

## Analyzing Price Action with Volume Bars

By wmueller

### Overview:

The exchange of shares/contracts at the BID or ASK results in price movement. Inventory, available shares/contracts, is transferred from the trader (supplier) with the resting order (BID or ASK) to the trader (consumer) with the market order (market buy or market sell). The trader's goal is to detect shifts in bullish and bearish forces as soon as possible so as to be able to enter and exit a trade with as much profitability and little risk as possible. He does that by reading price action, bid and ask volume and inferring what the four characters in this play we call "the market" are doing and who has the upper hand.

### Definitions:

BIDs are resting quoted orders to buy shares or contracts at a certain price. ASKs are resting quoted orders to sell shares or contracts at a certain price. The quantity of these available shares or contracts constitutes the liquidity of the market.

Constant volume bars ("volume per bar" in Sierra Chart settings, for example), provide a unique perspective on trading and price action. One volume bar represents X number of shares/contracts traded, where X can be any positive integer. Volumes per bar might be 50, 100, 200, 1000, etc. Using this indexing method we now see price movement versus number of shares traded rather than versus time or range increment. Volume is the truest measure we have of trader activity. The underlying belief of this model is that price action (PA) based on volume is the truest indication traders have of market behavior and intent. One often hears of the old adage "volume is cause and price is effect". In this model, price and volume are the two dimensions of trading with volume on the x axis and price on the y axis. With this charting method the volume study, usually below the price chart, is unnecessary.

Volume, or total volume, equals bid volume plus ask volume. Bid volume is the number of trades executed at the Bid for a particular price; same for Ask volume. In a completed volume bar, total volume is always the same: the pre-defined value. The bid and ask volumes will vary but their sum will always be the same. The bid and ask volume difference in each bar can give the trader insight into the trading forces at work.

### What we can see:

Besides price action, traders can see two things: the depth of market (DOM) ladder and the actual traded bid and ask volumes, the signed exchanges. For the moment, we do not care about resting Bids and Asks. They can be pulled (withdrawn) at any time and do not necessarily equate to actual traded Bid and Ask volumes, although they can give clues and are not without value. So all we are concerned with in this model are Bid and Ask volumes, as well as the resulting total volume and the price action (PA). All other markings on the chart are derivations of those 3 items in order to support the trader's beliefs.

### Volume at Price

This is the graph on the side of the price chart that shows the number of shares/contracts traded at each price. There are peaks and valleys in this graph. The peaks indicate price areas of maximum trading and thus, disagreement. That's right, disagreement. Every transaction requires a buyer who expects price to go up, and a seller who expect price to down. More trades at a specific price means more wagering on both expectations and thus more disagreement. Price stays near by for a while indicating an auction market behavior. A volume peak can attract PA to it. Valleys indicate areas of minimum trading and thus minimum disagreement. Price doesn't hang around very long. Often, it either makes a V type reversal or "jumps the creek" and continues on in the same direction.

## Offense and Defense

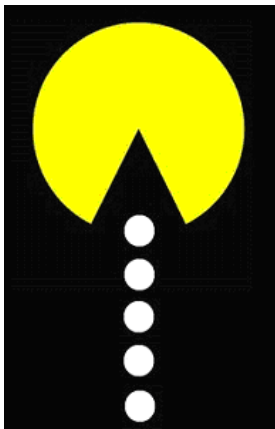
There are 4 characters in this play we call the market: Bullish Offense (non-quoting Market Buys), Bullish Defense (quoting Bids), Bearish Offense (non-quoting Market Sells), and Bearish Defense (quoting Asks). Two types of signed exchanges occur: Positive - between Bullish Offense and Bearish defense (Market Buy orders fill Asks) and Negative - between Bearish offense and Bullish Defense (market Sell orders fill Bids). Exchanges between Market Buys and Market Sells are infrequent, and therefore are ignored in this model. Traders are the actors who play the four characters and any one of them can change their “masks” at any time.

ACTORS	OFFENSE	DEFENSE
BULLISH	Market Buyers (non-quoting)	BIDs (quoting)
BEARISH	Market Sellers (non-quoting)	ASKs (quoting)

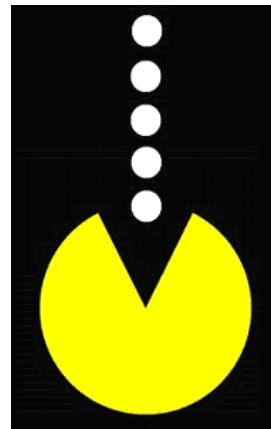
## Price Action (PA)

Price movement occurs when enough contracts are exchanged so that the quantity of Bids or Asks, the defensive orders at current price are consumed. For example: Suppose there are 250 asks at 50.25 (CL). They may not be visible in the DOM ladder but they are there nonetheless. Market buys (bullish offense) begin to come into the market and when 250 of them consume those Asks, then if there are still more of those market buy orders, price will go up to 50.26. If there are still sufficient market buy orders to fill all of the Asks at 50.26 then price will rise again, and so on and so forth. Likewise, market buys could cease and market sell orders could come in. Now the price would go down to the closest Bid price (the inside Bid). Think of Pacman eating his way through the cheeses (Bids and Asks) – except that the number of cheeses at each location varies as well as the speed of his chewing.

### Downward PA



### Upward PA



Using this type of charting, certain aspects of market action pop out once you learn how to read it. The first thing you must get into your head is that each bar represents a fixed number of shares/contracts changing hands. So now when we look at the size of the bar (range or high-low difference) we are seeing how many ticks price has moved for a fixed number of shares/contracts traded. And if we see a series of bars moving in one direction we can see in an instant whether that move required a large or a small number of shares/contracts. Price declines because inventory is eliminated at the inner Bid or it rises because inventory is eliminated at the inner Ask. Inventory can be eliminated in two ways: it can be consumed by market orders or it can be “pulled” by those who placed the Bids and Asks. Often it is a combination of the two.

## Inventory, Liquidity and Volatility

Inventory is the number of shares or contracts available at a particular price point. Inventory is provided by limit orders - Bids and Asks. Inventory is consumed by market buys and sells. Inventory can also be reduced by pulling the Bids or Asks. Liquidity is the number of shares/contracts that must be consumed, at the Bid or ASK to make price move. Volatility is the change in price over a certain number of shares/contracts traded. Thus, liquidity and volatility are inversely related. A volume bar's range (high – low) effectively indicates the

volatility of the market over that bar's duration, a certain number of shares/contracts traded. Average True Range (ATR) could be used to gauge the average volatility over a larger number of shares/contracts traded.

