

# IBM SPSS Modeler Advantage 6.2



*Note:* Before using this information and the product it supports, read the general information under Notices on p. 104.

This edition applies to IBM SPSS Decision Management 6 and to all subsequent releases and modifications until otherwise indicated in new editions.

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# Preface

## **About IBM Business Analytics**

IBM Business Analytics software delivers complete, consistent and accurate information that decision-makers trust to improve business performance. A comprehensive portfolio of [business intelligence](#), [predictive analytics](#), [financial performance and strategy management](#), and [analytic applications](#) provides clear, immediate and actionable insights into current performance and the ability to predict future outcomes. Combined with rich industry solutions, proven practices and professional services, organizations of every size can drive the highest productivity, confidently automate decisions and deliver better results.

As part of this portfolio, IBM SPSS Predictive Analytics software helps organizations predict future events and proactively act upon that insight to drive better business outcomes. Commercial, government and academic customers worldwide rely on IBM SPSS technology as a competitive advantage in attracting, retaining and growing customers, while reducing fraud and mitigating risk. By incorporating IBM SPSS software into their daily operations, organizations become predictive enterprises – able to direct and automate decisions to meet business goals and achieve measurable competitive advantage. For further information or to reach a representative visit <http://www.ibm.com/spss>.

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# Contents

<b>1</b>	<b><i>About IBM SPSS Decision Management</i></b>	<b>1</b>
	What's new .....	1
	About IBM SPSS Decision Management .....	1
<b>2</b>	<b><i>Customer response modeling example</i></b>	<b>2</b>
	IBM SPSS Modeler Advantage .....	2
	Maximizing profit for direct mail campaigns .....	3
	Launching the application .....	3
	Setting up data sources .....	4
	Building the model .....	8
	Evaluating the model .....	10
	Testing the model .....	17
	Scoring the model .....	18
<b>3</b>	<b><i>Navigating the workspace</i></b>	<b>21</b>
	Launching applications .....	21
	The Home page .....	24
	Gallery .....	24
	Setting preferences .....	25
	Saving projects, models, and rules .....	28
	Saving to IBM SPSS Collaboration and Deployment Services Repository .....	28
	Working with labels .....	30
	Locking projects .....	32
	Object properties .....	32
<b>4</b>	<b><i>Managing data sources</i></b>	<b>33</b>
	Previewing data .....	35
	Measurement levels .....	36
	Creating a new data source .....	37
	File source .....	38
	Database source .....	42
	IBM SPSS Collaboration and Deployment Services Enterprise View source .....	43

Cognos BI source . . . . .	44
Selecting input fields . . . . .	47
Expression manager . . . . .	47
Mapping fields . . . . .	49
<b>5 Working with rules</b>	<b>50</b>
Creating rules . . . . .	50
Defining segment rules . . . . .	50
Defining selection rules . . . . .	53
Exporting and reusing rules . . . . .	54
Adding annotations . . . . .	57
Using rules from ILOG Business Rule Management System . . . . .	57
<b>6 Building predictive models</b>	<b>61</b>
About predictive models . . . . .	61
Building models . . . . .	61
To build an automated model . . . . .	62
Automated modeling results . . . . .	63
Interactive models . . . . .	65
Optional model settings . . . . .	68
Evaluating models . . . . .	70
Simulating maximum profit . . . . .	76
Testing the model . . . . .	80
Using model scores in applications . . . . .	82
<b>7 Scoring Models</b>	<b>84</b>
Scoring models to a database table, file, or Cognos BI server . . . . .	84
Selecting data and subsets . . . . .	85
Selecting output fields . . . . .	85
Selecting the scoring destination . . . . .	86
Selecting records to be scored . . . . .	93
Scoring models . . . . .	93

**8 Administering applications 95**

General options ..... 96  
Controlling application shortcuts ..... 97  
Hiding the Home page ..... 97  
Locking data options ..... 98  
Locking scoring destination options ..... 98  
Downloading project metadata for use in creating external rules ..... 99  
Sample files ..... 99  
    Data ..... 99  
    Samples ..... 100

**9 Help and accessibility 101**

Getting help ..... 101  
Accessibility ..... 101  
    Help accessibility ..... 101

**Appendices**

**A Sharing streams between IBM SPSS Decision Management and IBM SPSS Modeler 102**

**B Notices 104**

**Index 106**

# ***About IBM SPSS Decision Management***

## ***What's new***

IBM® SPSS® Decision Management 6.2 adds the following features:

**Support for Cognos data.** When used with IBM® SPSS® Modeler Server 14.2 or newer, SPSS Decision Management adds the ability read data from a Cognos Business Intelligence server when defining data sources, and to write scoring results back to a Cognos BI Server. After defining a connection to a Cognos BI server, you can browse packages, dimensions, queries, and reports to choose the desired fields. [For more information, see the topic Cognos BI source in Chapter 4 on p. 44.](#)

**ILOG Business Rule Management System integration.** Rules created in a Business Rules Management System such as ILOG can be referenced and used in SPSS Decision Management applications, provided they have been developed to support the same data model used in the current SPSS Decision Management project. These external rules can be selected and used in the same manner as other models and rules within the SPSS Decision Management application. [For more information, see the topic Using rules from ILOG Business Rule Management System in Chapter 5 on p. 57.](#)

**Support for Linux on System Z.** SUSE Enterprise Server 10 is supported on 64-bit IBM System z10.

## ***About IBM SPSS Decision Management***

IBM® SPSS® Decision Management brings the benefit of predictive analytics to real business problems, allowing you to build custom applications tailored to your customers or industry. While applications are typically configured to solve very specific problems, all are based on a common set of capabilities:

- Automate decisions using business rules.
- Add insight using predictive models.
- Use prioritization or simulation to reach the best decision based on the above.

A number of packaged applications are available, tailored to solving specific business problems. Please contact your sales representative for more information.

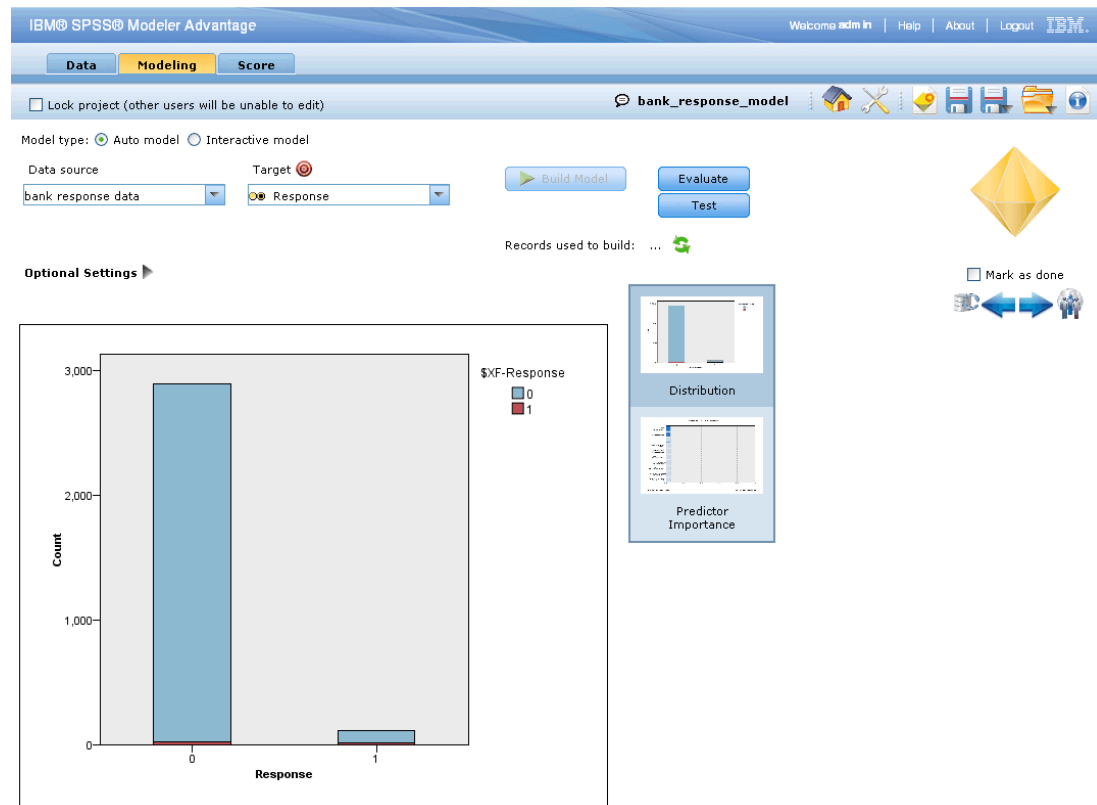
# Customer response modeling example

## IBM SPSS Modeler Advantage

IBM® SPSS® Modeler Advantage is an easy-to-use application that puts the power of predictive modeling in the hands of business users. Using predictive models, you can identify patterns based on what has happened in the past, and use them to predict what is likely to happen in the future.

For example, you can use a model to predict which customers are least likely to churn, or most likely to respond to a particular offer, based on characteristics such as income, age, and the organizations and memberships they subscribe to. The resulting predictions can be used to generate lists of target customers or cases of interest, as input for strategic planning, or can be integrated with rules in the context of a predictive application.

Figure 2-1  
IBM SPSS Modeler Advantage





## ***Maximizing profit for direct mail campaigns***

For this example of a predictive model you are marketing financial products and services to customers at a fictitious bank. In a recent test campaign, a number of customers were offered one of several new services, and their responses recorded. However, response rates were lower than hoped and the campaign failed to turn a profit.

Using IBM® SPSS® Modeler Advantage, your goal is to turn that loss into a profit by targeting the best available customers given your expected costs, revenue, and other factors.

Results from the test campaign are summarized below.

Test Campaign Results	
Mail count	3000
Response count	111
Response rate	3.7%
Cost	6750
Revenue	6660
Total profit (loss)	(90)

This example uses the data files *bank\_customer\_data.txt* and *bank\_response\_data.txt*, which are distributed and installed along with IBM SPSS Modeler Advantage. A completed version of this example is also provided in the file *bank\_response\_model.str*. Contact your administrator for details on installing and sample files if necessary. [For more information, see the topic Sample files in Chapter 8 on p. 99.](#)

## ***Launching the application***

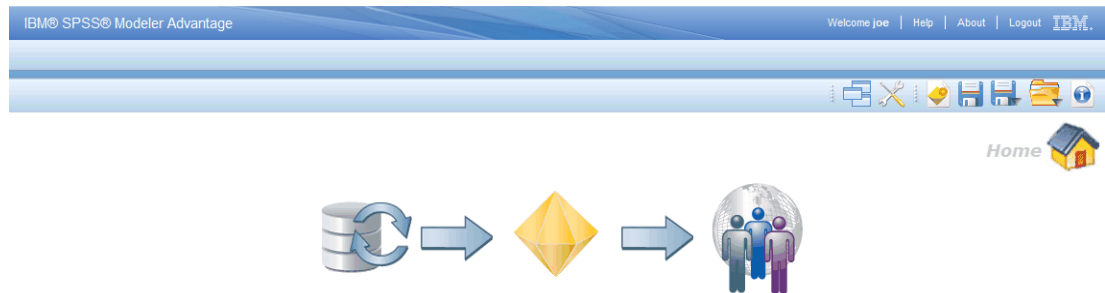
The Launch page includes links to available applications at your site. These links may be configured by your administrator; you may be able choose from additional applications by clicking the link in the upper right-hand corner.

Figure 2-2  
Applications launch page



- ▶ To start working through the example, open the IBM® SPSS® Decision Management Launch page. For ease of access in the future, you can add a bookmark to this page in your browser, or create a shortcut on your desktop.
- ▶ To create a new model, select New from the application drop-down list in the IBM® SPSS® Modeler Advantage group to display the IBM SPSS Modeler Advantage Home page.

Figure 2-3  
IBM SPSS Modeler Advantage Home page



Each icon on the Home page represents a different step in the modeling process, from defining data to building and scoring the model. To get started, click the Data icon at left.

## Setting up data sources

The Data tab allows you to configure data sources for the two data files used in the example. Data sets can be configured by your administrator, or you can add your own.

Figure 2-4  
Data tab

The screenshot displays the 'Data tab' in IBM SPSS Modeler. It is divided into two main sections: 'Project Data Model' and 'Data Sources'.

**Project Data Model:** This section shows a table of fields defined in the model. The 'Data source' is set to 'bank customer data'. The table lists the following fields:

Operational	Field name	Measurement	Values
<input checked="" type="checkbox"/>	Age	Continuous	[10,83]
<input checked="" type="checkbox"/>	Months as a Customer	Continuous	[0.0,48.0]
<input checked="" type="checkbox"/>	Number of Products	Continuous	[0,56]
<input checked="" type="checkbox"/>	Annual Income	Continuous	[0.0, 70,000]

**Data Sources:** This section shows a table of data sources available for the project. The 'Project Data Sources' are:

Name	Preview	Compatible	Copy	Remove	Lock
bank_customer_data		Project Data Model			<input type="checkbox"/>
bank_response_data		Map Fields			<input type="checkbox"/>

The project data model defines the fields that are available throughout the application, and may be required for rules and models to evaluate. All other data sources must be mapped to the data model in order to be used with the application.

This example uses two data files, both of which are distributed with the application:

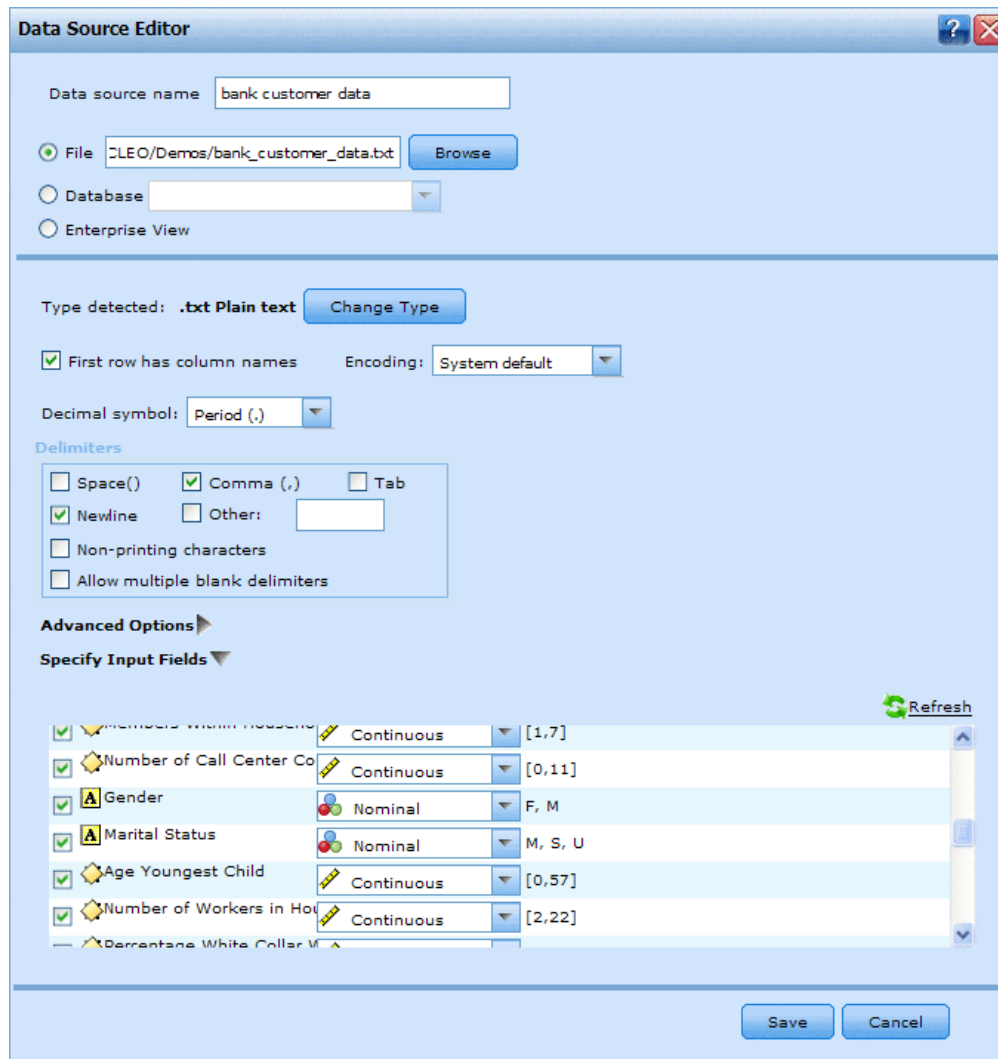
- **bank\_customer\_data.txt** includes information about current customers, including customer ID, payment history, the number of products they own, the number of months they have been a customer, as well as demographic information like age and income. The project data model is based on this file.
- **bank\_response\_data.txt** contains information about customers who have been offered one or more services in previous campaigns, and records their responses. By analyzing this data, the application can identify which customers are most likely to respond to similar offers in future campaigns.

By default, the sample data files are installed in the IBM® SPSS® Modeler Server *Demos* folder accessible from your application (for example, *C:\Program Files\IBM\SPSS\Modeler\14.2Demos\*). Contact your administrator for assistance installing these files if necessary. [For more information, see the topic Sample files in Chapter 8 on p. 99.](#)

#### ***To define the project data model***

- ▶ On the Project Data Sources panel, select Add a data source.

Figure 2-5  
Customer data source



- ▶ Specify *bank customer data* as the data source name.
- ▶ Select File, and select *bank\_customer\_data.txt*.
- ▶ Under Specify input fields, make sure the measurement type for the *Has Bad Payment Record* field is set to Flag. The flag setting indicates that the field can have two possible values, indicating *true* and *false* (typically coded as *T* and *F*, or 0 and 1 in a numeric field), to indicate the presence or absence of that attribute.
- ▶ Under Specify input fields, make sure the measurement type for the *Gender* field is set to Nominal. (The values of this field simply indicate gender as male or female, and not *true/false* as would be the case with a flag.)
- ▶ Select Save.

Since this is the first data source defined for the project, it is automatically selected for the project data model, and used to define the fields required by the application. All other data sets are mapped relative to this source.

### To define the response data source

The response data set contains many of the same fields used in the project data model, as well as two additional fields named *Campaign ID* and *Response*. These fields indicate which offer was made to each customer, and whether or not they responded, and can be used to build a model that predicts which customers are most likely to respond in future.

- On the Project Data Sources panel, select Add a data source.

Figure 2-6  
Response data source

**Data Source Editor**

Data source name:

File:

Database

Enterprise View

---

Type detected: **.txt Plain text**

First row has column names    Encoding:

Decimal symbol:

**Delimiters**

Space()     Comma (,)     Tab

Newline     Other:

Non-printing characters

Allow multiple blank delimiters

**Advanced Options** ►

**Specify Input Fields** ▼

Field	Type	Range
<input checked="" type="checkbox"/> Number of Workers in Ho	Continuous	[4,18]
<input checked="" type="checkbox"/> Percentage White Collar V	Continuous	[21,48]
<input checked="" type="checkbox"/> Household Debt to Equity	Continuous	[38,67]
<input checked="" type="checkbox"/> Income	Continuous	[28742.0,69553.0]
<input type="checkbox"/> Campaign ID	Nominal	1, 2, 3, 4
<input checked="" type="checkbox"/> Response	Flag	0/1

- Specify *bank response data* as the data source name.

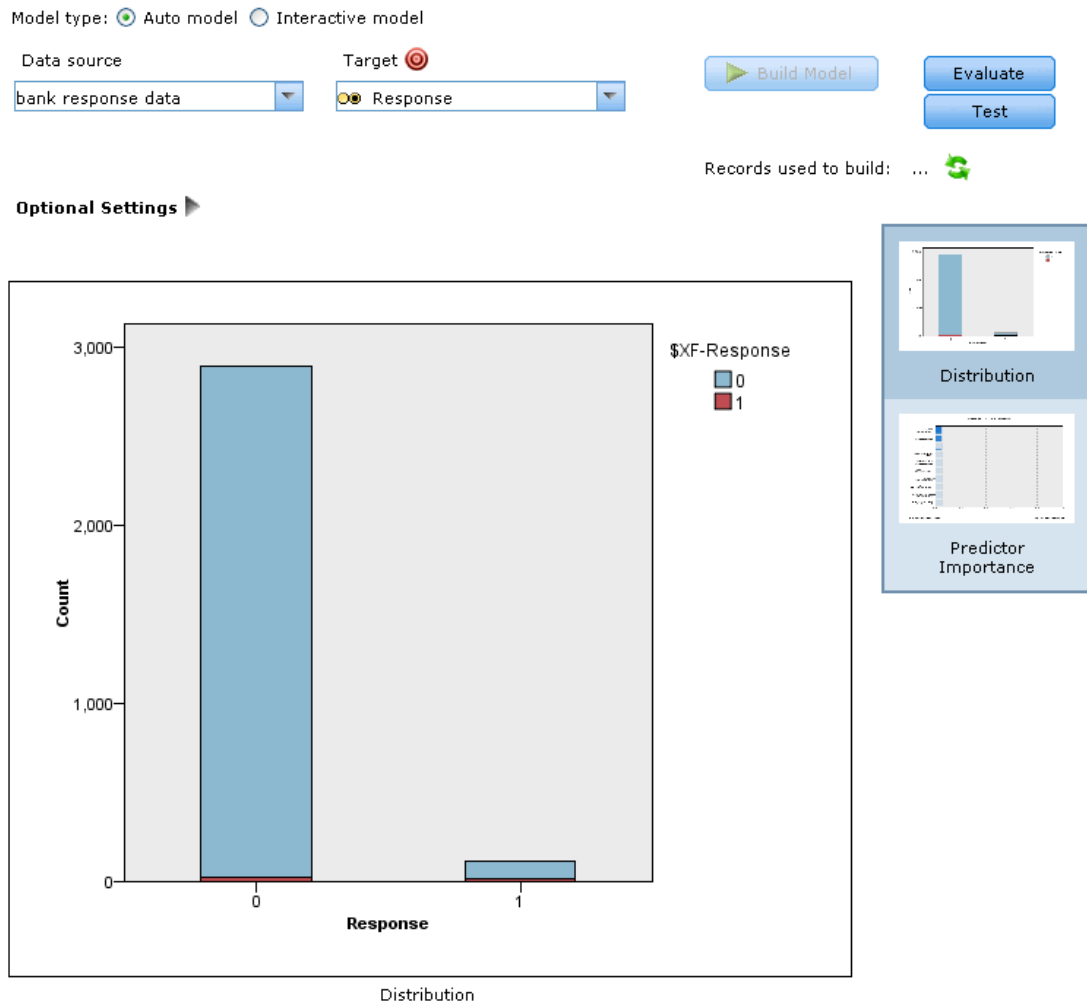
- ▶ Select File, and select *bank\_response\_data.txt*.
- ▶ Under Specify input fields, make sure the measurement type for the *Response* field is set to Flag.
- ▶ Under Specify input fields, deselect the check box next to the *Campaign ID* field to indicate this field should not be used as an input when modeling. (This field can be used to indicate which campaigns a customer was selected for in the past, but is not useful in predicting future response.)
- ▶ Select Save.

Because some of the fields in the data model are not found in the response data set, an orange icon is displayed for this data source under the Compatible column on the Data tab, indicating that some fields match, but not all. The data set is suitable for modeling, but not for simulation, scoring, or deployment. (To be used for these purposes, all fields from the data model need to be present.)

## ***Building the model***

The Modeling tab allows you to specify the data source, target field, and other options to build and evaluate the model.

Figure 2-7  
Model tab



- ▶ Select *bank response data* for the data source, and select *Response* as the target field.
- ▶ Select Build Model.

