

Trading and Hedge Funds

This chapter introduces how trading organizations, such as hedge funds or the proprietary trading desks of investment banks, apply risk management concepts to operate their businesses. Risk is uncertainty or a potential for loss. Risk isn't necessarily bad. Risky activities often provide higher profits than safe investments. Techniques developed to manage risk are used by trading desks to drive profitability by balancing risk and reward. Some of these techniques include choosing the most profitable investments, allocating a limited amount of money between multiple investments, eliminating risks through hedging, and assigning size limits to various investment strategies.

There are a limited number of decisions that can be made by trading desks to manage risk. Profitability starts when traders do a good job identifying investment opportunities. After that point, common decisions are: how to allocate capital between investment opportunities, limiting how much money is allocated to any single investment, and reducing the size of investments by liquidating or placing protective trades.

OVERVIEW OF BOOK

This book describes how risk management techniques are used by professional traders to reduce risk and maximize profits. The focus of the book is how traders working at hedge funds or on investment bank proprietary trading desks use risk management techniques to improve their profitability and keep themselves in business. However, these techniques can be applied to almost any trading or investment group.

This book focuses on six major activities that are part of managing trading businesses.

1. **Backtesting and Trade Forensics.** Backtesting is a disciplined approach to testing trading ideas before making bets with actual money. Trade forensics

- is a post-mortem analysis that identifies how well a trade is tracking pre-trade predictions and if markets have changed since the trade was initiated.
2. **Calculating Profits and Losses.** Once a trade has been made, traders have to calculate the daily profits and losses. For some financial instruments, this is as simple as checking the last traded price from an exchange feed. For other investments, calculating the fair value of the trade is challenging.
 3. **Setting Position Limits.** The size of investments that traders can make are typically limited by the volatility of their expected daily profits and losses. In other words, risk can be a way to measure size. As a result, the goal of hedge fund traders is to maximize the profits relative to a fixed amount of risk.
 4. **Hedging.** Hedging is a trading strategy designed to limit profits and losses in one investment by taking an offsetting position in another asset. For example, a hedge fund might want to lock in profits associated with a physical asset like an oil well that they can't sell right away. They can agree to sell oil at a fixed price and remove the risk of price fluctuations.
 5. **Managing Option Risk.** Certain types of financial instruments, particularly options, present much more complicated risk management challenges for traders. Risk managers have developed a variety of techniques to model this risk and fit options risk with other position limits.
 6. **Managing Credit Risk.** Trading can't be done in isolation. Every time someone wants to buy an asset, someone else needs to sell. Not all trades settle right away—trading often involves obligations that are taken on in the future. As a result, traders depend on their trading partners meeting their trading obligations, and are exposed to the risk that their trading partners will default on their obligations.

TRADING DESKS

Professional traders often work on teams called *trading desks*. A trading desk is a group whose members are traditionally seated side-by-side at a series of long desks (usually filled with computer equipment) that is responsible for buying and selling financial products for an organization. Trading desks will typically specialize in one or two types of financial products. Some trading desks will specialize in stocks, others in bonds, and so on.

Many types of companies will maintain trading desks. Some of these desks will focus on supporting the company's other lines of business—buying fuel for a trucking company or financial products on behalf of investors, for example. However, a couple types of trading desks are operated as their own line of business. The most prominent of these are *mutual funds*, *hedge funds*, and *proprietary trading desks* at banks.

Some organizations whose focus is on trading for profit are:

- **Mutual Funds.** Mutual funds are a pooled-investment fund where the leadership of the fund manages investments on behalf of investors. These funds are restricted from many investment strategies deemed too speculative or risky for uninformed investors.
- **Proprietary Trading Desks.** A trading desk found in many investment banks that operates like an internal hedge fund to invest the firm's capital.
- **Hedge Funds.** Hedge funds are pooled investment funds similar to mutual funds. They differ in that they do not cater to the general public—only to accredited investors. Many hedge funds seek to profit in all kinds of markets by using leverage (in other words, borrowing to increase investment exposure as well as risk), short-selling, and using other speculative investment practices that mutual funds are restricted from using.

One of the largest differences between hedge funds and proprietary trading desks compared to mutual funds or individual investors is that they will often make trades designed to make profits when prices decline. This is called *shorting* the market and allows profitability in both rising and falling markets. Shorting is not exclusive to hedge funds and trading desks—it can be done by individual investors. For example, shorting is commonly practiced in various commodity markets.

Shorting involves agreeing to sell something that the trader does not currently own. For example, a soybean farmer might agree to sell his crop (which hasn't been grown yet) for a fixed price per bushel when the crop is harvested. If prices fall after that point, the sales contract will acquire value to the farmer. If the contract allows him to sell 10,000 bushels of soybeans at \$20 per bushel and prices fall to \$10 per bushel, the contract is worth \$10 per bushel (or \$100,000) to the farmer. The contract is an asset to the farmer, and if a trading market exists for those contracts, could be sold to another trader.

HEDGE FUNDS

Hedge funds are a prototypical trading organization. They have few restrictions on their activities and typically have no source of income other than their skill at trading. In this book, hedge funds are used as an example of firms that use risk management techniques to help them compete more effectively.

KEY CONCEPT: LEVERAGE AND SHORTING

Two activities differentiate professional trading groups from most other types of investors. First, professional traders often finance trading positions through borrowed money. Second, professional traders have the ability to make trades that benefit from both rising and falling markets.

- *Leverage* is any activity (like borrowing money) that increases the size of the investment without increasing the capital that needs to be contributed by investors. This is sometimes called *gearing*.
- *Shorting* is entering into a trade that makes money when prices decline.

Hedge funds are private partnerships that invest in the financial markets. Like mutual funds, hedge funds pool money from investors and invest the money in an effort to make a profit. Their organizational structure varies from other investment structures because the investors in the fund are typically limited partners rather than clients. This allows hedge funds an extremely high level of flexibility in their operations and allows them to trade in markets deemed too risky for typical investors.

Hedge funds require that their investors meet certain qualifications before they are allowed to invest in the fund. By catering only to qualified investors, hedge funds can avoid many limitations designed to protect the average investor. The reasoning behind government rules to protect investors is that not all investors are sufficiently qualified to understand the risks associated with exotic or risky investments. In other words, the government limits investors from focusing only on an investment's profit potential without regard for the associated risks.

Hedge funds offer investors, traders, and hedge fund managers the possibility of making a lot of money. However, the hedge fund industry is also a competitive and stressful environment where the most successful traders win big and unsuccessful ones go broke. Hedge funds use risk management to successfully run a complex and risky business.

