

From SPSS Modeler 15.0 Help File

Note: cumulative charts

[IBM SPSS Modeler Help](#) > [Source, Process, and Output Nodes](#) > [Graph Nodes](#) > [Evaluation Node](#)

versus non-cumulative charts

Reading the Results of a Model Evaluation

The interpretation of an evaluation chart depends to a certain extent on the type of chart, but there are some characteristics common to all evaluation charts. For cumulative charts, higher lines indicate better models, especially on the left side of the chart. In many cases, when comparing multiple models the lines will cross, so that one model will be higher in one part of the chart and another will be higher in a different part of the chart. In this case, you need to consider what portion of the sample you want (which defines a point on the x axis) when deciding which model to choose.

Most of the noncumulative charts will be very similar. For good models, noncumulative charts should be high toward the left side of the chart and low toward the right side of the chart. (If a noncumulative chart shows a sawtooth pattern, you can smooth it out by reducing the number of quantiles to plot and re-executing the graph.) Dips on the left side of the chart or spikes on the right side can indicate areas where the model is predicting poorly. A flat line across the whole graph indicates a model that essentially provides no information.

Gains charts. Cumulative gains charts always start at 0% and end at 100% as you go from left to right. For a good model, the gains chart will rise steeply toward 100% and then level off. A model that provides no information will follow the diagonal from lower left to upper right (shown in the chart if **Include baseline** is selected).

Lift charts. Cumulative lift charts tend to start above 1.0 and gradually descend until they reach 1.0 as you go from left to right. The right edge of the chart represents the entire dataset, so the ratio of hits in cumulative quantiles to hits in data is 1.0. For a good model, lift should start well above 1.0 on the left, remain on a high plateau as you move to the right, and then trail off sharply toward 1.0 on the right side of the chart. For a model that provides no information, the line will hover around 1.0 for the entire graph. (If **Include baseline** is selected, a horizontal line at 1.0 is shown in the chart for reference.)

Response charts. Cumulative response charts tend to be very similar to lift charts except for the scaling. Response charts usually start near 100% and gradually descend until they reach the overall response rate (total hits / total records) on the right edge of the chart. For a good model, the line will start near or at 100% on the left, remain on a high plateau as you move to the right, and then trail off sharply toward the overall response rate on the right side of the chart. For a model that provides no information, the line will hover around the overall response rate for the entire graph. (If **Include baseline** is selected, a horizontal line at the overall response rate is shown in the chart for reference.)

Profit charts. Cumulative profit charts show the sum of profits as you increase the size of the selected sample, moving from left to right. Profit charts usually start near 0, increase steadily as you move to the right until they reach a peak or plateau in the middle, and then decrease toward the right edge of the chart. For a good model, profits will show a well-defined peak somewhere in the middle of the chart. For a model that provides no information, the line will be relatively straight and may be increasing, decreasing, or level depending on the cost/revenue structure that applies.

ROI charts. Cumulative ROI (return on investment) charts tend to be similar to response charts and lift charts except for the scaling. ROI charts usually start above 0% and gradually descend until they reach the overall ROI for the entire dataset (which can be negative). For a good model, the line should start well above 0%, remain on a high plateau as you move to the right, and then trail off rather sharply toward the overall ROI on the right side of the chart. For a model that provides no information, the line should hover around the overall ROI value.

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[IBM SPSS Modeler Help](#) > [Source, Process, and Output Nodes](#) > [Graph Nodes](#)

Evaluation Node

The Evaluation node offers an easy way to evaluate and compare predictive models to choose the best model for your application. Evaluation charts show how models perform in predicting particular outcomes. They work by sorting records based on the predicted value and confidence of the prediction, splitting the records into groups of equal size (**quantiles**), and then plotting the value of the business criterion for each quantile, from highest to lowest. Multiple models are shown as separate lines in the plot.