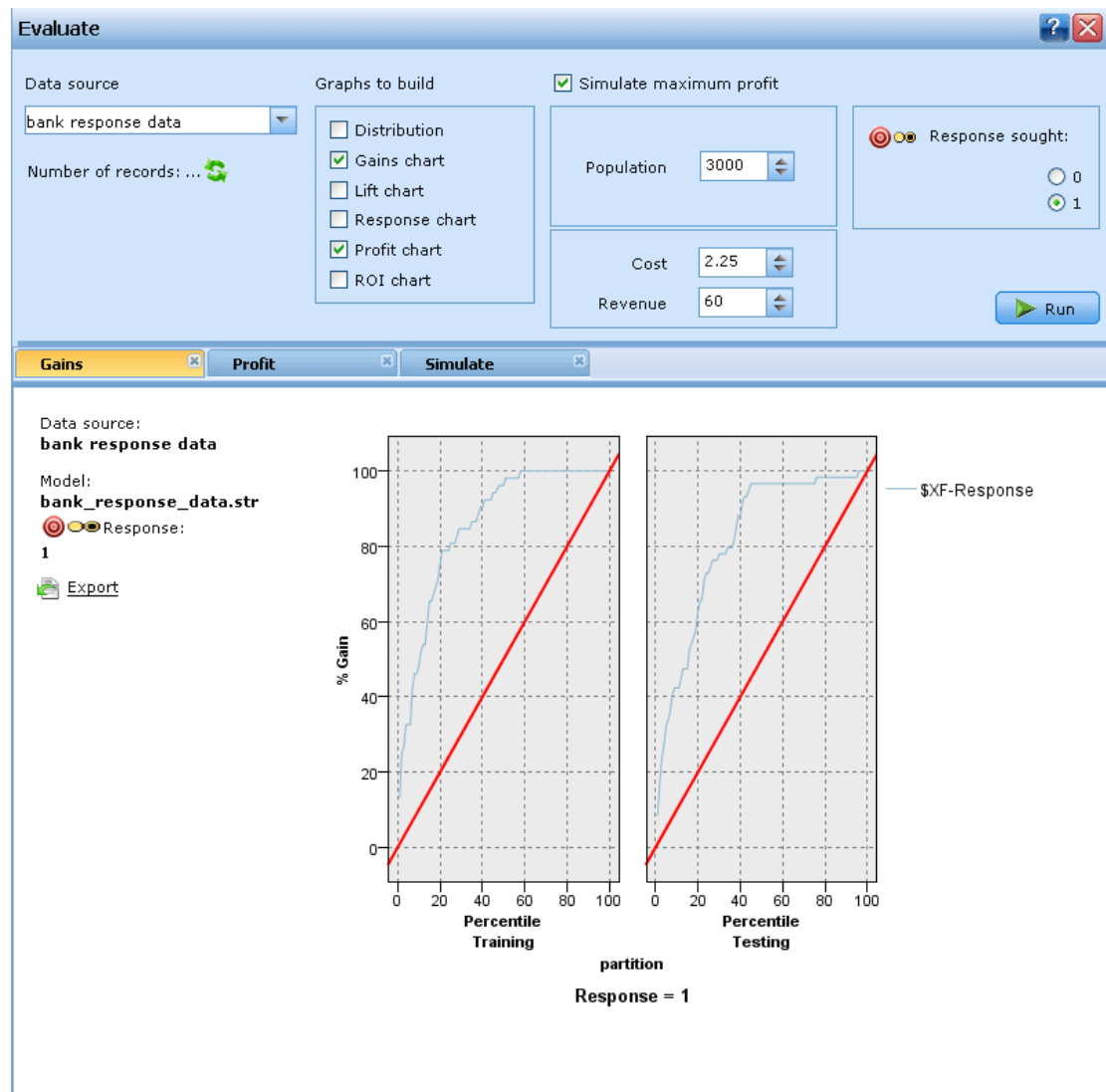
When the model completes, a distribution chart is displayed. The chart shows observed values on the horizontal axis, with a value of 1 indicating a positive response.

- The height of the bars reflects the overall response rate. Out of 3000 customers in the response data set, 111 responded, for an overall hit rate of about 3.8%.
  - The colored areas within each bar represent the responses predicted by the model, with red indicating a positive prediction, and blue indicating a negative response, as shown in the legend in the upper right corner. Due to the low overall response rate, there are relatively few predicted responses (red areas). However the false bar (*Response = 0*) is overwhelmingly blue, indicating that the overwhelming majority of those predicted not to respond actually did not.
- ▶ To get a better idea how the model will perform, click the Evaluate button.

## Evaluating the model

From the Modeling tab, select Evaluate to see how the model performs when applied to your customer data, and to understand how using the model can impact your bottom line.

Figure 2-8  
Evaluating the model



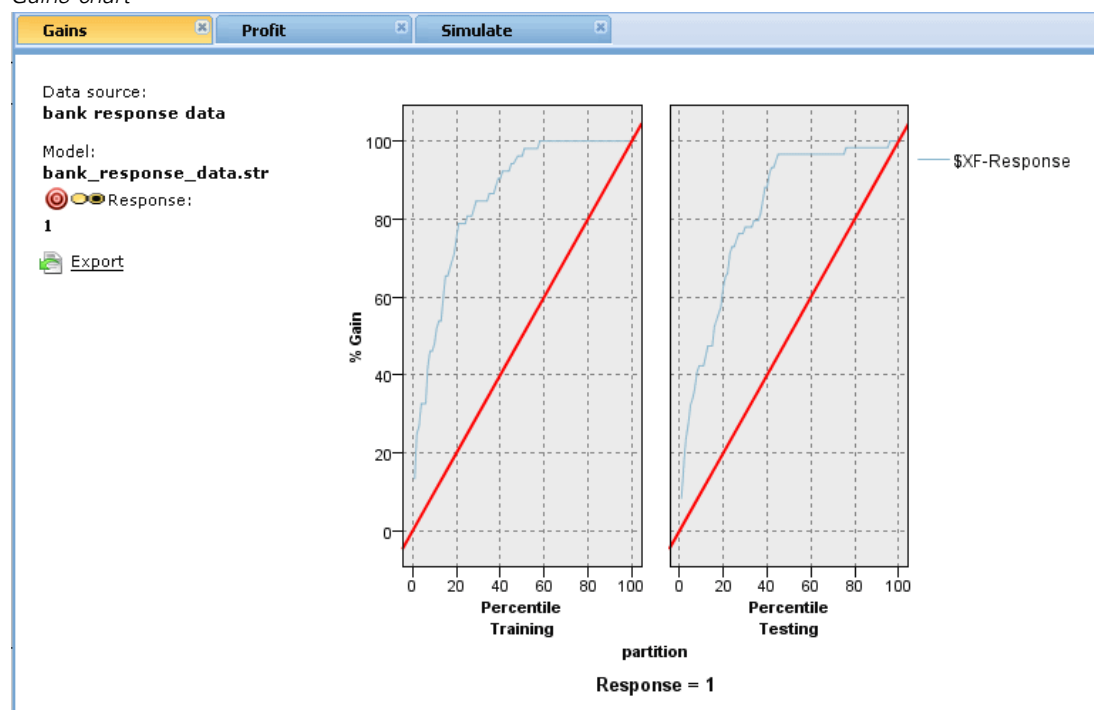
- ▶ For the data source, select *bank response data*.
- ▶ Select Gains chart and Profit chart for the graph types to build.
- ▶ Select Simulate maximum profit, and specify 3,000 for the population. This matches the number from your test campaign.



- ▶ Specify 2.25 and 60 for cost and revenue, respectively. These values indicate the cost to you for each offer made (such as production, handling, and mailing costs), as well as the expected revenue from each favorable response.
- ▶ For Response sought, specify 1.
- ▶ Click Run.

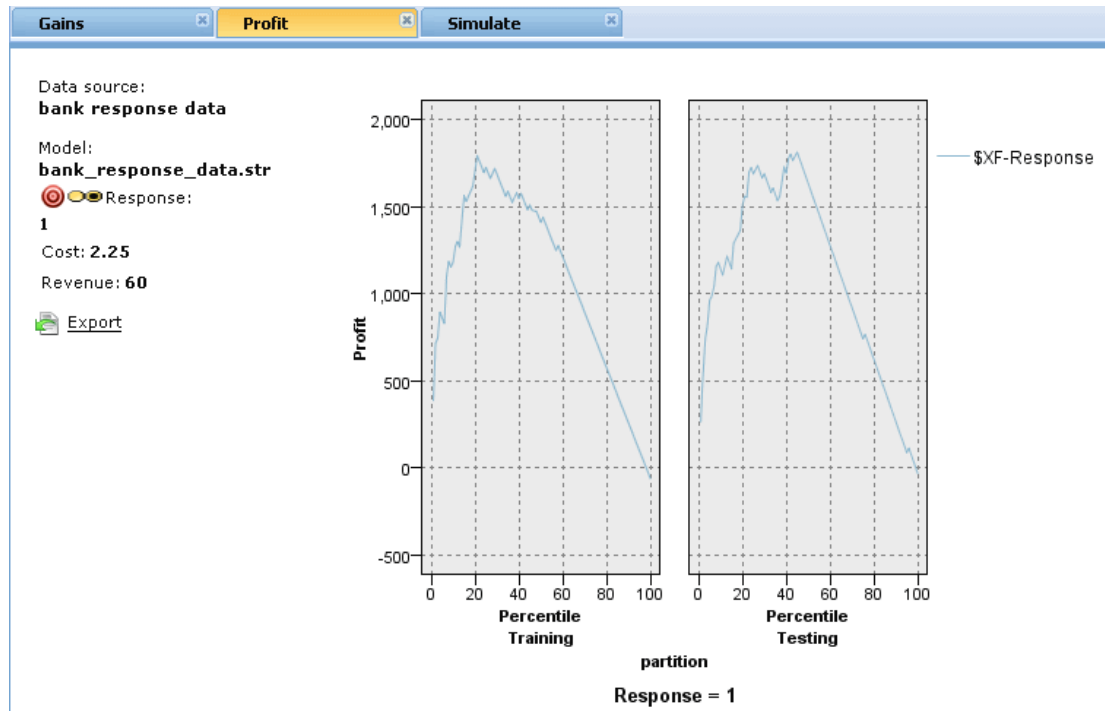
The gains chart shows the improvement or “lift” that can be obtained by using the model. Because the Automatically partition data option was selected (under Optional settings) when building the model, separate charts are displayed for the training and testing partitions. Each shows the proportion of hits (positive responses) at each percentile relative to the total number of hits in the sample. The flat diagonal line plots the expected response if no model were used—to gather half the hits, you would need to contact half the people. The curved line shows the improvement using the model—by targeting the 60% of customers who are most likely to respond, you can gain almost all the hits with a much smaller mailing.

Figure 2-9  
Gains chart



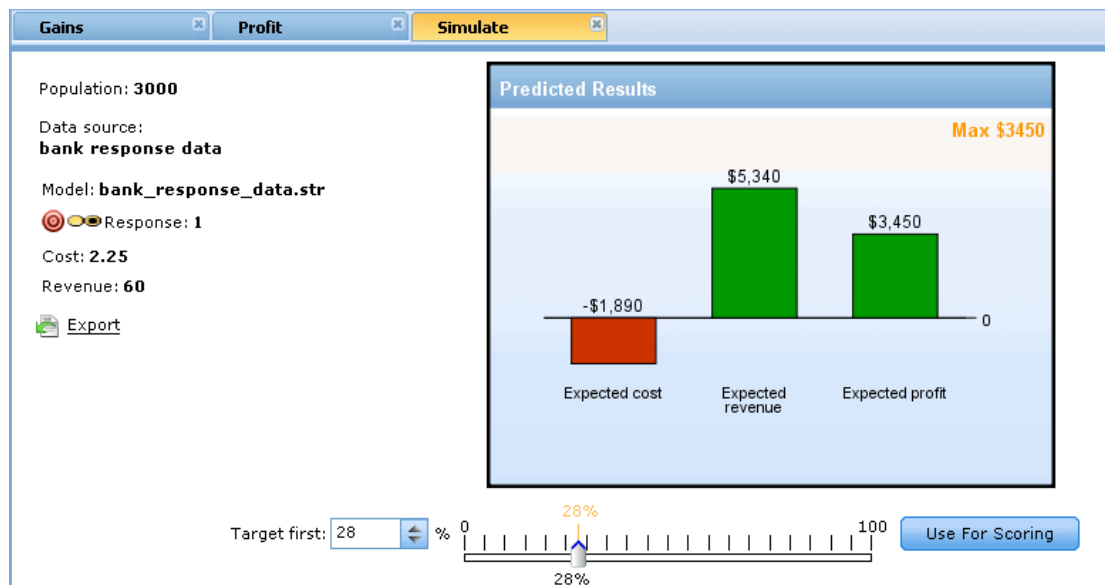
The profit chart shows the gains in terms of overall profit, based on the cost and revenue values specified. For the sample used to train the model, the profit appears to top out just under the 30th percentile.

Figure 2-10  
Profit chart



To understand how this works, click the Simulate tab to see the expected maximum profit for the size of the population you specified.

Figure 2-11  
Profit simulation



Expected profit is computed using the formula:

$$\text{expected profit} = (\text{probability to respond} * \text{revenue}) - \text{cost}$$

Where the probability to respond is determined for each customer based on the model. By targeting those identified by the model as most likely to respond, you can maximize your profit per customer. As you include more customers the total profit will increase, up to a certain point, even as the return per customer gradually decreases as customers with lower response rates are included. The simulation helps you decide where to draw the line to obtain the maximum profit.

Figure 2-12  
Profit comparison

Compare Profit ▼

	Targeted28%	Random28%	Everyone
Offers made	840	840	3000
Expected response	89	31.08	111
Expected response(%)	10.6	3.7	3.7
Expected cost	\$1890	\$1890	\$6750
Expected revenue	\$5340	\$1864.8	\$6660
Expected profit	<b>\$3450</b>	<b>\$-25.2</b>	<b>\$-90</b>

The profit comparison summarizes this result in more detail.

- **Targeted 28%.** This column shows the result from targeting the 28% of customers with the highest rates as predicted by the model. By selectively including the 840 customers most likely respond, you can maximize your return, resulting in an expected profit of \$3,450.00.
- **Random 28%.** Shows the result if you drew a random sample of the same size. In this case you would send the same number of offers (840), but the expected response would be lower (matching the rate from the test campaign) because you are not benefitting from the extra information provided by the model. This results in a loss, because the overall response rate is not high enough to return the cost of mailing each offer.
- **Everyone.** Shows the result if you included all 3000 customers in the sample, exactly matching the result from your test campaign. Again, this returns a loss because you are not benefitting from the model.

Looking at the results, you can see how using the model can improve the response rate to turn a losing campaign into a profitable one. The difference between a \$90.00 loss and a profit of \$3,450.00 represents the benefit gained through predictive modeling. This return is based on the 3000 customers from your test campaign, but by increasing the size of your target population, the benefits increase accordingly.

- After reviewing the simulation results, select Use for Scoring under the Predicted Profit chart to update the Score tab settings based on the specified percentage (28% in this case). [For more information, see the topic Scoring the model on p. 18.](#)

### Interactive modeling

While automated models may deliver all the predictive power you need, there are times when you may want to gain a little more control and insight into the inner working of the model. In this case interactive modeling can be used.

- ▶ Returning to the Modeling tab, select Interactive model.

Figure 2-13

*Building an interactive model*

Model type:  Auto model  Interactive model

Data source: bank response data

Target: Response

Response sought:  0  1

Start Build Evaluate Test

Records used to build: ...

- ▶ Select *bank response data* for the data source, and select *Response* as the target field.
- ▶ Specify 1 as the response sought, indicating you want to look for customers who gave a positive response.
- ▶ Select Start Build.

Figure 2-14

*Growing an interactive model*

Model type:  Auto model  Interactive model

Data source: bank response data Target: Response{1} [Restart model](#) Grow Model Evaluate Test

Records used to build: 1413

Find segments with: High probability Max. number of segments: 5

**Optional Settings** ▶

[Create a new rule](#)

Rule name	Count	Hits	Probability
1 Remainder	1413	52	3.68%

- ▶ Select Grow Model to identify segments with a higher probability of responding. The 3 best rules that identify segments with the highest probability to respond are created and displayed.

**Figure 2-15**  
Rules for an interactive model

Model type:  Auto model  Interactive model

Data source: bank response data      Target: Response{1}      [Restart model](#)      [Grow Model](#)      [Evaluate](#)      [Test](#)

Records used to build: 1413

Find segments with: High probability      Max. number of segments: 5

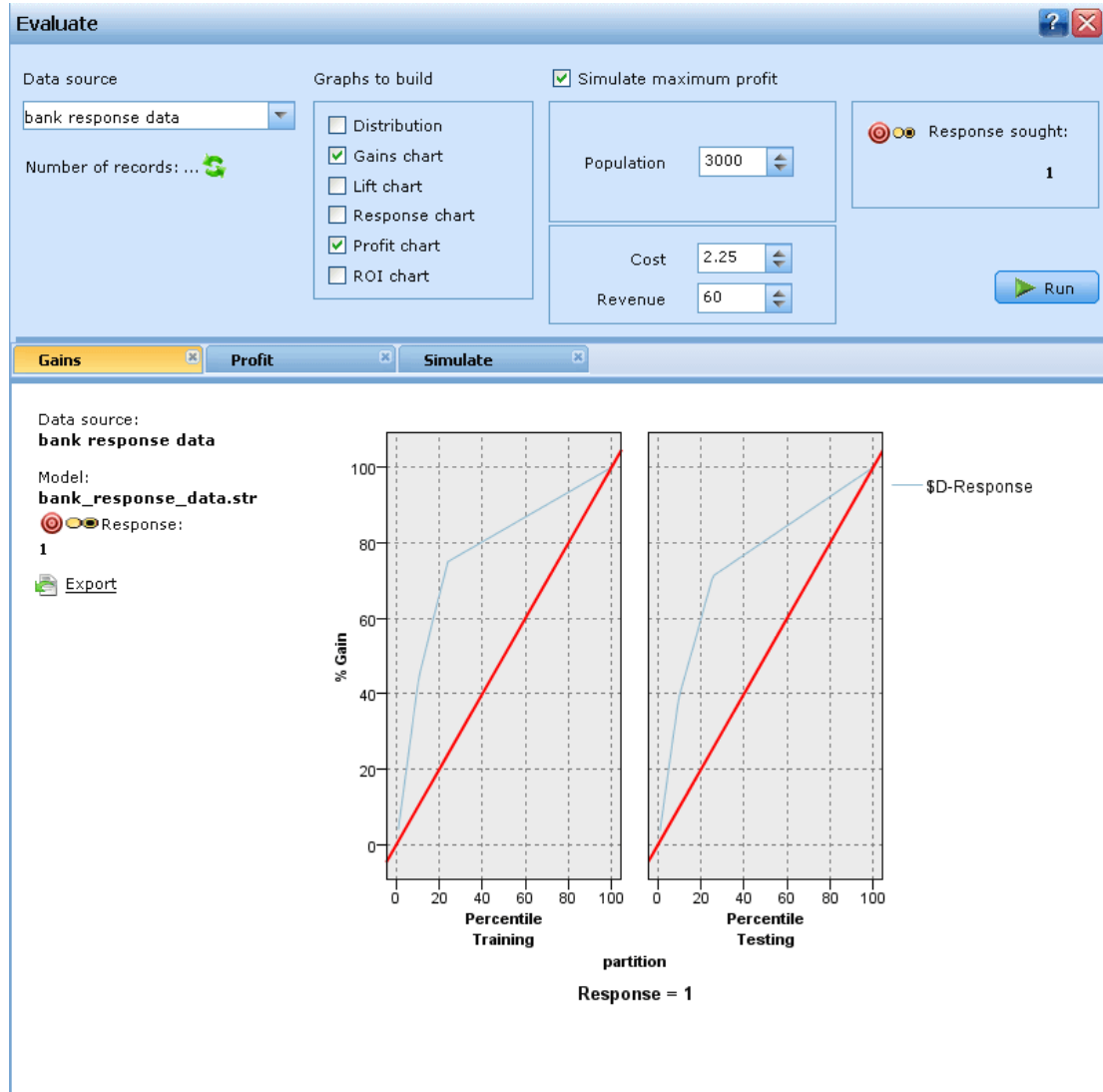
**Optional Settings** ▶

[Create a new rule](#)

Rule name		Count	Hits	Probability
1 RFM Score_transformed	Include	147	23	15.65%
2 Number of Transactions_tran...	Include	97	8	8.25%
3 Average Balance Feed Index_...	Include	94	8	8.51%
4 Remainder		1075	13	1.21%

- ▶ Click the Include/Exclude icons to select whether or not to include or exclude customers selected by each rule. For example, the second and third rule segments show response rates just over 8%, which is still higher than the overall test campaign rate of 3.7%, but not nearly as high as the rate of 15.65% for the first segment. To see how including or excluding these two rules may impact your overall profit, you can run the profit simulation both ways and compare the result, as follows:
- ▶ With all three rule segments set to Include, click Evaluate.

Figure 2-16  
Evaluating the interactive model



- ▶ Select Simulate maximum profit and specify 3,000 for the population, and specify 2.25 and 60 for cost and revenue, respectively. These are the same specifications used when evaluating the automated model. The response sought is automatically completed.
- ▶ Click Run and, when the graphs are built, display the Simulate tab.

Figure 2-17  
Interactive model profit simulation

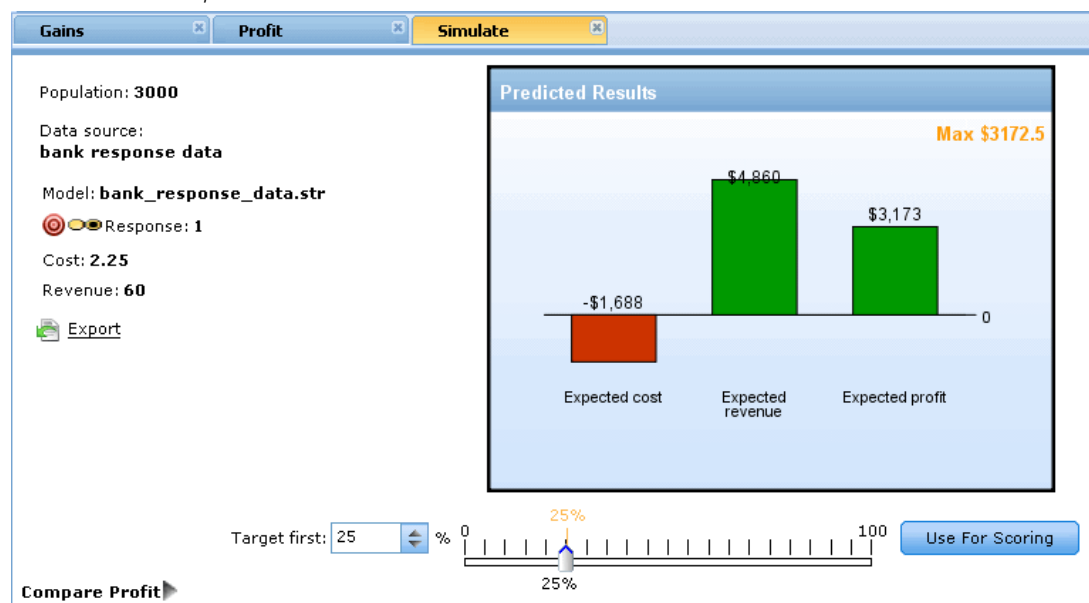


Figure 2-18  
Interactive model profit comparison

#### Compare Profit ▼

	Targeted25%	Random25%	Everyone
Offers made	750	750	3000
Expected response	81	27.75	111
Expected response(%)	10.8	3.7	3.7
Expected cost	\$1687.5	\$1687.5	\$6750
Expected revenue	\$4860	\$1665	\$6660
Expected profit	<b>\$3172.5</b>	<b>\$-22.5</b>	<b>\$-90</b>

The maximum simulated profit for this model \$3172.00, a bit lower than for the automated model in this case. Optionally, you can close the Evaluate dialog, change the setting for the second and third rule segments to Exclude, and repeat the profit simulation to see how this changes the result. The real benefit of interactive modeling is the increased control and insight it affords.

## Testing the model

When you have built your model, you can test a selection of customer records to see how they are likely to respond to your campaign.

- To preview how specific records will be processed by the model scoring, select Test from the Modeling tab. The Test dialog is displayed.

Figure 2-19  
Test results

The screenshot shows a 'Test' dialog box with the following configuration:

- Test data source:** bank customer data
- Specify Selections to Use:**
  - Records:** Return 10 record(s) based on first hit
  - Specify custom data
- Select Fields to Display:** (fields are visible in the summary table below)
- Run:** (button)

**Test Summary**

Preview	Customer ID	\$XF-Response	\$XFRP-Response
	5409	0	0.09
	5477	0	0.18
	5507	0	0.02
	8	0	0.05
	158	0	0.03
	173	0	0.15
	5408	0	0.03

- ▶ In the Records area, increase the Return figure to 100.
- ▶ In the Select Fields to Display area, select *Customer ID*. In addition, make sure the *\$XF-Response* and *\$XFRP-Response* fields are selected, as these indicate the predicted response (0 for no, 1 for yes in this case) and propensity score for each customer.

Optionally, you can include additional fields such as *Age*, *Weeks Since Last Offer*, and *Has Bad Payment Record* that may be useful in understand how or why a given customer will be scored a certain way by the model.