Hedge funds are usually arranged as limited partnerships. A limited partnership is composed of two tiers of investors. The first tier of investors, called the *general partners*, has management authority and is personally liable for any debts incurred by the firm. These general partners take on the most risk, but have a tremendous ability to make money. The second tier of

KEY CONCEPT: ACCREDITED INVESTOR

An investor with substantial assets or sufficient financial expertise that they can voluntarily exempt themselves from rules designed to protect the average investor.

investors, the *limited partners*, have no management authority and are only liable up to the amount of their investments.

Hedge funds often charge very high investment fees. For example, a standard annual fee for hedge funds is to charge 1 to 2 percent of the limited partners' investments in addition to 20 percent of net profits every year. For example, if an investor were to make a million-dollar investment, the annual fees might be \$20,000 (2 percent of the investment). In addition, if the hedge fund were to make a 10 percent return (\$100,000 profit), the hedge fund would keep another \$20,000, and the investor would make a \$60,000 profit.

Organizationally, a hedge fund will be managed by one or more general partners (the *hedge fund managers*) who manage a staff of employees (the traders, risk managers, information technology team, and so on). The fixed management fee will typically cover the salaries and fixed expenses of the hedge fund. The variable fees will be paid in bonuses to the general partners and the traders. For example, in a fund with a 20 percent of net profit payout, the payout might be split 50/50 between the general partner and the trader (an employee) who managed each strategy.

HEDGE FUNDS TODAY

Hedge funds have very few operating restrictions. They can make investments that benefit from both rising and falling markets. In addition, hedge funds can use various strategies and financial products to increase their *financial leverage*. Leverage is a term that describes the ability of a trader to make larger bets—increasing both the potential for profit and loss—for the same amount of initial investment.

Hedge funds have this flexibility because the investors in hedge funds have decided to opt out of some regulations designed to protect investors. The mechanism for opting out of these regulations is to become designated as an *accredited investor*. In the United States, the Securities Act of 1933, Regulation D, describes the conditions that allow investors to qualify as accredited investors.

Some of the requirements pertaining to individuals who may be considered accredited investors:

1. *A director, executive officer, or general partner of the company selling the securities*
2. *A natural person who has individual net worth, or joint net worth with the person's spouse, that exceeds \$1 million at the time of the purchase, excluding the value of the primary residence of such person*
3. *A natural person with income exceeding \$200,000 in each of the two most recent years, or joint income with a spouse exceeding \$300,000 for those years and a reasonable expectation of the same income level in the current year*
4. *A trust with assets in excess of \$5 million, not formed to acquire the securities offered, whose purchases a sophisticated person makes*

Source: U.S. Securities Act of 1933, Regulation D

Hedge funds are often in the news since they can have an immense impact on financial markets. Since the first hedge fund was started by Alfred Winslow Jones in 1949, hedge funds have experienced exponential growth. By 2013, the assets managed by hedge funds was estimated to be approximately \$2 trillion. This large size, combined with hedge funds' heavy use of leverage and use of rapid-fire trading strategies, makes hedge funds some of the most active traders in many financial markets.

STRATEGIES

Trading desks and hedge funds commonly specialize in a specific market or trading style. They don't try to be the best at everything. Instead, they try to pick and choose situations where they have an advantage. As a result, hedge funds will often have a standard approach to investing. Then, groups of traders will be organized into trading desks that are further specialized. Finally, the trading desk itself will be broken into *strategies*. A strategy is typically a systematic approach to trading managed by one or more traders who will focus on a very narrow style of trading. Traders often manage several strategies and their pay will be personally linked to the success of their strategies. (See Figure 1.1, Trading Desk Strategies.)

Both trading desks and hedge funds can vary substantially in composition. Some are based on a single strategy, while others may be focused on a market sector (like healthcare or energy) or geography (like a Brazil-focused

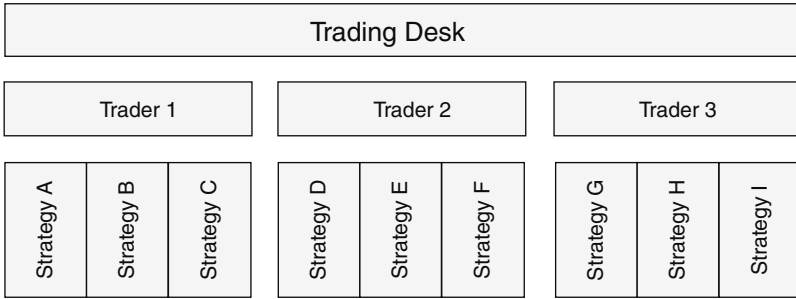


FIGURE 1.1 Trading Desk Strategies

fund). Some of the more common types of hedge fund styles are Global Macro, Relative Value, and Event-driven styles.

Global Macro

Global Macro strategies make *big-picture* bets based on the economy as a whole. For these strategies, investment decisions are commonly based on interest rates, Gross Domestic Product, unemployment rates, or similar economic data. When executed, trades are commonly made in stock indices, government bonds, and currency markets.

Global Macro trades are often directional—they speculate on the rise or fall of the overall market. For example, a hedge fund might buy broad based market indices when the market is expected to rise. It would sell or short these same indices when the market is expected to fall. By taking advantage of markets that allow short selling, these strategies can make profits in both rising and falling markets.

Many global macro strategies are based on an analysis of economic trends. In particular, traders study when trends are likely to persist and when they are likely to reverse. Through modeling, or intuition, the traders will rebalance their trading portfolios in an attempt to properly time the market.

Relative Value

Relative Value strategies make bets based on spreads between assets. Typically, these are long/short strategies where traders simultaneously buy one asset while shorting another. *Shorting* is making a trade that benefits the trader when the price of an asset falls. This can be done by borrowing an asset from another trader and selling it (called *short selling*) or by entering

into a derivative contract (like an agreement to sell an asset expected to be owned in the future at a fixed price).

Relative value strategies are often *market neutral*. By taking offsetting positions in related assets, the impact of the broader market move is mostly eliminated. For example, a trader might identify two bank stocks. By buying one stock and short selling the other, the trader will benefit if the long stock position (the stock that has been purchased) outperforms the short position (the stock that has been sold short). However, if the entire market goes up or down, both assets should change in value with offsetting profit or loss.

Event-Driven

Event-driven strategies analyze the tendencies of market participants around the time of certain events. In many cases, events like an upcoming economic announcement will make traders change their normal trading habits. This can create an inconsistency in how the market values assets immediately before and after the event.

