Trading order flow WITH MARKET PROFILE

Market Profile charts display aspects of trade activity other charts cannot. Deciphering this data and the "four steps of market activity" can help gauge what the market is doing.

BY ROBIN MESCH

Assume you're trying to find the nearest coffee shop, and a Starbucks delivery van pulls up next to you. Do you: a) Ask the driver for directions? b) Follow the delivery van? or c) Ask the van?

Surely none of us opted to chase the van or ask the vehicle itself, but these two choices symbolize what traders all too consistently select when determining market direction.

For many traders, the central focus for determining market moves is price, which has become equated with order flow. However, price and order flow are as different as the van and the driver. Price is merely an effect — a distribution vehicle — but traders routinely chase it looking for market direction. If you really want to know where the market is headed, you need to understand order flow.

Traders can tap into order flow with Market Profile, which is a database, a methodology, and a mindset all geared toward organizing, processing, and structuring a market's buy-and-sell order flow.

We'll explain how to interpret Market Profile charts and their four steps of market activity, as well as illustrate patterns that can be used for trade setups.

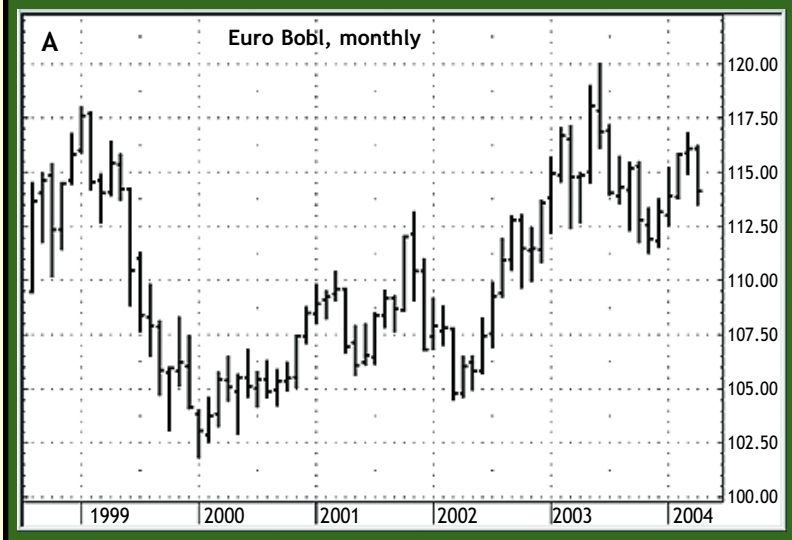
What is Market Profile?

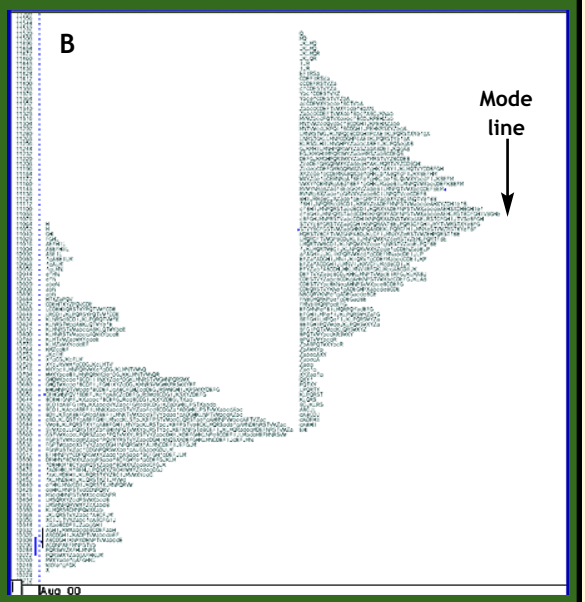
Market Profile is a database that organizes market activity in terms of order flow. Figure 1a is a monthly bar chart of the Euro Bobl futures (FGBM), which reflects German government bond prices.

Organizing the data into a bar chart helps highlight important patterns, but the bar chart captures only one dimension of the market — price. Order flow is a two-dimensional creature

FIGURE 1 BAR CHART VS. MARKET PROFILE

This comparison of a monthly Bobl bar chart to a Market Profile chart covering the same time period shows how Market Profile highlights the most frequently traded price levels (i.e., the mode line) since 1999.





Source: CQG

and is best expressed as how much time a market spends at a given price.

Figure 1b is the same data organized into "profiles" that capture the natural process of the auction. For a detailed discussion of Market Profile theory and how it organizes market data, see "Understanding Market Profile" (p. 75). Here, we'll focus on identifying a profile's unique patterns.

The profile data format shows exactly how much time a market spends at a given price and Figures 1a and 1b clearly show all prices are not created equal. Figure 1a shows the Bobl futures spent quite a bit of time at certain prices (i.e., from 105 to 107 between August 2000 and August 2002; around 111.00 from August 2002 to January 2004), creating bulges in the profile, which indicates the market felt those price areas were "fair."