For example: suppose we see a 50 tick move up in CL (crude oil) over ten 200 volume bars. That means it took 2000 contracts to move price up 50 ticks. Then suppose price dropped back down 50 ticks in only 3 volume bars, meaning that only 600 contracts had to change hands to move 50 ticks. 2000 contracts up, 600 down. That is a significant difference. But what does it mean? Going back to our definitions, we know that on the way up market buy orders had to take out 2000 asks (actually that's not necessarily true but let's keep it simple for the moment), so there were a lot of Asks to consume. There was a lot of bearish defense that bullish offense had to overcome. To use the Pacman analogy: there were a lot of cheeses Pacman had to eat. Note that I did not talk about the amount of time it took to accomplish this. Now, on the way back down it took only 30% as many bars, only 600 shares/contracts, to move 50 ticks. Bullish defense, the Bids, were much fewer on the way down than bearish defense, the Asks, on the way up. Bearish offense, market buyers, had less work to do on the way down. You might see it on the chart with 10 bars of 5 tick height (on average) on the way up, while on the way down you'd see 3 bars of almost 17 tick height (on average). The down move is much steeper. The taller the candle, the steeper the move, the greater the volatility and the weaker the defense is (fewer contracts per price level). Therefore, the liquidity was lower on the way down. As they say, volatility is volatile. Liquidity is ... well ... volatile too.

When we look at a normal time based chart (time increment is constant on the x-axis) and see a steep move up, we conclude that a strong move occurred. But in a volume chart it is different, more nuanced. Perhaps a weak move occurred, bearish defense faded out (Asks pulled) with the attendant liquidity vacuum. Or perhaps bullish offense (market buys) came on strong and consumed lots of Asks. You will see it instantly on the volume per bar chart. Volume per bar charts, to some extent, require that you invert your thinking. This is good because it opens up your mind to a different way of thinking about price action and how the four characters in the market interact.

Another interesting thing you can see on a constant volume bar chart is a series of bars with zero or 1 tick height – no price movement. In CL, you might see eight 50 volume bars in a row with no price change. That's 400 contracts all exchanging hands at the same price. You might think there was no action going on. On the contrary, there was an epic battle going on, mano-a-mano, and no one was prevailing. Volatility contracted and liquidity was very high. You can see this at the end of the Pit session (1325 - 1330 CT) in CL. Tons and tons of contracts are changing hands with little or no price movement. Sooner or later though, one side will prevail; and sometimes it will result in a big move – a volatility breakout. You will see price action move up to a new price and then stop and stay at the price as if it hit a brick wall. In this case bearish defense (Asks) were piling on to prevent any more upward movement – and it may not have been apparent in the DOM ladder. You may not notice this with a typical time based chart unless you have a volume study and are trained well enough to see, out of the corner of your eye, volume rising up to a relatively high value. With volume bars, it's right there on the main chart with more and more bars forming without any price movement.

#### Cumulative Delta (volume) and Ask/Bid Difference

Volume = Bid volume + ask volume. Ask-Bid Difference = Ask volume – Bid volume. Suppose in a 200 volume candle that moved up 4 ticks, 50 contracts traded at the bid and 150 traded at the ask. The ask/bid difference for that bar would be 100. If we started at zero then we now have a cumulative delta of +100. If the difference on the next bar is +100 then cumulative delta is now equal to +250. If the difference on the 3<sup>rd</sup> bar is -150 then cumulative delta is now +100, and so on and so forth. Cumulative Delta (CD) is the sum of the ask/bid difference of the signed exchanges.

Here is where things get a bit tricky. Suppose you have a 200 volume candle with the close 5 ticks above the open and an ask/bid difference of -50. How can that even be possible? It is possible because price action (PA) does not necessarily go from 0 to +5 ticks in a straight line. It can zig zag up and down in some torturous manner to get there. And when price zagged down perhaps there was a lot of bullish defense (Bids) there

attempting to contain or prevent the downward movement. This is where we have to think in terms of a four-character play: not Bulls vs. Bears, but rather bullish offense vs. bearish defense and bullish defense vs. bearish offense. Clearly, on that candle the bulls won as price went up 5 ticks. But the ask/bid delta was -50 so there were 125 bid trades and 75 ask trades. Thus, bullish defense was doing a lot of work sneaking price up and bearish defense was slacking off. This is an aspect of trading that may not be apparent to some; and it may give you a leg up in this game.

With this knowledge we can look at a series of price moves that make, say, a V shape. Price goes down and then comes right back up to the initial price. Now look at the cumulative delta. Suppose it went down then came back up but to a lower level. What does that mean? I think it means that, overall, bid volume exceeded ask volume over the entire V shaped move. What does that mean in terms of the four players? It means that on the way down there was more bullish defense than bearish defense on the way back up. What if cumulative delta came back up but to a higher level than where it started? It means that on the way down there was less bullish defense than bearish defense on the way back up.

What if price is going nowhere in one of those epic mano-a-mano battles, but cumulative delta is rising? That means bullish offense (market buys) are meeting significant bearish resistance (asks). One of two things will happen to resolve the battle allowing price to move. Either bearish resistance (asks) will finally dissipate allowing price to rise, or bullish offense (market buys) will wither and price will fall.

Note that I haven't talked about the intensity of offense (market buys and sells). The intensity of these two players affects the speed (how quickly) with which price action changes. Market buys and sells are the initiative players in the market; nothing happens without their action. So they control the pace. You can get an extra sense of price action from this, but I'm not sure it tells you anything about trading.

#### Offense, Defense and Price Action

So, we have the price chart and the cumulative delta chart which indicate, respectively, effect and offense. Unfortunately we do not have anything to indicate directly what defense is doing. So we must infer from PA and CD what defense is doing. It is important to get a handle on defense because, as is often noted, defense is where the big/smart money is. Retail traders are typically offense (market orders). Below is a table showing the nine possible scenarios involving price action and cumulative delta and my take on what offense and defense are doing in each one.