A large number of event-driven strategies focus on corporate actions like mergers, acquisitions, and spin offs. For example, if two companies are merging, the value of the two companies' stocks and bonds will be linked. If prices did not move to reflect the new information, there would be a trading opportunity. Alternately, a previously announced takeover might be rumored to be falling apart. In that case, the trader might bet that the prices will become decoupled.

FUND OF FUNDS

One of the major factors behind the growth of the hedge fund industry is the development of *funds of funds*. A fund of funds will allocate investors' money into a variety of different hedge funds. These funds simplify the job of investing in hedge funds since the fund-of-funds manager has the responsibility for monitoring hedge funds and allocating capital to them. This can make diversification easier and allow investors to invest in more than one hedge fund.

For this service, a fund of funds will typically charge its own fees. This creates a double fee structure where the fund-of-funds costs are charged in addition to the fees paid to the underlying hedge funds. For example, a fund of funds might charge an additional 1 percent of assets and 10 percent of net profits on top of the hedge fund's fees. These fees can easily cut into the benefits of holding a fund of funds.

Whether a hedge fund relies on fund of funds to acquire capital will have a big effect on the structure of the hedge fund. Funds of funds will typically want to handle their own diversification. As a result, they will typically want to invest in single strategy hedge funds. Funds of funds will also want to regularly modify the investments that are made in each hedge fund. This can be problematic for hedge funds, since they have to balance inconsistent funding with the needs to pay ongoing expenses like salaries and office space.

RISK MANAGEMENT

Risk measures uncertainty and potential for loss. Although this sounds like a bad thing, there is a strong relationship between risk and reward. In other words, risky activities typically offer a high potential for profit. Because of that, risk is largely a measure of an investment's size rather than a way to measure whether an investment is good or bad. For example, given the choice between investing \$50,000 in the market and keeping cash, many people would choose the investment because of the higher profit potential.

Risk management is a systematic, logical approach to limiting or mitigating risk. It is called "management" because its purpose is not focused strictly on eliminating risk. In most cases, eliminating risk will eliminate the possibility for profit. At its core, trading risk management has two focuses. The first aspect of trading risk management is concerned with putting in place processes to minimize or prevent unwanted risks. The second focus is to help decision makers better understand the tradeoffs between risk and reward.

Risk management is complicated by the fact that each group in an organization may understand risk differently. Even using common terminology, each stakeholder in the risk management process may have their own preconceptions and spin about what type of data is being provided by risk management analysis. This problem is exacerbated by the busy schedule of many senior decision makers. Quite often, decision makers don't want to understand risk management—they just want someone else to take care of it for them. This creates a danger that analysis prepared for one purpose will be used for other purposes without anyone taking the time to ensure that the data is used properly.

Some of the common uses for risk management:

- **Decision making tools.** In a trading organization like a hedge fund or trading desk, risk management is often used to help make decisions. For

example, a trading desk might have a choice of investing in two strategies and wants to maximize their profits for a given level of risk.

- **Regulatory Compliance.** In heavily regulated industries such as banking, risk management is often used to demonstrate compliance with regulations. An example of risk management being used for compliance is the calculation of the regulatory capital that banks need to keep on hand to meet government requirements.
- **Worst-Case Scenarios.** Senior managers at many firms often want to limit the amount of damage that could be caused by riskier parts of their businesses. As a result, there is a substantial interest in calculating worst-case scenarios for investments.
- **Process and Controls.** Risk management is often used to contribute to processes that limit the size of trader investments, make sure that trades are working as expected, and that each trade is allowed under the firm's policies.

RISK AND TRADING DECISIONS

For many hedge funds, risk management isn't just a theoretical exercise. There are a variety of practical applications to risk management that are used to make sound trading decisions in a very competitive industry. These processes have developed over time, because hedge fund managers—for all the potential profits that might be possible—have very little margin for error.

Backtesting and Trade Forensics

Professional traders such as hedge funds and investment banks' proprietary trading desks often follow a disciplined approach of testing investment strategies before placing any money at risk. The typical approach is to start with historical tests in a process called *backtesting*. Once that is finished, the historical tests are followed up with live simulations called *paper trading*. Then, once real money is at risk, the strategy is constantly monitored using tools called *trading forensics*.

Calculating Profits and Losses

Financial investments have to be valued every day. Unlike other assets, where the profit isn't known until the asset is resold, financial investments get *marked-to-market* every day. Typically, this process calculates the fair value of the assets based on recent transactions. This creates a substantial risk to traders in markets without heavy trading volume. Many protective

measures, like risk limits and forced liquidations, are triggered by price movements. This creates risks because prices can be set by a small transaction that does not provide the opportunity for all of the traders affected by the transaction the opportunity to transact at that price.

Hedging

Many trading companies want to lock in profits or protect an investment that can't be easily liquidated. Hedging is the term that describes an investment strategy designed to limit profits and losses in another investment. Hedging is a way for traders to pay money to transfer the possible risks (and rewards) of holding an asset to another investor. For example, an airline might limit its exposure to uncertain jet fuel prices by entering into a long-term purchase agreement.

Setting Position Limits

A fundamental way to control risks is to limit the size of investments. This is relatively easy when trading is limited to a single asset. However, a coherent approach to position limits that combines different types of assets in a highly leveraged environment becomes much more difficult. To handle this complexity, hedge funds and trading desks use risk management techniques to compare the sizes of various assets and liabilities consistently across asset types.

Managing Option Risk

Certain types of financial instruments, particularly options, present much more complicated risk management challenges for traders. As a result, the terminology associated with valuing and managing option risk is now inseparable from options trading. Formulas like the Black-Scholes formula have been developed to value options and calculus techniques are used to fit options into a value-at-risk framework.

Managing Credit Risk

Trading is not done in isolation. Every time someone wants to buy an asset, someone else needs to sell for a transaction to occur. Not all trades settle right away—trading often involves obligations that are taken on in the future. As a result, traders depend on their trading partners meeting their trading obligations, and are exposed to the risk that their trading partners will default on their obligations.

TRADING

Hedge funds use the money given to them by their investors, called *capital*, to make investments. Commonly, the hedge fund will actively manage these investments, buying and selling assets as needed to improve profitability and reduce risk. The term *trading* is used to describe the activity of buying and selling financial assets.

The difference between a professional investor who works at a hedge fund and an individual investor is often a matter of scale and seriousness. Successful hedge funds take trading seriously. As much as possible, they eliminate emotion and follow a disciplined, analytical approach to making trades. A key part of disciplined trading is to consider both potential profits and the uncertainty associated with those profits.

