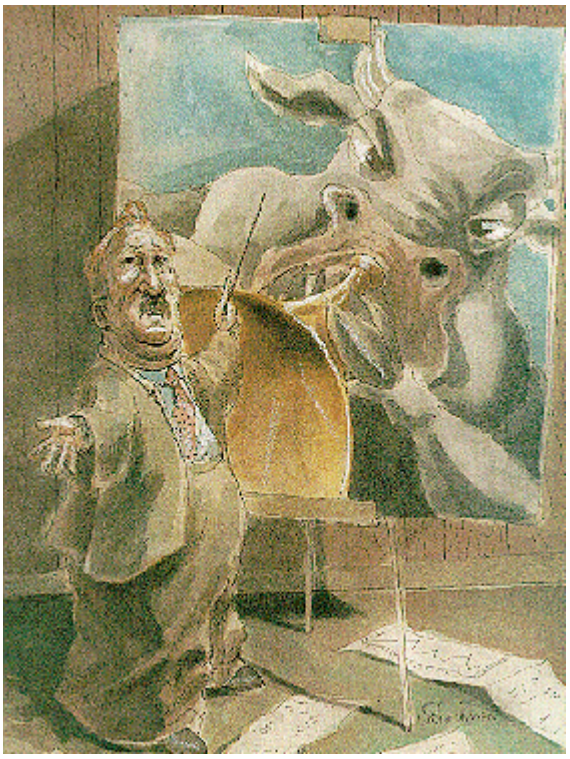
The overlay profile for current market analysis

by Donald L. Jones and Christopher J. Young



Market analysis seeks to determine the condition of the market because the trader who knows whether a market is trending, bracketing or in transition is better able to make an intelligent trading decision. Historically, technicians have studied market conditions using a combination of fundamentals, chart analysis and numerical formulas such as moving averages. The problem with the latter, though, has been that while seeking to average a number of trading days to smooth out the random market fluctuations (noise), moving averages introduce lag, an undesirable side effect.

We have developed a new graphic analysis technique based on value that promises to handle the noise problem without introducing lag. Called overlay methodology, this technique has four parts: The overlay profile, composed o linear additions of the Chicago Board of Trade's (CBOT) Market Profiles; the rotation profile, which is a day-to-day price profile; the rotation index, which numerically measures price rotation, and the quadrant of close, a second numeric measure that notes where in the price range the market closed.

Together, these four tools alert the trader to trending or bracketing markets and, if bracketing, identify the bracket limits They also identify congestion regions, pauses within trends and tendencies toward a change in market condition. These techniques apply to all auction-based markets. They may be used to detect trend onset by position traders, and by day traders to keep their trades with the trend or properly oriented within a bracket.

The overlay profile integrates, or adds daily Market Profiles to find value over time. Value in an

equilibrium market is not a single price, but a trading range. The rotation profile confirms or refutes the overlay's assessment of market condition by showing whether prices rotate frond high to low to high and so on, thereby defining the trading range in an equilibrium market. Trending periods exhibit little price rotation.

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While the overlay and rotation profiles are graphics that are interpreted visually, the rotation index is a numeric measure in which relatively small changes often signal impending changes in market condition. A rotation index value of one indicates perfect rotation (an equilibrium market), while a value of zero signifies complete trending. The quadrant of close is another numeric measure that notes the location of the close within the daily price range and also seems to provide early warning of change. Quadrant one denotes a close within the top 25% of the price range; quadrant two denotes a close in the next quarter down, and so on.

The overlay profile

An overlay profile (Figure 1, part a) locates value and determines whether the market is bracketing, trending or in transition between trending and bracketing. If bracketing, the overlay locates the price limits that identify the approximate breakout points for a transition to trending.

Bracketing markets on the overlay profile display a bell-shaped price-time curve, referred to as a "single distribution." Trending markets have more than one distribution — that is, there are several bell-shaped curves in different price regions. Transitional markets are those in which distributions become blurred because of the continued retracement of prices over time.

