New York
Mercantile Exchange

NYMEX/COMEX. Two divisions, one marketplace

A Guide to Metals Hedging

Introduction to the New York Mercantile Exchange

Significant, sometimes abrupt, changes in supply, demand, and pricing have touched many of the world's commodity markets during the past 25 years, including those for metals. International politics, war, changing economic patterns, and structural changes within the metals industry have created considerable uncertainty as to the future direction of market conditions. Uncertainty, in turn, leads to market volatility, and the need for an effective means to hedge the risk of adverse price exposure.

The principal risk management instruments available to participants in the metals markets today are the versatile futures and options contracts listed on the New York Mercantile Exchange. The contracts are designed to meet the needs of the modern metals industries by encompassing the standards and practices of a broad cross-section of the trade.

The Exchange is the world's largest physical commodity futures exchange. Trading is conducted through two divisions: the COMEX Division lists futures and options on gold, silver, copper, aluminum and the FTSE Eurotop 100® and FTSE Eurotop 300® European stock indexes.

The NYMEX Division offers futures and options contracts for platinum; light, sweet crude oil; heating oil; New York Harbor gasoline; natural gas; electricity; futures for palladium, propane, and Middle East crude oil, and options contracts on the price differentials between heating oil and crude oil, and New York Harbor gasoline and crude oil which are known as crack spread options.

COMEX Division gold futures began trading in 1974 to coincide with the repeal of the ban on the private ownership of gold in the United States. The NYMEX Division platinum contract, launched in 1956, is the oldest continuously traded precious metals futures contract in the world. The metals complex has evolved into the principal pricing indicator for the world gold, silver, and platinum group metals markets and the North American copper trade. Aluminum futures opened for trading in May 1999.

NYMEX ACCESS®

The Exchange's after-hours electronic trading system, NYMEX ACCESS®, allows trading in palladium futures, COMEX Division metals futures and NYMEX Division platinum and energy futures and options after the trading floor has closed for the day. The NYMEX ACCESS® trading session for gold, silver, platinum, palladium, aluminum, and copper begins at 4 P.M., New York time, and concludes at 8 A.M. the following morning, Mondays through Thursdays. A Sunday evening session commences at 7 P.M., New York time. When combined with the daily open outcry session, NYMEX ACCESS® extends the trading day to approximately 22 hours.

Terminals are in use in major cities in the United States and in London, Sydney, Hong Kong, and Singapore.

Efficient Markets Require Diverse Participants

To be efficient and effective risk management instruments, futures markets require a mix of commercial hedgers and private speculators. The New York Mercantile Exchange's metals markets have attracted private and institutional investors who seek to profit by assuming the risks that the underlying industries seek to avoid, in exchange for the possibility of rewards.

These investors, in combination with hedgers, have brought a diversified balance of participants to the Exchange's markets.

How a Transaction Works

The execution of a transaction on the trading floor is a finely honed process that can be completed in seconds. The open outcry auction process on the floor assures that transactions are completed at the best bid or offer.

The process starts when a customer places an order to buy or sell futures or options contracts with a representative on the trading floor via telephone, computer link or the firm's back office. An order slip is immediately prepared, time stamped, and given to a floor broker who is an Exchange member standing in the appropriate trading ring.

All buy and sell transactions are executed by open outcry between floor brokers in the same trading ring. Buyers compete with each other by bidding prices up. Sellers compete with each other by offering prices down. The trade is executed at the highest bid and lowest offer, often known as the bid-ask spread. Meanwhile, ring reporters listen to the brokers for changes in prices and enter the changes via hand-held computers, immediately disseminating prices to the commercial price reporting services as they simultaneously appear on the trading floor wallboards.

Confirmation of each completed trade is immediately sent by the floor broker's clerk to the originating broker or customer.

FUTURES

What are Futures?

Futures contracts are firm commitments to make or accept delivery of a specified quantity and quality of a commodity during a specific month in the future at a price agreed upon at the time the commitment is made. The buyer, known as the "long," agrees to take delivery of the underlying commodity. The seller, known as the "short," agrees to make delivery. Only a small number of contracts traded each year result in delivery of the underlying commodities. Instead, traders generally offset (a buyer will liquidate by selling the contract, the seller will liquidate by buying back the contract) their futures positions before their contracts mature. The difference between the initial purchase or sale price and the price of the offsetting transaction represents the realized profit or loss.

Futures contracts trade in standardized units in a highly visible, extremely competitive, continuous open auction. In this way, futures lend themselves to widely diverse participation and efficient price discovery, giving an accurate picture of the market.

To do this effectively, the underlying market must meet three broad criteria: The prices of the underlying commodities must be volatile, there must be a diverse, large number of buyers and sellers, and the underlying physical products must be fungible, that is, interchangeable for purposes of shipment or storage.

All market participants must work with a common denominator. Each understands that futures prices are quoted for products with precise specifications delivered to a specified point during a specified period of time.

Actually, deliveries of most futures contracts represent only a minuscule share of the trading volume; typically less than 1% in the case of metals. Precisely because the Exchange's physical commodity contracts allow actual delivery, they ensure that any market participant who desires will be able to transfer physical supply, and that the futures prices will be truly representative of cash market values.

Most market participants choose to buy or sell their physical supplies through their regular channels, using futures or options to manage price risk and liquidating their positions before delivery.

Why Use New York Mercantile Exchange Contracts?

- The contracts are standardized, accepted, and therefore liquid financial instruments.

- The Exchange offers cost-efficient trading and risk management opportunities.

- Futures and options contracts are traded competitively on the Exchange in an anonymous auction, representing a confluence of opinions on their values.

- Exchange futures and options prices are widely and instantaneously disseminated. Futures prices serve as world reference prices of actual transactions between market participants.

- The Exchange's markets allow hedgers and investors to trade anonymously through futures brokers, who act as independent agents for traders.

- The liquidity of the market allows futures contracts to be easily liquidated prior to required receipt or delivery of the underlying commodity.

- While futures contracts are seldom used for delivery, if delivery is required, financial performance is guaranteed, as it is for options that are exercised. Unlike principal-to-principal transactions which must be carefully examined for expected financial performance, counterparty credit risk is absent from transactions executed on the Exchange.

- Futures and options contract performance is supported by a strong financial system, backed by the Exchange's clearing members, including some of the strongest names in the brokerage and banking industries.

- The Exchange offers safe, fair, and orderly markets protected by its rigorous financial standards and surveillance procedures.

Commercial Applications of the Exchange's Metals Futures and Options

The Exchange provides buyers and sellers with price insurance and arbitrage opportunities that can be integrated into cash market operations.

Trading Exchange contracts can reduce the working capital requirements and the physical storage costs associated with physical market operations.

Trading Exchange contracts can improve the credit worthiness and add to the borrowing capacity of natural resource companies, thus augmenting the companies' financial management and performance capabilities.

Cash vs. Futures Prices — The Contango Price Relationship

Cash prices are the prices for which the commodity is sold at the various market locations. The futures price represents the current market opinion of what the commodity will be worth at some time in the future. Under normal circumstances of adequate supply, the price of the physical commodity for future delivery will be approximately equal to the present cash price, plus the amount it costs to carry or store the commodity from the present to the month of delivery. As a result, one would ordinarily expect to see an upward trend to the prices of distant contract months. These costs, known as carrying charges, determine the normal premium over cash, and create a market condition known as contango which is typical of many futures markets. In most physical markets, the crucial determinant of the price differential between two contract months is the cost of storing the commodity over that particular length of time. As a result, markets which compensate an individual fully for carrying charges — interest rates, insurance, and storage — are known as full contango markets, or full carrying charge markets.