Outcomes are handled by defining a specific value or range of values as a **hit**. Hits usually indicate success of some sort (such as a sale to a customer) or an event of interest (such as a specific medical diagnosis). You can define hit criteria on the Options tab of the dialog box, or you can use the default hit criteria as follows:

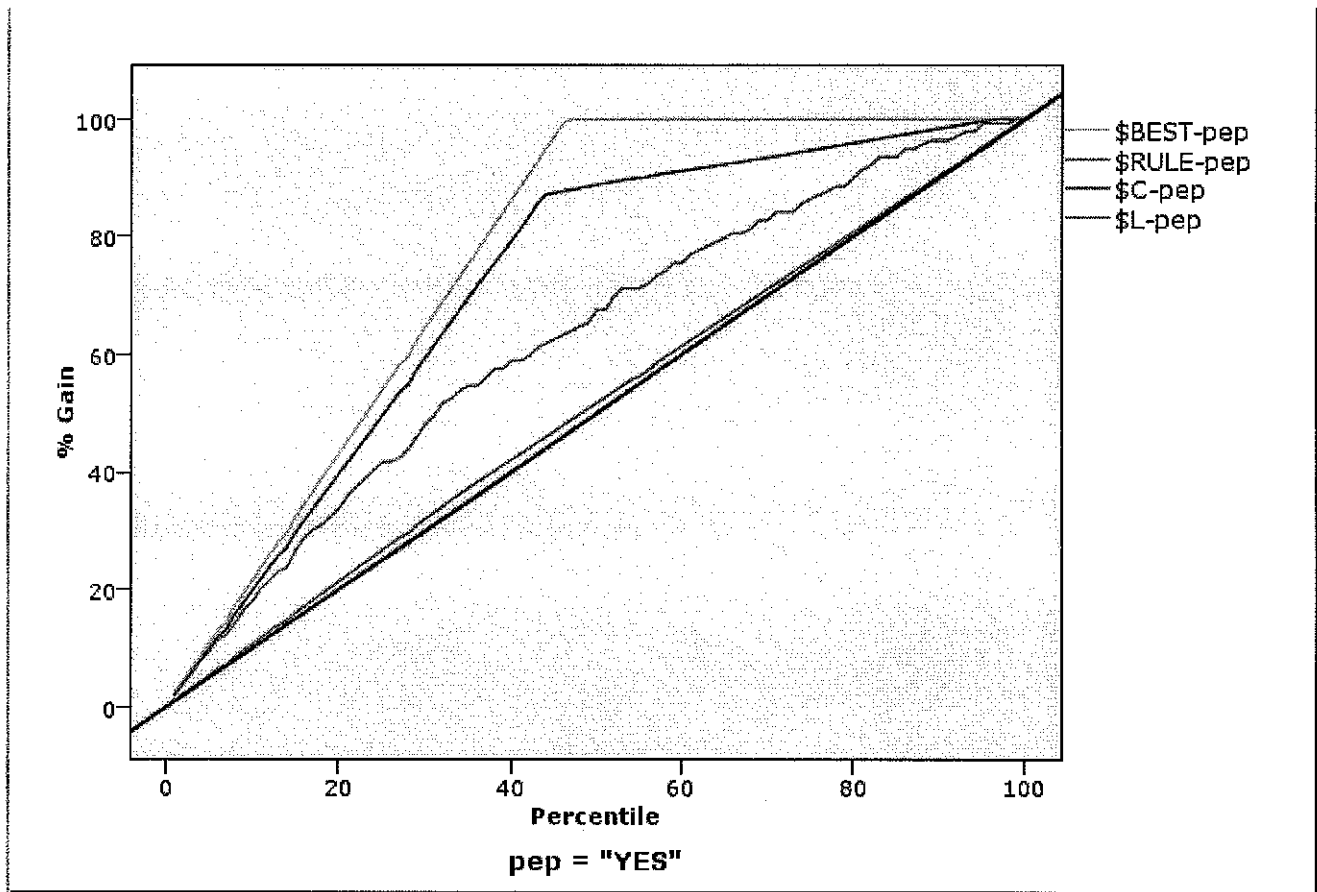
- **Flag** output fields are straightforward; hits correspond to *true* values.
- For **Nominal** output fields, the first value in the set defines a hit.
- For **Continuous** output fields, hits equal values greater than the midpoint of the field's range.

There are five types of evaluation charts, each of which emphasizes a different evaluation criterion.

Gains Charts

Gains are defined as the proportion of total hits that occurs in each quantile. Gains are computed as $(\text{number of hits in quantile} / \text{total number of hits}) \times 100\%$.