The Bobl spent little time at price levels traders considered relatively unfair, creating hollow portions in the Profile. The widest part of the curve (the "mode" line) is where the market spent the most time and built the most volume. This is often referred to as the consensus point, or the most "fair" price in a time period.

Left to its natural order, the market auction process seeks a fair price. First, a non-random order-flow imbalance creates a strong initial vertical move. Then, a somewhat random consensus-building (i.e., horizontal) phase follows and establishes a new fair price.

Most of the trades within each profile (70 percent) occur within its "value" area. To calculate the value area, add all Time Price Opportunity intervals (TPO) in a profile, find its mode, and then count out 70 percent of these TPOs on either side of this mode. In Figure 2, for example, there are 184 TPOs and the mode is 109.14. Start at this level and count the 129 TPOs that are centered around this price.

First, compare the line above the mode line to the one below it; include the widest line as part of the value area. In Figure 2, the line below the first profile's mode (y to H) is fatter than the one above, so we include that line. Next, compare the line above to the next line below and select the widest one. Repeat this process until all 129 TPOs are included. Figure 2 shows a Market Profile chart of the Chicago Board of Trade's (CBOT) March 2005 five-year T-note futures (FV H05) from Feb. 4 to Feb. 10. The blue lines to the right of each profile in Figure 2 represent their value areas (from 109.09 to 109.15 in the above example).

This process creates a bell-shaped curve typical of random activity around underlying order. Profiles follow the same structure and begin when a large price move carries the market out of an established range. Here, time is an artificial organizing principal; the more organic principal becomes a complet-

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TABLE 1 THE FOUR STEPS OF MARKET ACTIVITY

A typical Market Profile cycle includes four steps that range from strong vertical movement (always present) to building a bell-shaped curve.

Step 1: Strong vertical movement:
- The only non-random step.
- The most profitable trading opportunity.
- Represents a market imbalance: A large shift of capital into or out of the market.

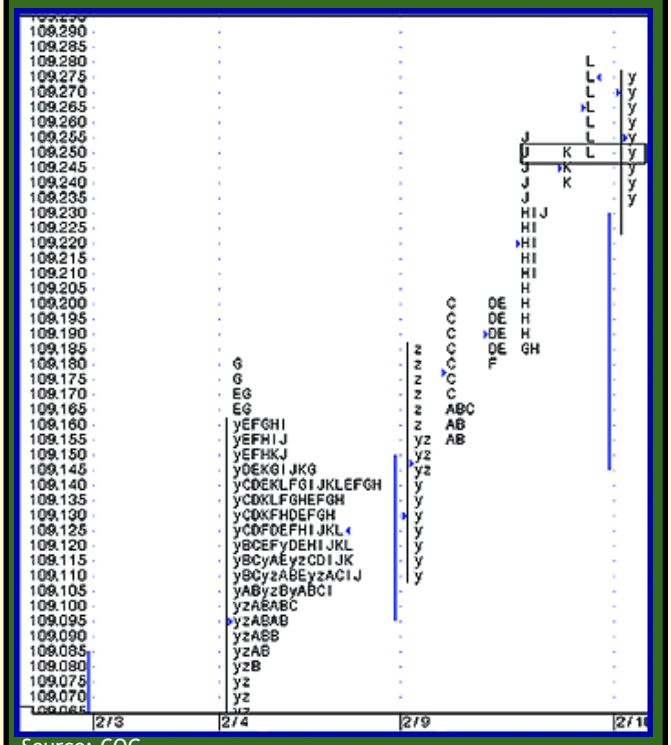
Step 2: Stops the directional move:
- Step 2 begins to build the first standard deviation.
- It's usually recognized by failing to set a lower low, and the start of a high horizontal ratio such as a 4x4.

Step 3: Forms a "p" or "b" shape:
- The market begins to move sideways, or "develop."
- A "p-" or "b-" shaped profile forms, with the first standard deviation near the top if step 1's move was up, and near the bottom if it was down.
- Prices rotate around what will become the control price (or mode) of this general area.

Step 4: The bell-shaped curve:
- The market tries to move toward efficiency.
- The first standard deviation of prices migrates toward the middle of the range that began with step 1.
- The combined profile becomes bell-shaped.

FIGURE 2 STEPS 1 AND 2

Step 1 is a typically strong price move that breaks out of the prior profile's mode line (Feb. 9). Step 2 begins when this vertical move ends and price starts trading sideways.



Source: CQG

ed cycle of market activity as reflected in the formation of a bell curve and the beginning of a new vertical move out of its mode line.

Four steps of market activity

Each cycle of market activity (i.e., the completion of a bell curve) consists of up to four steps (see Table 1, p. 53). Step 1, which is always present, is the non-random move — a rapid rally or decline that starts off a cycle. Step 1 represents a market imbalance; a large amount of capital comes into or out of the market. This first step generally offers the most profitable trading opportunity.

Figure 2's bell-shaped curve marked the high-volume region from Feb. 4 to Feb. 8. The step-1 move came out of the mode line in a typical pattern. As long as each successive bar is setting a new low and there is very little horizontal activity, the market is in step 1.

