SELLERS VS BUYERS: WHO WINS?
A STUDY OF CME OPTIONS EXPIRATION PATTERNS

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Introduction

Option traders rarely take into account a little known underlying fact of life about the nature of these derivative (options) markets. As the data in this study shows, most options expire out of the money, which means buyers lose on these trades. Given this option market reality, therefore, it would behoove serious option traders to consider developing a net option selling (writing) approach to trading in order to take advantage of this tendency. Many new traders believe that buying options is a quick way to make a lot of money.

Traders fail to see that time value decay makes buying strategies extremely difficult. Most options traders will lose their money – as is well known by those in the industry. To make money, traders must develop a solid risk management plan and know where all the pitfalls reside. But it takes years of trading to master these hidden booby traps. Even options writers are vulnerable to unknown and unpredictable events. There are no guarantees of profit even for the pros. If you plan to move forward in trading, please consult a professional about the risks.

This study analyzes data compiled by the Chicago Mercantile Exchange (CME) for a special options report prepared for this author's recently published book, *Options on Futures: New Trading Strategies* (John Wiley & Sons)

Three key patterns emerge from this study: (1) on average, three out of every four options held to expiration end up worthless; (2) the share of puts and calls that expired worthless is influenced by the primary trend of the underlying; and (3) option sellers still come out ahead even when the seller is going against the trend.

In addition to sifting through the findings of the CME report, this study also discusses the relevance of the data for trading options, and suggests that traders should develop a statistical edge by employing a net-selling approach to trading.

If you have any questions about this report, or would like to request additional information regarding option-selling strategies, call John Summa at 1-802-846-7509.

CME Data

In this report, we will look at five CME markets for options on futures. Based on a CME study of expiring and exercised options covering a period of three years (1997, 1998, 1999), an average of 76.5% of all options held to expiration at the Chicago Mercantile Exchange expired worthless (out of the money). The number remained consistent for the three-year period: 76.3%, 75.8% and 77.5% respectively, as shown in *Figure 1*. At this general level, therefore, we can conclude that for every option exercised in the money at expiration there were 3 options contracts that expired out of the money, and thus worthless, meaning option sellers had better odds than option buyers for positions held until expiration.

CME Grand Totals
% CME Exercised & Expired Worthless Options

Year	% Expired Worthless
1997	76.3%
1998	75.8%
1999	77.5%
3-Yr Avg.	**76.5%**

Figure 1 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

We present the data as options exercised versus those expiring worthless. *Figure 2* contains the actual numbers, showing that there were 20,003,138 expired (worthless) options and 6,131,438 exercised (in the money) options. Futures options that are in the money at expiration are automatically exercised. Therefore, we can derive total expired worthless options by subtracting those exercised from total options held to expiration. This leaves total expiring worthless, or out of the money. When we take a closer look at the data, we will be able to spot certain patterns; such as how a trend bias in the underlying affects the share of call options versus put options expiring worthless. Clearly, however, the overall pattern is that most options expired worthless.

CME Grand Totals
Total CME Exercised & Expired Worthless Call and Put Options

Year	Exercised	Expired Worthless
1997	2,082,282	6,752,321
1998	2,230,786	6,973,337
1999	1,818,370	6,277,480
Grand Total	**6,131,438**	**20,003,138**

Figure 2 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

The 3-year averages of exercised options (in the money) versus options expiring worthless (out of the money) for the markets examined below confirm what the overall findings just reviewed indicate – a bias in favor of option sellers. In *Figure 3*, the totals for exercised (in the money) and expiring worthless options for the S&P 500, NASDAQ 100, Eurodollar, Japanese Yen and Live Cattle are presented. For both puts and calls traded in each of these markets, options expiring worthless outnumbered those expiring in the money.

For example, if we take S&P 500 stock index futures options, a total of 2,739,573 put options expired worthless compared with just 177,741 that expired in the money.