The origins of these distributions are apparent in the Market Profile, the starting point for the overlays. The Market Profile is a histogram displaying daily tick information in half-hour segments, alphabetically labeled and called TPO (time-price opportunities) because the trader had an opportunity to trade at market prices at that time.

For example, if the first half hour of trading ranged from 8900 to 8916 (letter A), the second half hour traded from 8908 to 8924 (letter B) and the third half hour ranged from 8916 to 8924 (letter C). The Market Profile at that point would look like:

8924 BC
8920 BC
8916 ABC
8908 AB
8900 A

Market Profile gives a more detailed picture of market behavior than can be obtained from traditional bar charts. The expanded detail within the day has increased the potential for market analysis enormously. Market Profile essentially transforms a five-hour trading day into 10 half-hour mini days showing the time spent at each price. Subdividing the day this way generates a graphic that can be analyzed for

TPO overlay profile				Price rotation profile			
September 1988 T-bond (CBOT), 3/21/88 3/31/88							
Price	Days	IPO	(TPO density)	Days	TPO	L/F	Day symbol
9008	1	1	X	1	1		n
9004	1	3	XXX	1	3		n
9000	2	3	XXX	2	3		nk
8928	4	8	XXXXXXXX	4	8		nmkj
8924	5	14	XXXXXXXXXXXXXX	5	14	o	onmkj
8920	5	14	XXXXXXXXXXXXXX	5	14	o	onmkj
8916	6	21	XXXXXXXXXXXXXXXXXXXXX	6	21	o	onmikj
8912	5	24	XXXXXXXXXXXXXXXXXXXXXXXX	5	24	o	omikj
8908	6	24	XXXXXXXXXXXXXXXXXXXXXXXX	6	24	o	omijih
8904	5	18	XXXXXXXXXXXXXXXXX	5	18	g	ljihg
8900	5	15	XXXXXXXXXXXXXXX	5	15	g	ljihg
8828	5	7	XXXXXXXXXXXXXXXX	5	17	g	ljihg
8824	4	5	XXXXX	4	5	g	lihg
8820	1	2	XX	1	2		

FIGURE 1a: *The overlay profile is bell shaped, identifying a bracketing period. The rotation profile (Day symbol column) shows the price to be well distributed, confirming the bracketing determination. Resistance is at 9008 and support is 8821 The day symbol dates are found in Figure 1b below, column ID.*

Rotation index (RI), quadrant of close							
			8-day	Close	4-day	Close	Day
Date	Hi	Lo	RI	quad	RI	quad	ID
3/21	8926	8909	0.50	3	0.42	3	o
3/22	9008	8913	0.42	3	0.50	3	n
3/23	8929	8905	0.42	4	0.50	4	m
3/24	8919	8821	0.42	3	0.67	2	1
3/25	9002	8909	0.67	3	0.67	1	k
3/28	8928	8826	0.50	4	0.75	4	J
3/29	8909	8820	0.75	4	0.67	3	I
3/30	8913	8821	0.75	4	0.67	3	h
3/31	8905	8824	0.75	3	0.67	3	9

FIGURE 1b: *This equilibrium period shows the rotation index becoming larger, indicating a high degree of rotation. The quadrant of close is scattered, confirming the bracketing condition. On a rotation index, an index of 1.0 is 100% rotation, 0.0 is 100% trend. A reading of 0.5 or below indicates a tendency toward trending.*

short-term effects and, by using overlays of the Market Profiles, the longer-term effects become clear.

We published the earliest discussion about combining daily Market Profiles into overlays in mid-1988 and showed that overlays based on volume clearly defined the periods of trending and bracketing markets. In October 1988 and July 1989, we introduced the concept of the rotation profile to monitor price rotation during an overlay period.

Since those studies, we have moved away from volume to TPO-based profiles. TPO profiles are much smoother and more regular than their volume counterparts, since one large volume trade can, and does, skew the distribution. Considering markets tend to move relatively smoothly over time, TPO profiles seem to be more representative of market activity as a whole. Most important, TPO profiles are available on all markets, which is not the case for volume.