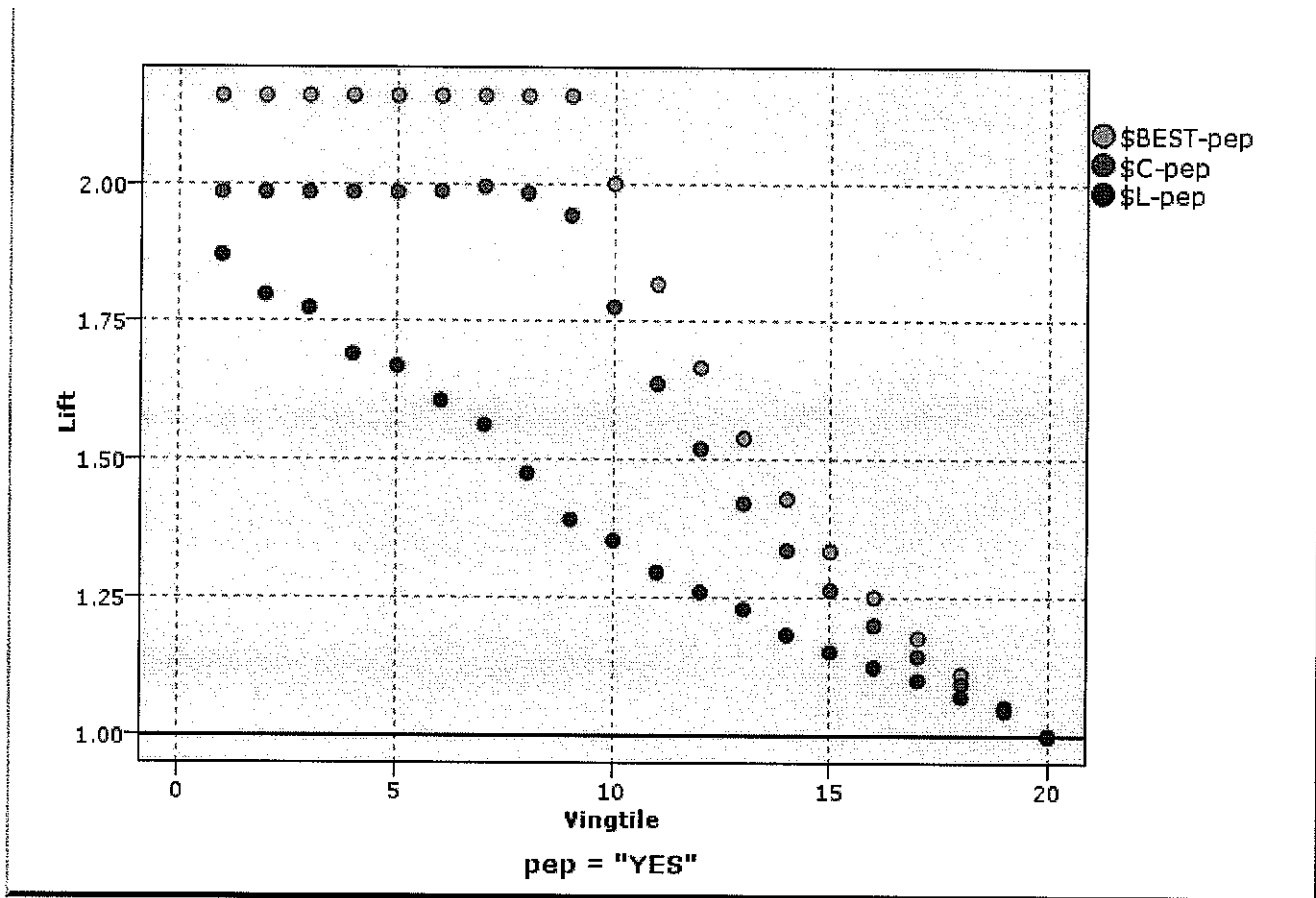
Gains chart (cumulative) with baseline, best line, and business rule displayed



Lift Charts

Lift compares the percentage of records in each quantile that are hits with the overall percentage of hits in the training data. It is computed as $(\text{hits in quantile} / \text{records in quantile}) / (\text{total hits} / \text{total records})$.

