



**ezHedge Collar Width Study and
Comparison to Dollar Cost Averaging**

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Introduction

Kase ezHedge is a consumer volume-averaging model that layers in fixed price hedges similar to dollar cost averaging (DCA). A DCA model hedges an even amount of volume over a designated period of time. This could be even-volume over weeks or months based upon the particular hedge program's approach. So, a DCA program captures the average market price for a given instrument over a given period of time. The difference between ezHedge and DCA is that ezHedge allows a hedger to layer into hedges in a more sophisticated manner that increases or decreases hedge volume depending on market conditions. This approach, based on an 18-month program, yields benefits about 3.6 times greater than the DCA model based on empirical evidence.

The table below summarizes the results of the 18-month programs as tested from December 1, 1991 to December 27, 2007, including open contracts. ezHedge over this period had higher total gains¹ and smaller total losses than DCA. The ezHedge cumulative gain, as stated earlier, is 3.6 times better than DCA. It also has 14% more winning hedges than DCA – with about two-thirds of the hedges beneficial versus about 50/50 for DCA.

Figure 1 – ezHedge versus Dollar Cost Averaging, \$ per mmbtu

Program	Total Losses	Total Gains	% Wins	Avg Win	Avg Loss	W/L Ratio	Cumulative Gain
ezHedge	(69.98)	172.30	66%	1.27	(0.99)	1.29	102.33
DCA	(82.50)	110.86	52%	1.02	(0.82)	1.25	28.36

While a DCA model averages out gains and losses over time, ezHedge maximizes gains, but also does not average out losses. So while ezHedge has a higher cumulative gain and lower net losses than DCA, in some years, losses were higher due to the higher variability of returns.

In an effort to continue to meet our clients' needs and add flexibility to the model based upon a users risk appetite, Kase examined the use of costless collars rather than simple swaps and futures. In doing so, the risks associated with the program are reduced. The study showed that when using collars, the ezHedge program still outperforms the DCA program, and that collars do cut down the risk of hedge costs.

Collars are still fixed price instruments, but rather than fixing a single price like a swap or futures contract, they fix a range of price by buying and selling options. A consumer costless collar consists of buying a call out-of-the-money (above the underlying price) and selling a put out-of-the-money (below the underlying price) that offsets the cost of the call. The deeper out-of-the-money the call is purchased the further out-of-the-money the put will have to be sold to evenly offset the cost. The deeper-out-of-the-money the put is sold the less risk the hedge takes. That said, the deeper out-of-the-money the call is purchased the less effective the hedge will be because it requires a larger price move to the upside for the hedge to go in-the-money and yield a benefit. So there is a balance to how far out-of-the-money a call should be purchased and a put sold.

The study examined the results from fixed price swaps (labeled as 0% collar width throughout the study) and collars with widths between +/- 5% and 50% of underlying prices on the day a hedge was triggered for the past 16 years. This means that if the underlying price was \$8.00 on a given

¹ The formal terms for losses or gains in a hedge program are costs and benefits. For simplicity these terms are used interchangeably in this report.

hedge day, and a 10% collar was used, a call was purchased at \$8.80 ($\$8.00 + (\$8.00 * 10\%) = \8.80) and a put was sold at \$7.20 ($\$8.00 - (\$8.00 * 10\%) = \7.20).

The study made the assumption that both the call and put were purchased and sold at even levels out-of-the-money. In reality, the call will probably be a bit further out-of-the-money than the put. The reason that this assumption was made was to simplify the testing process. The difference between the put to call spread was small enough that the assumption could be made for purposes of the study. For example, on February 1, 2008 the underlying price of April 2008 natural gas was \$7.775. An \$8.55 call (10% out-of-the-money or \$0.775) cost \$0.156. A put sold for \$0.156 had a strike price of \$7.15 and was only \$0.625 out-of-the-money. So there was a \$0.15 difference between the put and call.

The ezHedge settings as of December 27, 2007 were used for the tests. NYMEX settlement prices were used for both the ezHedge and DCA tests, and hedges were placed eighteen months forward for the second through nineteenth nearby. The DCA program purchased an even amount of volume each day for the same second through nineteenth nearby contracts. This gave the DCA program an exact average of market prices for the 18-month forward curve, commencing with the second nearby, over the rolling eighteen-month period.

The study examined how well both collared and non-collared ezHedge hedges performed versus the DCA program. The results of the study were judged by gains and losses measured in both dollars and percent of underlying price. Throughout this write up the dollar results are shown and discussed. The accompanying “ezHedge Collars Study.xls” workbook also shows the percent of underlying results for each test.

A comparison of the overall 16-year results for each test was made as well as a comparison of individual yearly results. This was done to show that ezHedge’s superior performance was not just the result of one or two good years. It also helped to show how wider collars decrease the risk, but also decrease the hedge gains because there are years that hedges did not yield any gains or losses when wider collars were used.

The main measurements that were compared were cumulative gains (CumG), max draw down (MDD) and the worst single year losses. Other statistics were examined, but these statistics showed the clearest difference between programs and collar widths.

Study Results

Figure 2 shows the results of each overall test. Individual year results can be found in the accompanying “ezHedge Collars Study.xls” workbook under the spreadsheet labeled “Yearly”. The results illustrate that as collars become wider the losses, translated into risk, become smaller, but so do the gains.

