

The Smeal College of Business

At Penn State University

Hosted in conjunction with Tradestation Securities

Presents

Trading Strategy Competition

Spring 2008

PENNSSTATE



SMEAL
College of Business

Competition Overview:

- ❖ **Description:** An equity trading competition that tests your ability to develop successful automated trading strategies with multiple securities and varying time horizons.
 - ❖ (See competition [webpage](#) for calendar)
 - ❖ Prizes will be presented to the top 3 competitors overall through the generosity of PNC
 - ❖ The competition will consist of **2 parts**: A one-time strategy submission based on an S&P 500 equity of your choice, and a series of short-term strategy submissions based on assigned securities.
 - ❖ The strategy based upon the equity you choose will run throughout the competition.
 - ❖ A new stock will be assigned during each week of the competition, and competitors will be able to submit strategies to trade the stocks during their respective trading periods.
-

Competition Guidelines:

❖ PART I:

Each competitor will choose one stock from the S&P 500 to trade during the entire competition. You will submit your strategy before the competition begins (as later discussed). You will be able to modify and re-submit a new strategy on the **same** stock during the competition ONE time. Should you do so, your new strategy will begin trading on the market open of the following day. Your performance will be calculated by backtesting your submitted strategy over the competition timeframe.

❖ PART II:

Each week of the competition will have an assigned stock which all competitors will trade. A week will be considered one Wednesday to Tuesday period (5 trading days). You must submit your strategy for each assigned stock by no later than 8:00 a.m. on Wednesday of the trading week (ie: a strategy starting on 4/23/08 must be submitted to the dropbox by 8:00 a.m. on 4/23/08). We will determine your performance each week by backtesting your submitted strategies on their respective securities over the week in which they were traded. No strategy modifications will be allowed for this part of the competition.

Results & Scoring:

- ❖ In determining the final results, your ranking in each part of the competition will determine your overall standing.
 - ❖ Each of the 2 parts will be equally weighted and will be calculated by your rank among your competitors
 - ❖ Your ranking for part II will be an average rank of each of your weekly strategies (Each of the 3 weeks is 16.67% (50%/3) of your overall score)
 - ❖ For example, if you finished 23rd out of 87 competitors for Part I, and an average of 13th out of 87 for Part II, your average rank (score) would be:
 - ❖ $[(23/87) \times (0.5) + (13/87) \times (0.5)] \times 100 = 20.69$
 - ❖ The person with the best overall weighted rank will be deemed the winner. Returns will not be adjusted for risk.
-

Registration:

- ❖ Visit <https://intranet.smeal.psu.edu/tsc> to create a trader acronym and account for you to use throughout the duration of the competition.
 - ❖ You will also receive a TradeStation login and password via e-mail upon registration, which will be necessary to participate in the competition.
 - ❖ These TradeStation logins may be shared by several other competitors. Each login may be signed in to TradeStation at only one location at a time; therefore, please do not disconnect other users if you are prompted to do so at login, and save your work frequently if you are building a strategy.

Note: Your trader acronym will be visible to all competitors when results are posted, so please create a non-identifiable name if you do not want others to view your ranking.

TradeStation

- ❖ TradeStation will be used for constructing your trading strategies for the competition. This is a stand-alone software package with powerful tools to chart, analyze, and build automatic trading strategies.
- ❖ You have the option of downloading the software onto your computer using the log-on information provided (alternatively, you may use TradeStation on the Trading Room computers):
 - ❖ Click [here](#) to download the TradeStation software, entering the user name and password given to you in your registration e-mail
 - ❖ Select “Install” for Version 8.3 (bottom selection), and follow the steps to complete the installation of TradeStation
- ❖ See the TradeStation tutorial pages for a walkthrough of building and submitting a strategy
- ❖ Feel free to create and test strategies using TradeStation before and during the competition as you wish -- your performance will only be measured on the strategies you submit for the competition

What is a Strategy?

- ❖ A trading strategy is a system of formulas which has the ability to automatically transmit buy and sell orders to a brokerage platform. This enables the user to take a hands-off approach to trading, and is seen as beneficial in many ways because of its execution speed and ability to remove emotion and irrational behavior from the trading process.
- ❖ TradeStation software makes constructing and applying strategies extremely simple, allowing the user to construct a basic strategy in under 5 minutes once he/she is familiar with the software.

TradeStation Guidelines:

- ❖ Your objective will be to construct several automated equity trading strategies in TradeStation. These will then be submitted as a TradeStation file and monitored throughout the competition (See the following pages for a tutorial on strategy creation)
- ❖ For Part I of the competition, you will be allowed to choose one stock listed within the S&P 500 (constituent list [here](#)) to trade during the competition using the strategy you submit
- ❖ After creating a strategy, you must visit <https://intranet.smeal.psu.edu/tsc> and submit your strategy in the dropbox. We will run your strategy on the stock you select and measure the profit/loss statement to measure your return.
- ❖ Your part I strategy must generate at least 10 trades during the competition, and each of your part II strategies must generate at least 4 trades during the week in which it is traded.