Risk management is a specialized portion of active management that focuses on monitoring and controlling risks that might affect an organization. For a hedge fund, this commonly means the risks associated with trading. However, on a broader level, risk management techniques can be applied to anything that might cause a loss or a diminished opportunity for gain.

MAKING A TRADE

Individual investors will have to handle all aspects of trading by themselves. However, many hedge funds are large enough that they can support specialists in every aspect of the trading process. In these hedge funds, there will be a wide variety of people involved in making trades and managing the risk of those trades. Commonly these groups are divided into a couple of major categories: front office, middle office, back office, and various support groups. (See Table 1.1, Groups Involved with Trading.)

Front Office

In a trading organization, the front office consists of various teams whose goal is to make trades on behalf of the organization. The front office is also referred

TABLE 1.1 Groups Involved with Trading

Front Office	Support and Control	Back Office
Sales	Middle Office	Reconciliation (Clearing)
Deal Structuring	Risk Management	Margining
Scheduling	Financial Control	Documentation
Trading		

to as the *commercial* group. This team is responsible for identifying trading opportunities, making trades, and managing any ongoing investments.

- **Sales and Origination.** The sales team is responsible for identifying potential trading partners and clients who need trading assistance. In cases where clients are likely to have complex needs, the sales team may be called the *origination team*.
- **Deal Structuring.** In many cases, determining a price for an asset requires substantial mathematical analysis. The deal-structuring team on a trading desk will be responsible for calculating fair prices and valuing complex (*structured*) transactions. These are typically quantitative, math-heavy groups found in front offices that trade derivatives or other complex products.
- **Scheduling.** Trading physical assets like commodities often involves a substantial amount of operational complexity. When trading desks trade products that are complicated to deliver (or accept delivery on), a dedicated team focuses on making sure that process goes smoothly. Scheduling teams need to understand minute details of the markets for which they are responsible.
- **Trading.** The trading desk is responsible for executing transactions and the market-focused follow up of monitoring and managing existing positions. In some firms, there are a variety of trading desks specializing in different areas. Different trading teams will usually have descriptive names like *foreign exchange trading* or *natural gas trading*. If the trading is done on behalf of the firm, this may be called *proprietary trading* to distinguish the trading desk from one supporting clients.

Support and Control

The trading desk is supported by several teams that provide operational controls over trading activity. Even though these groups generally sit close to the trading desk, they typically report to a different management team—one that is not directly in the trading chain of command.

- **Middle Office.** The middle office is responsible for ensuring the trading desk works smoothly. The middle office ensures that trades are properly entered into tracking systems, that existing positions are valued on a daily basis, and that all of the paperwork is completed properly.
- **Trading Desk Risk Management.** Risk managers assigned to trading desks ensure that traders are not taking on too much risk and keep management informed of ongoing risks associated with the current trading positions.

- **Financial Control.** The financial control team is responsible for accounting and profit and loss (P&L) reporting. The trades done by the trading desk ultimately need to be reflected in the firm's books and records and reported to the limited partners (shareholders if it is a public corporation) and the government. The financial control team is responsible for putting together those reports.

Processing (Back Office)

The back office provides post-trade processing, settlement, and clearing functions to the trading desk. These functions are commonly performed in a location that is remote from the trading desk.

- **Reconciliation (Clearing).** The reconciliation team ensures that the counterparty's back office agrees on the terms of every trade. If the two parties to the trade can't mutually agree on the terms, this team might need to pull phone records (trader's phone lines are typically recorded), instant messages, or emails where the traders agreed to the terms of the trade.
- **Margining.** Trading desks often require trading partners to post collateral when owed a large amount of money. The margin group is responsible for posting and receiving collateral. A request for additional collateral is called a *margin call*. This can usually be done by either trading organization.
- **Documentation.** The documentation team is responsible for finalizing all the paperwork necessary for trading. Just like the paperwork on any other legal agreement, a substantial amount of work goes into ensuring paperwork is correct for trades.

TRADES

A trade is a special type of transaction where the asset being traded can be resold at approximately the same price that it was purchased. This makes a trade different from many other transactions. For example, buying stock in a company is a trade. The stock can be resold at a later date. The price of the stock may have gone up or down, but it remains valuable. However, buying a cheeseburger is not a trade since the cheeseburger probably cannot be resold.

Another key element that allows assets (or liabilities) to be traded is the ability to substitute identical products for one another. For example, it is very difficult to set up trading based on unique works of art. The negotiation

between buyer and seller is too specific, and the worth of the piece too subjective, for prices to be fully generalized. However, it is possible to trade interchangeable products and use those transactions to determine a fair price. The ability to substitute equivalent products is called *fungibility*. For example, shares of common stock in a company are interchangeable. It is possible to buy shares of the same stock from two different people and the shares will be identical in all respects.

Like any type of transaction, trading requires two parties—typically a buyer and a seller. From the perspective of a trader (or a firm employing a trader), the other party in the transaction is called the *counterparty*. Typically, the price at which the asset (or liability) is transferred is based on voluntary negotiation between the two parties.

There are three major transaction types:

- **Buy.** *Buying* is associated with paying money to acquire an asset.
- **Sell.** *Selling* is associated with receiving money as compensation for transferring an asset to the buyer.
- **Short Sell.** *Short selling* is the practice of agreeing to sell something that isn't currently owned but is expected to be owned in the future.

Buying and selling are sometimes confusing terms when cash is not being exchanged. It is possible to swap non-cash assets for each other. In those cases, another descriptive term might be substituted for the terms buyer and seller to clarify the obligations of each party in the transaction. In this book, the terminology of *buyer* and *seller* will be used since it is the most commonly used terminology.

Because it involves both a buyer and a seller, trading is impossible in isolation. Trading is a group activity. Some markets, like exchanges, obscure the buyer/seller relationship. However, even in those markets, buyers and sellers are matched up and work together to create prices. Markets where buyers and seller can easily find one another are called *liquid* markets. Markets where it is difficult for a buyer and a seller to meet are called *illiquid* markets. Regardless of how much an asset might be worth to the right buyer, unless that buyer is willing to buy it right then, there is no way to convert an asset into cash. This is called *liquidity risk*.

Another complexity to trading is that, in many cases, it is not necessary to own an asset to sell it. This has its own term—the practice of selling assets that are not currently owned is called *short selling* or *shorting*. For example, a farmer can arrange to sell corn to a buyer through a forward contract before the corn is grown. After agreeing to the sale, the farmer could decide to grow soybeans. He is not required to grow corn. The farmer's obligation is to acquire corn before the delivery and not necessarily to grow it himself.

