In This Issue

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Capturing the Substance of Volume and Open Interest Data

Each month these pages report on a topic of general non-commercial interest for our readers. If you haven't noticed, this publication attempts to offer readers material of value without selling data services. We are committed to helping readers (CSI customers and non-customers alike) understand the markets sufficiently to avoid the industry traps to which we are all subject. Much of what you read here is the opinion and sentiment of Bob Pelletier and, as our mail proves, some do not agree with our opinions. For whatever it is worth, here is another edition for you to consider. Hopefully, most of the 50,000+ CSI Technical Journal readers will be better off for having seen the material researched for this latest edition.

In performing technical analysis on futures, the momentum of price movement is by far the most important predictive element of raw market data. Most technicians see little advantage in coupling volume and open interest data with price. The added value of volume and open interest may not be extraordinary, but don't be too quick to discount the importance of this supplementary information. In spite of the prevailing sentiment, we believe that for many technicians, there is sufficient content to offer significant help in trading the markets.

Because exchanges release volume and open interest reports up to a day late, it is difficult for analysts to pair the impact of volume and open interest with a given day's prices. To pacify critics, some exchanges offer estimated volume figures along with the day's pricing. Unfortunately, this information is often unreliable.

Volume is the term used to represent the number of contract transactions that are bought or sold during a given daily trading session. Volume may be thought of as a measure of speculative demand for the given commodity product (Please see CTJ495, Market Forces that Influence Cyclic Behavior). Open interest, on the other hand, represents the number of buyers (sellers) who remain in the market from prior days that have not yet sold (bought). When a buyer from a prior day eventually sells his position to a speculator today, the open interest count remains the same. The new buyer simply replaces the old buyer in tomorrow's open interest count.

If however, a given buyer (holder of a long position) sells his position to an old seller (holder of a short position) who wishes to buy, then the open interest count will drop by one. This accounts for an exit from the market by the pair of contract holders who agree upon the price for the opposite transaction. Open interest, like volume, is also a measure of demand for the commodity product, albeit a more or less seasonal component that must be interpreted in a different way.
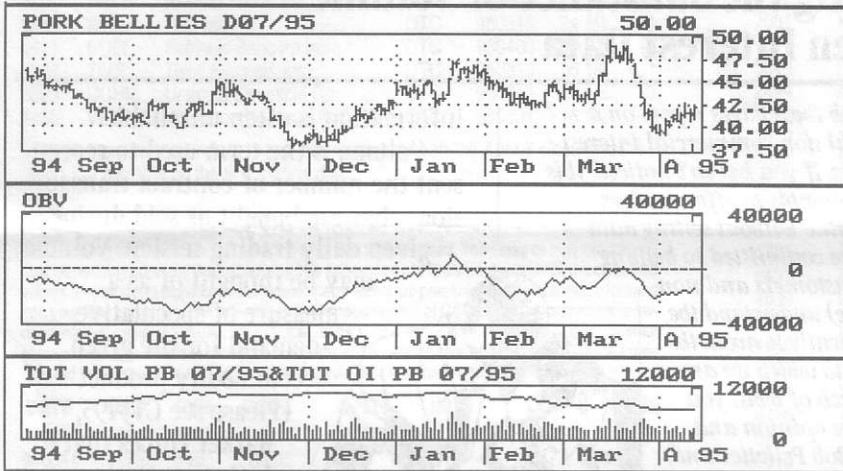
Both open interest and volume grow when new buyers and new sellers enter the market in anticipa-

tion of opposite price movement. Open interest and volume both fall when past buyers and past sellers agree to liquidate their positions. Net open interest growth occurs when the quantity

The above chart shows how On-Balance Volume has generally mirrored price movement. However, OBV's rate of decline was measurably less than the rate of price decline over the final two weeks of March. The failure of OBV to maintain the same rate of decline as price indicates a pent-up demand for pork bellies until early April 1995 when the market produced the anticipated price reversal response.

of new buyers and new sellers entering the market exceeds the quantity of old buyers and old sellers exiting from the market. The reverse occurs when open interest falls.