Under normal market conditions, when supplies are adequate, the price of a commodity for future delivery should be equal to the present spot prices plus carrying charges. The contango structure of the futures market is kept intact by the ability of dealers and financial institutions to bring carrying charges back into line through arbitrage.

If the contango is greater than prevailing carrying charges, dealers will buy physical metal and sell futures. Conversely, if the contango is below prevailing carrying charges, dealers will sell the physical and buy futures. The net effect of these transactions is to keep carrying charges in the futures market in line with interest rates.

Precious metals markets are almost always contango markets which reflect carrying charges. The contango is particularly consistent in gold because of a perceived unlimited spot supply of gold in central bank holdings.

The opposite of contango is backwardation, a market condition where the nearby month trades at a higher price relative to the outer months. Such a price relationship usually indicates a tightness of supply. The copper market has been in backwardation more often than not since the 1950s, but has gone into contango for significant periods of time.

Convergence

Regardless of whether the market is in contango or backwardation, over time, as a futures contract approaches its last day of trading, there is little difference between it and the cash price. The futures and cash prices will get closer and closer, a process known as convergence. A futures contract nearing expiration becomes, in effect, a spot contract.

Principles of Hedging and Price Discovery

Futures contracts have been used to manage cash market price risk for more than a century. Hedging allows a market participant to lock in prices and margins in advance and reduces the potential for unanticipated loss.

Hedging reduces exposure to price risk by shifting that risk to those with opposite risk profiles or to investors who are willing to accept the risk in exchange for profit opportunity. Hedging with futures eliminates the risk of fluctuating prices, but also means limiting the opportunity for future profits should prices move favorably.

A hedge involves establishing a position in the futures or options market that is equal and opposite to a position at risk in the physical market. For instance, a metals dealer who holds (is "long") 50 ounces of platinum can hedge by selling (going "short") one platinum futures contract. The principle behind establishing equal and opposite positions in the cash and futures or options markets is that a loss in one market should be offset by a gain in the other market.

Hedges work because cash prices and futures prices tend to move in tandem, converging as each delivery month contract reaches expiration. Even though the difference between the cash and futures prices may widen or narrow as cash and futures prices fluctuate independently, the risk of an adverse change in this relationship (known as basis risk) is generally much less than the risk of going unhedged and, the larger a group of participants in the market, the greater the likelihood that the futures price will reflect widely held industry consensus on the value of the commodity.

Because futures are traded on exchanges that are anonymous public auctions with prices displayed for all to see, the markets perform the important function of price discovery. The prices displayed on the trading floor of the Exchange, and disseminated to information vendors and news services worldwide, reflect the marketplace's collective valuation of how much buyers are willing to pay and how much sellers are willing to accept.

The purpose of a hedge is to avoid the risk of an adverse market movement resulting in major losses. Because the cash and futures markets do not have a perfect relationship, there is no such thing as a perfect hedge, so there will almost always be some profit or loss. However, an imperfect hedge can be a much better alternative than no hedge at all in a potentially volatile market.

The New York Mercantile Exchange's competitive, transparent markets are excellent indicators of market pricing, and allow commercial market participants to engage in efficient hedging strategies. While actual futures and cash market transactions will

not necessarily offset each other precisely, these examples will illustrate the principles of hedging.

Short Hedges

One of the most common commercial applications of futures is the short hedge, or seller's hedge, which is used for the protection of inventory value. Once title to a shipment of a commodity is taken anywhere along the supply chain, from wellhead, mine, or manufacturing plant to consumer, its value is subject to price risk until it is sold or used. Because the value of a commodity in storage or transit is known, a short hedge can be used to essentially lock in the inventory value. A general decline in prices generates profits in the futures market, which are offset by depreciation in the value of the physical inventory. The opposite applies when prices rise.

Example 1 – Precious Metal Producer's Short Hedge

The producer hedge is of particular use to precious metals mining companies, especially during periods of high price volatility. In addition, the concept of price and revenue forecasting has become important to producers because of the substantial cost and lead time required of new mining ventures. Because precious metals markets are almost always in contango, gold, silver, and platinum group metals futures have removed much of the risk associated with new mine price and revenue forecasting. Precious metals producers are able to use short hedges to help secure project financing.

In February, an official of a new mining venture reviews the company's most recent gold production plans. The sales and production projections suggest that the company will have 3,000 ounces of newly mined and refined gold available for sale the following July. The executive considers the current price of the August gold futures contract at $310.20 favorable, given the company's total production costs, including interest and depreciation, of $180 an ounce. As a result, the mining executive decides to lock in a profit by hedging his anticipated production.

Cash Market	Futures Market
In February:	
Spot gold price on the COMEX Division is $290.10. A mining company decides to hedge to lock in a sales price in excess of the break-even production cost level of $180.	Sells 30 August gold contracts @ $310.20 per ounce.
In July:	
The price of gold drops over the intervening five months to $275.50. The mining company sells 3,000 ounces of gold at this price, which is still above estimated production costs but below the price prevailing in February.	Buys 30 August gold contracts @ $278.20 per ounce
Cash Loss: $14.60/oz.	**Futures Profit: $32.00/oz.**
Overall Profit: $17.40 per ounce	

Comment:

The $14.60 loss on the cash side of the transaction is not realized but simply represents the fall in spot gold prices over the five-month hedge. Had the producer not hedged, the 3,000 ounces of gold would have been sold at $275.50. While still acceptable from a cost of production standpoint, an opportunity cost is also implied. This is equal to the price risk of not hedging. By hedging, the producer enjoyed a significantly more attractive return. The futures side of the transaction was associated with a profit of $32.00, for a net hedge profit of $17.40, after accounting for the cash market loss. Since the producer sold the newly refined bullion at $275.50, the effective sales price in a falling market, including the hedge profit, was $292.90.

The producer could have captured the entire contango by delivering the 3,000 ounces of newly refined gold, fulfilling the obligation incurred by the 30 short August futures. In practice, however, producers generally opt to sell their metal through their normal distribution channels, and liquidate their futures positions.

The overall profit of $17.40 per ounce generates additional revenue that can be used to offset possible interest costs on financing the producing property.

Example 2 – Metal Dealer's Short Inventory Hedge

In February, a copper dealer contracts with a producer to buy 500 tons for immediate delivery at the prevailing market price of 94.50¢ per pound. The market is in contango with futures at a premium to the spot month.

The dealer will ultimately resell the metal to fabricators. In the meantime, to protect his profit from a decline in the market and a loss of inventory value, he sells May copper futures simultaneous with his agreement to buy the metal from the producer. The dealer sells 40 May futures, the equivalent of 500 tons. The dealer will not liquidate his short hedge until he finds a buyer for the metal.

In mid-April, the dealer finds a customer for his metal who agrees to purchase the copper on the basis of the May futures settlement price on April 15, at which time the dealer must liquidate his futures position. The hedge looks like this:

Cash Market	**Futures Market**
In February:	
Dealer buys 500 tons at 94.50¢ per lb.	Sells 40 May futures contracts At 95.50¢ per pound.
April 15:	
Sell 500 tons at 97¢ per pound	Buy 40 contracts at 97.25¢ per pound.
Result: Gain of 2.50¢/lb.	**Loss of 1.75¢/lb.**
Overall Profit 0.75¢ per pound	

Comment:

Not only did the futures market permit the dealer to cover his forward risk, but his hedge enabled him to carry his inventory until he was able to sell his copper, earning an anticipated profit. Since he purchased his futures contracts simultaneously with his sale of the metal, he was fully compensated for the cost of carrying inventory until mid-April. Furthermore, the hedge gained 0.75¢ per pound.

