

Home On The (Trading) Range (Bars)

Trading Range Bars

There are different ways to chart price movements. Here we look at range bars and how they help identify the underlying trend.

by Suri Duddella

Bar charts, candlestick charts, and line charts are the most popular when it comes to charting, but what about range bars? Range bars are a unique way of building price charts and are excellent in finding the underlying trend and movement of the current bar. Since each bar on the chart has the same range (high to low), it reduces the volatility and noise within the range of the bar.

Range bars are generated continuously as a new tick is formed outside the minimum price range. They are closely related to point & figure or renko charts, which are also based on equal price range change. The range bar chart is a study of pure price movement, and time is not taken into consideration while plotting the price action. Range bar movement is not time-dependent but does depend on price movement when a preset range of a price bar is complete; hence, the time axis (x-axis) on a range bar chart is irrelevant.

When range bars are constructed, chart dependency on the time scale (x-axis) has been removed as it produces its own price scale on the y-axis. This helps remove gaps and produce clear levels of support & resistance. Range bars also work with other trend indicators, all instruments, and all time frame trading. Range bar charts are great for observing active market activity and are helpful in identifying support & resistance lines, buy/sell signals, and trendlines.

In Figure 1 you see a five-minute chart of the e-mini Russell 2000 (ER2) with two-point range bars. The chart shows fewer bars than the regular five-minute bar chart while displaying key resistance & support levels.



The range bar chart is a study of pure price movement.



FIGURE 1: FIVE-MINUTE CHART OF THE E-MINI RUSSELL 2000 WITH TWO-POINT RANGE BARS. There are fewer bars on this chart than there would have been on the similar bar chart. Also, note there are clear support & resistance levels.

RANGE BAR CHART VS. BAR CHART

In Figure 2 you see a range bar chart compared to a bar chart of the ER2. On a five-minute bar chart, each day would consist of 81 bars during regular trading hours. The range bar chart each day would produce 20 to 35 range bars. This reduced number will give you an advantage when it comes to trading. Since you are looking at fewer bars with low intrabar noise, your decision process will become quicker.

HISTORY OF RANGE BARS

The origin of range bars seems to be controversial. An article in 2003 noted that a number of authors claimed to have invented range bars or variations of it (see “Related reading”). Actually, few charting packages have used range bars in their native form. I devised range bars for TradeStation and implemented a few useful indicators, and here, I present some studies and observations from my own trading using range bars.

ADVANTAGES

When you are constructing range bars, the range of the bar (high to low) is held constant while price is moved (on the y-axis) through the passage of time. Here’s an example. Assume you are constructing a one-point range bar on a one-minute chart. If the market moves from 790–791.20, 791.20–790.40, 790.40–791.10, 790.30–791, and 791–790.60 in five one-minute bars, only one range bar will be created from 790 to 791, since all five one-minute bars trade within a one-point range.

In consolidation ranges or narrow price ranges, the number of range bars will be minimal while they eliminate choppiness. Range bars have the potential of showing the actual underlying trend strength as they produce a single bar by combining a series of price bars.

In Figure 3 you see a one-minute chart of the ER2 with two-point range bars. The bottom chart shows a bar chart on the one-minute chart. ER2 made the low of 773.20 on January 9, 2007, around 12:15 pm and reversed its trend to close at around 784 by the end of

HOW TO CONSTRUCT RANGE BARS

- Every bar must have the same constant range.
- A new range bar is created when a tick closes outside of the range (high/low) of previous bar.
- The new bar’s open becomes the previous bar’s close. Each bar has its own time period.
- In the case of gaps or multiple ranges in the current time frame, *ghost* or *phantom* bars are created to fill the range. If the current range bar size is one point and the market opens three and a half points higher (gap) on the following trading day, there will be three phantom bars created from the previous range bar close to fill the gap.



FIGURE 2: RANGE BAR VS. BAR CHART. Here you can clearly see that the bar chart has far more bars than the range bar chart. Because of the fewer number of bars there is a lot less noise, making it easier to determine when to place a trade.

day (shaded area). Note there are fewer bars on the range bar chart of two-point ranges than the bar chart. Further, the consolidation around 12:40 pm to 1:15 pm was eliminated.

WHAT IS THE BEST PRICE RANGE?

