

HEDGING COSTS:

Understanding and Minimizing

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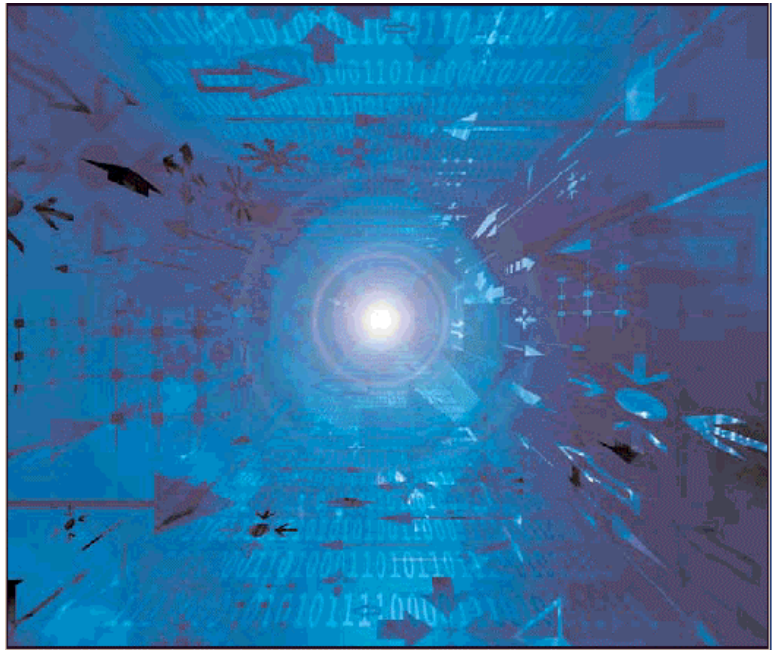


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HEDGING COSTS: UNDERSTANDING AND MINIMIZING

In the notoriously opaque commodity markets, there is a fundamental imbalance between market-makers and hedgers when it comes to market data and risk analytics. The impact is that many hedgers execute their risk management transactions at levels away from fair market value. The purpose of this paper is to illustrate how execution costs are determined, and to provide a framework to determine a fair execution cost. The examples in this paper use the Kiodex Risk Workbench® to demonstrate how to quantify



a fair versus an unfair cost associated with a given transaction.

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Components of Hedging Execution Costs

When a company implements an energy hedging program to minimize commodity price risk, the company needs to make a number of choices:

- What instrument should we use: swaps, collars, options, or a combination?
- What underlying location should we hedge against?
- How many months should we hedge?

Once the design of the hedge program is finalized, the company begins receiving transaction quotes from its counterparts, who will determine transaction cost using the following formula: Total transaction cost for the customer equals the dealer's cost of hedging, plus the dealer's economic premium (which is a combination of a service charge, liquidity premium and credit charge). The trading term used for transaction cost is *bid/offer spread*. The midpoint of a bid/offer spread is the dealer's cost of hedging. The dealer will *bid* to buy at a lower price than the cost of hedging and *offer* to sell at a higher price than the cost of hedging, thereby charging an economic premium for both transactions. In this paper, transaction costs and bid/offer spread will also be referred to as the *hedge execution cost*. This section examines the components of the hedge execution cost.

Cost of Hedging

Most commodity derivatives dealers are not interested in owning commodity price risk. Thus, when they enter into a transaction with a hedger, they frequently enter into offsetting transactions with one of their counterparts through a broker. For example, if a dealer quotes a price

at which he is prepared to sell a fixed-price swap, the dealer is also prepared to enter into an opposite transaction to buy a swap with similar terms. Entering into opposite transactions enables the dealer to hedge the commodity price risk associated with the first transaction in which he sells the fixed-price swap. The cost of entering into an opposite transaction is the dealer's *cost of hedging*.

Service Charge

Companies who offer hedging products to the market provide a valuable service for which they need to be compensated. This fee is similar to a brokerage fee, and is built into the quote once the dealer determines the cost of entering into an offsetting transaction. Dealers establish the fair market value or midpoint for a particular hedge transaction. They will offer to sell to the hedger at a spread over the midpoint, and bid to buy from the hedger at a spread below the midpoint. In other words, dealers *buy low and sell high*.