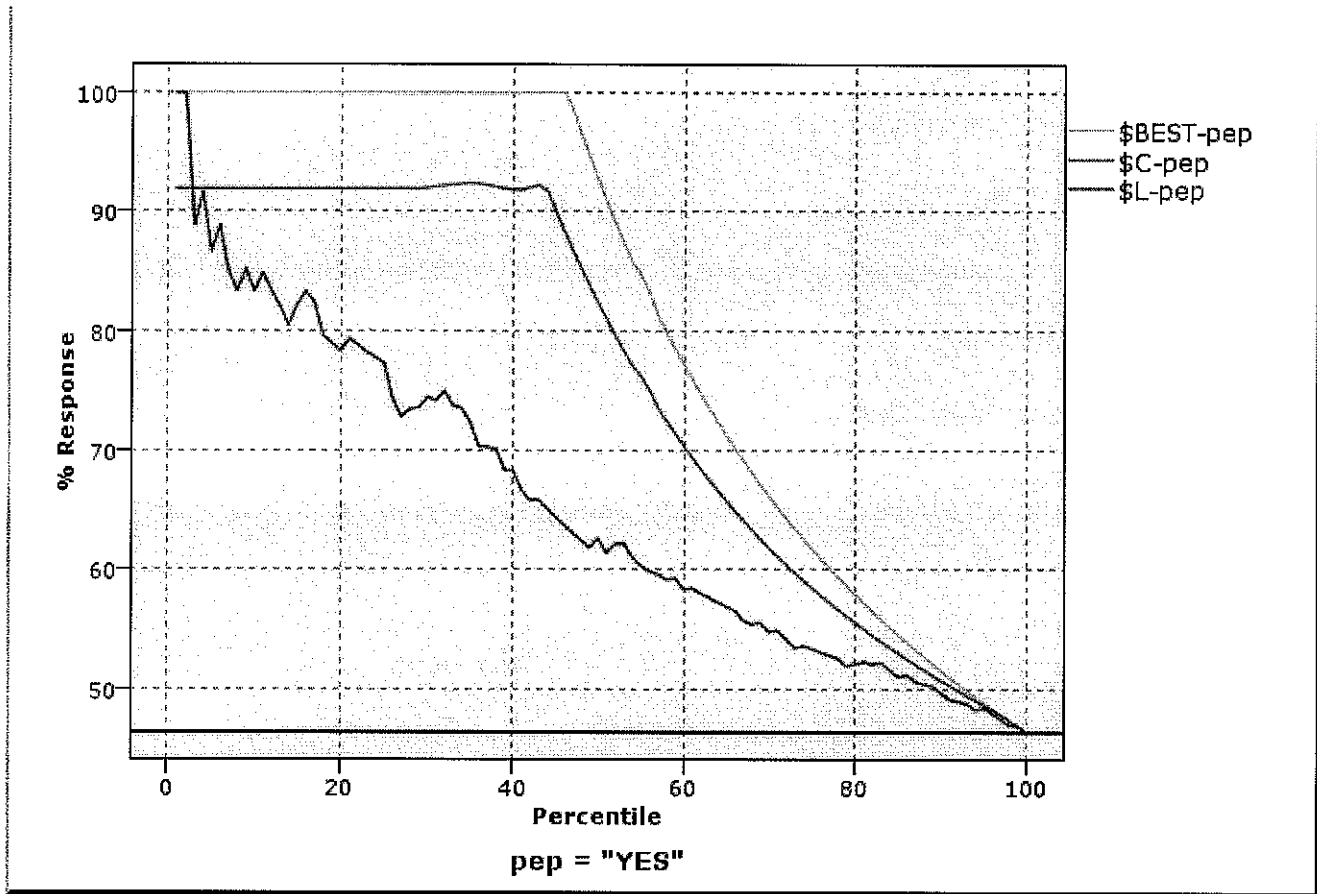
Lift chart (cumulative) using points and best line



Response Charts

Response is simply the percentage of records in the quantile that are hits. Response is computed as (hits in quantile / records in quantile) × 100%.

