Choosing A Time Bar Length In Intraday Trading

by Cynthia Kase

Most intraday technical traders use charts based on hours or fractions of an hour. Most trading days, however, do not divide evenly into hours or conventional time fractions such as 30 or 45 minutes: For example, the crude oil market trades for 325 minutes, gasoline trades for 315 minutes and Eurodollars trade for 400 minutes. If you set your time length for 60 minutes, the last bar of the day will only represent a fraction of an hour rather than a full hour.

For periods longer than about 15 minutes, I suggest one of two methods: Either divide the number of minutes in a day into same-length bars, or divide the day into bar lengths such that the leftover bars cover the last five to 10 minutes of the day, thus giving the indicators a heavier weighting of the closing time period. You will need software that provides intraday charts in a variable-minute format.

I prefer to divide the day by a number from the Fibonacci† series or use time lengths that are Fibonacci numbers. My cycle analyses indicate that seven, nine and 12 minutes are appropriate for crude oil futures. Thus, if I want to use a bar length approximating an hour for crude oil, I will use 65 minutes (325 minutes divided into fifths). If I want to give extra weight to the close in my indicators I will use 63 or 64 minutes, giving me a five- or 10-minute bar at the end of the day, which will carry the same weight as the longer bars. If I wanted slightly shorter bars, I would use 55-minute bars (the 10th number in the Fibonacci series), or if I want a shorter day-end bar, 53 minutes.

Figures 1 and 2 graph the NYMEX June crude contract. Figure 1 shows a slow stochastic chart divided into six 55-minute bars on the top, while Figure 2 is essentially the same reduced to 53-minute bars, giving me six 53-minute bars and a seven-minute bar at the end of the day. I used a slow stochastic indicator with 34-period observa-

tions and with %K and %D each smoothed three times. Although the differences are slight, the 53-minute stochastic in Figure 2 leads the 55-minute stochastic in Figure 1, allowing earlier trading signals. See, as an example, the breakdown below the 75% mark on April 17, 1991.

> **If you cannot find a suitable contract for the smallest time bar you are comfortable trading, look at alternative markets or sit out of the market until volatility settles back down.**

Figure 3 shows a 65-minute (five even bars per day) directional movement index (DMI) with an ADX line, and Figure 4 a similar 63-minute chart with a 10-minute bar at the end of the day. The fractional chart shows much cleaner envelopes and a faster-reacting ADX line. An example is the bearish envelope starting on April 18. The lower chart envelope opens much more definitively and the ADX line evens out and starts to rise, both of which would be more clearly supportive of a short position.

For time periods shorter than about 15 minutes, the impact of having a short end bar is reduced, as the bars are fairly short anyway. So simply choose one of the numbers mentioned above. Another advantage to this method is that many traders use five-, 10- and 15-minute bars. Using three-, nine- or 13-minute bars will give you a little lead time to enter trades before the crowd.

CHECKING FOR MINIMUM VOLATILITY

For a time frame to be tradeable, it must have enough volatility for you to make money but not so much that you will risk too much in doing so. The next step is to calculate the average true range of the market.

A 55-MINUTE BAR CHART OF JUNE CRUDE OIL FUTURES

CLM1 55m H= 2125 L= 2105 C= 2110 + 24

FIGURE 1, part b

SLOW STOCHASTICS OSCILLATOR

CLM1 55m SST0 H= 2125 L= 2105 C= 2117 + 23   46   42
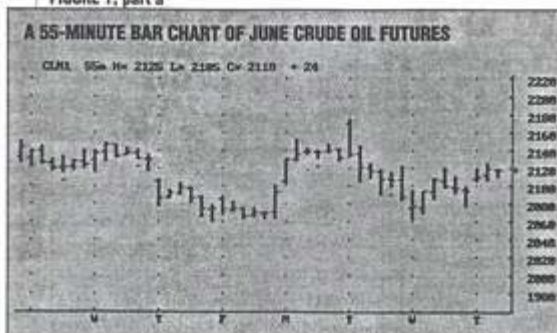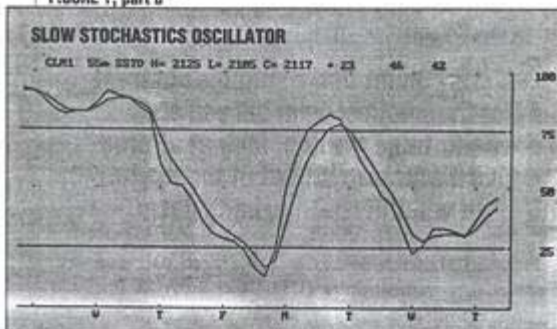