It is important to view open interest from a seasonal perspective because contra-seasonal movement in open interest has more significance when correlated with price. If price advances with strong contra-seasonal open interest advances, then this is viewed by technicians as a bullish technical factor because aggressive new buying appears to be in process. Similarly, if price declines with strong contra-seasonal open interest advances, then this can be viewed as bearish because aggressive new selling looks to be in process. When price advances with a contra-seasonal open interest decline, then the price decline may be prompted by short covering which suggests technical price weakness. When prices decline and open interest shows a contra-seasonal decrease, longs are prematurely leaving the market, suggesting technical strength.

The behavior of volume over time for all contracts of a commodity

depends more on its level relative to other volume readings over the short term than on the seasonal aspects of volume over an annualized period. A high volume relative to the average for the past year is less important than today's volume as compared to its general level over the past couple of weeks. Think of volume as your short term memory and open interest as your longer term permanent memory when sorting out your market studies.

Contract-by-contract volume and open interest reports identify to the trader the general level of liquidity for each of the delivery contracts. In most markets, volume and open interest levels slowly grow from contract inception until around the first notice day. This is the day near the end of a contract's life when the exchange begins the process of matching speculative position holders with hedgers. These hedgers may be producers or suppliers that desire to offer or take delivery of the underlying product. It is important to trade in liquid markets and most speculators hope to avoid being assigned a delivery notice. Knowing the relative levels of volume and open interest for all available contracts will help to guide you away from obvious pitfalls and aid in choosing the most appropriate delivery month for you.

Volume, coupled with price activity, can be used in technical analysis for developing trading systems. Joseph Granville's On-Balance Volume study tracks volume on a cumulative basis where day-to-day positive and negative price change is used to isolate whether volume is growing or contracting in step with price. In perhaps an oversimplification of his theory, if On-Balance Volume moves in step with price, then the market is behaving properly. If price moves in a direction opposite from On-Balance Volume, then this represents an opportunity to enter positions opposite from the

prevailing price trend. This idea was introduced in "Granville's New Key to Stock Market Profits," (Englewood Cliffs, N.J.: Prentice Hall 1953). Other off-the-shelf studies that factor in volume and/or open interest are Volume-Weighted RSI (the Money Flow Index) and PDI, which are included in QuickStudy.®

In summary, volume and open interest, although largely ignored by technicians, provide valuable information on market sentiment and contract liquidity. The substance of the information they provide can be captured in various market studies, including On-Balance Volume, the Money Flow Index and PDI. We urge you to take full advantage of the data you receive by considering the impact of volume and open interest in the markets.
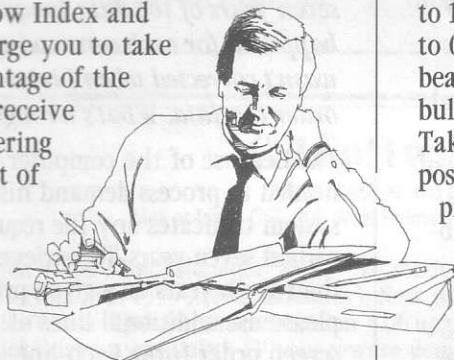
Building a Volume and Open Interest Model

Read further only if you are interested in model building. The following material may be helpful to some and confusing to others. It is a bit technical and assumes the reader can see between the lines to capture the analytical substance. It is not meant to be easily understood by the average trader.

A model could be developed to transform the above ideas into a technical trading system for study. Using regression analysis on short term price behavior, one could measure in a probabilistic sense whether today's price was bullish or bearish with respect to a price projection made from the recent immediate past. The projection probability price would hold a probability reading of say 0 to 1

as a measurement of the likelihood that prices are rising significantly, or a reading of 0 to -1 as a measurement of the likelihood that price is falling. Similarly, volume, On-Balance Volume, and open interest could all be respectively quantified and transformed into signed probability readings.

Remember to measure open interest movement against the seasonal norm for the given market under study, and to study volume and On-Balance Volume with a shorter term perspective. And if you are a student of probability, please forgive us for splitting the probability distribution from the 0 to 1 norm into two relationships of -1 to 0 and 0 to 1 instead of 0 to .5 for bearish movement and .5 to 1 for bullish movement of a given variable. Taking this minor liberty made it possible for us to manipulate the probabilities into an algebraic form that offered certain conveniences.