## Scoring the model

To score a model means to apply it to the data source that you are interested in. For example, having generated a model that predicts which customers are most likely to respond, you can now score prospective customers to identify who you want to include in your campaign. In the Evaluate dialog box, you determined the percentage of records to score in order to maximize profit, and indicated the percentage of records you wanted to score based on this result.



Figure 2-20  
Score tab

The screenshot shows the 'Score' tab of a software interface. At the top, there are tabs for 'Data', 'Modeling', and 'Score'. Below the tabs, there is a 'Lock project' checkbox and the project name 'bank\_response\_model'. The main section is titled 'Score Now' and contains several sections: 'Data source to score' with a dropdown menu set to 'bank customer data'; 'Select data subset' and 'Specify output fields' sections, both with right-pointing arrows; 'Destination' section with a dropdown set to 'File' and a 'File location' field containing 'bank\_customer\_scores.txt'; 'File type' section with a dropdown set to 'Flat file'; a 'Map Fields' button; and a 'Scoring' section with 'Preview' and 'Score' buttons. At the bottom, there is a field 'For the first 1000 rows of data' and a 'Records to score:...' field with a refresh icon.

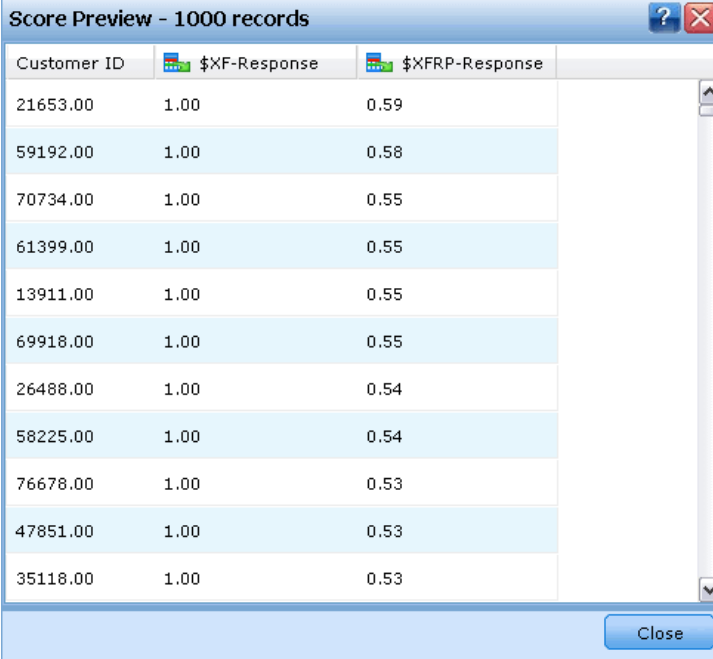
- ▶ Select the Score tab.
- ▶ Under Specify output fields, ensure the *Customer ID* field is selected.
- ▶ Specify a destination for the scoring results. This can be either a database table or file. (If you just want to preview the scores, you can skip this step.)
- ▶ Under Scoring, the settings should already be configured to score the top 28% of records, based on the profit simulation you ran in the while evaluating the model. (If you did not select the Use for Scoring button when viewing the simulation results, you can update the settings here.)

Figure 2-21  
Selecting records based on propensity

The screenshot shows the 'Scoring' dialog box. At the top, there is a 'Scoring' dropdown menu. Below it are two radio buttons: 'Score all records' and 'Score records based on propensity', with the latter being selected. Underneath is a 'Propensity options' section with three radio buttons: 'Top 28 %', 'Top 1000 records', and 'Min/Max propensity'. The 'Top 28 %' option is selected, and the number '28' is entered in a text field next to it. The 'Min/Max propensity' option has 'Min 50' and 'Max 100' entered in text fields next to it.

- ▶ At the bottom of the dialog, click Preview to display a sample of the results your scoring will obtain.

Figure 2-22  
Preview of scoring results



The screenshot shows a dialog box titled "Score Preview - 1000 records" with a table of data. The table has three columns: "Customer ID", "\$XF-Response", and "\$XFRP-Response". The data is as follows:

Customer ID	\$XF-Response	\$XFRP-Response
21653.00	1.00	0.59
59192.00	1.00	0.58
70734.00	1.00	0.55
61399.00	1.00	0.55
13911.00	1.00	0.55
69918.00	1.00	0.55
26488.00	1.00	0.54
58225.00	1.00	0.54
76678.00	1.00	0.53
47851.00	1.00	0.53
35118.00	1.00	0.53

The dialog box also features a "Close" button at the bottom right.

Because you have chosen to score based on propensity, only customers with the highest propensity to respond are included. By linking the customer ID back to your customer database, you could generate a mailing list based on this result.

- ▶ Click Score; the model is applied to the customer data and a message is displayed at the bottom of the dialog to confirm this.

# Navigating the workspace

## Launching applications

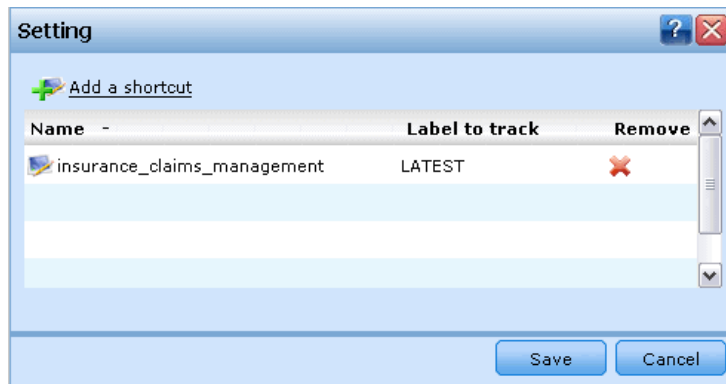
The Applications Launch page provides configurable links to your installed applications. Each panel represents an installed application. Click the drop-down to choose from recently-saved projects, models, or rules. You can also add one or more custom shortcuts that point to specific, labeled versions.

Figure 3-1  
Applications launch page



- ▶ To access the Applications Launch page, navigate to <http://hostname:port/DM>, where *hostname* is the IP address or name of the repository machine and *port* is the application server port number. If you don't know this information, contact your administrator. You can also add a bookmark to this page in your browser, or create a shortcut on your desktop.
- ▶ To create a new project, model, or rule, select *New* from the drop-down list for the desired application and click *Go*.
- ▶ To open a saved project, model, or rule, select a recently-used version or shortcut from the drop-down list in the application panel, or select *Browse* from the drop-down list to choose a different object or version.
- ▶ To add a new custom shortcut that will always be available in the drop-down list, click the triangular arrow icon in the upper right corner of the application panel. Optionally, you can specify the number of shortcuts to display.

Figure 3-2  
Adding a custom shortcut



#### ***Other ways to open an application***

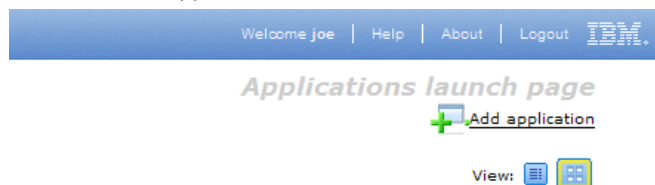
- Copy or type the URL into the address bar in your browser, or add the URL to the list of saved bookmarks or favorites in your browser.
- Create a desktop shortcut pointing to the URL.
- Link to an application URL from within your company's Intranet site or portal.

#### ***Customizing the launch page***

The controls in the upper right corner of the Application Launch page allow you to add applications, and to toggle the display between panel and list view. You can also drag panels to rearrange them on the page.

- ▶ To add a new application panel, select Add application in the upper right corner of the Application Launch page. (If no additional applications are available, this link is not available.)

Figure 3-3  
Link to add an application



A list of available applications is displayed. Optionally, you can create shortcuts to one or more labeled versions.

Figure 3-4  
Adding a new application to the launch page

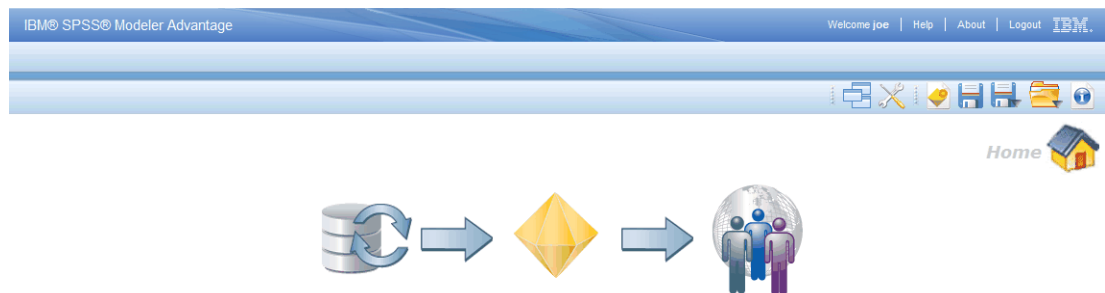


- ▶ To change the arrangement of application panels on the Launch page, click on the title bar of any panel and hold down the mouse button to drag the panel to a new location.
- ▶ To remove an application, click the remove icon (red X) in the upper right corner of the application panel. Any shortcuts that point to that application will also be removed. (The remove icon will not be available if the application panel has been locked on the page by the administrator.)
- ▶ Unsaved projects, models, and rules may be listed in the gallery on the launch page. This gallery displays models that are still building, as well as those that have completed building but are not yet saved. [For more information, see the topic Gallery on p. 24.](#)

## The Home page

The application provides a step-by-step workflow, as represented by the icons on the Home page. Click any icon to jump to that step.

Figure 3-5  
Home page



**Data.** Define data sets for use by the application.

**Model.** Build models using analytical data, evaluate them using predictor importance, distribution, gains charts, and so on to gain insight by discovering patterns hidden in data, and use these to further refine your decisions.

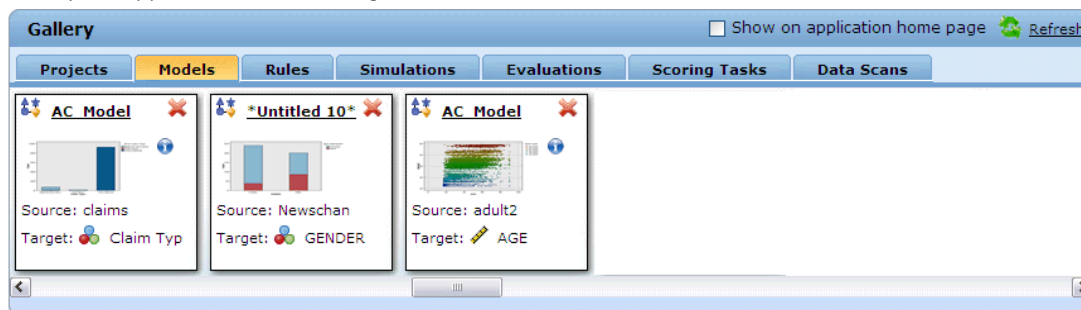
**Score.** Score the model.

**Tracking step completion.** While working through the application, you can mark major sections as done. These sections are highlighted with a green check mark for easy reference. Optionally, your administrator may complete one or more sections for you (such as data sources).

## Gallery

The gallery may be displayed on the Applications Launch Page, as well as each application home page, depending on how your administrator has set up your system. It lists unsaved work, such as a model that has been left to build overnight—you can start the model before you leave work, close your browser, and return to find your results in the morning. You can also use the gallery to retrieve your work after accidentally closing your browser. Items in the gallery may include projects, rules, models, data scans, evaluations, and other long-running tasks as appropriate to the application.

Figure 3-6  
Gallery on Applications Launch Page



If the name of the item is underlined, click the name to open the relevant item. For example, if you have an unsaved data scan, click on the data scan title in the gallery to open the Data tab.

If you do not require any item shown in the gallery click the delete icon to remove it; a warning message is displayed to confirm you want to permanently delete the item.

## Setting preferences

There are a number of preferences you can adjust to customize IBM® SPSS® Decision Management to your needs. Primarily, this customization consists of setting your own default options to save you having to repeatedly select the same actions when creating, testing, and saving your work. The preferences you set are unique to you and apply to any application that you use.

To access the User Preferences settings dialog, from within any application, click the User Preferences icon on the toolbar.

Figure 3-7  
User preferences icon



Figure 3-8  
User Preferences settings dialog

**Setting**

**User Settings**

Login name: joe

Role: Business user

**General Settings**

Default number of recently opened objects in application shortcuts: 3

Date format: YYYY-MM-DD

Time format: HH:MM:SS

Currency: \$

Decimal places: 2

Number of rows to show on preview: 10

**Test and Simulate Settings**

Define Step Settings

Combine Step Settings

Rule Settings

Save Cancel

You can specify your own preferred settings for each area as detailed in the sections that follow.

### User settings

Figure 3-9  
User Settings

**User Settings**

Login name: joe

Role: Business user

### General settings

Figure 3-10  
General Settings

**General Settings**

Default number of recently opened objects in application shortcuts: 3

Date format: YYYY-MM-DD

Time format: HH:MM:SS

Currency: \$

Decimal places: 2

Number of rows to show on preview: 10

**Default number of recently opened objects in application shortcuts.** Select the number of items to be available from the drop-down list on the Application Launch page.

**Date format.** Select the format to use when displaying or recording dates.



**Time format.** Select the format to use when displaying or recording time.

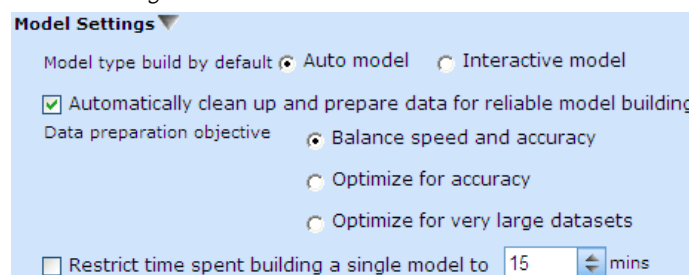
**Currency.** Select the default currency for each new project. Note that this will not overwrite existing data brought in as a different currency.

**Number of rows to show on preview.** Select the maximum number of records to show when displaying previews; for example, when checking a data source upon import.

**Always prompt before deleting.** Select this to override any deletion prompts that have been removed within individual applications.

### Model settings

Figure 3-11  
Model Settings



**Model type build by default.** Specify whether by default you want the application to build the best model automatically from the available data, or if you want to fine tune the building options each time a model is built.

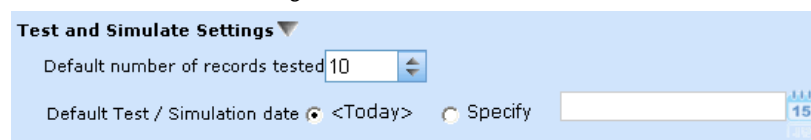
**Automatically clean up.** Selecting this option enables you to let the application do a lot of the data preparation. For example, repairing data issues, screening less useful data, or deriving new attributes.

You can choose whether the clean up operation should give an equal balance to both speed and accuracy, give priority to accuracy over speed, or give priority to speed such as when you are working with very large datasets or are looking for a quick result.

**Restrict time spent building.** Use this option to specify the default amount of time to spend building each model. This can be especially useful when processing large datasets, and can have a significant impact on the time needed for modeling building to complete.

### Test and simulation settings

Figure 3-12  
Test and Simulation Settings



**Default number of records tested.** Specify the default number of records to include when running a test.

**Default Test/Simulation Date.** Specify whether the default simulation date is set to the current date, or a specific date.

## ***Saving projects, models, and rules***

You can save your work to the IBM® SPSS® Collaboration and Deployment Services Repository, or download to the local file system. Saving to the IBM SPSS Collaboration and Deployment Services Repository provides important benefits including support for multiple versions, labeling, and security. Depending on the local configuration, not all options may be supported.



Creates a new model.



Saves the current project, model, or rule to its last known location in the IBM SPSS Collaboration and Deployment Services Repository. Optionally, you can apply a new label when saving.



Saves the current project, model, or rule under a new name. Where applicable, you can choose between saving to the IBM SPSS Collaboration and Deployment Services Repository, and downloading to the local file system.

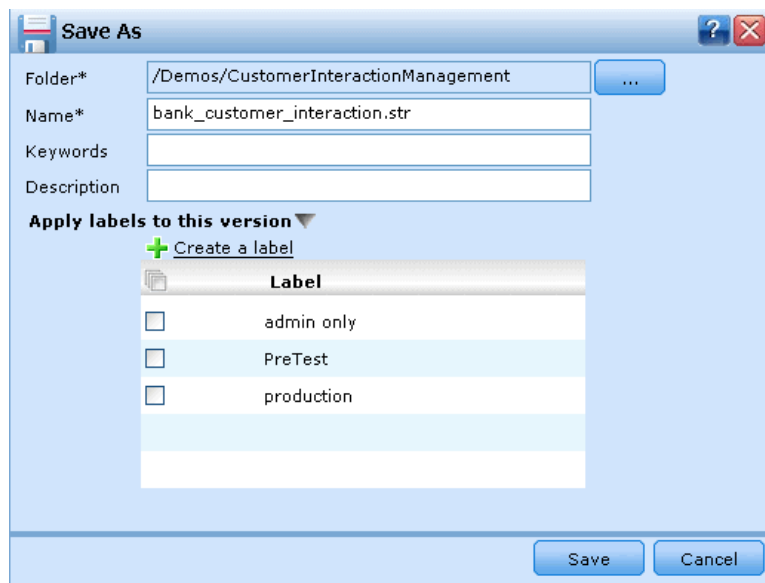


Opens a project, model, or rule from the IBM SPSS Collaboration and Deployment Services Repository and/or local file system as applicable.

## ***Saving to IBM SPSS Collaboration and Deployment Services Repository***

IBM® SPSS® Collaboration and Deployment Services Repository provides important benefits including support for multiple versions, labeling, and security. Each time you save you create a new version, and you can revert to an earlier version at any time. You can also manage versions using labels, and apply security settings to determine who can access, view, or remove an object. Support for IBM® SPSS® Collaboration and Deployment Services is required to access these features.

Figure 3-13  
Save As dialog box



**Folder.** Choose the folder to save to (see below).

**Name.** Enter a unique name for the object you are saving.

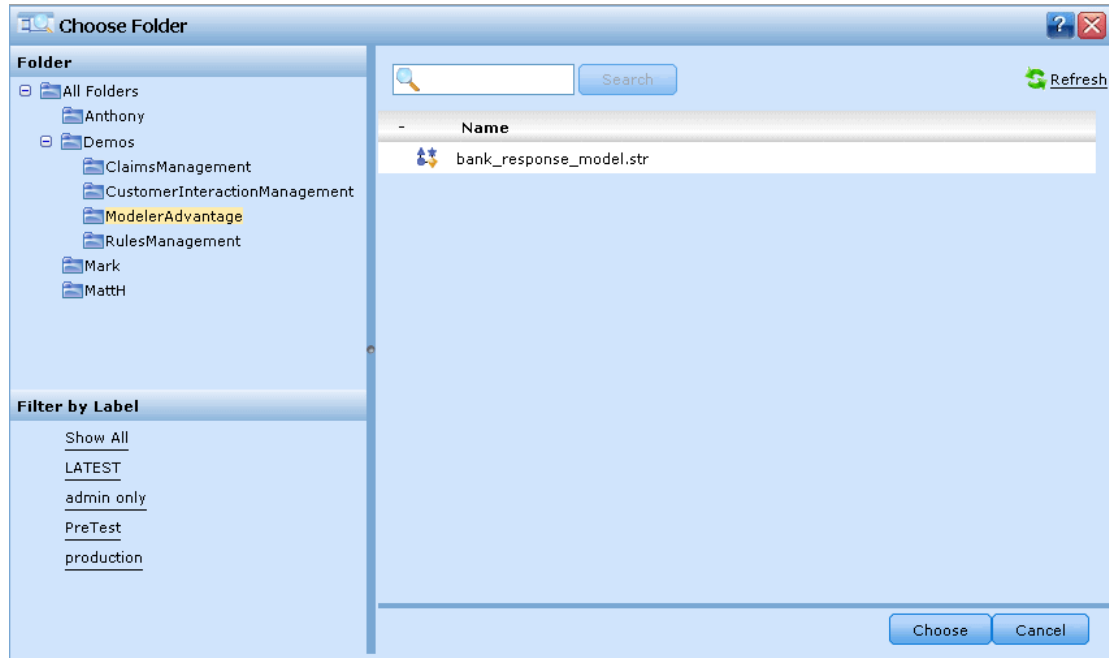
**Keywords.** Enter any keywords to quickly identify the saved object when searching for it. For example these might be “Sales” and “1-2009”.

**Description.** Enter a longer description of the object saved. For example, this might be “Analysis of retail sales; 1st quarter of 2009”.

**Apply labels to this version.** If you are likely to have several versions of the same saved object you can identify each with a unique label. Either select an existing label or create a new one.

### Choosing a folder

Figure 3-14  
Choosing the folder to save to



The tree view in the left pane displays folders in the IBM SPSS Collaboration and Deployment Services Repository you have authority to see. Navigate the folder tree or perform a search to find what you're looking for. You can also filter the file list by labels available in the lower-left pane. For example, you might click a *production* label to only display files marked with that label.

To see more details about a file, click the information icon beside it. A properties panel is displayed, with details such as keywords, labels, author, and date.

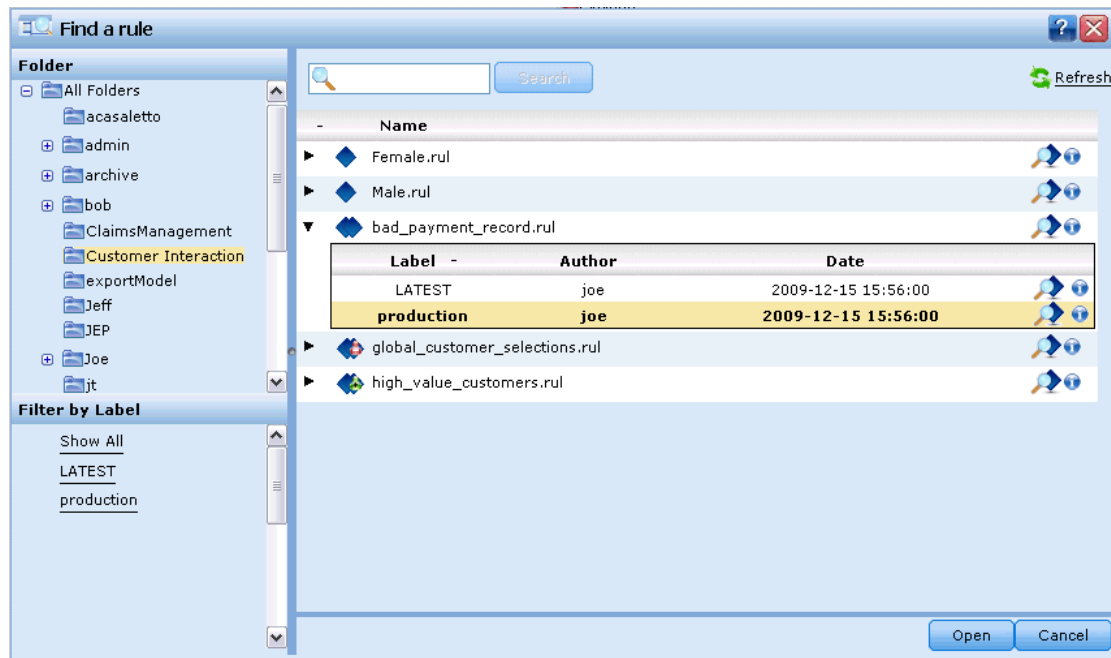
**Folder.** Displays available folders and allows you to navigate the hierarchy.

**Filter by Label.** Limits the display to objects with the selected label. When browsing folders, only objects with this label are shown.

### Working with labels

Labels are used to identify a specific version of a project, model, or rule. When you share a rule between multiple projects, for example, you can specify that you want to use the version labeled *production*. If a newer version of the rule is created, the one used in your project won't change unless the *production* label is explicitly moved to that version.

Figure 3-15  
Finding an existing rule



When referencing shared objects, using a labeled version is strongly recommended, particularly in a production environment, as any changes to the latest version may otherwise have unintended consequences. In certain cases, such as when referencing a rule from within a rule, a labeled version must be used. [For more information, see the topic Exporting and reusing rules in Chapter 5 on p. 54.](#)

If no version is specified, the latest version is used, which means that subsequent changes to the rule will automatically be picked up. (Think of *LATEST* as a special label that is automatically rolled to each new version as it is created.)

Each time you save a new object or version, you can choose the labels to apply to that version. [For more information, see the topic Saving projects, models, and rules on p. 28.](#)

**Restrictions on label names.** When defining labels for use with IBM® SPSS® Decision Management, the characters **? # &** and **:** (colon) cannot be included in label names, as they may prevent the application for correctly interpreting references to objects that use these labels. For example, the following would not be usable as a label names.