#### Price Action (PA) vs. Cumulative Delta (CD) Divergence Pattern Decoding

	<b>PA Falling</b>	<b>PA Flat</b>	<b>PA Rising</b>
<b>CD Rising</b>	Minimal BIDs, up ticks seeing bearish defense. ASKs sneaking PA down.	Bullish offense trying but ASKs are holding the line	Bullish offense in control, overcoming bearish defense (ASKs)
<b>CD Flat</b>	Pulling the BIDs, no bullish defense. ASK's advancing minimally.	Nobody winning or losing, equal pressure in both directions	Pulling the ASK's, no bearish defense. BID's advancing minimally.
<b>CD Falling</b>	Bearish offense in control, overcoming bullish defense (BIDs)	Bearish offense trying but BIDs are holding the line	Minimal ASK's, downticks seeing bullish defense, BIDs sneaking PA up.

#### Understanding the Table

Lower left corner, PA falling – CD falling: market sellers, are driving PA; Bids, are static.

Upper right corner, PA rising – CD rising: market buyer, are driving PA; Asks, are static.

This is pretty normal activity.

Upper left corner, CD rising – PA falling” Asks are driving PA down. Defense tends to be the smart money or big money so this is something to pay attention to. If this happens after a big move up with PA changing direction before CD, you have distribution which means the big money is changing direction. Often, but not always, CD will follow suit. Remember, however, that the big money doesn’t always win.  
Lower right corner, CD falling – PA rising. Bids are driving PA up. Same deal only reverse direction.

12 O’clock PA flat – CD rising: market buys (offense) are pushing hard but Asks (defense) are holding the line. Consolidation occurs. This could also be distribution. Afterwards, there is often a big move but it could be a continuation or a reversal. You either wait for market to tip its hand and pay with larger risk or take the gamble with smaller risk. Either side could win or lose this battle. And there can be fakeout breakouts. You’ll have to be quick on the button if things go your way.

6 O’clock, PA flat – CD falling: market sells are pushing hard but Bids are holding the line. Same deal as above but opposite direction.

3 O’clock, CD flat – PA rising: Pulling the Asks. This is probably the trickiest action of all; deception is the name of the game. There are two possibilities. Luring in longs only to hit them with sell orders. Or, they realize they need to get out of the way because big money is hitting the buy button.

9 O’clock, CD flat – PA falling. Pulling the Bids. Same deal as above only opposite direction.

Dead center: Bullish and bearish offense are equal and defense is static. Neither side is winning. They call this agreement but I call it intense disagreement – both sides think PA will go their way; but obviously only one side will win. Which side will it be?

## PA Candle Size

Zero to two tick range candle = high liquidity, low volatility. A group of them together is a volume cluster. Look at CD to determine if Asks or Bids are holding the line. Sometimes a subsequent large range candle will indicate the new direction.

Large Range candle = high volatility, low liquidity, Asks or Bids have probably been pulled. Be prepared for a change in direction or intensity of movement.

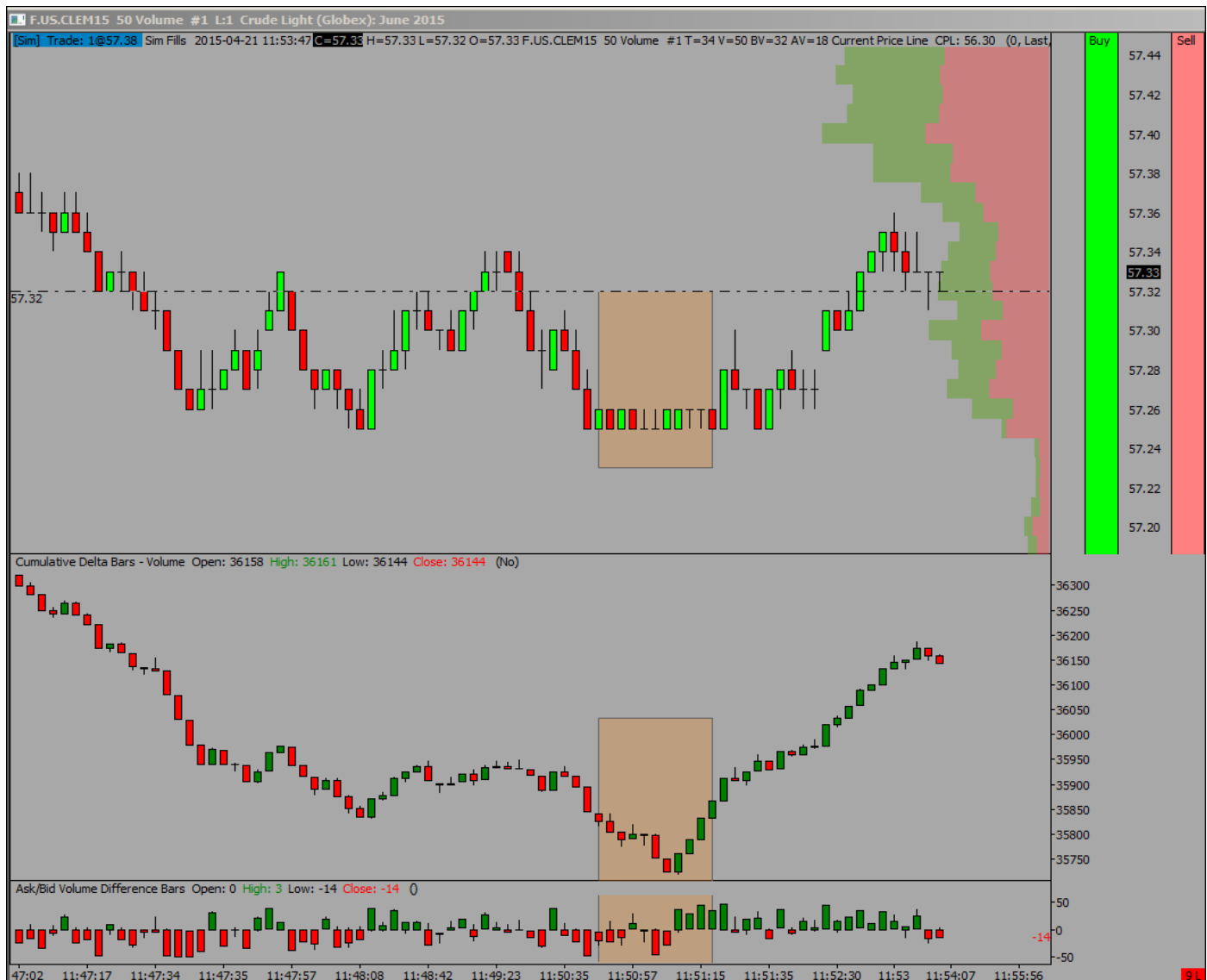
## Using Directional Volume (Delta Volume) charting