Had he not hedged the 500 tons, he would have had a cash market profit of

2.50¢ per pound, but the price of copper could just as easily gone against him, creating a major inventory loss.

Long Hedges

A long hedge is the purchase of a futures contract by someone who has a commitment to buy in the cash market. It is used to protect against price increases in the future.

The end-user with a fixed budget, such as a manufacturing company that uses metal as a raw material, can also use a long hedge to establish a fixed cost, though not necessarily a fixed margin. In cases where commodity costs are a significant portion of operating expenses, a fixed margin might be established when income from operations can be predicted with some accuracy, such as for jewelry manufacturers who require precious metals as raw materials, or fabricators of finished metal products.

Example 3 – Precious Metals Fabricator's Long Hedge

The fabricator hedge allows a manufacturer to fix a price for his principal raw material, in this case, silver.

The process of establishing this hedge, however, involves a different perspective on the contango, the differential between the nearby and deferred futures.

In the metals producer's short hedge, the silver producer locks in a favorable price for anticipated refined bullion output by selling the deferred contract, benefiting from the positive spread relationship which almost always prevails between a nearby and deferred gold or silver futures contract. While this implies a structural disadvantage to a long hedge, the following example shows that the benefits of such a transaction outweigh the costs:

In February, a sterlingware manufacturer accepts an order to be delivered in August. The manufacturer estimates that the project will require 5,000 ounces of silver, which he will need in May when he begins fabricating the product. Based on the price of COMEX Division silver futures for delivery in May and his production costs, the manufacturer commits to a price with his customer.

The manufacturer could purchase the required silver when he accepts his customer's order. However, that would force him to either tie up considerable working

capital or arrange financing of the metal, as well as to make storage provisions from February to May.

If the manufacturer waits until May to buy the silver, he will be speculating on stable or falling silver prices. If prices do fall, the manufacturer will make additional profits; however, if prices rise, he may see his anticipated profits reduced or even disappear.

The manufacturer does not wish to speculate or incur unnecessary costs, so he constructs a futures hedge as follows:

Cash Market	**Futures Market**
In February:	
Manufacturer sells sterlingware based on silver price of $5.50/oz.	Buys one contract, May silver, $5.58/oz.
In late April:	
Manufacturer buys 5,000 oz. cash silver @ $6.20/oz.	Sells one contract of May silver @ $6.23/oz.
Cash Loss: 70¢/oz.	**Futures Profit: 65¢/oz.**
Overall Loss: 5¢ per ounce	

Comment:

By engaging in a long hedge, the manufacturer, who realized a futures profit of 65¢ per ounce, was able to offset 93% of the loss implied by a 70¢ rally in the price of silver. Although the long hedge failed to cover 5¢ of the price advance, the result is still superior to the alternative of purchasing physical silver in early February and bearing the 8¢-per-ounce carrying cost — the difference between February and May futures — for three months. Additionally, the 5¢ loss on the overall position can be considered the cost of protection against a spike in prices.

If the price of May silver had fallen, the manufacturer would have closed his futures position at a loss, but a lower cash price for silver would have compensated for most, if not all, of that loss.

Example 4 – The Fabricator's Long Hedge in a Backwardated Market

As previously noted, most physical commodity futures markets are contango markets whereby prices in the farther dated months are higher than the nearby months, reflecting costs of storage and financing. Sometimes, however, prices get progressively lower the further out the contracts go, generally reflecting current high demand. Since the 1950s, for instance, more often than not, the copper market has been in backwardation. The following illustrates how a copper consumer would hedge his acquisition costs in the face of an expected increase in materials costs:

In March, a manufacturer of power generation equipment receives an electric utility's bid solicitation for a piece of equipment that will require that he take delivery of 50,000 pounds of electrolytic grade copper by September. The current price of copper is $1.10 per pound, but, since the copper market is in backwardation, September COMEX Division copper futures are quoted at 99.70¢ a pound. However, all things remaining equal, in September, the current prices will likely be about $1.10.

In order to submit a competitive bid, the equipment manufacturer buys September copper futures at 99.70¢ a pound, and submits, and wins, a bid based on that cost.

By September, cash market copper prices are $1.08. The manufacturer liquidates his futures position by selling the futures contracts he purchased for 99.70¢ for the now current futures price of $1.085, earning a profit of 8.8¢ a pound on his futures position. He then buys his physical copper for $1.08.

Cash Market	**Futures Market**
In March: Current cash price: $1.10 per pound	
Manufacturer signs contract for power generation equipment based on copper price of 99.70¢ per pound	Buys two Sept. copper futures at 99.70¢ per pound.
In August:	
Manufacturer buys 50,000 lbs. cash copper at $1.08 per lb.	Sells two contracts of Sept. copper at $1.085 per lb.
Loss: 8.30¢/lb.	**Gain: 8.80¢/lb.**
Overall Profit: 0.50¢ per pound	

Comment:

The manufacturer could have waited until September to buy his copper. But he is "short" because he made the commitment to sell the equipment containing the physical copper. His hedge, based on copper at 99.70¢, gave him a competitive edge (assuming his competition does not hedge) of more than 8¢ per pound.

If, by September, the price of physical copper has fallen to 90¢, he liquidates his futures at a 9.70¢ a pound loss. He still has his sale of the equipment based on copper at 99.70¢, however, and buys his physical copper for 90¢, for a 9.70¢ profit.

Copper dealers use the market to hedge along similar principles.

Trading Strips

Strip trading is a flexible strategy that copper futures market participants can use to lock in a single price for two to 24 consecutive months forward. The strip trade is executed by simultaneously opening a futures position in each of the months to be hedged through a single Exchange transaction during the open outcry session. The price of the futures contracts for the strip is typically the average of the current market value for those months, although strips can trade above or below the average, depending upon market conditions. A seven-month strip, for example, consists of an equal number of futures contracts for each of seven consecutive contract months, bought or sold for a single account, quoted and traded at a single price.

In obtaining an average price for multiple months, the hedger can average his cash flow over a period of time.

The futures positions assumed in a strip trade are like any other futures position. All futures contracts are based on physical delivery. Any part of the position can be liquidated by an offsetting futures trade, an exchange of futures for physicals (EFP), or, if desired, physical delivery through the Exchange clearinghouse. Strips let a hedger retain the flexibility to change a strategy by buying or selling additional futures contracts in any month, or liquidating the position of any month of the strip, something that cannot be done easily with over-the-counter instruments.

Regular margin requirements apply to strip trades.

Example 5 – Fabricator Buys a Copper Strip to Fix His Average Monthly Cost

A fabricator has a contract with a copper producer to purchase each month's required tonnage at a monthly average price when the metal is shipped. The fabricator decides to fix the price and take advantage of the backwardation, so he buys a six-month strip of contracts. His quota is 125 tons per month, or 10 contracts (25,000 pounds per contract), the volume distributed evenly over the six-month period beginning in September. The use of the strip allows the company to also hedge its expenditures for copper evenly throughout the period beginning in September.

The fabricator's risk management committee is comfortable with locking in a single price over the period.

Assuming the risk manager wishes to hedge 100% of his physical requirements, he buys 10 contracts for each of the six months, or 60 contracts representing 1.5 million pounds of copper cathodes.

The fabricator's hedge, which has locked in a price of 87.56¢ per pound for a total of 1.5 million pounds over the period, looks like this:

Month	Current Futures Price	Strip Price	Market Position
SEPT	92.00	87.56¢	Long 10 contracts
OCT	91.60	87.56¢	Long 10 contracts
NOV	88.80	87.56¢	Long 10 contracts
DEC	86.30	87.56¢	Long 10 contracts
JAN	84.80	87.56¢	Long 10 contracts
FEB	81.90	87.56¢	Long 10 contracts
	Average 87.56¢ per pound		

The fabricator buys the strip at 87.56¢ when the spot price is 92¢. Assuming the fabricator takes delivery from its traditional suppliers, it liquidates the futures positions in the relevant months, offsetting its physical market transactions. If the fabricator chooses, it can take delivery through the Exchange for any, or all, of the months involved in the strategy.