*Test & Deploy*

*DEPLOY:PHASE1*

## Locking projects

When you open a project, model, or rule for editing, the object is locked in the IBM® SPSS® Collaboration and Deployment Services Repository so that other users cannot edit it. This is indicated by a check box in the upper right corner of the workspace. Alternatively, you can deselect this check box to allow others to edit the object.

Figure 3-16  
Locking a workspace



- When a project is locked, other users can open it for viewing, but cannot save changes.
- When you close a locked project (for example by closing the browser) the lock is released so that others may edit the object.
- If you choose to unlock a project without closing it (by deselecting the Lock check box) you will be prompted to save any changes. Unsaved changes will be lost after the object is unlocked.
- After unlocking a project, you can continue to browse the workspace, but you can no longer save changes.

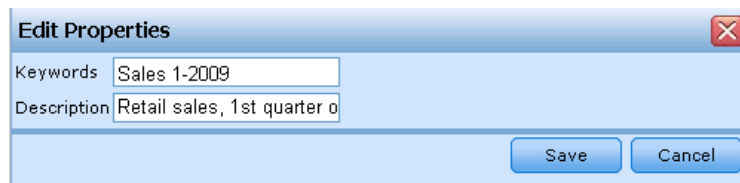
## Object properties

When editing a ruleset, model, or project, you can add keywords and a description to help identify the object when browsing for it at a later date. To display the Edit Properties dialog, click the Properties icon in any application.

Figure 3-17  
Properties icon



Figure 3-18  
Properties for a model, rule, or project



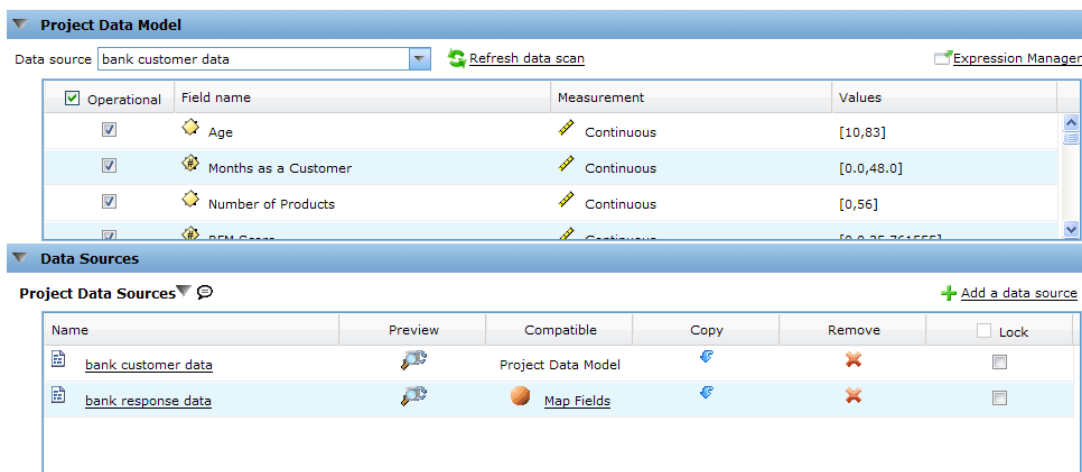
**Keywords.** Enter any keywords to quickly identify the saved object when searching for it. For example these might be “Sales” and “1-2009”

**Description.** Enter a longer description of the object saved. For example, this might be “Analysis of retail sales; 1st quarter of 2009”.

# Managing data sources

The Data tab enables you to define data sources for analysis, simulation and testing, scoring, or other use. Data sets can be configured by your administrator, or you can add your own.

Figure 4-1  
Data tab



The tab is divided into three main areas:

- **Project Data Model.** Defines the fields required by the application. All other data sets are mapped relative to this source.
- **Project Data Sources.** Lists the data sources that have been saved for use with the current project, model, or rule.
- **My Data Sources.** Lists data sources you have defined or saved. Data sets from this list can be copied to or from different projects, making it possible to share data across applications.

## Project data model

The project data model acts like a template listing the input fields and types your project will use.

**Operational.** A check in this box shows that the data in the field is available for use in rules and expressions, and for predictions. Remove the check box if the field is to be used as the target field for analysis; for example, if you are running a query to see how well customers will respond to a direct mail campaign, the results field would be analytical since you do not know the response values in advance.

*Note:* If you select an IBM® SPSS® Collaboration and Deployment Services Enterprise View data source as the project data model, the boxes in this column are disabled.

**Field Name.** Displays the name of each field, as listed in the data source, along with an icon that identifies its storage type.

**Measurement.** Displays the measurement type of each field in the data source. If you change any of the measurement types, you must refresh the data scan to ensure data compatibility. [For more information, see the topic Measurement levels on p. 36.](#)

**Value.** Lists the values for each field in the data source. For example, maximum and minimum values in a range. For flag fields, hold the mouse pointer over the value to display a tool tip that indicates the “true” and “false” values defined for the field.

### ***Project data sources***

Project data sources may include those predefined by the administrator, or added by users. Optionally, the administrator may have locked one or more data sources to prevent users from modifying or removing them, or locked all data options so users can’t create new data sources.

If a data source’s inputs don’t directly match those of the project data model you can map the former to the latter and fix the discrepancy. For example, if the project data model requires a field named *purchase* with values *Yes* and *No* (measurement level flag), then any data source used must have a comparable field that can be mapped accordingly.

**Name.** Displays the data source name and shows an icon that identifies its file type.

**Preview.** Enables you to preview a sample of the data contained in the source. [For more information, see the topic Previewing data on p. 35.](#)

**Compatible.** Either displays a note that the data source is used as the project data model, or shows a green, orange, or red ball to indicate how compatible with the project data model the data source is.

- A green ball shows that the data source is operationally compatible with the project data model data source. An operationally compatible data source is one that includes all the operational fields of the project data model, but can have additional fields. This data source is suitable for rules, scoring, simulation, and test operations.
- An orange ball shows that the data source has at least one field that is compatible with the project data model, with the same name and type. This data source may also have additional fields, and is suitable for building and evaluating models.
- A red ball shows that the data source is incompatible with the project data model, and fields must be mapped before it can be used in the application. An incompatible data source is one which has at least one field whose type is incompatible with the equivalent project data model type.

**Map fields.** This option allows you to compare the data source fields with those in the project data model and map or unmap any compatible fields to match those required by the project data model. [For more information, see the topic Mapping fields on p. 49.](#)

**Copy.** Enables you to copy the data source to the My Data Sources area.



### ***My data sources***

Data sources on this list are saved with your user account, so they are available whenever you log in, and can be copied to any project, model, or rule that you open (assuming your administrator has given you authority to do so). Fields in this part of the tab work in the same way as those in the Project Data Sources area; although there is no Compatibility column.

The Copy column enables you to copy the data source into the Project Data Sources area.

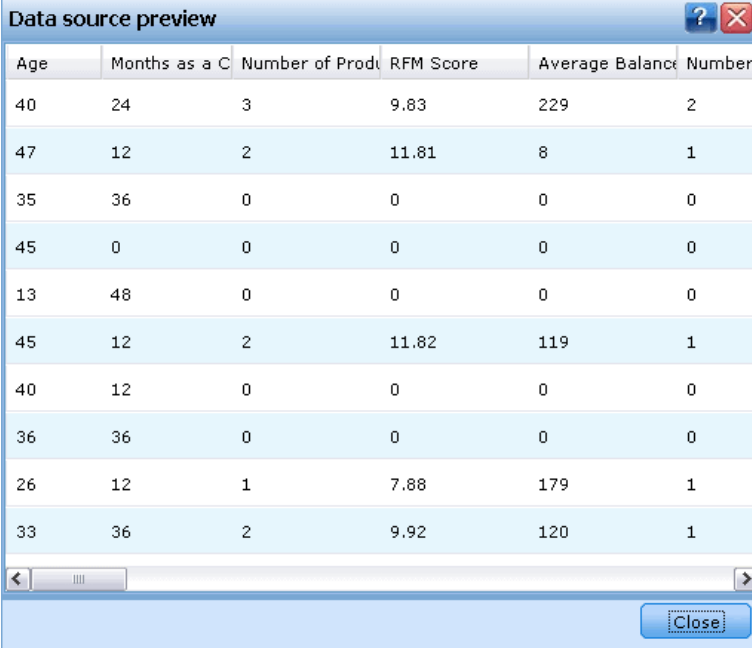
### ***Working with data sources***

- ▶ To add a new data source to either the Project Data Sources or My Data Sources lists, select Add a data source. [For more information, see the topic Creating a new data source on p. 37.](#)
- ▶ To change the measurement level, or type, of a field in the data source in the Project Data Model, select the relevant level. [For more information, see the topic Measurement levels on p. 36.](#)
- ▶ To copy data sources to or from the Project Data Sources list, click the appropriate arrow in the Copy column.
- ▶ To map field names for a data source to the project data model, click the appropriate link under the Compatible column. (Once field names have been mapped, the link is no longer displayed.) [For more information, see the topic Mapping fields on p. 49.](#)
- ▶ To preview a data source, click the Preview icon. [For more information, see the topic Previewing data on p. 35.](#)

## ***Previewing data***

To verify that you have selected the correct data source, click the Preview icon to display a sample of the data contained in the source.

Figure 4-2  
Data preview



Age	Months as a C	Number of Products	RFM Score	Average Balance	Number
40	24	3	9.83	229	2
47	12	2	11.81	8	1
35	36	0	0	0	0
45	0	0	0	0	0
13	48	0	0	0	0
45	12	2	11.82	119	1
40	12	0	0	0	0
36	36	0	0	0	0
26	12	1	7.88	179	1
33	36	2	9.92	120	1

## Measurement levels

The measurement level helps characterize the information represented by each data field, and may determine how a given field is used in rules, modeling, or other applications. The measurement level can be specified in the Project Data Model for a data source; for example, you may want to set the measurement level for an integer field with values of 0 and 1 to *Flag*, to indicate that 0 = *False* and 1 = *True*. Alternatively, you can change the level in the Data Source Editor dialog when you specify the input fields to be used. [For more information, see the topic Selecting input fields on p. 47.](#)

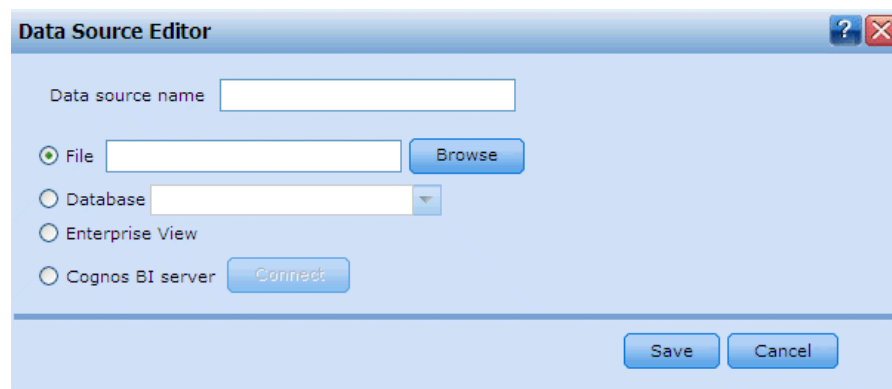
The following measurement levels are available:

- **Continuous.** Used to describe numeric values, such as a range of 0–100 or 0.75–1.25. A continuous value can be an integer, real number, or date/time.
- **Categorical.** Used for string values when an exact number of distinct values is unknown. This is an **uninstantiated** data type, meaning that all possible information about the storage and usage of the data is not yet known. Once data have been read, the measurement level will be *Flag*, *Nominal*, or *Typeless*.
- **Flag.** Used for data with two distinct values that indicate the presence or absence of a trait, such as true and false, Yes and No or 0 and 1. In IBM® SPSS® Decision Management, the first value from the category list will be used as “false” value and the second will be the “true” value, as indicated by a tool tip when hovering over the values when displayed on the Data tab. Data may be represented as text, integer, real number, date, time, or timestamp.

- **Nominal.** Used to describe data with multiple distinct values, each treated as a member of a set, such as *small/medium/large*. Nominal data can have any storage—numeric, string, or date/time. Note that setting the measurement level to *Nominal* does not automatically change the values to string storage.
- **Ordinal.** Used to describe data with multiple distinct values that have an inherent order. For example, salary categories or satisfaction rankings can be typed as ordinal data. The order is defined by the natural sort order of the data elements. For example, 1, 3, 5 is the default sort order for a set of integers, while HIGH, LOW, NORMAL (ascending alphabetically) is the order for a set of strings. The ordinal measurement level enables you to define a set of categorical data as ordinal data for the purposes of visualization, model building, and export to other applications (such as IBM® SPSS® Statistics) that recognize ordinal data as a distinct type. You can use an ordinal field anywhere that a nominal field can be used. Additionally, fields of any storage type (real, integer, string, date, time, and so on) can be defined as ordinal.
- **Typeless.** Used for data that does not conform to any of the above types, for fields with a single value, or for nominal data where the set has more members than the defined maximum. It is also useful for cases in which the measurement level would otherwise be a set with many members (such as an account number).

## Creating a new data source

Figure 4-3  
Data Source Editor



- ▶ To access the Data Source Editor, select Add a data source under either the Project Data Sources or My Data Sources area.
- ▶ Type a name for the data source.
- ▶ Select the source type:
  - **File.** Supported file types include text (\*.txt, \*.csv), Excel, and the \*.sav format used by IBM® SPSS® Statistics. [For more information, see the topic File source on p. 38.](#)
  - **Database.** Any database that supports ODBC, including Microsoft SQL Server, DB2, Oracle, and others. [For more information, see the topic Database source on p. 42.](#)

- **IBM SPSS Collaboration and Deployment Services Enterprise View.** Creates a connection to an IBM® SPSS® Collaboration and Deployment Services Enterprise View as defined in IBM® SPSS® Collaboration and Deployment Services. [For more information, see the topic IBM SPSS Collaboration and Deployment Services Enterprise View source on p. 43.](#)
  - **Cognos BI server.** Any database that supports Cognos BI server, version 14.1 or lower. [For more information, see the topic Cognos BI source on p. 44.](#)
- Specify options as appropriate for the source type.

## File source

The application supports several data file types. When you enter the filename or browse for the file, the application automatically detects the type and expands the Data Source Editor to display additional fields that relate to that type.

If the file type is incorrect, or requires a specific version (for example Microsoft Excel 1997-2003), you can change the type to the one required.

### Text-based data files

When you select a text-based data source, you are prompted to enter further details.

Figure 4-4  
Text-based data source settings

The screenshot shows the 'Data Source Editor' dialog box. The 'Data source name' field contains 'bank customer data'. The 'File' radio button is selected, and the file path is 'C:\LEO\Demos\bank\_customer\_data.txt'. Below this, there are radio buttons for 'Database' and 'Enterprise View'. The 'Type detected' section shows '.txt Plain text' with a 'Change Type' button. The 'First row has column names' checkbox is checked, and the 'Encoding' is set to 'System default'. The 'Decimal symbol' is set to 'Period (.)'. The 'Delimiters' section includes checkboxes for 'Space()', 'Comma (,)', 'Tab', 'Newline', 'Other:', 'Non-printing characters', and 'Allow multiple blank delimiters'. At the bottom, there are 'Advanced Options' and 'Specify Input Fields' sections, both with right-pointing arrows. The 'Save' and 'Cancel' buttons are at the bottom right.

**First row has column names.** Select this if the names of each column are included as a heading row in the data source.

**Encoding.** Specifies the text-encoding method used. You can choose between the system default or UTF-8.

**Decimal symbol.** Specifies how decimals should be represented in the data.

- **Period (.)**. The period character will be used as the decimal separator.
- **Comma (,)**. The comma character will be used as the decimal separator.

**Delimiters.** Using the check boxes listed for this control, you can specify which characters, such as the comma (,), define field boundaries in the file. You can also specify more than one delimiter, such as “,|” for records that use multiple delimiters. The default delimiter is the comma.

*Note:* If the comma is also defined as the decimal separator, the default settings here will not work. In cases where the comma is both the field delimiter and the decimal separator, select Other in the Delimiters list. Then manually specify a comma in the entry field.

Select Allow multiple blank delimiters to treat multiple adjacent blank delimiter characters as a single delimiter. For example, if one data value is followed by four spaces and then another data value, this group would be treated as two fields rather than five.

### Advanced options

Figure 4-5  
Advanced options

**EOL comment characters.** Specify characters, such as # or !, to indicate annotations in the data. Wherever one of these characters appears in the data file, everything up to but not including the next new-line character will be ignored.

**Specify input fields.** Specify the number of input fields to be used from each record.

**Skip header characters.** Specify how many characters you want to ignore at the beginning of the first record.

**Lines to scan for type.** Specify how many lines to scan for specified data types.

**Strip lead and trail spaces.** Select to discard leading and trailing spaces in strings on import. You can choose to strip from the left, right, both sides, or none.

**Invalid characters.** Select Discard to remove invalid characters from the data source. Select Replace with to replace invalid characters with the specified symbol (one character only). Invalid characters are null characters or any character that does not exist in the encoding method specified.

**Quotes.** Using the drop-down lists, you can specify how single and double quotation marks are treated on import. You can choose to Discard all quotation marks, Include as text by including them in the field value, or Pair and discard to match pairs of quotation marks and remove them. If a quotation mark is unmatched, you will receive an error message. Both Discard and Pair and discard store the field value (without quotation marks) as a string.

**Specify input fields.** For more information, see the topic [Selecting input fields](#) on p. 47.

### Excel data files

When you select an Excel data source, you are prompted to enter further details.

Figure 4-6  
Excel data source settings

The screenshot shows the 'Data Source Editor' dialog box. At the top, the title bar reads 'Data Source Editor'. Below the title bar, there is a text field for 'Data source name' containing 'bank customer data'. Underneath, there are three radio button options: 'File' (selected), 'Database', and 'Enterprise View'. The 'File' option is followed by a text field containing '\$CLEO/Demos/bank\_customer\_d:' and a 'Browse' button. Below these options, there is a section for 'Type detected: .xls Microsoft Excel 97-2003' with a 'Change Type' button. The next section contains a checked checkbox for 'First row has column names', an unchecked checkbox for 'Use named range' with an empty text field, and a 'Choose worksheet:' section with 'By name' (unchecked) and 'By index' (checked) options, the latter having a text field with '0'. Below that is a 'Range on worksheet:' section with 'Range starts on first non-blank row' (checked) and 'Explicit range of cells' (unchecked) with two empty text fields. At the bottom of this section is a dropdown menu for 'On blank row' set to 'Stop'. A 'Specify Input Fields' button is located below the 'On blank row' dropdown. At the very bottom of the dialog, there is a 'Lock data source' checkbox (unchecked) and 'Save' and 'Cancel' buttons.

**First row has column names.** Select this if the names of each column are included as a heading row in the data source.

**Named range.** Enables you to select a named range of cells as defined in the Excel worksheet. If you use a named range, other worksheet and data range settings are no longer applicable and are disabled as a result.

**Choose worksheet.** Specifies the worksheet to import, either by name or by index.

- **By name.** Select the name of the worksheet you want to import.
- **By index.** Specify the index value for the worksheet you want to import, beginning with 0 for the first worksheet, 1 for the second worksheet, and so on.

**Range on worksheet.** You can import data beginning with the first non-blank row or with an explicit range of cells.

- **Range starts on first non-blank row.** Locates the first non-blank cell and uses this as the upper left corner of the data range.
- **Explicit range of cells.** Enables you to specify an explicit range by row and column. For example, to specify the Excel range A1:D5, you can enter A1 in the first field and D5 in the second (or alternatively, R1C1 and R5C4). All rows in the specified range are returned, including blank rows.

**On blank rows.** If a blank row is encountered, you can choose whether to skip and ignore the row or choose Return blank rows to continue reading all data to the end of the worksheet, including blank rows.

**Specify input fields.** For more information, see the topic [Selecting input fields on p. 47](#).

### IBM SPSS Statistics data files

When you select a IBM® SPSS® Statistics data source, you are prompted to enter further details.

Figure 4-7  
IBM SPSS Statistics data source settings

The screenshot shows the 'Data Source Editor' dialog box. The 'Data source name' field contains 'bank customer data'. The 'File' radio button is selected, with the path '\$CLEO/Demos/bank\_customer\_d' and a 'Browse' button. The 'Database' and 'Enterprise View' radio buttons are unselected. The 'Type detected' section shows '.sav SPSS Statistics' with a 'Change Type' button. Under 'Variable names', 'Read names and labels' is selected. Under 'Values', 'Read data and labels' is selected. There is a 'Specify Input Fields' button with a right-pointing arrow. At the bottom, there is a 'Lock data source' checkbox (unchecked), and 'Save' and 'Cancel' buttons.

**Variable names.** Select a method of handling variable names and labels upon import from a SPSS Statistics *.sav* file.

- **Read names and labels.** Select to read in both variable names and labels; this is the default option. Labels may be displayed in charts, model browsers, and other types of output.
- **Read labels as names.** Select to read in the descriptive variable labels from the SPSS Statistics *.sav* file rather than the short field names, and use these labels as variable names.

**Values.** Select a method of handling values and labels upon import from a SPSS Statistics *.sav* file.

- **Read data and labels.** Select to read in both actual values and value labels; this is the default option.
- **Read labels as data.** Select if you want to use the value labels from the *.sav* file rather than the numerical or symbolic codes used to represent the values. For example, selecting this option for data with a gender field whose values of 1 and 2 actually represent *male* and *female*, respectively, will convert the field to a string and import *male* and *female* as the actual values.

It is important to consider missing values in your SPSS Statistics data before selecting this option. For example, if a numeric field uses labels only for missing values (0 = *No Answer*, -99 = *Unknown*), then selecting the option above will import only the value labels *No Answer* and *Unknown* and will convert the field to a string. In such cases, you should import the values themselves.

**Specify input fields.** For more information, see the topic [Selecting input fields on p. 47](#).

## Database source

When you select a Database source, you are prompted to enter further details.

Figure 4-8  
Database data source settings

**Test connection.** Enter your database username and password and click to check that you have access to the database.

**Table Name.** Select the table from which data is to be used.

**Strip lead and trail spaces.** Select to discard leading and trailing spaces in strings on import. You can choose to strip from the left, right, both sides, or none.

**Quote table and column names.** Specify whether you want table and column names to be enclosed in quotation marks when queries are sent to the database (if, for example, they contain spaces or punctuation).

- The As needed option will quote table and field names *only* if they include nonstandard characters. Nonstandard characters include non-ASCII characters, space characters, and any non-alphanumeric character other than a full stop (.).



- Select Never if you *never* want table and field names quoted.
- Select Always if you want *all* table and field names quoted.

**Specify input fields.** For more information, see the topic [Selecting input fields on p. 47](#).

## **IBM SPSS Collaboration and Deployment Services Enterprise View source**

When you select an IBM® SPSS® Collaboration and Deployment Services Enterprise View source, you are prompted to enter further details.

Figure 4-9

IBM SPSS Collaboration and Deployment Services Enterprise View data source settings

The screenshot shows the 'Data Source Editor' dialog box. At the top, the title bar reads 'Data Source Editor'. Below the title bar, there is a text field for 'Data source name' containing 'Employee Records'. There are three radio buttons: 'File', 'Database', and 'Enterprise View', with 'Enterprise View' selected. Below the radio buttons, there are three rows of fields: 'Application View' with a dropdown showing 'av\_yaliu' and 'LATEST', a 'Browse' button, and a text field; 'Table' with a dropdown showing 'Employees'; and 'Data Provider' with a dropdown showing 'analyticDPD\_yaliu'. Below these fields, the 'Environment' is set to 'Analytic'. At the bottom, there is a 'Specify Input Fields' button with a right-pointing arrow, and 'Save' and 'Cancel' buttons.

**Application view.** The drop-down list displays the selected application view, if any. If connections have been made to other Application Views in the current session, these also appear on the drop-down list. Click the adjacent Browse button to search for other Application Views in the repository.

**Table.** Select the table from which data is to be used.

**Data provider.** The drop-down list displays the names of up to ten Data Provider Definitions (DPDs) for the selected Application View. Only DPDs that reference the selected Application View are shown.

**Environment.** The environment value, which is set in IBM® SPSS® Collaboration and Deployment Services, determines which DPDs are available.

**Specify input fields.** For more information, see the topic [Selecting input fields on p. 47](#).

For more details about the IBM SPSS Collaboration and Deployment Services Enterprise View, and complete details about how this data is configured, see the IBM SPSS Collaboration and Deployment Services documentation.