In a delta volume chart, Cumulative Delta study looks like a Renko chart. A new bar is created only when Ask volume – Bid Volume increases by X contracts, X being a number you set in the chart settings window. With this charting method CD will never be flat. Thus, the middle row of the PA-CD Divergence table above is not used. Consequently, high volume consolidations where trading oscillates between Bids and Asks, a non-directional volume cluster will be contained within one bar. In Sierra Charts this can be mitigated somewhat by setting the Graph Draw Type to Candle Price Volume Bars. So when you see a fat bar you know a consolidation occurred. An interesting situation is when you have a consolidation and then a breakout with a liquidity vacuum. You will get a long and fat bar.

Let's look at some Charts

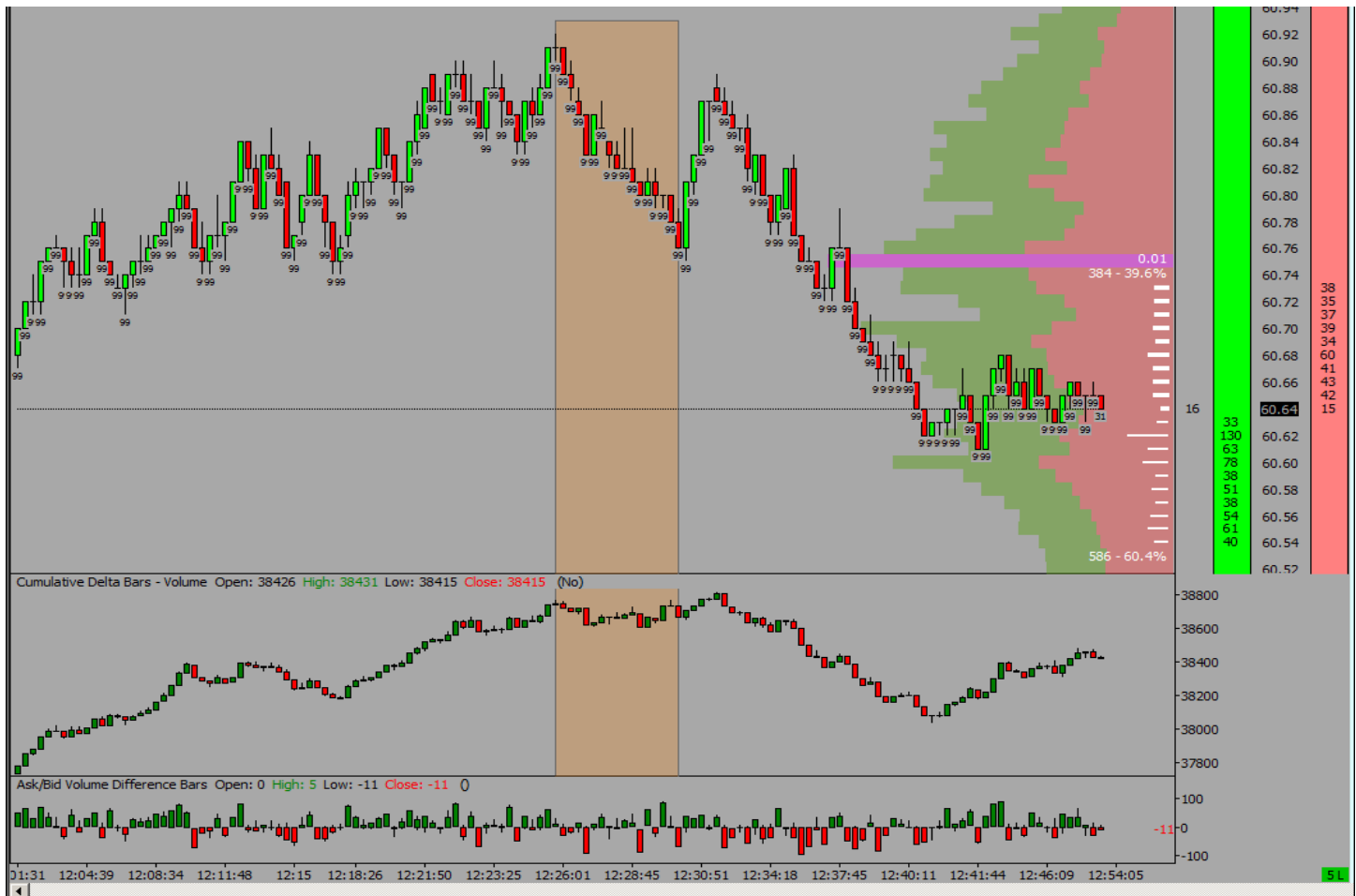
### Price action – Cumulative Delta Divergence – volume cluster

In the top study of the chart (50 volume price chart, CL) notice how price is not moving in the orange box. This is a **volume cluster**. Volatility decreases significantly in a volume cluster. In the cumulative delta (CD) study (below price chart) cumulative delta is going down then going up. CD going down means more trades hitting the bids – bullish defense not allowing bearish offense to get through. This is absorption. Then CD goes up with price flat indicating bearish defense holding the line against bullish offense. First, bids holding the line; then asks holding the line. After the end of the orange box, we see price moving up with CD moving up too. Bullish offense, is finally winning out over bearish defense. The volume cluster has become support. If PA had gone down, instead of up, the volume cluster would have been resistance. A move like this out of the cluster is a volatility breakout and can be the beginning of a powerful move.



## PA CD divergence Picture - PA dropping, CD flat

Notice in the highlighted region how PA is dropping while CD remains flat. This happens when the number of available Bids has decreased. The inventory of Bids has been reduced. The Bids have been pulled. Asks could have also been added, but we aren't seeing an overabundance of trades at the Ask; otherwise CD would be rising. Then, after the highlighted region, bullish offense came back in and PA along with CD went up. Then everything turned around and PA went down significantly. In this instance PA turned down before CD. Bullish defense gave up and bearish defense held the line (if not coming on stronger). Defense often is the cause of the turn.



