

# Technical Strategy Development using Backtesting BT<Go> - A Tutorial -- v1.7

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## What is Backtesting?

Backtesting in its most general definition in the context of trading financial instruments is simply evaluating the profitability of a set of trading rules, referred to as a trading strategy or model, using historical data.

## Benefits of Using a Trading Strategy

Using a systematic trading strategy with a well-defined set of rules removes the natural tendency to focus on the positive outcomes and overlook the losses when looking to identify market patterns. While backtesting cannot predict the performance of a strategy in the future, its primary benefit lies in assisting the trader to understand the vulnerabilities of a strategy as it responds to real world data. Thus the trader can evaluate the efficacy of a strategy without committing actual money.

## Developing a Technical Trading Strategy

In this tutorial we will concern ourselves with backtesting from the perspective of the technical analyst. The technical analyst often begins developing a trading strategy by displaying an indicator or study on a chart and observing certain patterns that might lead to profitable trades. A simple example of a technical strategy is the crossing of 2 moving averages where you enter a long position when the faster moving average crosses above the slower moving average and you enter a short position when the reverse occurs.

But it would be very tedious to then try to determine the profitability of the strategy by manually recording each trade and calculating its profit or loss and then summing the results. Thus a function to assist in the strategy evaluation process is very beneficial. In addition to calculating profit and loss, also it is essential to calculate other important measures to evaluate the effectiveness of a strategy. For example, Profit Factor, Sharpe Ratio, Sortino Ratio, Maximum Drawdown, Drawdown Duration, and many other measures are useful for this purpose.

A full evaluation of the strategy also requires displaying the trades and the statistical measures historically on a price chart as well as other means of visualization such as scatter charts and 3D charts. Visual analysis is a powerful complementary tool to the statistical analysis

Further, a means of determining what the appropriate values should be used for the parameters of the studies, e.g. the moving average periods in the strategy described above, should be provided. This process is often referred to as parameter optimization.

Finally, the function should include a means of comparing the effectiveness of one strategy with another. All of this functionality is included in BT<Go>.

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## Running BT<Go>

The BT<Go> function presents a tabbed interface to quickly navigate between the various stages of strategy development. This facilitates quickly editing the Strategy Definition and then seeing the effect in Strategy Analysis and returning to Strategy Definition to make additional revisions to the strategy. It is quite common to repeat this cycle many times when developing a successful strategy.

This screenshot shows the Bloomberg BT<Go> interface with the 'Strategies' tab selected. The top navigation bar includes links for 'New Strategy', 'Tutorial', 'Forum', and 'Backtesting'. Below the navigation is a breadcrumb trail: 'Home > Strategies'. The main content area displays a table with columns for 'Title' and 'Description'. One row is highlighted with a yellow background, showing 'AF1 2005-2012' under 'Title' and 'AF1 from 2005 to 2012' under 'Description'. There are also filter buttons for 'Title' and 'Description'.

Once several strategies have been developed, it is desirable to see how the strategies compare with each other. This is done by including several strategies in the Multi-Strategy Worksheet.

This screenshot shows the Bloomberg BT<Go> interface with the 'Multi-Strategy Worksheets' tab selected. The top navigation bar includes links for 'New Worksheet', 'Tutorial', 'Forum', and 'Backtesting'. Below the navigation is a breadcrumb trail: 'Home > Worksheets'. The main content area displays a table with columns for 'Title' and 'Description'. One row is highlighted with a yellow background, showing 'AF1 2005-2012' under 'Title' and 'AF1 from 2005 to 2012' under 'Description'. There are also filter buttons for 'Title' and 'Description'.

The Optimizations tab permits access to all parameter optimization jobs that have been run.

This screenshot shows the Bloomberg BT<Go> interface with the 'Optimizations' tab selected. The top navigation bar includes links for 'New Optimization', 'Refresh', 'Tutorial', 'Forum', and 'Backtesting'. Below the navigation is a breadcrumb trail: 'Home > Optimizations'. The main content area displays a table with columns for 'Optimization Title', 'Strategy Title', 'Security', 'Start Date', 'End Date', 'Period', 'Status', and 'Submitted'. One row is highlighted with a yellow background, showing 'MAO with MaxLoss' under 'Optimization Title' and 'MAO with MaxLoss' under 'Strategy Title'. There are also filter buttons for 'Optimization Title' and 'Strategy Title'.

Once the user has navigated more deeply into a strategy via a multi-strategy view, either a multi-strategy worksheet or an optimization results screen, the “bread crumb” line allows quick navigation to Home or back up the tree.

## Creating a Technical Trading Strategy

### What is a Technical Trading Strategy?

A technical trading strategy consists of a model for trading a financial market with a set of rules that define when to enter and exit either long or short positions. The strategy can be constructed using standard studies or indicators such as Simple Moving Averages or the Relative Strength Index (RSI) or enhanced using custom calculations.

Once the strategy has been fully defined, it can be used to place buy and sell orders in the market.

### Steps to creating a Technical Trading Strategy

There are several steps in developing a successful trading strategy:

1. Start with a trading idea - A simple idea for a technical strategy is the crossing of 2 moving averages where you enter a long position when the faster moving average crosses above the slower moving average and you enter a short position when the reverse occurs.
2. Select the Factors that you will be using in the trading strategy
3. Write the rules that express the idea in a definitive form.
4. Backtest the trading strategy over some historical time period.
5. Optimize the trading system parameters
6. Evaluate the optimized strategy. As a surrogate for real time trading, evaluate the optimized strategy by backtesting over a historical period that includes a data region that was not used for the optimization. This is often referred to as out-of-sample testing.
7. Improve and refine the trading strategy - an effective technical strategy is rarely as simple as this reversing moving average cross. An effective technical strategy typically combines a series of rules using a combination of studies.

The examples included in this tutorial demonstrate the process with a variety of strategies.

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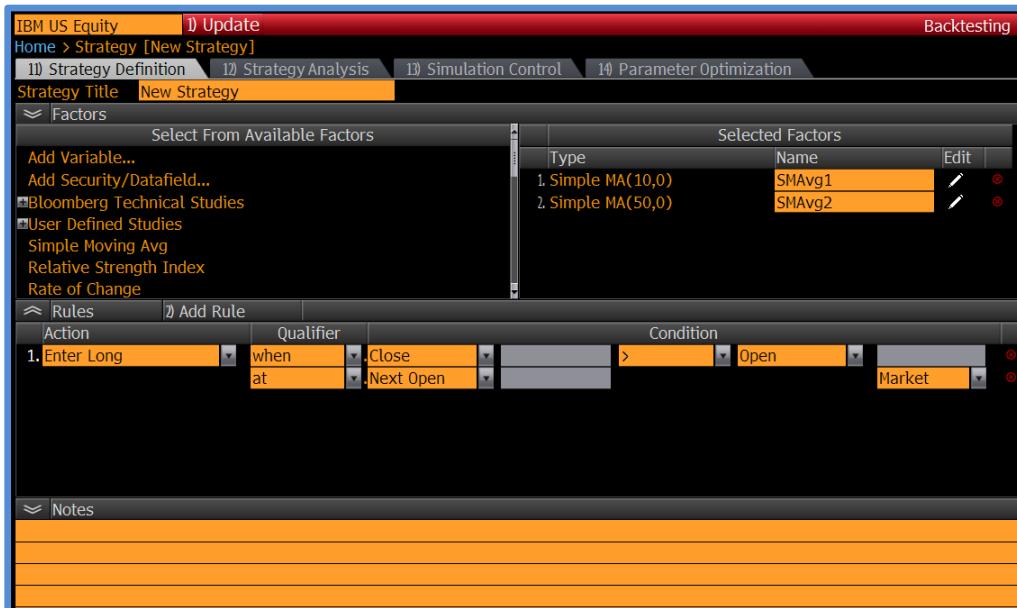
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## The Strategy Definition Wizard

Most technical strategy development products demand that the trader learn to express the rules for strategy in the form of a programming language. In the function BT<Go>, we have taken the approach that 1<sup>st</sup> level of strategy development can be accomplished with the more user-friendly technical strategy definition editor that you see here.

The **Strategy Definition** screen is displayed when you are at the Home position and you have selected 1) **New Strategy**. Note that each of the **Factors**, **Rules**, and **Notes** sections can expanded and collapsed using the up/down chevron button at the left side of each section header line.



The **Strategy Definition** screen consists of several sections. It is recommended that the **Strategy Title** be immediately changed from the default "New Strategy" to a unique name that will identify the strategy. In addition, it is advisable to add **Notes** to explain the goal of the strategy and what it does and to describe modifications made in the course of developing a more complex strategy.

The **Select From Available Factors** section contain the comprehensive set of studies, that are available for use in defining the strategy. It also includes two "Add" action items:

"**Add Variable...**" is used to add a numeric variable for used in place of an explicit Value to permit optimization, and

"**Add Security/Datafield...**" is used when it is desirable to include additional data, either different datafields for the parent security or data from another security.

The **Selected Factors** section to the right is populated by clicking on the desired item in the **Select From Available Factors** section. All selected Factors will now available for use as a choice in the various drop lists used to modify a rule.

The **Rules** section contains a sample rule ready to be modified. To add another Rule, click on the **2) Add Rule** button.

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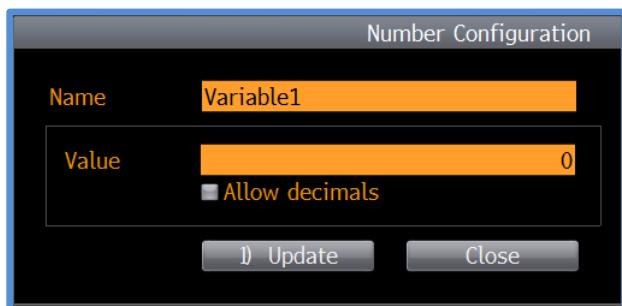
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## Selecting Factors

**Factors** are inputs such as studies, variables, and references to additional securities and/or data fields that will be available for use in defining the strategy. Factors to be used in the strategy are selected by clicking on the desired factor in the “Select From Available Factors” section. If the desired factor is not visible, expand any tree node by clicking on a “+” icon or use the scroll bar to move up and down in the list.

## Selecting a Variable

A Variable represents a numeric field that is used in defining a rule in place of a specific Value. The Variable is then available for use as a parameter during Strategy Optimization.

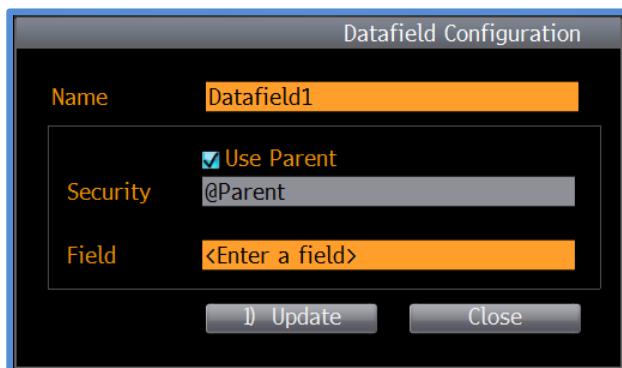


After clicking on the **Add Variable...** line, the Number Configuration dialog appears. It is best to replace the default name Variable1 with a name that expresses its relevance in the strategy. E.g. “Pct Max Loss” might be a good name for a variable that will be used in defining a Money Management rule.

Also specify the initial value to be used for the variable. Set the “Allow decimals” option if you wish to allow the number to have decimals. Otherwise only whole numbers will be permitted.

## Selecting Security/Datafield

With this dialog, you can specify additional data sets in addition to the default Open, High, Low, and Close prices that are the standard inputs from the Parent security, i.e. the security that is specified in either the security hotspot or in the Simulation Control security field.



After clicking on the **Add Security/Datafield...** line, the Datafield Configuration dialog appears. It is best to replace the default name Datafield1 with a name that expresses its relevance in the strategy. E.g. “Volume” would be a good name if you wanted to use the Volume field from the Parent security.

If you wish to use data from an alternate security, you must first turn off the “Use Parent” option. The Security field will become active to allow entry of the alternate ticker in addition to the desired Field Cash Index as part of your strategy. An example might be specifying the “VIX Index” with the Field “Last Price”.

## Selecting a Bloomberg Technical Study

Click on the “+” icon to the left of the Bloomberg Technical Studies to see the Fear & Greed and the

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Trend studies that can be used in the strategy.