## Cognos BI source

*Note:* If the IBM® SPSS® Modeler Server in use with IBM® SPSS® Decision Management does not support Cognos BI server, version 14.1 or lower, then this option is not available.

Figure 4-10  
Data Source Editor - Cognos BI server selected

The screenshot shows the 'Data Source Editor' dialog box. At the top, the title bar reads 'Data Source Editor'. Below it, the 'Data source name' field contains the text 'SEB01'. There are four radio button options: 'File', 'Database', 'Enterprise View', and 'Cognos BI server'. The 'Cognos BI server' option is selected, and a 'Connect' button is positioned to its right. To the left of the 'File' and 'Database' options are empty text input fields, and a 'Browse' button is to the right of the 'File' field. Below these options is a 'Package' field with an empty text box and a 'Browse' button to its right. Underneath the package field is a section titled 'Select Package Objects' with a right-pointing arrow. Below that is another section titled 'Review Input fields' with a right-pointing arrow. At the bottom of the dialog are 'Save' and 'Cancel' buttons.

When you select Cognos BI server and click Connect you are prompted to enter the server connection details.

Figure 4-11  
Cognos server selection

The screenshot shows the 'Connect to Cognos BI Server' dialog box. The title bar reads 'Connect to Cognos BI Server'. The 'Server URL' field contains the text 'http://9.119.83.17:9300/p2pd/servlet/dispatch'. Below this is the 'Mode' section with two radio buttons: 'Set credentials' and 'Use Anonymous Connection'. The 'Use Anonymous Connection' option is selected. There are three text input fields: 'Namespace', 'User name', and 'Password'. At the bottom of the dialog are 'Connect' and 'Cancel' buttons.

- ▶ Type the Server URL of the Cognos server from which to import or export data. Contact your Cognos system administrator if you are not sure which URL to use.
- ▶ Select the Mode in which you will connect.

- ▶ To log in as a specific user (for example, as an administrator), select **Set Credentials** and enter the Cognos namespace, username, and password:
  - Specify the Cognos security authentication provider Namespace used to log on to the server. The authentication provider is used to define and maintain users, groups, and roles, and to control the authentication process.
  - Enter the Cognos User name with which to log on to the server.
  - Enter the Password associated with the specified user name.
- ▶ Alternatively, to log in with no user credentials, in which case you can not fill in the namespace, username, and password fields, select **Use Anonymous connection**.

**Note:** Some server connections do not allow Anonymous connections.

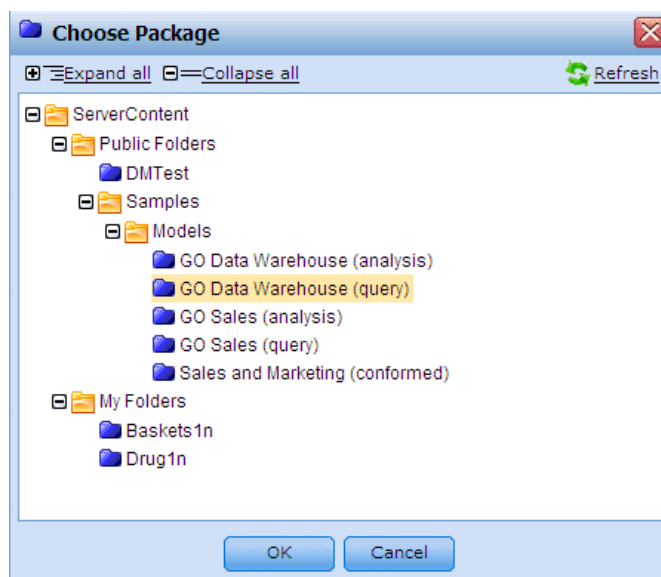
### Selecting Cognos package details

When you have set up a Cognos server connection, you first select a package from which to import data and then select the query subjects or individual query items that you want to import from the selected package.

A package contains a Cognos model and all of the folders, queries, reports, views, shortcuts, URLs, and job definitions associated with that model. A Cognos model defines business rules, data descriptions, data relationships, business dimensions and hierarchies, and other administrative tasks.

To select a package, click **Browse**, the **Choose Package** dialog box is displayed and lists all available packages from which you can import content.

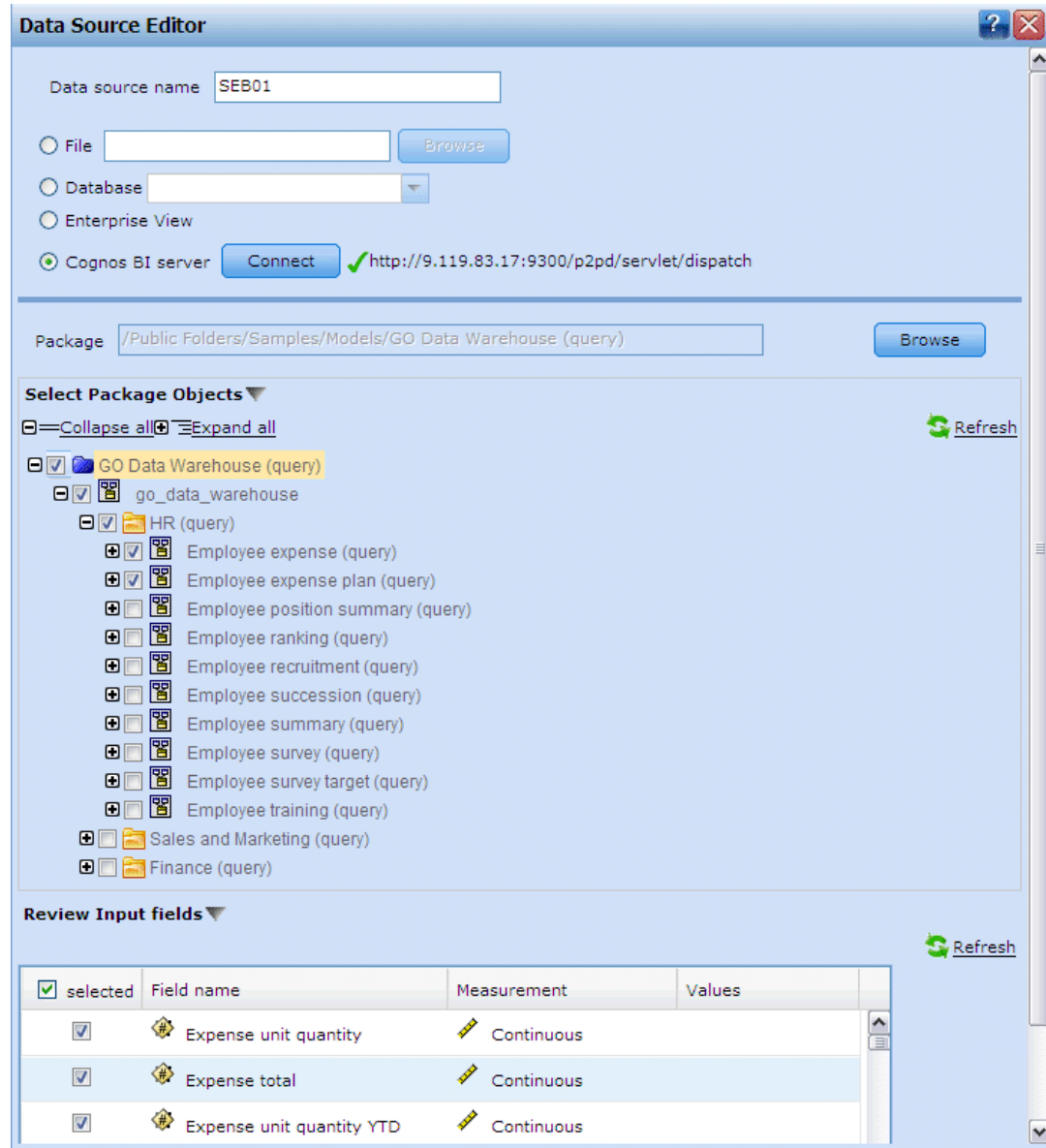
Figure 4-12  
*Cognos package selection*



Where necessary, expand the list to find the package you require; click on the package name to select it, and click OK. The package details are shown in the Data Source Editor.

After you have selected a package you then choose the package object query subjects (which represent database tables) or individual field query items (which represent table columns) that you want to use from the package. *Note:* The data must be in UTF-8 format.

Figure 4-13  
*Cognos input field selection*



**Select Package Objects.** Displays the name of the selected package, together with the package objects (also known as namespaces) associated with the package that you can select. Expand one or more package objects to display the input fields that you can import. Selecting a package object automatically selects all of its input fields.

**Review Input Fields.** Lists the input fields (also known as database objects) that will be imported into IBM® SPSS® Decision Management for processing. If you do not require a particular field, clear the check box next to the field name.

## Selecting input fields

When you have a large amount of data, you may want to reduce or fine tune the data imported from your source; for example, to only use the fields that are relevant to your area of interest.

Figure 4-14  
Data input fields

Field name	Measurement	Values
<input checked="" type="checkbox"/> Age	Continuous	[10.0,98.0]
<input checked="" type="checkbox"/> Months_as_a_Customer	Continuous	[0.0,48.0]
<input checked="" type="checkbox"/> Number_of_Products	Continuous	[0.0,53.0]
<input checked="" type="checkbox"/> RFM_Score	Continuous	[0.0,37.394378662109375]

- ▶ At the bottom of the Data Source Editor dialog, click Specify Input Fields; the dialog expands to display all of the data fields in your source. In addition, all expressions that you have defined are also displayed. [For more information, see the topic Expression manager on p. 47.](#)
- ▶ Select each of the fields and expressions that you want to use.

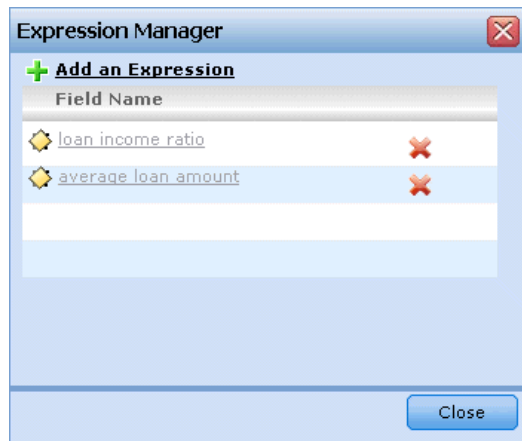
In addition to selecting data you can, where required, change the measurement level for one or more of the data fields. [For more information, see the topic Measurement levels on p. 36.](#)

## Expression manager

You can use the expression manager to derive additional fields or attributes for use by the application. For example, if you are using banking data, you may want to create an expression that shows the ratio between a customer's income and the number of loan accounts they have. Expressions are always numeric with a measurement of Continuous; this can not be changed.

*Note:* Expressions are available throughout the application in the same way as operational data; for example, in rules and model predictors.

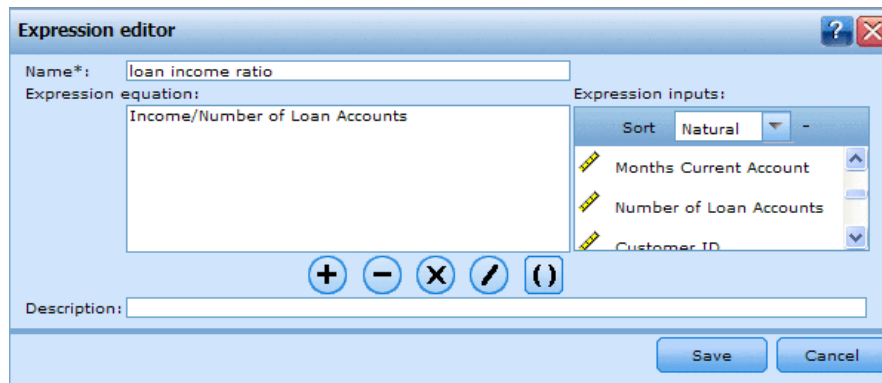
Figure 4-15  
*Expression manager*



- ▶ To display existing expressions, click Expression Manager on either the Data tab or the Data Source Editor.

### ***Creating an expression***

Figure 4-16  
*Creating a new expression*



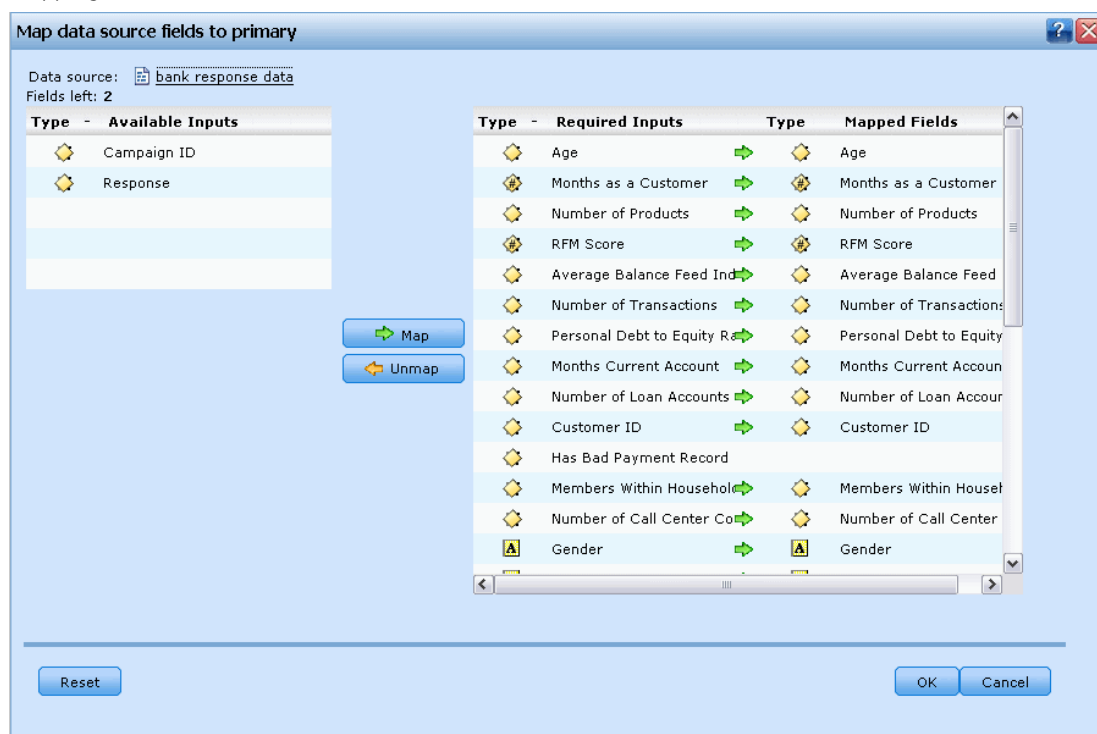
- ▶ In the Expression Manager dialog, click Add an Expression; the Expression Editor dialog is displayed, showing all available inputs from the data source.
- ▶ Enter a unique Name for the expression.
- ▶ Either double-click or drag the required inputs and mathematical symbols to the Expression Equation field to build your expression.
- ▶ Enter a Description that explains what the expression is used for.
- ▶ Click Save to return to the Expression Manager dialog.

## Mapping fields

When adding a new data source, you may need to map all of its fields to ensure compatibility with the project data model. For example, if the project data model requires a field named *purchase* with values *Yes* and *No* (measurement level flag), then any data source used must have a compatible field. If the field names are not identical, they can be mapped accordingly. Note that the input and associated mapped field must have the same data type.

Alternatively, if the project data model changes, then it may be that many data sources no longer map to it correctly. If that is the case, then the compatibility indicator ball in the Project Data Sources area will change to the appropriate color for each of those data sources; you will then have to remap all of them to the new project data model.

Figure 4-17  
Mapping data fields



- ▶ In the Project Data Sources area, click Map fields. A dialog opens, and the system makes a best guess at mapping fields for you. At any point, you can return to the system's best guess by clicking Reset.
- ▶ Select a field in the Available Inputs column, and its corresponding field in the Required Input Fields column, and click Map to map the two fields. Repeat this until all fields in the Available Inputs column have been mapped.
- ▶ When finished, click OK.

## ***Working with rules***

Rules are used to automate decisions based on business logic, or on the output from predictive models. Depending on the application, you might use rules to exclude customers based on payment history, to refer risky claims to a special investigations unit, or to target those with the highest propensity to churn, buy, or commit fraud as identified by a predictive model. While rules bring automation, models provide predictive power, and the ability to combine them is one of the key features that distinguish predictive applications from other analytical tools.

Rules can be created, applied, and saved at different points within each application.

### ***Creating rules***

- ▶ At the point in the application where you want to add a rule, select **Create a new rule**.
- ▶ Alternatively, select **Find an existing rule** to browse for existing rules which can be added or reused in the current application. [For more information, see the topic \*Exporting and reusing rules\* on p. 54.](#)
- ▶ To create a shared rule, launch IBM® SPSS® Rules Management from the Application Launch page.

### ***Defining segment rules***

Segment rules are used throughout the application to select and allocate records in different applications as appropriate. Segments are defined by one or more expressions that return a true or false result. For example you might have a rule with a single segment that returned true if the value of the age field was less than 18. Segments can be defined based on fields or expressions defined in the data, or on the propensity scores or predictions returned by a model.



Figure 5-1  
Segment rule editor

**Edit Rule**

Name\*: High Value Customers

Expressions\*

- Months Current Account > 12
- Number of Products > 3
- Choose value...

Description :

OK Cancel

Each segment is defined by one or more expressions, and returns a value of true if all conditions are met. For example a segment defined by age and gender would only include records that met both conditions, and the rule would return *false* for all others.

#### To create or edit a segment rule

- In the application where you want to add the rule, select Create a new rule.

Figure 5-2  
Creating a new segment rule

**New Rule**

Name\*: Bad Payment Record

Expressions\*

- Has Bad Payment Record = 1

Choose value...

Sort Natural

- Customer ID
- Has Bad Payment Record
- Members Within Household
- Number of Call Center Contacts

Description:

OK Cancel

- Specify a name for the rule.

- ▶ For the input column, click the down-arrow icon to specify a field, rule, or model, as desired.



Allows you to choose a field from the current data set.



Allows you to choose an existing model or rule from the repository.



Allows you to build a new model.

- ▶ Choose the function you want to use. For numeric range inputs, options include the following:

- = (equals)
- != (not equal to)
- > (greater than)
- < (less than)
- >= (greater than or equal to)
- <= (less than or equal to)
- BETWEEN
- ISNIL

For categorical values:

- = (equals)
- != (not equal to)
- ONE OF
- ISNIL

- ▶ Specify a value as appropriate for the input type. For non-numeric values, a dropdown list of choices is provided.

Alternatively, select Find an existing rule to browse for rules that have already been defined. [For more information, see the topic Exporting and reusing rules on p. 54.](#)

### **Segment rule sets**

- Segment rules can also be combined into sets. A segment ruleset returns a value of true if *any* of the individual segments is true. Note this differs from the expressions *within* a segment, all of which must be true.
- You can export segment rulesets from any application that uses rules, or you can do this in IBM® SPSS® Rules Management if available. [For more information, see the topic Exporting and reusing rules on p. 54.](#)

## Defining selection rules

A selection rule is a set of one or more segment rules or rule sets with an *Include* or *Exclude* attribute assigned to each. Selection rules are used throughout the applications to select subsets of records for modeling, or scoring, or other processing.

Figure 5-3  
Selection rule

Rule name -	Include/Exclude	Remove
1 Bad Payment Record	Exclude	X
Has Bad Payment Reco...		
2 Weeks Since Last Offer	Exclude	X
Weeks Since Last Off...		

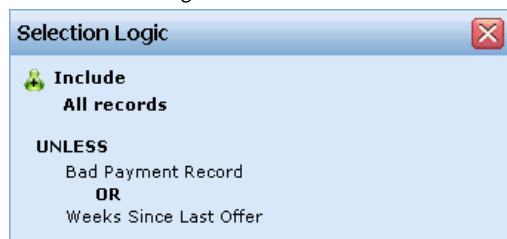
- ▶ In the application where you want to add the rule, select **Create a new rule**. This link is available at points where selection rules can be applied.
- ▶ Specify a name for the rule and add one or more expressions as desired. [For more information, see the topic Defining segment rules on p. 50.](#)
- ▶ Click **OK** to save the segment rule.
- ▶ In the selection rule editor, click the icons in the **Include/Exclude** column to toggle this setting for each rule. For referenced selection rulesets, this setting cannot be changed.

Alternatively, select **Find an existing rule** to browse for rules that have already been defined. [For more information, see the topic Exporting and reusing rules on p. 54.](#)

## Evaluating selection rules

Select **View selection logic** to see details on how selections are made (logical AND versus OR).

Figure 5-4  
Selection rule logic



- When evaluating selection rules, if multiple include segments are specified, records matching *any* of the segments are included. For example, customers might be included based on credit rating OR tenure.
- If multiple exclude segments are specified, records matching any of the segments are excluded. For example, customers might be excluded based on age OR credit rating.

- In case of a conflict, exclude rules take precedence. For example, a customer that falls into any excluded segment will be excluded regardless of any segments they would otherwise qualify for.
- When creating selection rule sets in IBM® SPSS® Rules Management, all rules must be of the same type—either *Include* or *Exclude*. You cannot combine inclusion and exclusion rules in the same rule set.

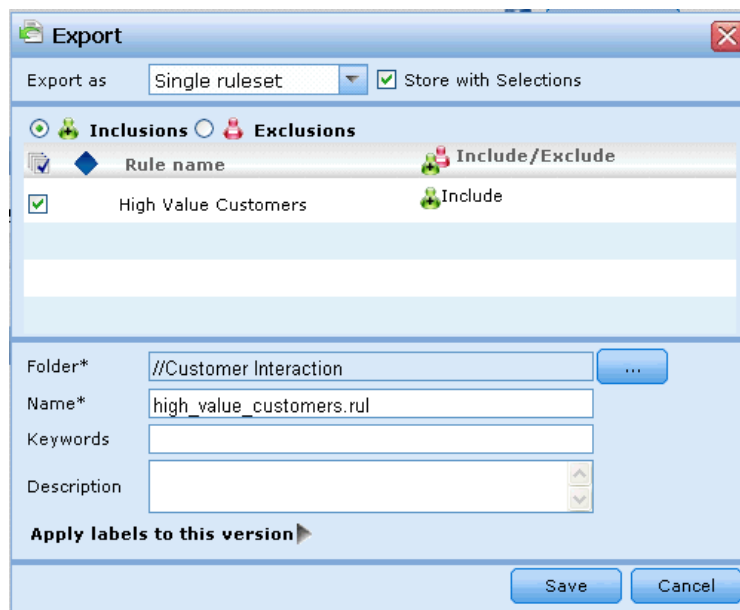
## Exporting and reusing rules

By default, rules created in an application are saved with that application. Alternatively, rules can be exported or saved to IBM® SPSS® Collaboration and Deployment Services Repository for use in multiple applications. In this case each application stores a reference to a specific, labeled version of the shared rule; any changes to the rule are automatically applied to all applications that use that version.

### Exporting rules

- From any application that contains a local rule you want to share, choose Export to save the rule to IBM SPSS Collaboration and Deployment Services Repository where it can be reused as needed.

Figure 5-5  
Exporting a selection rule



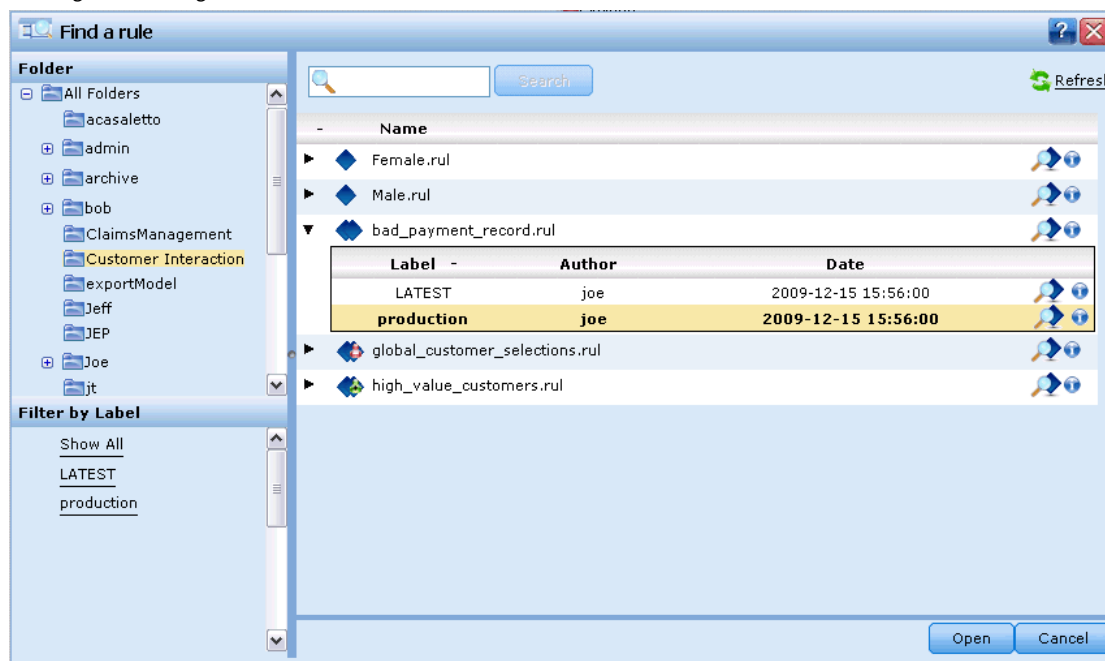
- When exporting multiple rules, specify whether you want to export them all in a single ruleset, or individual rules. In the case of individual rules, each segment is exported as a separate rule.