If the copper market stays in backwardation, and spot prices stay at about 92¢ per pound, the fabricator will likely realize a gain as futures prices rise to that level as each contract month becomes the spot month. As with any other hedge, however, there may be a loss in the futures market for a particular month that is compensated for by a gain in the cash market; conversely, a gain in the futures market will offset a loss in the cash market.

Other Considerations

Basis

As noted earlier, futures contracts are standardized instruments that stipulate the quantity, quality, and delivery points for a wide cross section of the underlying industry. Basis is the differential that exists between the cash price of a given commodity and the price of the nearest futures contract for the same, or a related commodity.

The predictability and size of the basis can involve three price relationships:

- The difference between the futures contract and the spot price of the underlying commodity.
- The difference between the price at the futures contract delivery point and the price at a different location.
- The price at the futures contract delivery point and the price of a similar, but not identical quality, commodity at the same location.

Premiums for Physicals or Discounts for Scrap

Basis usually is not a major consideration in the precious metals markets, although differences in supply and demand conditions between market centers can cause a premium in the price of the delivered physical commodity to the price of the futures. Basis can be more problematic for copper market participants.

Metal which does not meet the purity specifications of a metals futures contract (scrap copper, for example) will be priced at a discount to the futures contracts.

Example 6 – Use of Hedge Market Where No Exchange Delivery is Intended

On January 20, a scrap dealer buys five truckloads of No. 2 copper scrap over the scale from a collector at the March COMEX Division futures price less 21¢ per pound, the prevailing discount for scrap. At the same time, he sells March COMEX Division futures at 90¢ a pound, the current March futures price. The scrap dealer is able to use the futures market to protect his position even though he cannot deliver scrap against the futures contract.

On February 1, the scrap dealer sells the five truckloads to the ABC Copper Refining Co. at the March COMEX Division copper futures price, which is now 86¢, less 19¢, the now-prevailing scrap discount, and buys back his hedge.

Cash Market	Futures Market
January 20:	
Buys scrap at 69¢ per pound (COMEX Division, less 21¢)	Sells March futures at 90¢
February 1:	
Sells scrap at 67¢ (COMEX Division, less 19¢)	Buys March futures at 86¢
Loss: 2¢ on cash market	**Gain: 4¢ on futures**
Overall gain: 2¢ per pound	

The scrap dealer's profit on his futures transaction offsets his loss in the cash market.

If the market rises instead of falls, the scrap dealer's loss on his futures position is offset by his gain in the cash market. Assume futures prices rise to 93¢:

Cash Market	Futures Market
January 20:	
Buys scrap at 69¢ per pound (COMEX Division, less 21¢)	Sells March futures at 90¢
February 1:	
Sells scrap at 74¢ (COMEX Division less 19¢)	Buys March futures at 93¢
Gain: 5¢ on cash market	**Loss: 3¢ on futures**
Overall gain: 2¢ per pound	

Exchange of Futures for Physicals (EFP)

An exchange of futures for physicals, also known as an EFP, is simply the exchange of a futures position for a physical position in the cash market.

There are a number of advantages to using EFPs instead of going through the Exchange's standard delivery procedures. EFPs allow flexibility in the delivery of a commodity which does not necessarily conform to the delivery location specified by the futures contract, and it allows traders a choice of a trading partner rather than a randomly matched partner, as happens in the Exchange delivery process.

An EFP allows a trader to remove his futures position in an Exchange-approved transaction during trading hours, or based on the settlement price after the market closes, or any other mutually agreeable price. The EFP also allows traders to create flexible pricing contracts which would otherwise be difficult to structure and execute.

Example 7 – Using an EFP

A fabricator hedges his requirements for physical metal by buying futures. When the time comes to take delivery, he executes an EFP with a metals dealer. The dealer quotes a price for the metal delivered to the fabricator's plant as a premium of 2.75¢ per pound to the COMEX Division copper futures contract.

The fabricator then instructs his broker to transfer his hedge position to the dealer's account. The dealer issues an invoice for the total cost of the metal, which is the prevailing COMEX Division futures price plus 2.75¢ per pound.

The fabricator originally held a long futures position; the dealer, a short futures position. By exchanging their futures positions, they net out their futures, and the fabricator now owns the physical.

Blind vs. Selective Hedge

The term "blind hedge" refers to the practice of not deviating from a fully planned hedging strategy, with volumes, contracts, and entry and exit points established prior to the execution of the hedge. In a selective hedge, the execution of the overall strategy can be fine-tuned to better reflect ongoing cash market conditions. Thus, if a third case of continuously increasing prices were assumed, it is unlikely that the pro-

ducer would blindly stick to his losing short hedges, rather than liquidate early to contain his future losses. A selective hedge, for example, might link the volume to be hedged to an ongoing assessment of the cash-futures basis relationship and the perceived likelihood of a reduction in posted prices.

Technical Analysis

The word "technical" is often used in connection with the action of prices in the futures market. Often heard phrases are, the market declined because of a "technical reaction," it went up on a "technical rally," the market is "technically weak" or "technically strong." Technical is used to mean a price movement based on a continuation of, or deviation from, an observed price pattern.

The market price of a specific commodity is considered by technical traders to be the most important determinant of the environment which will affect futures prices. Through the use of the information revealed from charting daily futures prices, technicians attempt to make accurate predictions regarding futures price behavior.

Charting Price Trend Lines

Charting is the practice of recording, in graph format, the market price movements of a particular commodity over time with the objective of defining price levels at which commodities should be bought or sold. Daily price movements are plotted as high, low, and closing prices to help the trader determine trends, resistance points at which prices should not be easily exceeded, and support points below which prices should not easily fall. These technical signals are used by traders to indicate when to buy or sell.

Trend lines are the simplest form of technical analysis. Connecting a series of high points to draw a downtrend can give the trader his first set of clues to current market direction. Using lows and highs together, in either direction, will yield a price channel between the two lines, indicating if and when a piece breakout beyond the channel may occur. Moving averages represent a more complex way of identifying these underlying trends.

Technical traders always trade with the trend, never against it. While there will always be moderate rallies in downtrends and moderate reactions in uptrends, countertrend movement is seldom sustained.

A variety of patterns have been identified to help recognize changes in a trend. Market cycles have been variously depicted at “double tops,” (when the market rises but hits resistance at a certain level, retreats, rises again, but still cannot breach the previous resistance point, and falls back again); “double bottoms,” an inverse pattern that shows resistance to a falling market; “head-and-shoulder formations,” again the same general pattern, but with the resistance points being hit at succeedingly lower (or higher) levels; “triangular flag patterns,” when the market consolidates sideways; and “price gaps,” when the low price of one bar on a chart is higher than the high of the preceding bar (or inversely, the high is lower than the low of the preceding bar, a price or price range where no trades take place).

Other techniques and terms which are commonly used in technical analysis include:

- **Historical Volatility:** Analysis of a commodity’s past price variability based on time frame (for example, 20-day) and price interval.

- **Moving Average:** Moving average (open, high, low, close, midpoint, average) to follow the trend signal data fluctuations, and signal long and short positions.

- **Ratio:** Despite large fluctuations in price, many commodities have price relationships. By calculating and analyzing their ratio, overvalued and undervalued markets can be found.

- **Rate of Change:** Monitors and calculates the market’s rate of change relative to previous trend intervals, as specified in the value input (also known as peaks and valleys).