## Selecting a User-Defined Study



## Selecting another Study

Other studies that are globally available to all users can be selected by finding the study in the list presented and clicking on the study name.

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## Defining the Trading Rules

### What is a Rule?

A rule consists of 3 parts: the Action, the Qualifier, and the Condition declaration. Only a single instance of an Action is present in a rule, but there can be several Qualifier/Condition lines. A rule is modified using the drop lists presented and making the appropriate choices for each item, the Action, the Qualifier, and the Condition.

Rules	Add Rule	Action	Qualifier	Condition				
		1. Enter Long	when	>	SMAvg1	SMAVG	Market	Stop
			and	>	SMAvg2	SMAVG		
			at	crosses below	SMAvg2	SMAVG		
		2. Exit Long	when		Prior Low			

### The Action

The Action specifies whether the rule defines an Entry or an Exit for a Trade, a Trade being a paired Buy order and Sell order or a paired Sell order and Buy order.

The action **Enter Long** is a Buy order to take a Long position in the market and the action **Exit Long** is a Sell order to move from a Long position to a neutral position.

Similarly, the action **Enter Short** is a Sell order to take a Short position while the action **Exit Short** is a Buy order to move from a Short position to a neutral position.

The **Cover and Go Long** and **Close and Go Short** actions combine the Entry and Exit actions into a single rule used to reverse a market position.

The **Liquidate** rule is an Exit rule that applies to both a long and a short position.

### The Qualifier

The Qualifier determines the function of each line. It consists of the choices “**when**”, “**and**”, and “**at**”.

### *The “when” and the “and” Lines*

The “**when**” line and its associated “**and**” lines specify when the Action is to occur based on the logical AND of the “**when**” line Condition and each following “**and**” line Condition.

A **Condition** for a “**when**” line and its associated “**and**” lines consists of a comparison between a left part and a right part with the Boolean operation specified between them. An example is the simple condition that the Close is greater than the Open where the “is greater than” operation is shown using the “>” symbol. In addition to normal Boolean operators, there are several operators that are often used in trading strategy development. These are: “Crosses Above”, “Crosses Below”, and “Crosses” which implies from either direction.

In the above example, the long Entry is triggered at the time when the Close is greater than both the first Simple Moving Average and the second Simple Moving Average used as Factors. The Exit is triggered when the strategy is holding a long position and when the Close crosses below the second Simple Moving Average.

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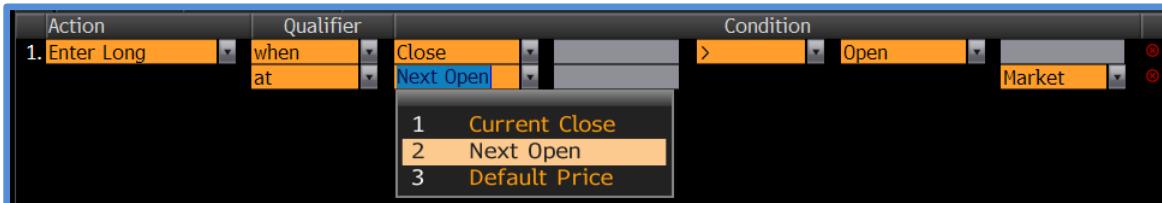
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## The "at" Line

Each rule always includes an “at” line where the **Condition** defines an **Order Price** and an **Order Type**, either Market, Stop, or Limit.

### Order Type = Market

If an Order Type of Market is chosen, the Order Price choice is limited to Current Close, Next Open, or Default Price. In the latter case, the global price setting for the Default Trade Price will be used.



### Order Type = Stop or Limit

If an Order Type of Stop or Limit is chosen, additional Price choices become available. Note that the Price choices use the reference "Prior". Stop and Limit orders become active on the bar following the trigger specified by the "when" condition and thus the price for execution must be a validly established lagging value. Choosing "Default Price" switches the Order Type back to "Market"



### "at" Only Rule

A rule with only an action and an “at” is a valid rule if the Order Type is either a Stop or Limit. If the rule is an Exit action, the rule will become active on the bar following the strategy entering into a corresponding position.



The above Exit Long rule defines a trailing stop using the trailing Prior Low as the Stop Price. A lagged Moving Average or Donchian Channel is also often used to define a trailing stop price.

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## Using Rules with Profit and Loss

Exit rules that incorporate profit and loss in the "when" condition can be specified. This rule can be specified using the key words, "Profit on Close", "Loss on Close", "Max Profit", or "Max Loss".

### "Profit on Close" or "Loss on Close"

The "Profit on Close" or "Loss on Close" exit is triggered when the profit or loss calculated using the Close at each bar exceeds the trigger value entered. Loss trigger levels are specified as positive values. The execution occurs using the price as indicated on the "at" line, either "Current Close" or "Next Open" using the Market order type.

#### *Profit.Currency or Loss.Currency*

Trigger Level = Total Profit or Loss for this Trade expressed in units of the local currency  
= ABS(Trade Entry Price - Close Price) \* Trade Size

#### *Profit.% Equity or Loss.% Equity*

Trigger Level = 100 \* Total Profit or Loss for this Trade / Total Equity at Trade Entry

#### *Profit.% Price or Loss.% Price*

Profit Trigger Level Long = 100 \* (Close Price - Trade Entry Price) / Trade Entry Price  
Loss Trigger Level Long = 100 \* (Trade Entry Price - Close Price) / Trade Entry Price  
Profit Trigger Level Short = - Profit Trigger Level Long  
Loss Trigger Level Short = - Loss Trigger Level Long

Action	Qualifier	Condition
1. Cover and go Long	when	TAS1 %K Stochastic crosses above Value 30
2. Close and go Short	when	TAS1 %K Stochastic crosses below Value 70
3. Liquidate	when	Profit On Close % Price > Value 5
4. Liquidate	when	Loss On Close % Price > Value 3
	at	Next Open Market
	at	Next Open Market
	at	Current Close Market
	at	Current Close Market

In the above example, either a long or a short position will be liquidated at the CurrentClose when the profit calculated on-close has exceeded 5% or the loss calculated on-close has exceeded 3%.

#### *Profit.Ticks or Loss.Ticks*

Profit Trigger Level Long = (Close Price - Trade Entry Price) / Tick Size

Loss Trigger Level Long = (Trade Entry Price - Close Price) / Tick Size

Profit Trigger Level Short = - Profit Trigger Level Long

Loss Trigger Level Short = - Loss Trigger Level Long

Tick Size is the minimum price change

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## "Max Profit" or "Max Loss"

The "Max Profit" or "Max Loss" exit is triggered when the profit or loss calculated using the High or Low at each bar exceeds the trigger value entered. The execution occurs using the price as indicated on the "at" line.

The identifiers "Max Profit" is used in combination with the Limit order type and the identifier "Max Loss" is used in combination with the Stop order type to specify an intra-bar exit price.

Action	Qualifier	Condition
1. Cover and go Long	when at	TAS1 %K Stochastic crosses above Value 30 Market
2. Close and go Short	when at	TAS1 %K Stochastic crosses below Value 70 Market
3. Liquidate	when at	Max Profit % Price >= Value 5 Limit
4. Liquidate	when at	Max Loss % Price >= Value 3 Stop

In the above example:

- a long will be liquidated when the profit calculated using the high price has exceeded 5% at a limit price that is equal to the 1.05 times the entry price.
- a short position will be liquidated when the loss calculated using the low price has exceeded 3% at a stop price that is equal to the 0.97 times the entry price.

## Stop and Limit Order Execution Rules

When a Stop order is specified, the expectation is that the order will execute if the stop price is breached. In actual trading, when the stop price is touched, the stop order goes into the order book as a market order. Depending on the depth of the book, the order may execute at a price worse than the stop price. A Limit order, on the other hand, remains a resting order at the limit price if there is insufficient volume at the limit price to fill the order.

Stop and Limit orders also behave differently in the way that they are evaluated at the Open. If the Open price is below a sell Stop order, the order will execute at the Open price or lower, depending on the depth of the order book. The reverse is true for a buy Limit order. A Limit order to buy will execute at the Open Price if the open price is lower than the Limit order price and is guaranteed to never be executed at a price higher than the Limit price.

For backtesting, these order types only differ in the way they evaluate the Open price. A Stop order allows the execution at an Open price that is worse than the Stop price while a Limit order guarantees the Limit price or better. Otherwise, Stop and Limit order execute if the Stop price or Limit price are within the High to Low range of the bar.

To avoid peek-ahead, when the order type of Stop or Limit is chosen, any study or price value is automatically lagged. This is indicated by having the term "Prior" pre-pended to all available exit price choices.

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## Inserting and Deleting Lines

### *The "when" & "and" Lines*

An "and" line is inserted above the "at" line by picking the "and" item from the "at" drop list.

Each of these lines can be individually deleted. Deleting the "when" line promotes the next "and" line to become the "when" line. If there are no more "and" lines present, deleting the "when" line promotes the "at" line to be the top and only row of the rule.

A "when" line and its associated "and" lines can also be removed by selecting "at" in the "when" drop list, leaving an "at" only rule.

### *The "at" Line*

Each rule must have an "at" line. Deleting the "at" line deletes the entire rule.

To restore a "when" line into an "at" only rule, choose the "when" in the "at" drop list.

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## Simulation Control

The Simulation Control tab defines the periodicity of the data; the date range to test over; the order properties and the transaction costs which are used to control how the backtest simulation will be run. At the top is where the security symbol, the date range, the sampling periodicity, and the reporting currency are set.

The screenshot shows the Bloomberg Strategy [MA X - 1] interface. The top navigation bar includes 'IBM US Equity' and '98) Update'. Below the navigation bar, there are tabs: 'Home > Strategy [MA X - 1]', '11) Strategy Definition', '12) Strategy Analysis', '13) Simulation Control' (which is selected), and '14) Strategy Optimization'. The main area has several input fields: 'IBM US Equity' (selected), '01/01/2010' to '03/31/2012' (date range), 'Today' (periodicity), and 'Local CCY' (reporting currency). The 'Order Properties' section contains: 'Trading Approach' (Long & Short), 'Capital' (100k), 'Default Trade Price' (Next Open), and 'Trade Entry' (All in). The 'Transaction Costs' section contains: 'Commission Per Trade' (0.0000 Local CCY), 'Commission Per Share' (0.00000 Local CCY), 'Commission Percentage' (0.0000 %), and 'Slippage' (0.0000 Local CCY).

## Periodicity and Date Range



The Periodicity that is chosen for the simulation limits the date ranges that can be specified. This is shown in the drop list shown to the right.

If an intraday periodicity is chosen, it is assumed that the simulation will start at the beginning of the start date.

If the Today option is checked, then the simulation proceeds to the current date/time that the simulation is run.

## Reporting Currency

A reporting currency other than the local currency of the security being traded can be specified.

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## Order Properties

The Order Properties section contains settings that affect how an order will be constructed when a signal to buy or sell is triggered.

### Setting the Trading Approach

The default Trading Approach permits both Long and Short trades. It can be changed to either Long Only or Short Only. If the Strategy contains rules that conflict with the Trading Approach chosen, they will be removed or adapted when the 98) Update is entered.

When switching from a Long & Short strategy to a Long Only strategy, if the strategy contained the reversal rule Cover and Go Long it will be converted to an Enter Long rule and if the strategy contained a Close and Go Short rule, it will be converted to an Exit Long rule.

When switching from a Long & Short strategy to a Short Only strategy, if the strategy contained the reversal rule Close and Go Short it will be converted to an Enter Short rule and if the strategy contained a Cover and Go Long rule, it will be converted to an Exit Short rule.

### Setting Initial Capital

#### *Equities and Fixed Income*

For Equities and Fixed Income, if the Trade Size is set to "All in" then the Initial Capital is used to determine initial trade size using the price as quoted. If a fixed number of Shares is specified, then a check is made to ensure that sufficient Initial Capital is available for the first trade to occur. If you choose to trade a fixed Capital amount, ensure that the Initial Capital specified is greater than the fixed Capital amount.

The amount of Capital available to trade will be reevaluated at each step. Thus if losses exceed the amount available, no additional trade entries will be permitted.

It is important to note that the Initial Capital has the units of the Local currency. It is thus important that enough Initial Capital be specified for at least 1 trade to occur.

#### *Futures & Currencies*

For Futures and Currencies which trade using exchange or dealer determined explicit margining rules, Initial Capital is only used for statistical calculations such as Sharpe ratio that require a reference capital amount.

