Chapter V.

Back Testing Rules

In This Chapter

Overview

The Expert Design Studio includes a full-featured back tester that can back test the profitability of one or several rules within minutes. The EDS tester compares the performance of securities that pass a rule to the general market during the same time period, and also compares the screening technique represented by the rule to a buy-and-hold strategy. The test can be run on the user's entire database or on a selected list, and the user can specify the exact time period for the test.

Setting up a test

Before testing a rule, a Report Tab for that rule must be created. No matter how many rules have been created in a Document, only those rules with associated Report Tabs can be tested.

Rules

AllWorks
ERUPin5Days
Reversal

OK   Cancel
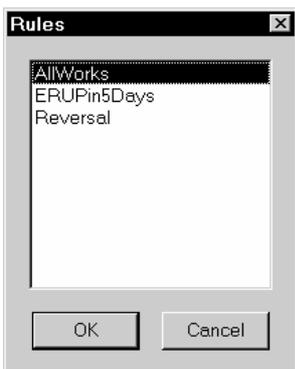
Rules dialog box

◻ *To create Report Tabs:*

1. With the Rule Library tab selected in Report View, choose the **Report** command from the EDS menu bar and then select **Insert** from the *Report* submenu.

    - or -

    Click the right mouse button and choose **Insert Report** from the shortcut menu.

2. A dialog box appears with the rules you have entered listed. Select by highlighting the rule(s) you want to test.

3. Click **OK** and Report Tabs corresponding to the rule names will be created.

◻ *To set up a test, proceed as follows:*

1. Open the Document that holds the rule(s) you want to back test.

2. From Report View, select the Report Tab corresponding to the rule that you want to back test.

3. Select **Report** on the menu bar, then **New Backtest**.

    - or -

    Click the right mouse button, and choose **New Backtest** from the shortcut menu.

4. A series of four dialog boxes will appear.

5. When you have completed information in the four dialog boxes, click **Finish**. Enter information in the dialog boxes as follows:

Name dialog box

Specify a name for the test. EDS assigns a default name which is derived from the name of the Document and the Report Tab title. You can accept the default name or enter a new name. When you have completed the information, click **Next**.
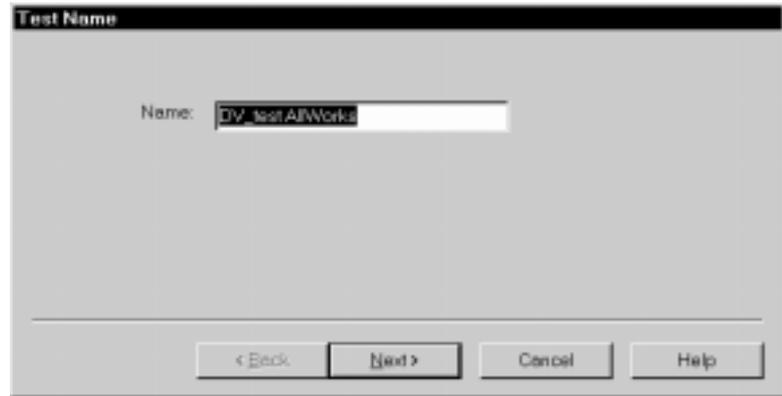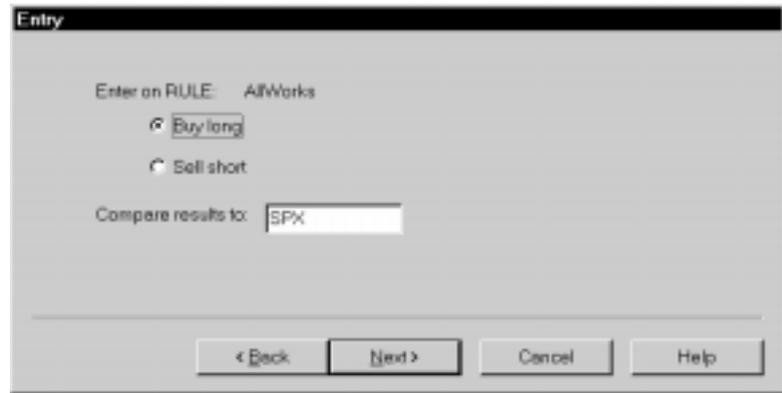
Name dialog box

Entry dialog box

Two items of information are entered in this next dialog box:

Entry dialog box

- Select one of the two options *Buy Long* or *Sell Short* depending on how the screening strategy is to be used.