## PA reversal – Gravestone in CD

Right at the top we see a Gravestone in the Cumulative Delta study coinciding with a down candle in PA. Notice that the previous candle was a tall green PA and medium size green CD. Bullish offense was in full swing right up until the gravestone but there weren't a huge number of ASK's at each price level. This is exhaustion. The CD gravestone indicates that bullish offense hit a wall of ASK's and then bearish offense took over, nulling out the positive ASK-BID difference that occurred at the beginning of the bar. Bulls were trapped at the top. You see this quite often (at least in CL).



PA flat while CD rises and PA turning before CD

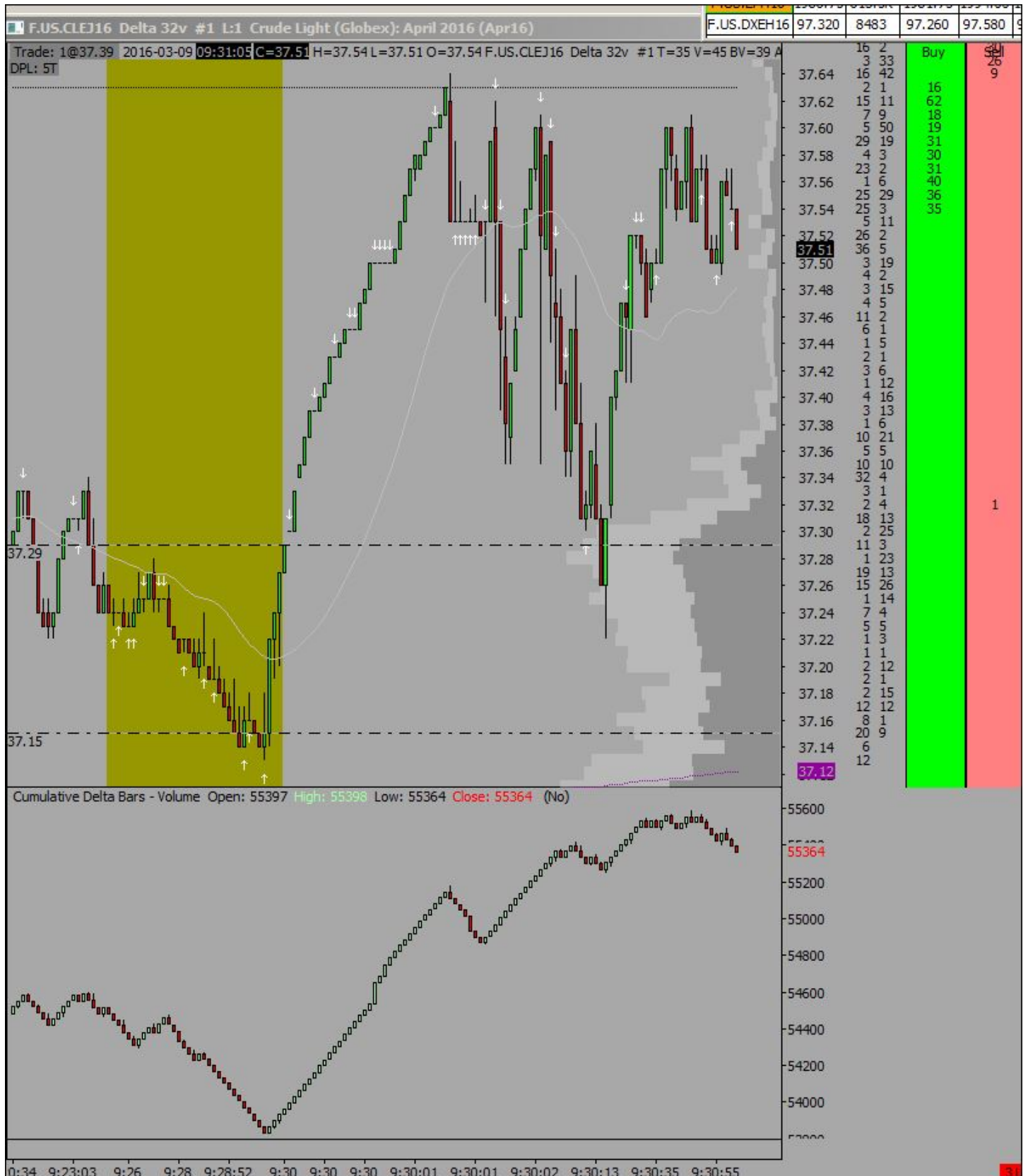
NOTE: This chart is a Delta Volume chart which makes the CD study look like Renko Chart. A new bar is created only when the difference in ASK – BID Volume reaches a specified number, either up or down. So directional volume is the independent variable, rather than total volume.

In the left oval PA is flat while CD rises. Then CD starts to fall and PA falls with it. The ASKs have stopped the market buys. In the right oval PA starts to drop, then goes flat while CD still rises (ASKs holding the line) then CD and PA turn down. These kinds of reversals take place a few times each day; and if you can spot them, you have some extra arrows in your entry quiver.