An order flow imbalance cannot go on indefinitely — ultimately it will dry up. This leads to step 2, which occurs when the vertical move has gone far enough in one direction to shut off the buying or selling — that is, when it reaches a price too high to attract more buyers or too low to attract more sellers. This step begins with a bar that does not set a new low or a new high and starts to show signs of short-term horizontal activity.

Figure 2 shows step 2 began at the "y" bar on Feb. 10. This step is typically marked a "4x4" pattern, or a high horizontal-to-vertical ratio that starts to suggest the buy or sell order flow imbalance is ending. It's easy to pick out a 4x4 on a 30-minute bar chart — just check whether you can draw a horizontal line that crosses four consecutive bars.

On the shortest timeframe, the existence of a 4x4 is evidence of random activity, or horizontal motion. A 4x4 has a 100-percent horizontal ratio of possible to actual width. A high 100-percent horizontal ratio (i.e., an 8x8 or 10x10) is evidence of extreme randomness on a very short-term basis.

Figure 3 shows the five-year March 2005 T-note futures from Feb. 9 to 11. A strong directional move emerged from the area with a very high 100-percent horizontal ratio (11x11). The 100-percent horizontal ratio helps us determine not only when the vertical phase of market activity is ending, but also when a horizontal phase is ripe for a directional move — when a market establishes extreme randomness, it usually signals a directional move. In this case, the market started to decline at "D" right out of the mode line, which is the typical pattern.

Developing the profile

A vertical move is followed by a development period, which is the third step of market activity. In step 3, the market moves horizontally while it

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Key statistics

The ***mean*** (or average) of a set of values is the sum of the values divided by the number of values in the set. If a set consists of 10 numbers, add them and divide by 10 to get the mean. For example, the mean of 1, 2, 3, 4, 5, 6, 7, and 200 is 28.5 (228/8).

The ***median*** of a data set is its middle value (when the set has an odd number of elements) or the mean of the middle two elements (when the set has an even number of elements). The median is less susceptible than the mean to distortion from extreme, non-representative values. The median of 1, 2, 3, 4, 5, 6, 7, and 200 is 4.5 ((4+5)/2), which is much more in line with the majority of numbers in the set.

The ***mode*** is the value that appears most often in a data set. In the above example, all numbers appear one time, which means it has no distinct mode. A data set can have either one or several modes. For example, the mode of 1, 1, 2, 3, 4, 5 is 1, but the modes of 1, 2, 2, 3, 3, 4, 5 are 2 and 3.

Variance measures how spread out a group of values are — in other words, how much they vary. Mathematically, variance is the average squared "deviation" (or difference) of each number in the group from the group's mean value, divided by the number of elements in the group. For example, for the numbers 8, 9, and 10, the mean is 9 and the variance is:

$$\{(8-9)^2 + (9-9)^2 + (10-9)^2\}/3 = (1 + 0 + 1)/3 = .667$$

Now look at the variance of a more widely distributed set of numbers: 2, 9, and 16:

$$\{(2-9)^2 + (9-9)^2 + (16-9)^2\}/3 = (49 + 0 + 49)/3 = 32.67$$

The more varied prices, the higher their variance — the more widely distributed they will be. The more varied a market's price changes from day to day (or week to week etc.), the more volatile that market is.

A common application of variance in trading is ***standard deviation***, which is the square root of variance. The standard deviation of 8, 9, and 10 is $\sqrt{.667}$= .82; the standard deviation of 2, 9, and 16 is $\sqrt{32.67}$ = 5.72.

FIGURE 3 100-PERCENT HORIZONTAL RATIO

One-hundred-percent horizontal ratios are easy to find — look for four or more filled columns — and typically signal a vertical move. This 11X11 ratio (letters H to D) occurred between Feb. 10 and 11 before the expected selloff began at "D."

Source: CQG

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builds the first standard deviation at one end of the previous move. For a detailed explanation of standard deviation, see "Key statistics."

In step 3, the market typically doesn't develop all the way back to the origin of the vertical move. Instead, one end of the move is developed, which results in a p- or b-shaped profile. This step normally continues until it builds up a bell-shaped curve with a distinct mode and often a high 100-percent horizontal ratio, such as the 11x11 that occurred in Figure 3.

Figure 4 shows the five-year T-note futures on Feb. 9 and illustrates a typical p-shape pattern. Figures 5a and 5b show the "p" and "b" patterns as they developed: from Feb. 14 to 19 (b) and Feb. 20 to 24 (p), outlined in red and blue, respectively. Figure 5b, combines this data to more clearly illustrate the "b" and "p" shapes. Putting both step 3's together begins the creation of the bell-shaped curve.

During step 4, the final step of market activity, the market begins to form a bell-shaped curve over the entire range of step 1. As this happens, the mode begins to float from one end toward the center of the range, returning to step 1's initiation point (see Figure 6, p. 76). Step 4 is complete when the data develops a bell-shaped curve, or a capital-D shape.