The best range of a price bar depends on the market instrument and time frame traded. It would require experience and knowledge of the charts and markets to pick the best range. I don’t believe there is an empirical formula for finding the best range of a bar; some may use a comfortable range like five ticks in ER2 or 10 points in the mini-Dow contracts (YM) for



FIGURE 3: ONE-MINUTE CHART OF THE ER2 WITH TWO-POINT RANGE BARS. Note the low at 773.20 on January 9, 2007. In the shaded area on both charts, prices rallied to close at approximately 784 by the end of the trading day. In the range bar the consolidations and noise were eliminated, making it a simple charting type.

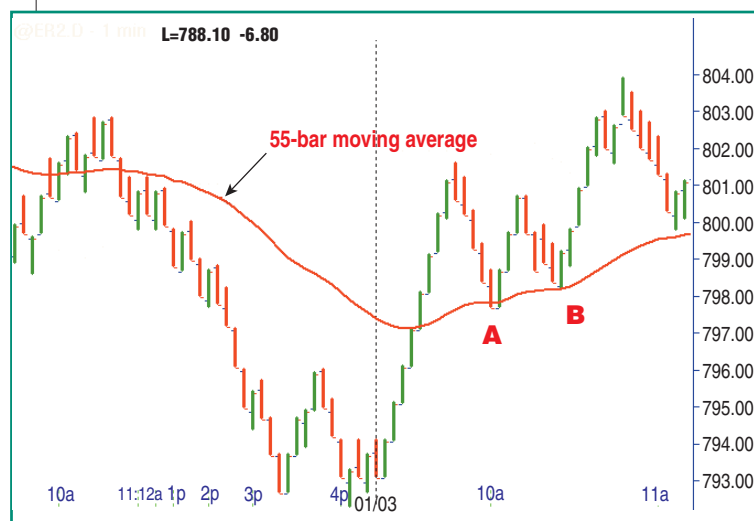


FIGURE 4: ONE-MINUTE CHART OF ER2 WITH ONE-POINT RANGE BARS. A 55-period moving average is applied to the range bars to catch trends. At points A and B, areas where prices bounced off, you can see how the moving average acted as a support level.



FIGURE 5: DAILY CHART OF ER2 WITH SEVEN-POINT RANGE BARS. Here you see how the 55-period MA acts as a strong support level at points A and B.

the minimum on an intraday chart. Here are some guidelines.

One of the best ways to find the range of the bar is to compute the average range size of the chart for the past three days and use a multiple of it. For example, in the ER2 chart, the typical average range of one-minute bars for the past three days is 0.5 to 0.7. The average of five-minute bars for the past three days is about 0.8 to 1.0 point.

Another way is to use the opening range of five minutes on the one-minute chart and trade the opening range breakouts and breakdowns. Some experienced traders follow their instincts and pick a range that shows reversals at key turning points. A visual inspection of charts for perfect reversals in range bars could point to a harmonic size of the bar. For the ER2, I find the following bar sizes to be harmonic: 0.6 in the one-minute chart, 1.2 in the five-minute, 2.1 in the 30-minute, and five to seven points in the daily. The bar ranges can be tailored for other market instruments.

TRADING RANGE BARS

As with any technical analysis indicator, range bars are not the holy grail. However, they are better than conventional bar charts or candlestick charts, as they clearly eliminate the noise and construct a smooth underlying trend. This is because they produce far fewer bars in a trading session compared to candlesticks or bar charts. In my experience, using range bars with a combination of other technical indicators produces superior results.

Range bars are also prone to whipsaws and could be erroneous during fast-moving markets or gaps. But a careful study and understanding of range bar movements could help you be on the right side of the trades. In my trading, range bars have helped me identify the trends using some simple indicators like moving averages, Bollinger Bands, and key reversal bar patterns. I will discuss a few setups, which I have found to be helpful. These include the following:

- Moving averages and range bar action
- Range bars with Bollinger Bands
- Two-bar reversal pattern
- Range bars in Keltner/Bollinger Band squeeze setup

RANGE BARS WITH MOVING AVERAGES

Many traders use moving averages (MAs) on the charts for trading signals. Traders use moving averages to find trends, support & resistance levels, and crossover systems to trigger their trades. Trading MA crossovers may not be the best solution for all trading since they produce lag effects and are prone to whipsaws. But since range bar charts are designed with less volatile data (managed data), they may be a workable solution for moving average systems. Some of the key moving averages when applied to range

bars produce impressive results that indicate trends as they bounce off key moving averages like the 21-period, 55-period, and 200-period MAs more regularly than other moving averages.

