equity shares becomes too difficult or too costly for the arbitrageur.
Credit issues	Credit issues may complicate valuation since bonds have exposure to credit risk. When credit spreads widen or narrow, there would be a mismatch in the values of the stock and convertible bond positions that the convertible manager may or may not have attempted to hedge away.
Time decay of call option	The convertible bond arbitrage strategy can lose money due to time decay of the convertible bond's embedded call option during periods of reduced realized equity volatility and/or due to a general compression of market implied volatility levels.
Extreme market volatility	Convertible arbitrage strategies have performed best when convertible issuance is high (implying a wider choice among convertible securities as well as downward price pressure and cheaper prices), general market volatility levels are moderate, and the liquidity to trade and adjust positions is sufficient. Extreme market volatility typically implies heightened credit risks. Convertibles are naturally less-liquid securities, so convertible managers generally do not fare well during such periods. Because hedge funds have become the natural market makers for convertibles and typically face significant redemption pressures from investors during crises, the strategy may have further unattractive left-tail risk attributes during periods of market stress.

- 7 Hedge Fund A's volatility trading strategy can be implemented by following multiple paths. One path is through simple exchange-traded options. The maturity of such options typically extends to no more than two years. In terms of expiry, the longer-dated options will have more absolute exposure to volatility levels than shorter-dated options, but the shorter-dated options will exhibit more delta sensitivity to price changes.

A second, similar path is to implement the volatility trading strategy using OTC options. In this case, the tenor and strike prices of the options can be customized. The tenor of expiry dates can then be extended beyond what is available with exchange-traded options.

A third path is to use VIX futures or options on VIX futures as a way to more explicitly express a pure volatility view without the need for constant delta hedging of an equity put or call for isolating the volatility exposure.

A fourth path for implementing a volatility trading strategy would be to purchase an OTC volatility swap or a variance swap from a creditworthy counterparty. A volatility swap is a forward contract on future realized price volatility. Similarly, a variance swap is a forward contract on future realized price variance, where variance is the square of volatility. Both volatility and variance swaps provide "pure" exposure to volatility alone, unlike standardized options in which the volatility exposure depends on the price of the underlying asset and must be isolated and extracted via delta hedging.

- 8 a** Multi-strategy managers like Hedge Fund B can reallocate capital into different strategy areas more quickly and efficiently than would be possible by a fund-of-funds (FoF) manager like Hedge Fund C. The multi-strategy manager has full transparency and a better picture of the interactions of the different teams' portfolio risks than would ever be possible for FoF managers to achieve. Consequently, the multi-strategy manager can react faster to different real-time market impacts—for example, by rapidly increasing or decreasing leverage within different strategies depending upon the perceived riskiness of available opportunities.
- b** The fees paid by investors in a multi-strategy fund can be structured in a number of ways, some of which can be very attractive when compared to the FoFs' added fee layering and netting risk attributes. Conceptually, FoF investors always face netting risk, whereby they are responsible for paying performance fees due to winning underlying funds while suffering return drag from the performance of losing underlying funds. Even if the FoF's overall performance is flat or down, FoF investors must still pay incentive fees due to the managers of winning funds.
- 9** Based on the investment committee's considerations, Singh should view a 10% allocation to the global macro hedge fund strategy as most suitable for the Foundation. Such an allocation would result in a decrease in standard deviation (volatility) and significant increases in the combined portfolio's Sharpe and Sortino ratios (these are the highest such ratios among the strategies presented). In addition, the lower maximum drawdown (15.0%) indicates less downside risk in the combined portfolio than with any of the other strategy choices.