ECONOMIC ROADBLOCKS FOR THE YEN p. 6

Strategies, analysis, and news for FX traders

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Time-adjusted range and volume

By adjusting intraday volume and range data to the time of day, the "Marney Indicators" help highlight a market's unique characteristics and trade opportunities.

BY CASPAR MARNEY

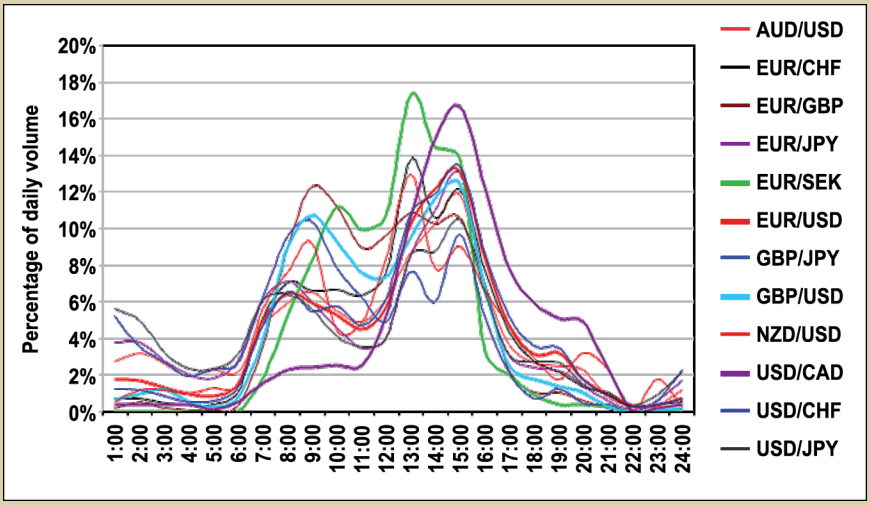
"Exploiting currencies with time and volume" (*Currency Trader*, December 2009) discussed the commonality of currency markets — how the actual volume throughout a 24-hour trading day correlates significantly to average hourly ranges, and most importantly, how those patterns are very predictable, exhibiting a significant degree of "stationarity" (Figure 1).

Although identifying the optimal times of day to trade is extremely valuable, real-time analysis of a market is potentially *in*valuable. Unfortunately, because the forex market is so fragmented it is almost impossible to get an accurate real-time measure of all the volume occurring at any given moment. However, historical analysis shows there is a very high correlation between the number of price updates ("tick updates") per unit of time and the volume traded per unit of time.

Tick updates are easily quantified and can be plotted in real time, and because many forex data vendors now capture tick updates, currency volume can be plotted in real time by using tick updates as a proxy. Although most tick update databases date back only to the recent past (making any statistically meaningful analysis difficult), Zurich-based Olsen Data (www.olsendata.com) has been capturing tick updates since 1986, making their database an invaluable research tool.

The two indicators that will be described here — the Marney Volume Indicator (MVI) and the Marney Range Indicator (MRI) — are designed to determine the unique volume and range profiles of individual currency markets in real time. They will be illustrated using this data, imported into the MultiCharts analysis platform.

FIGURE 1: VOLUME (%) ANALYSIS BY CURRENCY PAIR



Despite the wide range of currency pairs and native trading sessions, volume profiles are very similar.

Providing context for volume and range

The MVI and MRI time-adjust average volume and true range data, respectively, throughout the day. The indicators take each hour of the day (for example, 8:00 to 9:00 a.m.) and then calculate the average volume or true range for that hour over the past *n* days. This gives you a measurement of whether the current volume or range is larger or smaller than is typical for that specific time period.

The MVI and MRI are shown in the following charts using hourly price data and tick-volume proxy updates, but they can also be plotted using higher-frequency data or actual volume, if available.