Total Exercised/Expired Options Contracts (1997-1999)				
Futures Contract	**Total Exercised Call Options**	**Total Exercised Put Options**	**Total Expired Call Options**	**Total Expired Put Options**
S&P	587,729	177,741	843,414	2,739,573
NASDAQ 100	15,541	5,660	65,948	111,490
Eurodollar	1,378,928	1,041,841	4,301,125	4,178,247
Japanese Yen	160,132	255,606	668,265	530,654
Live Cattle	47,576	50,311	172,378	162,319

Figure 3 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

As for call options, a primary bull market trend helped buyers – who saw 843,414 call options expire worthless compared with 587,729 expiring in the money, clearly a much better performance by option buyers compared with put buyers. Eurodollars, meanwhile, had 4,178,247 put options expiring worthless, while 1,041,841 expired in the money. Eurodollar call buyers, however, did not do much better. A total of 4,301,125 call options expired worthless while just 1,378,928 ended up in the money, despite a favorable (i.e., bullish) trend. As the rest of the data in this study shows, even when trading with the primary trend, most buyers still ended up losing on positions held until expiration.

% Exercised/Expired Options Contracts (1997-1999)				
Futures Contract	**% Exercised Call Options**	**% Exercised Put Options**	**% Expired Call Options**	**% Expired Put Options**
S&P	41.1%	6.1%	58.9%	93.9%
NASDAQ 100	19.1%	4.8%	80.9%	95.2%
Eurodollar	24.3%	20.0%	75.7%	80.0%
Japanese Yen	19.3%	32.5%	80.7%	67.5%
Live Cattle	21.6%	23.7%	78.4%	76.3%
Average	**25.0%**	**17.4%**	**74.9%**	**82.6%**

Figure 4 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

Figure 4 presents the data in terms of percentages, which makes it a little easier to make comparisons. For the group as a whole, put options expiring worthless for the entire group had the highest percentage with 82.6% expiring out of the money. The percentage of call options expiring worthless, meanwhile, came to 74.9%. The put options percentage expiring worthless came in above the entire study average cited earlier (76.5% expired worthless of all the CME futures options) because the stock index options on futures (NASDAQ 100 and S&P 500) had very large numbers of put options expiring worthless, 95.2 % and 93.9% respectively. This bias in favor of put sellers, to which we turn below, can be attributed to the strong bullish bias of the stock indexes during this period, despite some sharp, but short-lived market declines. Data for 2001-2003, however, would no doubt show a shift toward more calls expiring worthless, reflecting the change to a primary bear market trend since early 2000.

Individual Markets

When we take a closer look at the individual markets, especially stock index futures options, it becomes quite clear how the primary trend in the underlying futures market affects the share of puts and calls expiring worthless. In spite of this pattern, though, both puts and calls expiring worthless easily outnumbered those expiring in the money. For example, looking at NASDAQ 100 options in *Figure 5*, remarkably, 82.6% of *all* call options and 96.1% of *all* put options expired worthless between 1997 and 1999.

The most bullish of the 3 years was 1999, as can be seen in *Figure 6.* The fourth quarter of 1999 witnessed the last, and most explosive, move higher by the NASDAQ 100 to over 4,000. Put option buyers were throwing their money away during 1999, as 98.3% of all put options in that year expired out of the money, as shown in *Figure 5*. Despite the bullish fault higher, however, call buyers still lost to sellers as 82.6% of all calls expired worthless that year.

% Exercised/Expired Options Contracts – NASDAQ 100				
NASDAQ 100 Options	**% Exercised Call Options**	**% Exercised Put Options**	**% Expired Call Options**	**% Expired Put Options**
1997	9.4%	6.8%	90.6%	93.2%
1998	26.2%	3.3%	73.1%	96.7%
1999	16.6%	1.7%	83.40%	98.3%
3-Yr. Avg.	**17.4%**	**3.9%**	**82.6%**	**96.1%**

Figure 5 – Source: CME "Exercised/Expired Recap For Expired Contract Report"

Clearly, buyers are on the losing side of most trades, as only 3.9% of all put options expired in the money, and 17.4% of the all calls expired worthless, as can be seen in Figure 5.