Run upstairs then jump out the window – news reaction

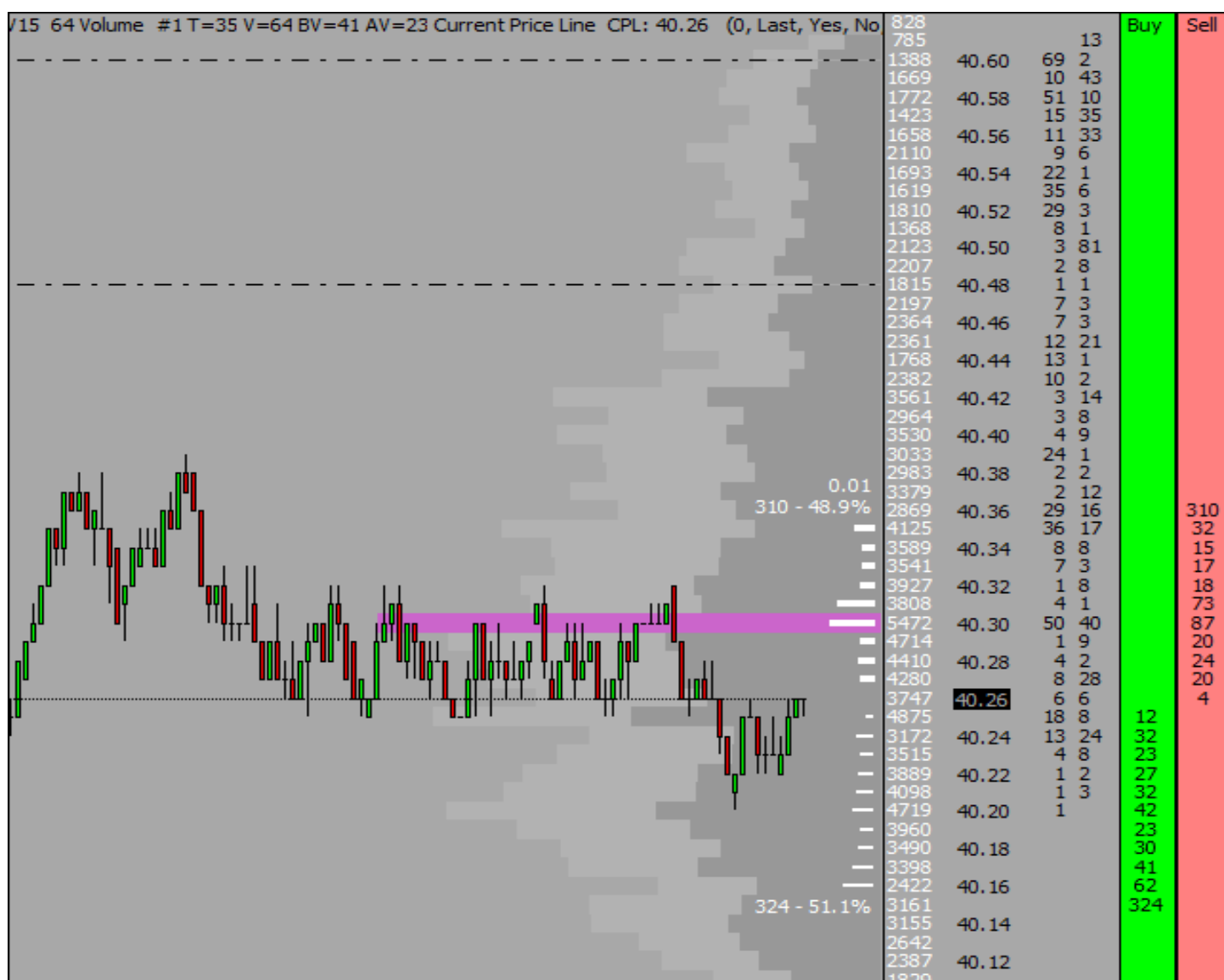
This occurred when the Crude Oil Inventory number was released at 0830 CT. The upward move beginning at the end of the yellow shaded area ended with a big red candle. CD went straight up indicating trades at the Ask only – pretty much instantaneously. Then when the market buys wer satisfied pA immediately went down 10 ticks indicating the Bids had not kept up with the move. For the next 30 seconds there were huge gyrations indicating and illiquid market. Notice how CD is generally moving up almost the entire time.



Using the Depth of Market (DOM) ladder (not part of the model)

The DOM ladder is the collection of numbers showing the quantity of BIDS and ASKS below and above current price respectively. There are many traders who do not use charts but use the DOM ladder from which to trade. The DOM can indicate intent but often that intent is deception. Above current price are resting ASKS (also known as offers), below are resting BIDS. In the picture below the DOM ladder is displayed two ways: one with numbers in the green and red columns (which also serve as the buy and sell order columns), and the other the horizontal white bars to give a graphical picture. This picture also shows the constant 64 volume bar chart along with the Volume at Price display (right justified).

When all the ASKS are consumed (or pulled) Price will go up one tick on the next market buy order. Thus watching the innermost ASK resting quantity might give a trader some indication of impending price movement. If Ask quantity is decreasing price might go up and vice versa for Bid quantity. It doesn't always happen, but it is something to watch for. In the CL chart below, notice the large number of resting ASKS (87 to be exact) at \$40.30. Sometimes that large order can actually attract price towards it. But the trader(s) placing that order may not intend to sell 87 contracts. When price gets to that point, the Asks, as well as the ones at \$40.31, might get pulled allowing price to move up even more. Sellers at the lower prices are now feeling pain and their stop losses (which are unseen market buys) might get triggered which will drive price even higher. Thus, the entity behind the large number of ASKS might have wanted price to go up. It pays to consider how something in the DOM could be deception.



## APPENDIX

Using the Trading Model with Volume Bars to frame The Now Moment Questions from Mark Douglas (The Disciplined Trader, p.216)

1. What is the market signaling at this moment?  
\*Is PA convergent or divergent with Cumulative Delta (CD)? Is PA consolidating, expanding, ranging? Is defense or offense controlling? Where does price want to go?
2. Who is paying up to get in or out?  
\*Market Buys/sells, or bids/asks. Big money vs. small money, institutions vs. public.
3. How much strength is there?  
\*Small range bar = lots of defense, bids/asks. Quick action, lots of small bars in one direction = lots of offense (market orders). Look at angle of ascent/descent. Very high range bar = liquidity vacuum. Many bars of zero width no change in price = volume cluster.
4. Is momentum building?  
\*Look at slope. Are the volume bars getting larger?
5. Can it be measured relative to something?  
\*Compare the size (range) of the volume bars.
6. What would have to happen to indicate the momentum is changing?  
\*PA – CD divergence, PA slope change, are bar ranges expanding/contracting?
7. Is the trend weakening or is this a normal retracement?  
\*PA – CD divergence, PA slope change. Compare the size (range) of the volume bars. Compare recent highs/lows. Is trend line angle reducing?
8. What would show that? If the market has displayed a fairly symmetrical type of pattern and that pattern has been disturbed, then it is a good indication the balance of forces has shifted.  
\*Look slope changes, bar length changes and cumulative delta divergences. Still in channel or moving outside of it?
9. Are there any places where one side will definitely gain dominance over the other? If that point is reached, it still may take sometime for the other side to be convinced they are losers. How long am I willing to give them to rush out of their positions?  
\*Look for support/resistance, swing highs/lows that show a top/bottom, supply/demand. What happens with PA there? Sideways action – could go either way, must wait. Reversal, wait for the pullback. Ploughs through – wait for a pull back. Always look for a spot where you can define a low risk point where, if your expectation is wrong, you would exit the trade at a minimum cost (a low cost fail point) and yet have a high probability of success.
10. If they don't rush out, what will that indicate?  
\* If PA doesn't move and CD doesn't show a divergence, then there is agreement and lack of activity.
11. What did traders have to believe to form the current pattern relative to the past? Remember that people's beliefs don't change unless they are extremely disappointed (by unfulfilled expectations).  
\*There is always disagreement in the market; otherwise prices don't move. It takes a stronger belief on the part of the bulls (bears) for prices to go up (down). The move can be brought about either by offense or defense.