- In the text box titled *Compare Results to*, enter a market index symbol. This index is used as a comparison with the results of the screening technique. The default is SPX which is the Standard & Poor's 500 index.

When you have completed the information, click **Next** (or **Back** to return to the previous dialog box).

Range dialog box

This is where you specify the time range for the test.
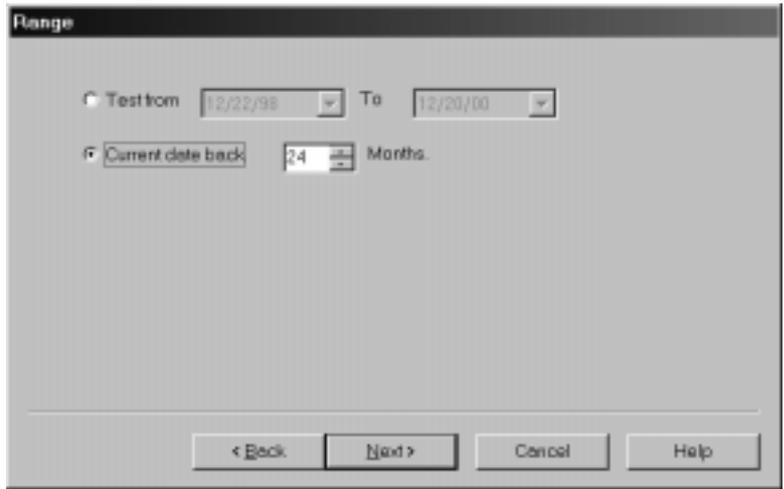
Range dialog box

You have two choices for the time range:

- Specify a date range. If you select this first option, you must specify *Test from* and *To* dates. Use this option if you want to test a specific market environment. For example, you can test rules under bearish market environments, bullish market environments, or sideways market environments.

- Specify the number of months for the back test. For this option, you need only to enter the length of the test in months. With this option, the test period always ends at the current date. The default test period is the last 24 months. This time period can be increased or decreased by clicking the up or down arrows on the *Current date back* text box.

When you have completed the information, click **Next** (or **Back** to return to the previous dialog box).
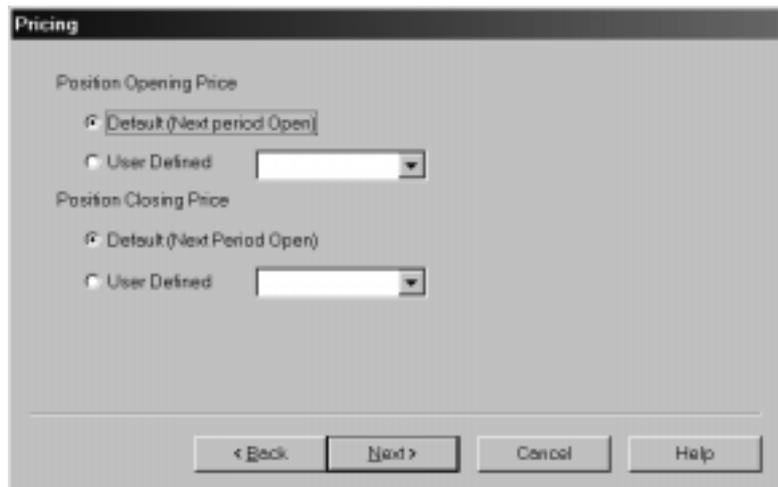
Pricing dialog box

The *Pricing* information determines how positions are priced at entry and exit. If you elect to accept the defaults, next period open prices will be used. Alternatively, you can specify a calculation procedure which allows for slippage. You start by creating a UDF (User Defined Function) for this purpose, which you then can select from the *Pricing* dialog box.