NASDAQ 100 Weekly Chart and 4-Week Moving Average Trend Line

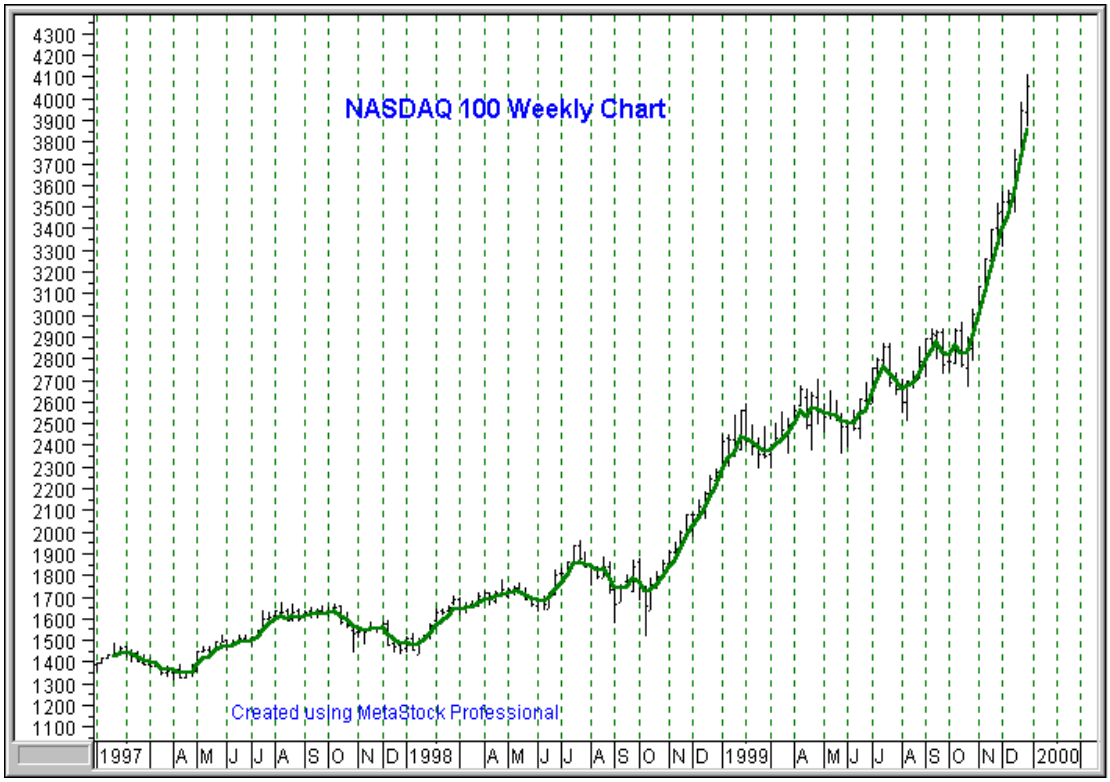

Figure 6 – Created using MetaStock Professional

In terms of absolute numbers, *Figure 7* shows worthless NASDAQ 100 options dwarfing the number of those exercised in the money at expiration, with 111,490 puts and 65, 928 calls expiring worthless compared to just 15,541 calls and 5,660 puts expiring in the money. This is a ratio of more than 19-to-1 puts expiring worthless versus those expiring in the money. For call options, the ratio is approximately 4-to-1 the number expiring worthless versus those expiring in the money.