An equation defining $X(i)$, the market index for the ith day, could be written that would combine the above probability elements of price (P), volume (V), On-Balance Volume (B), and open interest (I) into a form useful for developing an index of market strength. Consider:

$$X(i) = \{W1*P+(1-W1)*P*[(W2*V+W3*B+W4*I)]\}$$

where:

The equation for $X(i)$ is structured to produced a reading from -1 to +1 for a given day i, where readings less than 0 represent negative price expectation and readings greater than 0 represents positive price expectation. All assigned weights are positive and each may range from 0 to 1, provided you comply with the summing rules shown below.

P is the price probability projection for day i computed from fitting a straight line through M past prices for past days ranging from day i-M to day
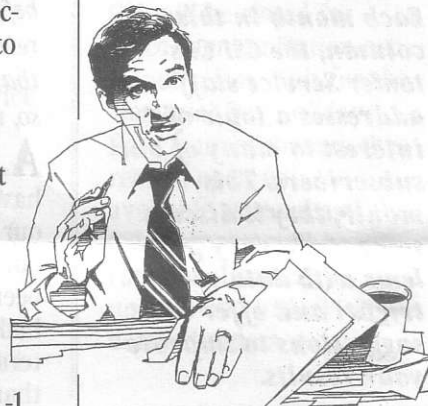
Ask Customer Service

Q. *I have been using CSI for years and have always been happy with the reliability of the retrieval system. Lately, I sometimes have to call twice before I can get data, and at times, my retrieval sessions seem to take longer than usual. Is something wrong and, if so, is it temporary?*

A. Over the past few months we have added more new subscribers to our system than in any other time in our history. Our customer base has been growing at a faster pace than we had anticipated and, for the very short term, it has reached a point greater than our computer system can easily handle.

The biggest degradation on our system comes not from the additional callers requesting daily updates, but from users requesting large amounts of historical data on-demand. This is a typical requirement for new subscribers, and one which we will handle better in the very near future.

We welcome our many new patrons and apologize for any accessing problems experienced by customers old and new. We are in the process of upgrading our system to handle the greater demands being placed on it. We expect to have the current round of improvements in place by early to mid May. You may have already noticed an improvement. If not, you'll be seeing a change shortly. We thank all of our customers for your patience!

Q. *Are there particular times when I am most likely to experience the most efficient retrieval service from CSI?*

A. Our computer is busiest from around 6 p.m. to 9 p.m. eastern time on weekdays. If you don't need your data during this time and can avoid these periods of possible congestion, you'll be improving service for yourself and for others.

Q. *Does the timing of my history on-demand orders have any impact on the daily update service?*

A. It sure does. Since processing historical data is very demanding on our computer and can tie up phone lines for extended periods of time, we ask that you try to limit large history requests to off-peak hours. Late at night or on weekends can be periods of very low demand. Calling at these times often results in lower phone rates.

Q. *When I ordered a long file as history on-demand, I only got the first seven years of the data I requested. This happened for each commodity, and it wasn't corrected when I tried to re-order the data. What's wrong?*

A. Because of the computer resources needed to process demand history, our system truncates any file request to the earliest seven years. To retrieve more than seven years on a given price series, please use additional lines of the on-screen order form. Each line should request a different time period (without overlap) of no more than seven years each. Recent versions of Quick-Trieve® will automatically store all the data in a single file on your hard drive.

We expect to relax this limitation from seven to 12 years in the very near future, as it is a top priority in our current efforts to upgrade our services. We regret any inconvenience this may have caused you.

Q. *I tried several times to get data on a Tymnet line last weekend with no success. When I switched to direct-dial, the call went right through. Is this a coincidence?*

A. Probably not. If a particular phone port goes down during the overnight and weekend hours when our staff is

off duty, that port will not function until it is manually reset by our staff. If you experience repeated difficulty with a particular method of access, please consider using a different phone number or an alternate method such as direct dial, or, if you are a network caller, another network.

A Reminder:

The Customer Service fax line (407) 392-1379 receives data from various sources from around 3:30 to 6:00 p.m. eastern time each weekday. If you need to fax customer service during these hours, please use the Marketing/ Bookkeeping fax line at (407) 392-7761.

This will free up the Customer Service fax line for incoming data and improve your chances of avoiding a busy signal. Your cooperation will be greatly appreciated.