- **Relative Strength Index (RSI):** Study to measure the market’s strength and weakness. A high RSI (>70) indicates an overbought or weakening market, and a low RSI (<30) an oversold, bear market.

- **Stochastic Oscillator:** A computer-generated overbought/oversold indicator whose traditional interpretation is similar to that of the RSI. A high stochastic reading (>80) indicates an overbought, or weakening, market and a low reading (<20) indicates an oversold market.

- **Support/Resistance/Reversal:** Levels determined through technical analysis that indicate trading support, resistance, or the reversal (inverse) of a market price in a specific time frame.

Interested readers can familiarize themselves with the concepts of technical trading through various books and periodicals on the subject.

Volume and Open Interest

Figures for volume and open interest are also important and widely used technical trading tools. Volume refers to the total number of trades in a particular commodity futures contract on a given day. Increasing volume is generally considered an indication that the current price trend is strong and likely to continue. Changes in average volume figures are seen as indicating when major high or low points in a market are being approached. Technical traders believe volume will increase rapidly as these points are approached.

Open interest refers to the total number of long or short positions in a specific contract which have not been liquidated or offset by an opposing buy or sell order. Increasing open interest figures are considered supportive of the underlying price trend. That is, they may indicate market strength during periods of rising prices, or the support of a downward trend during periods of market weakness. Similarly, decreasing open interest figures during rising price trends are seen to indicate a technical weakness in the market — a possible dip or reversal based upon the liquidation of long open interest.

Open interest is also an indicator of commercial use of a futures contract.

The combination of volume and open interest figures, used in conjunction with a major technical analysis system, can provide useful information that traders can factor into their decision-making process. Parallel or inverse relationships between volume and open interest can be analyzed to determine the degree of support which may exist for a specific price trend.

Options

Options on futures offer additional flexibility in managing price risk. There are two types of options, calls and puts. A call gives the holder or buyer of the option the right, but not the obligation, to buy the underlying futures contract at a specific price up to a certain date. A put gives the holder the right, but not the obligation, to sell the underlying futures contract at a specific price up to a certain date. A call is purchased when the expectation is for rising prices; a put is bought when the expectation is for neutral or falling prices.

The target price at which a buyer or seller purchases the right to buy or sell the option is the exercise price or strike price. The buyer pays a premium, or the price of the option, to the seller for the right to hold the option at that strike price.

An options seller, or writer, incurs an obligation to perform should the option be exercised by the purchaser. The writer of a call incurs an obligation to sell a futures contract and the writer of a put has an obligation to buy a futures contract.

An option is a wasting asset. The premium declines as time passes. Depending upon the movement of an option's price, the buyer will choose one of three alternatives to terminate an options position: Exercise the option, liquidate it by selling it back on the Exchange, or let it expire without market value.

Options give hedgers the ability to protect themselves from adverse price moves while participating in favorable price moves. If the options expire worthless, the only cost is the premium. Many people think of buying options like buying insurance.

By using options alone, or in combination with futures contracts, strategies can be devised to cover virtually any risk profile, time horizon, or cost consideration.

Determinants of an Options Premium

In return for the rights they are granted, options buyers pay options sellers a premium. The four major factors affecting the premium are:

- Futures price relative to options strike price.
- Time remaining before options expiration.
- Volatility of underlying futures price.
- Interest rates.

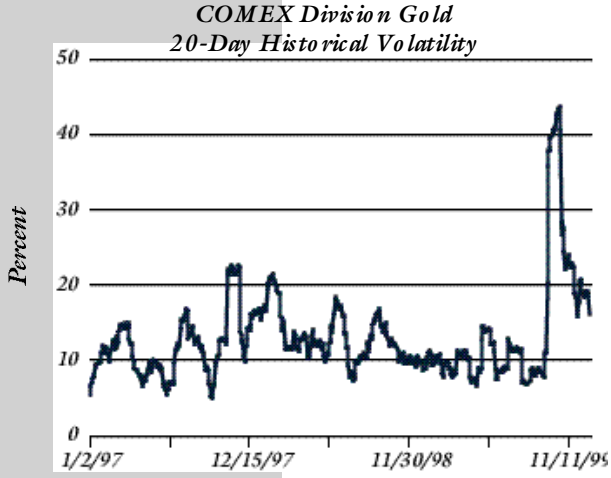

Figure 1

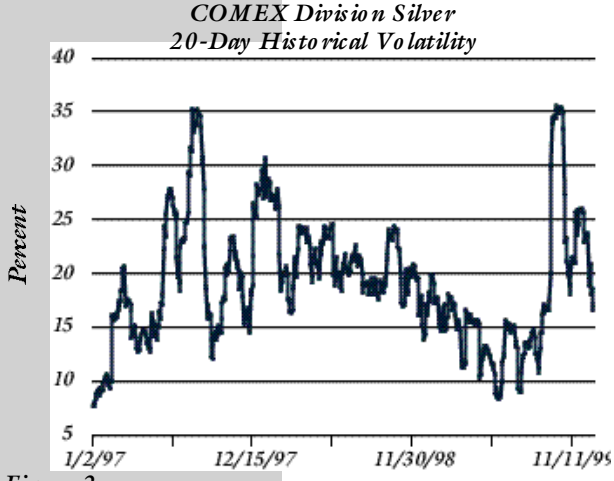

Figure 2

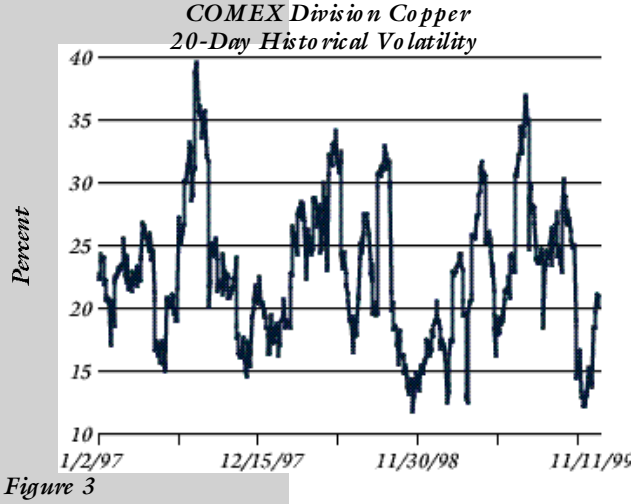

Figure 3

As in the futures market, options trading takes place in an open outcry auction market on the floor of the Exchange. While the value of futures is tied to the underlying cash commodity through the delivery process, the value of an option is related to the underlying futures contract through the ability to exercise the option.

Options Rights and Obligations

Call

Buyer	Has the right to buy a futures contract at a predetermined price on or before a defined date. Expectation: Rising prices
Seller	Grants right to buyer, so has obligation to sell futures at predetermined price at buyer's sole option. Expectation: Neutral or falling prices

Put

Buyer	Has right to sell futures contract at a predetermined price on or before a defined date. Expectation: Falling prices
Seller	Grants right to buyer, so has obligation to buy futures at a predetermined price at buyer's sole option. Expectation: Neutral or rising prices

Strike Price vs. Futures Price

Strike prices are listed in various increments, depending upon the contract.

The most important influence on an option's price is the relationship between the underlying futures price and the options strike price.

Depending upon futures prices relative to a given strike price, an option is said to be at-the-money, in-the-money, or out-of-the-money. An option is at-the-money when the strike price equals the price of the underlying futures contract.