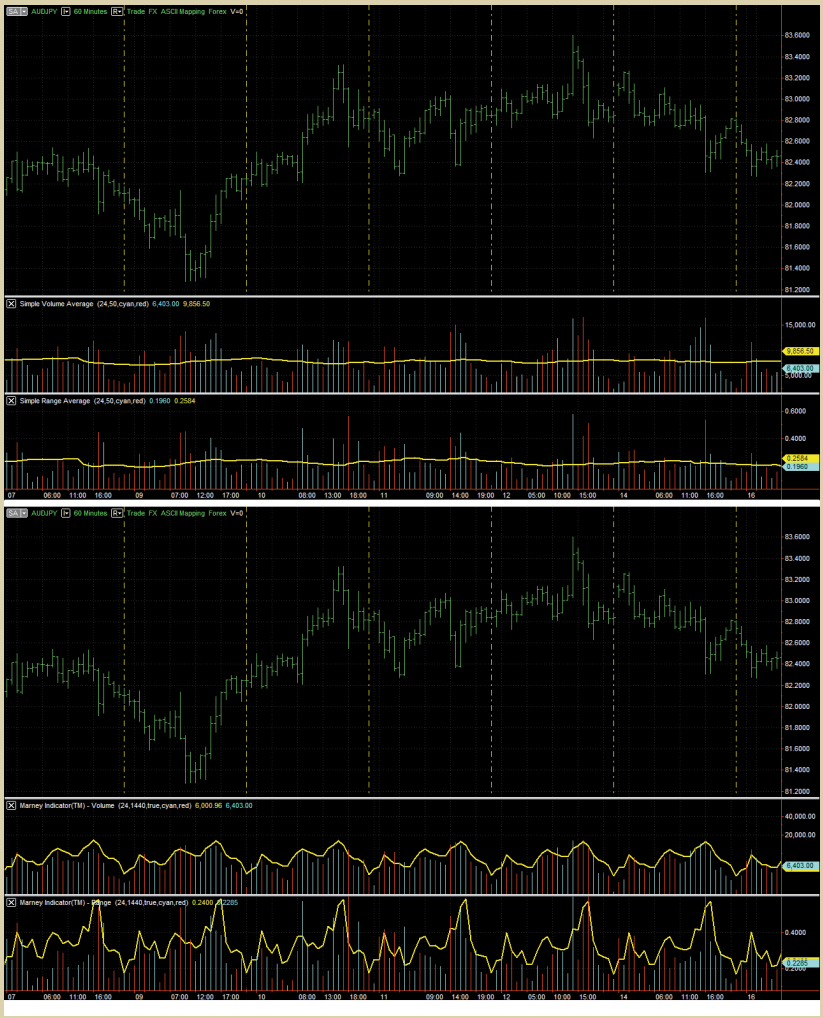
Figure 2 compares 24-period simple moving averages (SMAs) of the hourly range and volume data (top) to 24-period MVI and MRI (bottom) in the Australian dollar/Japanese yen (AUD/JPY) pair. The histogram bars represent the hourly volumes and ranges, with the blue bars representing up hours and red bars down hours. The MVI and MRI (with the range expressed as a percent of the closing price) illustrate how stable the relationship between time, volume and range are over time. The indicators show the three peaks in both range and volume that coincide with the opening of the Asian, European and London and, finally, the U.S. forex sessions. The yellow, vertical dashed lines mark session breaks at 10 p.m. (the New York close); both indicators tend to peak occur around 3 p.m. London time.

Because the indicators are plotted in real-time they allow you to see whether the current volume and range are above or below their expected levels at any given time of day. The indicators can be used several ways to exploit a market's unique "pulse."

The AUD/JPY pair in Figure 2, for example, has pronounced peaks in volume and range during the Asian sessions, which is to be expected. Perhaps less intuitively, the pair displays its largest ranges and volumes during the London afternoon session, even though neither currency is native to that time period.

In contrast, in Figure 3 the U.S. dol-

FIGURE 2: VOLUME AND RANGE VS. MVI AND MRI IN AUD/JPY



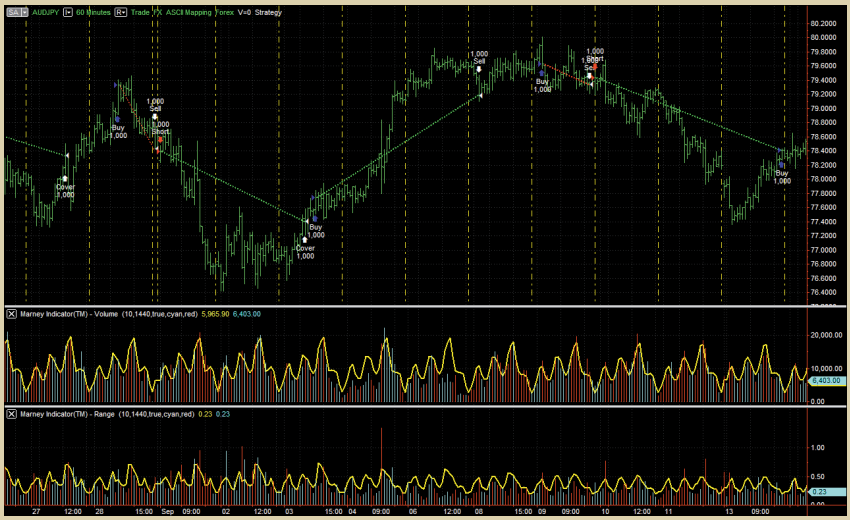
The top panel shows 24-period SMAs of the hourly range and volume data. The bottom half shows the 24-period MVI and MRI. The AUD/JPY pair has the expected volume and range peaks during the Asian sessions, but its largest hourly ranges and volumes occur during the London afternoon session.