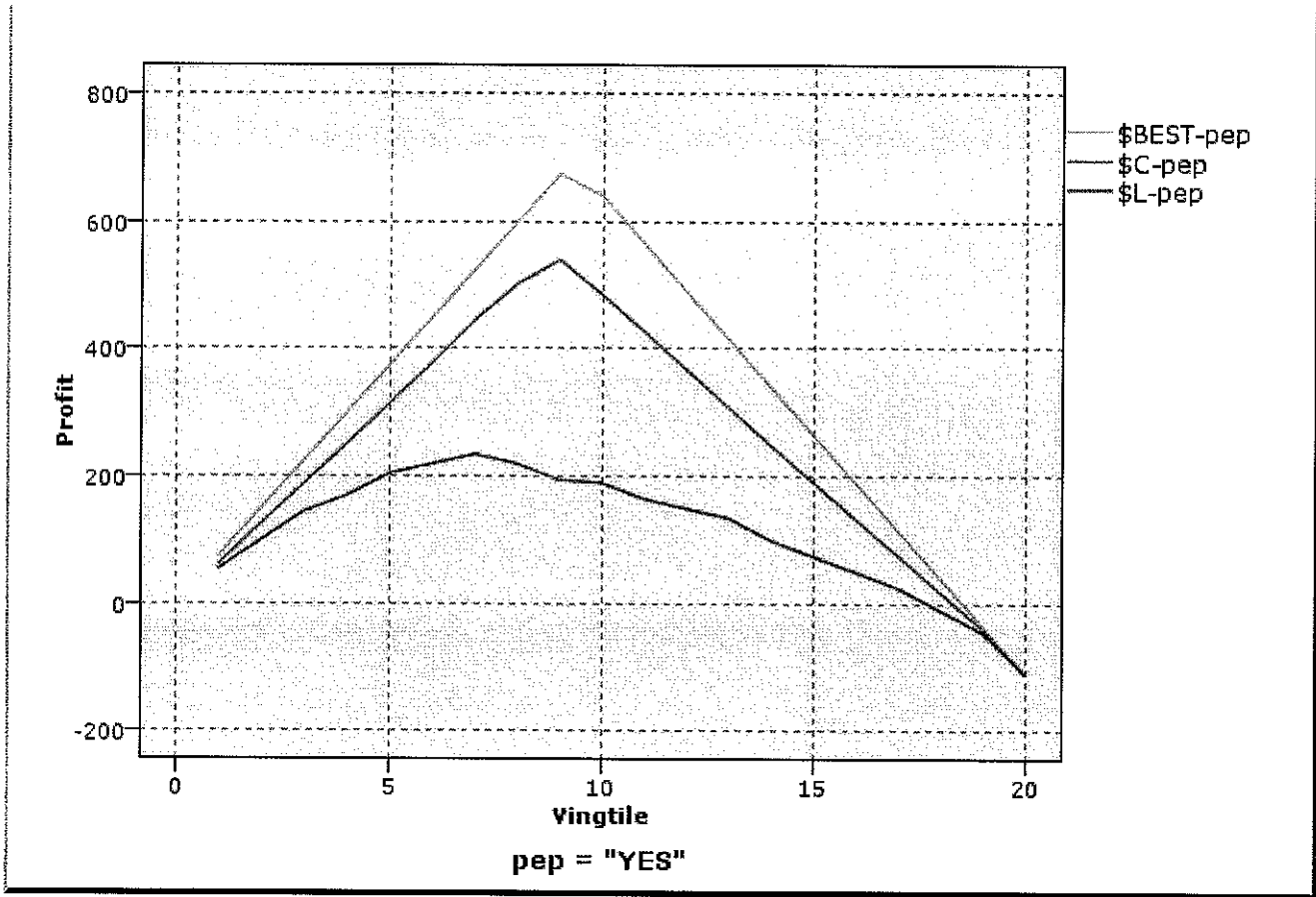
Response chart (cumulative) with best line



Profit Charts

Profit equals the **revenue** for each record minus the **cost** for the record. Profits for a quantile are simply the sum of profits for all records in the quantile. Revenues are assumed to apply only to hits, but costs apply to all records. Profits and costs can be fixed or can be defined by fields in the data. Profits are computed as (sum of revenue for records in quantile – sum of costs for records in quantile).

