Hedging Made Easy:

A Guide for the Do-It-Yourselfer

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Most energy swaps are based on the New York Mercantile Exchange's first or second nearby futures contracts and are of 18 months duration or less. Contrary to popular belief, most swaps are not written long-term for cash market products that carry a high basis risk such as West Coast gasoline.

Also, very few swaps are matched between producers and consumers. Most hedgers on the sell side are smaller crude producers who want to hedge when prices are high and most buy-hedgers are product consumers who want to hedge when prices are low.

Thus almost all deals which are said to be "matched" or back-to-back ultimately end with a market maker who sooner or later hedges in the futures market.

Anyone who hedges with a swap provided by a third party will have to pay a margin to cover the market maker's overhead, his risk in taking their credit, and his risk in executing the deal. The minimum cost for hedging this way is about 5 cents per barrel and can run as high as 20 cents.

If you are thinking of hedging your oil exposure with a swap of 18 months duration or less, have the means to put up the margin required and you have, or can open an account with a futures broker, why not do it yourself?

This lets you save the swap dealer's profit, which can be substantial, and gives you greater control over your own business.

Of course, there is also the cost of overhead (manpower and computer time for example), which is either embedded in the dealer's price, or which you will have to absorb yourself.

What you will need is a calendar covering the duration of the hedge period, the expiration dates for the contracts in question, dates the exchange will be closed for holidays and an ordinary hand-held calculator. If you wish to price a hedge in real-time to get results in short order a spreadsheet program such as Lotus or Excel is advised.

For the sake of illustration, let's assume the following hedge is required:

Sell-hedge for Crude

Start date:	January 1, 1992
End date:	December 31, 1992
Contract:	NYMEX light sweet crude first nearby
Volumes:	1Q and 3Q= 100,000 barrels a month
	2Q and 4Q= 200,000 barrels a month
Total volume:	1.80 million barrels

1) The first step is to take out your calendar and cross off all weekends and all days during which the Exchange will be closed. If you are going out beyond dates for which these dates have been decided, simply assume that this year's holidays will be the same as next year's. If the Exchange's calendar changes by one or two days it will not make a great difference. (The Exchange makes available free a calendar of all energy futures and options expiration dates and Exchange holidays.)

2) Circle the expiration dates for each contract, then count how many days during the month each contract will be in effect. For example there are 22 trading days in January 1992. The February contract expires on January 21, so there are 14 days during which February is the first nearby and 8 days during which March is the first nearby. Note that if you wish to switch over to the next contract a number of days prior to expiration then simply move your deemed expiration day forward by that number of days.

3) Once you have completed step two, calculate the fraction that each contract constitutes of a given month's volume, and multiply to determine the number of contracts needed in a given month. Using the January example again, the number of February contracts is (14/22) X 100 = 64; the number of March contracts is (8/22) X 100 = 36. Continue this procedure until the number of contracts in each month is known. Don't forget, in the second and fourth quarters, the requirement will be 200,000 barrels, or 200 contracts, a month.

In this case we find:

Calendar Month	Number of Contracts	Contract Month
January	64	G2 (Feb 92)
	36	H2 (Mar 92)
February	68	H2 (Mar 92)
	32	J2 (Apr 92)
March	68	J2 (Apr 92)
	32	K2 (May 92)
April	133	K2 (May 92)
	67	M2 (Jun 92)
May	130	M2 (Jun 92)
	70	N2 (Jul 92)
June	145	N2 (Jul 92)
	55	Q2 (Aug 92)
July	64	Q2 (Aug 92)
	36	U2 (Sept 92)
August	67	U2 (Sept 92)
	33	V2 (Oct 92)
Sept.	71	V2 (Oct 92)
	29	X2 (Nov 92)
Oct.	127	X2 (Nov 92)
	73	Z2 (Dec 92)
Nov.	158	Z2 (Dec 92)
	42	F3 (Jan 93)
Dec	150	F3 (Jan 93)
	50	G3 (Feb 93)

4) Once the number of contracts needed for each month has been calculated, sum all the contracts so you know the total of each contract to be bought or sold for the hedge.

In this case we calculate the totals as 64 G2, 104 H2, 100 J2, 165 K2, 197 M2, 215 N2, 119 Q2, 103 U2, 104 V2, 156 X2, 231 Z2, 192 F3, 50 G3, for a grand total of 1,800 contracts, the equivalent of 1.80 million barrels.

5) Next call your broker and give him the volumes you wish to hedge in each given month. Have him get live bid and offer quotes from the floor; savvy traders never get quotes from just one side of the market in order to keep their intentions confidential from the floor.