FIGURE 3: MVI AND MRI APPLIED TO USD/CAD

USD/CAD shows little activity during the Asian session, displaying a much more significant volume increase when U.S. and Canadian markets open.

TABLE 1: TEST SETTINGS	
Indicator look-back period:	24 days
Currency pair:	AUD/JPY
Test period:	March 2000-March 2010
Time frame:	Hourly
Initial account size:	¥62,000,000
Trade size:	100,000
Trading costs:	0.02 points per round turn

FIGURE 4: TRADE SIGNALS



Trades are entered when volume and range are above the 24-day MVI and MRI, and price breaks out above or below the 24-hour high/low.

FIGURE 5: FILTERING TRADES

The MVI and MRI (bottom) version of the system traded less frequently than the SMA version (top), avoiding many losing trades.

lar/Canadian dollar (USDCAD) pair shows little activity during the Asian session, displaying a much more significant increase in volume when the U.S. and Canadian markets open.

Click here to download code for the MVI and MRI, and for information about analysis programs that include the indicators.

Trading with the indicators

"Exploiting currencies with time and volume" showed how the largest ranges and volumes occurred in the London afternoon session, and how that characteristic could be profitably exploited by trading in the direction of a new high or low for the day. However, if we were to look at trades only during periods of above-average volume and range, there would hardly ever be any trades executed outside of those hours. For example, a significant move accompanied by above-average volume and range using the MVI and MRI at, say, 2 a.m. would unlikely indicate above average volume and range if only an SMA was used.

Time-adjusting the range and volume makes it possible to determine whether these are above average for any given time of day. Let's define a simple trading strategy to test whether this theory has value in trading:

If both range and volume are above the current MVI and MRI levels:

1. buy if the market makes a new 24-hour high;
2. sell if the market makes a new 24-hour low.

A trailing stop was used to exit trades: All long trades were exited when price made a 24-hour low, and all short trades were exited when price made a 24-hour high. Figure 4 shows several trade signals

in the AUD/JPY pair; Table 1 lists the test settings.

Almost any breakout during the London afternoon session will trigger a signal when using standard SMAs of range and volume as triggers, since that period usually has above-average ranges and volumes. Figure 5 shows how the MVI and MRI (bottom) avoided many losing trades triggered by using the standard SMAs (top). Conversely, hardly any breakouts during the Asian session would trigger trade entries when using simple moving averages because that session tends to have much lower than average ranges and volumes. Again, the MVI and MRI ensure trade entries are triggered only if the volume and range are above average for the specific time of day. Figure 6 compares the strategy's equity curve using SMAs (top) vs. the MVI and MRI (bottom), while Table 2 compares some key performance statistics.

If the presence of above-average ranges and volumes for a given time of day are significant, it is worthwhile to consider if performance is related to the degree to which a reading exceeds the average. Figure 7 shows the results of taking signals when the range and volume exceed the MVI and MRI by a certain multiple (from 1 to 2, tested in increments of 0.1). The higher the multiple, the higher the profit factor (gross profit/gross loss).

Using the indicators in volume and range analysis

The MVI and MRI are also useful for discretionary trading. There is already a huge body of work on volume and range analysis. To summarize though, there are four main principles:

1. Bullish volume: Increasing volume in an uptrend.
2. Bearish volume: Increasing volume in a downtrend.
3. Bullish range: Increasing range in an uptrend.
4. Bearish range: Increasing range in a downtrend.

Combinations of these signals can be equally significant. For example, a market making a new high on decreasing volume or range can indicate the move will not be sustained.

Accordingly, knowing what the likely ranges and volumes are going to be by applying the MVI and MRI can provide an additional edge. You can measure not only whether the volume and range are higher than average, but whether they are higher than average for a specific time of day, and whether they are likely to increase or decrease.