- When exporting multiple selection rules, if you choose Store with selections, a selection ruleset is exported. In this case you can export either inclusions or exclusions, but not both. If you need a mix of inclusions and exclusions, these need to be exported in separate rulesets. If Store with selections is not selected, a segment ruleset is exported.
- When exporting from an aggregation rule editor, if you choose Export with risk points, an aggregation ruleset is created. If this option is not selected, a segment ruleset is exported.

### Using existing rules

- ▶ In any application where you want to make use of a shared rule, select Find an existing rule to browse IBM SPSS Collaboration and Deployment Services Repository for existing rules that can be reused in the current application.

Figure 5-6  
Finding an existing rule

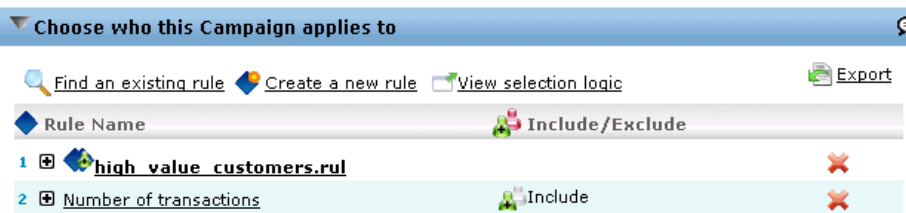


- ▶ To reference a specific labeled version, click the arrow next to the rule name and choose the desired version. If no version is selected, the latest is used. (Think of *LATEST* as a special label)

that is automatically rolled to each new version as it is created.) Using a specific labeled version is recommended to avoid unexpected results that can occur when a new version of a rule is created.

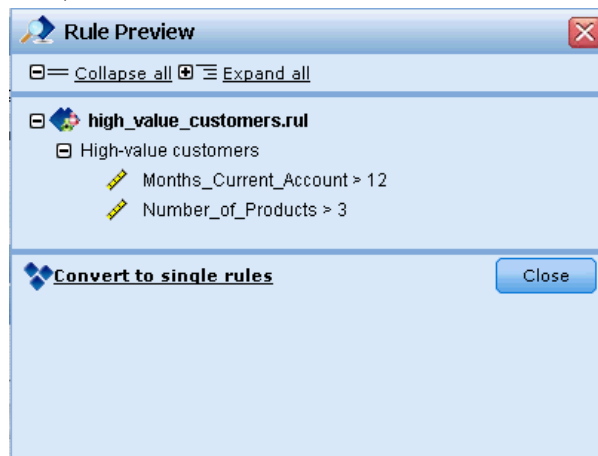
Referenced rules can be combined with local rules in many cases, but are visually distinguished from local rules by bold text, and by an icon that indicates the type of rule (or ruleset).

Figure 5-7  
Selection rule editor with both shared and local rules



- ▶ Alternatively, referenced rules can be converted to local rules and saved in the current application if desired. To do this, click on the name of any referenced rule, and then select Convert to single rules in the Rule Preview dialog box.

Figure 5-8  
Rule preview



### Guidelines for sharing rules

When browsing and working with shared rules, the following guidelines apply:

- Rules can be exported for reuse from any application, but once exported, can be edited in IBM® SPSS® Rules Management, and cannot be edited in any other application. Note that SPSS Rules Management may not be installed at all sites or available to all users.
- Using a specific labeled version (other than *LATEST*) is strongly recommended, particularly in a production environment, as ongoing changes the latest version may otherwise have unintended consequences. In certain cases, such as when referencing a rule from within a rule, a labeled version must be used.
- Single rules can be added from IBM SPSS Collaboration and Deployment Services Repository by reference, or converted to local rules from the Rule Preview dialog box.

- Single rules can be referenced and combined with local rules in any rule editor. If exported as a rule set, nested references to single rules will be preserved.
- Segment and selection rule sets can be referenced and combined like single rules in most cases, but the combined rule set cannot be exported without first converting any nested rule sets to single rules. Thus an exported rule set can contain references to nested rules, *but not to nested rule sets*.
- Aggregation rule sets can also be referenced, but cannot be combined with other rules, and cannot contain nested references to other rules. When referencing an aggregation rule set, the referenced rule replaces the entire contents of the aggregation rule editor. (Alternatively, if not referencing an aggregation rule set, the aggregation editor can contain a mix of local rules, referenced segment rules, and segment rule sets.)
- When using SPSS Rules Management, the same restrictions apply as for exported rules. Nested rules are allowed, nested rule sets are not. This is because SPSS Rules Management is designed to create and edit shared rules (similar to exporting from any of the other applications).
- To avoid any of the restrictions on referenced rule sets, whether in SPSS Rules Management or elsewhere, a rule set can always be converted to separate, local rules.

## Adding annotations

In an aggregation or allocation, select Add Annotations to add a column of free text fields into which you can enter a note that will be included with the rule output. For example, this may be extra information that tells a call center operator who to contact when an insurance claim is flagged for referral.

Figure 5-9  
Adding annotations

	Sum of Points>=	Allocate to	Annotations
1	4	Refer	Contact xt. 1234
2	1	Standard	Process as normal
3	0	Fast track	Apply fast tracking

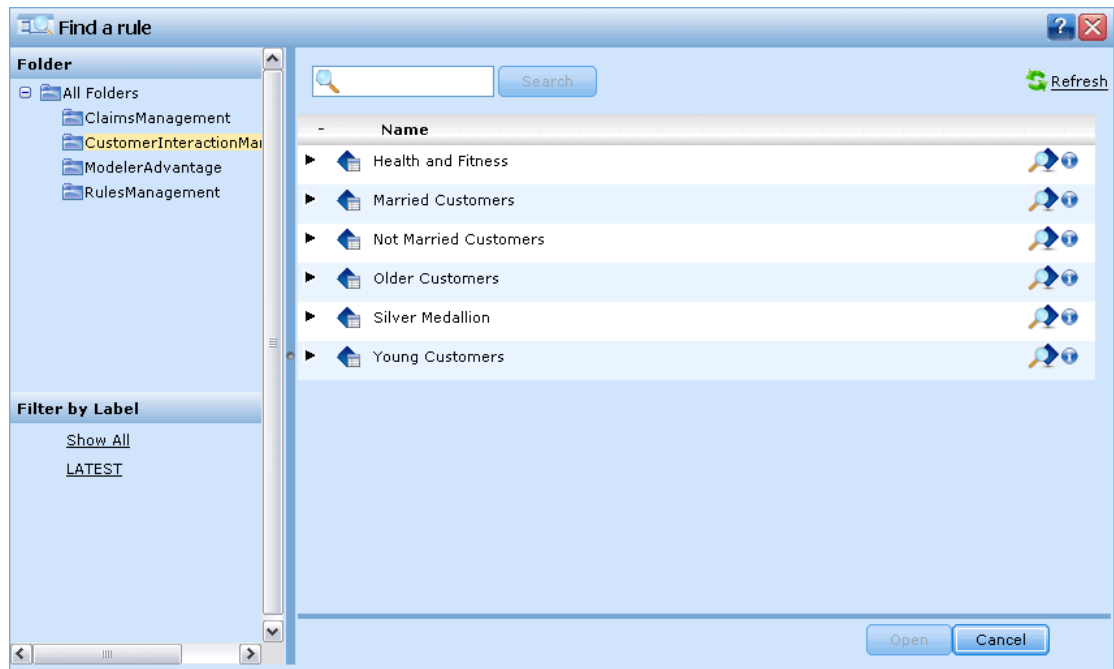
Annotations can be used in combination with the Return with value specified for a dimension, to provide additional detail. While the Return with value is associated with the dimension or decision that is returned, the annotation tells you which rules fired as input to that decision.

## Using rules from ILOG Business Rule Management System

Rules created in a Business Rules Management System such as ILOG can be referenced and used in IBM® SPSS® Decision Management applications. These external rules can be selected and used in the same manner as other rules, by selecting Find an existing rule at the desired point in the application. External rules are distinguished by their icon, but otherwise usable in the standard manner.

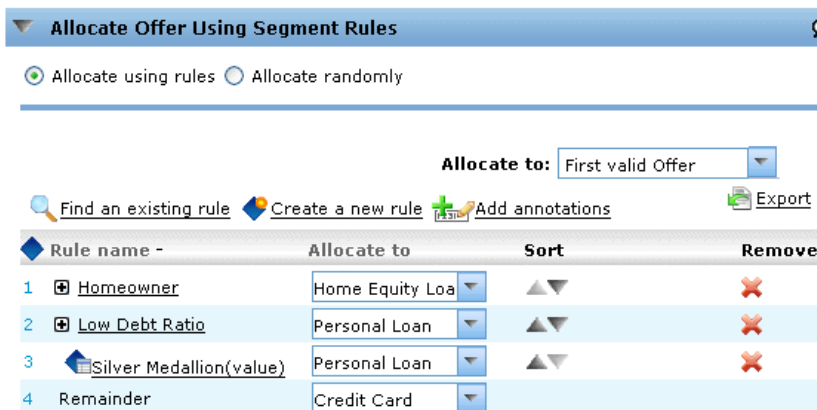
For information on creating external rules for use in SPSS Decision Management, see the *Application Designers Guide*.

Figure 5-10  
Using an external rule



The rule is inserted into the application in the same manner as any other rule. Note that rule outputs must match the context in which the rule is used; for example allocations require a true/false or yes/no (boolean) value as input to the decision.

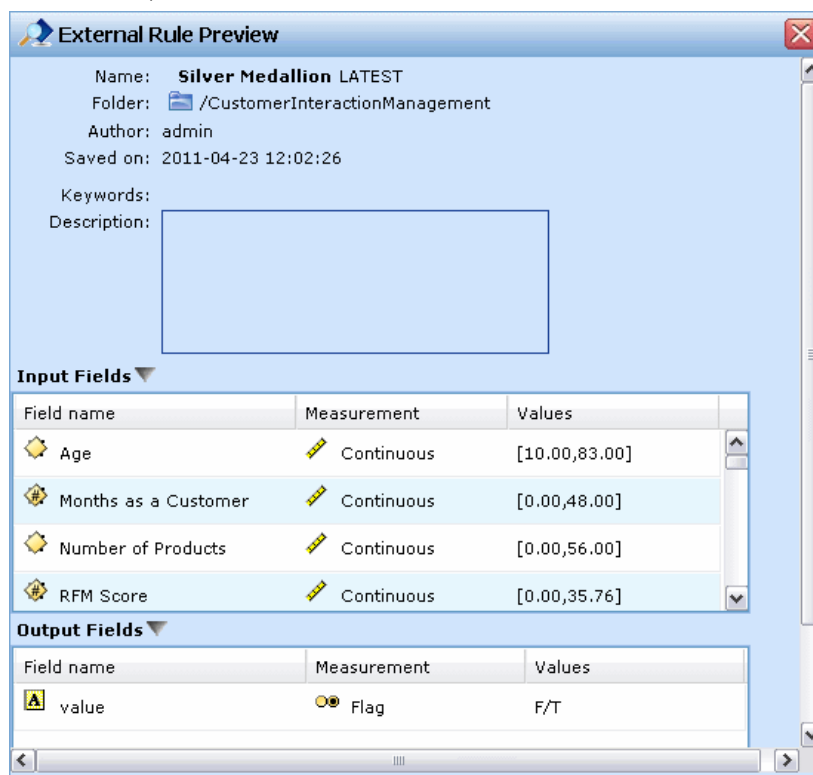
Figure 5-11  
Using an external rule in an allocation



As with other rules, click the name of any external rule used in the application to view details on the rule including input and fields, along with the rule description and other properties.

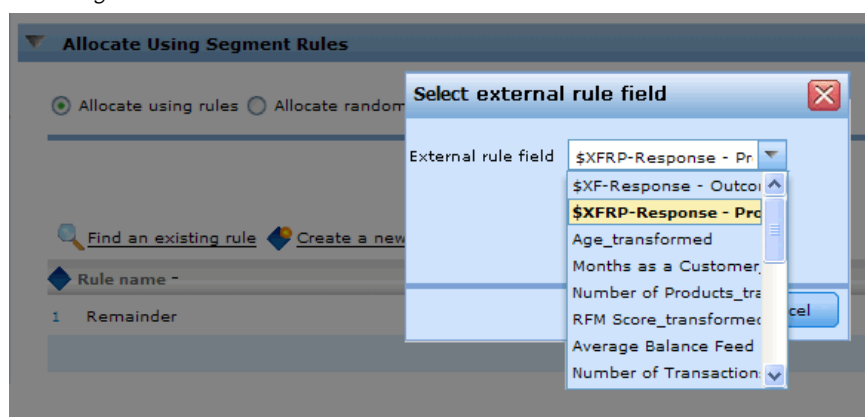


Figure 5-12  
External rule preview



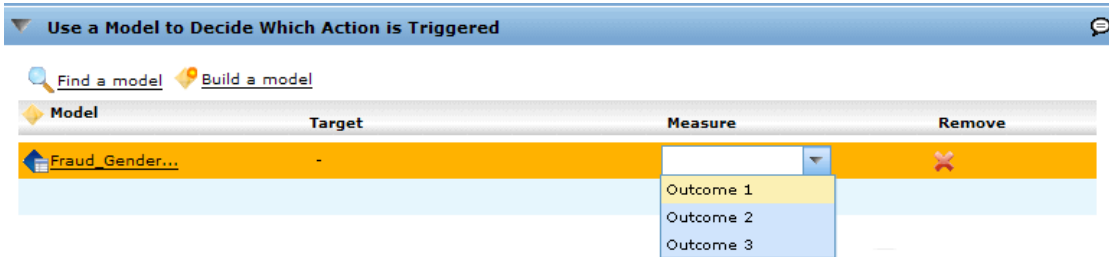
If an external rule has multiple output fields, a prompt is displayed allowing you to choose the desired field.

Figure 5-13  
Selecting an external rule field



If an external rule is used in place of a model, no target field is shown, and all configured outputs are shown in the drop-down list.

Figure 5-14  
Using an external rule in place of a model



### **Tips for using external rules**

- Rules that return a value of *true* or *false* (or *yes/no* or *0/1*) can be used in any selection or allocation, as input to any rule in the rule editor, or as a Return with field associated with a specific dimension item.
- Rules that return categorical outputs (*red, white, or blue; north, south, east, west, etc.*) can be used in the Use a model to decide section on the Define tab, as an input in the rule editor, or as a Return with field associated with a dimension item.
- Rules that return numerical outputs can be used in the Use a model to decide section on the Define tab, as input to a prioritization, as an input in the rule editor, or as a Return with field associated with a dimension item.

---

# ***Building predictive models***

## ***About predictive models***

Models can be used to predict what is likely to happen in the future, based on patterns in past data. For example, you might use a model to predict which customers are least likely to churn, or most likely to respond to a particular offer, based on characteristics such as income, age, and the organizations and memberships they subscribe to.

Models can be used in the same way as rules, but while rules may be based on corporate policies, business logic, or other assumptions, models are built on actual observations of past results, and can discover patterns that may not otherwise be apparent. While rules bring common business logic to applications, models lend insight and predictive power.

### ***Data for building and scoring models***

Two different types of data are used in the modeling process:

- To build the model, you need information about the thing you want to predict. For example, if you want to predict churn, you need information about customers who have churned in the past. This is often referred to as historical or analytical data, and must contain some or all of the fields in the project data model, plus an additional field that records the outcome or result you want to predict. This extra field is used as the **target** for modeling.
- To use the model in predicting future results, you need data about the group or population you are interested in, such as potential customers or incoming claims, for example. This is often referred to as **operational** data, or **scoring** data. The project data model is typically based on this data.
- If the target field is included in the data model, the Operational column should not be selected for this field, because it is not available when scoring the model. Having built the model using historical data, the goal in scoring is to apply the model to new data where the outcome is not already known.

## ***Building models***

The Modeling tab allows you to specify a data source, target field, and other options. You can also choose whether to build an automated or interactive model.

Note that if **parameters** were added to the application (stream file) in IBM® SPSS® Modeler, then a Parameters link will be available on the Modeling tab and the Score tab. Clicking the Parameters link shows the defined parameters and their current values, and allows you to change the parameter values to affect the model build or score.

You can build a new model using any of the following methods:

### To build an automated model

When building an automated model, the only required specifications are a data source and target field. You can also choose options for preparing and partitioning data, and for selecting the fields and records to use. The model is generated by applying a range of methods as appropriate to the target type, and automatically identifying the specific technique or combination that performs best on the selected data.

When scored, the model returns one or more fields containing predictions, as well as confidence values associated with those predictions. For example if the target field is a flag field named *Response*, the model returns a field named *XF-Response* containing predicted values for that field.

Figure 6-1  
Model settings

Model type:  Auto model  Interactive model

Data source: bank response data

Target: Response

Build Model Evaluate Test

Records used to build: ...

- ▶ Specify a data source. This can be any analytical data source that records the outcome you want to predict.
- ▶ Specify a target field the records the result you want to predict. For example, the target field might indicate which customers have churned, responded to past offers, raised fraudulent claims, and so on.

All other fields will automatically be included as inputs that may be useful in predicting this value.

- ▶ Specify optional settings as desired. [For more information, see the topic Optional model settings on p. 68.](#)
- ▶ Select Build Model.

You can close the browser or work on other tasks while the model builds. The model can be accessed from the Gallery once building is complete. [For more information, see the topic Gallery in Chapter 3 on p. 24.](#) If the model is taking longer to build than expected, click the Stop button to revert to the previously-saved version.

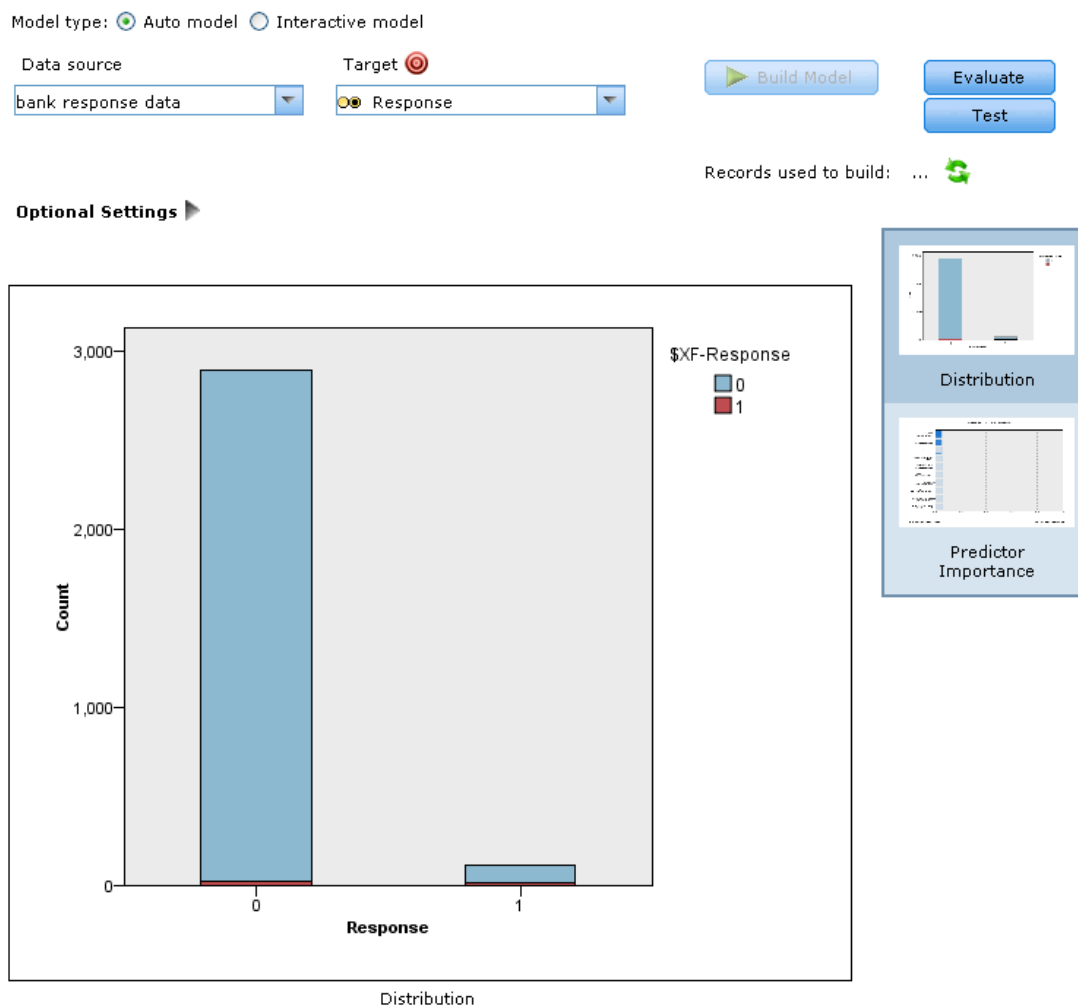
When model building is complete, distribution and predictor importance charts are displayed. [For more information, see the topic Automated modeling results on p. 63.](#)

- ▶ Optionally, use the Evaluate and Test features to see how the model performs on your sample data. [For more information, see the topic Evaluating models on p. 70.](#)

## Automated modeling results

When an automated model completes, distribution and variable importance charts are displayed, providing a quick visual assessment of model performance, and of the importance of different predictors in obtaining the final result.

Figure 6-2  
Distribution of observed and predicted values



### Distribution charts

The model distribution charts display observed values on the horizontal axis, with predicted values on the vertical axis or overlay. This allows you to see how often each value or response was predicted, and how often that prediction was correct, providing a quick visual assessment of model accuracy.

- For flag or set targets, the distribution is shown using a bar chart, with one bar for each category of the target field. The height of each bar indicates how many times that result is predicted by the model. The colored regions within each bar indicate how many times the

matching result was actually observed in the testing data. If the model is reasonably accurate, then the largest area within each bar should match the corresponding response.

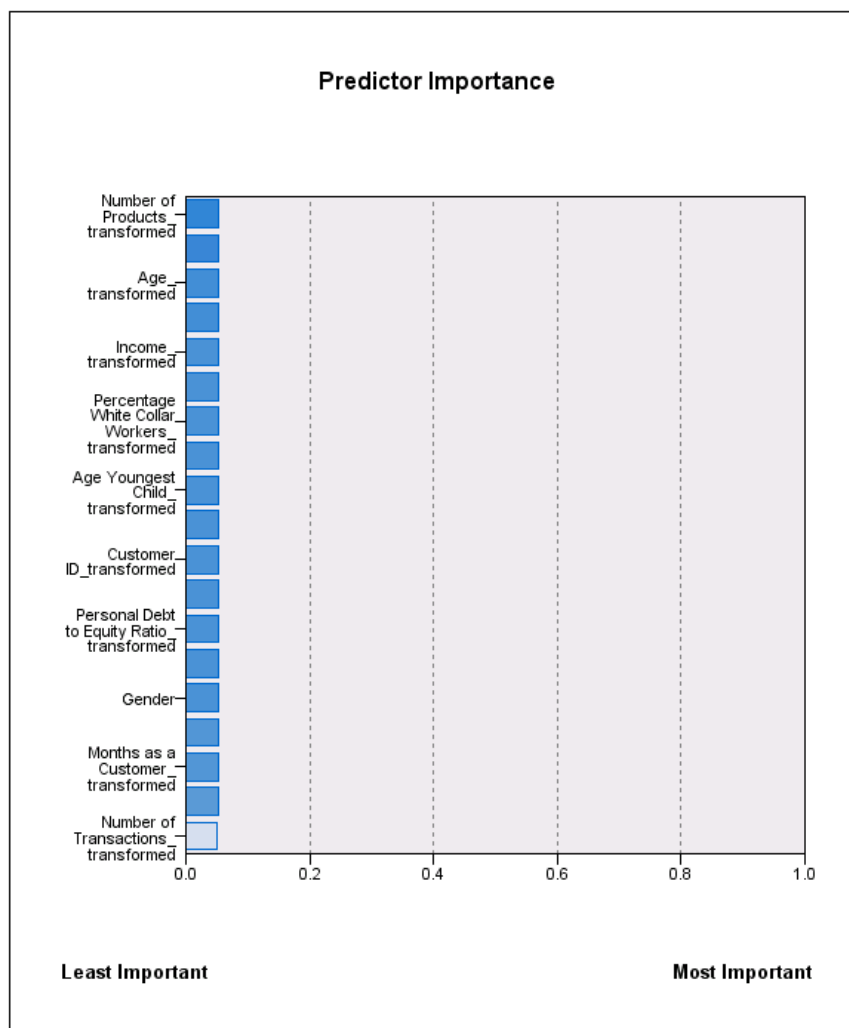
- For range targets, the distribution is represented by a binned scatterplot. Again, predicted values are plotted on the horizontal axis, and observed values are plotted on the vertical axis. Ideally the dots should cluster along a diagonal line. The more scattered the dots (results) and the farther from a linear distribution, the less accurate the model is.