KEY CONCEPT: REQUIREMENTS FOR TRADING

Trading requires:

- A buyer or a seller willing to take the other side of the transaction
- The ability to both buy and sell without a substantial loss of value. A substantial loss of value might be defined as 10 percent.
- The ability to define standard products which can be interchanged with one another (these are called *fungible* products)

Other markets also allow short selling. In the stock market, short selling is made possible by borrowing shares and agreeing to repay them at some point in the future.

If done for purely speculative purposes, short selling is a way of betting that prices will decline over time. However, short selling can be used for a variety of other purposes. For example, a broker might short a stock to allow a customer to make an immediate transaction. The broker would then have to purchase in a later transaction. This can help small investors who want a one-stop solution for trading.

MARKETS

Trades can occur in a variety of venues. While this can be as simple as finding a trading partner and signing a contract, the customized nature of many contracts prevents them from being traded (transferred to another trader for a cash payment). As a result, it is common for traders to use resources that can help them find trading partners and sign standardized trading contracts. (See Table 1.2, Types of Trading Venues.)

KEY CONCEPT: REGULATIONS AROUND SHORT SELLING

Many countries and markets have restrictions on short selling. In those markets, specific actions, those designated as “short selling,” might have regulatory and compliance implications. Depending on how the regulations are written, there may be little relationship between “short selling” as a trading concept and “short selling” as a regulatory concept.

TABLE 1.2 Types of Trading Venues

Bilateral	Broker	Dealer	Exchange
Traders directly find one another.	Traders are introduced to each other through use of a broker.	Traders transact directly with a dealer	Traders are matched up on an exchange. The exchange simultaneously transacts with both traders.

Some common types of trading venues:

Bilateral Trading. The trader is responsible for finding a trading partner and signing a contract directly with that partner. Commodity markets where a limited number of producers and consumers interact regularly are often bilateral markets.

Broker. A broker introduces customers to one another for bilateral trading. In some cases, the broker has the ability to trade on behalf of the customer. This is a common way for traders with limited trading connections to get access to trading markets. Brokers typically get paid a commission for arranging trades.

Dealer. A dealer executes customer trades against the dealer's own account. In other words, the dealer is the counterparty for a trade. In many cases, the dealer is a broker/dealer, with the capabilities of both a broker and a dealer. Like the broker market, traders with limited trading connections often use broker/dealers to get access to trading markets. Dealers will make a profit by offering slightly different prices to buyers and sellers—a *bid price* that indicates where they are willing to buy and an *ask price* where they are willing to sell.

Exchange. An exchange is a centralized location for trading standardized products. It is necessary to be a member of an exchange to trade on it. The exchange interposes itself between buyers and sellers and requires its members to post a refundable good faith deposit, called *margin*, when they transact. This margin payment will be held as collateral to ensure buyers and sellers meet their trading obligations.

MARKET AND LIMIT ORDERS

When traders are working with brokers and exchanges, they typically have to provide instructions for how they would like to trade. This is different from a bilateral contract (like a forward) where terms can be individually

negotiated. Brokers and exchanges allow a limited number of instructions, and the terminology for those instructions is reasonably standardized.

Market Orders

In many cases, traders want a fast execution at the prevailing market price. These are called *market orders*. Market orders are executed by the broker or exchange as soon as possible. These trades should receive the best price available at the time of execution. A market order specifies only the name of the security and the action to be taken (either buy or sell).

- Market orders are the most common type of order.
- Market orders are executed as soon as possible.

Limit Orders (Limit Buy, Limit Sell)

In other cases, traders might want to accept a trade only under certain conditions. In these cases, traders can use a *limit order* to specify the price at which a customer is willing to transact. For example, a buy limit order will specify the highest price that the trader is willing to pay. A sell limit order will specify the lowest price that a trader is willing to accept.

- Limit orders do not guarantee an execution.
- If they are not executed, limit orders will typically remain active for the remainder of the trading day. However, this can be changed—traders can specify different instructions or cancel limit orders.
- Limit orders have a time priority—the first trader to place a limit order at a specific price receives the first execution.
- A *bid price* is the price at which a trader is willing to buy an asset while using a limit order.
- An *ask price* (also called an *offer price*) is the price at which a trader is willing to sell an asset while using a limit order.

Stop Orders (Stop Buy, Stop Sell)

Traders can submit orders that are initially inactive but become active under specific conditions. One type of activated order is a *stop order*. Stop orders convert into market orders if the market reaches or goes through a certain price level (the *stop price*). *Buy Stop* orders are placed above the current market price and become market buy orders if the price reaches the stop price. *Sell Stop* orders are placed below the current market price and will become market sell orders if the price reaches the stop price.

- Stop orders are most commonly used to limit losses to existing positions from large price moves. This is called a stop-loss. For example, a trader might enter a stop-loss order to liquidate a stock investment if prices drop more than 10 percent.
- Stop orders can also be used to enter positions if the market hits a certain level. For example, a trader following a technical analysis strategy may wish to trigger a buy order if the market rises above some resistance level.

Stop Limit Orders

If traders need to give more complex instructions, they can create *stop limit* orders. Stop limit orders combine features of both stop and limit orders. These will work similarly to stop orders, except that a limit order will be created rather than a market order.

ORDER LIFESPAN

Another factor in submitting transactions is how long the order will stay active before it is executed or cancelled. These instructions primarily apply to limit orders since market orders are filled immediately. By default, limit orders are good only on the day that they were submitted and the instructions go into effect when the broker or exchange receives the order. However, other instructions are possible.

Day Orders

The most common lifespan for a limit order is the remainder of the trading day on which it was submitted. This is typically the default lifespan for orders if no special instructions are provided.

Good till Canceled (GTC)

Traders can submit orders that are good indefinitely (unless they are canceled). GTC orders, also called *open orders*, remain in effect until they are canceled.

Fill-or-Kill (FOK)

In some cases, traders want an immediate execution but want to place a limit on the maximum price they pay (or minimum price they receive) for an

execution. Fill or Kill orders are immediately executed to the extent possible and then canceled. In many cases, these orders will not be fully executed.

At-Open, At-Close

Most orders become active as soon as they are submitted. However, sometimes traders want to match the opening or closing price rather than get an immediate execution. For example, a derivative contract might depend on the market close price on the expiration date. To limit the risk associated with a mismatch between the contract and the trading price, the trader might wish to transact as near to the closing transaction as possible.

