



**S-Trader**





## LR | Linear Regression

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## Description

In statistics, linear regression is a linear approach for modeling the relationship between a scalar dependent variable  $Y$  and one or more explanatory variables (or independent variables) denoted  $X$ . The case of one explanatory variable is called simple linear regression. For more than one explanatory variable, the process is called multiple linear regression. (This term is distinct from multivariate linear regression, where multiple correlated dependent variables are predicted, rather than a single scalar variable.) In technical analysis linear regression is commonly used as a quantitative way to determine the underlying trend and when prices are overextended. A linear regression trendline uses the least squares method to plot a straight line through prices so as to minimize the distances between the prices and the resulting trendline. This linear regression indicator plots the trendline value for each data point by first calculating the slope and the intercept of the regression line. The coefficient of determination, denoted  $R^2$  or  $r^2$  and pronounced "R squared", is the proportion of the variance in the dependent variable that is predictable from the independent variable(s).

## Formula

Step 1: Calculate  $X_{AVERAGE}$  and  $Y_{AVERAGE}$

Step 2: Slope =  $LRS = m = \frac{\sum[(X_i - X_{AVERAGE}) * (Y_i - Y_{AVERAGE})]}{\sum(X_i - X_{AVERAGE})^2}$

Step 3: Intercept =  $LRI = b = Y_{AVERAGE} - m * X_{AVERAGE}$

Step 4: Forecast =  $LRF = m * x_i + b$

Step 5: For each period, calculate  $f_i$  = the regression forecast at point  $i$ ;

Step 6: Calculate  $SSTOT = \sum(Y_i - Y_{AVERAGE})^2$ ,  $SSREG = \sum(f_i - Y_{AVERAGE})^2$ ,  $SSRES = \sum(Y_i - f_i)^2$

Step 7: Coefficient of determination =  $R^2 = 1 - SSRES / SSTOT$



## Parameters

|                |  |
|----------------|--|
| <b>Source</b>  | Any price source (O, H, L, C, Vol, OI) or any other built-in or custom study |
| <b>Periods</b> | Any number of periods  |

## Output value(s)

There are four output values resulting from the formula, the Linear Regression Slope, the Linear Regression Intercept, the Linear Regression Forecast and the Linear Regression R Squared.

## Plot

The plot is in a separate panel at the bottom.

## Quant Script™ Syntax

|                   |  |
|-------------------|--|
| <b>Short Form</b> | <i>LRS</i> (Source, Periods)                               |
|                   | <i>LRI</i> (Source, Periods)                               |
|                   | <i>LRF</i> (Source, Periods), <i>TSF</i> (Source, Periods) |
|                   | <i>R2</i> (Source, Periods)                                |



|                  |  |
|------------------|--|
| <b>Long Form</b> | <i>LinearRegressionSlope</i> (Source, Periods)   |
|                  | <i>LinearRegressionIntercept</i> (Source, Periods)                                     |
|                  | <i>LinearRegressionForecast</i> (Source, Periods), TimeSeriesForecast(Source, Periods) |
|                  | <i>RSquared</i> (Source, Periods)  |