Trading profile

Now that we have an overview of the complete market cycle we can try to put what we've learned together in a trade strategy. Figure 7 (p. 76) shows a long-term profile of the

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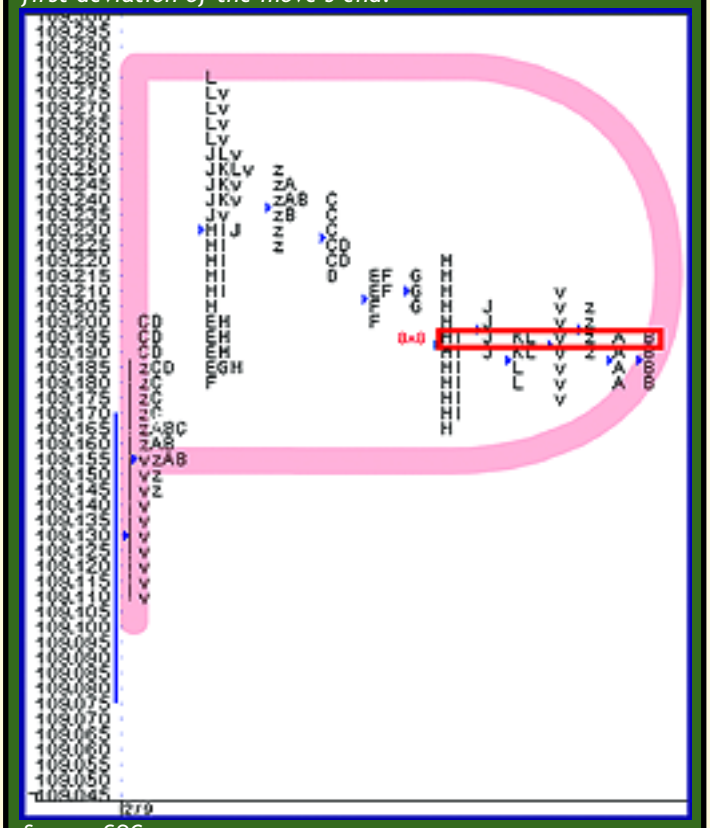
FIGURE 4 STEP 3 "p" SHAPE

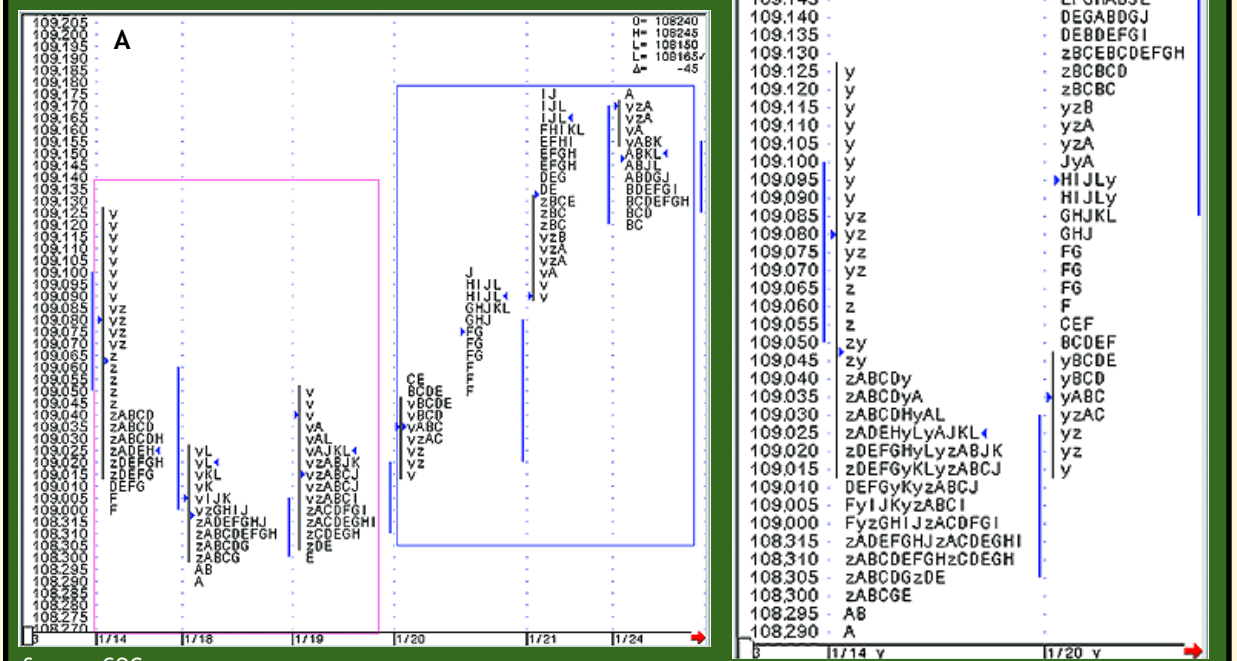
"P"-shaped patterns typically occur after the market halts a prior upswing (step 1) and begins to develop around the first deviation of the move's end.