Open and close orders are typically executed on a best-effort basis. It is also common for exchanges to require these orders to be submitted early. For example, an exchange might stop accepting market-on-close orders 15 minutes prior to the close. If a large number of orders come in right at the open or closing time, the market on open/close orders might only be guaranteed to be executed at a price within the range of prices being traded during the open or close—not necessarily at the official open or close price.

TRADING POSITIONS

For a trading desk, a differentiation is made between *trades* and *positions*. A *trade* is a transaction, a *position* is the net exposure that results from one or more trades. For example, if a trader executes two trades, each purchasing 300 metric tonnes of aluminum, the result is a 600 metric tonne position. The terminology that describes positions is different from the terminology used to describe trades.

The terms buy and sell can get confusing because contracts can be traded in the same way as assets. For example, it is possible to buy a contract that obligates the owner of the contract to sell an asset. The transaction that led to the position (buying a contract) is less important than the end result (the trader now has an obligation to sell an asset). To reduce confusion, traders use the terms *long* and *short* to describe positions:

- A *long position* profits when the price of the asset increases and loses money when prices drop.
- A *short position* profits when the price of the asset declines and loses money when prices rise.
- A *flat position* neither gains nor loses money when prices change.

When risk management or the head of a trading group examines trading positions, the terms long and short typically refer to the underlying asset exposure rather than the individual contracts. This allows the exposure from multiple contracts to be combined together (netted) and reported as a single number.

PRICES

There are many different prices that exist in the financial markets. The simplest definition of price is the amount of money that someone would pay to acquire an asset. However, prices also have a time component. Not only do prices change every day, traders can agree to deliver assets at some point in the future.

Some common types of prices:

- **Spot Prices.** The spot price is the price at which an asset can be bought or sold *on the spot* (for immediate delivery).
- **Forward Prices.** A forward price is the price at which two traders have agreed to transact at some point in the future. A forward price will need to be described by two dates—the valuation date (the date when the price was transacted) and the delivery date (when the product needs to be delivered).
- **Quotes.** A quote is the price where limit order traders are willing to buy or sell some quantity of an asset. Quotes are often characterized as a bid/ask spread and consist of two numbers—the highest price that a trader is willing to buy and the lowest price that a trader is willing to sell. Since quotes don't actually result in a transaction, these are often not recorded.

MANAGING TRADING RISK

Coinciding with the rapid growth of hedge funds, the last quarter of the twentieth century provided a renaissance to the fields of trading and risk management. New financial markets and products exploded onto the financial consciousness of investors, computers allowed individual investors to directly access market data, and large financial firms pioneered the use of methodologies to categorize and contain risk. New legislation soon followed creating requirements and rules with which companies had to comply.

Traders have managed risk for many years. However, the business of risk management was largely created by banks in the early 1990s. From

the time of the Great Depression in the 1930s until the late 1990s, banks in the United States were divided into commercial banks and investment banks by the Glass-Steagall Act (the U.S. Banking Act of 1933). This act prevented financial institutions that take deposits from customers (commercial banks) from engaging in many financial activities involving financial markets.

Under the Glass-Steagall Act, deposit-taking institutions were prevented from:

- Buying or selling securities for customers
- Investing in securities on their own behalf
- Underwriting or distributing securities
- Owning or affiliating with companies involved in securities activities
- Sharing employees with securities firms.

During the Glass-Steagall era, U.S. banks were split into two categories—commercial banks that took customer deposits and investment banks that handled securities. Over time, both types of banks found ways to expand into the other side of banking by taking advantage of loopholes and ambiguity in several of the Glass-Steagall clauses. These loopholes allowed commercial banks to create subsidiaries that handled securities trading. Coinciding with the growth of the derivatives market in the mid-1970s, U.S. commercial banks started creating subsidiaries to enter securities markets in a limited manner.

Demonstration of sound risk management practices convinced banking regulators to allow the use of these loopholes. Over time, these exemptions grew. By the time the Glass-Steagall Act was finally repealed in 1999, it was mostly a symbolic action—large financial conglomerates handling both commercial and investment banking already existed.

The risk management concepts pioneered by banks were soon adopted by hedge funds. This helped hedge funds improve their profitability and attract more investors. The concepts applied by large financial institutions for managing trading and investment risk are now applied by most trading organizations.

KEY CONCEPT: SECURITIES

Securities are tradable financial instruments like stocks, bonds, and derivatives.

KEY CONCEPT: MODERN RISK MANAGEMENT

Modern risk management was developed by commercial and investment banks. The banking industry is still subject to extensive regulations focusing on controlling risk. As a result, risk management is closely associated with the regulations affecting large financial institutions. Even so, a variety of other companies make extensive use of risk management concepts. These include hedge funds, trading desks, and companies subject to commodity price movements like airlines and natural gas drillers.

WHAT IS RISK?

Risk, broadly defined on an organizational level, is a potential for loss or the diminished opportunity for gain. It isn't always bad since higher risk is closely associated with higher profit potential.

Terminology to describe risks falls into two broad categories. Some risks, like a trading partner going bankrupt, involve a limited number of possible outcomes. These risks are called *discrete risks*. Other risks involve a continuous range of possible outcomes. These types of risk are called *continuous risks*. Risk management uses slightly different terminology for each type of risk.

The two broad categories of terminology to describe risk are:

- **Discrete Risks.** These risks will either happen or not happen. *Discrete risks* are commonly described in terms of their probability and magnitude. For example, a discrete risk might be described as a 5 percent chance of losing \$2 million.
- **Continuous Risks.** Some risks involve a range of potential outcomes. *Continuous risks* are described using the same terminology used to describe statistical distributions. For example, statistics might be used to define both an average outcome and the expected variance in outcomes. (See Figure 1.2, Discrete Risks, and Figure 1.3, Continuous Risks.)

Risks are further described based on the source of the risk. The two most important risks facing hedge funds are commonly related to price movements (*market risk*) or the ability of counterparties to meet their obligations (*credit risk*). However, it is important to recognize that any organization is actually exposed to many sources of risk. Some of the more common risks faced by trading desks are listed below. (See Table 1.3, Types of Risk.)