### Setting the Default Trade Price

The default Trade Price can be set to either Current Close or Next Open. Because the strategy is being evaluated using the Current Close, Current Close as the an entry or exit price is only valid value for execution on the Signal bar. All other evaluations of the entry or exit price are made on the bar following the Signal. This applies to Next Open Market orders, and Stop and Limit orders.

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## Setting Trade Size

### Equities and Fixed Income

For Equities and Fixed Income instruments, the choices for Trade Size are:

**All In** - this choice specifies that all of the net equity will be used to calculate the Trade Size for each trade entry. i.e. Trade Size = Total Equity / Entry Price.

**Capital** - this choice specifies that a fixed amount of capital will be allocated to each trade using the amount of Capital entered. i.e. Trade Size = Capital / Entry Price

**Contracts/Notional/Shares** - this choice specifies an explicit Trade Size for each trade using the number entered.

### Futures

For Futures, the Trade Size is specified as the fixed number of **Contracts** that will be used for each trade.

### Currencies

For Currencies, the Trade Size should be specified as a fixed **Notional** amount for the currency being traded.

## Calculating Profit or Loss for each Trade

The method of calculating profit and loss differs depending on the instrument type being analyzed.

### Equities and Fixed Income

Profit Long = Trade Size \* (Trade Entry Price - Trade Exit Price)

Profit Short = - Trade Size \* (Trade Entry Price - Trade Exit Price)

### Futures

Profit Long = Trade Size \* Tick Value \* (Trade Entry Price - Trade Exit Price) / Tick Size

Profit Short = - Trade Size \* Tick Value \* (Trade Entry Price - Trade Exit Price) / Tick Size



### Currencies

Profit Long = Trade Size \* (Trade Entry Price - Trade Exit Price)

Profit Short = - Trade Size \* (Trade Entry Price - Trade Exit Price)

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## Transaction Costs

For **Transaction Costs** to be taken into consideration when evaluating a strategy, they must be entered on the Simulation Control screen. The mechanisms for specifying transaction costs are:

- **Commission Per Trade**

The commission charge calculated on a per transaction basis regardless of the trade size or the total value of the transaction.

- **Commission Per Share**

The commission charge on a per share or contract basis.

- **Commission Percentage**

The commission charge calculated as a percentage of the total value of the transaction.

- **Slippage**

The price difference, in units per share, between the signal price and the actual trade execution price. The slippage is applied to the trade price by being added to a buy trade price and subtracted from a sell trade price.

Transaction costs are applied cumulatively if more than one type is specified.

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## Evaluating Results

In describing the process of evaluating a trading strategy and comparing different strategies, we will use the Basic Moving Average Cross strategy "SMAVG CROSS - 1" and its variations that are discussed in Samples 1 through 4 in the Samples section.

### Single Strategy Analysis of the SMAVG CROSS - 1

#### The Strategy Analysis Chart

The Strategy Analysis Chart includes event markers that show the location of where on the strategy generated trade signals. It is important to note that, unless execution on Current Close has been chosen, the trade actually occurs on the day or data point following the signal.

The chart also includes the historical profit curve which shows the historical performance of the strategy. In addition, a side-panel with a Statistics Summary is present below.



By clicking on the Factors button above the side-panel, you can open the side-panel to a view that permits the control of what is visible on the chart. Using the “Add Factor” button, you can also add more studies that you might want to include in refining the strategy.



The side-panel can also be closed by clicking on the “>>” button to provide more space for the chart.

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## Statistics Side Table - Summary

Statistic	Column Name	Definition
Trades	Long	Total Long Trades
	Short	Total Short Trades
	Total	Total Trades Long + Short
P&L	Long	Net profit(loss) long trades after trade costs (Closed + Open Positions)
	Short	Net profit(loss) short trades after trade costs (Closed + Open Positions)
	Total	Net profit(loss) all trades after trade costs (Closed + Open Positions)
% P&L	Long	Percent profit(loss) long trades after trade costs vs. initial capital
	Short	Percent profit(loss) short trades after trade costs vs. initial capital
	Total	Percent profit(loss) all trades after trade costs vs. initial capital

## Statistics Side Table - Additional Stats

Statistic	Column Name	Definition
Avg. P&L	Long	Average profit(loss) long trades after trade costs (Closed + Open Positions)
	Short	Average profit(loss) short trades after trade costs (Closed + Open Positions)
	Total	Average profit(loss) all trades after trade costs (Closed + Open Positions)
Total Wins	Long	Total Profit of winning long trades
	Short	Total Profit of winning short trades
	Total	Total Profit of all winning trades
Total Losses	Long	Total Loss of losing long trades
	Short	Total Loss of losing short trades
	Total	Total Loss of all losing trades
Avg Win	Long	Average Profit of winning long trades
	Short	Average Profit of winning short trades
	Total	Average Profit of all winning trades
Avg Loss	Long	Average Loss of losing long trades
	Short	Average Loss of losing short trades
	Total	Average Loss of all losing trades
Max Win	Long	Maximum Profit of winning long trades
	Short	Maximum Profit of winning short trades
	Total	Maximum Profit of all winning trades
Max Loss	Long	Maximum Loss of losing long trades
	Short	Maximum Loss of losing short trades
	Total	Maximum Loss of all losing trades
Num Bars	Long	Total time in market (duration) for long trades expressed as number of bars
	Short	Total time in market (duration) for short trades expressed as number of bars
	Total	Total time in market (duration) for all trades expressed as number of bars

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## Statistics Side Table – More Stats

Statistic	Definition
Avg Duration	Average duration per trade expressed as number of bars
Max Adv Ex	Maximum Adverse Excursion
Max Fav Ex	Maximum Favorable Excursion
Sharpe	Sharpe Ratio using average Risk Free Rate (3 Month US T-Bill) during test period
Sortino	Similar to Sharpe Ratio using only variation of negative returns
Total Return	Same as %P&L
%MaxReturn	Maximum percentage increase since start of test period
%MinReturn	Minimum percentage return since the start of test period
%WinningRatio	Percentage of all trades that were profitable. A trade is profitable if the portfolio increases in value from that trade to the next.
%LosingRatio	Percent of all trades that were losses. A trade is a losing trade if the portfolio decreases in value from that trade to the next.
%Max DD	Max Drawdown is the biggest percentage drop from any equity high to the next equity low. It measures the biggest loss possible over the horizon, if the investor would have bought the security at that high point and sold at the next low.
Max DD Length	Length of time from the start of % Max DD to the next equity low in number of bar intervals.
Recovery From Max DD	Length of time from the low point of the % Max DD until the previous high is reached again in number of bar intervals.
Max DD Recovery Period	Sum of Max DD length and Recovery from Max DD.
% Max Increase	Largest percent equity increase from any equity low to the next equity high.
Max Increase Length	Length of time from the start of % Max Increase to the next equity high in number of bar intervals.

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## The Trade Table

The Trade Table includes the information about entry and exit date/time and price as well as cumulative and per trade statistics. You can use the scrollbar at the bottom of the table to bring more columns into view or you can use the Zoom control in the lower right to adjust the font size and thus increase the number of columns shown.

IBM US Equity										<input type="button" value="Copy"/>	<input type="button" value="Rename"/>	<input type="button" value="Delete"/>	Backtesting
Home > View [IBM 2005-2012] > Strategy [MA X - 1]										Strategy Definition			
Trade #		Entry Date	Entry Price	Exit Date	Exit Price	Position	Shares	Trade P&L	Cumulative P&L	Total Return	%Max Return	Statistics	Columns
51	02/22/2012	193.03	03/30/2012	208.65	Long	707	11.04k	47.67k	8.08	8.13			
50	02/07/2012	192.45	02/22/2012	193.03	Short	712	-412.96	36.62k	-.30	.36			
49	01/25/2012	191.33	02/07/2012	192.45	Long	712	797.44	37.04k	.59	.98			
48	01/19/2012	181.79	01/25/2012	191.33	Short	790	-7.54k	36.24k	-5.24	-2.39			
47	01/13/2012	179.48	01/19/2012	181.79	Long	790	1.82k	43.78k	1.29	1.29			
46	01/10/2012	183.23	01/13/2012	179.48	Short	759	-2.85k	41.95k	2.05	2.05			
45	12/20/2011	185.50	01/10/2012	183.23	Long	759	-1.72k	39.11k	-1.22	.66			
44	12/14/2011	189.84	12/20/2011	185.50	Short	725	3.15k	40.83k	2.29	2.81			
43	10/11/2011	184.59	12/14/2011	189.84	Long	725	3.81k	37.68k	2.84	4.90			
42	09/06/2011	163.06	10/11/2011	184.59	Short	945	-20.35k	33.88k	-13.19	1.85			
41	07/25/2011	183.89	09/06/2011	163.06	Long	945	-19.68k	54.22k	-11.32	-.52			
40	06/28/2011	168.33	07/25/2011	183.89	Short	1138	-17.71k	73.91k	-9.24	-1.35			
39	04/27/2011	168.61	06/28/2011	168.33	Long	1138	-318.64	91.61k	-.17	2.22			
38	04/05/2011	163.81	04/27/2011	168.61	Short	1207	-5.79k	91.93k	-2.93	.43			
37	01/18/2011	149.82	04/05/2011	163.81	Long	1207	16.89k	97.73k	9.34	10.55			
36	01/07/2011	148.79	01/18/2011	149.82	Short	1223	-1.26k	80.84k	-.69	.81			
35	10/14/2010	140.35	01/07/2011	148.79	Long	1223	10.32k	82.10k	6.01	6.01			
34	10/04/2010	135.23	10/14/2010	140.35	Short	1320	-6.76k	71.78k	-3.79	-.70			
33	09/21/2010	131.45	10/04/2010	135.23	Long	1320	4.99k	78.54k	2.88	3.09			
32	09/13/2010	128.63	09/21/2010	131.45	Short	1379	-3.89k	73.55k	-2.19	.16			
31	08/30/2010	125.08	09/13/2010	128.63	Long	1379	4.90k	77.43k	2.84	2.84			
30	08/16/2010	127.47	08/30/2010	125.08	Short	1328	3.17k	72.54k	1.87	2.85			
29	07/23/2010	127.30	08/16/2010	127.47	Long	1328	225.76	69.37k	.13	3.05			
28	07/15/2010	129.87	07/23/2010	127.30	Short	1277	3.28k	69.14k	1.98	5.31			
27	07/09/2010	127.90	07/15/2010	129.87	Long	1277	2.52k	65.86k	1.54	1.54			
26	05/26/2010	124.89	07/09/2010	127.90	Short	1340	-4.03k	63.34k	-2.41	1.28			
25	03/30/2010	128.90	05/26/2010	124.89	Long	1340	-5.37k	67.38k	-3.11	1.83			
24	02/16/2010	124.01	03/30/2010	128.90	Short	1428	-5.20k	72.75k	-3.10	-4.47			

Zoom 75%

As shown below, you can open the side-panel by clicking on the “<<” button and then select which columns should be shown in the table.