Liquidity Premium

With certain transactions, depending on market liquidity, the dealer may not be able immediately to enter into an offsetting position. For example, certain commodity locations, commodity types and deal structures are illiquid because there are no market participants engaged in related transactions. When such circumstances exist, the dealer cannot enter into a risk-minimizing, opposing transaction and therefore is required to keep an unhedged position on his books for an indeterminate time. Alternately, the dealer can hedge his position over a period of time, hedging small lots at a time so as not to dislocate an illiquid market with a larger transaction. In both of those cases, however, the dealer is generating inventory risk associated with owning an unhedged position. As such, the dealer only enters into a risk-generating transaction if

there is additional compensation in the form of a charge that can be considered a *liquidity premium*.

Credit Charge

Whereas the dealer can hedge commodity price risk, it is rare for the dealer to be able to hedge the credit risk of the hedger. In a typical transaction, the dealer engages in an opposite transaction with another dealer once a transaction is executed with a hedger. If the hedger defaults during the transaction period, and the hedger owes the dealer for the transaction at that point in time, the dealer incurs a loss of the mark-to-market value of the transaction plus transaction costs, less any recovery from the hedger in a bankruptcy proceeding. Dealers' credit departments minimize credit risk by: (1) evaluating the financial health of prospective customers; (2) requiring the hedger to post margin on the transaction when the value moves in the dealer's favor; and (3) requiring a letter of credit from a third party. Even with such risk mitigations, dealers typically maintain residual credit risk. In fact, dealers benefit when they extend credit, because they attract more customers. To compensate for the additional credit risk, dealers add an additional credit charge to their cost of hedging, service charge and liquidity premium. ■

Execution Cost Benchmarks and the Uneven Playing Field

Execution Cost Benchmarks

Given the dynamic interplay of hedging costs, service charges, liquidity premiums and credit charges for an individual transaction and customer, there is no constant fair value that applies to distinct instrument types, commodity locations, and customers. It is useful, however, to give approximate benchmarks for fair all-in hedge execution costs for broad categories of hedge

transactions. The benchmarks shown below are guidelines rather than precise calibrations. These estimates are an outcome of our experience in the commodity markets:

NYMEX Swaps	0.125% - 0.25% of notional
Basis Swaps	0.50%-1% of notional ~ (3-6 cents/MMBTU in gas)
OTC (NYMEX) Options	0.75% of notional (volume * premium)
NYMEX Collar	1-2 point volatility spread (between option sold and option bought)
Index Options	Up to 1.5-2 times the equivalent NYMEX options

If the hedge execution costs for a given transaction exceed these benchmarks, we advise further discussions with the dealer to ensure fair execution. There may be explanations for a higher hedge execution cost, such as credit risk and liquidity premiums.

Uneven Playing Field: Asymmetry in Access to Information and Analytical Tools

The cost benchmarks above are estimated market norms that allow a dealer to manage his operations profitably. Dealers, however, are able to generate excess returns over fair execution costs on account of information gaps, and analytic gaps.

An information gap exists because of the asymmetric information flow between the dealer and the hedger. This asymmetry is seen in over the-counter markets, which lack the published bids and offers of public exchanges. For example, without the Kiorex Risk Workbench®, the hedger does not know the market price of the IF TETCO M3 basis for the next 24 months. The dealer, however, does have access to such information, and can charge a premium for the hedger's lack of information. Accordingly, the dealer does not have an incentive to share market

information. That information gap can be expensive for the hedger.

An analytic gap arises from asymmetric analytic capabilities between the dealer and the hedger, including the ability to build sophisticated mathematical models, and to obtain volatility quotes to price option transactions. Dealers spend significant resources on a staff of Ph.D. holders to develop complex option models. Dealers also have tools to identify volatility surfaces, smiles, and skews, which cause the volatility of an option to vary with strike and expiration date. The advanced analysis available to dealers places the hedger at a disadvantage. As with the information gap described above, the dealer can take advantage of this analytic gap and charge the hedger an excessive execution cost.

The hedger can mitigate the information gap and the analytic gap by reviewing each transaction with multiple dealers and selecting the lowest possible price. Managers, however, have time constraints, relationships, and board-approved trading partners. In addition, dealers understand the hedger's information and analytic gaps. The drive to make excess profits causes all the dealers to show the excess charge to an uninformed hedger. Hedgers can always achieve value by removing the information and analytic barrier. The Kiodex Risk Workbench® gives the hedger market data and analytics that level the playing field. ■

Uncovering Dealer Margin Using the Kiodex Risk Workbench®

The best defense against paying an excessive execution cost is to have access to market data and analytics that allow the hedger to quantify the dealer margin. By using the Kiodex Risk Workbench®, the hedger not only reduces

the information and analytic gap, but also increases his negotiating power in executing the transaction. A hedger using the Kiodex Risk Workbench® can calculate the dealer margin, compare it to the benchmark, adjust it for peculiar market or credit conditions, and identify excess dealer margins.