Confirming SUE and PEAD

The MVI and MRI also complement existing research on the Standardized Unexpected Earnings (SUE) effect: If a company's earnings are within expectations by a small

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TABLE 2: PERFORMANCE COMPARISON

	MVI/MRI	SMA
No. of trades:	813	1333
Winning percentage:	43.17%	37.28
Max. drawdown:	15.96%	16.82%
Net profit:	¥5,555,980	¥4,591,880
Return on capital:	89.61%	74.06%
Profit factor:	1.23	1.19
Average winning trade:	¥ 6,834	¥ 3,445

The MVI/MRI strategy was more profitable (on fewer trades), and had a higher winning percentage and profit factor.

FIGURE 6: EQUITY CURVES

The SMA version of the strategy (top) had a more volatile (and less profitable) equity curve than the version using the MVI and MRI (bottom).

deviation, then little market impact is expected; the larger the deviation from expectations, the larger the likely impact on the market.

Similarly, Post Earnings Announcement Drift (PEAD) research involves the tendency of a market to continue to move for a certain amount of time after an unexpected announcement — disproving efficient market theory.

Although both these theories are primarily concerned with equities, they also apply to other markets, including currencies, and we can also highlight both of these exploitable effects using the MVI and MRI: We can determine how big an impact any event or economic announcement has on the market by analyzing it relative to the expected volume and range.

The following example illustrates a recent example of both the SUE and PEAD effects. On March 30, 2010 UK GDP growth was announced for the final quarter of 2009. The estimate was +0.3 percent, up from the +0.1 percent initial estimate. The actual number came in at +0.4 percent. As Figure 8 shows, this was positive for the British pound, with both the range and volume increasing above the average expected values for that time of day, demonstrating an equivalent of the SUE effect. The Euro/British pound (EUR/GBP) pair then continued lower throughout the day (pound strengthening), demonstrating the subsequent effect of PEAD on the price action. An early indication the market would trend lower was given by the higher-than-average volume and range values for that time of day.

Market context

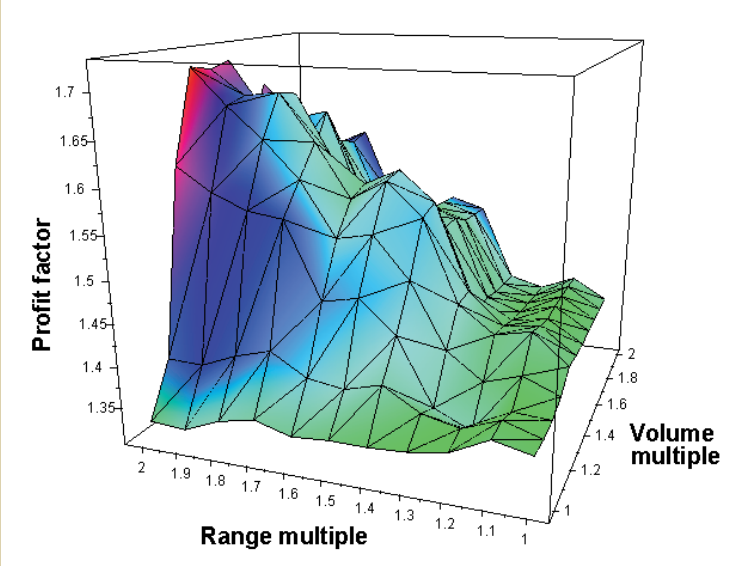
While all currency pairs show a degree of commonality, with the highest ranges and volume occurring during the London afternoon, each also has a unique, predictable, profile. Plotting these profiles using the MVI and MRI helps identify when volume and ranges are likely to increase or decrease during the day, providing a useful additional indicator for volume and range analysis.

Standard volume and range analysis tends to use simple moving averages, which lag the market. Time-adjusting the average using the MVI and MRI provides a much more meaningful analysis of the market.

Though conceived as a way of quantifying the unique behavior of currency markets, these indicators and the principles behind them can be applied to any market, and also to other indicators, such as volatility.

For information on the author, see p. 4.

FIGURE 7: PROFIT FACTOR MULTIPLES



The higher the multiple of the MVI and MRI, the higher the profit factor (gross profit/gross loss).

FIGURE 8: MVI AND MRI APPLIED TO EUR/GBP

Both the range and volume increased above the average expected values for that time of day, demonstrating an equivalent of the SUE effect. The EUR/GBP pair continued to drop throughout the day (reflecting pound strength), demonstrating the subsequent effect of PEAD on the price action.