Rotation

Equilibrium markets (also known as trading range, congestion phase and bracketing periods) display prices that rotate between well-defined upper and lower bounds. Price rotation throughout the range (that is, every price in the range is hit) is evidence that both buyers and sellers consider a range of prices to be fair. So long as buyers lose interest at the upper price of the trading range and sellers will not trade below the lower bound, prices will rotate within the bracket.

Price movement out of the bracket occurs when either buyers or sellers change their minds about value. This starts a trend, which initially displays comparatively little price rotation. A trending market moves and pauses to consolidate and then moves again until the trend is complete.

The rotation profile is a graphic of price over time with a time frame of one day. The larger scale makes it easy to follow the markets' rotation over a number of days. A visual inspection of the graphic is usually adequate to estimate the level and amount of rotation in a particular price-time distribution to support or refute the trader's interpretation of the overlay profile.

An example of rotation in a bracketing market is the Day symbol column of Figure 2 for prices between 8820 and 9008. The earliest day, marked by "o" on the graph, had a range of 8908 to 8924 (note the day symbols are listed in the ID column in Figure 1, part b).

Rotation goes up from o to n, down through m and so forth. In the middle of the distribution, as many as six of the 10 days occurred, illustrating substantial rotation. On 4/4 (symbol f), a downside breakout alerted a trend start, with virtually no rotation for the f and e (4/5) days. Examples of price rotation under both bracketing and trending conditions are shown in Figure 2. Both the overlay and the rotation profiles can be constructed by hand from the basic Market Profile daily data.

A high degree of rotation indicates that all participants (exchange members, commercials and the public) are involved. When all types of participants are active, the market rotates. Trends are driven only by the public. A market in which the overlay profile has a single distribution (bracket) but the rotation profile shows little rotation has a poorly defined structure with little information for the trader. The overlay and rotation profiles tend to be "market coincident," that is, they show the current condition of the market. An early warning of impending change is often found in the quantitative rotation index. In many cases it will begin to change well before the overlay and/or rotation profiles show price movement.

The quadrant of close is a less sensitive indicator. We use both measures for their alert functions, even though they come from diverse origins. Figure 1, part b, shows the eight-day and four-day rotation index

TPO overlay profile				Price rotation profile			
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8912	5	24	XXXXXXXXXXXXXXXXXXXXXXXX	5	24	o	omikj
8908	6	24	XXXXXXXXXXXXXXXXXXXXXXXX	6	24	o	omijih
8904	5	18	XXXXXXXXXXXXXXXXXX	5	18		ljihg
8900	5	15	XXXXXXXXXXXXXXX	5	15		gljihg
8828	5	17	XXXXXXXXXXXXXXXXX	5	17		gljihg
8824	4	5	XXXXX	4	5		glihg
8820	1	2	XX	1	2		
8816	1	2	XX	1	2	e	e
8812	1	7	XXXXXXX	1	7	e	e
8808	2	8	XXXXXXXX	2	8	e	fe
8804	2	6	XXXXXX	2	6	e	fe
8800	1	4	XXXX	1	4		f
8728	1	1	X	1	1		f

FIGURE 2: *With the addition of two new days to Figure 1, part a, the overlay profile shows the beginning of a second distribution centered around 8808 and the rotation profile shows low rotation for the two new days. The breakout below 8820 signals the start of a trend*.

