TradeStation® Labs

ANALYSIS CONCEPTS

Analyzing Volume in the Pre-market Stock Session

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Features
- Focus: Technical
- Markets: Equities
- Time Perspective: Short-term

Studies/Files Included:
- Workspaces
- Indicators

Introduction

Traders of U.S. equities know that the conventional session for these securities is 9:30 a.m. to 4:00 p.m., U.S. Eastern Time. These hours have been in place on the New York Stock Exchange (NYSE) and NASDAQ for many years. However, changes in market structures, venues and technology – along with the tide of globalization – have pushed the boundaries. Now there are distinct sessions each day before and after the standard NYSE and NASDAQ day sessions.

This *Analysis Concepts* paper delves into the volume characteristics of the Pre-market session. The objectives are to:

- isolate and compare Pre-market volume data

- compare a stock's Pre-market volume data to its own Pre-market volume history

- test the theory that exceptionally high Pre-market volume may be a useful trade filter.

Background

In TradeStation nomenclature, the three sessions per day are referred to as the Pre-market session, the Primary session and the Post-market session. The trading hours are detailed in Table 1.

Table 1: Three sessions per day for U.S. Equities. All times are U.S. Eastern Time (ET).

	Session Start Time	Session End Time
Pre-market	8:00 a.m.	9:30 a.m.
Primary market	9:30 a.m.	4:00 p.m.
Post-market	4:00 p.m.	8:00 p.m.

Although trades may be reported before 8:00 a.m., volume is often very light and bid/ask spreads are wide at very early U.S. hours. The period from 8:00 a.m. until the Primary market opens at 9:30 a.m. is how we define the Pre-market session and is the focal point of this paper. That is also the period studied in Table 2.

Of course, volume in the Primary market session dominates the total volume by far, both in gross totals and when adjusted for the length of the sessions. To illustrate this point, we analyzed volume data in the Pre-market and Primary sessions for a short list of active stocks. The period covered is December 2011. The last column in Table 2 shows the volume in the early session as a percent of the Primary-session volume, adjusted for the different session lengths.

Table 2: Sample average volume for Pre-market and Primary sessions. Data is for December 2011.

Symbol	Average volume, Pre-market session	Average volume, Primary session	Average volume per hour, Pre-market session	Average volume per hour, Primary session	Pre-market session volume as % of primary session volume, adjusted for length of session
AAPL	118,237	9,884,894	78,825	1,520,753	5.18%
EBAY	11,894	8,661,903	7,929	1,332,600	0.60%
GMCR	31,299	5,068,013	20,866	779,694	2.68%
ESRX	4,826	4,703,438	3,218	723,606	0.44%
BBBY	9,217	2,459,232	6,145	378,343	1.62%

Putting these multiple sessions into perspective, the Post-market session (not studied here) is often a very low volume period, used as a "late exit" facility for traders who need to adjust a position. Of course, news events – earnings reports in particular – can make the Post-market session for any particular security an active and volatile affair.

However, the stage for the Pre-market session is set by news and market action from Europe, U.S. economic reports, earnings reports, etc. It is the beginning of the U.S. banking and business day and is followed by the 6.5 hours of the Primary session. This is why the price and volume characteristics of the Pre-market session are so intriguing, even to those who may not be trading in that session and despite the small percentages in the last column of Table 2. Are those price and volume characteristics foreshadowing the action to come in the Primary session?

A particular note of caution: on any given day, even a generally liquid security may have only a few or even no trades in the Pre-market session.

Isolating and Tracking Pre-market Volume

RadarScreen®, Chart Analysis and custom sessions may be used to establish a method and organize tools for identifying and monitoring stocks that show exceptional volume in the Pre-market session.

The first requirement is to be able to do real-time monitoring of Pre-market volume on a list of securities and compare it to the average Pre-market volume for the previous number of trading days. It is also useful to track the price direction in the Pre-market session. These are best done using RadarScreen, a custom session and a custom indicator.

Figure 1: RadarScreen page with indicator TSL:Pre-market Volume_RadarScreen applied to the NASDAQ 100 components (excerpt).