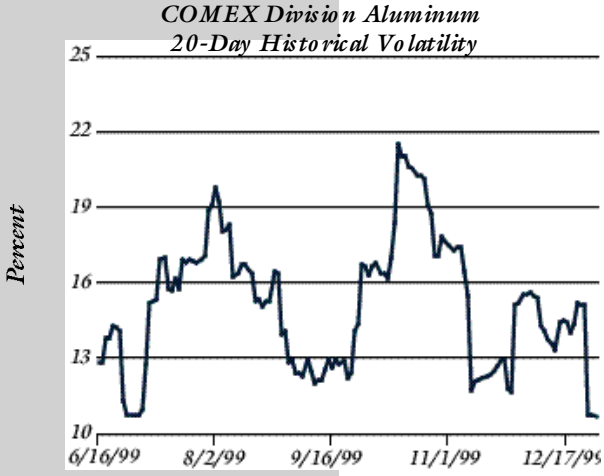

Figure 4

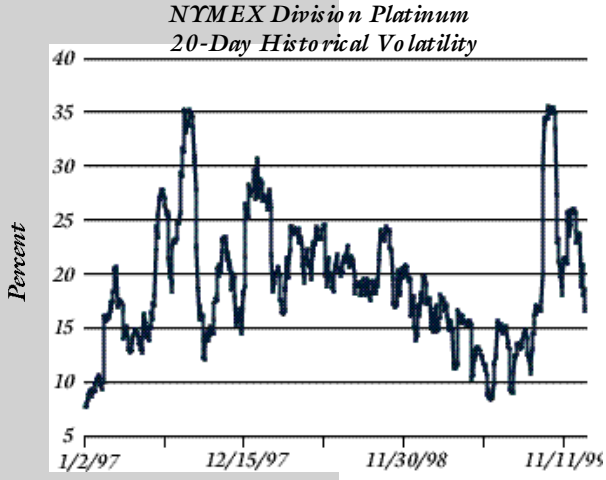

Figure 5

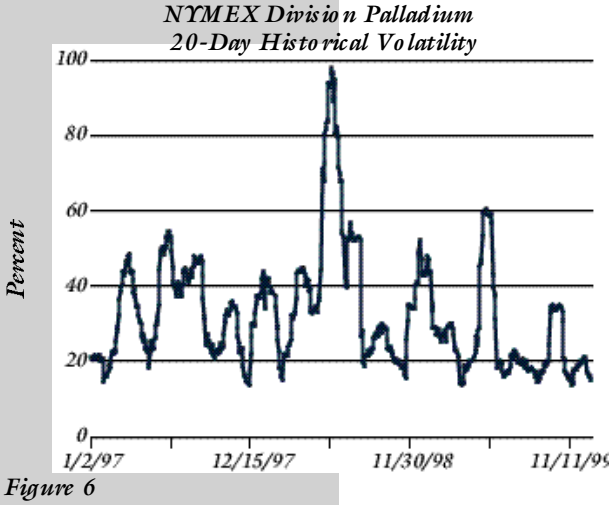

Figure 6

An option is considered in-the-money when the price of the futures contract is above a call's strike price, or when the futures price is below a put's strike price. An option which is not an in-the-money option has no intrinsic value.

A call is out-of-the-money when the futures price is less than the options strike price. For example, when the March gold futures price is $300 per ounce, the March $310 call grants the holder of the options contract the right to buy a March futures contract at $310 even though the market is at $300.

A put is out-of-the-money when the underlying futures price is higher than the put's strike price, such as when the March futures are $300 and the strike price of the March put is $290.

An options premium will usually equal or exceed whatever intrinsic value the option has, if any. Intrinsic value is the amount by which an option is in-the-money.

Time Value

An option's time value is the amount buyers are willing to pay for the option above its intrinsic value. Out-of-the-money options carry all time premiums since their intrinsic value is zero, as do at-the-money options. As an option becomes deeply in- or out-of-the-money, the time premium shrinks. As an option approaches expiration, or volatility decreases, time value decreases. It is important to note that time value is equal for the same strike and same expiration for both calls and puts.

The time value of an option shrinks as the expiration date approaches, all other factors being equal. The reason is that there is less and less time for a major change in market behavior and a decreasing likelihood that the option will increase in value.

Call/ Put Parity

Options prices are linked to futures prices through the exercise feature. If, at the call option's expiration, futures are trad-

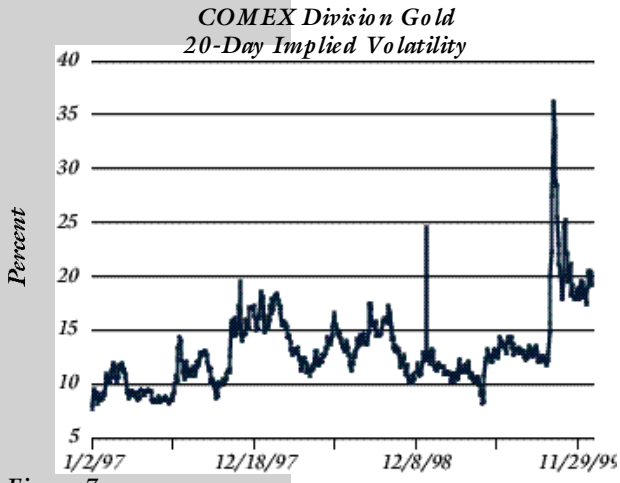

Figure 7

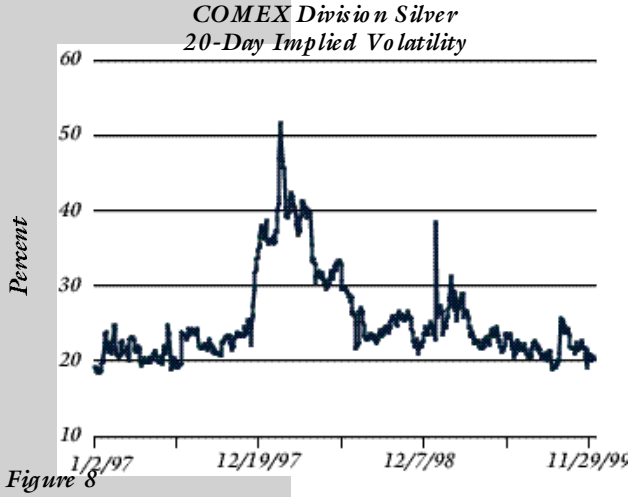

Figure 8

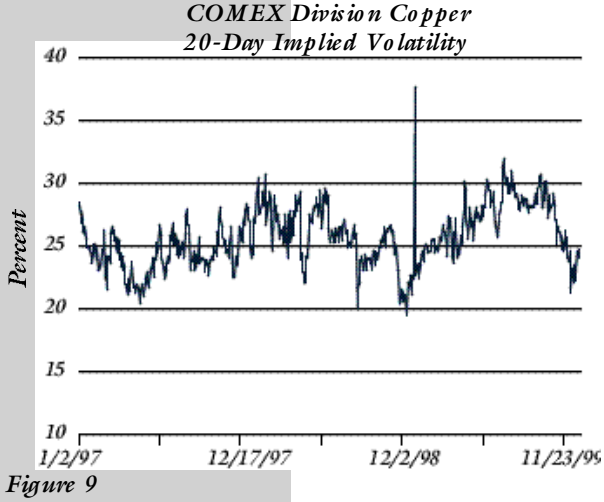

Figure 9

ing at 100¢, a 90¢-call is worth 10¢, intrinsically the difference between the futures price and the strike price. This is because the holder of a 90¢-call can exercise his option, receive a long futures position at 90¢, immediately turn around and sell the futures contract for $1.00, and make 10¢. This is known as trading at parity. If the call is only trading at, say, 5¢, then a trader can buy 90¢-calls, exercise them into long futures at 90¢, sell them for $1.00 and make a risk-free 5¢, exclusive of transaction costs; market forces ensure that an opportunity like this cannot last long.