IBM US Equity										<input type="button" value="Copy"/>	<input type="button" value="Rename"/>	<input type="button" value="Delete"/>	Backtesting
Home > View [IBM 2005-2012] > Strategy [MA X - 1]										Strategy Definition			
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50	02/07/2012	192.45	02/22/2012	193.03	Short	712	-412.96	36.62k	-.30	.36			
49	01/25/2012	191.33	02/07/2012	192.45	Long	712	797.44	37.04k	.59	.98			
48	01/19/2012	181.79	01/25/2012	191.33	Short	790	-7.54k	36.24k	-5.24	-2.39			
47	01/13/2012	179.48	01/19/2012	181.79	Long	790	1.82k	43.78k	1.29	1.29			
46	01/10/2012	183.23	01/13/2012	179.48	Short	759	-2.85k	41.95k	2.05	2.05			
45	12/20/2011	185.50	01/10/2012	183.23	Long	759	-1.72k	39.11k	-1.22	.66			
44	12/14/2011	189.84	12/20/2011	185.50	Short	725	3.15k	40.83k	2.29	2.81			
43	10/11/2011	184.59	12/14/2011	189.84	Long	725	3.81k	37.68k	2.84	4.90			
42	09/06/2011	163.06	10/11/2011	184.59	Short	945	-20.35k	33.88k	-13.19	1.85			
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40	06/28/2011	168.33	07/25/2011	183.89	Short	1138	-17.71k	73.91k	-9.24	-1.35			
39	04/27/2011	168.61	06/28/2011	168.33	Long	1138	-318.64	91.61k	-.17	2.22			
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37	01/18/2011	149.82	04/05/2011	163.81	Long	1207	16.89k	97.73k	9.34	10.55			
36	01/07/2011	148.79	01/18/2011	149.82	Short	1223	-1.26k	80.84k	-.69	.81			
35	10/14/2010	140.35	01/07/2011	148.79	Long	1223	10.32k	82.10k	6.01	6.01			
34	10/04/2010	135.23	10/14/2010	140.35	Short	1320	-6.76k	71.78k	-3.79	-.70			
33	09/21/2010	131.45	10/04/2010	135.23	Long	1320	4.99k	78.54k	2.88	3.09			
32	09/13/2010	128.63	09/21/2010	131.45	Short	1379	-3.89k	73.55k	-2.19	.16			
31	08/30/2010	125.08	09/13/2010	128.63	Long	1379	4.90k	77.43k	2.84	2.84			
30	08/16/2010	127.47	08/30/2010	125.08	Short	1328	3.17k	72.54k	1.87	2.85			
29	07/23/2010	127.30	08/16/2010	127.47	Long	1328	225.76	69.37k	.13	3.05			
28	07/15/2010	129.87	07/23/2010	127.30	Short	1277	3.28k	69.14k	1.98	5.31			
27	07/09/2010	127.90	07/15/2010	129.87	Long	1277	2.52k	65.86k	1.54	1.54			
26	05/26/2010	124.89	07/09/2010	127.90	Short	1340	-4.03k	63.34k	-2.41	1.28			
25	03/30/2010	128.90	05/26/2010	124.89	Long	1340	-5.37k	67.38k	-3.11	1.83			
24	02/16/2010	124.01	03/30/2010	128.90	Short	1428	-5.20k	72.75k	-3.10	-4.47			

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## Trade Table Columns

Column Name	Definition
<b>Entry Date</b>	Entry Date (and Time, if Intraday)
<b>Entry Price</b>	Entry Price
<b>Exit Date</b>	Exit Date (and Time, if Intraday)
<b>Exit Price</b>	Exit Price
<b>Position</b>	Position/Trade Direction: Long or Short
<b>Size</b>	Position/Trade Size: Shares/Contracts/Notional Amount
<b>Trade P&amp;L</b>	Net Profit After Trade Costs (Closed + Open Positions)
<b>Cumulative P&amp;L</b>	Percent profit after trade costs vs initial capital
<b>Total Return</b>	Total Return = $100 * ((\text{Trade P&L} / \text{Total Capital on Trade Entry}) - 1)$ ; Total Capital on Trade Entry = Initial Capital + Prior Cumulative P&L
<b>%MaxReturn</b>	Maximum percentage increase since start of this trade
<b>%MinReturn</b>	Minimum percentage return since the start of this trade
<b>%Max DD</b>	% Drawdown is the drop from a high point to the next low point of the profit curve measured in % of equity at the high point. Once a new high is reached, the percentage change from the prior high to the intervening low is recorded and a new drawdown calculation begins. Thus, several drawdowns may occur while a trade is active. Max DD is the largest drawdown for the duration of a trade.
<b>Max DD Length</b>	Length of time from the start of the %Max DD until the low point is reached, measured in # of bar intervals
<b>Recovery From Max DD</b>	The time from the low point of the Max DD until the previous high is reached again, measured in # of bar intervals. (-1 if previous high is not exceeded before the trade is terminated).
<b>Max DD Recovery Period</b>	Sum of Max DD length and Recovery from Max DD.
<b>% Max Increase</b>	% Increase is the rise from a low point to the next high point of the profit curve measured in % of equity the low point. Once a new low is reached, the percentage change from the prior low to the intervening high is recorded and a new increase calculation begins. Thus, several increases may occur while a trade is active. Max Increase is the largest increase for the duration of a trade.
<b>Max Increase Length</b>	Length of time from the start of the %Max Increase until the high point is reached, measured in # of bar intervals

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## The Trade Scatter Chart

The Trade Scatter Chart is used to visualize and compare the per-Trade Statistics. The values to be plotted on both the horizontal or X axis and vertical or Y axis are selected in the side-panel shown. The Legend defines the meaning of the icons and icon color.

### Trade P&L vs. Trade Number

In the example below, the X axis is the trade number, from left to right it shows the first trade to the last trade and the Y axis is the per-trade P&L. We can readily see the distribution of winners and losers as well where the outlying trades, both winners and losers occur.



### % Max Drawdown vs. Trade Number

In the example below, the X axis is the trade number, from left to right it shows the first trade to the last trade and the Y axis is the per-trade % Max Drawdown. It is important to note that for drawdown, larger numbers indicate a worse result. We can see that several trades that were ultimately winners experienced significant drawdown.



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## Trade P&L vs. % Max Drawdown

In the example below, the X axis is per-trade % Max Drawdown, and the Y axis is the per-Trade P&L. This is another way of seeing the relationship between ultimate profitability and adverse excursion of each trade.



## Trade P&L vs. % Max Drawdown with Trails

While the time order of the trades is no longer left to right, it may be desirable to view the time relationship between a number of trades. To do so, you point at a trade icon of interest and the time sequence appears as a connecting trail. You also see a more detailed description of that trade's characteristics. In the example below, it becomes apparent that the sequence of trade with significant losses would lead to a very significant cumulative drawdown for the strategy.



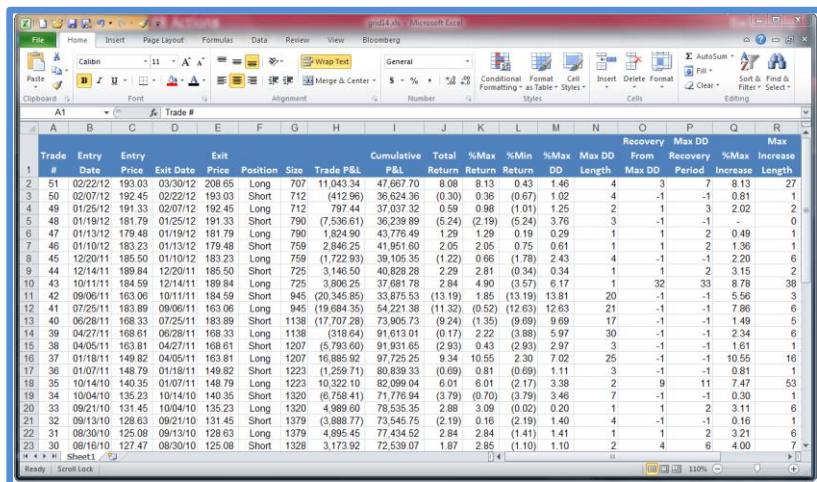
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## Exporting Results to Excel

It is sometime useful to have the backtesting results in Excel. There are two types of export available.

### Exporting in the Trade Table

The Trade Table can be exported directly. From the Actions menu on the red toolbar, select the Export to Excel option. The Trade Table export includes the information about entry and exit date/time and price as well as cumulative and per trade statistics.

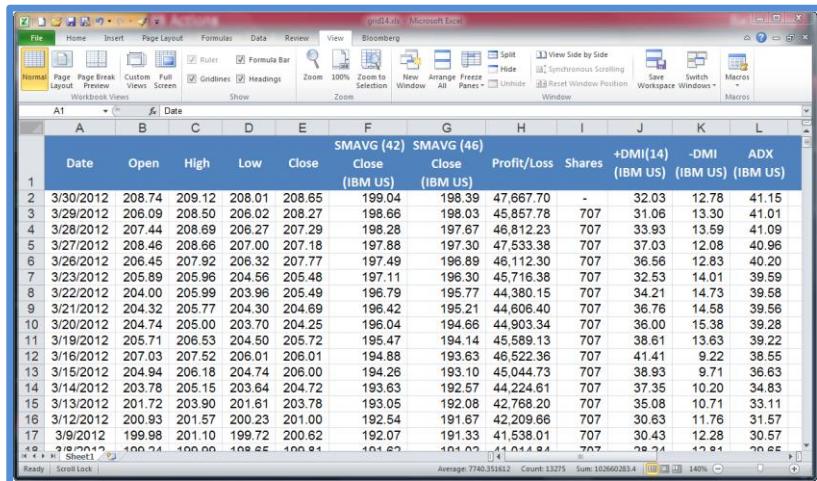


A screenshot of a Microsoft Excel window titled "grid14.xls - Microsoft Excel". The spreadsheet contains a large dataset of trade information. The columns include: Trade #, Date, Entry Price, Exit Date, Exit Price, Position, Size, Trade P&L, P&L, Cumulative Total, %Max, %Min, %Max, Max DD, Max DD Length, From Recovery, Period, Increase, and Max Length. The data spans from row 2 to approximately row 35, showing various trade entries and exits with associated metrics like profit/loss, percentage changes, and maximum drawdowns.

Trade #	Date	Entry Price	Exit Date	Exit Price	Position	Size	Trade P&L	P&L	Cumulative Total	%Max	%Min	%Max	Max DD	Max DD Length	From Recovery	Period	Increase	Max Length
2	02/22/12	193.03	03/09/12	208.65	Long	707	11,043.34	47,807.70	-	8.13	0.44	-4.46	4	3	7	8.13	27	
3	50	02/07/12	192.45	02/22/12	193.03	Short	712	(142.96)	36,624.36	(0.30)	0.36	(0.67)	1.02	4	-1	-1	0.81	1
4	49	01/25/12	191.33	02/07/12	192.45	Long	712	797.44	37,037.32	0.59	0.98	(1.01)	1.25	2	1	-3	2.02	2
5	48	01/19/12	181.79	01/25/12	191.33	Short	790	(758.61)	36,238.69	(5.24)	(2.19)	(5.24)	3.76	3	-1	-1	0	0
6	47	01/13/12	179.48	01/19/12	181.79	Long	790	1,824.90	43,776.49	1.29	1.29	0.19	0.29	1	1	2	0.49	1
7	46	01/10/12	183.23	01/13/12	179.48	Short	759	2,846.25	41,951.60	2.05	2.05	0.75	0.61	1	1	2	1.36	1
8	45	12/20/11	185.50	01/10/12	183.23	Long	759	(1,722.93)	39,105.35	(1.22)	0.66	(1.78)	2.43	4	-1	-1	2.20	6
9	44	12/14/11	189.84	12/20/11	185.50	Short	726	3,146.50	40,828.28	2.29	2.81	(0.34)	0.34	1	1	2	3.15	2
10	43	10/11/11	186.49	12/14/11	189.84	Long	726	3,146.50	37,681.78	2.29	2.81	(3.57)	1.71	1	32	33	8.78	38
11	42	08/01/11	183.06	10/11/11	184.59	Short	945	(20,345.85)	37,681.78	(11.49)	1.85	(1.01)	0.81	20	-1	-1	0.52	3
12	41	07/25/11	183.89	09/06/11	183.06	Long	945	(19,684.35)	54,221.38	(11.32)	(0.52)	(12.63)	12.63	21	-1	-1	7.86	6
13	40	06/28/11	188.33	07/25/11	183.89	Short	1138	(17,707.28)	73,905.73	(9.24)	(1.35)	(0.69)	9.69	17	-1	-1	1.49	5
14	39	04/27/11	168.61	06/28/11	188.33	Long	1138	(318.64)	91,813.01	(0.17)	2.22	(3.88)	5.97	30	-1	-1	2.34	6
15	38	04/05/11	163.81	04/27/11	168.61	Short	1207	(5,793.60)	91,913.65	(2.93)	0.43	(2.93)	2.97	3	-1	-1	1.61	1
16	37	01/18/11	149.82	04/05/11	163.81	Long	1207	16,885.92	97,725.25	9.34	10.55	2.30	7.02	25	-1	-1	10.55	16
17	36	01/07/11	148.79	01/18/11	149.82	Short	1223	(1,259.71)	80,839.33	(0.69)	0.81	(0.69)	1.11	3	-1	-1	0.81	1
18	35	10/14/10	149.35	01/07/11	148.79	Long	1223	10,322.10	82,099.04	6.01	6.01	(2.17)	3.38	2	9	11	7.47	53
19	34	09/01/10	149.10	10/14/10	149.35	Short	1250	(6,150.01)	82,099.04	(3.40)	0.70	(3.40)	3.47	7	-1	-1	0.30	1
20	33	09/21/10	131.49	10/04/10	135.23	Long	1250	1,899.09	76,535.35	2.88	3.09	(0.65)	2.20	1	1	2	1.11	6
21	32	09/13/10	128.63	09/21/10	131.45	Short	1379	(3,888.77)	73,545.75	(2.19)	0.16	(2.19)	1.40	4	-1	-1	0.16	1
22	31	08/30/10	125.08	09/13/10	126.63	Long	1379	4,895.45	77,434.52	2.84	2.84	(1.41)	1.41	1	1	2	3.21	6
23	30	08/16/10	127.47	08/30/10	125.08	Short	1328	3,173.92	72,539.07	1.87	2.85	(1.10)	1.10	2	4	6	4.00	7

### Exporting in the Trade Details

To export the Trade Detail, you must right-click on the background of the price chart itself. In the pop-up menu presented, choose Copy/Export Options -> Copy Data to Clipboard. You can then paste the data into an Excel Worksheet.