The column *Date* is included as a plot because not every stock trades in the Pre-market session each day. This column assures us that we are evaluating today's Pre-market session. The symbols are then sorted by today's Pre-market volume as a percent of average Pre-market volume, *%AvPre-M Vol*. Note that the *Format Symbol* dialog is set to use a custom session that views only the data from the Pre-market session; this RadarScreen page will not update after that session.

The inputs and plots for the custom indicator above, TSL:Pre-market Volume_RadarScreen, are detailed in the tables below. The indicator and the custom session are available for download with this paper.

Table 3: Inputs for RadarScreen indicator, TSL:Pre-market Volume_RadarScreen.

Input	Default Value	Description
Length	10	Number of bars (days) to be used in average of Pre-market volume
AlertPct	20	Pre-market volume exceeding the average Pre-market volume by this percent will generate an alert
Upcolor	Green	Color for Pre-M Close if greater than prior Primary market close and positive values for Pre-M NetChg and Pre-M C-O
DownColor	Red	Color for Pre-M Close if less than prior Primary market close and negative values for Pre-M NetChg and Pre-M C-O
HighVolumeBGColor	Yellow	Color for background of Pre-M Vol cell if Pre-M Vol greater than average
DefaultBGColor	Black	Default cell background color

Table 4: Plots for RadarScreen indicator, TSL:Pre-market Volume_RadarScreen.

Plot	Description
Pre-M Vol	Volume in the current or most recent Pre-market session
AvgPre-M Vol	Average volume in the trailing Length Pre-market sessions prior to the most recent Pre-market session
%AvPre-M Vol	Volume in the current or most recent Pre-market session as a percent of average volume in the trailing Length Pre-market sessions prior to the most recent Pre-market session
Pre-M Close	Last trade or close of the current or most recent Pre-market session
Pre-M NetChg	Net change of the current or most recent Pre-market session from the close of the last Primary session
Pre-M C-O	Net change of the current or most recent Pre-market session from its open
Date	Date of the last Pre-market data reported
Time	Closing time of the Pre-market session (included to check that the symbols are formatted with the correct custom session; this plot may be hidden by the user)

Figure 2: Chart Analysis window with Pre-market and Primary session data. Volume and average volume for Pre-market session only.

Traders will also want to zoom in on specific symbols and examine their Pre-market volume and price history. The chart in Figure 2 is constructed using the standard custom session *US Stock with Pre-market* (supplied with TradeStation) and a 390-minute bar interval. There are two bars per day: one for the Pre-market session (light gray) and another for the Primary session (black).

Also in the chart is a custom indicator, TSL:Pre-market Volume_Chart, that calculates and displays the volume and average volume for the Pre-market sessions only. Pre-market sessions that have volume exceeding the average Pre-market volume are marked with a dot. Notice how clearly the Pre-market volume spikes stand out.

Table 5: Inputs for Chart Analysis indicator, TSL:Pre-market Volume_Chart.

Input	Default Value	Description
Length	10	Number of bars (days) to be used in average of Pre-market volume
AlertPct	20	Pre-market volume exceeding the average Pre-market volume by this percent will generate an alert and cause the additional dot on the histogram

Table 6: Plots for Chart Analysis indicator, TSL:Pre-market Volume_Chart.

Plot	Description
Pre-M Vol	Volume in the current or most recent Pre-market session
AvgPre-M Vol	Average volume in the trailing Length Pre-market sessions prior to the most recent pre-market session
HiPre-M Vol	Dot indicating Pre-market volume exceeding its average by at least AlertPct percent

We have seen two perspectives for monitoring Pre-market volume. The RadarScreen page in Figure 1, with custom session and indicator, is ideal for monitoring this volume and finding exceptionally high Pre-market volume on a list of symbols in real-time. The Chart Analysis window in Figure 2 offers a close-up view of the Pre-market volume data, along with the price bars for both the Pre-market and Primary sessions, for a single security. This affords the opportunity to examine the price patterns in the Pre-market session and see if there is notable price correlation with the following Primary session.

These perspectives may be particularly useful to the discretionary trader: a RadarScreen layout with real-time flags and alerts highlighting those securities showing exceptional volume in the Pre-market session, and the accompanying chart allowing detailed consideration of a security's price and volume patterns in these sessions.