Strategy Building & Submission:

1. Open the Tradestation program
2. In the left-hand toolbar, click the “Chart Analysis” button to open a new chart

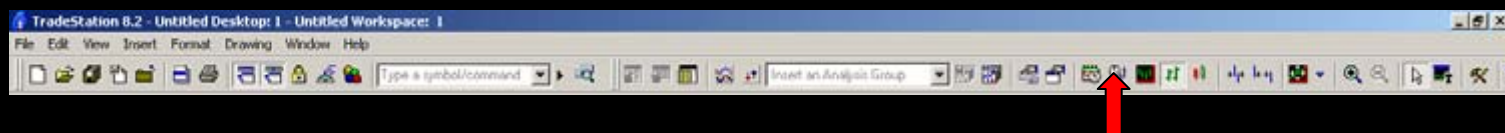


3. To change the symbol on the open chart, left-click anywhere on the chart, enter the new symbol, and press enter. This can also be done by entering the symbol in the box in the top toolbar which reads “Type a symbol/command”, or by right clicking on the chart, selecting “Format Symbol”, and entering the new symbol.



4. To change the time interval for the data points on the chart, scroll over the buttons in the toolbar along the top of the screen and click the one which reads “Interval”. This can also be done by right-clicking on the chart, selecting “Format Symbol”, and changing the interval and interval settings. In this window, the time period of data displayed may also be changed to incorporate more data onto the chart (ie – changing the date range on a 5 minute chart to 30 days back instead of the default of 5 days).

***Note: In many strategies, the shorter the bar interval, the more frequently the strategy will trade. Experimenting with both the bar interval and date range may prove helpful when backtesting strategies.*



Strategy Building & Submission:

5. To insert a strategy, right-click on the chart, select “Insert Strategy” and a window will appear which lists all of the strategies built-in to Tradestation.



- Each listed strategy is generated by TradeStation's programming language, called Easy Language. The code for these strategies can be easily modified to create different or completely new trading strategies.

```
TradeStation Strategy - Bollinger Bands LE : Strategy
inputs:
  BollingerPrice( Close ),
  TestPriceLBand( Close ), { cross of this price over LowerBand triggers placement
of stop order at LowerBand }
  Length( 20 ),
  NumDevsDn( 2 );

variables:
  LowerBand( 0 );

LowerBand = BollingerBand( BollingerPrice, Length, -NumDevsDn );

if CurrentBar > 1 and TestPriceLBand crosses over LowerBand then
{ CB > 1 check used to avoid spurious cross confirmation at CB = 1 }
  Buy ( "BBandLE" ) next bar at LowerBand stop ;
{ ie, don't buy if next bar completely below current LowerBand, but wait for next
crossing condition - an example of a non-persistent setup triggering a stop
order that is replaced until hit }

{ ** Copyright (c) 2005 TradeStation Technologies, Inc. All rights reserved. **
** TradeStation reserves the right to modify or overwrite this strategy component
with each release. ** }
```

Strategy Building & Submission:

6. Select at least 1 strategy to be applied to the chart, and click OK. (While viewing the strategy list, you may click on any of the available strategies and click the “Definition” button to view the characteristics of that strategy. This is a good way to familiarize yourself with the various strategies, especially if you have little or no background in technical analysis.)
- ❖ If you are prompted with an additional window after selecting a strategy, a window titled “Format Analysis Techniques and Strategies” will appear. The values in the “Input Values” column affect your strategy, so you may double-click and change them, or just close the window. You are likely to need at least 2 strategies: 1 to initiate a long or short position, and 1 to exit that long or short position.
 - ❖ In the “Insert Strategies” window, several columns of checkmarks appear, representing the actions that that specific strategy will invoke.
 - For example, if a strategy you choose has 1 checkmark in the “buy” column, you will also need to select a strategy with a checkmark in the “sell” column to close that position, or a strategy with a checkmark in the “sell short” column to reverse your buy position and take a short position.