Total Exercised/Expired Options Contracts – NASDAQ 100				
NASDAQ 100 Options	**Exercised Call Options**	**Exercised Put Options**	**Expired Call Options**	**Expired Put Options**
1997	1,866	4,259	18,099	58,438
1998	9,464	990	26,681	29,470
1999	4,211	411	21,168	23,582
Grand Total	**15,541**	**5,660**	**65,948**	**111,490**

Figure 7 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

It should be noted, furthermore, that these percentages might actually be understating the severity of bias in favor of sellers. Even if an option expires in the money, it may not be a

profitable trade, since the option needs to be in the money enough to cover the premium paid for the option, at which point it becomes profitable. At the same time, since sellers receive premium when they write an option, just because an option expires in the money it does not mean that they necessarily lose on the trade. For a call or put seller to lose, in other words, the option must expire in the money by more than the amount of premium received when opening the position.

If you sell an S&P 500 put option for 20 points, it must expire by more than 20 points in the money (i.e., below the strike price of the put), in order for the trade to be a loser. Therefore, the expiration data is actually understating the advantage writers have over buyers, since the data only reveals the number of options expiring worthless, not by *how much* in the money the options expired. Clearly, some of the exercised, in-the-money options, which we have been counted as winners for the buyers, are actually losers.

S&P 500 futures options

Turning to S&P 500 futures options, the second most active options group after Eurodollars (discussed below), a pattern can be seen similar to what was observed for options on NASDAQ 100 future. During the study period, as shown in *Figure 8*, there were a total of 2,739,573 put options expiring out of the money and 843,414 call options expiring worthless. Just 177,741 put options, meanwhile, were exercised in the money along with 587,729 call options.

Total Exercised/Expired Options Contracts – S&P 500				
S&P 500 Options	**Exercised Call Options**	**Exercised Put Options**	**Expired Call Options**	**Expired Put Options**
1997	237,231	66,786	287,532	1,068,606
1998	201,303	66,564	256,728	901,975
1999	149,195	44,391	299,154	768,992
Grand Total	**587,729**	**177,741**	**843,414**	**2,739,573**

Figure 8 – Source: CME "Exercised/Expired Recap For Expired Contract Report"

Figure 9 presents the breakdown in percentage terms; with 93.9% of all put options expiring worthless, but just 59.2% of all call options expiring out of the money, again due to the primary bull market trend, which leads many to buy puts as insurance, most of which expired worthless.

% Exercised/Expired Options Contracts – S&P 500				
S&P 500 Options	**% Exercised Call Options**	**% Exercised Put Options**	**% Expired Call Options**	**% Expired Put Options**
1997	45.2%	5.9%	54.8%	94.1%
1998	44.0%	6.9%	56.0%	93.1%
1999	33.3%	5.5%	66.7%	94.5%
3-Yr Avg.	**40.8%**	**6.1%**	**59.2%**	**93.9%**

Figure 9 – Source: CME "Exercised/Expired Recap For Expired Contract Report"

Just as with the NASDAQ 100, the highest percentage of expiring put options occurred in 1999, although it was only slightly higher than the two previous years. During 1997, for example, 94.1% of all put options expired worthless, while in 1998, 93.1% expired out of the money.

The strong bias toward put options expiring worthless can be attributed partially to the bullish bias of the underlying during these three years, as can be seen in *Figure 10*. Beginning in late 1998, the S&P 500 rallied sharply higher, pulling back toward the end of 1999, but resuming its upward bias going into 2000. It is worth noting that despite the sharp, but brief declines in the S&P 500 in October 1997, September/October 1998 and October/November 1999, put sellers held the upper hand.

Figure 10 is a weekly bar chart (bar) and 4-week moving average (bolded line), which shows the severity of these declines. Meanwhile, despite the bullishness that followed these sell-offs, call buyers still lost to sellers, and 1999 saw the worst performance of call buyers with 66.7% expiring worthless, up from 56% the previous year.