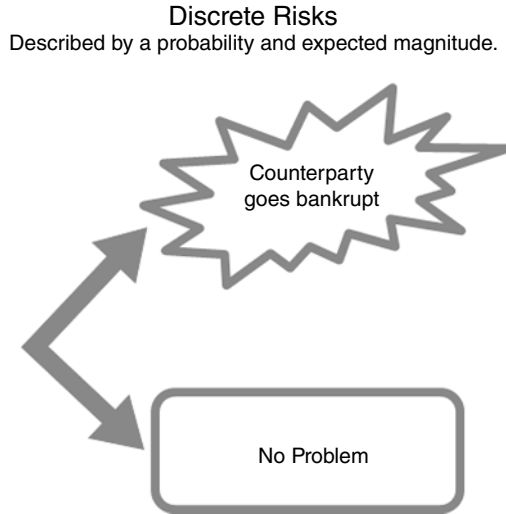


FIGURE 1.2 Discrete Risks

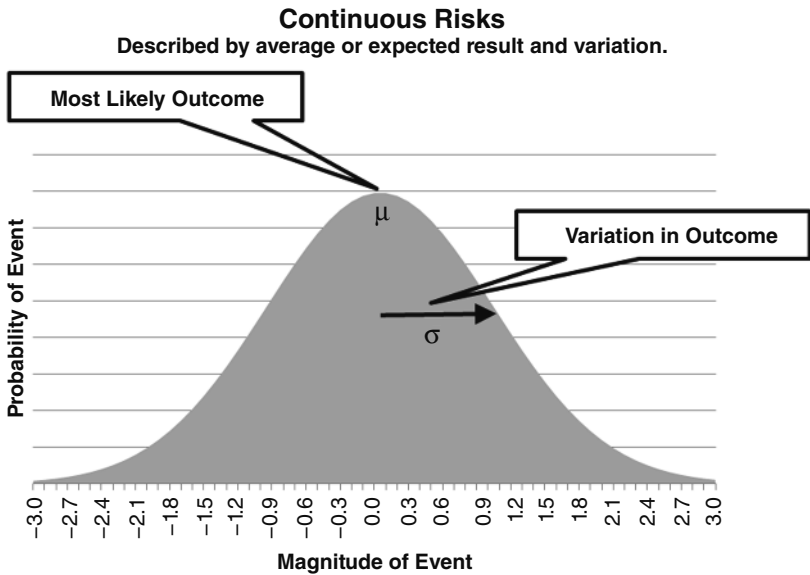


FIGURE 1.3 Continuous Risks

TABLE 1.3 Types of Risk

Risk	Definition
Market Risk	Market risk is the loss of money or resources due to adverse price moves.
Credit Risk	Credit risk is the loss of money or resources due to a trading partner not repaying a debt or a loan.
Litigation Risk	Litigation risk is the risk of loss due to lawsuits or arbitration proceedings.
Compliance Risk	Compliance risk is the risk of losses due to regulatory actions, fines, or sanctions.
Reputational Risk	Reputational risk is the risk of lost revenue or a decline in shareholder value due to damage to a firm's reputation.
Strategic Risk	Strategic risk is the potential outcome of a strategic decision. For example, what happens to a firm's future prospects if a strategy is successful? It is the risk that a strategy is well executed but still doesn't result in the desired outcome.
Operational Risk	An operational risk is a loss occurring from a failure to execute some process. For example, failing to schedule the proper size dock space for an oil tanker can result in the failure to deliver oil to a client.

KEY CONCEPT: MARKET AND CREDIT RISK

Risk is a potential for loss or the diminished opportunity for gain. The Traders are responsible for managing a wide variety of risks. Of those, the two most important risks to traders are typically *market risk* and *credit risk*:

- **Market Risk.** Losses resulting from changes in prices.
- **Credit Risk.** Losses resulting from bankruptcy of trading partners.

Traders, and risk managers associated with trading desks, are the groups closest to these two risks. While other risks, like reputational risk, are still important to traders, a trading desk is the front line group focused on monetary risks. Of course, this focus can go too far. Many trading desks have been criticized for focusing on market and credit risk to the exclusion of other risks.

RISK AND REWARD

From a trading perspective, there is a strong relationship between risk and reward. Generally speaking, high-risk activities typically have a greater opportunity for profit than lower-risk activities. As a result, it often makes sense to monitor and manage risks rather than eliminate or avoid risky activities. For example, complex jobs that require specialized skills and precise execution tend to have higher profit margins than jobs that can be done easily.

The business of trading for profit, called speculation, might be defined as “assuming substantial investment risk to obtain a commensurate profit”. This is very different than gambling, which might be defined “playing a game where the results depend on luck rather than player skill”. Risk management can help identify situations that have a better than average risk/return relationship. This can improve the profitability of a hedge fund and differentiate a hedge fund from its peers.

While risk management is often mathematical, it still requires good judgment to be effective. An often-repeated maxim at hedge funds is that the best way to avoid trading losses is to make smart trading decisions. While risk management might reduce the uncertainty of the final result, it will do little to improve profitability if the initial investment was fundamentally flawed.

It is also a mistake to look at uncertainty separate from returns. In efficient markets, risk and reward are closely related. As a result, reducing risk typically means reducing the size of an investment rather than making a better investment. It is also easy to replace a profitable, but uncertain, strategy with one that is certain to lose money.

It is much harder to find a strategy that makes a profit without taking risk. In fact, this is so rare that it has its own name—*arbitrage*. A strategy that gives the potential for making a profit without any risk is called an arbitrage opportunity. Arbitrage opportunities are quite rare. In fact, the concept of a *fair price* in financial modeling is based on the assumption that arbitrage doesn't exist. A fair price is defined as a price at which neither the buyer nor the seller can make a risk-free profit.

Terminology associated with arbitrage:

- **Arbitrage.** A risk-free opportunity for profit
- **Fair Price.** A price that allows neither side a risk-free profit (often called an *arbitrage opportunity*).

For example, a trader might believe that the price of oil is rising to \$500 per barrel in the next six months. However, if the trader can buy that oil today for \$100 per barrel and pay \$10 per barrel for risk-free storage of oil, the fair price of oil delivered in six months is \$110 per barrel. Any other price would

KEY CONCEPT: ARBITRAGE

Arbitrage is a risk-free opportunity for profit. It doesn't have to be a guaranteed profit—a 50/50 chance of winning money would be considered arbitrage if it didn't cost any money.

allow some trader to make a risk-free profit (buying oil today, storing it, and reselling it in the future). If the trader can find someone to pay him \$500 per barrel, rather than \$110 per barrel, he will have found an arbitrage opportunity.

MONITORING RISK

Risk management work is split between monitoring risk and taking steps to actively manage risk. In this work, identifying and monitoring comes before managing. Trying to manage a risk without understanding it is a recipe for disaster. As a result, the starting point for managing risk typically involves predicting what types of risks might face an organization and monitoring those risks.