A screenshot of a Microsoft Excel window titled "grid14.xls - Microsoft Excel". The spreadsheet contains a large dataset of trade details. The columns include: Date, Open, High, Low, Close, Close (IBM US), Close (IBM US), Profit/Loss, Shares, +DMI (14) (IBM US), -DMI (IBM US), and ADX. The data spans from row 2 to approximately row 35, showing daily price movements and technical indicators like moving averages and DMI.

	Date	Open	High	Low	Close	Close (IBM US)	Close (IBM US)	Profit/Loss	Shares	+DMI (14) (IBM US)	-DMI (IBM US)	ADX
2	3/30/2012	208.74	209.12	208.01	208.65	199.04	198.39	47,867.70	-	32.03	12.78	41.15
3	3/29/2012	206.09	208.50	206.02	208.27	198.66	198.03	45,857.78	707	31.06	13.30	41.01
4	3/28/2012	207.44	208.69	206.27	207.29	198.28	197.67	46,812.23	707	33.93	13.59	41.09
5	3/27/2012	208.46	208.66	207.00	207.18	197.88	197.30	47,533.38	707	37.03	12.08	40.96
6	3/26/2012	206.45	207.92	206.32	207.77	197.49	196.89	46,112.30	707	36.56	12.83	40.20
7	3/23/2012	205.89	205.96	204.56	205.48	197.11	196.30	45,716.38	707	32.53	14.01	39.59
8	3/22/2012	204.00	205.99	203.96	205.49	196.79	195.77	44,380.15	707	34.21	14.73	39.58
9	3/21/2012	204.32	205.77	204.30	204.89	196.42	195.21	44,606.40	707	36.76	14.58	39.56
10	3/20/2012	204.74	205.00	203.70	204.25	196.04	194.66	44,903.34	707	36.00	15.38	39.28
11	3/19/2012	205.71	206.53	204.50	205.72	195.47	194.14	45,589.13	707	38.61	13.63	39.22
12	3/16/2012	207.03	207.52	206.01	206.01	194.88	193.63	46,522.36	707	41.41	9.22	38.55
13	3/15/2012	204.94	206.18	204.74	206.00	194.26	193.10	45,044.73	707	38.93	9.71	36.63
14	3/14/2012	203.78	205.15	203.64	204.72	193.63	192.57	44,224.61	707	37.35	10.20	34.83
15	3/13/2012	201.72	203.90	201.61	203.78	193.05	192.08	42,768.20	707	35.08	10.71	33.11
16	3/12/2012	200.93	201.57	200.23	201.00	192.54	191.67	42,209.66	707	30.63	11.76	31.57
17	3/9/2012	199.98	201.10	199.72	200.62	192.07	191.33	41,538.01	707	30.43	12.28	30.57

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## Multi-Strategy Analysis

It is often desirable to compare the results from different strategies. The mechanism provided in BT<Go> is the Multi-Strategy Worksheet.

### The Multi-Strategy Worksheets Screen

The Multi-Strategy Worksheets Screen "My Worksheets" tab presents a directory of all the worksheets that you have defined. It consists of a Title column, a Description column, and a Run column which contains the shortcut that can be used for quickly accessing the worksheet from the command line, (e.g. running BT IBM0512<Go>). At the top of the table is a filter row that can be used to find specific worksheets. It is most useful when a large number of worksheets are present.

1) New Strategy 2) New Worksheet			Backtesting
1) Strategies 2) Multi-Strategy Worksheets			
2) My Worksheets 2) Sample Worksheets			
Title	Description	Run	
<Filter by Title>	<Filter By Description>		
31) AF1 2005-2012	AF1 from 2005 to 2012	BT AF0512	①
32) CL1 2005-2012	Crude Oil 2005-2012	BT CL0512	①
33) IBM 2005-2012	IBM from 2005 to 2012	BT IBM0512	①
34) IBM 2006-2009	IBM from 2006 to 2009	BT IBM2009	①
35) IBM 2010-2012	IBM from 2010 to 2012	BT IBM2012	①
36) MSFT 2005-2012	MSFT from 2005 to 2012	BT MSFT0512	①
37) PaIK: IBM 2005-2008	IBM 2005-2008 with PaIK Strategies	BT PALKIBM	①
38) PaIK: IBM 2008-2011	IBM 2008-2011 with PaIK Strategies	BT PALKIBM1	①
39) SGT: IBM 2005-2012	IBM 2005 to 2102 with Stop to Go with Trend	BT SGT0512	①
40) SPX 2005-2012	SPX1 from 2005 to 2012	BT SPX0512	①
41) TY1 2005-2015	Ten Year Note 2005-2012	BT TY0512	①

It is important to note that a strategy can be used in more than one worksheet. If a change is made to the strategy, the change is reflected in every worksheet where it is used. In the example above, you can see that there several worksheets for IBM with different date ranges. Having multiple copies of a worksheet with the same strategies and with different date ranges is a convenient way to do out-of-sample strategy evaluation.

Click on the "Sample Worksheets" tab to see all sample worksheets provided.

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## Creating a new Multi-Strategy Worksheet

The multi-strategy comparison process begins with the creation of a new worksheet by running

**2) New Worksheet.** A dialog is presented where you specify the worksheet title, the short cut and a Description to explain the purpose of the worksheet and how it will be used.



A new worksheet is created with the Table tab selected and only the Buy & Hold strategy present. You can use the Simulation Control tab to specify the Simulation Control settings as previously described. These settings are unique to each worksheet.



Strategy	Current Position			Trades			Profit (Loss)			
	P&L	Age	Long	Short	Total	Total	%Total	Long	Short	
3) Buy & Hold	107.00k	1829	1	0	1	107.00k	107.00	107.00k	0.00	

While the "Multi-Strategy Analysis" has the same presentation format choices, Table, Chart, and Scatter Chart, that are available in the Single Strategy analysis, the data are presented in a manner that reflects the need to compare the effectiveness of multiple strategies.

# Bloomberg

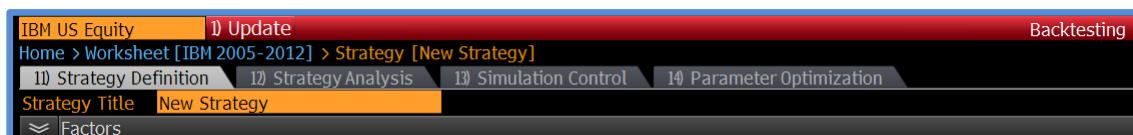
## Adding Strategies to the Worksheet

Strategies are added by running 2) Add Strategy and choosing either "Import Existing Strategy" or "Create New Strategy". If "Import Existing Strategy" is chosen, the Select Strategies dialog is displayed with list of all your strategies.



Clicking on a strategy name in the Available Strategies section transfers the strategy name into the Selected Strategies section. A strategy can only be included once in a worksheet so the strategy name becomes grayed-out in the Available Strategies section.

If "Create New Strategy" is chosen, we switch to the Strategy Definition screen to create the new Strategy. As can be seen, in the illustration below, you can navigate back to the worksheet by clicking on "Worksheet[IBM 2005-2012]" in the bread crumb trail.



The strategy created in this manner is immediately added into the worksheet. It is, of course, also accessible via the "My Strategies" screen.

It is important to reiterate that a strategy can be used in more than one worksheet. If a change is made to the strategy, the change is reflected in every worksheet where it is used.

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## The Multi-Strategy Analysis Table

The Multi-Strategy Table consists of 4 main column groups: Current Position, Trades counts, Profit (Loss), and Statistics. The Current Position columns includes a column with an icon provides feedback about the most current trade. If an icon is present in this column, then the strategy is currently holding a position. If the triangular icon is pointing upwards, it is a long position and if the icon is pointing downwards, it is a short position. The color of the icon provides the profitability feedback - a green-colored icon indicates a profitable trade whereas a red-colored icon indicates a losing trade.

Strategy	P&L	Age	Trades			Profit (Loss)			
			Long	Short	Total	Total	%Total	Long	Short
31) Buy & Hold	▲ 107.00k	1829	1	0	1	107.00k	107.00	107.00k	0.00
32) MA X - 1	✗ ▲ 9.30k	33	35	35	70	102.41k	102.41	154.56k	-52.14k
33) MA X - 2	✗ ▲ 15.34k	37	40	40	80	209.87k	209.87	231.16k	-21.30k
34) MA X - 3	✗ ▲ 16.47k	33	25	26	51	258.38k	258.38	265.87k	-7.48k
35) MA X - 4	✗ ▲ 21.46k	33	25	26	51	366.87k	366.87	339.69k	27.18k

You can use the scrollbar at the bottom of the table to bring more Statistics columns into view or you can use the Zoom control in the lower right to adjust the font size and thus increase the number of columns shown. Or, as seen below, you can open the Columns side-panel by clicking on the "<>" button and then selecting or deselecting the visibility of each column.

Strategy	P&L	Age	Trades			Profit (Loss)			
			Long	Short	Total	Total	%Total	Long	Short
31) Buy & Hold	▲ 107.00k	1829	1	0	1	107.0	107.0	107.00k	0.00
32) MA X - 1	✗ ▲ 9.30k	33	35	35	70	102.4	102.4	154.56k	-52.14k
33) MA X - 2	✗ ▲ 15.34k	37	40	40	80	209.8	209.8	231.16k	-21.30k
34) MA X - 3	✗ ▲ 16.47k	33	25	26	51	258.3	258.3	265.87k	-7.48k
35) MA X - 4	✗ ▲ 21.46k	33	25	26	51	366.8	366.8	339.69k	27.18k

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## The Multi-Strategy Analysis Chart

The Multi-Strategy Analysis Chart shows the price data in the upper panel and the profit curve for each strategy included in the worksheet in the bottom panel, making it easy to compare their performance.



You can open the Columns side-panel by clicking on the "<<" button and then selecting or deselecting which of the profit curves are visible on the chart.



# Bloomberg

## Strategy Optimization

The parameters associated with each of the Factors used in the Rules of the Strategy may be optimized to further evaluate the efficacy of the Strategy. BT<Go> allows you to evaluate 10,000 parameter combinations in an optimization job.

The optimization job is executed on Bloomberg's servers allowing you to continue with other work while each iteration in the strategy optimization is being evaluated.

### The Optimizations Screen

The Optimizations screen allows you to access all of the optimization jobs you have submitted. On this screen, you can see the title assigned to the Optimization run, the title of the Strategy used, the Start and End Date range and the data Period that was optimized as well as the date on which the Optimization was submitted. You can also delete optimizations that are no longer useful.