### ***Predictor importance charts***

Typically, you will want to focus your modeling efforts on the predictor fields that matter most and consider dropping or ignoring those that matter least. The predictor importance chart helps you do this by indicating the relative importance of each predictor in estimating the model. Since the values are relative, the sum of the values for all predictors on the display is 1.0. Predictor importance does not relate to model accuracy. It just relates to the importance of each predictor in making a prediction, not whether or not the prediction is accurate.

Calculating predictor importance may take significantly longer than model building, particularly when using large datasets.

Figure 6-3  
Variable Importance chart



If the option to automatically partition data was selected when the model was built, then the testing partition will automatically be selected on the Evaluate page.

If partitioning was not turned on, you will need to select a data source for evaluating the model. Selecting a data source other than the one used to build the model is recommended. Note that partitioning is on by default, so this should not be necessary unless you have changed this setting.

### ***Interactive models***

Interactive models allow you to identify segments that show a higher or lower likelihood relative to a specific outcome. For example, you might look for customers who are least likely to churn, or most likely to say yes to a particular offer. The resulting model resembles a list of selection rules, with an Include or Exclude attribute that specifies how each segment is scored.

Interactive models resemble selection rules, but differ in how they are scored. In the case of a selection rule, excluded records are removed, resulting in fewer records in the output. In the case of a model, no records are removed, but additional fields are added indicating the prediction and propensity values for each record. Included segments are scored as *True* (or *False*, or whatever outcome you are trying to predict). Excluded segments are scored as *NULL*, as are any records that fall to the remainder because they do not match any rule.

Each record is also given a propensity score that indicates the likelihood of the target response, making it possible to identify the customers who are most likely to respond. As such, interactive models are well-suited for generating mailing lists, and they are widely used in customer relationship management, including call center or marketing applications.

- Interactive modeling is available for categorical targets only.
- You can view, modify, and reorganize segments and to choose which to include or exclude for purposes of scoring. For example, you can choose to exclude one group of customers from future offers and include others and immediately see how this affects your overall hit rate.
- As with a selection rules, you can manually add or edit segments as needed. It is often easier to let the model find them for you, however, and a number of options are provided to help you fine-tune the result.
- Rules are applied in the order listed, with the first matching rule determining the outcome for a given record. Taken independently, rules or conditions may overlap, but the order of rules resolves ambiguity. If no rule matches, the record is assigned to the remainder rule.

### ***To obtain an interactive model***

Figure 6-4  
*Building an interactive model*

Model type:  Auto model  Interactive model

Data source: bank response data

Target: Response

Response sought:

0

1

Start Build Evaluate Test

Records used to build: ...

- ▶ Specify a data source. This can be any analytical source that records the outcome you want to predict.
- ▶ Specify a target field that records the result you want to predict.



- ▶ Specify the specific value or response you want to find. For example if the target field is named *response*, you could choose *True* or *False* to find customers who responded — or who didn't — accordingly.

For example, the target might indicate which customers have churned, responded to past offers, raised fraudulent claims, etc. All other fields will automatically be included as inputs that may be useful in predicting this value.

- ▶ Select Start Build.

**Figure 6-5**  
*Building an interactive model*

Model type:  Auto model  Interactive model

Data source: bank response data      Target: Response{1}      [Restart model](#)      [Grow Model](#)      [Evaluate](#)      [Test](#)

Records used to build: 1413

Find segments with: High probability      Max. number of segments: 5

**Optional Settings** ▶

[Create a new rule](#)

Rule name	Count	Hits	Probability
1 Remainder	1413	52	3.68%

- ▶ Specify whether you want to find segments with high or low probability relative to the specified target. For example, you could look for groups or customers who are mostly likely to churn, or least likely, and include them accordingly.
  - ▶ Specify the maximum number of segments to be found. Typically this number is kept small in the interest of simplicity and performance.
  - ▶ Select Grow Model to obtain a list of one or more segment rules that identify groups with higher or lower probability.
  - ▶ Click the Include/Exclude icons to specify how the rules are to be used and how the relevant segments are scored.
- Included segments are given a score that matches the target value (for example *response=true*). Excluded segments are scored as *NULL*, but are not removed from the file.
- ▶ Optionally, you can manually add or edit segments as desired. [For more information, see the topic Defining segment rules in Chapter 5 on p. 50.](#)
  - ▶ Optionally, use the Evaluate and Test features to see how the model performs on your sample data.

### **Tips**

- Use the up/down arrows to move rules up or down. Each record is scored based on the first hit, so the order of rules will change the result. For example a record that matches multiple rules will be scored based on the first that applies.

- Change one or more options and select Grow Model again to find additional rules. For example, you might lower the threshold for minimum segment or confidence interval in order to identify additional segments.
- Clicking Grow Model does not clear the table or rebuild the model from scratch, it only finds more segment rules to add to the table.

## Optional model settings

When building models, you can choose from the following optional settings. If changing any of these settings for an existing model, the model must be rebuilt for changes to apply.

Figure 6-6  
Specifying optional settings

**Optional Settings** ▼

Automatically partition data to enable model evaluation on build data source for evaluation and testing

Automatically clean up and prepare data for reliable model building

**Specify inputs to use** ▼

Type	Field name	Target
<input checked="" type="checkbox"/> long	Age	
<input checked="" type="checkbox"/> double	Months as a Customer	
<input checked="" type="checkbox"/> long	Number of Products	
<input checked="" type="checkbox"/> double	RFM Score	

**Specify selection to use** ▼

Find an existing rule | Create a new rule | View selection logic | Export

Rule name	Include/Exclude	Remove

**Automatically partition data, to enable model validation on build data source.** Splits the data into separate subsets or samples for training and testing the model. By building the model on one subset and testing it on another, you can get an idea how it will generalize to other data sets.

**Automatically clean up and prepare data for reliable model building.** Identifies and repairs data issues to make modeling faster, more predictable, and more reliable. Screens fields that are problematic or not likely to be useful, for example by handling missing and extreme values, deriving new attributes when appropriate, and improving performance through intelligent screening and sampling techniques. The first time a model is built with a new data source, the analysis is done to identify issues and fixes, which may slow performance on the first pass only. On subsequent runs, the fixes are applied, but the analysis is not repeated unless the data source changes. This setting may be disabled for some models, including those with custom data preparation settings specified by an expert user.

**Specify inputs to use.** Allows you to select the fields you want to use. Typically these would be those that have some practical relationship to the thing you are trying to predict, such as age or income. If you have a large data set, limiting the number of fields is one way of simplifying the model. If the data contains fields such as customer id or contact number, these would not typically

be useful in modeling and should not be selected. Fields that duplicate other data may also be excluded.

Clicking on a linked input field (an expression) opens the expression viewer for that expression. To edit an expression, see the Data tab. [For more information, see the topic Expression manager in Chapter 4 on p. 47.](#)

**Specify selections to use.** Specifies which records to include or exclude when modeling. You can search for existing rules, or create new ones as appropriate. [For more information, see the topic Defining selection rules in Chapter 5 on p. 53.](#)

In addition, if global selections have been defined, they will be displayed here, and you can specify whether they should also apply during modeling. You can either choose to use all or none of the global selection rules; you cannot choose a subset.

## Segmentation options

Figure 6-7  
Segmentation options

**Segmentation Options** ▼

Minimum segment size: % of previous segment	5.0	%
Absolute value	50	
Maximum number of attributes used in a rule	5	
<input checked="" type="checkbox"/> Allow attribute reuse		
Confidence interval for new conditions	95.0	%

When build interactive models, a number of segmentation options are available. These are in addition to the options available with other types of models.

**Minimum segment size.** These settings dictate the minimum segment size, with the larger of the two values taking precedence. For example, if the percentage value equates to a number higher than the absolute value, the percentage setting takes precedence.

- **Percentage of previous segment.** Specifies the minimum group size as a percentage of records. The minimum allowed setting is 0; the maximum allowed setting is 99.9.
- **Absolute value.** Specifies the minimum group size as an absolute number of records. The minimum allowed setting is 1; there is no maximum setting.

**Maximum number of attributes.** Specifies the maximum number of conditions per segment rule. The minimum allowed setting is 1; there is no maximum setting.

**Allow attribute re-use.** When enabled, each cycle can consider all attributes, even those that have been used in previous cycles. The conditions for a segment are built up in cycles, where each cycle adds a new condition. The number of cycles is defined using the Maximum number of attributes setting.

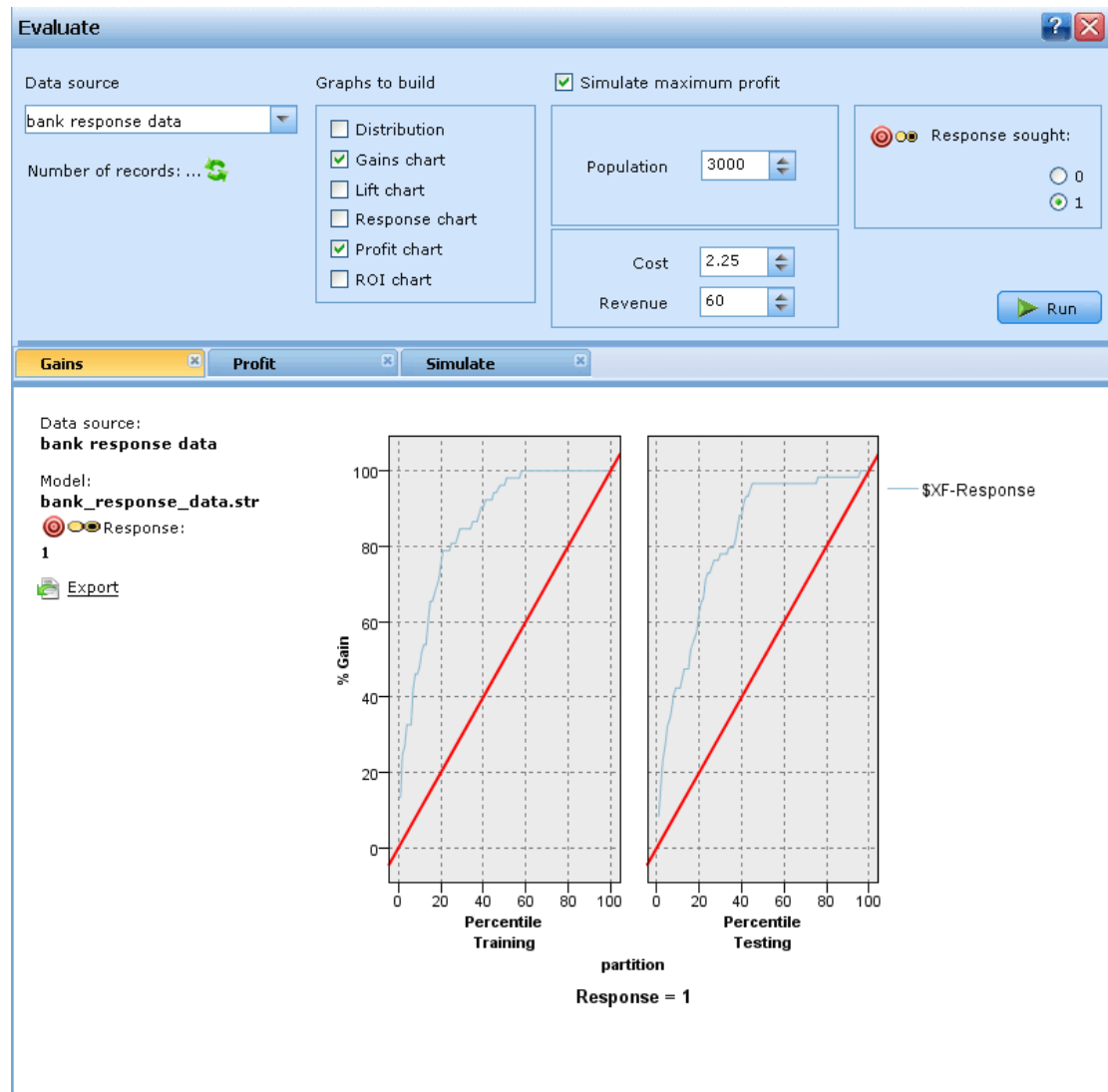
**Confidence interval for new conditions.** Specifies the confidence level for testing segment significance. This setting plays a significant role in the number of segments (if any) that are returned as well as the number-of-conditions-per-segment rule. The higher the value, the smaller the returned result set. The minimum allowed setting is 50; the maximum allowed setting is 99.9.

## Evaluating models

After building or opening a completed model, select Evaluate to obtain distribution, gains, lift, response, profit, and ROI charts, and to simulate the maximum profit possible. This dialog is only available if the selected model is complete.

Figure 6-8

Gains chart



- ▶ In the upper panel, select an evaluation data set. As with model building, this must be an analytical data set for which actual responses are known. (Otherwise you have no way to compare actual responses to those predicted by the model.)
- ▶ Select the graphs you want to build.
- ▶ If simulating profit, select the Simulate maximum profit box and enter the population on which to base the profit calculation. [For more information, see the topic Simulating maximum profit on p. 76.](#)
- ▶ If requesting a profit or ROI chart, or if simulating profit, specify cost and revenue values. These values indicate the cost for each offer, and the amount of revenue you expect to make from each favorable response, respectively.
- ▶ Select the response value that is considered as a “hit.” This must be one of the values for the target field used to build the model, such as *response = true* to indicate a positive or favorable response.
- ▶ Select Run to view the results.

### ***Distribution charts (all targets)***

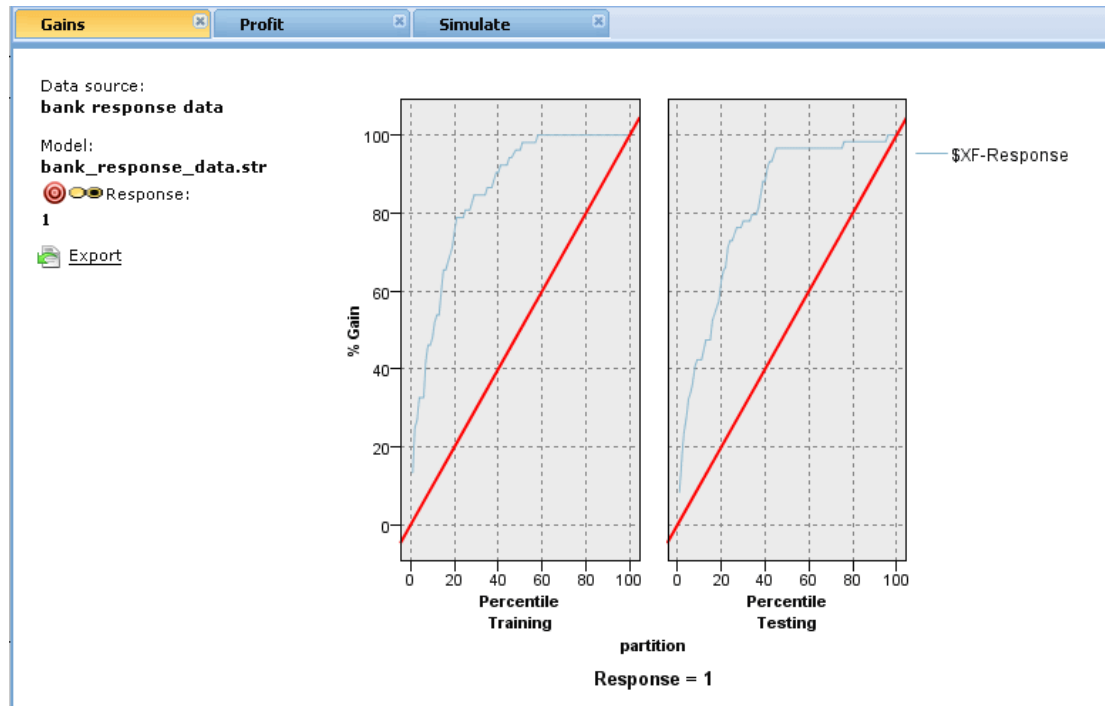
Distribution charts plot observed versus expected values, and are displayed by default when the model completes. The Evaluate dialog box allows you to obtain distribution charts for a data set other than the testing data set. For range targets, the distribution chart is the only chart type available.

For flag and set targets, you can choose from the following additional charts:

### ***Gains charts***

Gains are used to show the gain or “lift” that can be obtained by using the model, and are defined as the proportion of hits in each increment relative to the total number of available hits. The flat diagonal line plots the expected response for the entire sample, if no model were used. In this case, the response rate would be constant, since one person is just as likely to respond as another. To double your yield, you would need to ask twice as many people. The curved line indicates how much you can improve this result by targeting those who are most likely to respond. The steeper the curve, the higher the gain.

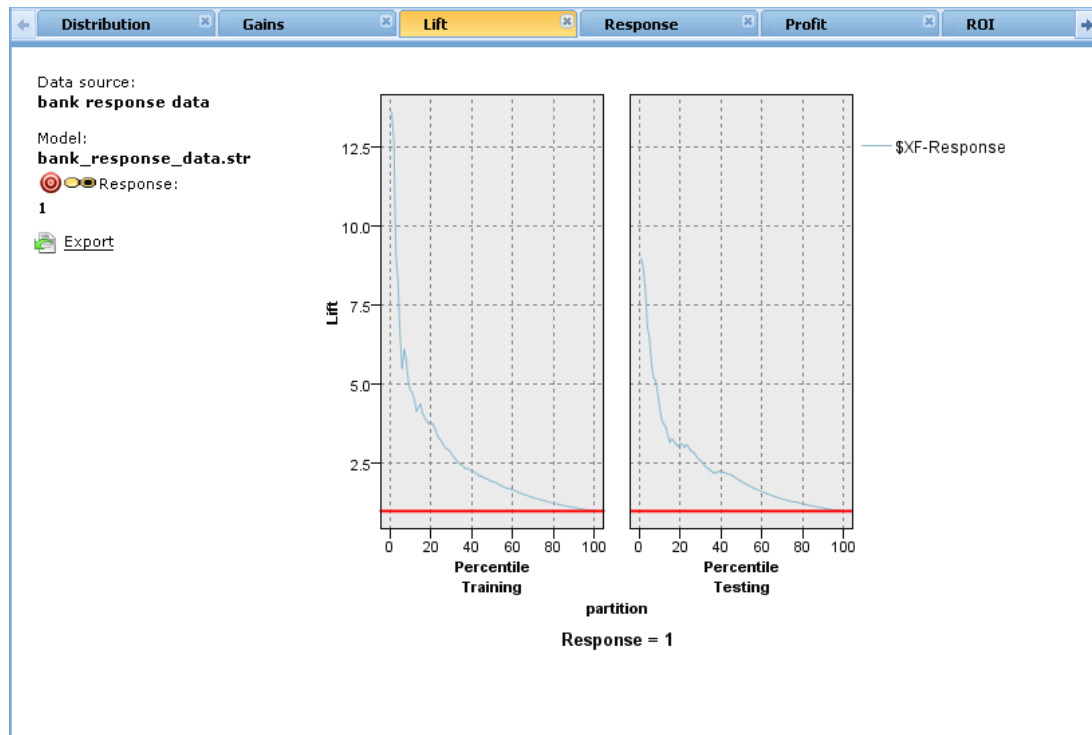
Figure 6-9  
Gains chart



### Lift charts

The lift chart plots the percentage of records in each increment that are hits with the overall percentage of hits in the training data set.

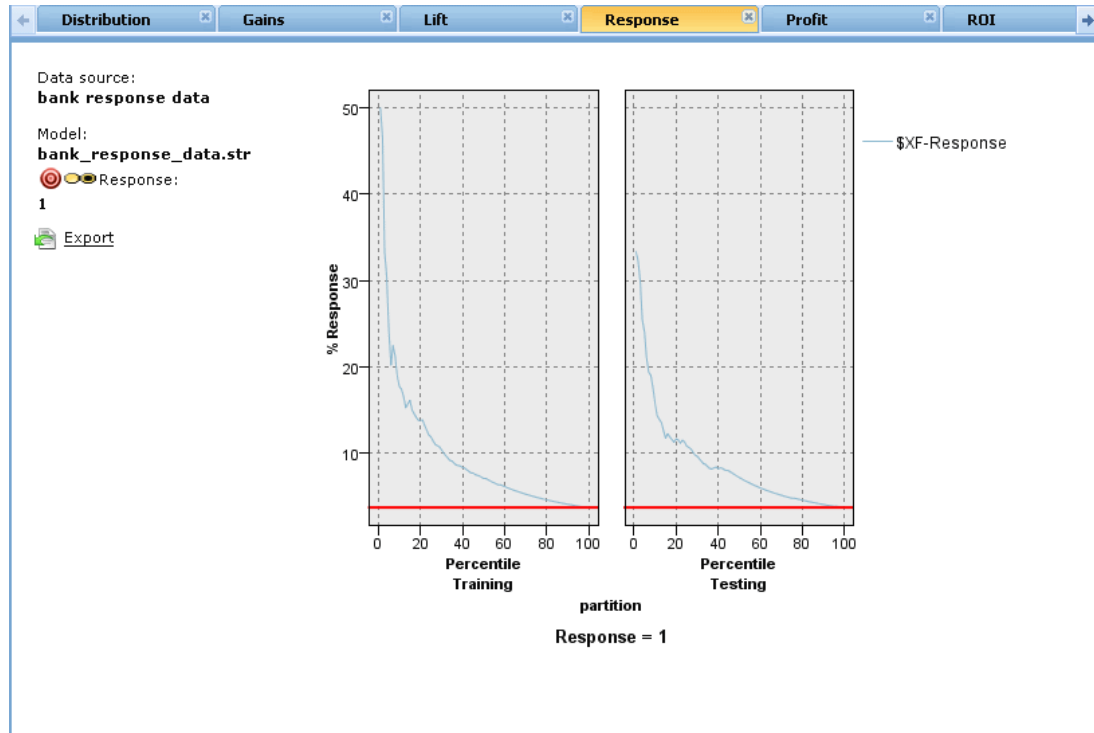
Figure 6-10  
Lift chart



### Response charts

The response chart plots the percentage of records in the increment that are hits.