Still, both strategy traders and discretionary traders may wonder if this Pre-market volume data can be used as a filter for trading signals. What might be the effect on trading results if this volume information is used to qualify simple price signals?
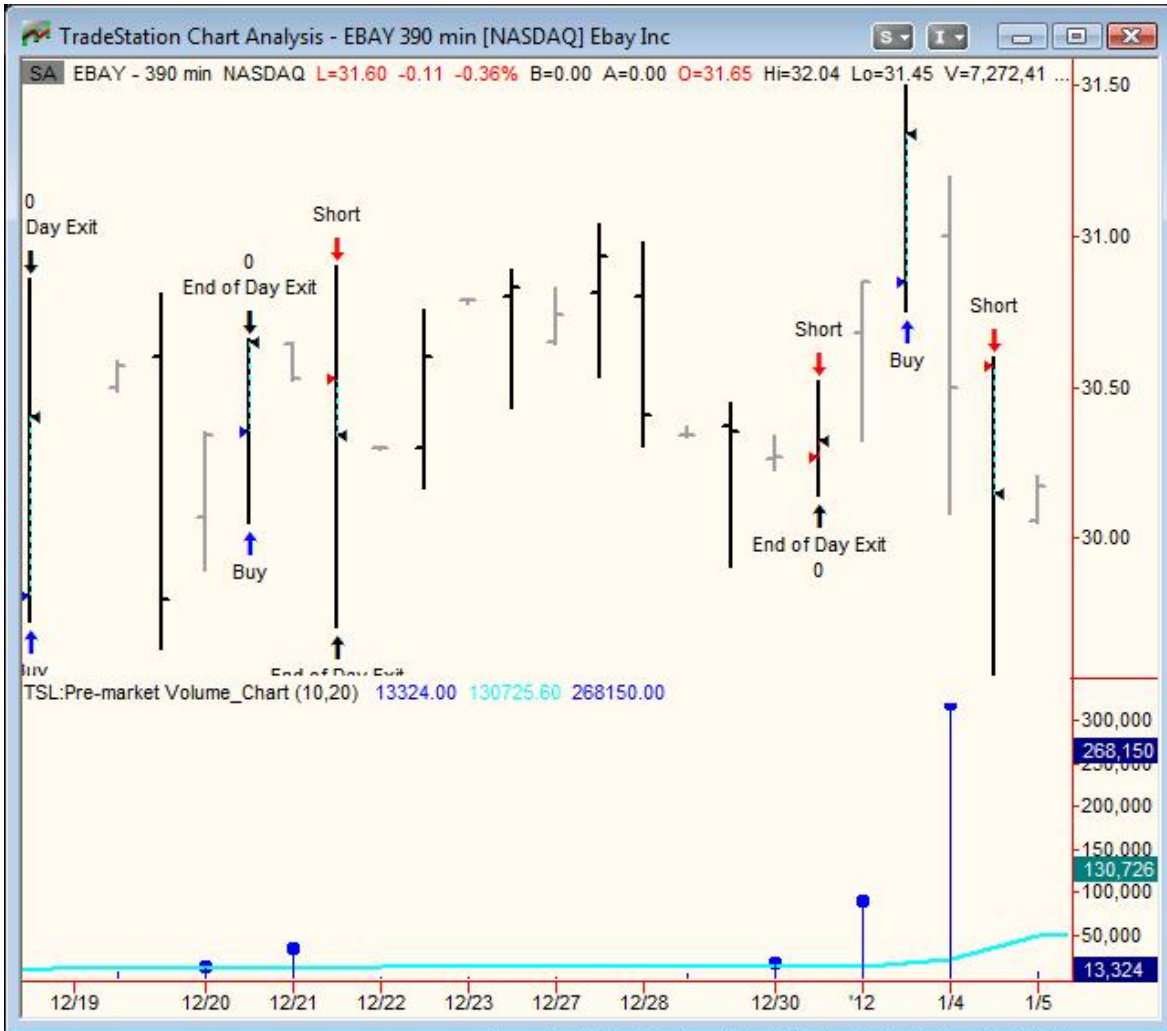
Pre-market Volume as a Trading Filter

Many traders agree that, on the face of it, fewer trades in a strategy is desirable, depending on the results, of course. Fewer trades means fewer slippage possibilities; in addition, less overall time-in-market limits one's exposure to unexpected exogenous events and makes for more efficient use of capital. Ideally, "fewer trades" would mean "fewer unprofitable trades." A filter in a trading strategy is meant to reduce the number of unprofitable trades, just as a materials filter should remove impurities. Realistically, however, a trading filter is likely to remove some of the profitable trades as well.