The Kiodex Risk Workbench® provides pricing tools for a hedger to calculate the fair market value (also known as the *mid* or midpoint) of swaps, basis swaps, options, and collars. The hedger can then compare dealer quotes for the same swap, option, or collar, and calculate the execution cost that the dealer is charging for a given transaction. Finally, the hedger can compare the transaction charge with the benchmark.

Example of dealer margin discovery in a collar structure

Suppose that a producer of natural gas at NYMEX Henry Hub (NYM HH) wants to enter into a collar for zero upfront premium. Here are the details:

Term	November 2003 to March 2004
Commodity	Natural Gas
Location	NYMEX HH
Date of Transaction	September 30, 2003
NYM HH (Underlying)	\$5.0985/MMBTU
Manager's Put Option Strike	\$4.00/MMBTU
Dealer Offer for Call Strike	\$7.51/MMBTU

Kiodex Risk Workbench® Steps

Using the Asian Option Strategy pricing tool, here are the steps:

STEP 1. Price a costless collar with 0.00 volatility point spread

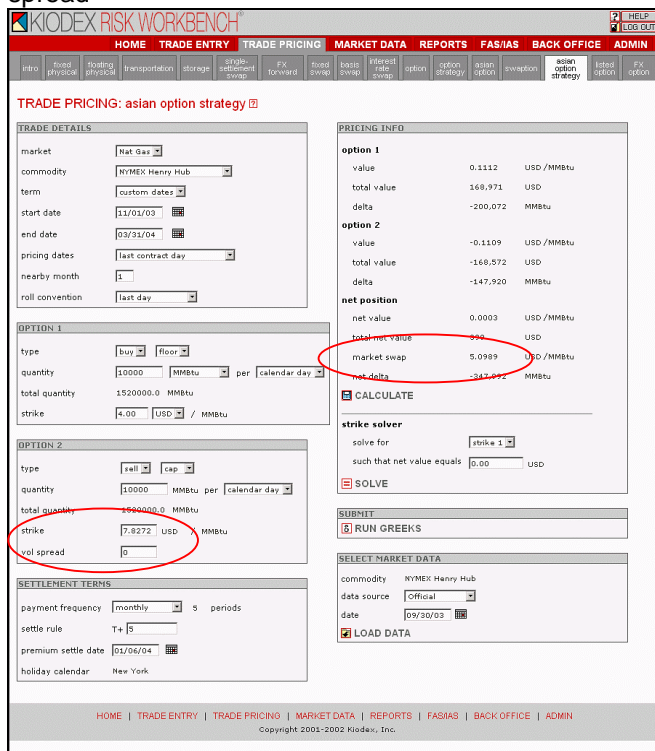


Figure 1: Costless Collar, zero volatility spread

STEP 2. Price the same costless collar with 1 volatility spread paid to the dealer (-1 volatility point spread)

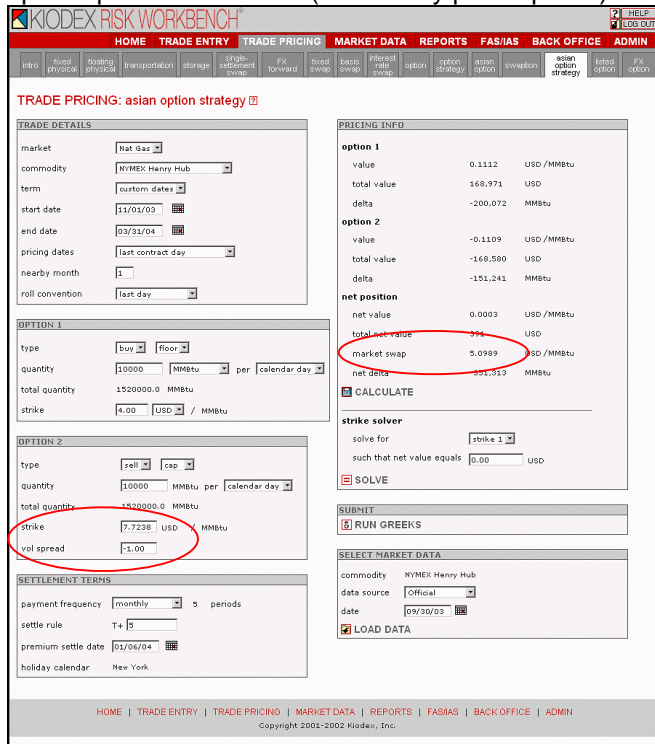


Figure 2: Costless Collar, negative volatility spread

FMV Call Strike (0 point volatility spread)	\$7.83 / MMBTU
Change in strike for each volatility point in the spread	\$0.09 / MMBTU
Dealer Implied Volatility Spread (Dealer Quote – FMV) / Delta Volatility Spread (above)	3.55 volatility points

