The trade facilitation factor

by Donald L. Jones

A cardinal rule for traders using the Chicago Board of Trade's daily Liquidity Data Bank report is to avoid markets that are not "facilitating" trade. Over a period of days, such markets are characterized by decreasing volume, a narrowing of the trading range and an increasing number of Time-Price Opportunities (TPOs) per tick. Sometimes market changes are gradual; so gradual, in fact, that even an expert might have trouble recognizing the shift from trade facilitation to non-facilitation.

For the average trader who must distill a market overview into a trading decision at a particular point in time, a quantifiable, measurable way of determining the level of trade facilitation at any time could be very helpful. Recent research at Commodity Information Services (CISCO) indicates that by using two within-the-day variables—TPOs and ticks—it is possible to define a reliable measure of trade facilitation as the trading day unfolds.

The Trade Facilitation Factors (TFFs) in Figure 1 are based on the cumulative, daily TPO count. The TFFs in Figure 2 are based on cumulative tick count and provide a cross-check on the TFFs determined by TPO count. Figure 3 calculates TFFs according to the ratio of TPOs to ticks and serves as a third reference.

These TFF tables can be generated by hand, although the large number of strictly arithmetic operations makes it more convenient to use a computer spreadsheet. To build Figures 1 through 3, we started with 210 days of T-bond Liquidity Data Bank (LDB) reports from mid-October 1986 through August 24, 1987. Over that time frame there were both up and down markets, quiet markets and very active markets. Any other period would have done as well, so long as a variety of market conditions and activity levels were covered. As time goes by, adding more days to this study will foster some modification. However, because of the broad database, large changes seem unlikely and Figures 1 through 3, as given, will probably be valid for quite a while.

In order to create these trade facilitation tables, each trading day was first converted to a "TPO line" where each half-hour period (A, B . . .L) contains the total number of TPOs up to that point in time. For example, on a given day, the A half-hour period (8 a.m. to 8:30 a.m.) might have 15 TPOs, B period

T- Bond trade facilitation factors for TPO count

TFF	A	B	C	D	E	F	G	H	I	J	K	L
100%	20	35	57	76	93	110	129	146	165	181	198	215
95	17	30	44	57	70	82	95	108	123	140	155	172
90	21	33	46	57	66	76	87	98	108	121	135	151
85	14	25	36	47	57	67	76	85	96	108	121	137
80	16	27	38	47	55	64	72	81	90	102	113	129
75	14	24	35	44	53	62	71	80	90	100	109	123
70	13	24	32	40	47	57	65	75	84	95	106	118
65	12	23	32	41	50	58	66	75	82	91	100	113
60	13	22	29	39	47	54	61	68	77	84	96	108
55	10	19	29	38	47	54	61	69	76	85	92	104
50	10	19	26	33	41	49	56	64	72	81	89	101
45	10	18	26	33	43	51	57	64	70	80	88	98
40	11	18	27	36	42	49	56	63	70	77	86	95
35	9	18	24	32	39	45	51	56	65	74	82	93
30	9	17	24	31	37	43	49	55	63	70	79	90
25	11	18	25	30	37	42	48	54	61	69	75	86
20	9	17	25	30	36	42	48	53	59	64	74	82
15	9	16	22	28	35	40	46	51	57	62	69	78
10	8	15	22	27	32	37	43	48	54	59	66	74
5	7	13	19	24	29	34	39	44	50	56	61	68
0	6	11	15	20	24	28	32	37	40	44	48	5