S&P 500 Weekly Chart and 4-Week Moving Average Trend Line

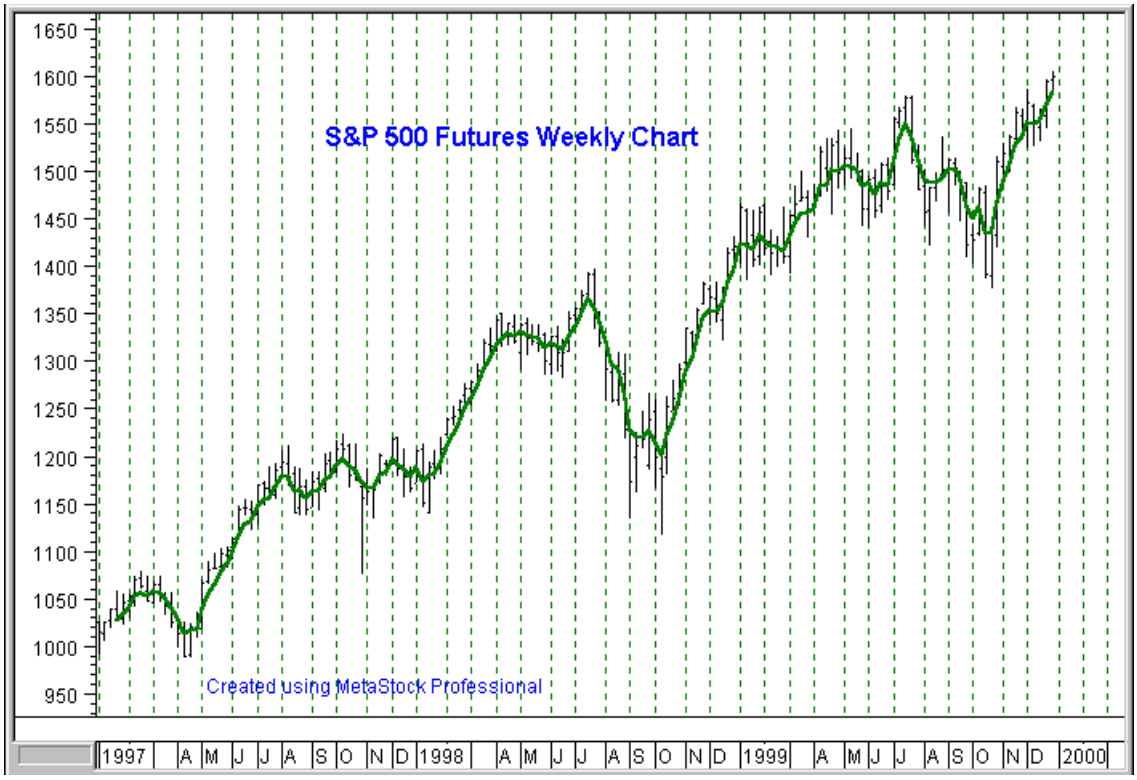

Figure 10 – Created using MetaStock Professional

Eurodollars

The most active options market is Eurodollars. As *Figure 11* reveals, 78.2% of all Eurodollar put options and 74% of all call options expired worthless. The total number of put options expiring worthless, shown in *Figure 12*, amounted to 4,178,247, while there were a total of 4,301,125 call options that expired out of the money.

Note that in 1999, there was a sharp drop in the percentage *and* number of put options expiring worthless. The percentage of puts expiring worthless in 1998 amounted to 91.8%, but this figure dropped to 58.4% in 1999, which can be attributed to the change in the primary trend to bearish for the Eurodollar market (see Figure 13). Meanwhile, there was a sharp increase in the percentage of calls expiring out of the money, going from 65.2 in 1998 to 90.2% in 1999.