Optimizations								Page 1 / 1	Backtesting
Optimization Title	Strategy Title	Security	Start Date	End Date	Period	Status	Submitted on		
31) BBands 1 with MM Rule	BBands 1 with MM	MSFT US Equity	02/02/2006	02/07/2012	Daily	Complete	03/30/2012		x
32) MA X - 2 : 1	MA X - 2	IBM US Equity	01/04/2006	03/29/2009	Daily	Complete	03/29/2012		x
33) MA X - 1: 1	MA X - 1	IBM US Equity	01/01/2006	12/31/2009	Daily	Complete	03/29/2012		x
34) Boll	Boll	IBM US Equity	11/15/2002	11/15/2011	Daily	Complete	03/23/2012		x
35) ADOsc	ADOsc	IBM US Equity	12/01/2010	12/01/2011	Daily	Complete	03/20/2012		x
36) MAO	MAO	IBM US Equity	03/20/2011	03/19/2012	Daily	Complete	03/19/2012		x
37) BBands with MM Rules	BBands with MM R	MSFT US Equity	02/02/2006	02/07/2012	Daily	Complete	03/16/2012		x
38) Trender Lagged	Trender Lagged	IBM US Equity	03/09/2005	03/09/2007	Daily	Complete	03/09/2012		x
39) BBands with MM Rules	BBands with MM R	MSFT US Equity	02/02/2006	02/07/2012	Daily	Complete	03/05/2012		x
40) BBands with MM Rules	BBands with MM R	MSFT US Equity	02/02/2006	02/07/2012	Daily	Complete	03/05/2012		x
41) Augmented MA X - 1	Augmented MA X - IBM US Equity	IBM US Equity	01/01/2006	03/02/2012	Daily	Complete	03/02/2012		x
42) New Strategy 1	New Strategy 1	CL1 Comdty	02/27/2010	02/27/2012	Daily	Expired	02/27/2012		x
43) My SMA	My SMA	IBM US Equity	02/06/2006	02/06/2009	Daily	Expired	02/06/2012		x
44) My SMA	My SMA	IBM US Equity	02/06/2006	02/06/2009	Daily	Expired	02/06/2012		x
45)									x
46)									x
47)									x
48)									x
49)									x
50)									x
51)									x
52)									x

### Expired Status

Optimization runs older than 30 days become "**Expired**". Once an optimization run has been expired, you can no longer drill down into the details for each optimization pass. The Table and 3D Surface view of the Optimization Analysis as well as the Strategy Definition and Simulation Control setting that were used by the Optimization run can still be viewed.

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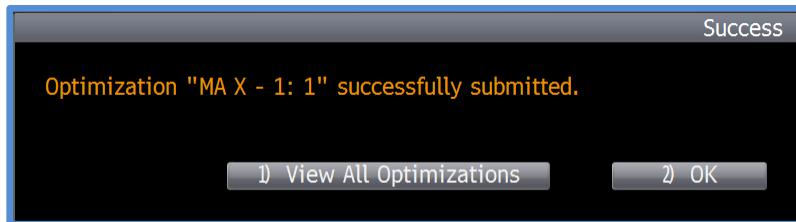
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## Submitting an Optimization for a Strategy

To prepare a strategy optimization run, start from the view of a single strategy. There you can click on the Parameter Optimization tab to display the Strategy Optimization setup screen.



Here is where you choose the parameters that you wish to optimize. Click on a parameter name in the Available Parameters section to transfer it to the Selected Parameters section for optimization. Then set the Minimum and Maximum values and the Step increment that define how many iterations to make for each parameter. As you change these values, the Current Iterations count and the Remaining Iterations count that are located in the lower right hand corner of the screen will be updated to reflect your changes. Once you are satisfied with your settings, run 98) Submit Optimization. The following dialog will appear when the Optimization run has been successfully started on the Optimization server.



You can now run 1) View All Optimizations to go directly to the Optimizations screen. You will see:

1) New Strategy 2) New Worksheet 3) Refresh								Page 1/2	Backtesting
1) Strategies		2) Multi-Strategy Worksheets							
2) My Strategies		22) Sample Strategies		23) Optimizations					
Optimization Title	Strategy Title	Security	Start Date	End Date	Period	Status	Submitted on		
31) MA X - 1: 1	MA X - 1	IBM US Equity	01/01/2010	16:18:38	Daily	2% Done	16:19:07		
32) MA X - 2 for Crude	MA X - 2 for Crude	CL1 Comdty	01/04/2009	03/31/2012	Daily	Complete	03/31/2012		

The top line shows your optimization run active. If your run has a large number of iterations, it may take some time to complete. You can continue other activities on the terminal and return to the Optimizations screen later. Otherwise, run 3) Refresh to update the Optimization run status.

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## Analyzing an Optimization of Sample Strategy SMAVG CROSS -1

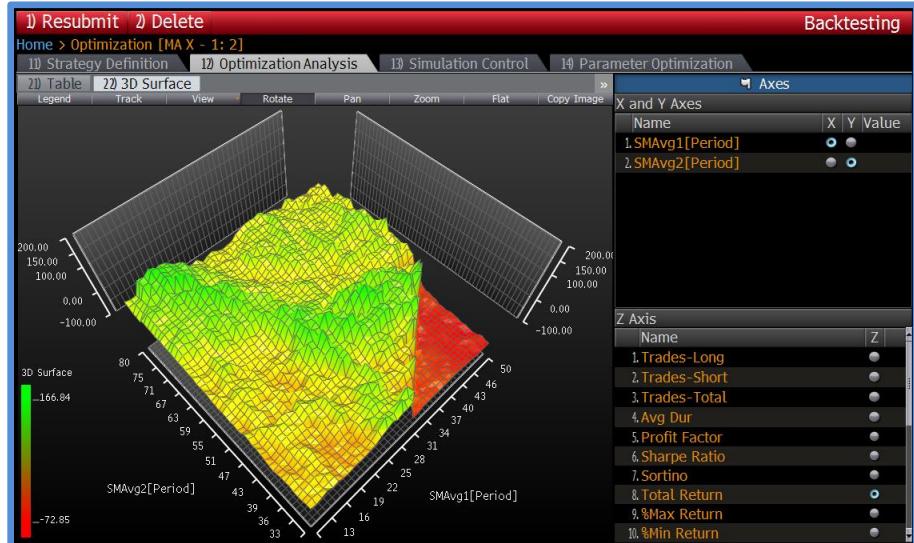
The Optimization Analysis screens show every combination of parameters outlined in the Parameter Optimization tab. In this example, the date range from 01/01/2006 to 12/31/2009 was chosen for the optimization run.

### Optimization Analysis Table

Backtesting																
Home > Optimization [MA X - 1: 2]		Strategy Definition		Optimization Analysis		Simulation Control		Parameter Optimization								
2) Table		2) 3D Surface														
Parameters		Current Position		Trades				Profit (Loss)								
SMAvg1 [Period]	SMAvg2 [Period]	PRL	Age	Long	Short	Total	Total	% Total	Long	Short	Avg Dur	Profit Factor	Sharpe	Sortino		
35	49	▲	67.16k	8	9	9	18	163.80k	163.80	133.38k	30.42k	80.17	4.86	1.26	2.16	
18	73	▲	83.07k	97	6	6	12	155.41k	155.41	122.36k	33.05k	121.25	8.25	1.24	2.19	
33	17	▲	82.31k	98	6	6	12	153.08k	153.08	122.29k	30.79k	121.33	7.32	1.23	2.16	
34	28	50	▲	60.66k	7	8	8	16	152.05k	152.05	125.43k	26.63k	90.62	4.54	1.20	2.12
35	15	78	▲	84.72k	101	6	6	12	152.04k	152.04	122.28k	29.76k	121.42	6.62	1.22	2.15
36	26	48	▲	62.59k	10	9	9	18	149.90k	149.90	124.19k	25.71k	80.67	3.72	1.18	2.08
37	16	78	▲	83.75k	100	6	6	12	149.15k	149.15	120.36k	28.78k	121.33	7.40	1.21	2.11
38	15	79	▲	83.49k	100	6	6	12	148.39k	148.39	119.72k	28.68k	121.42	6.70	1.20	2.12
39	19	69	▲	89.48k	95	6	6	12	146.42k	146.42	121.48k	24.94k	121.33	6.49	1.17	2.05
40	34	50	▲	60.40k	7	8	8	16	146.14k	146.14	122.24k	23.90k	90.25	4.70	1.16	1.99
41	26	54	▲	75.85k	4	7	7	14	145.76k	145.76	119.99k	25.77k	103.64	5.81	1.16	2.04
42	16	77	▲	82.43k	100	6	6	12	145.19k	145.19	117.69k	27.50k	121.33	6.92	1.18	2.07
43	31	47	▲	61.50k	8	9	9	18	144.34k	144.34	122.33k	22.01k	80.50	3.85	1.14	1.99
44	16	75	▲	79.03k	99	6	6	12	143.01k	143.01	115.79k	27.22k	121.42	7.16	1.17	2.05
45	20	67	▲	89.78k	91	6	6	12	142.43k	142.43	117.96k	24.47k	121.25	5.68	1.14	1.99
46	16	76	▲	78.77k	99	6	6	12	142.24k	142.24	115.40k	26.88k	121.33	7.06	1.16	2.04
47	42	46	▲	82.1k	3	17	17	34	142.14k	142.14	119.36k	22.78k	42.38	3.26	1.12	1.93
48	29	50	▲	58.23k	6	8	8	16	141.91k	141.91	118.48k	23.43k	90.62	4.15	1.13	1.97
49	35	48	▲	61.56k	8	9	9	18	141.82k	141.82	118.75k	23.07k	80.22	4.30	1.13	1.93
50	30	47	▲	59.28k	8	9	9	18	140.75k	140.75	119.83k	20.99k	80.56	3.68	1.12	1.96
51	19	72	▲	78.05k	97	6	6	12	139.97k	139.97	112.85k	27.12k	121.25	7.07	1.14	2.00
52	34	49	▲	58.77k	7	9	9	18	139.47k	139.47	117.85k	21.62k	80.22	3.99	1.12	1.91
53	36	48	▲	62.48k	9	9	9	18	139.35k	139.35	118.08k	21.27k	80.17	4.12	1.12	1.90
54	25	57	▲	66.28k	2	7	7	14	138.30k	138.30	115.94k	22.36k	103.71	5.59	1.11	1.94
55	45	46	▲	5.66k	4	31	31	62	138.26k	138.26	117.73k	20.54k	23.18	2.88	1.11	1.95
56	25	53	▲	72.24k	5	7	7	14	137.61k	137.61	114.18k	22.42k	103.71	5.32	1.12	1.95

Zoom 75%

### Optimization Analysis 3D Chart



Visualizing the optimization results using the 3D Surface is often useful. In the adjacent chart, the Total Return is plotted on the Z-axis with X-axis representing the range of the period for SMAvg1 and the Y-axis representing the range of the period for SMAvg2. The brightest green regions represent the parameter combinations that produce the highest Total Return. The Z-axis can be changed to evaluate the response of other statistics.

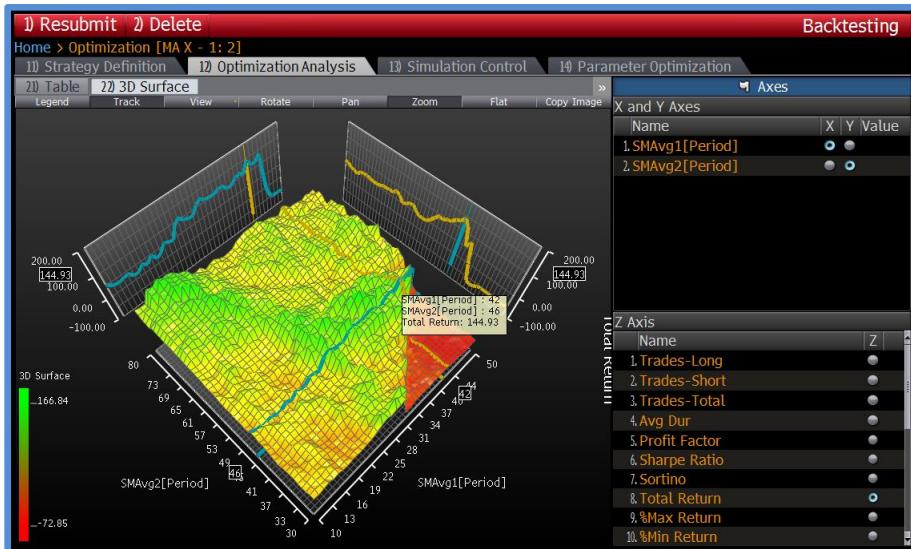
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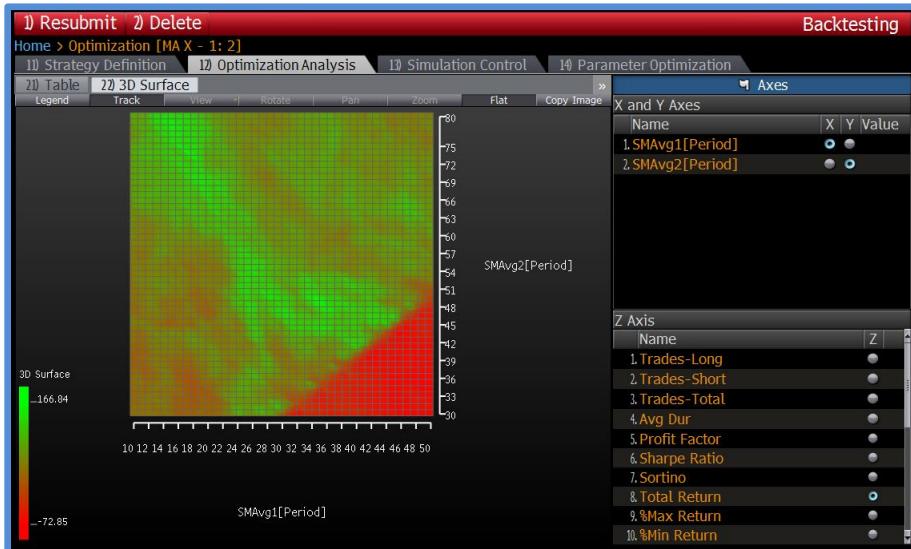
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## Optimization Analysis 3D Chart with Tracking



The 3D Surface can be rotated, panned, and zoomed to obtain a clearer perspective. Clicking on the Track button activates an X-Y cross-hair tool which then defines the 2-D cross sections that are shown in the side fences. A tooltip pop-up shows the values at the cross-hairs intersection.