Source: CQG

FIGURE 5 STEP 3 "b" AND "p" SHAPES

The "b"-shaped pattern formed from Feb. 14 to 19 before the "p" developed over the next three days. Figure 5b shows the same data consolidated into more recognizable shapes. These two patterns often form a completed bell curve, or "d"-shaped pattern.



Source: CQG

Understanding Market Profile

Market Profile, which was developed by Peter Steidlmayer at the Chicago Board of Trade (CBOT) in the 80s, measures order flow and is based on two assumptions:

First, the market is an auction process, which moves up or down until buy and sell demand are equal.

Second, the market moves either sideways or vertically depending on whether the current buy/sell demand is relatively in or out of balance. When buying demand roughly matches selling demand, the market tends to move horizontally; when this relationship is out of line (i.e., more buyers than sellers or vice versa), a vertical price move is imminent.

A large price move is fairly easy to identify on a price bar chart, but a sideways move, which implies that buy-and-sell demand is in equilibrium, can be tough to interpret.

Steidlmayer realized these horizontal moves tended to form Gaussian (bell-shaped) curves, which group prices around that curve's peak, or its mode (i.e., the most frequent price). Sixty-eight percent of these prices are also within one standard deviation of the mean — see Figure A. A Market Profile chart organizes price data according to this principle, except it turns the bell curve on its side (90 degrees).

Figure B shows a 30-minute Market Profile chart of the S&P 500 index from Feb. 14 to Feb. 24, 2005. Each letter represents the S&P's price range during one 30-minute time interval and is called a TPO, or Time Price Opportunity. For example, there are 13 TPOs (letters A to M) each day in Figure B, which represent the trading day's 13 half-hour trading periods: Letter A shows the S&P price from 9:30 to 10 a.m. ET, letter B shows its price from 10 to 10:30 a.m., and so on.

Market Profile charts plot each TPO to as far to the left as possible in each day, so if price overlaps during two TPO intervals, (e.g., letters A and B), that row includes both letters. Therefore, the widest sections of the profile represent areas where the market traded most frequently. The chart plots additional rows as subsequent TPOs trade outside the prior interval's range.

According to Figure B, for example, the S&P 500 traded between 1196 and 1199 from 9:30 to 10 a.m. ET on Feb. 22, and traded within that range for much of the next 30 minutes before breaking above the 1200 level from 10:30 to 11 a.m. However, the S&P sold off below 1190 in the final two hours of the day (letters J through M).

Figure B's 30-minute TPOs are organized by day, which makes it more intuitive to understand at first, but more significant patterns tend to appear as you consolidate a day's 13 TPOs into larger, composite profiles. For example, if you combine Figure B's TPOs from Feb. 22 to Feb. 24, the profile will look different than a daily one.

Although Figure B's lettering scheme (A to M, or 9:30 a.m. to 3 p.m. ET) is easy to follow, there are no solid rules about this format. For example, different data providers, markets (i.e., pit vs. electronic), and securities may use other letters. As you build composite profiles, the key is to recognize larger patterns instead of focusing on a profile's letters.

(To learn more about Market Profile, visit the Chicago Board of Trade's Web site: www.cbot.com/cbot/pub/page/0,3181,1168,00.html.)

—Active Trader *Staff*

FIGURE A STANDARD DEVIATION

The Gaussian (or "bell") curve shows the standard deviation of values around the mean. The curve's peak also represents the mode.

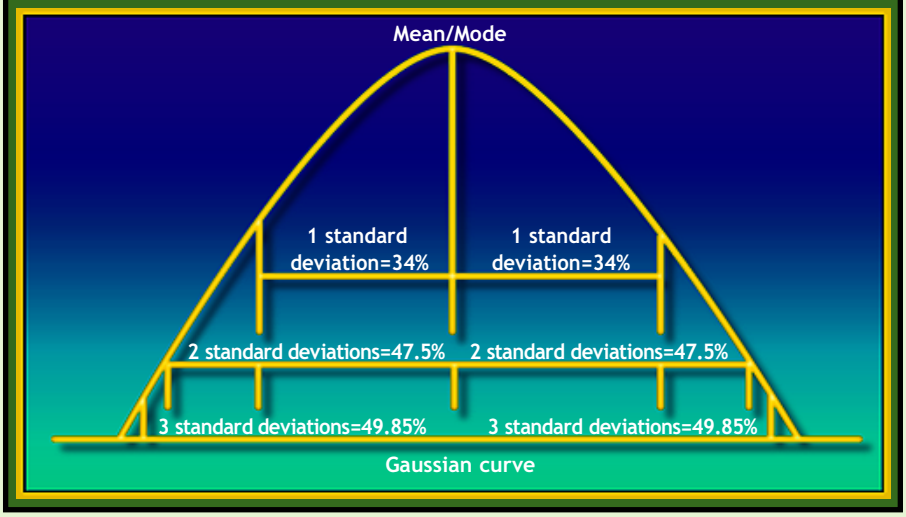
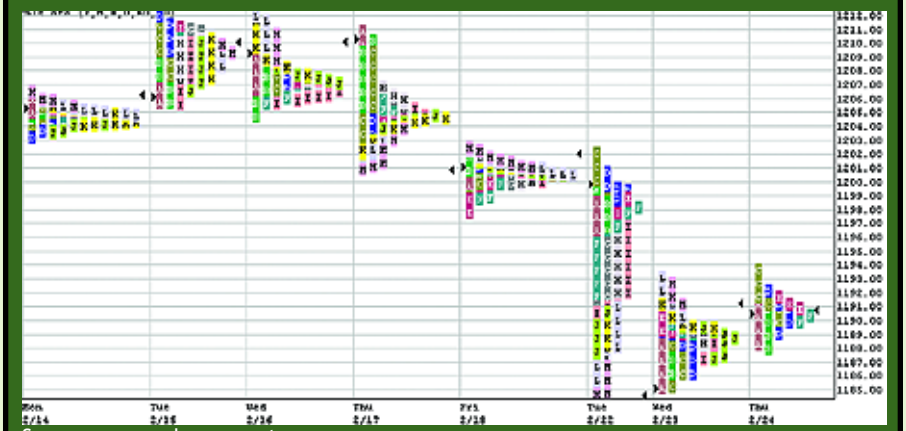