% Exercised/Expired Options Contracts – Eurodollar				
Eurodollar Options	**% Exercised Call Options**	**% Exercised Put Options**	**% Expired Call Options**	**% Expired Put Options**
1997	33.4%	15.6%	66.6%	84.4%
1998	34.8%	8.2%	65.2%	91.8%
1999	9.8%	41.6%	90.2%	58.4%
Grand Total	**26%**	**21.8%**	**74%**	**78.2%**

Figure 11- Source: CME "Exercised/Expired Recap For Expired Contract Report"

As the market became bearish in 1999, the number of calls expiring in the money fell from 704,947 to 225,595. The percentage of calls expiring in the money, therefore, dropped from 34.8% to just 9.8%.

As *Figure 12* shows, only 834,033 puts expired worthless that year, down from 1,792,817, again reflecting the bearish trend of 1999. The other two years of the study period were bullish, which is reflected in the higher share of puts expiring worthless relative to calls.

Total Exercised/Expired Options Contracts – Eurodollar				
Eurodollar Options	**Exercised Call Options**	**Exercised Put Options**	**Expired Call Options**	**Expired Put Options**
1997	448,386	287,627	894,182	1,551,397
1998	704,947	160,587	1,322,163	1,792,817
1999	225,595	593,627	2,084,780	834,033
Grand Total	**1,378,928**	**1,041,841**	**4,301,125**	**4,178,247**

Figure 12- Source: CME "Exercised/Expired Recap For Expired Contract Report"

Eurodollar 100 Weekly Chart and 4-Week Moving Average Trend Line

Figure 13– Created using MetaStock Professional

Japanese Yen

The Japanese Yen suffered a major bear market throughout 1997 and the first half of 1998, before moving sharply higher. In 1997, just 50% of the puts expired worthless, but this number rose to 70% in 1998 as the bear market came to a sudden end with a major rally in the Yen, as seen in *Figure 16*.

As the Yen continued higher into late 1999, put sellers continued to enjoy the benefits, as the percentage of puts expiring worthless rose to 80.5%. Interestingly, however, call buyers still faced a tough market, as *Figure 14* shows.

% Exercised/Expired Options Contracts – Yen				
Yen Options	**% Exercised Call Options**	**% Exercised Put Options**	**% Expired Call Options**	**% Expired Put Options**
1997	14.2%	50.0%	85.8%	50.0%
1998	20.0%	30.0%	80.0%	70.0%
1999	28.0%	19.5%	72.0%	80.5%
3-Yr. Avg.	**20.7%**	**33.2%**	**79.2%**	**66.8%**

Figure 14 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

In 1997 85.8% of all calls held to expiration ended up worthless, but this number remained high despite the turn lower in the market in 1998. 80% of all calls expired

worthless in 1998, and 72% ended up out of the money in 1999 as the bull market continued.

The three-year average of puts expiring worthless came to 66.8%, but there were a greater percentage of calls expiring worthless, which totaled 79.2%. Overall, there were 530,654 puts and 668,265 calls that expired worthless during the study period.

Total Exercised/Expired Options Contracts – Yen				
Yen Options	**Exercised Call Options**	**Exercised Put Options**	**Expired Call Options**	**Expired Put Options**
1997	48,310	114,032	292,261	114,143
1998	62,306	93,575	248,279	218,187
1999	49,516	47,999	127,725	198,324
Grand Totals	**160,132**	**255,606**	**668,265**	**530,654**