The fair market value (“FMV Call Strike”) is calculated by assuming the dealer does not charge any execution cost for the transaction (a zero volatility spread). In other words, suppose that the dealer buys the call option from the hedge manager at the fair market value and sells the put option with the \$4.00 strike at the fair market value. In such a scenario, the dealer would set the call strike for a zero-premium collar \$7.83/MMBTU. The Kiodex Risk Workbench® can also calculate the call strike if the dealer were to charge a volatility spread as an execution cost. For each volatility point that the dealer charges, the Kiodex Risk Workbench® shows that the hedger lowers his call strike by 9 cents/MMBTU. Based on these two numbers and the dealer quote of \$7.51/MMBTU, it is easy to calculate that the dealer is charging 3.55 $\{(\$7.83 - \$7.51) / \$0.09\}$ volatility points in this transaction.

Having this information can be extremely valuable to the hedger. Assume that the producer is a BBB-rated company and there are no liquidity constraints in the Henry Hub market, and the hedger determines that a 1.75 volatility spread is a fair execution charge. Anything in excess of 1.75 volatility points spread is unfair, and must be negotiated down with the dealer. In such a scenario, the hedger will most likely execute this costless collar by selling a call strike at \$7.67/MMBTU, rather than the \$7.51/MMBTU originally offered by the dealer.

Tactics for Lower Execution Costs

First, a caveat: There is no guarantee that any particular tactic always results in superior execution. Ultimately, the market prevails. That said, there are three general tactics that signal to the market that the hedger is an educated, well-informed consumer of hedging instruments: Ask knowledgeable questions, increase the number of counterparts you use, and make your own market.

A. Ask Questions

A dealer cannot charge excess costs when he knows that there are no information and analytic gaps. Examples of good questions include:

1. What is the underlying price or forward curve used in your bid or offer?
2. What is your implied volatility for the period?
3. Why is your implied volatility greater than the implied volatility for a similar listed contract?
4. How are you calculating the cost of my credit risk?
5. Why is the price from my model so different from your quote?
6. What discount rate are you charging to calculate your quote?

B. Increase the Number of Hedging Counterparts

Having a wide variety of counterparts with whom to explore transactions increases the leverage of a risk manager against any given counterpart. The hedger must weight the ISDA agreements with multiple counterparts against the benefit of improved execution.

C. Make Your Own Market

Last, the hedger can lower the cost of execution by leaving firm orders to execute at a level that the hedger calculates. Instead of being a pure price-taker, the hedger communicates a trade that he is willing to transact now, and until a specific time in the future.

A well-informed and well-equipped hedger who has proper tools to price deals and calculate fair execution costs can show a firm order, good until canceled, or good until a fixed time and date, to his preferred and most reliable dealer.

For example, suppose a hedger is in the market for collars, and calculates with good analytics and data that a fairly priced collar has a call strike price of \$7.67/MMBTU and put strike of \$4.00/MMBTU. Armed with that information, and instead of shopping for the best quote, the hedger calls his preferred counterpart and leaves an order for his collar to be filled that those leads any time in the next hour.

If the dealer does not complete the transaction, the hedger may opt to show the order to another dealer. A dealer who knows that he can either lift the hedger's offer at \$7.67/MMBTU and make a small profit, or lose the order and make nothing, most likely prefers to make some money. Finally, the dealer prizes a firm order not only because it communicates information about the markets, but also because it represents a free option. The dealer can fill the order (that is, execute the free option) when the market moves in his favor, or when the order suits his business. ■

About the Author

Moazzam Khoja, CFA is a product specialist at KiodeX. He has worked for the past eight years in the energy risk management starting with Sithe Energies, Enron and Tractebel North America. His has experience in natural gas option trading, gas and power deal structuring, credit pricing, and credit derivatives trading. He obtained his MBA from the Columbia Business School in 1996 and his chartered financial analyst designation in 2003.