FIGURE 1

T- Bond trade facilitation factors for ticks

TFF	A	B	C	D	E	F	G	H	I	J	K	L
100%	17	22	30	38	44	46	53	55	61	66	70	76
95	17	22	24	26	27	30	32	34	38	42	46	53
90	15	18	23	27	30	32	34	38	39	42	43	45
85	18	20	23	25	27	28	30	30	31	34	38	42
80	13	18	19	20	23	26	27	29	31	32	35	40
75	14	18	21	23	25	27	28	30	31	33	36	37
70	12	16	18	19	21	24	27	27	29	31	32	35
65	10	14	17	20	22	24	25	27	27	27	29	33
60	14	15	17	20	21	22	23	24	26	28	30	31
55	10	12	14	16	17	19	19	20	22	23	24	28
50	10	14	17	19	20	20	20	22	24	24	25	26
45	10	13	14	15	17	19	20	21	21	21	22	24
40	11	12	15	15	16	16	18	18	18	19	20	22
35	11	15	16	16	17	17	18	18	19	20	20	21
30	10	12	14	15	16	17	18	19	20	21	21	21
25	11	13	13	14	15	15	15	16	16	17	18	20
20	12	13	14	15	15	15	16	16	17	17	18	18
15	9	11	12	15	14	14	15	15	16	16	16	17
10	9	10	12	13	13	13	13	14	14	14	14	16
5	8	9	10	11	11	11	12	12	13	14	14	14
0	6	7	8	8	8	9	9	10	10	10	10	11

FIGURE 2

T- Bond trade facilitation factors for TPO / tick ratios

TFF	A	B	C	D	E	F	G	H	I	J	K	L
100%	1.2	1.6	1.9	2.0	2.1	2.4	2.4	2.7	2.7	2.7	2.8	2.8
95	1.0	1.4	1.8	2.2	2.6	2.7	3.0	3.2	3.2	3.3	3.4	3.2
90	1.4	1.8	2.0	2.1	2.2	2.4	2.6	2.6	2.8	2.9	3.1	3.4
85	0.8	1.3	1.6	1.9	2.1	2.4	2.5	2.8	3.1	3.2	3.2	3.3
80	1.2	1.5	2.0	2.3	2.4	2.5	2.7	2.8	2.9	3.2	3.2	3.2
75	1.0	1.3	1.7	1.9	2.1	2.3	2.5	2.7	2.9	2.0	3.0	3.3
70	1.1	1.5	1.8	2.1	2.2	2.4	2.4	2.8	2.9	3.1	3.3	3.4
65	1.2	1.6	1.9	2.0	2.3	2.4	2.6	2.8	3.0	3.4	3.4	3.4
60	0.9	1.5	1.7	2.0	2.2	2.5	2.7	2.8	3.0	3.0	3.2	3.5
55	1.0	1.6	2.1	2.4	2.8	2.8	3.2	3.4	3.5	3.7	3.8	3.7
50	1.0	1.4	1.5	1.7	2.0	2.5	2.8	2.9	3.0	3.4	3.6	3.9
45	1.0	1.4	1.9	2.2	2.5	2.7	2.8	3.0	3.3	3.8	4.0	4.1
40	1.0	1.5	1.8	2.4	2.6	3.1	3.1	3.5	3.9	4.1	4.3	4.3
35	0.8	1.2	1.5	2.0	2.3	2.6	2.8	3.1	3.4	3.7	4.1	4.4
30	0.9	1.4	1.7	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.8	4.3
25	1.0	1.4	1.9	2.1	2.5	2.8	3.2	3.4	3.8	4.1	4.2	4.3
20	0.8	1.3	1.8	2.0	2.4	2.8	3.0	3.3	3.5	3.8	4.2	4.6
15	1.0	1.5	1.8	2.0	2.5	2.9	3.1	3.4	3.6	3.9	4.3	4.6
10	0.9	1.5	1.8	2.1	2.5	2.8	3.3	3.4	3.9	4.2	4.7	4.6
5	0.9	1.4	1.9	2.2	2.6	3.1	3.3	3.7	3.8	4.0	4.4	4.9
0	1.0	1.6	1.9	2.5	3.0	3.1	3.6	3.7	4.0	4.4	4.8	4.8

FIGURE 3

Actual TPOs and TFFs

8/27/87	A	B	C	D	E	F	G	H	I	J	K	L
TPO	12	25	32	41	48	55	62	68	76	87	94	101
TFF	65	75	70	70	70	60	60	60	55	60	60	50
8/28/87												
TPO	12	26	35	51	58	71	80	87	93	98	108	113
TFF	65	80	75	85	85	85	85	85	85	75	75	65

FIGURE 4

might have 12 and the C period 13. Therefore, on the cumulative TPO line, A=15, B=27, C=40 and so on to the L period. In this way, each half-hour period shows the *cumulative* TPO activity of the day to that point in time.