Figure 15 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

Yen Weekly Chart and 4-Week Moving Average Trend Line

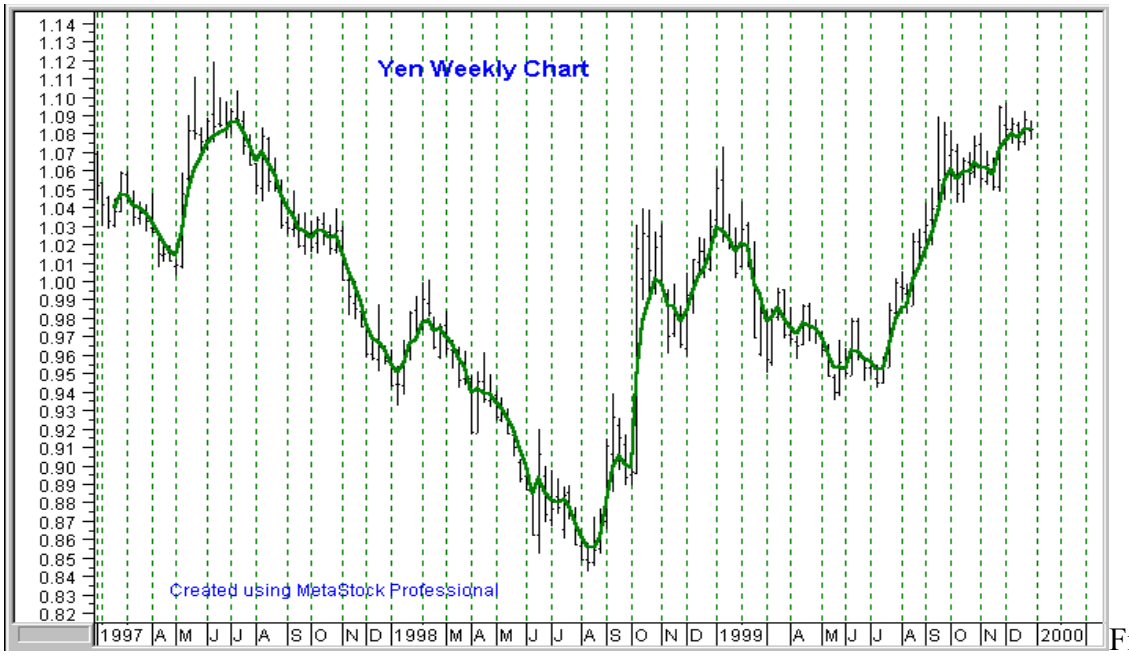

Figure 16 – Created using MetaStock Professional

Live Cattle

Looking at Live Cattle, our last market in this study, the same patterns observed in the other futures options markets again appear. In *Figure17,* for Live Cattle, during the study period a total of 76.7% of all call options expired worthless while 73.7% of all the puts ended up expiring out of the money. In 1999, however, a whopping 96% of all put options expired worthless, and in 1998 91% of all call options expired with no value for the buyer.

% Exercised/Expired Options Contracts – Live Cattle				
Live Cattle Options	**% Exercised Call Options**	**% Exercised Put Options**	**% Expired Call Options**	**% Expired Put Options**
1997	13%	20%	87%	80%
1998	9%	55%	91%	45%
1999	48%	4%	52%	96%
3-Yr. Avg.	**23.3%**	**26.3%**	**76.7%**	**73.7%**

Figure 17 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

Figure 18 contains the actual numbers, which shows that overall there were 162,319 puts expiring worthless compared with 50,311 that expired in the money. As for calls, the total number of calls expiring out of the money was 172,378 with 47,576 expiring with some value (in the money).

Total Exercised/Expired Options Contracts – Live Cattle				
Live Cattle Options	**Exercised Call Options**	**Exercised Put Options**	**Expired Call Options**	**Expired Put Options**
1997	9,041	12,785	60,864	51,923
1998	8,080	34,092	78,456	27,750
1999	30,455	3,434	33,058	82,646
Grand Totals	**47,576**	**50,311**	**172,378**	**162,319**

Figure 18 - Source: CME "Exercised/Expired Recap For Expired Contract Report"

Once again, the extremes noted above for 1998 (91% for calls) and 1999 (96% puts) of options expiring worthless can be attributed to the direction of the underlying market. *Figure 19* shows that during 1998, the trend was strongly bearish, and the following year just the reverse. This fits our pattern, since 91% of the calls in 1998 expired worthless (bearish year) as the market declined, and 96% of the puts ended up out of the money in 1999 (bullish year) as the market rallied. Clearly, put and call sellers had a trading edge going with the trend. Yet, remarkably, even going against the trend, sellers had an approximately 50% chance of winning on expiration (i.e., having the option expire out of the money). Of course, risk of loss for the seller here is much higher than in most of the other examples, and selling options can result in significant losses.