Identifying and Classifying Risk

The first step to monitoring risks is to establish a set of risks that might affect the organization. Typically, the responsibility to identify risks is shared across a wide number of business units. This involves an examination of items that have caused previous losses and brainstorming about what might cause losses in the future. Many types of risk are well known (market risk, credit risk, and so on). Using pre-defined risk categories can provide a structure for brainstorming about risk and make sure some risks aren't being ignored.

Measuring and Quantifying Risk

Once risks are identified, it is necessary to estimate the relative importance of each risk. Typically, this is done by establishing a common framework for comparing risks (like their direct or indirect monetary impact upon the organization). This step typically involves mathematical modeling and discussion on how to get the right amount of information to decision makers. Either too much or too little information is bad. For example, producing a 10,000 page report on a daily basis might be comprehensive, but it would be almost impossible for any business leader to use it in making daily decisions.

Risk Monitoring

After risks are identified and the framework for tracking the risks has been established, ongoing daily processes are used to keep the information up to date. Typically, there is a team dedicated to tracking the most important identified risks to an organization. This team is often supplemented by a broader group on a regular basis (several times a year) to identify newly developing or previously unidentified risks.

Compliance and Reporting

Many firms, especially financial institutions like banks and hedge funds, need to comply with government regulations concerning risk. Typically firms need to establish controls to prevent certain types of risks from occurring and monitor those controls to make sure they are effective. In addition, firms need to report their risk activities to shareholders and senior managers on a regular basis.

MANAGING RISK

To be effective, risk management can't just monitor risks. To use risk management effectively, decisions have to be made about how to handle risks. Making those decisions is often a collective effort of a large number of teams. In most firms, at the front lines of risk management is a dedicated risk management function headed by a senior manager called the *Chief Risk Officer*. In addition to that group, commercially focused teams (like the trading desk) are often heavily involved in day-to-day risk management. Then, there are a broader set of stakeholders like the chief executive officer (CEO), the chief financial officer (CFO), and heads of each business line that have the ultimate responsibility for decisions that will affect the corporation.

Typically, risk management decisions are tiered so that smaller decisions are made at the trading desk and decisions with more serious implications get made by senior managers. The different types of decisions that can be made to manage risk are generally fairly limited. Techniques to manage the risk fall into one of four major categories. (See Table 1.4, Risk Management Techniques.)

Risk Avoidance

Avoidance is the practice of avoiding activities that could carry specific risks. For example, a company might decide not to do business in a certain area of the world due to concerns over regional conflict or risk that the foreign

TABLE 1.4 Risk Management Techniques

Technique	Description
Avoidance	The elimination of risk and/or the withdrawal from activities that might lead to that risk.
Control	Reduction of the risks through organizational safeguards and other techniques to reduce the likelihood of problems.
Transfer	The offloading of risk to a third party (or different group in the organization) by purchasing insurance, outsourcing, or contract modification.
Acceptance	Taking on risks and setting aside a budget that will cover potential losses and adverse events.

government will seize assets. Typically, in these situations, a company is giving up potential profit opportunities to focus on other activities where the risks can be more easily controlled.

Risk Reduction

Diversification, the use of collateral, and checklists to prevent operational errors are all techniques that trading desks use to reduce risks. In many cases, risk reduction takes the form of optimization—maximizing the return that could be earned for a given level of risk.

Risk Transfer

Risks can often be transferred to another market participant or between risk categories. This typically involves a cost or a tradeoff of some type. For example, credit risk might be mitigated by either purchasing protection (called Credit Default Swaps) from a third party or by requiring that additional collateral be posted for trading. If additional collateral is chosen as the mitigation, money might be saved, but the trading partner might ask for collateral too. This could lead to a new risk exacerbating cash flow problems when prices change.

Risk Acceptance

Risk acceptance involves accepting the possibility for loss. For example, a trading company may set aside reserves to cover non-payment of monies that are owed the company by its trading partners. Alternately, a trading desk might limit a trader to having no more than a \$1 million cumulative loss in a strategy.

TEST YOUR KNOWLEDGE

1. What is market risk?
 - A. The risk that causes the reputation of the firm to be adversely affected.
 - B. The risk that activities internal to an organization (like properly scheduling a commodity delivery) will cause a loss.
 - C. The risk that a trading partner will default on its obligations.
 - D. The risk of losses arising from adverse price movements.
2. Choose the best answer. Can you buy a contract to sell an asset?
 - A. Yes. However, the purchase and sale offset, so there won't be any purpose in making this trade.
 - B. No. It is not possible to purchase a contract to sell an asset.
 - C. Yes. A contract is a piece of paper, which can have value, and be bought and sold like any other asset.
 - D. No. Financial contracts cannot be transferred.
3. If an investor is long a gasoline/crude oil spread, what will happen?
 - A. The investor will benefit if the spread gets larger.
 - B. The investor will benefit if the spread gets smaller.
 - C. The investor will benefit if gasoline and crude oil both rise in price equally.
 - D. The investor will benefit if both gasoline and crude oil drop in price equally.
4. Which group is typically responsible for the filing of financial statements?
 - A. Risk Management
 - B. Trading Desk
 - C. Financial Control
 - D. Middle Office
5. Hedge funds are typically organized in what type of structure?
 - A. Corporation
 - B. Limited Liability Company (LLC)
 - C. Limited Partnership
 - D. Sole Proprietorship
6. Who can invest in hedge funds?
 - A. Anyone.
 - B. Only accredited investors or officers of the hedge fund.
 - C. Only citizens of the United States.
 - D. Only employees of the hedge fund.
7. What kind of investments are made by a global macro hedge fund?
 - A. Directional bets on major economic events.
 - B. Spread positions in closely related assets.

- C. Positions in stocks of companies undergoing corporate actions like mergers or restructuring.
 - D. Investments in other hedge funds.
8. Which answer correctly defines a *short sale* in the financial markets?
- A. A sale that has to be executed quickly, that is “on short notice.”
 - B. A sale made under distressed conditions.
 - C. An asset sale at a price that falls short of repaying the loan that was originally used to purchase the asset.
 - D. A sale of a borrowed asset.
9. Lynne is a trader at a hedge fund. She has a flat position in gold. What happens to the position if the price of gold rises?
- A. The position makes money.
 - B. Nothing.
 - C. The position loses money.
 - D. Insufficient information.
10. What kinds of fees are typically charged by hedge funds?
- A. Hedge funds will charge investors a percentage of net assets invested.
 - B. Hedge funds will charge investors a percentage of any net profits.
 - C. Hedge funds will charge investors a fixed fee regardless of the size of their assets.
 - D. Hedge funds will charge investors both a percentage of net assets and a percentage of net profits.