Select from these options in the Pricing window:

- *Position Opening Price* - Select one of these:
    - **Default (Next period Open)** - The opening price for all positions will be the next day's open price.
    - **User Defined** - The opening price for all positions will be computed using the UDF selected in the adjacent text box.
- *Position Closing Price* - Select one of these options:
    - **Default (Next period Open)** - The closing price for all positions will be the next day's open price.
    - **User Defined** - The closing price for all positions will be computed using the UDF selected in the adjacent text box.

When you have completed the information, click **Next** (or **Back** to return to the previous dialog box).

Pricing dialog box

Exit dialog box

This dialog box appears last. An important component of every test is when to exit those positions taken based on your screening strategy. The *Exit* dialog box provides two options for exiting positions. These options are as follows:

- The first choice is to simply exit all positions after a specific holding period (the default is 21 periods). For this option, select the option labeled **Evaluate for** and then enter the holding period (days unless properties is set to weeks). With this selection, the evaluation is based on the value of each position 21 periods after its entry date. The maximum profit, average profit, maximum drawdown, and average drawdown will then be calculated based on position entry and exit values. A strategy tested over a fixed time period is often used to simply test whether a strategy outperforms or underperforms the market.

- The second choice allows you to implement a sell strategy of your choosing. This sell strategy then becomes an integral part of your trading system. You have several options to define a sell strategy:

  - Establish a capital protection stop.

  - Establish a profit protection stop.

  - Specify a rule that you have created to represent a sell strategy.

  - Combination of any of the above.

Exit dialog box

Establish a capital protection stop

Select the option labeled **Trade It** and then check the first option box (**Protect Capital**). Next complete the following entry for this option:

% of my capital: When you place a trade, how much capital do you want to protect if the security starts to drop before it becomes profitable? Enter a percentage here. An input of 90 will protect 90% of the capital, meaning a stock will be sold when it falls 10% from the purchase price.

Establish a profit protection stop

Select the option labeled **Trade It** and then check the second option box (**Protect Profit**). Next complete the following entries for this option:

% of my profit above %: After you have begun to make a profit, how much of that profit do you want to conserve and at what point do you want to start to protect profits? Enter these two percentages here. By selecting 85% of profit above 5%, once the position reaches a 5% profit a stop is established based on protecting 85% of the profit achieved to that point.

Specify a rule that you have created to represent a sell strategy

This option is for users who want to create their own rules for when to sell. For this option, you must have first created a sell rule in the Rule Library. Using this option, the user not only creates a buy strategy, but also creates his own individualized sell strategy. The sell rules can be as simple as a decreasing Price Phase indicator or can be a combination of several rules. Users can combine a profit and capital protection stop strategy with an exit rule or the rule can be a stand alone stop strategy.

To use a sell rule, first select the option labeled **Trade It** and then check the bottom option box. Next complete the following entries:

After periods: Time periods before allowing exit based on the rule. Use arrows to specify number of time periods.

Exit on rule: From the *exit on rule* list box, select the rule that you want to use for your sell strategy. To select a rule, click the arrow next to the box to display a list of rules for which tabs have been created. Choose the rule that you created for exiting positions.

When you have completed information in this last dialog box, click **Finish** (or **Back** to return to the previous dialog box). The **Finish** command switches the screen to Test View where you can initiate a back test using the completed setup information.

Note
You can elect to include open positions in the back test summary. First display the *Properties* dialog box by selecting **Edit** from the **Test** menu. At the bottom of the **Exit** tab, check the *include open positions held at least* option box and enter the number of days.

Running a test

By default, the back test is run on all the tickers in your database. You can also run the test on a selected list of tickers or on a particular type of ticker such as groups or sectors.
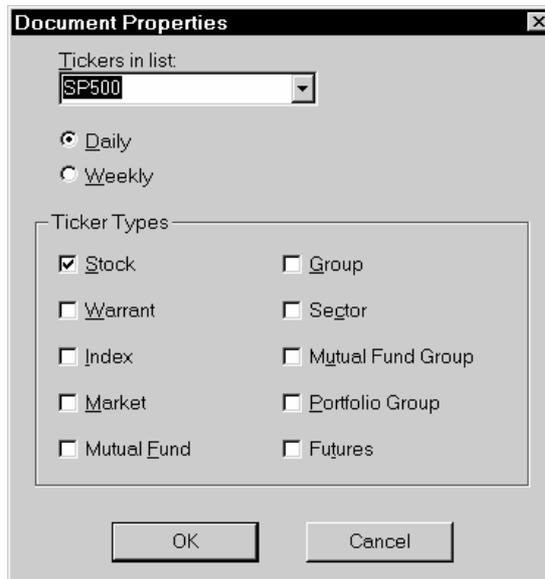
❑ *To select tickers for testing:*

1. Select **File** from the menu bar and choose **Properties.**

   - or

   Click on the **Properties** toolbar icon.