After all days were converted to TPO lines, the resulting table was sorted on the L column (the last period of the day for T-bonds). The sorted table was then compressed to 21 lines by averaging groups of 10 lines (for each TPO). This provided a range of TFFs from zero to 100% in steps of 5%.

Since this procedure focuses on the L period totals, there is no guarantee that values in other TPO columns will uniformly go from low to high. In fact, in Figure I, the D column between TFFs 35% and 45% shows a bump of 36 where you'd expect TPO counts of 32 or 33. Such bumps are probably caused by the small number of points (10) used in the averages.

TFFs and TPOs

Looking at Figure 1, the first row of data is for the most active market in the 10 months under study, a cumulative 215 TPOs for the day. Trading at or above the levels on this row constitutes activity in the upper five percentile level, markets that are highly facilitating trade.

The least active markets are in the bottom row, or the lowest five percentile of activity. They are characterized by 6 or fewer TPOs in the A period, 32 or less by the G period.

To use the table during a trading day, a trader needs only to count the TPOs that have occurred through a particular time period, look up that value in the table and obtain an immediate estimate of facilitation from the TFF column. For instance, imagine that the day is at the H period and there have been 86 TPOs so far. Looking in the H column, the closest TPO count is 85. Crossing to the TFF column, the TFF value is 85%. The market is facilitating trade very well.

TFFs and ticks

Figure 2 is a closely related trade facilitation table developed by following the same procedure as Figure 1, only with ticks traversed through each half-hour period in place of the TPOs. In this case, the focus is on the trading range and its growth. Tick counts can provide a cross-check on the TPO-count determination of trade facilitation. (Just as in the TPO table, any number of ticks above the 100% level indicates full trade facilitation while anything less than the zero level is still zero facilitation.)

Three-way cross-check

Another derived trade facilitation factor, namely the ratio of TPOs to ticks for each period, can be developed from Figures 1 and 2. The TFFs in Figure 3 are based on the ratio of the TPOs in each cell of Figure 1 to the tick counts in Figure 2. These TFFs serve as a cross-check on conclusions derived from TFFs in Figures 1 and 2.

The ratio-based TFFs have a column A that is essentially 1.0 (exactly what it would be if the TPOs and ticks had been sorted together). From A to L at the TFF = 100 level, the increase is somewhat less than triple, while at the TFF = 0 level it runs from 1 to 4.8. The high ratios are caused by the fattening of the profiles during periods of low trade facilitation.

Case histories

T-bonds for Aug 31, 1987, 12:30 p.m.	
8714	A
8713	A
8712	A
8711	A
8710	A
8709	A
8708	A
8707	AB
8706	ABE
8705	ABE
8704	BEF
8703	BEFI
8702	BDEFGI
8701	BDEFGI
8700	BDFGHI
8631	BCDGHI
8630	CDGHI
8629	CDH
8628	CDH
8627	CD
8626	CD
8625	C
8624	C
Center	8702
Value	8705
Area	8628
TPO-UPR	15
TPO-LWR	33
TPO-Total	48
Ticks	23
TF Factor	2.1

CBOT Market Profile of September 1987

TPO data provided by CBOT. Calculations by CISCO.

FIGURE 5

To test the TFFs against T-bond market data, I selected several days from various classes of market activity (by hindsight), looked them up and classified them as to trade facilitation.

1. Dec 1986 contract: 10/29/86, upward trending market. Observation: 133 TPOs, 55 ticks, close 97-4/32. TFFs: TPO 80%, tick 95%. Conclusion: Actively facilitating trade. Close next day: 98-5/32.