FIGURE B MARKET PROFILE CHART

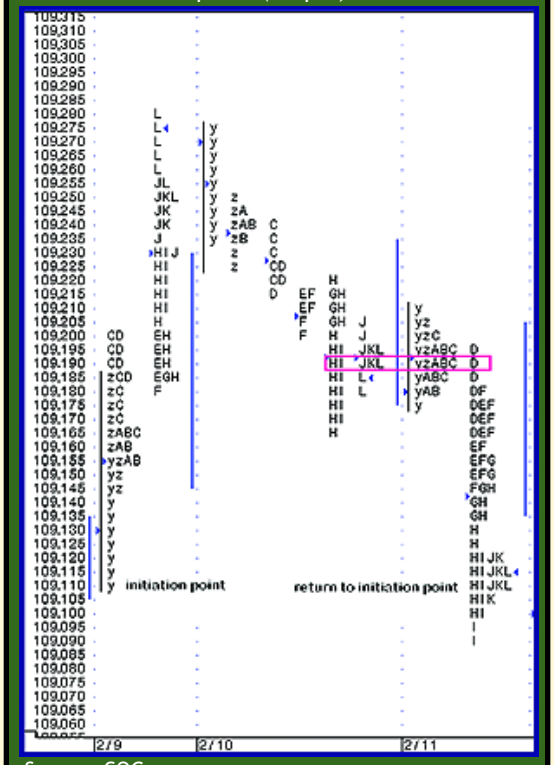
This 30-minute chart shows that the S&P 500 traded in a fairly tight range on Feb. 18, creating a wide profile, before it sold off the next day. (Vertical moves result in narrower profiles.)



Source: www.erlangerquote.com

FIGURE 6 STEP 4 COMPLETING THE BELL CURVE

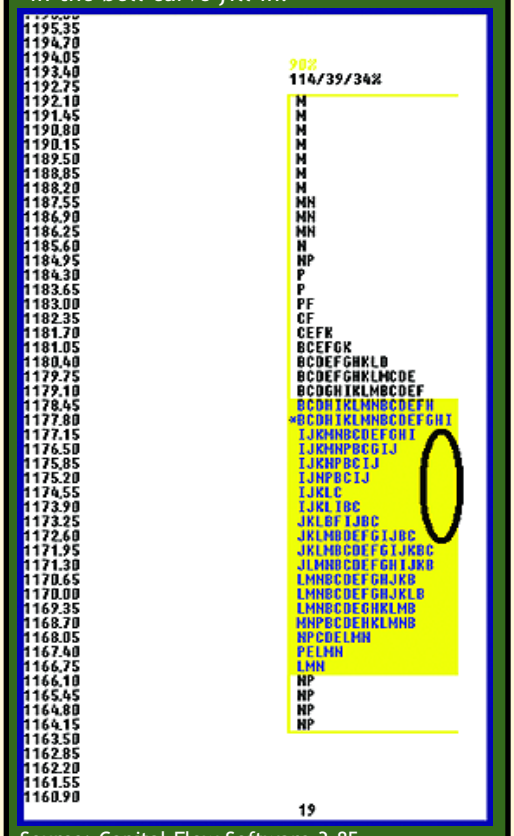
The final step of market activity occurred as the five-year T-note futures fell and returned to its initiation point (Step 1).



Source: CQG

FIGURE 7 S&P 500 TRADE SETUP

On Jan. 25, this underdeveloped step 4 (see circled area) suggested that the S&P futures would be range-bound until a more complete bell curve developed. At this point, sell the top and buy the bottom of the shaded value area until holes in the bell curve fill in.