Live Cattle Weekly Chart and 4-Week Moving Average Trend Line

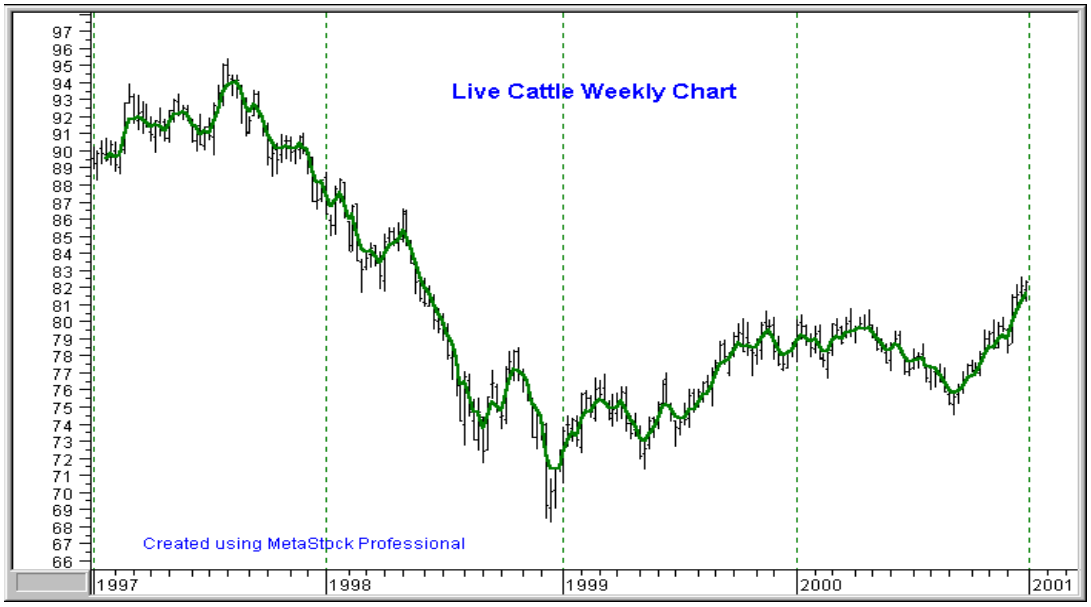

Figure 19 – Created using MetaStock Professional

Figure 18 shows that 48% of Live Cattle calls expired in the money in 1999 and 55% expired with some value in 1998. In other words, despite the strong trends apparent in *Figure 19*, buyers of call options had at best a 48% chance of winning in 1999 and a 55% chance of winning in 1999, assuming the options expired deep enough in the money to cover the cost of purchase of the option. Maximum loss for the buyer, of course, is limited to the purchase price of the option, where as for the seller losses can sometimes be unlimited depending on the type trade (i.e., naked versus covered writing).

Conclusion

Data presented in this study comes from a three-year report conducted by the CME of all options on futures traded on the exchange. While not the entire story, overall the data suggests that option sellers have an advantage in the form of a bias towards options expiring out of the money (worthless). We showed that if the option seller is trading with the trend of the underlying, this advantage increases substantially. Yet if the seller is wrong about the trend, this does not dramatically change the probability of success. The buyer, therefore, would appear to face a decided disadvantage relative to sellers. Even though we suggest that the data understates the case for selling because it does not tell us how many of the options that expired in the money were winning versus losing trades, the data should say enough to encourage you to think of developing selling strategies as your primary approach to trading options. Having said that, however, selling strategies can involve substantial risk (buyers, by definition, face limited losses), so it is important to practice strict money management and trade with risk capital only when deploying selling strategies.

There is risk of loss trading options and futures. Trade with risk capital only.