The test labeled “None” is the traditional ezHedge program that does not use collars, but rather just straight swaps and futures. The total losses were \$69.98 per mmBtu over a 16-year period and the total gains were \$172.30 per mmBtu. The single worst year loss for this program was \$30.60 in 2007. On the extreme other end of the test results, the 50% collar yielded no losses, but the total gain was only \$53.01 per mmBtu over 16-years. When looking at the 50% collar width yearly breakdown (begins at cell A1 in the Yearly worksheet) it can be seen that there are seven years that neither gained nor lost money. This means that for a company looking to mitigate volatility, for

many the purpose of hedging, there were years that the program failed to do so and the price of the company's gas would have floated with the market.

Figure 2 – ezHedge Historical Collar Width Study Results, \$ per mmBtu

Collar	MDD	ADD	Total Losses	Total Gains	Winning Months	Even Months	Losing Months	% Wins	Avg W	Avg L	W/L	CumG	Worst Year
50	0.00	0.00	0.00	53.01	41	171	0	100%	1.29	0.00	INF	53.01	0.00
45	0.00	0.00	0.00	59.35	50	162	0	100%	1.19	0.00	INF	59.35	0.00
40	(0.10)	(0.08)	(0.17)	67.21	59	150	3	95%	1.14	(0.06)	20.18	67.04	(0.07)
35	(1.45)	(0.58)	(1.74)	76.14	67	138	7	91%	1.14	(0.25)	4.57	74.40	(0.54)
30	(4.54)	(1.80)	(5.40)	85.92	73	125	14	84%	1.18	(0.39)	3.05	80.53	(1.95)
25	(9.75)	(3.89)	(11.66)	96.71	78	112	22	78%	1.24	(0.53)	2.34	85.05	(5.01)
20	(15.83)	(4.88)	(19.54)	108.10	85	96	31	73%	1.27	(0.63)	2.02	88.57	(9.07)
15	(22.53)	(7.19)	(28.77)	120.47	95	77	40	70%	1.27	(0.72)	1.76	91.70	(13.66)
10	(31.18)	(8.09)	(40.46)	135.52	110	55	47	70%	1.23	(0.86)	1.43	95.07	(19.30)
5	(40.71)	(7.59)	(53.33)	153.05	122	38	52	70%	1.25	(1.03)	1.22	99.72	(24.95)
None	(52.22)	(6.25)	(69.98)	172.30	136	5	71	66%	1.27	(0.99)	1.29	102.33	(30.60)
DCA	(50.84)	(8.08)	(82.50)	110.86	109	1	101	52%	1.02	(0.82)	1.25	28.36	(24.21)

Even a more realistic collar width, like +/-15%, cut down on the costs. The 15% collar yielded a benefit to the hedge program 70% of the time versus 66% of the time for the fixed price program. The total losses and gains for the 15% collar were \$28.77 and \$120.47. So in this case \$51.83 was given up in gains to reduce losses by \$41.21. The cumulative gain of the fixed price program is only \$10.63 better than the 15% collar program. For a company looking to mitigate volatility and take a more conservative approach, this would have been a great program to follow because the collars were still narrow enough that the prices never floated with the market in any single year (see results starting in cell A155 of Yearly spreadsheet), nor were the collars too narrow that large losses were taken.

The cumulative gain for all the ezHedge tests, with or without collars, outperformed the DCA program. The cumulative gain for DCA over the 16-year period was \$28.36, and ezHedge with no collar yielded a cumulative gain of \$102.33, 3.6 times that of DCA. Even the extremely wide collars at 45% had over two times the cumulative gains of the DCA program.

In nine of the 11 cases studied the largest single year loss was smaller than the DCA program. The two instances of ezHedge that had slightly higher single year losses were the fixed price program, and 5% collars. Each of these losses were in 2007 (see cells P200, P222 and P244 in the Yearly spreadsheet). However, the cumulative gains for the fixed price and 5% collar programs are 3.6 and 3.5 times greater than the DCA cumulative gains respectively. Both programs also had 14% and 18% better win percentages and lower average draw down (ADD) results versus DCA.

All of the ezHedge studies except the fixed price program had smaller MDD than DCA. It is also interesting to note that in all of the programs the ADD was better for ezHedge with and without collars except for 10% collars, which was about even with the DCA program.

Conclusions

To summarize, the DCA program dampens volatility but virtually breaks even over the longer term. ezHedge, regardless of collar width, outperforms the DCA program. As little as a +/- 10% collar

reduces losses to the same standard deviation level (0.90) (cells D11 and D14 of the Summary worksheet) and halves the losses, that is, cuts the losses in half compared with DCA.

For tests that had higher single year losses, the losses were more than made up for in cumulative gains, which were about 3.5 times that of the DCA program. The collar tests that drastically cut losses gave up some gains, but even then, still almost doubled the cumulative gains compared to the DCA program.

The study also proved that collars control the risk of hedge costs. A wide collar yields smaller or even no hedge cost at the expense of some hedge benefit. In some years the collar width was wide enough that the market floated inside the range of the collar. For some hedge programs this would defeat the purpose of locking in price to mitigate volatility, but for others, that view hedging as an insurance policy, the wide collars would have worked well.

The choice of collar width and use of collars at all, is dependent upon the risk appetite of the user. Aggressive hedgers that want to yield the most benefit from a program may not use collars at all, or very narrow 5% to 10% collars. They will experience larger hedge costs at times, but also benefit from much larger gains than conservative hedgers who might use a very wide collar. The conservative hedger would experience smaller hedge costs at the expense of greater hedge benefits.

To conclude, the use or width of collars is totally dependant upon the goals and risk appetite of a company's hedge program. However, whether or not collars are used, the results of this study have proved that ezHedge always outperforms a straight dollar cost averaging program.