I implement moving averages to spot the support & resistance levels. Range bars with moving averages perform well for intraday trading on all time frames including one-minute, five-minute, and 30-minute charts.

Figure 4 displays a one-minute chart of the emini Russell 2000 (ER2) with one-point range bars. A 55-period moving average is applied to catch trends. Points A and B illustrate areas where prices bounced off the support level at the 55-period MA. This type of visual trading allows intraday traders to be more confident of their trading, whether trading stocks or futures.

In Figure 5 you see the daily chart of the ER2 with seven-point range bars. A 55-period moving average is applied to

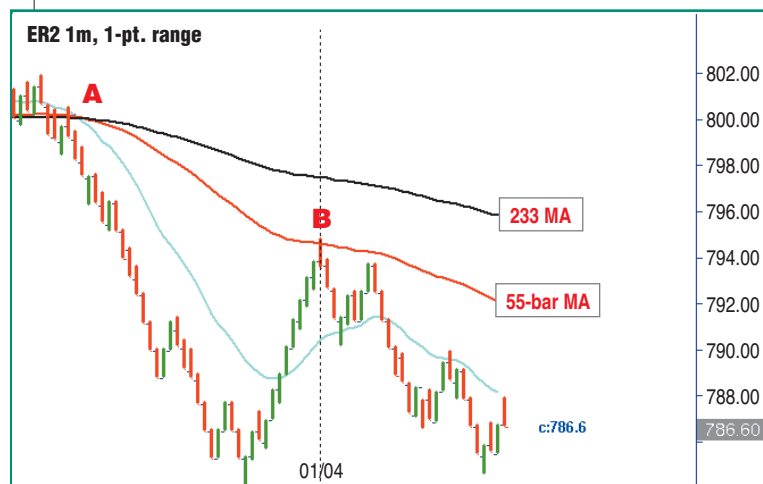


FIGURE 6: ONE-MINUTE CHART OF THE ER2 WITH ONE-POINT RANGE BARS. In a downtrending market, the 55-period MA acts as a strong resistance level. This helps determine where to enter short.

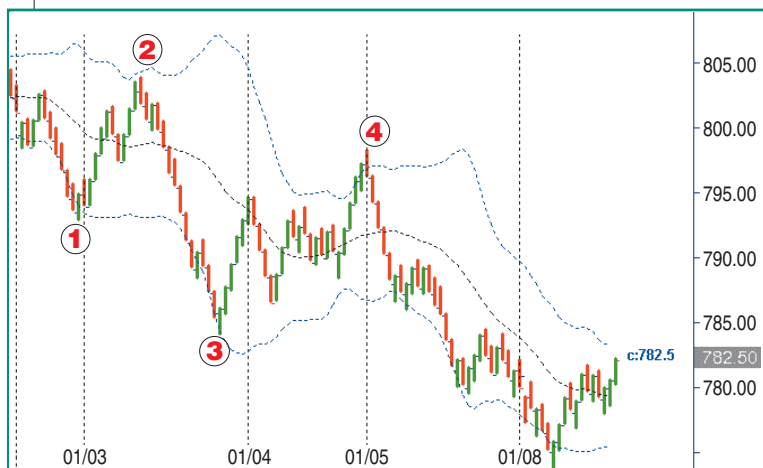


FIGURE 7: RANGE BARS AND BOLLINGER BANDS. Here you see a one-point range with 21-period, two standard deviation Bollinger Bands. A single bar closes outside the Bollinger Bands, signaling an extreme and the possibility of the end of the trend.