12. What will disappoint those with the predominant force?

\*Lack of strong enough PA in the desired direction or a move in the wrong direction.

13. What is the likelihood of that happening?

\*Must have statistics on the PA and CD patterns you are seeing to know what the likelihood is.

14. What is the risk in finding out in trading?

\* The risk is the difference between entry and fail point.

15. Is there enough potential for movement to make the trade worth the risk?

\* must look for a likely target based on previous edge levels and volume-at-price structures to come up with an educated guess. But remember it is only a guess. Anything can happen.

## Trading – What Might Happen

Situation: Price moves up then hits a brick wall and trades there for a while. CD rises while PA is flat. Bullish offense has met bearish defense – the ASKs are piling on to prevent price from rising any further. What might happen?

- Scenario 1: The bears relent, the ASKs dry up and bullish offense (market buys) continue on and price rises. The flat lining PA has become a continuation pattern. Tradable pattern is to buy a few ticks above the top of the consolidation zone. Or even better, wait for a pullback to confirm that the consolidation has become support.
- Scenario 2: The bulls relent, market buys dry up and the bears, sensing this, come on strong with lots of market sells. PA and CD drop. Tradable pattern is a sell stop a few ticks below the consolidation area's low. Or even better, wait for a pullback to confirm resistance.
- Scenario 3: The fake out breakout Part I. The bears seem to relent, PA rises above the brick wall consolidation area. Break out traders, bullish market buys, get sucked in, then they get exhausted. Bearish offense, market sells, come on strong against a bullish defense, BIDs, which are weak because bullish offense, market buys, got exhausted. PA goes down. Scalpers may have gone long too; but as soon as there is any hint of bulls letting up they must exit. Or a tight stop loss could be used with the understanding that, in a breakout, PA should take off and go for a while. That's why they call it a breakout. Then the breakout traders start feeling the pain, as they often do, and start to exit creating more bearish offense, market sells. Remember, most stop losses are market orders – they are shown on the ladder. So to take them out requires either big money stop hunting or a cascade reversal to take out the bids.
- Scenario 4: The fake out breakout, Part II. Everything said in part I applies except the scalper didn't go long. Instead he waits for either pullback or the turnaround. A very telling signal is a gravestone on the CD study, especially after CD has made a move of at least 800 contracts (on CL), preferably more.

In much of this kind of short term trading, one waits for confirmations, pullbacks to set up a local price point that tells you where you would be wrong with minimal risk if you entered. Looking at the longer term trend helps in this regard. Thus, picking tops and bottoms is not part of this modus operandi. Perma-faders die in this environment. It takes a very long time for most traders to learn the personality (personalities) of a particular market, develop a strategy to profit consistently and then execute the strategy flawlessly in real time.

## Smart money vs. the public

I believe most of the Bids and Asks are placed by professionals. They try to hide their intentions, somewhat, in those resting orders, which in reality are pulled or almost instantly. As mentioned earlier, you can often see Bids or Asks affecting PA at the end of the Pit session in CL. This is an example of the old adage: "Amateurs open the market but the pro's close it." That belief notwithstanding, the pro's do use market orders; but I contend the amateurs are a small part of the Bid/Ask orders.

## Scenarios

1. When would the smart money pull its BIDs?
  - a. When it is afraid price is going to go up substantially (beginning of rally).
  - b. If it is trying to suck in longs to get a reversal going (end of rally).
2. When would smart money pull its ASKs?
  - a. When it is afraid price is going to go down substantially (beginning of downdraft).
  - b. If it is trying to suck in shorts to get a reversal going (end of down draft).
3. When would smart money pile on the BID's and prevent price from dropping any further?
  - a. When it wants to reverse the downtrend.
  - b. When it wants a fakeout breakout.

### Bait n Switch – Reversal to Long

PA has been going down.

Additional Asks make MKT look weaker, hold the line with, or pull, Bids, draw more shorts in. Then Asks get pulled.

PA should make a leap up.

### Getting the edge – hitting into a price just before it leaves (long)

You opine that market should go up.

You see that Asks are being consumed at price X so you buy at X.

X goes to Bid.

You now have the edge, you're at BE.

### The Obvious (short)

Price gets down to a level fairly quickly

Then there is a bid pull

PA continues to go down

### The Wedgie (triangle)

PA gets to a level

Then PA pulls back, then goes back up to level

Then PA pulls back again but not as much, and perhaps again.

Go long after a pull back before it breaks through. Use the pullback level as the fail point (+ a tick or 2)

### Fake Out Breakout (long)

Bids get pulled PA goes down.

Then market buys pile on.

PA jumps up.

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// CUSTOM STUDY
// DelDivBar.cpp
// originated by "yon" from the SierraChart support board
// http://www.sierrachart.com/SupportBoard.php?ThreadID=4449#P18857
// modified by wmueller

//This program draws a down-arrow above a price bar that has a close equal to or below its open
//and whos corresponding cumulative delta bar has its close greater than its open by
//a minimum threshold which is an adjustable parameter.
//It also draws an up-arrow below a price bar that has a close equal to or above its open
//and whos corresponding cumulative delta bar has its close less than its open also by
//said minimum threshold.

//The down arrow would indicate that price went down or stayed flat but cumulative delta went up
//meaning that the ASKs (offers) were holding price in place or even pushing it down
//Likewise, the up arrow would indicate that price went up or stayed flat but cumulative delta went down
//meaning that the BIDs were holding price in place or even pushing it up.