2. The *Properties* dialog box appears. Select a list from the *List* text box or select specific *Ticker Types* for the test.

3. Click **OK**.
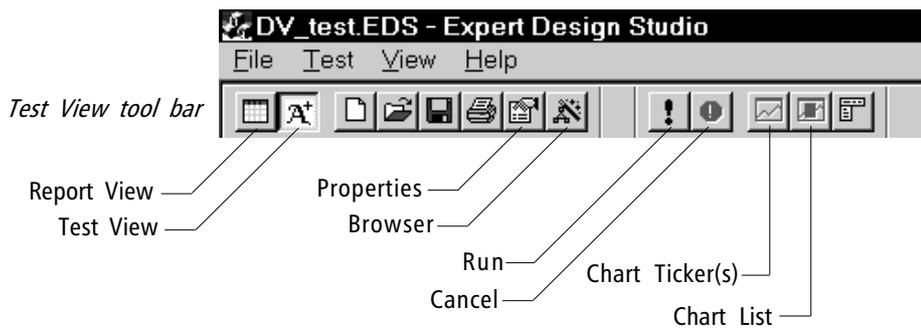

Document Properties dialog box

❑ *To run the test:*

1. You should now be in Test View. If not, click the Test View toolbar icon to switch to Test View.

2. From the menu bar, select **Test** and then **Run**.

   - or -

   Click the **Run** icon which appears as a "!" on the Test View toolbar.

Test View tool bar

Report View ——
Test View ——
Properties ——
Browser ——
Run ——
Cancel ——
Chart Ticker(s) ——
Chart List ——

DV_test.EDS - Expert Design Studio

File Test View Help

3. A dialog box then appears which allows you to review the testing parameters that were entered for the selected rule.

4. Click **OK** to run the test.

Navigating the system

You can move back and forth between the test and the report sections of the program by either of the following methods:

*   Select **View** from the menu bar and select **Report View** or **Test View**.

    -or-

    Click on the **Report View** or **Test View** toolbar icons.

*   In Test View, you can display test reports for the selected (or active) Report Tab and you can initiate new tests for the selected Report Tab. If you are in Report View, you can switch to Test View only if both of the following are true:

*   The selected Report Tab is for a rule report (not a Summary report).

*   Test setup information has been completed for the selected Report Tab (i.e., rule).

Running additional tests

☐ *To run a back test for a Report Tab which has previously been tested, do the following:*

1. Select the Report Tab corresponding to the rule for which you want to run a new test.

2. Click the **Test View** icon to switch to Test View.

3. Click the **Run** icon on the Test View toolbar. A *Properties* dialog box for this rule will appear.

4. The *Properties* dialog box provides three tabs (*Entry, Range, Exit*). These tabs correspond to the three categories of test parameters discussed above. The information displayed on these tabs is the latest test setup information entered for this rule. You can change any of the parameters on these tabs as required for the new test.

5. When you have completed your changes to the test parameters, click **OK** to run the test.
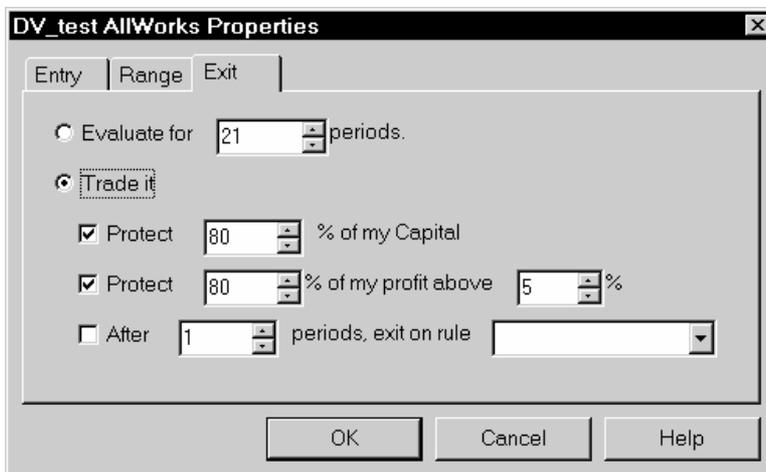
Properties dialog box for pre-tested rule