Figures 1b and 2b use a slow stochastics indicator with 34-period observations and with %K and %D each smoothed three times. Selecting the 55-minute bar produces a chart with six bars an hour.
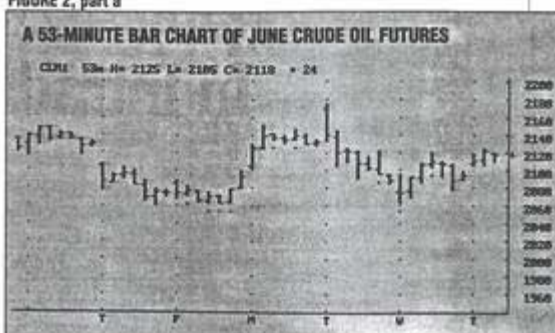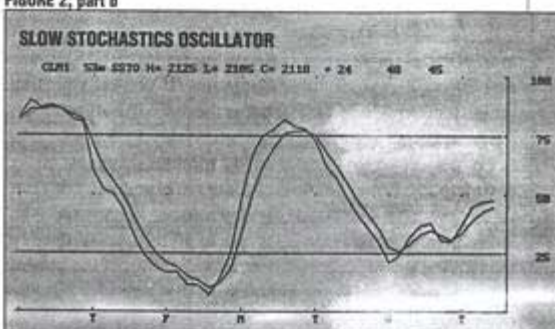
FIGURE 2, part a

A 53-MINUTE BAR CHART OF JUNE CRUDE OIL FUTURES

CLM1 53m H= 2125 L= 2105 C= 2110 + 24

FIGURE 2, part b

SLOW STOCHASTICS OSCILLATOR

CLM1 53m SST0 H= 2125 L= 2105 C= 2110 + 24   48   45

Reducing the bar length to 53 minutes produces six bars plus a residual seven-minute bar representing the closing activity for the day. This additional bar highlights the importance of the close for the stochastics indicator, improving its lead time.

True range is found by determining the largest of the current bar's high minus low, high minus previous close or lower minus previous close. The values are an absolute basis averaged over *n* bars. For *n*, multiply the number by two that you would use for a slow moving average or slow stochastic (about a cycle length's worth of bars). In practice, you can keep tabs on what the true range is simply by roughly estimating the high versus low range.

T hen calculate the average price move between ticks. I call this the tick value. In crude oil, the market I follow most, the average runs between 1 and 1.5 cents per tick in a normal market. During the Gulf crisis this level got up to about 6 cents per tick. The average true range you are trading should be about 2.5 times this number, plus your round-turn brokerage commission. So, for example, if you were paying $20 per round turn to an oil futures broker, that is about equal to 2 cents per barrel. Thus, in a normal market I make sure that the minimum true range I follow is about 4.5 cents per time bar. During the war in the Persian Gulf and the months preceding it, this value rose to about 17. If you don't have direct access to the exchange floor, you may want to multiply the tick value by a larger factor.

RISKS AND ASSUMPTIONS

The last step is to see whether the market is too risky for you. If we make a very general assumption that the actual true ranges of individual bars fall into a standard deviation pattern, then if the price moves against a profitable position roughly 2.5 times the average true range, then we can say that chances are very good that the move was not random market noise but significant. Although in practice it is quite a bit more profitable to exit trades on technical signals (such as momentum-divergence), it is a good idea to use a trailing stop just in case such an exit is missed. So on average we must assume a risk of about 2.5 times the true range to trade a particular market.

If the risk level is too high, then you can reduce your time bar size or trade a less volatile (for example, the second nearby instead of the first nearby) contract. If you cannot find a suitable contract for the smallest time bar you are comfortable trading, look at alternative markets or sit out of the market until volatility settles back down. Time bar lengths can make all the difference.

Cynthia Kase, (212) 310-3990 or (718) 727-2214, manages commodity risk for Chemical Bank and is developing a computer intraday trading model for commodities.