//Typically, market buys push price up and market sells push price down; and cumulative delta goes up
//when price goes up and it goes down when price goes down.
//The up arrows and down arrows indicate when that is NOT the case and the BIDs and ASKs, rather
//than the market buys and sells, are really driving price action (PA).
//Up arrows indicate that the BIDs are sneaking price up or at least holding it in place.
//Down arrows indicate that the ASKs are sneaking price down or at least holding it in place.
//This can be important information to detect shifts in sentiment and, possibly, turns in PA.

////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////

#include "sierrachart.h"

SCDLLName("DelDivatBar") // declare the name of the study dll "name.dll"

// Declare the function
SCSFExport scsf_my_DelDivatBar(SCStudyGraphRef sc)
{
    // create the top and bottom signals by referencing them to subgraphs
    SCSubgraphRef TopSignal = sc.Subgraph[1]; // create the topsignal (down arrow) array and
reference it to sc.subgraph[1]
    SCSubgraphRef BottomSignal = sc.Subgraph[2]; // create the bottomsignal (up arrow) array and
reference it to sc.subgraph[2]

    // Declare the adjustable parameters that show up in the study settings window
    SCInputRef SoundAlert = sc.Input[1]; // 1 = alert on, 0 = alert off
    SCInputRef Thresh = sc.Input[2]; //sets how many ticks difference from open to close must there be.
range 0-16

    // Section 1 - Set the configuration variables and defaults

    // This section only runs once upon adding an instance of the study to a chart
    // and when a chartbook is opened and an instance of this study is on a chart in a chartbook.
    // It is run once for each instance in this case.

```

```

    if (sc.SetDefaults)
    {
        sc.GraphName = "DelDivatBar"; // this is the actual name: Analysis >> Studies >> Add Custom
Study >> [Custom Study Name],
        sc.StudyDescription = "DelDivatBar"; // description that shows up in the study description

//When sc.AutoLoop is set to 1 (TRUE), then sc.BaseData and sc.Subgraph[].Data[] array element looping is
automatically performed.
//Otherwise, you will need to create your own internal loop to iterate through these arrays.
//It is preferred that you set sc.AutoLoop to 1 (TRUE) unless you do not require it.
//For a complete discussion on this, refer to Automatic Looping/Iterating.
//sc.AutoLoop must only be set within the sc.SetDefaults code block at the top of the study function.
        sc.AutoLoop = 1; // true

//sc.FreeDLL can be a TRUE (1) or FALSE (0) value indicating whether or not to free the DLL
//your study is located in after running your study function.
//Set this to 0 (FALSE) to tell Sierra Chart not to free the DLL. As of version 752, the default is 0.
//Previously this was 1 by default. Setting it to 0 (FALSE) will significantly speed up calling your
//Advanced Custom Study function because the overhead of loading and freeing the DLL will be eliminated.
//It is critical with Sierra Chart versions 297 and higher that after your study development is done that
//you set this member to FALSE (0). Otherwise, CPU usage will be noticeably increased.
//The disadvantage of setting this to FALSE (0) is you can not make changes to your function source code while
//Sierra Chart is running since the DLL file is opened, locked and cannot be modified.
//For this reason, you should set sc.FreeDLL to 1 (TRUE), while developing your study,
//and set it to 0 (FALSE) once you are finished.
        sc.FreeDLL = 0;

// use the main graph region (typically the price chart)
        sc.GraphRegion = 0;

        TopSignal.Name = "TopSignal"; //variable name for the graphic that would go above the bar
        BottomSignal.Name = "BottomSignal"; //var name for the graphic that would go below the bar

        TopSignal.DrawStyle = DRAWSTYLE_ARROWDOWN; // use a down arrow above the bar
        BottomSignal.DrawStyle = DRAWSTYLE_ARROWUP; // use an up arrow below the bar

// Adjustable parameters
// Parameter 1 details - do you want a sound alert?
        SoundAlert.Name = "SoundAlert";
        SoundAlert.SetDescription("SoundAlert");
        SoundAlert.SetInt(0); // it is an integer, initialize to 0 (off)
        SoundAlert.SetIntLimits(0, 1); // range of values: 0, 1 (off/on)

// Parameter 2 details - Threshold, min difference between bid vol and ask vol
        Thresh.Name = "Threshold";
        Thresh.SetDescription("Cum. Delta O/C min. diff. to trigger alert");
        Thresh.SetInt(0); // it is an integer, initialize to 0
        Thresh.SetIntLimits(0, 256); // threshold range 0 - 256

// Must return before doing any data processing if sc.SetDefaults is set
        return;
    } // end of if conditional

```

/ Section 2 - data processing

// Everything below here is run on every chart update or when the chart is reloaded.

// Declare the variables

```
int Ask = sc.AskVolume[sc.Index-1];      // from sierra charts
int Bid = sc.BidVolume[sc.Index-1];      // from sierra charts
int Delta = Ask-Bid;                      // from sierra charts
float BarOC = sc.Close[sc.Index-1]-sc.Open[sc.Index-1]; // from sierra charts
int sound_alert = SoundAlert.GetInt();    // sound alert enable param. 0/1 off/on
int Threshold = Thresh.GetInt();          // Min. o/c diff in the cum delta bar to trigger an alert
```

// If the price bar has an close-open difference  $\geq 0$  and the cumulative delta bar close-open  $\leq$  -threshold

```
if( BarOC  $\geq$  0 && (Delta + Threshold)  $<$  0)
```

```
{
```

```
    BottomSignal[sc.Index-1] = sc.Low[sc.Index-1]-sc.TickSize; // issue the bottom signal alert (down
arrow)
```

```
    if(sound_alert == 1)sc.SetAlert(7);
```

```
}
```

// If the price bar has an close-open difference  $\leq 0$  and the cumulative delta bar close-open  $\geq$  +threshold

```
if(BarOC  $\leq$  0 && (Delta - Threshold)  $>$  0)
```

```
{
```

```
    TopSignal[sc.Index-1] = sc.High[sc.Index-1]+sc.TickSize; // issue the topsignal alert (up arrow)
```

```
    if(sound_alert == 1)sc.SetAlert(8);
```

```
}
```

```
} // end of function
```