Viewing test reports

You can view two reports in Test View — a Summary report that details the performance of the rule that was tested and a Positions report that provides detailed trading results for each position. To select either report, click on the appropriate command tab found in the upper left corner of the toolbar.

Summary report

A number of statistics appear on the Summary report. This report details the performance of the rule that was tested. For testing purposes, all trades are based on the opening price the day after the buy and sell signals.

The Summary report provides four columns of data:

- *First column (untitled)* - values representative of all trades
- *Winners* - values derived from winning trades.
- *Losers* - values derived from losing trades.
- *Neutral* - values derived from break-even trades.

Summary report

`Summary report rows`

Each row of data on the report provides the following information:

Number of trades in test:

This row of data represents the total number of trades examined for the test. It also represents the number of securities that passed this screening rule during the test period. Figures are also shown for winning, losing, and neutral trades.

Average days per trade:

These are the average holding periods for all the trades and for winning trades, losing trades, and break-even trades. If you tested a buy strategy with a fixed 15 day holding period as in the example shown, all the values will be 15 days. If a variable stop system is in place, average holding periods will be computed.

Maximum Profit/Loss:

The figures here are the biggest gain and biggest loss of all the trades that were executed.

Average Drawdown:

Risk is an important element in any trading system. Figures here represent the average drawdowns for all trades, winning trades, and losing trades.

Average Profit/Loss:

The most important question in any trading system is: "What was the average return per trade?" This row shows the average profit/loss of all the trades, average profit/loss of winning trades, and average profit/loss of losing trades. If you are testing a shorting strategy rather than buying long, the figure will be positive if the short position fell before the stop level was triggered (before the short was covered).

Note
The market index used for comparison with screening results is changed in the dialog box which appears when the **Run** command is selected from Test View. Click the **Entry** tab and enter a new market index symbol in the text box titled *Compare Results to*.

Average Index Profit/Loss:

Many stock trading systems are profitable. The best systems are not only profitable but they beat the market. The Average Index Profit/Loss row lists the results from trading a market index (by default the SPX) instead of stocks. The calculation is the same for the index as it is for the stocks in the trading system so results of stock selection versus the market are directly comparable. The *Winners* column shows what the market did during the winning trades. The *Losers* column shows what the market did during the losing trades.

Certainly the most important figure is the average overall return per trade for the market index, which is 1.40% in the example shown. Ideally, the average return per trade on a stock trading system should be greater than the average return for a market index.

Probability:

This figure answers the question: "What percentage of trades are winners?" The figure under the *Winners* column represents the probability of a profitable trade. The *Losers* column shows the probability of a losing trade. *Neutral* trades are not factored into this calculation.

Average Annual ROI:

The Average ROI figures are the annualized returns for all trades, winning trades, and losing trades. In the example shown, the average trade gains 1.41% with a 15 day holding period. Annualized, this is a return of 23.74%.

Annual Index (Buy & Hold):

How did the market perform for the testing time period? This row lists the annualized buy and hold return for the market (by default the S&P 500). That is, it looks at the market index value at the beginning of the testing period and at the end of the testing period and annualizes the return. This figure is different than annualizing the average gain per trade in a market index. It is possible for a trading system to beat the market on a per trade basis but have a lower annualized return than the market on a buy-and-hold basis. That simply means that when you purchased stocks you typically outperformed the market over the same period but the majority of trades were purchased in unfavorable market conditions.

Reward/Risk Ratio:

In an assessment of a trading system or screening technique, both risk and reward should be examined. The Reward/Risk Ratio is such a measure. It compares maximum reward as represented by annualized profit with maximum risk as represented by maximum drawdown.