## Optimization Analysis 3D Chart Flattened



Clicking on the "Flat" button transforms the 3D Surface into a contour plot representation of optimization space which can also be useful for analyzing the stability of the optimization space.

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## Optimization Analysis Table Columns

	Column Name	Definition
Current Position	Position Icon	Up Arrow = Long Position; Down Arrow = Short Position; Green Arrow = Profitable Position; Red Arrow = Losing Position; Blank cell indicates no position at most recent bar
	P&L	Current Position's Profit or Loss Amount
	Age	Number of bars current trade has been active
Trades	Long	Total Long Trades
	Short	Total Short Trades
	Total	Total Trades Long + Short
Profit (Loss)	Total	Net Profit After Trade Costs (Closed + Open Positions)
	%Total	Percent profit after trade costs vs initial capital
	Long	Net profit long trades after trade costs (Closed + Open Positions)
	Short	Net profit short trades after trade costs (Closed + Open Positions)
Statistics	Avg Dur(in Bars)	Average number of bars per trade
	Profit Factor	Net profit of winning trades/Net loss of losing trades
	Sharpe	Sharpe Ratio using average Risk Free Rate (3 Month US T-Bill) during test period
	Sortino	Similar to Sharpe Ratio using only variation of negative returns
	Total Return	Same as Total Profit
	%MaxReturn	Maximum percentage increase since start of test period
	%MinReturn	Minimum percentage return since the start of test period
	%WinningRatio	Percentage of all trades that were profitable. A trade is profitable if the portfolio increases in value from that trade to the next.
	%LosingRatio	Percent of all trades that were losses. A trade is a losing trade if the portfolio decreases in value from that trade to the next.
	%Max DD	Max Drawdown is the biggest percentage drop from any equity high to the next equity low. It measures the biggest loss possible over the horizon, if the investor would have bought the security at that high point and sold at the next low.
	Max DD Length	Length of time from the start of % Max DD to the next equity low in number of bar intervals.
	Recovery From Max DD	Length of time from the low point of the % Max DD until the previous high is reached again in number of bar intervals.
	Max DD Recovery Period	Sum of Max DD length and Recovery from Max DD.
	% Max Increase	Largest percent equity increase from any equity low to the next equity high.
	Max Increase Length	Length of time from the start of % Max Increase to the next equity high in number of bar intervals.

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# Bloomberg

## Sample Strategies

### Sample 1 – SMAvg Cross - 1- IBM US Equity - Basic Moving Average Cross

To begin we will consider a very basic strategy of used by technical analysts, the crossing of 2 moving averages. To include a study as a Factor in a strategy, find the desired study in the Select From Available Factors section and click on the name. The study will then appear in the Selected Factors section. In the following example, the Simple Moving Average was chosen twice and then the Period parameter of each instance was modified by clicking on the pencil to display the Study Settings dialog.

The screenshot shows the Bloomberg Strategy Definition interface for 'MA X - 1'. The 'Selected Factors' table lists two Simple MA studies: 'SMAvg1' (42,0) and 'SMAvg2' (46,0). The 'Rules' section contains two rules: 1. 'Cover and go Long' when SMAvg1 crosses above SMAvg2 at Next Open, and 2. 'Close and go Short' when SMAvg1 crosses below SMAvg2 at Next Open. The 'Description' field is set to 'Basic MA Cross Reversal'.

Each Rule in the example above consists of 2 lines:

The “when” line defines the Signals that will trigger a trade. In this case, we are defining a reversal strategy using “Cover and Go Long” when the faster Simple MA crosses above the slower Simple MA and then reversing the long position using “Close and Go Short” when the faster Simple MA crosses below the slower Simple MA.

The “at” line defines the order that will be used to execute the trade. The first part of the “at” line defines the Order Price to be Next Open and the last part, the Order Type to be a Market order.

The periods for the moving averages, 42 & 46, were chosen from a parameter optimization run with IBM US Equity for the date range 01/02/06 to 12/31/2009 as discussed above.

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# Bloomberg

## Sample 2 – SMAvg Cross - 2 – IBM US Equity - Basic Moving Average Cross with ADX

As a first step to improving the strategy we will use the ADX output of the DMI study which measure trend strength. The principle here is that when the trend strength is too high, we are too late to ride the trend and should stay on the side-line. We also may expect that the long side has different characteristics than the short side

The screenshot shows the Bloomberg Strategy [MA X - 2] interface. In the 'Selected Factors' section, five factors are listed:

Type	Name	Edit
1. Simple MA(42,0)	SMAvg1	X
2. Simple MA(46,0)	SMAvg2	X
3. DMI(14)	DMI1	X
4. Number(32)	ADX_Long	X
5. Number(22)	ADX_Short	X

In the 'Rules' section, there are two rules defined:

- Action:** Cover and go Long  
**when:** SMAvg1 SMAVG crosses above SMAvg2 SMAVG  
**and:** DMI1 ADX < 32  
**at:** Next Open
- Action:** Close and go Short  
**when:** SMAvg1 SMAVG crosses below SMAvg2 SMAVG  
**and:** DMI1 ADX < 22  
**at:** Next Open

A description at the bottom states: "MA Cross Reversal with ADX".

As can be seen example above, each Rule now consists of several lines:

Several additional factors were selected. First the DMI study was added by first finding and then selecting the Directional Movement Index study from the Available Factors. This makes the ADX output available for integration in the strategy.

To permit treating the short side separately from the long side, 2 numeric variables, ADX\_Long and ADX\_Short were added by twice clicking on the Add Variable feature in the Select From Available Factors section. The purpose of using variables here instead of the alternative explicit Value declaration is to permit optimization of the variable values.

Each “when” line has been augmented with an additional “and” condition by inserting an “and” line using the “at” drop list and then conditioning the entries with the ADX output of the DMI1 factor.

The ADX\_Long and ADX\_Short levels, 32 & 22, were chosen from a parameter optimization run with IBM US Equity for the same 01/02/06 to 12/31/2009 date range

# Bloomberg

## Sample 3 – SMAvg Cross - 3 – IBM US Equity - SMAVG CROSS - 2 with Break Even Stop

As a further step at improving the result we might consider adding a Break Even stop beginning with the short side.

The screenshot shows the Bloomberg Strategy Definition interface for 'IBM US Equity' under 'Strategy [MA X - 3]'. The 'Backtesting' tab is selected. The 'Selected Factors' table includes:

Type	Name	Edit
1. Simple MA(42,0)	SMAvg1	edit
2. Simple MA(46,0)	SMAvg2	edit
3. DMI(14)	DMI1	edit
4. Number(32)	ADX_Long	edit
5. Number(22)	ADX_Short	edit

The 'Rules' section contains three rules:

- 1. Cover and go Long: when SMAvg1 crosses above SMAvg2 and DMI1 at Next Open, ADX < 32. Action: Market.
- 2. Close and go Short: when SMAvg1 crosses below SMAvg2 and DMI1 at Next Open, ADX < 22. Action: Market.
- 3. Exit Short: when High crosses above Entry Price at Next Open. Action: Market.

In the 'Notes' section, it says: 'MA X - 2 with Breakeven Stop on Short'.

As can be seen example above, a 3<sup>rd</sup> rule that specifies a Break Even Stop on the short side has been added:

Because the rule specifies that the High crosses above the Entry Price, it cannot become active before the High has moved below the Entry Price, thus giving the trade some time to develop.

# Bloomberg

## Sample 4 – SMAvg Cross – IBM US Equity - SMAVG CROSS - 2 - with Trailing Stop set to Prior High

This sample explore whether adding a trailing stop for the short trades

The screenshot shows the Bloomberg Strategy [MA X - 4] interface. At the top, there are tabs for Home, Strategy [MA X - 4], Strategy Definition, Strategy Analysis, Simulation Control, and Strategy Optimization. The Strategy Title is set to MA X - 4. On the left, under 'Factors', there is a list of available factors including Add Variable..., Add Security/Datafield..., Bloomberg Technical Studies, User Defined Studies, Simple Moving Avg, Relative Strength Index, and Rate of Change. A 'Selected Factors' table lists five items: 1. Simple MA(42,0) named SMAvg1, 2. Simple MA(46,0) named SMAvg2, 3. DMI(14) named DMI1, 4. Number(32) named ADX\_Long, and 5. Number(22) named ADX\_Short. Below this is a 'Rules' section with three entries:

Action	Qualifier	Condition
1. Cover and go Long	when and at	SMAvg1 crosses above SMAvg2 < 32 SMAVG crosses above ADX_Long Market Stop
2. Close and go Short	when and at	SMAvg1 crosses below SMAvg2 < 22 SMAVG crosses below ADX_Short Market Stop
3. Exit Short	at	Prior High

Below the rules, there is a 'Description' section containing the text: "MA X - 2 with TrailingBarHigh Stop on Short".

As can be seen example above, a 3<sup>th</sup> rule that specifies a Trailing Stop using the Prior High as the stop price has been used:

The “when” line was removed by changing the “when” to “at” to produce a rule with only an “at” line. A rule without a “when” line is generally used to specify an exit rule that is always active when the strategy is in a position.

# Bloomberg

## Comparing the Performance of the SMAvg Cross Strategy Variations on IBM US Equity

In these Samples, we have demonstrated how a basic strategy can be changed with various additions to the strategy with the goal of improving the strategies historical performance.

### Using Single Charts

In the following figures, the region used for parameter optimization is illustrated by the bounding rectangle on the profit curve. The regions outside of the rectangle therefore represent the out-of-sample zones used to evaluate the strategy's robustness.

**Figure 1.1 – SMAVG CROSS – 1 Total Profit = 108,350; Max Drawdown = 35.44%; Max DD Length = 174 days**



**Figure 2.1 – SMAVG CROSS – 2 Total Profit = 421,600 Max Drawdown = 17.26%; Max DD Length = 91 days**



**Figure 3.1 – SMAVG CROSS – 3 Total Profit = 268,900 Max Drawdown = 18.87%; Max DD Length = 78 days**



**Figure 4.1 – SMAVG CROSS – 4 Total Profit = 380,570 Max Drawdown = 13.72%; Max DD Length = 35 days**



The above charts show that adding the ADX criterion significantly improved the performance of the original simple moving average strategy particularly in the out-of sample regions. Adding a trailing Stop Loss on the short side further reduced some losses and minimized the drawdown. While the Total Profit for strategy SMAVG CROSS - 4 is somewhat less than for strategy SMAVG CROSS - 2, the improved drawdown characteristics may make the SMAVG CROSS - 4 strategy preferable.

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# Bloomberg

## Using Trade Scatter Charts

As can be seen in the Scatter Charts shown below, as the strategy is progressively improved, the number of losing trades is reduced.

**Figure 1.2 – SMAVG CROSS – 1 Total Profit = 108,350; Max Drawdown = 35.44%; Max DD Length = 174 days**



**Figure 3.2 – SMAVG CROSS – 3 Total Profit = 268,900 Max Drawdown = 18.87%; Max DD Length = 78 days**



**Figure 2.2 – SMAVG CROSS – 2 Total Profit = 421,600 Max Drawdown = 17.26%; Max DD Length = 91 days**



**Figure 4.2 – SMAVG CROSS – 4 Total Profit = 380,570 Max Drawdown = 13.72%; Max DD Length = 35 days**



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## Sample 5 - BBands with Money Management Rules – MSFT US Equity

This Long Only strategy uses the idea that we only want to entry a trade when we break out above the Upper Bollinger Band. There are 2 money management exit rules included, a Profit Taking rule and a Stop Loss rule.