Strategy Building & Submission:

6. After applied to the chart, your strategy should then appear on the chart with a combination of blue, red, and/or white arrows connected by blue and red dotted lines.
 - ❖ If your strategy does not show up, make sure you have selected both entry and exit strategies. The blue arrows represent the initiation of a long (buy) position, while the red arrows represent a short entry and the white arrows an exit of either your long or short position.
7. You **must** next change a few settings to set your strategy up correctly with the guidelines of the competition. Doing this incorrectly can potentially result in your strategy producing different results from what you may have observed when your strategy performance is calculated for the competition.
 - ❖ After your strategy has been successfully inserted, click “Format” --> “Strategies” on the main menu. Click the “Properties for all” button. The window that appears will let you set up all of the constraints that your strategy is based upon. The area of this window labeled “Costs/Capitalization” **must** be modified as follows for each strategy you create:

- **Commission: \$0.005 per share/contract**
- **Slippage: \$0**
- **Initial Capital: \$1,000,000**
- **Interest Rate: 4%**
- **“Use Look-inside-bar Back-testing”: Checked**
 - **“Intra-day [1] minute”: Checked**
 - **“Maximum number of bars study will-reference”: Set to the longest look-back used by strategy (i.e., if a 200 bar average is used, this must be set to at least 200)**

Note: The “Trade Size” settings will be important to your strategy. **You may choose to trade a certain number of shares at a time, or a specific dollar amount of shares.** Adjusting your trade size too high or too low will result in either reduced performance or bankruptcy
For Example: 2 trades incurring 10% losses with your trade size set to \$500,000 will produce a \$100,000 loss. The same trades using a \$5,000,000 trade size would bankrupt the account.

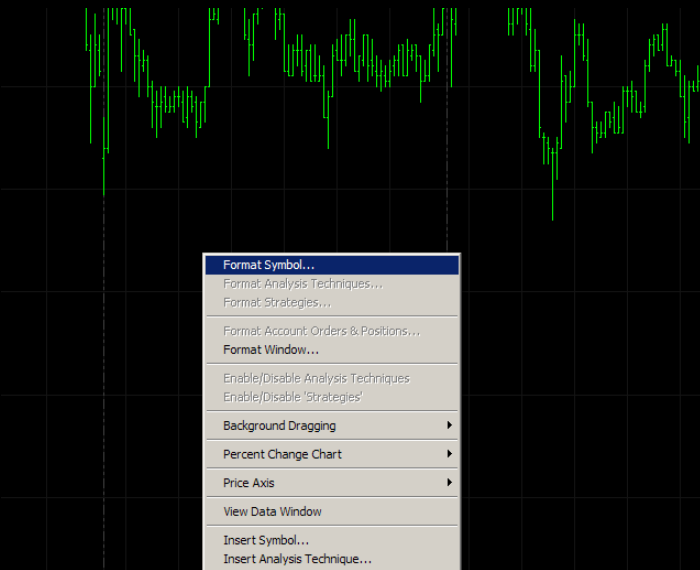
Backtesting:

9. Another important feature of Tradestation is its ability to **backtest** strategies. This entails applying your strategy to a specified date range of historical prices, and generating a performance report to show whether the strategy would have been a profitable one. Keep in mind that past performance does not guarantee future performance, so you are best off testing your strategy over numerous periods of time in the past.
- ❖ To do this, click “View” → “Strategy performance report” on the main menu. A window will appear, detailing your profit/loss figure (“Total Net Profit”), and nearly every aspect of your trading strategy. Notice the series of tabs along the bottom of the window, which will let you view a graphical view of your performance, a listing of every trade made by your strategy, and numerous statistical measures of the strategy.

	All Trades	Winners	Losers
Total Number of Trades	38	18	20
Avg. Trade Net Profit	(\$26.82)	\$152.00	(\$187.75)
1 Std. Deviation of Avg. Trade	\$213.03	\$114.45	\$138.21
Avg. Trade + 1 Std. Deviation	\$186.22	\$266.45	(\$49.54)
Avg. Trade - 1 Std. Deviation	(\$239.65)	\$37.55	(\$325.96)
Coefficient of Variation	794.43%	75.29%	73.62%
Time Averages			
Avg. Time in Trades	7 Dys, 10 Hrs, 6 Mins	8 Dys, 2 Hrs, 40 Mins	6 Dys, 19 Hrs, 12 Mins
Avg. Time Between Trades	9 Dys, 13 Hrs, 53 Mins	27 Dys	17 Dys, 13 Hrs, 53 Mins
Avg. Time Between Trade Profit Peaks	74 Dys, 12 Hrs		
Outliers			
	Total	Positive	Negative
Number of Outliers	0	0	0
Outlier Profit/Loss	\$0.00	\$0.00	\$0.00
Run-Up/Drawdown			
		Run-Up	Drawdown
Max. Value		\$700.00	(\$629.00)

Strategy Building & Submission:

10. It may be beneficial to backtest your strategy over a variety of periods, to determine the consistency of the strategy. To change the chart timeframe, right click on an open area of your chart and select “Format Symbol”.
- ❖ You may backtest over a specified period of time from the current day, or over a specific time period by entering start and end dates.