2. March 1987 contract: 12/24/86, flat pre-holiday market. Observation: 34 TPOs, 8 ticks, close 100-12/32. TFFs: TPO below 1%, tick below 0%. Conclusion: Dead, dead, dead. Close next day: 100-16/32.

The conclusion from the data at point one is that the market may or may not be facilitating trade and must be watched carefully for end of trend.

3. March 1987 contract: 1/5/87, possible start of a trend. Observation: 99 TPOs, 24 ticks, close 100-18/32. TFFs: TPO 45%, tick 45%. Conclusion: Maybe, maybe not; actually pretty active. Close next day: 100-16/32.

4. June 1987 contract: 3/12/87, flat, bracketing. Observation: 79 TPOs, 17 ticks, close 100-13/32. TFFs: TPO 15%, tick 15%. Conclusion: Not facilitating. Close next day: 100-24/32.

5. June 1987 contract: 4/9/87, trending down. Observation: 185 TPOs, 88 ticks, close 96-22/32. TFFs: TPO 95%, tick 100% . Conclusion: Highly facilitating. Close next day: 94-22/32.

6. September 1987 contract: 8/27/87, start of trend down. Observation: 185 TPOs, 88 ticks, close 96-22/32. TFF: TPO 85%, tick 75%. Conclusion: highly facilitating. Close next day: 87- 12/32.

Figure 4 illustrates the TPO counts and TFFs for August 27 and 28. Note that the TFFs were fairly stable throughout both days. This indicates that trade facilitation was roughly the same from start to finish. If there had been a large shift within the day it would have served as a significant alert portending change. For the same contract, a market snapshot of the next trading day, August 31, is shown in Figure 5.

In addition to the center, Value Area and TPO counts in Figure 5, the lowest group provides the TFF data. In I period with 48 TPOs, the TFF is 5%. The TFF for ticks is about 55%. The ratio of TPOs to ticks is very small at 2.1, resulting in TFF = 100% from Figure 3. The conclusion from the data at the I point is that the market may or may not be facilitating trade and must be watched carefully for end of trend. The anomaly is the low TPO count in a market that appears to be discontinuing its trend. This anomaly may be accounted for by the transfer of trading to the December contract or it may signal a basic problem with the market. In either case, the trader has been alerted to a potential trading with TFFs.

The TFFs are a quantified estimate of trade facilitation for all types of markets over the entire trading day. The three types of TFFs offer cross checking that is invaluable in the final determination. With the CISCO TFFs, any trader can estimate the level of trade facilitation at any time of the day. Possibly, this is most important for T-bond traders because the evening session starts before LDB reports are released

An important element not considered in this article is the actual volume. That is not because volume is unimportant, but rather that volume is not available during the trading day. After the close, volume can be used to confirm or modify conclusions drawn from the TFFs, offering a fourth cross check. If the

exchanges begin to release mid-day volumes, as has been suggested, the volume confirmation could come earlier.

The relative simplicity of constructing the trade facilitation tables makes it possible for any trader to build tables for futures other than T-bonds. The necessary historical data are available from the CBOT on microfiche or on diskettes from several vendors including CISCO. Several quote services carry CBOT Market Profiles (of which the report is an end-of-the-day summary), and although their history is not extensive, their users can save the daily profiles on their own computers. As time allows, we plan to do trade facilitation tables on other commodities, starting with soybeans and some of the other CBOT agriculturals.

Donald Jones is president of CISCO, a futures database service, 327 S. LaSalle, Suite 800, Chicago, IL 60604, (312) 922-3661.

References

Jones, Donald R. [1987], Estimating the Market Profile Value Area of intraday trading, *Stocks & Commodities*, September, 12-14.

Drinka, Thomas P. and Robert L. McNutt [1987], Market Profile and market logic, *S&C*, December, 15-18.

Drinka, Thomas P. and Robert L. McNutt, [1988], Market Profile, *Stocks & Commodities*, January, 40-42.