Adjust the bids (in this case) as necessary to account for the volume you wish to hedge. High-volume orders could move the market in the back months, thus affecting the prices at which the deal is executed. The values shown under the Adjusted Floor Bid column are based on actual quotations on one day in late November. Multiply the bid on each contract by the fraction that contract constitutes of the hedge. As follows:

Contract	Ratio	Adj. Floor Bid	Portion of Price Contribution, $/bbl
G2	64/1800	$21.19	$0.7534
H2	104/1800	20.98	1.2121
J2	100/1800	20.84	1.1577
K2	165/1800	20.68	1.8957
M2	197/1800	20.62	2.2567
N2	215/1800	20.48	2.4462
Q2	119/1800	20.25	1.3387
U2	103/1800	20.11	1.1507
V2	104/1800	20.10	1.1613
X2	156/1800	20.03	1.7359
Z2	231/1800	19.75	2.5345
F3	192/1800	19.70	2.1013
G3	50/1800	19.68	0.5466

6) Next sum up all the values in the contribution column. This is the "raw" swap price. In our example this equates to $20.29 a barrel.

7) Now, you deduct from the raw swap price your estimated brokerage commissions and a small amount to account for the close-out of the contracts as the swap matures; assume about 3 cents per barrel. The equivalent swap price is $20.26.

8) The final step involves interest on cash flow. In the case we are evaluating, the market is in backwardation, with current prices higher than forward prices, and we assume that the rate of backwardation stays constant. Thus, since our hedge is a flat price, we would theoretically expect to pay cash to a third party swap provider during the portion of the deal when the market was above the average price and receive cash when below. A swap provider should credit the interest earned on the cash flow, or vice versa. If you do your swap yourself you can use your money for other purposes. (Figure 1).

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Figure 1	**Market Backwardated**	**Market in Contango**
Buy Hedge	negative cash flow	positive cash flow
Sell Hedge	positive cash flow	negative cash flow

Here's how to do the calculation:

Take the difference between the futures price and the hedge price for a given calendar month, less your 3 cents a barrel set aside for execution costs. Multiply by the number of contracts.

For example in January we have 64 G2 contracts at a difference of 90 cents and 36 H2 contracts at a difference of 69 cents. Thus we assume $82,440.00 would be due the swap provider at the end of the first month. At the end of February, assuming 9% per annum (compounded monthly to keep our calculations simple) the $82,440 is now worth $83,058.30.

At the end of February we have 68 H2 contracts at 69 cents difference and 32 J2 contracts at 55 cents difference equating to a payment to the provider of $64,520. At the

Crude Oil Futures Expiration Calendar 1992

JANUARY

S	M	T	W	T	F	S
			[1]	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	[21]	22	23	24	25
26	27	28	29	30	31	

FEBRUARY

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	[17]	18	19	[20]	21	22
23	24	25	26	27	28	29

MARCH

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	[20]	21
22	23	24	25	26	27	28
29	30	31				

APRIL

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	[17]	18
19	20	[21]	22	23	24	25
26	27	28	29	30		

MAY

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	[19]	20	21	22	23
24	[25]	26	27	28	29	30
31						

JUNE

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	[22]	23	24	25	26	27
28	29	30				

JULY

S	M	T	W	T	F	S
			1	2	[3]	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	[21]	22	23	24	25
26	27	28	29	30	31	

AUGUST

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	[20]	21	22
23	24	25	26	27	28	29
30	31					

SEPTEMBER

S	M	T	W	T	F	S
		1	2	3	4	5
6	[7]	8	9	10	11	12
13	14	15	16	17	18	19
20	21	[22]	23	24	25	26
27	28	29	30			

OCTOBER

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	[20]	21	22	23	24
25	26	27	28	29	30	31

NOVEMBER

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	[20]	21
22	23	24	25	[26]	[27]	28
29	30					

DECEMBER

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	[18]	19
20	21	22	23	[24]	[25]	26
27	28	29	30	31		

[ ] Exchange Holidays

[ ] Crude Oil Futures (Termination Day)

Note: The calculations for this article were made before the above calendar was finalized and assumed a December 21 termination date.

end of March the account is now worth $147,578.30.

Continuing this procedure through the year, we find a balance in our favor of $23,411.26 at the end of the deal, or about 1.3 cents per barrel.