Reward/Risk Ratio = (NW * Avg Profit) / (NL * Avg Loss)

   where: NW = No. of Winning Trades, NL = No. of Losing Trades

As a rule, the higher the Reward/Risk Ratio the better. A high ratio implies that reward per trading dollar is increasing relative to the risk per trading dollar.

Positions report

In Test View, click the **Positions** tab to view the Positions report. This report lists all trades completed during the test period and provides detailed trading results for each position.

Positions report

Positions report columns

The first six columns on the Positions report are the days *Held*, the *Entry* and *Exit Dates* and *Prices*, and *Total Profit*. These items are self explanatory except for the Entry Dtae which is explained below. The last two items are also explained below.

Entry Date

For a daily backtest, the entry is at the Open price on the day after the Rule has been met. For a weekly backtest, entry is on the Monday following the day that the Rule was met.

DrawDn %:

For long positions, this figure is derived from the lowest price reached by the security during the holding period. For short positions, it is derived form the highest price reached.

Max Pft %:

For long positions, this figure is derived from the highest price reached by the security during the holding period. For short positions, it is derived form the lowest price reached.

Sorting

The Positions report is initially sorted in alphabetical order by ticker symbol. When the same symbol is traded a number of times, the most recent trade appears first. To change the sort to another column, simply click on the column. Click again on the same column for a reverse short.

After running a test, it is recommended that the Positions report be resorted on the *Maximum Profit %* column. The stocks showing the largest return should be charted to make sure the data is correct. Bad data on stocks can skew the results of a test. The same should be done on the *Drawdown %* column.

Charting tickers

To display a chart of a ticker listed in a report, simply double-click on its symbol. Or, you can highlight one or more ticker symbols and select the **Chart Ticker** toolbar icon.

Creating a list of tickers for charting

You can easily scroll through charts of all the tickers listed on the Positions report by first creating a list.

 To create a list of tickers for charting, do as follows:

1. Click the **Chart List** toolbar icon. The *Chart List* dialog box will appear.

2. By default, a list named AIQEDS is created for the tickers on the report. Select one of the following choices from the *Chart List* dialog box:

    • Choose **All** and the list will include all tickers listed in the report.

    • Choose **Selected** (after first highlighting the tickers you are interested in) and the list will be limited to those tickers you have selected.

Chart List

List Name:

AIQEDS

Tickers

- ⦿ All
- ○ Selected

[OK] [Cancel]

Chart List dialog box

3. Click **OK** and TradingExpert's Charts application will open with AIQEDS preselected as the active list and a chart of the first ticker in the list displayed in the Charts window.

4. Use TradingExpert's Explore feature to quickly scroll through the charts.

Fine-tuning rules

The process of building a trading system involves extensive back testing of the screening rules. You can begin by running a series of tests for each individual rule to establish the optimum rule parameters. After running each test, vary the rule parameters and retest to see if performance improves. Continue this process until you are satisfied that each rule is achieving maximum results.

Next, you can begin testing different combinations of rules. Start by combining the rules that you think will give the best results into a single rule and back test. Adding or subtracting screening rules may or may not increase returns. Thorough back testing with different combinations of rules should lead to the optimum combination.

It is also suggested that you back test your screening rules over different time periods and on different lists of stocks. After building and fine tuning a system over one time period, run some additional tests on different time periods or on a different group of securities. Confidence is increased when the system outperforms under different types of conditions.

In some circumstances, you might want to design a trading system specifically for one type of market. Regardless, you should back test under all conditions simply to know what sort of results to expect if you are wrong in your assessment of the market.

Report Tabs right-mouse-click menu

Clicking the right mouse button while viewing a Report Tab displays a floating menu with the following options:

Run this Report - Generates a report for this Rule.

Go to Rule Definition - Displays Rule Library. The Rule corresponding to this tab is highlighted.

Insert Report - Displays the *Rule* dialog box. See Chapter VI for instructions on using this function to designate rules for the Document's scanning report.

Delete Report - Deletes existing report for this rule.

Rename Report - Displays the *Rule* dialog box. See Chapter VI for instructions on using this function.

Export Report - Displays the *Rule* dialog box.

New Backtest - Displays the *Export To* dialog box.

View Backtest - Generates a new backtest for this Rule.