The option cannot have a negative value, so if the risk does not occur, that is, if futures prices do no exceed the strike price, the option will be worth zero. An option will not be exercised to buy futures at 90¢ when the futures can be purchased at 70¢.

For a put option, the risk is the possibility that the futures price will be below the strike price. When this occurs, the option will be worth precisely the difference between the strike price and the futures price. Since a put gives its holder the right to sell futures, if futures are at 70¢, the holder of a 90¢ put could exercise the put into a short futures position at 90¢ and immediately buy it back for 70¢, making 20¢, exclusive of transaction costs. At expiration, the put will be worth 20¢.

If futures prices are not below the strike price, the option will be worth zero.

Metals options are automatically exercised if, on expiration day, they are one tick or more in-the-money, unless the holder of the option notifies the Exchange that he wants to abandon them.

Volatility

Volatility is a measure of the amount by which an underlying futures contract is expected to fluctuate in a given period of time. Markets which move up or down very

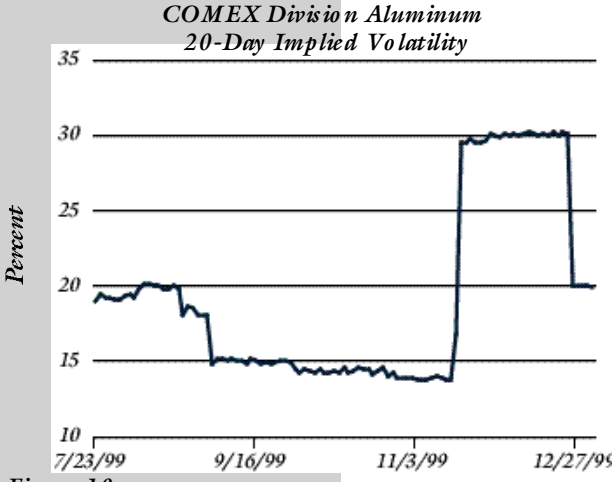

Figure 10

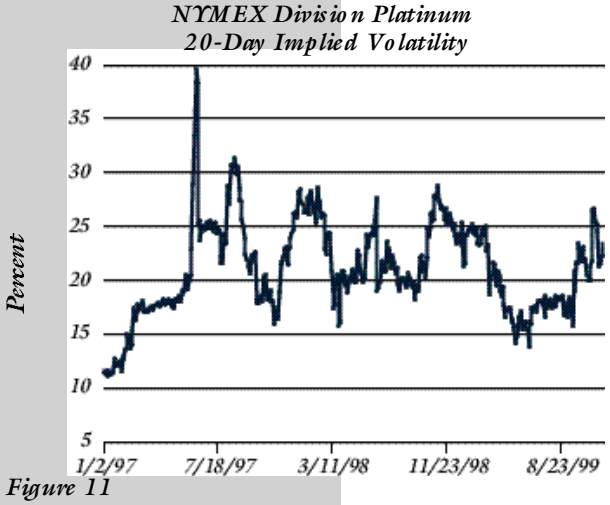

Figure 11

quickly are highly volatile: markets which move up or down only slowly are non-volatile, which is why volatility is an important factor in the pricing of options. As prices fluctuate more widely and frequently, the premiums for options on futures increase, since the probability of the option attaining intrinsic value or moving deeper into the money increases. If market volatility declines, premiums for puts and calls decline correspondingly.

Historical volatility will be calculated from the past movement of commodity futures prices over a specified time period. Technically, historical volatility is the annual standard deviation of the changes in the futures price, expressed in percentage terms. Or, to put it another way, 50% volatility, for example, means that there is a 68.3% chance (one standard deviation) that, a year from now, prices will be 50% higher or lower.

Historical volatility is useful because it provides a basis for anticipating future volatility, which is what options traders really want to know.

Implied volatility is also the most important aspect of options trading. Implied volatility reflects current sentiment of volatility as reflected by today's options price. It is the unknown embedded component in an options premium. Since the past is not necessarily a good forecaster of the future, at any point in time, implied volatility may be higher or lower than historical volatility.

Implied volatility is the key component to options pricing. It is, in fact, the only unknown in an option's pricing model. Given an option's market price and knowing the other variables in the pricing model — the futures price, the strike price, the time to expiration, and interest rates — the options pricing model is adjusted to derive the volatility implied by the option's price.

Interest Rates

Interest rates have a small bearing on options prices because they represent the profit or cost that could result from an alternate use of the funds used for the premium. The inter-

est rate of the 90-day U.S. Treasury bills is often used as a guide. In practice, though, isolating the effect of interest rates on futures options premiums is difficult, if not impossible. A change in interest rates influences the net present value calculation of a premium, the cost of buying and storing a commodity, and even the commodity's price. Most of the interest rate effect will already be incorporated in the futures price through the cost of carrying the physical commodity.

Hedging with Options

Options offer additional flexibility for hedging and investing. Calls can be purchased to "cap" prices, if the expectation is for rising prices. Conversely, a "floor" can be established by the purchase of puts if there is a likelihood of a market decline. Calls and puts can be combined in a single strategy to effectively put a "collar" on prices, limiting the upward and downward moves.

Example 8 – Purchasing a Call to "Cap" Rising Copper Prices

To guard against a copper price increase, a fabricator buys call options on COMEX Division copper futures.

With May and July copper trading at 84.5¢ and 85¢ per pound, respectively, the fabricator buys two 84¢-May calls at 2.5¢ per pound, and two 86¢-July calls at 2.6¢ per pound.

By April, spot copper has risen to 87.5¢ per pound and the May call to 4¢ per pound.

The fabricator sells his two May 84¢-calls and purchases 50,000 pounds of physical copper. When he is ready to close the balance of his position in June, copper is trading at 90¢ a pound and the July call is 4.4¢. He again liquidates his options and buys cash copper.

Cash Price	Futures Price	Option Premium
In January:		
	May copper 84.50¢	May options 2.50¢
	July copper 86¢	July options 2.60¢
In April:		
87.50¢		May options 4¢
In June:		
90¢		July options 4.40¢
Result: Average purchase price for copper, 87.10¢ (cash price less profit on options, or 88.75¢ - 1.65¢)		

In this instance, the fabricator pays only 87.1¢ a pound to acquire the physical copper, despite the fact that copper prices rose considerably. Had the price of copper fallen, the fabricator would have let the options expire without market value and purchased cash copper at lower prices.

Example 9 – Establishing a Price "Floor" by Buying Puts

On March 16, spot copper is trading at 90¢ per pound, but a copper producer is concerned that prices will be lower in December when he will have product to ship. Since December futures are trading at 75¢ per pound, the producer considers selling futures to lock in that price to guard against a decline. However, he fears that if the current supply tightness persists, prices could rise above that level since copper is in backwardation. He decides to use options instead of selling futures, buying a December put with a strike price of 70¢ for 3.0¢.

On December 1, the copper refiner sells spot copper and liquidates his options contract. The chart below illustrates the results if the spot price has decreased to 60¢ (Case A) or if it has increased to $1.10 (Case B).

	Case A Prices Decrease	Case B Prices Increase
Dec 1: Spot Price	60¢	$1.10
Dec 1: Futures	60¢	$1.10
Cash Market Revenue	60¢	$1.10
Less: Gain (Loss) on Options		
Sales Price, Dec 1	10¢	0
Purchase Price, Mar 16	3¢	3¢
Effective Option Revenue	7¢	(3¢)
Effective Copper Revenue	7¢	$1.07

Summary of Results: In Case A, the producer receives only 60¢ for his copper, but the financial offset provided by the 7¢ options profit gives him an effective selling price of 67¢ per pound (he paid 3¢ for the option, but sold it for 10¢). This is eight cents less than he would have received using futures alone to hedge, but the reason he chose to purchase the put is apparent in Case B.