Source: Capital Flow Software 3.85

March 2005 S&P 500 futures (SPH05) from Jan. 19 to Jan. 25, 2005. During that period, the S&P ranged from 1192 to 1164, and the value area was between 1179 and 1166.

What step do you think the S&P is and where would you expect it to develop next? Actually, Figure 7's shaded area is a step 4, which is still underdeveloped. In this profile, we would not expect a directional move to occur until the entire profile reverts into a more fully developed bell-curve.

There is much more development necessary to transform this step 4 into a fully ripe D-shaped pattern. Combining the profiles so far shows the market-auction process wasn't complete in the S&P's middle region (see circled areas).

Look for holes in the profile that need to be filled. You have an opportunity to trade the top and bottom of the developing value area until those holes are filled in. The profile needs to develop in the circled area to form a bell-shaped curve.

Figure 8 shows this is exactly what happened over the next several days. The strategy of buying around 1167 and selling toward 1177 (i.e., the developing value area) worked quite well until Jan. 28 as the low volume areas filled in.

Trading a completed bell-shaped pattern

Figure 9 shows when the data is put into a composite profile, the market has formed a completed bell-shape curve. Finally, the cup is full and ready to spill. The market has formed a complete bell-shape curve and step 4 is ready to become a new step 1. But in which direction?

At this point, our strategy must shift away from buying the bottom and selling the top of the value area. The steps of market activity show us when to use a congestion trading strategy (Figure 8) versus a trend-following strategy (Figure 9).

When trading the steps of market activity, don't lose sight of the larger picture, which will start to influence market direction once the shorter timeframes have completed their market activity cycles.

Figure 10 shows the shorter-term bell curve (i.e., Jan. 19 to 28, middle) in the context of data going back to Dec. 3, 2004 (left), which suggests the recent price action is part of a larger underdeveloped bell curve (see circled area).

There are important clues in terms of the steps of market activity and volume analysis to help us determine a buy-and-sell strategy and the next directional move of the market. The completed short-term profile (middle) tells us to no longer play for a range trade, but for a step-1 directional move instead. (Typically, those moves start out of the high-volume area.)

Also, if you compare Figure 10's shorter-term price action to its longer-term profile, (i.e., the underdeveloped step 4, which began on Dec. 3), it would be safe to assume the S&P will head higher.

Buying the bottom of value (1166) toward the end of January and holding, or buying the mode of the short-term profile (around 1172), would be a fairly low-risk strategy since we'd anticipate the larger "D" shape bell curve to form. Figure 10's right section, which began on Jan. 28, shows the market did rally as expected.

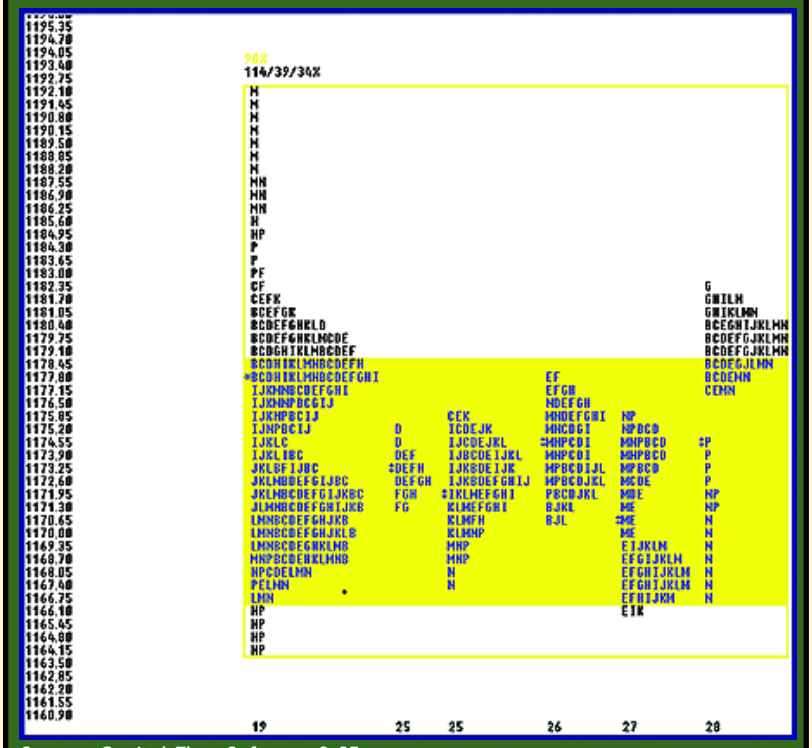
Bottom line

The bell-curve database taps into the two-dimensional nature of order flow. This represents a unique paradigm for understanding and anticipating market activity. The key is to stop trading in terms of price and start organizing trades according to market structure. Overall, this approach calls for a change in mindset wherein you trade market time, not clock time, and you buy time in your trade, not price.

For information on the author see p. 10.