The image shows a dialog box titled "Format Symbol - CSC0 5 min [NASDAQ] Cisco Systems". The dialog has tabs for "Settings", "Style", "Scaling", and "Properties". The "Settings" tab is active. The "Symbol" is set to "CSC0" with a "Lookup..." button. The "Select Interval:" list has "Intra-day" selected. The "Interval Settings:" section shows "5 Minute Bar". The "Range:" section has "5 Days Back" selected, with a red arrow pointing to it. Other options include "Bare Back" (500) and "First Date" (12/02/2007). The "Apply time-based Range setting to all data series" checkbox is checked. The "Display:" section has "Time Zone" set to "Local". There is a "Set as Default" checkbox at the bottom. Buttons for "OK", "Cancel", and "Help" are at the bottom right.

Optimization:

11. To try and get the most out of your chosen strategy, you may choose to “Optimize” it using Tradestation’s optimization algorithms.
 - ❖ To do this, right click on the chart and select “Format Strategies”. A window will appear allowing you to customize your selected strategies.
 - ❖ Most, although not all strategies will have a column next to the name of the strategy called “Input Values”. The input values mean different things for different strategies, but they affect the way in which the strategy is calculated. To find the “best” value for any individual input value, double click on the “Input Value” field, which will open a list of the available input fields.
 - ❖ Click on the one you want to optimize, and click the “Optimize” button below. A window will appear asking you for the range of input values you wish to test, and for the increment between input values which Tradestation will use when optimizing.
 - ❖ Click “OK”, and you will notice the text in the “Value” field has changed slightly. When ready, click “OK”, then “Optimize”.
 - ❖ Tradestation will run through a series of calculations, select the optimal input values (which produced the highest net profit), and apply them to your strategy.
 - ❖ When the optimization is done, you can go to the “View” menu and select either “View Strategy Optimization Report” or “View Strategy Performance Report” to view the results of the optimization, and your new net profit figure.

Strategy Submission:

- ❖ After you have taken the necessary steps to build a strategy, you will need to correctly save and submit the file so we can monitor the performance of your strategy.
- ❖ With your strategy *open* and *visible* in Tradestation, from the main menu select File → Save Workspace As... and name the file with the following format:
 - ❖ Your trader acronym, followed by a period, followed by the ticker symbol of the stock the strategy is trading.
 - ❖ For example, if your trader acronym is “ace”:
 - ❖ If you choose to trade Microsoft for your individual strategy, you would submit the TradeStation file ace.MSFT to the specified dropbox (the file may appear as “ace.MSFT.tsw” after you save if your file extensions are visible).
 - ❖ Under the “week” dropdown box on the submission page, you will need to select the appropriate label based on the strategy you are submitting . You **must** submit with the correct label to have your results counted.
- ❖ Visit <https://intranet.smeal.psu.edu/tsc> and upload the TradeStation file(s) you created to the dropbox by the given deadlines.

TradeStation Support:

- ❖ Additional information on using TradeStation can be found in the following locations (you may need to use one of the TradeStation user name/passwords to access several of the links):
- ❖ 1) Archived Webinar – Introduction to Strategy Trading (use the zip file with presentation)
<https://www.tradestation.com/support/webinars/default.aspx>
- 2) Tutorial - Introduction to Strategy Trading
https://www.tradestation.com/support/tutorials/strategy_intro.aspx
- 3) Tutorial - Strategy Testing & Optimization
https://www.tradestation.com/support/tutorials/strategy_testing.aspx
- 4) Tutorial - Strategy Automation
https://www.tradestation.com/support/tutorials/strategy_automation.aspx
- 5) Tutorial - Introduction to EasyLanguage
<https://www.tradestation.com/support/tutorials/easylanguage.aspx>

File Library

6) EasyLanguage File Library – TradeStation users contribute studies and exchange them with other community members. Students will find a wide variety of examples (all available for download) of how other TradeStation users are taking advantage of the power of EasyLanguage.
https://www.tradestation.com/Discussions/Forum.aspx?Forum_ID=216

EasyLanguage Support Forum

https://www.tradestation.com/Discussions/Forum.aspx?Forum_ID=213

Checklist:

- ☑ Be sure to have registered on the competition homepage
- ☑ Choose a security to trade for the duration of the competition, and submit the strategy as a Tradestation (.tsw) file, following the steps from the previous “strategy building & submission” pages. There is no deadline, but your strategy will only become active as of the following day’s open should you submit a strategy after the competition has begun.
- ☑ Check the competition website for the assigned security for each week, and submit a strategy to the drop box each week no later than noon on the Sunday prior to the strategy’s trading period.

Contact/Questions:

- ❖ If you have questions not covered on the FAQ section of the competition website (<https://intranet.smeal.psu.edu/tsc>) , please e-mail TSComp@smeal.psu.edu with any questions regarding the competition