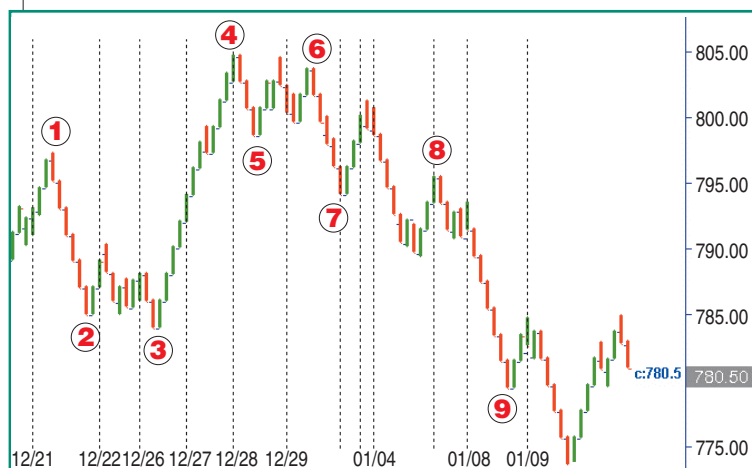


FIGURE 8: TWO-BAR REVERSAL PATTERNS IN RANGE BARS. Two-bar reversals are signaled when the close is near the Bollinger Band followed by a reversal bar. When a new bar is generated from the previous bar's range in the opposite direction, a reversal is likely.

catch trends. Points A and B illustrate areas where prices bounced off the 55-period moving average support level.

In Figure 6 a one-minute chart of the ER2 with one-point range bars can be seen; 55-period and 233-period moving averages are applied to catch the trends. Points A and B illustrate key resistance levels.

RANGE BARS AND BOLLINGER BANDS

Bollinger Bands use standard deviation measures to produce a band around the mean of price distribution. They exhibit an underlying trend and show a bandlike structure of constriction and expansion as they move through price changes. Typically, these bands constrict during lower-volatility or sideways markets and expand during higher-volatility markets. Historically, these bands produce buy and sell signals near the boundaries using price bars or candlesticks. Used with range bars, Bollinger Bands produce a more useful effect as the underlying data is filtered and used in its trend format. Hence, range bar-based Bollinger Bands are more effective at signaling trends.

Many trade setups are possible using Bollinger Bands such as trend changes at key support & resistance levels and constriction of bands to signal volatility changes.

Figure 7 illustrates a five-minute range bar chart of ER2 with a one-point range and Bollinger Bands (21-periods, two standard deviations). Single-bar closes outside the Bollinger Bands signal a potential extreme range and caution for the end of the trend.

TWO-BAR REVERSALS

In most markets, major trend changes occur during the extreme ranges. Major trend reversals often follow price reversal bars near or outside the extreme bands. In an uptrending market, price reaches or breaks through the upper Bollinger Band to suggest a strong trend. When a bar closes below the bar that broke above the upper band, a reversal is signaled. This signals a two-bar reversal pattern in Bollinger Bands. This condition also signals reversals in downtrending markets when the price reaches the lower Bollinger Band and a two-bar reversal pattern is generated.

Figure 8 shows various two-bar reversal patterns in range bars. Two-bar reversals are signaled when the price closes near the Bollinger Band, followed by a reversal bar. When a new bar is generated from a previous bar's range in the opposite direction, the trend may be signaling a reversal.

KELTNER/BOLLINGER BAND SQUEEZE SETUP

Bollinger Bands are great at detecting low-volatility or sideways markets since they contract around the mean of the price. Keltner channels are produced using a moving average offset by average true range (ATR),

which is another measure of volatility. Keltner channels indicate an uptrend when trading above the upper band and downtrend when trading below the lower band.

The study of Keltner channels along with Bollinger Bands gives insight to the potential market expansion from lulls or sideways periods. During quiet periods, Bollinger Bands produce narrow bands and trade inside the Keltner channels, suggesting lower volatility. When Bollinger Bands expand outside the Keltner channels, they suggest volatility expansion to the breakout side. The use of range bars to compute these indicators are excellent, as they are produced with far less noise and choppiness to suggest a clear trend, while Bollinger expansions on the breakouts of Keltner channels produce a viable signal to take a trade in the direction of expansion.

Figure 9 shows a range bar chart of 1.8 points with Bollinger Bands (21-period, two standard deviations) and Keltner channels (21-period, 1.5 standard deviations). Point 1 shows where Bollinger Bands contract and trade inside the Keltner channels suggesting lower volatility. Once the market picks a direction and expands its direction, Bollinger Bands trade outside the Keltner channels in the direction of the channel breakout. At point 1, the direction of the trade is to the downside. Point 2 shows the Bollinger Band squeeze inside the Keltner channels. An expansion outside of the Keltner channels gives a signal of a breakout, which in this case was at around 791.