If the price increases, the producer receives $1.10 from the spot market sale, but he would have lost 35¢ on the sale of the futures while the put option with the 70¢ strike price — the right to sell futures at 70¢ — now has no market value because futures are trading at $1.10. There is a net loss of 3¢ — the options premium paid — on the position, giving the producer an effective selling price of $1.07.

Example 10 – Selling an Out-of-the-Money Gold Call to Earn Income in a Stable Market

A central bank, with an inventory of gold that is not yielding a return, sells calls to generate income from what it believes will be a stable market.

Spot gold prices are $290 per ounce, and futures one year forward are priced at $301 per ounce, so the bank sells a call for one year forward with a strike price of $310, $9 over the market, for $3 per ounce.

As the contract month of the call becomes the spot month, the convergence of the contango of the gold market works in the bank's favor. Assuming there has been no change in the market, the spot price is still $290, and the call, sold with a higher strike price, is abandoned, leaving the bank to pocket the premium, generating income from a non-income producing asset.

If the market rises, however, to $313 (the strike price of the call plus the premium) or higher, the options contract will be exercised by the buyer, and the metal will be "called away."

The bank, therefore, also incurs the risk that it may be required to cover its obligation.

Example 11 – Hedging Against a Price Decline in a Potential High Volatility Market by Purchasing Out-of-the-Money Puts

On December 23, a copper producer considers hedging against a weakening market. He knows his cost of production is 65¢ a pound, and wants to protect the most margin at the least cost. He does not want to hedge with futures, which would effectively lock in a July futures price of 94¢ per pound, nor does he want to spend 6.5¢ per pound for a July at-the-money put. He does want to protect his profitability against a significant drop in the price to 80¢, so the producer decides to purchase a put with a strike price of 80¢ for which he pays a two-cent premium. He considers this to be the optimum cost-efficient price protection, while allowing participation in any favorable upward price move. The producer has decided to hedge against the markets becoming highly volatile by purchasing an out-of-the-money put.

If the market price drops sharply, he will net no less than 78¢ per pound (80¢ for the copper, less the two-cent premium for the option). If prices rise, the premium of the option is the cost of the price insurance; if the market goes to $1.20, the producer will realize $1.18 ($1.20-2¢).

Example 12 – Using a Collar to Protect a Price Level While Mitigating the Cost of the Hedge

Sometimes the cost of buying an option can be more expensive than a company's balance sheet requires. A collar strategy allows a hedger the opportunity to lower the cost of the hedge, while creating a beneficial revenue stream.

A copper producer's collar strategy involves the sale of a call, which is offset by the purchase of a put. The call and put both have out-of-the-money strike prices and expire in the same month. The producer would sell half as many calls as he would buy puts. That way, if copper futures prices rise, he would only be exposed on half of his tonnage; if the price drops, he can tender all of the tonnage.

With July futures prices at 94¢, for example, the producer is exposed to falling prices and needs to set a floor. The cost of the 86¢-put is 3.3¢ per pound. Rather than incur this expense, the company decides to sell out-of-the-money calls to generate revenue. The effect is to cap the upside potential while reducing the cost of downside insurance.

The risk manager decides to buy 100 puts with a strike price of 86¢ and sell 50 calls with a 100¢ strike price for a premium of 4.3¢ per pound. A collar of 86¢ to $1.00 is now set. The minimum he will receive for his production is 86¢, the maximum, $1.00. The financial effect is illustrated below:

	Case A Futures Fall to 80¢	**Case B Futures Stay at 94¢**	**Case C Futures Rise to $1.20**
Cost of 86¢ put (100 contracts) per pound	(3.30¢)	(3.30¢)	(3.30¢)
Net gain on sale of 100¢ call at premium of 4.3¢ per pound for 50 contracts	2.15¢	2.15¢	2.15¢
Cost of collar per pound	(1.15¢)	(1.15¢)	(1.15¢)
Market gain on puts (86¢-80¢) per pound	6¢	0	0
Market gain (loss) on short call position (100¢-94¢) on 50 lots	0	0	6¢
Net market gain on 50 lots of physical metal not covered by sale of call if market rises from 94¢ to 120¢	N/A	N/A	26¢
Average market gain total 100 lots (6¢ per pound on 50 lots, 26¢ per pound on 50 lots)			16¢
Effective selling price of copper	84.85¢	92.85¢	108.85¢

Summary of Results: In each case, the outright cost of the collar was $1.15 per pound; a premium paid for the put of 3.3¢, and a gain on the sale of the call of 4.3¢. However, because calls were sold on only half as many puts, the net gain was 2.15¢ per pound.

In Case A, the purchase of the put enabled the producer to gain 6¢ over the market price; when prices fell to 80¢, he was able to exercise his 100 puts and sell futures at 86¢, thus taking full advantage of the protection offered by the put. After subtracting the cost of the collar, the effective price of copper was 84.85¢ per pound. The 50 calls that he sold were deeply out-of-the-money, and thus were not exercised.

In Case B, futures prices remained stable, but the cost of the collar — the producer's cost of insurance — was $1.15 per pound, giving him an effective copper price of 92.85¢.

In Case C, the producer's exposure to copper prices above $1.00 through his short call position becomes apparent when futures prices rise to $1.20.

He gains 6¢ a pound on the rise of prices from 94¢ to $1.00 for the 50 lots covered by the short call. There is also a gain of 26¢ a pound on the 50 lots that are not covered by the short call, totaling 32¢, which is an average market gain of 16¢ per pound on 100 lots. The $1.15 cost of the collar yields a net gain of 14.85¢ per pound, for an effective copper price of $1.0885. Thus the collar allowed the producer to participate in the rising market, although some of the potential gain was given up because of his obligation under the short call and the cost of the collar itself.

Conclusion

The simple strategies outlined in this brochure are designed to illustrate the broad principles of commodity hedging. Commercial hedgers may adapt any particular strategy to reflect their particular market position or conditions particular to the markets for the underlying commodity. Numerous strategies involving options alone or in combination with futures can also be employed, which are outlined in the New York Mercantile Exchange *Options Strategies* brochure.

Exchange Information

24-Hour Market Information Services

The Exchange makes information available 24 hours a day through a telephone system which puts you in touch with vital information faster than ever.

A single telephone number (212) 299-2322, provides access to prices, trading volume, settlements, open interest information, and warehouse stocks for all COMEX Division futures and options contracts.

Information on the Exchange's platinum and palladium markets can be obtained by calling *Fastfacts*, the NYMEX Division information line, at (212) 301-4871.

You can also obtain similar information through the Exchange's website at www.nymex.com to find out more about the The site provides data including settlements, daily highs and lows, estimated volume, and daily price quotations. It also lists contract specifications, expiration dates, Exchange announcements, and holiday closings.

Price Histories

Price histories for all Exchange contracts are available on diskette. These include gold; silver; copper; aluminum; platinum; palladium; light, sweet crude oil; heating oil; unleaded gasoline; natural gas; electricity; propane; options on the heating oil/crude oil crack spread and the New York Harbor unleaded gasoline/crude oil crack spread; and the FTSE Eurotop 100® and FTSE Eurotop 300® indexes. To order, contact the Exchange public information office by phone at (212) 299-2318.

Quote Services

Current price information is disseminated by a large number of information service vendors. The Commodity Code Directory, published by the Exchange, lists the principal information service vendors and the retrieval codes for Exchange contracts. This information is also available on the Exchange's website.

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