Traders should be careful not to judge individual trades but focus on the net results and the impact of a filter on the net results. Given all this, what metrics should we be looking at? By definition, there would be fewer trades if a filter is employed. Some of the important metrics then are the Percent Profitable and associated values such as Profit Factor and Average Winning and Losing Trades viewed in comparison to the unfiltered strategy.

As we commonly do in the *Analysis Concepts* papers, we outline a simple set of rules to use as controls. These rules are not meant to be taken as a complete strategy for use "as is." Further, as we look at some excerpts from the results, consider whether those results shed light on our examination of Pre-market volume, not whether they are tradable out-of-the-box. They are not; as you will see below, there are no protective stops included in the tests.

The price signals are based on the net change of the Pre-market session compared to the previous Primary session. A higher close in the Pre-market session generates a long entry at the open of the Primary session; the reverse would generate a short entry. The position is held only for the remainder of that Primary session. The last rule in Table 7 is the filter. Keep in mind that no trade is generated if there is no trading in the Pre-market session or if it is unchanged from the prior Primary session.

Figure 3: EBAY, strategy example per rules above, with volume filter.

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Table 7: Trading Rules for test of Pre-market volume filter.

Strategy Test Condition	Description
Long entry	Pre-market session closes higher than the previous Primary session
Short entry	Pre-market session closes lower than the previous Primary session
Exits	Exit positions at the close of the Primary session. No protective stops or profit targets
Trade size	100 shares
Date range	July 1 – December 30, 2011
Bar intervals and sessions	390-minute bar with standard custom session *US Stock with Pre-market* (supplied with TradeStation) as in Figures 2 and 3
Costs	Commission at $.01 per share; no slippage
Pre-market volume filter	Pre-market volume must exceed the 10-period average of the Pre-market volume by at least 20%

Figure 4: EBAY, per rules above, without volume filter.

TradeStation Performance Summary

	All Trades
Total Net Profit	$515.00
Gross Profit	$3,598.00
Gross Loss	($3,083.00)
Profit Factor	1.17
Total Number of Trades	120
Percent Profitable	50.00%
Winning Trades	60
Losing Trades	59
Even Trades	1
Avg. Trade Net Profit	$4.29
Avg. Winning Trade	$59.97
Avg. Losing Trade	($52.25)
Ratio Avg. Win:Avg. Loss	1.15

Figure 5: EBAY, per rules above, with volume filter.

TradeStation Performance Summary

	All Trades
Total Net Profit	$767.00
Gross Profit	$1,464.00
Gross Loss	($697.00)
Profit Factor	2.10
Total Number of Trades	29
Percent Profitable	58.62%
Winning Trades	17
Losing Trades	12
Even Trades	0
Avg. Trade Net Profit	$26.45
Avg. Winning Trade	$86.12
Avg. Losing Trade	($58.08)
Ratio Avg. Win:Avg. Loss	1.48

Figure 4 is an excerpt from the Strategy Performance Report on a test applied to EBAY, without the Pre-market volume filter. Figure 5 are the results when including the Pre-market volume filter. There are, of course, fewer trades overall. Importantly, the total number of trades fell 76%, with 80% fewer losing trades and 72% fewer winning trades. Profit Factor and other metrics also improved, with the exception of Avg. Losing Trade. Overall, this is an interesting illustration of what a filter is intended to do: better performance with fewer trades. To be sure, not all tests will be as academically or practically successful as this.

Figure 6: ORCL, per rules above, without volume filter.