FIGURE 8 TRADING THE "VALUE" AREA

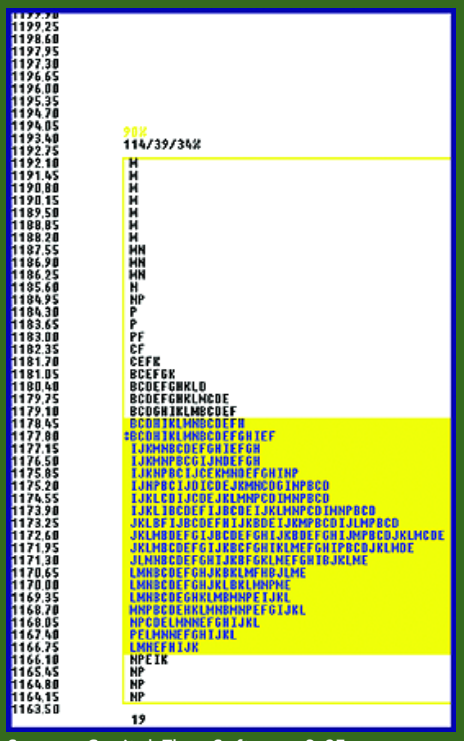
The S&P traded between 1166 and 1179 from Jan. 25 to 28, which confirms that the strategy suggested in Figure 7 (i.e., selling the top and buying the bottom of this range) would have been profitable.



Source: Capital Flow Software 3.85

FIGURE 9 BELL CURVE COMPLETE

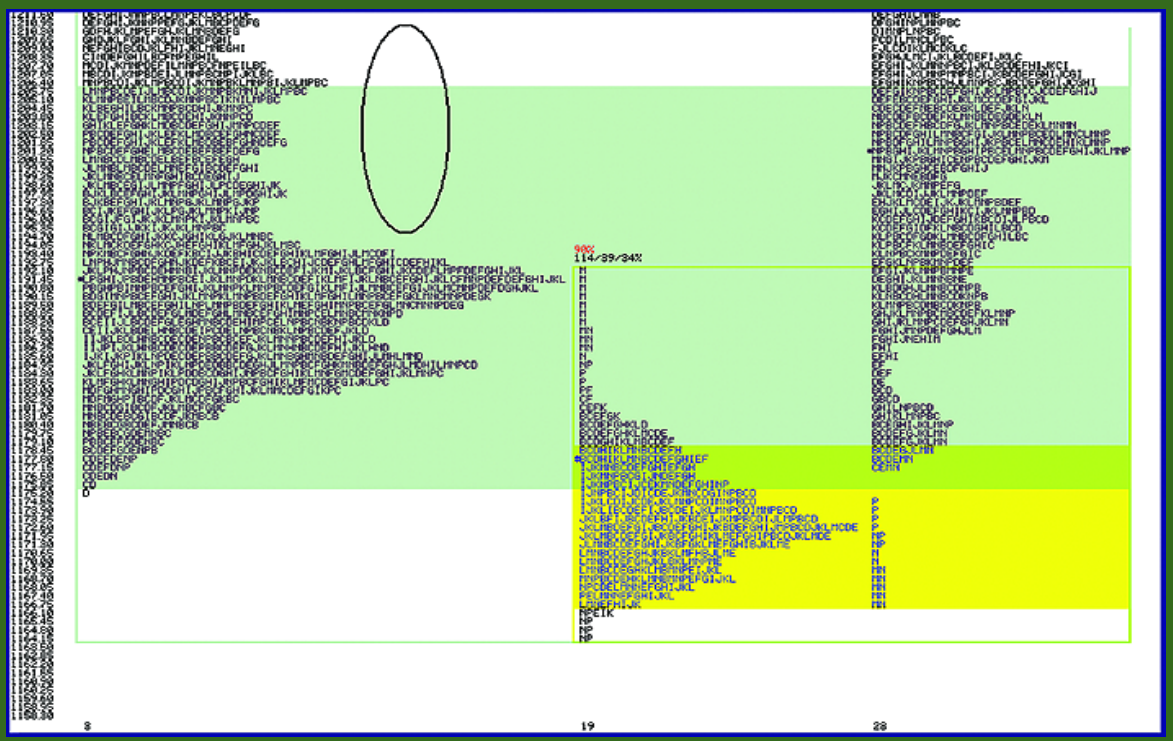
This composite profile contains the same data as Figures 7 and 8 and shows the bell curve has been completed over this time period (Jan. 19 to 28). This indicates that we must change our strategy to anticipate trends from buying and selling the value area.



Source: Capital Flow Software 3.85

FIGURE 10 SHORT- VS. LONGER-TERM PATTERNS

Analyzing completed short-term bell curves over longer-term periods can reveal clues about the market's next move. Here, Figure 9's bell curve (Jan. 19 to 28, middle) is shown within the context of a larger pattern, which began on Dec. 3, 2004. The circled area suggests this longer-term bell curve will fill in the upper section of its pattern, which occurred (as expected) after Jan. 28.



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