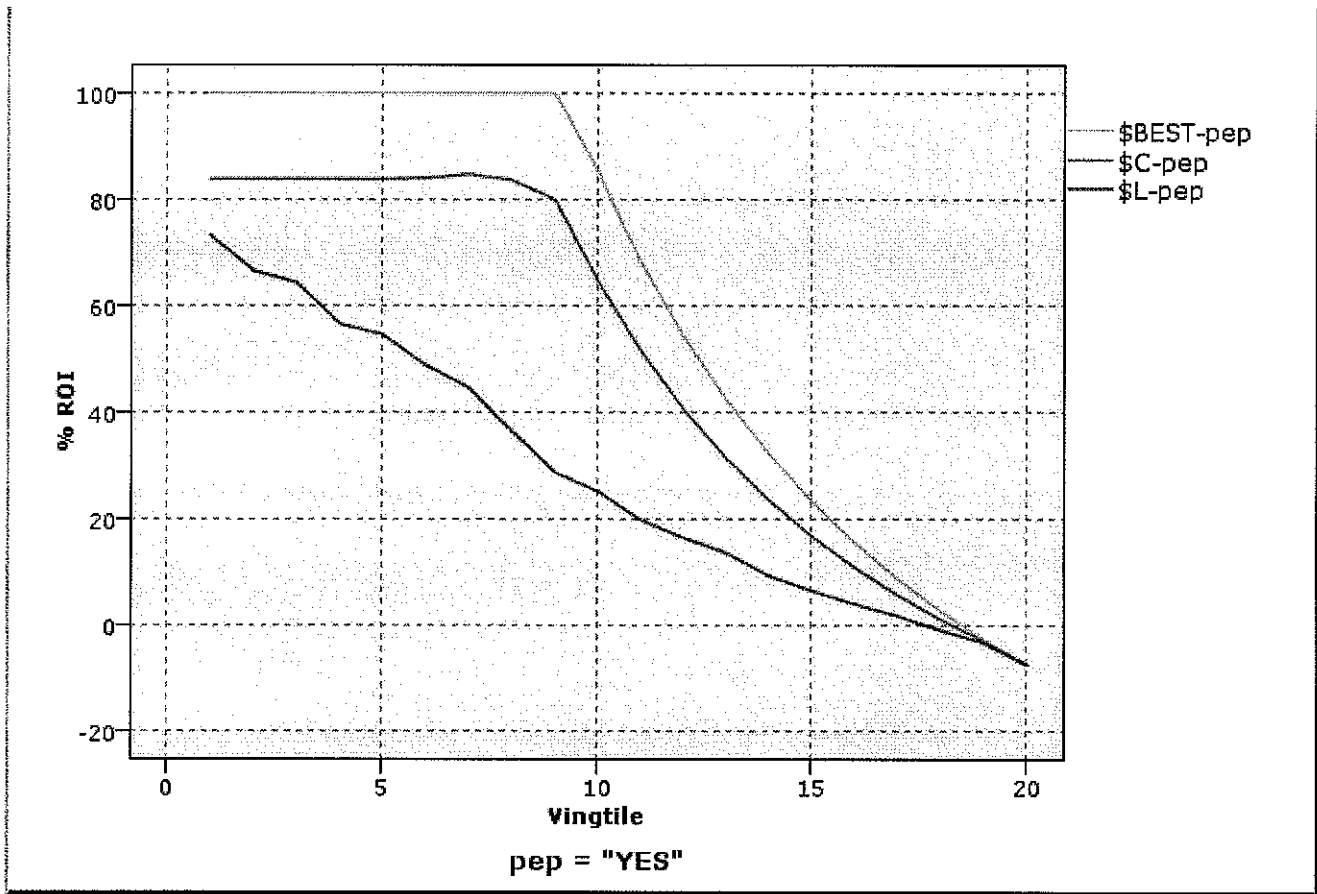
Profit chart (cumulative) with best line



ROI Charts

ROI (return on investment) is similar to profit in that it involves defining revenues and costs. ROI compares profits to costs for the quantile. ROI is computed as $(\text{profits for quantile} / \text{costs for quantile}) \times 100\%$.

ROI chart (cumulative) with best line



Evaluation charts can also be cumulative, so that each point equals the value for the corresponding quantile plus all higher quantiles. Cumulative charts usually convey the overall performance of models better, whereas noncumulative charts often excel at indicating particular problem areas for models.

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