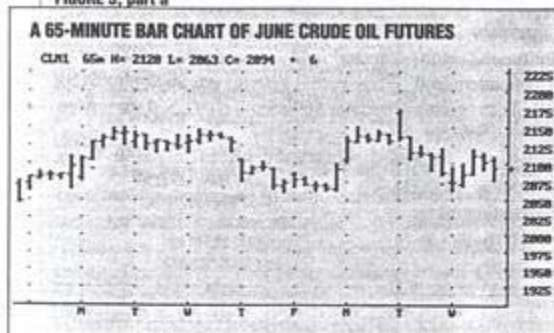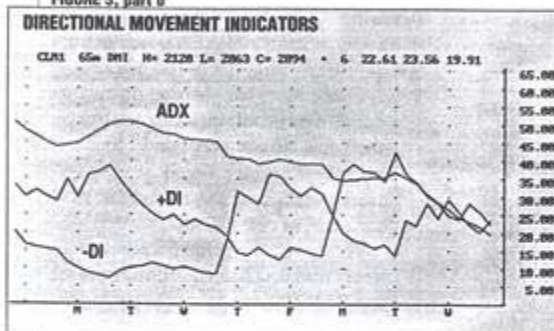## A 65-MINUTE BAR CHART OF JUNE CRUDE OIL FUTURES

CLR1 65m H= 2128 L= 2863 C= 2894 * 6

63-MINUTE BAR CHART OF JUNE CRUDE OIL FUTURES

CLR1 63m H= 2128 L= 2863 C= 2894 * 6

DIRECTIONAL MOVEMENT INDICATORS

CLR1 65m DMI H= 2128 L= 2863 C= 2894 * 6 22.61 23.56 19.91

DIRECTIONAL MOVEMENT INDICATORS

CLR1 63m DMI H= 2128 L= 2863 C= 2894 * 6 28.63 24.18 19.85

A 65-minute chart divides the day's bars into even periods. The lower chart is the ADX (indicator of trend intensity), +Directional Movement Index and -Directional Movement Index. A falling ADX line indicates that the market is showing less trend intensity. Sell signals are generated when the - DI line rises above the +DI line. Buy signals occur when the +DI line rises above the -DI line.
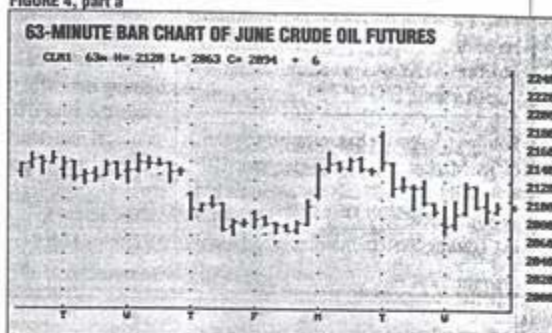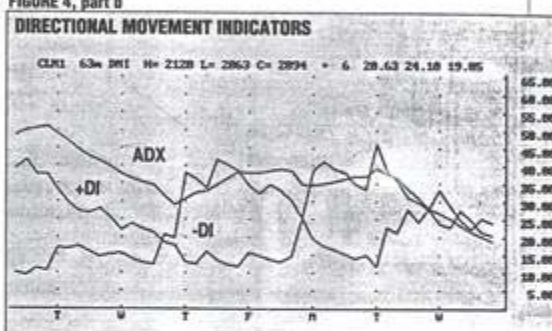
A 63-minute bar chart produces five bars plus a 10-minute residual bar for the day. This additional bar emphasizes the close for the day, thus increasing the sensitivity of the ADX indicator to the short-term trends. A nine-day period is used for the directional movement indicators in both Figures 3b and 4b.

August Trading Days

Following are events in August that could affect trading.

1	NAPM survey	21	2- and 5-year Treasury note announcement; Treasury statement
2	Leading indicators; unemployment		
5	Treasury stripping report	22	Last trading day for gilt, Bund options (LIFFE)
7	Beige book; consumer credit	23	Last trading day for Treasury bond, 10-, 5- and 2-year note options (CBOT); T-bill options (IOM); US bond options (LIFFE)
9	Last trading day for currency options (IOM); producer price index		
	SIMEX closed		Delivery day for gilt, Bund options (LIFFE)
13	Retail sales		Advanced durable goods
14	Manufacturers sales and inventories; consumer price index	24	Expiration day for T-bond, 10-, 5- and 2-year note options (CBOT)
15	Housing starts	26	LIFFE closed
16	Last trading day for S&P options (IOM); cash currency options (PHLX); merchandise trade; industrial production; 1-year Treasury bill announcement; Philadelphia Fed survey	27	Delivery day for US bond options (LIFFE)
		28	Corporate profits; GNP
		29	Personal income; single-family home sales
		30	Expiration day for JGB options (TSE)
17	Settlement day for cash Treasury options—long bonds (CBOE)		Leading indicators; factory orders; Chicago Purchase Manager Survey
19	Last trading day for currency futures (IMM)		CME closes at noon
20	FOMC meeting		

Source: Discount Corporation