## Dialogs

### Chart Study Dialog

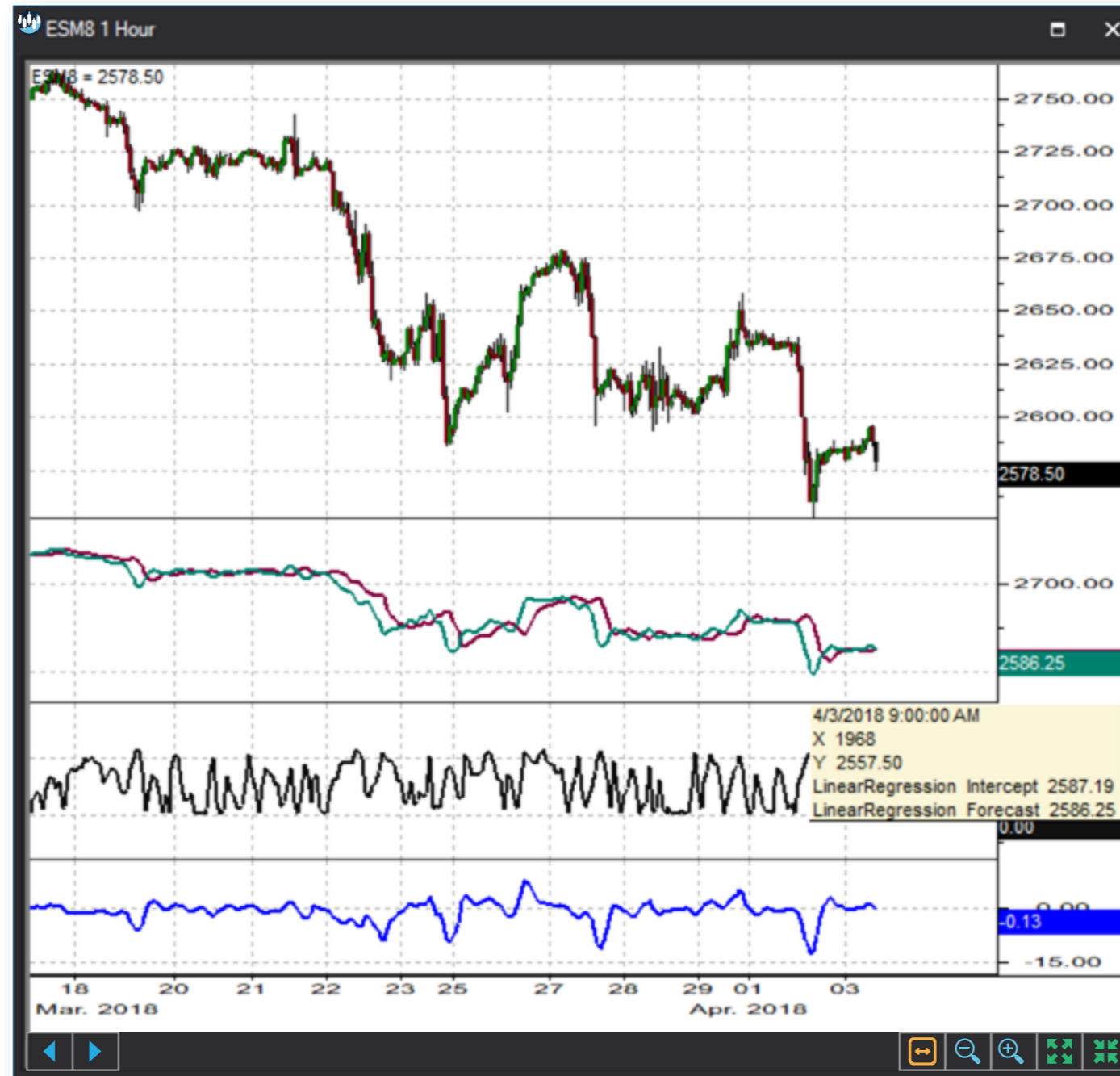
The screenshot shows the 'Linear Regression' dialog box with the following settings:

- Indicator Parameters:**
  - Source: ESM8.close
  - Period: 7
- Series Configuration:**

| Parameter | Line Style | Line Type | Width | Color   | Background |
|-----------|------------|-----------|-------|---------|------------|
| Slope     | Line       | Solid     | 2     | Blue    | None       |
| Intercept | Line       | Solid     | 2     | Magenta | None       |
| Forecast  | Line       | Solid     | 2     | Teal    | None       |
| R2        | Line       | Solid     | 2     | Black   | None       |
- Buttons:**
  - Save as Default Setting
  - Add
  - Cancel



## Sample Chart With Study





## Quant Script™ Wizard Study Dialog

The image shows two overlapping dialog boxes in the S-Trader desktop platform. The 'Custom Study Wizard' dialog is on the left, and the 'Add Variable' dialog is on the right.

**Custom Study Wizard**

- Save To Group: Default
- Custom Study Name: [Empty text box]
- Password: [Empty text box]
- Result: Line, Solid, 2, [Color selection: teal]
- Reverse\_Result: Line, Solid, 2, [Color selection: purple]
- Add To New Panel:
- Buttons: Add New Variable, Edit Selected Variable
- Table with columns: Name, Description
- Buttons: OK, Cancel

**Add Variable**

- Name: [Empty text box]
- Description: [Empty text box]
- Source: CLOSE
- Period: 7
- Variable List: LRF, LRI, LRS, R2, RandomWalkIndexDown, RandomWalkIndexUp, RangeActionVerificationIndex, RAVI, RSquared, RWID, RWIU, SchaffTrendCycleMACD, SchaffTrendCycleMACDS, SI, Slope, STCMACD, STCMACDS, SwingIndex
- Button: Create Script Line
- Text: Slope(CLOSE, 7)
- Buttons: OK, Cancel



## Quant Script™ Study Dialog

**Custom Study Editor** [X]

Save To Group: 5\_TREND INDICATORS [v] A 14.25 [v]

Custom Study Name: R2

Password: [ ]

Result: Line [v] Solid [v] 2 [v] [Color swatches]

Reverse\_Result: Line [v] Solid [v] 2 [v] [Color swatches]

Formula Add To New Panel [x]

```
SET A1 = LRS(CLOSE,7)
SET A2 = Slope(CLOSE, 7)

SET B1 = LRI(CLOSE,7)
SET B2 = Intercept(CLOSE, 7)

SET C1 = LRF(CLOSE,7)
SET C2 = Forecast(CLOSE, 7)

SET D1 = R2(CLOSE,7)
SET D2 = Rsquared(CLOSE, 7)
```

[OK] [Cancel]