TradeStation Performance Summary	
	All Trades
Total Net Profit	$273.00
Gross Profit	$3,074.00
Gross Loss	($2,801.00)
Profit Factor	1.10
Total Number of Trades	126
Percent Profitable	52.38%
Winning Trades	66
Losing Trades	60
Even Trades	0
Avg. Trade Net Profit	$2.17
Avg. Winning Trade	$46.58
Avg. Losing Trade	($46.68)
Ratio Avg. Win:Avg. Loss	1.00

Figure 7: ORCL, per rules above, with volume filter.

TradeStation Performance Summary	
	All Trades
Total Net Profit	$355.00
Gross Profit	$1,143.00
Gross Loss	($788.00)
Profit Factor	1.45
Total Number of Trades	33
Percent Profitable	60.61%
Winning Trades	20
Losing Trades	13
Even Trades	0
Avg. Trade Net Profit	$10.76
Avg. Winning Trade	$57.15
Avg. Losing Trade	($60.62)
Ratio Avg. Win:Avg. Loss	0.94

Figures 6 and 7 above show the same fields with the same tests for ORCL, without and with the Pre-market volume filter, respectively. The total number of trades fell 74%, with 78% fewer losing trades and 70% fewer winning trades. Profit Factor and other metrics also improved with the exception, once again, of Avg. Losing Trade.

While working with this data, we wondered what the impact might be when tested on a security that trades with relatively light volume and much less frequently in the Pre-market session. Remember the note above that no trade is generated if there is no trading in the Pre-market session or if it is unchanged from the prior Primary session.

Figure 8: FISV, per rules above, without volume filter.

TradeStation Performance Summary	
	All Trades
Total Net Profit	($4.00)
Gross Profit	$2,175.00
Gross Loss	($2,179.00)
Profit Factor	1.00
Total Number of Trades	73
Percent Profitable	42.47%
Winning Trades	31
Losing Trades	42
Even Trades	0
Avg. Trade Net Profit	($0.05)
Avg. Winning Trade	$70.16
Avg. Losing Trade	($51.88)
Ratio Avg. Win:Avg. Loss	1.35

Figure 9: FISV, per rules above, with volume filter.

TradeStation Performance Summary	
	All Trades
Total Net Profit	$170.00
Gross Profit	$487.00
Gross Loss	($317.00)
Profit Factor	1.54
Total Number of Trades	16
Percent Profitable	56.25%
Winning Trades	9
Losing Trades	7
Even Trades	0
Avg. Trade Net Profit	$10.63
Avg. Winning Trade	$54.11
Avg. Losing Trade	($45.29)
Ratio Avg. Win:Avg. Loss	1.19

Figures 8 and 9 above show the same tests for FISV. Figure 8 shows only 73 trades even without any volume filter. That is the result of having no trading or no net change in the Pre-market session. Perhaps the most notable metric is the 84% decrease in the number of losing trades.

Conclusion

Interest in trading hours outside of the traditional session is growing as flows of capital and information become ever more dynamic. While volume in the Pre-market session for U.S. equities is still dwarfed by that in the Primary session, it is drawing more attention from traders large and small.

In this paper, we provided tools for monitoring the price and volume action in the Pre-market session, both as distinct from and related to the Primary session. RadarScreen, Charting, custom sessions and custom indicators combined to make this possible. These can be essential tools for the discretionary trader.

For the strategy trader, we used a simple trading strategy to test using this data to filter trading signals. This raised the general topic of the role of filters in trading strategies and how to evaluate their effectiveness.

No attempts were made to limit risk or maximize profits, nor was there any optimization of parameters in this academic exercise. We recognize that more sophisticated trade signals and trade management are called for in any strategy to be used in actual trading.

Successful trading, whether strategy based or discretionary, should be built on a solid understanding of market mechanics combined with practical tools built to accomplish the task.

To use the files provided with this issue of Analysis Concepts:

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- Files with extension ''.tsw'' – These are TradeStation workspaces. These may be stored in any folder where you choose to save TradeStation workspaces.
- Files with extension ''.txt'' – These are text versions of the EasyLanguage documents and are generally used only by advanced EasyLanguage users.
- Other supporting documents or files may also be attached to the report.