	T1	T2	T3	T4		T1	T2	T3	T4		T1	T2	T3	T4
Q1	0	0	0	1	Q1	1	1	1	1	Q1	1	0	0	0
Q2	0	0	1	0	Q2	1	1	1	1	Q2	0	1	0	0
Q3	0	1	0	0	Q3	1	1	1	1	Q3	0	0	1	0
Q4	1	0	0	0	Q4	1	1	1	1	Q4	0	0	0	1
	Downward					Full Rotation					Uptrend			

FIGURE 3: *The rotation index is calculated from a price-time matrix.*

and quadrants of close for the bracketing period March 21 through March 31. The rotation index during the first several days was at or below 0.5 (trending) but then moved into the bracketing region above 0.5. The quadrant of close wandered but seemed to stay near the bottom, giving a weak alert for a potential move down. The rotation index is calculated from a price-time matrix (Figure 3). First, divide the total price range into as many divisions as desired and, for simplicity, divide the time period covered into the same number of divisions. In Figure 3, we've arbitrarily used four price and time segments.

Q4 is the price range of the lowest quadrant, Q3 is the next higher price range, and so on. T1 is the latest time quadrant, T2 is the next earlier time quadrant, and so on. A 1 in any of the Q-T coordinates means that a price within the Q range occurred within the T timeframe. A zero means that no price within the Q range occurred in the T time frame.

There are three ideal markets: fully rotating, where every quadrant (Q) is visited by price in every time segment (T); a perfect uptrend with the lowest price (Q4) starting at the earliest time frame (T4) and moving uniformly upward, and the perfect downtrend, which starts with the highest price (Q1) at the earliest time (T4).

As an example, the data for eight days of the September 1988 Treasury bond (day) are:

Date	low	High	Date	Low	High
05 31 88	8411	8431	05 27 88	8408	8424
05 26 88	8416	8502	05 25 88	8422	8500
05 24 88	8413	8423	05 23 88	8408	8430
05 20 88	8415	8505	05 19 88	8417	8504

The price ranges within the four time segments (each two days long) are:

T1 = 8431 to 8408 T3 = 8430 to 8408
T2 = 8502 to 8416 T4 = 8505 to 8415

and, because the total price range is 8505 to 8408, the four approximately equal (in range) price quadrants are:

Q1 = 8505 to 8430 Q3 = 8422 to 8416
Q2 = 8429 to 8423 Q4 = 8415 to 8408

resulting in a matrix:

# of 1st	Rotation index	Normalized index
16	1.00	1.00
14	0.875	0.833
12	0.750	0.666
10	0.625	0.500
8	0.500	0.333
6	0.375	0.166
4	0.250	0.000

In this four-by-four example, a raw rotation index is obtained by summing the 1s, then dividing the sum by 16. For a strongly rotating market the rotation index will be near 1.0. A matrix with three-quarters of the cells equal to 1 will have a rotation index of 0.75. A perfect trend (either up or down) will have the minimum rotation index of 0.25.

Because the maximum range 0.25 to 1.0 = 0.75 is inconvenient, we have normalized the range to 1.0 with the formula:

$$NRI = RI - \left[\frac{(1 - RI)}{0.75} \times 0.25\right]$$

where:

NRI = Normalized rotation index

RI = Rotation index

Before normalization, the rotation index for the eight-day bond example is 0.9375. Normalized, it is 0.9167. From now on, whenever we use the term rotation index, we are referring to the normalized rotation index.

An abbreviated table of raw rotation index vs. normalized rotation index is:

	T1	T2	T3	T4
Q1	1	1	1	1
Q2	1	1	1	1
Q3	1	1	1	1
Q4	1	0	1	1

The rotation index does not give the direction of the trend, although a quick and usually correct way to determine direction is to simply to note the quadrant of close. A close in quadrant one signifies an up market, a downtrend normally will close in quadrant four.

For most situations it is enough to first calculate the rotation index and then, if it is below about 0.6, to note the quadrant of the close for trend direction.

Donald Jones, originally a mathematician and physicist, has, over the past 20 years, collected a futures database, conducted technical analysis and managed money in the futures market. In 1986 he added the Market Profile/Liquidity Data Bank information to the CISCO databases, 327 S. LaSalle, Suite 800, Chicago, IL 60604, (312) 922-3661.

Christopher Young was trained as a physicist. He is currently the manager of the CISCO database.

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