Correction:

The March '95 Ask Customer Service column addressed using QuickTrieve Automation to speed file conversion, but gave the wrong keystroke combination to record a macro. To "Learn" a new macro, press <Alt><L>, then enter the QA number as desired. When finished learning the new macro, press <Alt><L> again. Our apologies for this inconvenience. ✦

CSI Software Product Summary

Please check all that apply and complete the information box at right.
Mail or fax to CSI, 200 West Palmetto Park Road, Boca Raton, Florida 33432; Fax: (407) 392-7761

❑ **QuickTrieve®/QuickManager®** for PC - To retrieve, manage & edit data (includes 1995 Alerts Calendar); New daily user $59. QuickTrieve/QuickManager version 4.06 upgrade (for current QuickTrieve users only): $39; shareware demo disk $5

❑ **1995 Commodity Alerts Calendar** for use with QuickTrieve $20; Calendar upgrade for current QT 4.06 users $10

❑ **QuickPlot®/QuickStudy®** for PC - Charting & analysis software (requires QT/QM) $89

❑ **Trade Data Manager™** - Macintosh downloader & accounting program $59; upgrade $49 or *FREE* with $100 history order

❑ **Trading System Performance Evaluator™** (TSPE) for PC - Computes your system's capital requirements $149

❑ **Trader's Money Manager™** for PC - $399 (includes TSPE); Demo disk: $15

❑ **TraDe$k™** for PC - Traders' complete accounting system - CSI daily user $149; Unrestricted use $299; 30-day trial version $22

❑ **Seasonal Index Value Pack** for PC - Ten years of history for 33 popular commodities $315

❑ **Daily Updates** for PC - Starting at $10.80 per month

❑ **CSI Technical Journal Subscription** - $35/Yr. Reprint - 8/90 to present - $5/each issue

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"Once the model is built and the heuristic learning process is complete, the user should prove the model and the associated parameters by applying it to a randomly selected, virgin test period."

i-1. M might nominally be set at 10, for example, and the last M days would become the sample from which day M's probability projection would be measured against the past.

Similarly, V is the volume probability projection for day i computed from fitting a straight line through K past volume readings for past days ranging from day i-K to day i-1.

Likewise, B is the On-Balance Volume probability projection for day i computed from fitting a straight line through L past On-Balance-Volume readings for past days ranging from day i-L to day i-1.

I is the open interest probability projection for day i computed from measuring the contra-seasonal forces that compare today's open interest reading with the norms of the distant annualized past for the commodity in question.

K, L and M should be treated as constants and, for convenience and simplicity, they may all very well represent the same value.

W1 and 1-W1 are weights applied to a) price alone and b) price coupled with volume, On-Balance Volume and open interest.

W2 is the weight assigned to volume

W3 is the weight assigned to On-Balance Volume, and

W4 is the weight assigned to open interest.

The three weights W2, W3, and W4 must always sum to 1.

When analyzing a given market, allow i to range forward to day N, the final day of data on file for the market to be considered. The weight W1 and should be nominally set at .5, and the weights W2, W3, and W4 could be nominally set at one-third each because there are a total of three weights that will modify the three variables attached to the price probability.

The suggested model would be more or less heuristic, where the four weights are dynamically determined

and adjusted daily. In other words begin with the nominal starting points suggested with i beginning at 1 plus the maximum of K, L and M and ending at N, the index of the last day on file. Then build a feed back mechanism that will allow small delta perturbations to the weights that will deliver marginally improved performance. The feedback mechanism will constantly measure whether the readings for X(i) produce the hoped for response on day i+1. We are attempting to answer the question: How should the weights be modified and in what direction must they change to produce an improved indicator for X(i+1) that will better predict future price?

The intent of the model is to iteratively and sequentially pass through several years (a total of N days) of Perpetual Contract®, back adjusted or another form of continuous data for a long period of time to determine an optimal set of weights that will predict future price movement. Once the model is built and the heuristic learning process is complete, the user should prove the model and the associated parameters by applying it to a randomly selected, virgin test period. Finally, the analyst should then pass her output through TSPE or TMM (You may want to consult CSI's promotional material on these products), or equivalent to be sure you have a technical trading product worthy of investment.

We sincerely hope that the above is generally helpful. Building a model requires a number of assumptions that we may not have stated. A class of problems may be solved in a manner like the above, but results should be certified on independent data before attempting actual use. ✦

Bob Pelletier