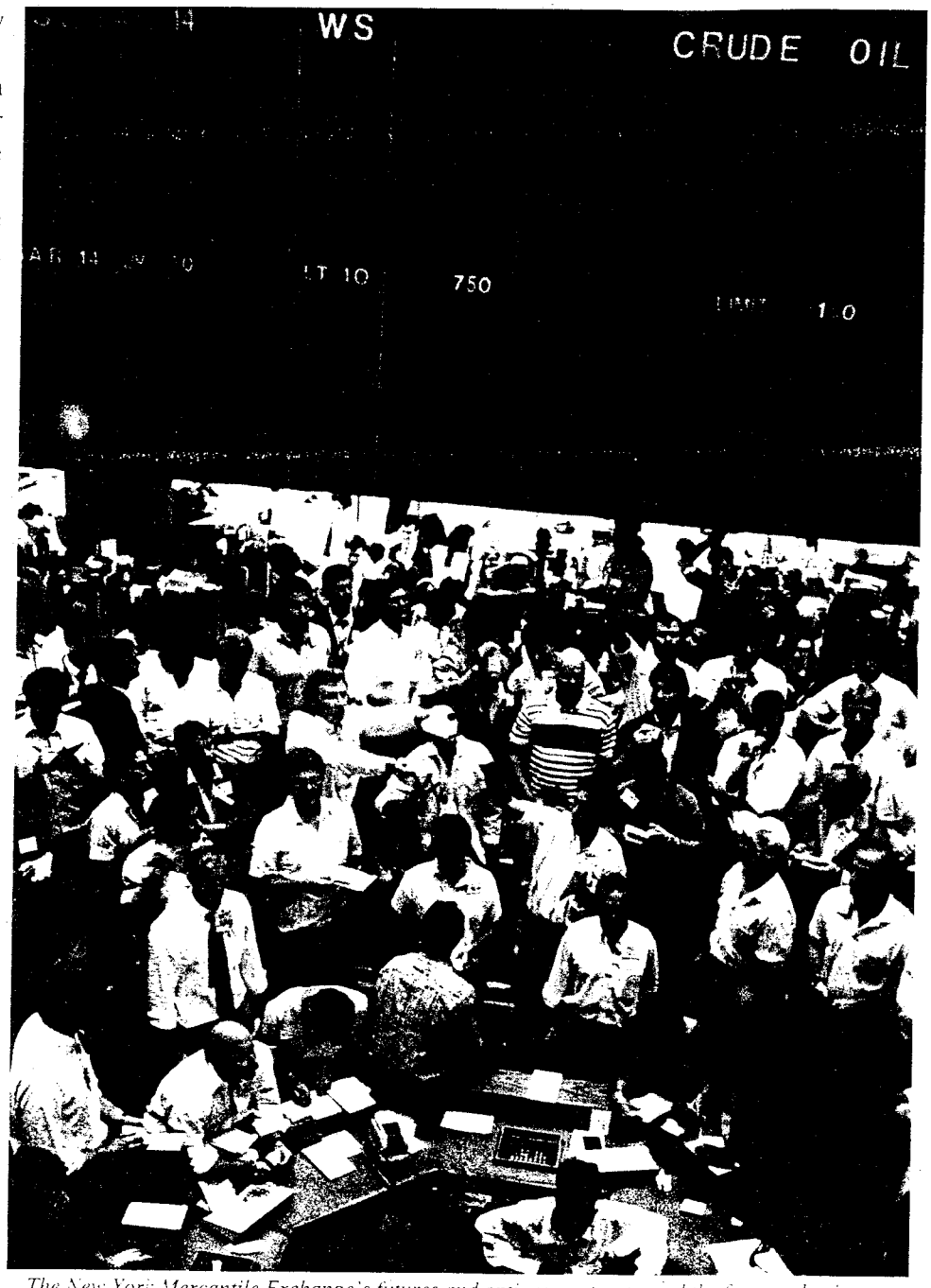
9) Calculate the final swap price by summing the raw swap price and interest factor. In reality since we are adjusting the swap price, the interest calculation will change slightly, but for our purposes the above procedure should suffice. (Remember if we had been buyers in the case above the interest would be a debit rather than a credit.) Thus our final equivalent swap price is roughly $20.28.

10) Once you have sold the appropriate number of contracts into the exchange adjust the above calculations based on the actual executions received. You will probably find if you have been conservative in your initial calculation (as most market makers will be) that you can execute the contracts at prices better than you assumed further enhancing the swap price you receive by doing it yourself.

Now all that's necessary is for you to unwind the swap by buying back your contracts on a pro-rata basis over the life of the swap. For example, you must buy back 64 February contracts over 14 days, or buy 4.57 contracts per day. Since the number of contracts to be purchased every day is uneven, you must keep track of the fractional imbalance from day to day. For example, if you bought five contracts the first day then the second day you would theoretically need to buy 4.14. If you then bought 4 contracts the second day, the third you would need to buy back 4.71 and so forth.

In most cases you will find you can improve your swap price further by good hedge management and executions.

In the case we have evaluated, even if the difference between your swap price and the market maker's price was only 10 cents per barrel, you would have saved $180,000 by doing it yourself!



Dana Duke

The New York Mercantile Exchange's futures and options contracts, and the free market in which they trade, offer opportunities to tailor risk management programs for the oil and natural gas industries and their customers.

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