The screenshot shows the Bloomberg Strategy Definition interface for 'BBands with MM Rules'. The top navigation bar includes tabs for Home, Strategy, Simulation Control, and Strategy Optimization. The main area displays the 'Selected Factors' table and the 'Rules' section. The 'Selected Factors' table lists three items: 'Boll(21,1.6,2)' named 'Boll1', 'Number(60)' named 'ProfitInPercent', and 'Number(5)' named 'LossInPercent'. The 'Rules' section contains three entries:

Action	Qualifier	Condition
1. Enter Long	when Close at Current Close	crosses above Boll1
2. Exit Long	when Profit at Prior Close	% Equity > ProfitInPercent
3. Exit Long	when Loss at Prior Close	% Equity > LossInPercent

A description below the rules states: 'Bollinger Band Breakout with Money Management Rules'.

This strategy relies on keeping the losses small and allowing the profits to run. As can be seen in the charts below, it relies upon just a few large winners for its profitability. While it minimizes the losses incurred during the 2007-2008 down turn, it fails to capitalize on the smaller rallies that have occurred post 2009.

Figure 5.1 - BBands with MM Rules - Chart



Figure 5.2 - BBands with MM Rules - Scatter Chart



# Bloomberg

## Sample 6 – Using an Additional Data Fields - MSFT US Equity Analyst Recommendations and 3 Month 100% Moneyness Implied Volatility

This example introduces the use of additional Datafields as well as a custom study that was developed using the CS.Lite framework. The fields **Total Buy and Sell Recommendations** and the **3 Month 100% Moneyness Implied Volatility** supplement the Simple Moving Average-based and Money Management elements.

The profit of \$65,650 generated by this strategy is significantly better than the Buy & Hold of \$20,700 over the same period and the Max Drawdown of 36% is also much better than the 56% for the Buy & Hold.

**Figure 6.1 - Analyst Recommendations - Chart**



**Figure 6.2 - Analyst Recommendations - Scatter Chart**



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# Bloomberg

The CS.Lite custom study call ROC of MA used in the above example is illustrated here. Note that the study has two outputs, MAlagged which is the Simple Moving Average with a lag as well as, ROCofMA which is the Rate of Change of the Simple Moving Average.

**1) Preview    2) Save As    3) Syntax Help    4) Actions -    ROC of SMA**

**Input Parameters**

Parameter Name	Type	Default	Min	Max	Display Name
MAperiod	Integer	10	<input checked="" type="checkbox"/> 2	<input type="checkbox"/>	0 MAperiod
1. ROCperiod	Integer	5	<input checked="" type="checkbox"/> 1	<input type="checkbox"/>	0 ROCperiod
2. MLag	Integer	0	<input type="checkbox"/>	<input type="checkbox"/>	0 MLag

**Expression**

```
MAlagged=SMAvg(C,MAperiod)>>MLag;
ROCoMA=ROC(MAlagged,ROCperiod);
```

**Output Lines**

Line Name	Variable	Visible	Panel	Color	Width	Style
MAlagged	MAlagged	<input checked="" type="checkbox"/>	Parent Panel	<input type="color"/>	1	Solid Line
1. ROCofMA	ROCoMA	<input checked="" type="checkbox"/>	Study Panel	<input type="color"/>	1	Solid Line

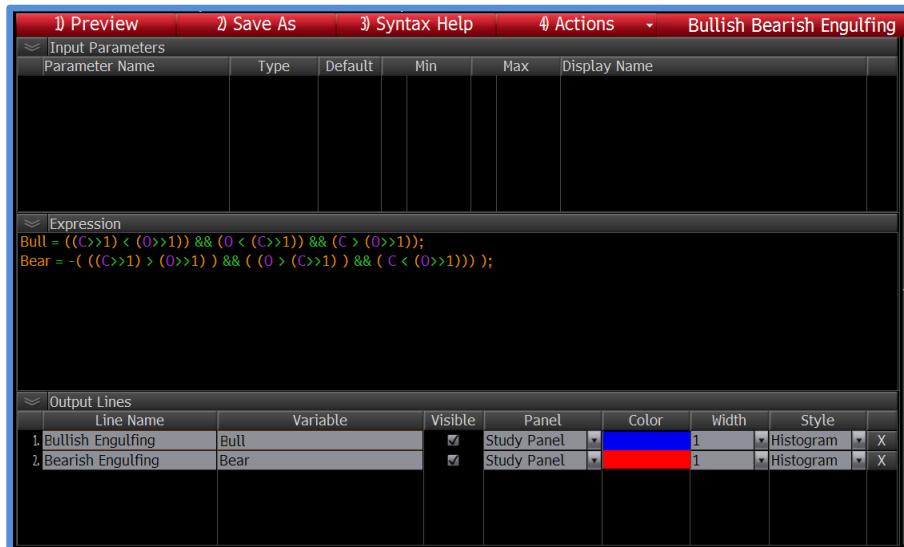
**Expression**

```
MAlagged=SMAvg(C,MAperiod)>>MLag;
ROCoMA=ROC(MAlagged,ROCperiod);
```

# Bloomberg

## Sample 7 -Bullish & Bearish Engulfing Candle Patterns - GBPUSD Curncy

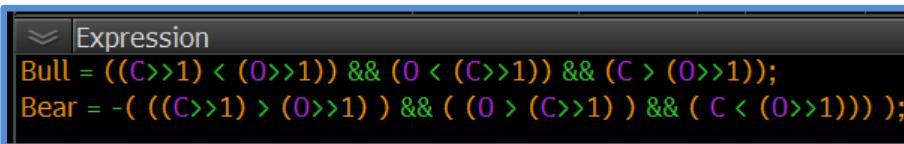
This sample illustrates using a CS.Lite custom study to define the Bullish and Bearish Engulfing Candlestick patterns and then analyzing a Long/Short strategy based on these patterns.



The formulas below express the relationships between the open and the closes that define the Engulfing patterns. For example, the form

"(C>>1) < (O>>1)" can be read as:

Close 1 ago is less than the Open 1 ago.



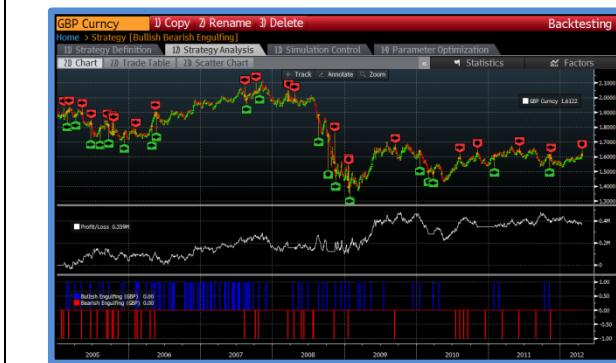
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The study output value name Bullish Engulfing = 1 when the Bullish Engulfing pattern is detected and the study output name Bearish Engulfing = -1 when the Bearish Engulfing pattern is detected. The strategy reverses its position unless a prior exit may have occurred. If the latter is true, the Cover and go Long behaves identically to an Entry Long and the Close and go Short behaves identically to an Entry Short.

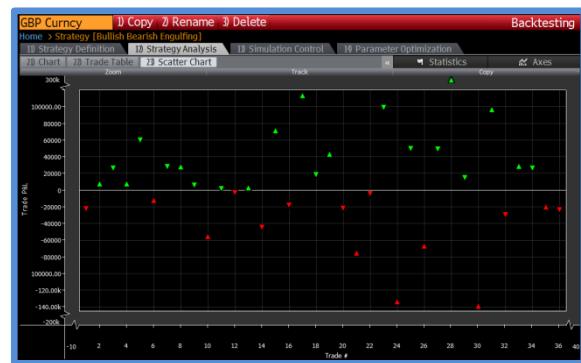
The screenshot shows the Bloomberg Strategy Definition interface for the 'Bullish Bearish Engulfing' strategy. The top navigation bar includes tabs for Home, Strategy, Simulation Control, and Parameter Optimization. The 'Strategy Title' is set to 'Bullish Bearish Engulfing'. The 'Factors' section lists 'Bullish Bearish Engulfing', 'Long Loss Level %', and 'Short Loss Level %' under 'Selected Factors'. The 'Rules' section contains four rules defining entry and exit conditions based on candlestick patterns and price levels. A note at the bottom states: 'The Bullish Bearish Engulfing Strategy goes long after a bullish engulfing candlestick pattern, and short after a bearish engulfing pattern. The strategy uses a sample CS.Lite study that outputs a '1' for bullish engulfing and '-1' for bearish engulfing.'

In the Simulation Control the Trade Size was set to the notional amount 1M indicating that each trade was for 1 million British pounds. The profit of about \$360,000 generated by this strategy is significantly better than the Buy & Hold loss of \$292,000 over the same period.

**Figure 7.1 - Bullish & Bearish Engulfing - Chart**



**Figure 7.2 - Bullish & Bearish Engulfing - Scatter Chart**



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## Sample 8 – Using SMAVG CROSS -2 for CL1 – CL1 Comdty

This sample illustrate using the SMAVG CROSS 2 strategy with parameters adapted for trading Crude Light using the CL1 generic data series. In the Simulation Control screen the Trade Size was set to 1 Contract for this evaluation.

The screenshot shows the 'Strategy Definition' tab selected in the top navigation bar. The 'Strategy Title' is 'MA X - 2 for CL1'. The 'Factors' section lists several technical indicators: Simple Moving Avg, Simple MA(29.0), Simple MA(28.0), DMI(14), Number(32), and Number(22). The 'Rules' section contains two rules: 'Cover and go Long' and 'Close and go Short', each with specific conditions involving SMAvg1, SMAvg2, DMI1, ADX, and market timing. A 'Notes' section at the bottom is empty.

The parameters used were chosen by optimizing using the date range of 01/02/2009 to 12/31/2010. The profit of \$20,500 generated by this strategy from 01/01/2011 to current is significantly better than the Buy & Hold of \$3,140 over the same period and only incurring a minimal period of absolute loss.

Figure 8.1 - SMAVG CROSS 2 for CL1 - Chart



Figure 8.2 - SMAVG CROSS 2 for CL1 - Scatter Chart



A Stop Loss to limit the down-side should be added improve this strategy.



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## Sample 9 – RSI L/S with Bias – SPY US Equity

This example uses the RSI study enhanced with a Simple Moving Average bias along with asymmetrical exit rules, the long Exit using Current Close with the short Exit using Next Open.

The screenshot shows the Bloomberg Strategy Definition interface for 'RSI L/S with Bias'. The top navigation bar includes 'SPY US Equity', 'Update', 'Home > Strategy [RSI L/S with Bias]', 'Strategy Definition', 'Strategy Analysis', 'Simulation Control', 'Parameter Optimization', and 'Backtesting'. The 'Strategy Title' is set to 'RSI L/S with Bias'. The 'Factors' section lists 'Add Variable...', 'Add Security/Datafield...', 'Bloomberg Technical Studies', 'User Defined Studies', and 'Simple Moving Avg'. The 'Selected Factors' table contains four entries: 1. RSI(5) named 'RSI1', 2. Simple MA(200,0) named 'SMAvg1', 3. Number(30) named 'RSI Level Long', and 4. Number(70) named 'RSI Level Short'. The 'Rules' section shows four rules: 1. Enter Long when RSI1 crosses above SMAvg1 at Next Open, with a condition of RSI > 30. 2. Exit Long when RSI1 crosses above SMAvg1 at Current Close, with a condition of Value > 55. 3. Enter Short when RSI1 crosses below SMAvg1 at Next Open, with a condition of RSI < 70. 4. Exit Short when RSI1 crosses below SMAvg1 at Next Open, with a condition of Value < 45. A note at the bottom states: 'Short term RSI using Long Term Simple Moving Average to bias the entry. Using asymmetrical exits - long exits on Current Close, Short exits on Next Open.'

The profit of \$81,478 generated by this strategy is significantly better than the Buy & Hold of \$8,739 over the same period and the Max Drawdown of 17% is also much better than the 57% for the Buy & Hold.

Figure 9.1 - RSI L/S with Bias - Chart



Figure 9.2 - RSI L/S with Bias - Scatter Chart