Figure 10 shows a Bollinger/Keltner channel squeeze setup. When the Bollinger Bands trade inside the Keltner channels, look for a breakout/breakdown from the bands. At point 1 the squeeze gave a signal for a breakdown to enter a short trade.

PROFIT FROM THE RANGE

Using probabilities in your favor is the premise of trading. Knowing and understanding where a trend has a high probability of continuation or reversal, and executing a trade to take advantage of that knowledge, gives a trader an edge. Many traders have implemented various strategies, pattern recognition techniques, and various chart types. But constant range bars provide a different dimension for trading and provide an uncanny advantage of filtering underlying noise to determine trends or reversal of trends, and hence, range bars should be part of any trader's arsenal. Their discovery has significantly improved many traders' outlook, and I think it could influence some of the best strategies and indicators in the future.

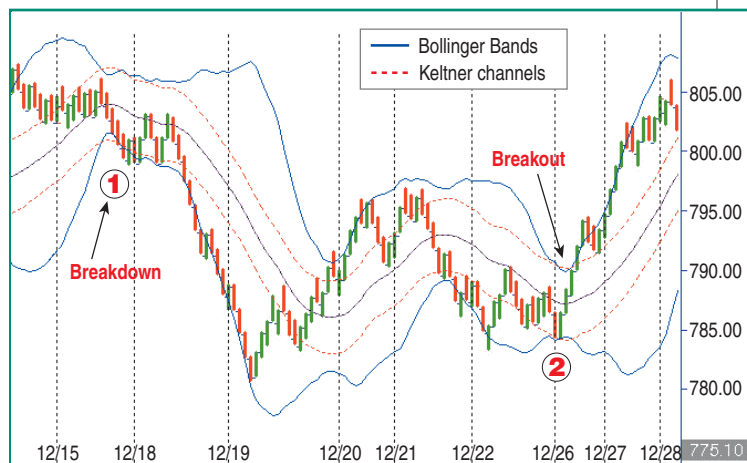


FIGURE 9: RANGE BAR OF 1.8-POINT RANGE WITH BOLLINGER BANDS AND KELTNER CHANNELS. At point 1 the Bollinger Bands contract inside the Keltner channels. At point 2 the Bollinger Bands squeeze within the Keltner channels and expand outside of them when prices break out around 791.

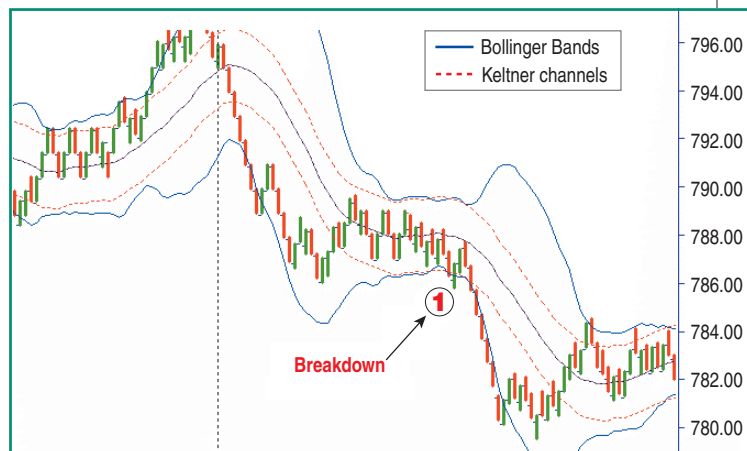


FIGURE 10: BOLLINGER/KELTNER CHANNEL SQUEEZE SETUP. When the Bollinger Bands trade within the Keltner channels, look for a breakout/breakdown from the bands. At point 1, the squeeze gave a signal for a breakdown, which was an ideal place to enter a short trade.

Suri Duddella is a private trader who has been trading in the futures, equities, and forex markets full time for the past 12 years using his proprietary models and methods. For more on his research, visit his website at www.suriNotes.com.

RELATED READING

MacRae, Desmond [2003]. "Momentum Bars: The Sequel — The New World Of Technical Analysis And Parallel Invention," *SFO*, April.

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