Figure 6-11  
Response chart

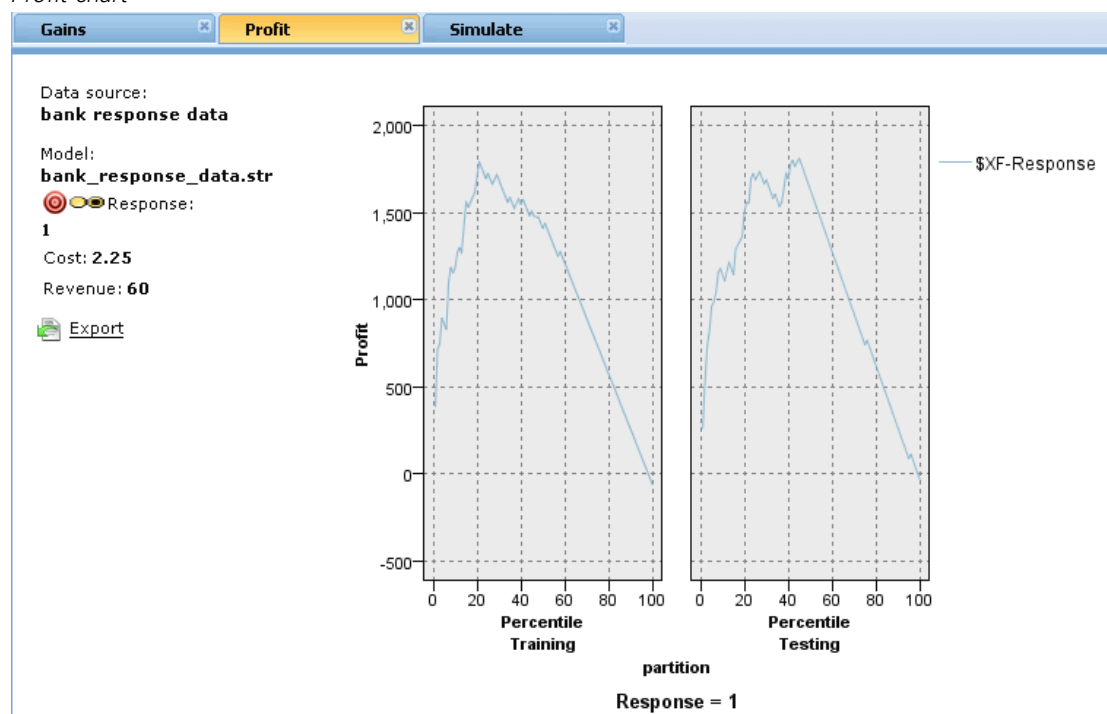


### Profit charts

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. [For more information, see the topic Simulating maximum profit on p. 76.](#)



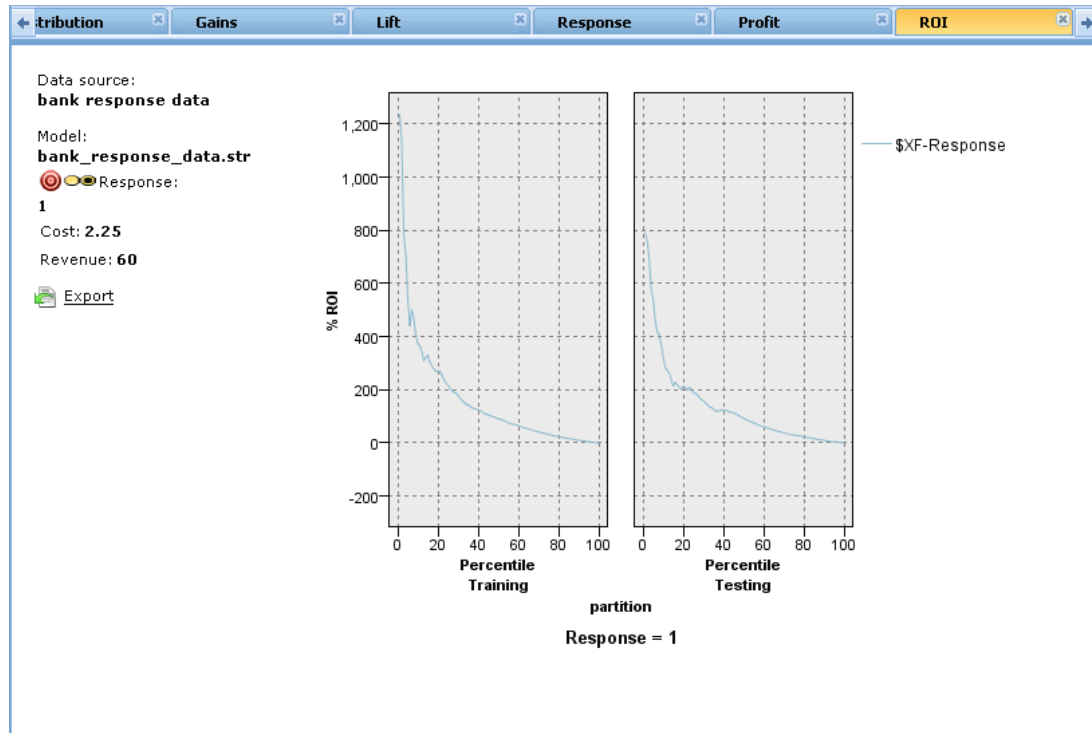
Figure 6-12  
Profit chart



### ROI charts

ROI (return on investment) is similar to profit in that it involves defining revenues and costs. ROI compares profits to costs for each interval.

Figure 6-13  
ROI chart



### ***Simulating maximum profit***

Based on the response rates predicted by the model, you can simulate the maximum profit to be made for a given population. To do this you need to specify cost and revenue values, as well as the size of the population.

Figure 6-14  
Simulation settings

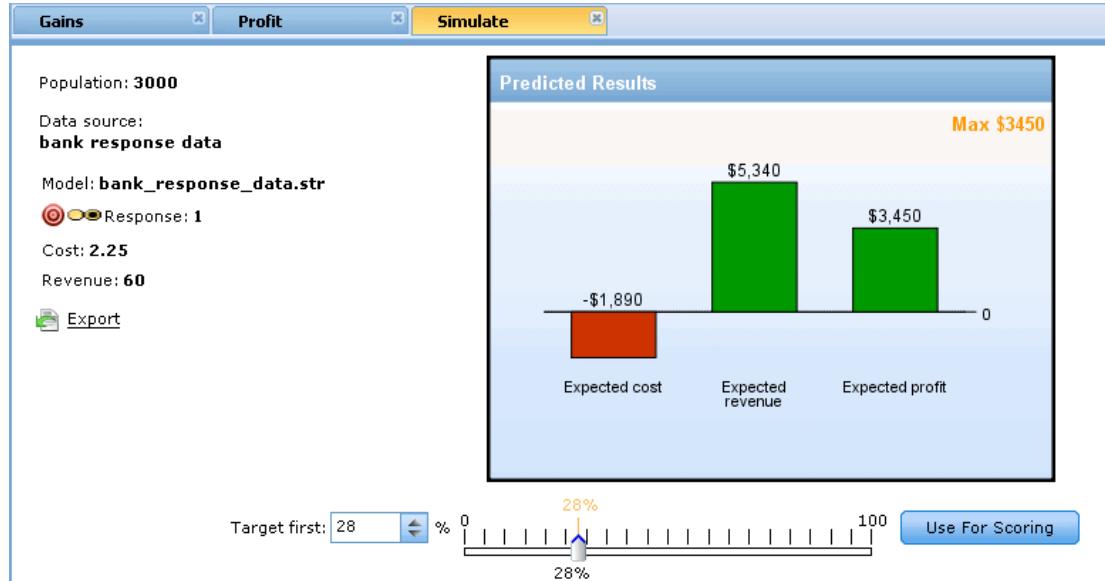


To predict the maximum profit:

- ▶ Specify the population, or total number of records, on which the prediction should be based.  
*Note:* When scoring a model, this is automatically set to the total number of records in the data source or subset.
- ▶ Specify the cost associated with each record. For example, this could be the print and mailing cost, per person, of promotional literature for a campaign.
- ▶ Specify the expected revenue that a positive response would generate. For example, the retail cost of an item in a campaign.
- ▶ Select the response you are interested in.

- Click Run.

Figure 6-15  
Simulated profit prediction



The predicted results graph shows the best result for maximum profit, and identifies the percentage of records you would need to target to achieve this, based on propensity to respond as identified by the model. [For more information, see the topic Evaluating the model in Chapter 2 on p. 10.](#)

Beneath the graph you can move a slider bar from zero to 100% of the records to target to see how this would affect your profit.

When the figures are acceptable, you can choose to use the settings for scoring your records. To do this, click Use for Scoring, the percentage of records to target is displayed in the Top % field in the Propensity Options area of the Score tab. [For more information, see the topic Scoring models to a database table, file, or Cognos BI server in Chapter 7 on p. 84.](#)

### ***Profit comparison***

To verify that the chosen records are a good selection, you can compare the likely profit to be made from those records, a random group of the same percentage of records, and the whole set of records.

Figure 6-16  
Profit comparison

Compare Profit ▼

	Targeted28%	Random28%	Everyone
Offers made	840	840	3000
Expected response	89	31.08	111
Expected response(%)	10.6	3.7	3.7
Expected cost	\$1890	\$1890	\$6750
Expected revenue	\$5340	\$1864.8	\$6660
Expected profit	<b>\$3450</b>	<b>\$-25.2</b>	<b>\$-90</b>

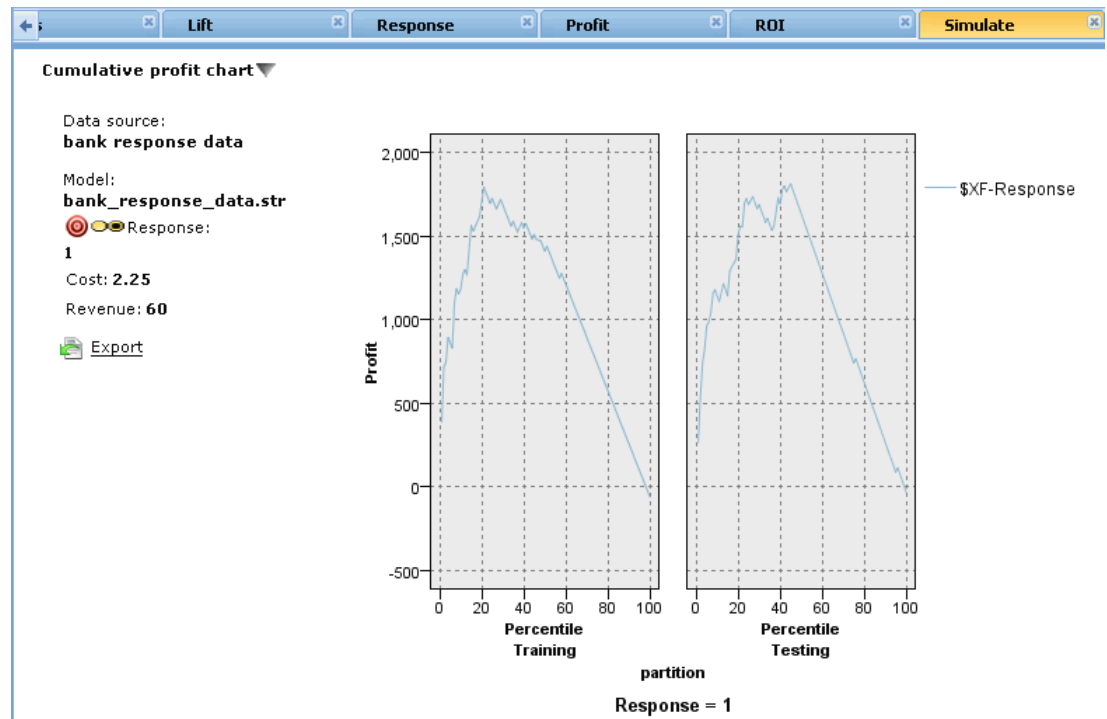
Details shown include the number of records targeted, the likely response rate, costs, income, and overall profit. You can export this information in html format for use in other applications.

**Profit chart**

You can display the predicted cumulative or non-cumulative profit from the selected records as a graph.

**Note:** This graph is generated when you first run the evaluation and is not automatically updated with any changes you make via the slider in the profit simulation section.

Figure 6-17  
Cumulative profit chart



## Testing the model

The Test dialog box allows you to see how one or more sample records will be scored. Results are specific to the context in which the test is run, and may reflect the scores returned by a model or rule. For example, you can look at a handful of customer records and see which customers are likely to respond to a direct mail campaign.

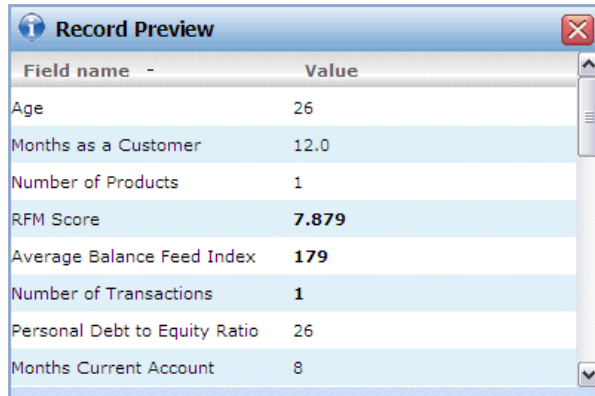
Figure 6-18  
Test results

Preview	Customer ID	\$XF-Response	\$XFRP-Response
	5409	0	0.09
	5477	0	0.18
	5507	0	0.02
	8	0	0.05
	158	0	0.03
	173	0	0.15
	5408	0	0.03

- ▶ On the Modeling tab, click Test; the Test dialog is displayed.
- ▶ Select the data source you want to use, or select Specify custom data in the Records section to enter test records manually.
- ▶ Specify selections to use, if any. For example, you may want to include or exclude certain records from the test. You can search for existing rules, or create new ones as appropriate. [For more information, see the topic Defining selection rules in Chapter 5 on p. 53.](#)
- ▶ If using a data source, specify the number of records you want to return. You can return the first  $N$  records, up to a maximum of 100, read from the top of the data or from a random sample of records.
- ▶ If using custom data, select Specify custom data and click Add custom record. All fields defined in the project data model are listed, allowing you to specify a value for each. Click Save when finished.
- ▶ Under Select Fields to Display, select the fields you want to appear in the test output.
- ▶ Click Run.
- ▶ The test summary displays results for each record. Values for the selected input fields will be displayed.

- ▶ Click the information icon at the beginning of each row to obtain details for that row.

Figure 6-19  
*Test record preview*

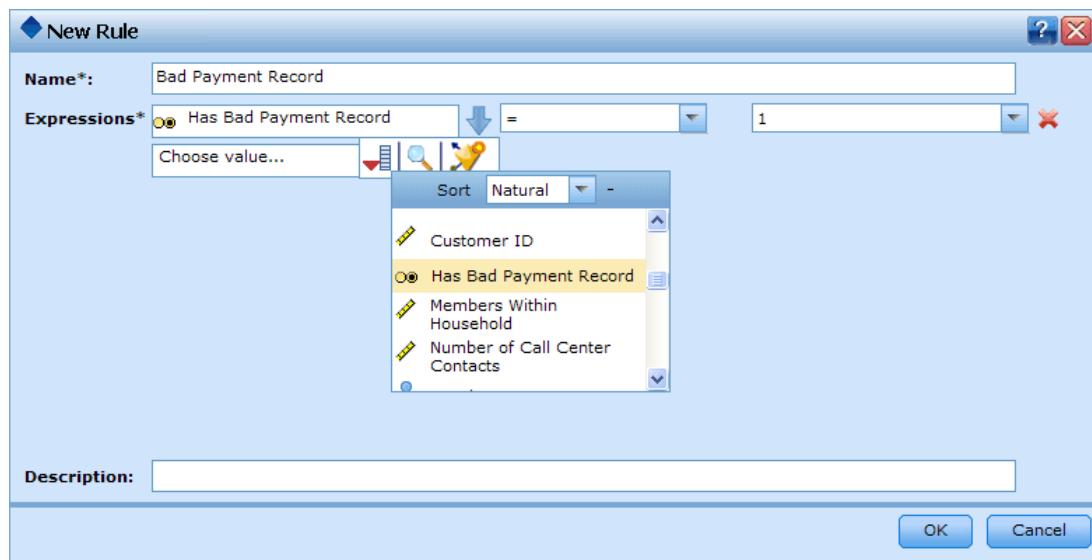


Field name	Value
Age	26
Months as a Customer	12.0
Number of Products	1
RFM Score	<b>7.879</b>
Average Balance Feed Index	<b>179</b>
Number of Transactions	<b>1</b>
Personal Debt to Equity Ratio	26
Months Current Account	8

## Using model scores in applications

To score a model means to apply it to some data or population in order to obtain a result or prediction that can be used as input to decisions. For example, you might score all customers in your database to identify prospects for a direct mail campaign, or score customers one at a time as they contact your call center in order to decide which products or services to offer them. Depending on the application, scoring results can be written to a database table or flat file, or used as inputs to the segment, selection, and allocation rules that drive decisions in an application.

Figure 6-20  
*Creating a new segment rule*



**New Rule**

Name\*: Bad Payment Record

Expressions\*: Has Bad Payment Record = 1

Choose value...

Sort: Natural

- Customer ID
- Has Bad Payment Record**
- Members Within Household
- Number of Call Center Contacts

Description:

OK Cancel



Model scores can be used in the following ways:

- As input to rules. [For more information, see the topic Creating rules in Chapter 5 on p. 50.](#)
- For applications that support batch scoring, model scores can be written to a database table or flat file. [For more information, see the topic Scoring models to a database table, file, or Cognos BI server in Chapter 7 on p. 84.](#)

### **Model output fields**

By convention, the names of the scoring output fields are based on the name of the target field, but with a custom prefix added. For example if the target field is named *Response*, the output fields will have names like *\$XF-Response* and *\$XFRP-Response*. The specific fields depend on the type of model, and the measurement level for the selected target field, as detailed below. [For more information, see the topic Measurement levels in Chapter 4 on p. 36.](#)

**Flag targets.** Automated models with flag targets output the following fields:

- **\$XF-<target>**. Predicted value for each record, reported in terms of the “true” and “false” values defined for the field.
- **\$XFRP-<target>**. Propensity score; indicates the likelihood of the “true” value for each record. Propensity scores differ from confidence scores, which are typically reported in terms of the prediction for that record. For example a “false” prediction with a high confidence will translate to a low propensity as this would indicate a high likelihood *not* to respond.

**Categorical targets.** Automated models with categorical targets (nominal or ordinal) output the following fields:

- **\$XS-<target>**. Predicted value for each record.
- **\$XSC-<target>**. Confidence value associated with the prediction

**Continuous targets.** Automated models with continuous numeric targets output the following fields:

- **\$XR-<target>**. Predicted value for each record.
- **\$XRE-<target>**. Standard error for the prediction.

**Interactive models.** Interactive models (flag or categorical targets only) output the following fields:

- **\$D-<target>**. Predicted outcome for each record, with the “true” value defined for the field used to indicate the desired response, and null indicating any other value.
- **\$DP-<target>**. Probability of desired outcome for each record; matches the probability displayed for the segment in the results table when building the model. [For more information, see the topic Interactive models on p. 65.](#)
- **\$DI-<target>**. Index number used to identify the segment into which the record falls (displayed in the left-most column in the modeling results).
- **\$DRP-<target>**. Propensity score indicating the likelihood of the desired response. Available for flag targets only.

# Scoring Models

## Scoring models to a database table, file, or Cognos BI server

To score a model means to apply it to the data sample or population you are interested in. For example you might use your existing customers to generate a model that predicts which customers are most likely to respond to a campaign, and then use the model to score records for people who are not currently your customers, but whom you might want to include in a promotional mailing.

Figure 7-1  
Score tab

The screenshot shows the 'Score' tab in a software interface. At the top, there are three tabs: 'Data', 'Modeling', and 'Score'. Below the tabs, there is a checkbox for 'Lock project (other users will be unable to edit)' and the text 'bank\_response\_model'. The main area is titled 'Score Now' and contains several sections: 'Data source to score' with a dropdown menu set to 'bank customer data' and a note 'Data preview now available'; 'Select data subset' with a right-pointing arrow; 'Specify output fields' with a right-pointing arrow; 'Destination' with a dropdown menu set to 'File' and a 'File location' text box containing 'bank\_customer\_scores.txt'; 'File type' with a dropdown menu set to 'Flat file'; a 'Map Fields' button; and 'Scoring' with a right-pointing arrow. At the bottom, there are two buttons: 'Preview' and 'Score'. Below the 'Preview' button, there is a text box containing '1000' and the text 'For the first 1000 rows of data Records to score:...' followed by a refresh icon.

The basic steps in scoring a model are:

- ▶ Select the data source, and any subsets of that data, to be scored.
- ▶ Select the information to be output and how it is to be stored.
- ▶ Select the destination for the scored data.
- ▶ Specify which records are to be scored, and display a preview of the expected results.
- ▶ Click Score to run scoring against the model using your settings.

Scores are written to one or more fields which are added to the data. By convention, the names of these fields are based on the target field, but with a prefix added. For example if the target field is named *Response*, the output fields will have names like *\$XF-Response* and *\$XFRP-Response*. [For more information, see the topic Selecting output fields on p. 85.](#)

## Selecting data and subsets

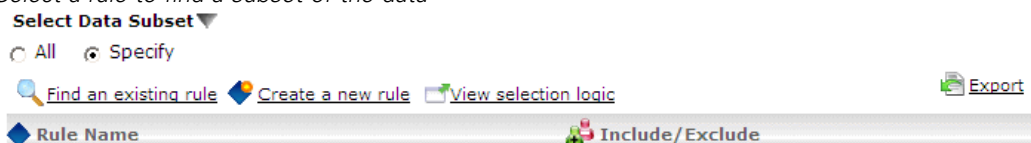
From the Dataset to be scored list, select the required data source.

### Data subsets

If you don't want to score the entire data source, you can select a subset of the data by using an existing rule, or creating a new rule that will only be used for this model. [For more information, see the topic Defining selection rules in Chapter 5 on p. 53.](#)

Figure 7-2

Select a rule to find a subset of the data

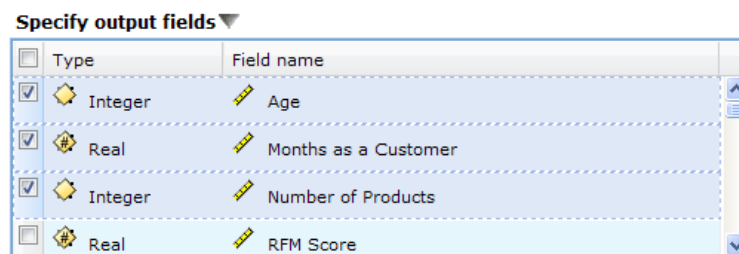


## Selecting output fields

On the Score tab, select Specify Output Fields to choose the fields to include with the scoring output. In addition to the actual scores, you will typically want at least one field that allows you to identify each record, such as a customer id field. Optionally, some or all of the input fields used in modeling may also be included.

Figure 7-3

Selecting output fields



### Model output fields

By convention, the names of the scoring output fields are based on the name of the target field, but with a custom prefix added. For example if the target field is named *Response*, the output fields will have names like *\$XF-Response* and *\$XFRP-Response*. The specific fields depend on the type of model, and the measurement level for the selected target field, as detailed below. [For more information, see the topic Measurement levels in Chapter 4 on p. 36.](#)

**Flag targets.** Automated models with flag targets output the following fields:

- **\$XF-<target>**. Predicted value for each record, reported in terms of the “true” and “false” values defined for the field.
- **\$XFRP-<target>**. Propensity score; indicates the likelihood of the “true” value for each record. Propensity scores differ from confidence scores, which are typically reported in terms of the prediction for that record. For example a “false” prediction with a high confidence will translate to a low propensity as this would indicate a high likelihood *not* to respond.

**Categorical targets.** Automated models with categorical targets (nominal or ordinal) output the following fields:

- **\$XS-<target>**. Predicted value for each record.
- **\$XSC-<target>**. Confidence value associated with the prediction

**Continuous targets.** Automated models with continuous numeric targets output the following fields:

- **\$XR-<target>**. Predicted value for each record.
- **\$XRE-<target>**. Standard error for the prediction.

**Interactive models.** Interactive models (flag or categorical targets only) output the following fields:

- **\$D-<target>**. Predicted outcome for each record, with the “true” value defined for the field used to indicate the desired response, and null indicating any other value.
- **\$DP-<target>**. Probability of desired outcome for each record; matches the probability displayed for the segment in the results table when building the model. [For more information, see the topic Interactive models in Chapter 6 on p. 65.](#)
- **\$DI-<target>**. Index number used to identify the segment into which the record falls (displayed in the left-most column in the modeling results).
- **\$DRP-<target>**. Propensity score indicating the likelihood of the desired response. Available for flag targets only.

## **Selecting the scoring destination**

You can choose to output the scoring data to a database, file, or Cognos BI server. Supported file types include text (\*.txt, \*.csv), Excel, the \*.sav format used by IBM® SPSS® Statistics, SAS, and those supported by IBM® SPSS® Data Collection. [For more information, see the topic File destination on p. 87.](#)

### **Database destination**

When you choose to send scoring output to a database you are prompted to enter further details.

**Figure 7-4**  
Database destination details

**Destination**  
Database

**Database Name**  
dBASE Files

**How are scores stored**  
Create new table

**Table Name**  
Month End Returns

Map fields

- ▶ Enter the Database Name or browse for the one you require.

**Figure 7-5**  
Select the database

**Output Data Destination**

Select a database

Name
dBASE Files
Excel Files
MS Access Database
SQLServer2005

**Login Name**  
swebb

**Password**  
.....

OK Cancel

- ▶ Specify how scores are to be stored. You can choose to create a new table, in which case you are prompted to enter a name for the table. Alternatively, you can either append them to an existing table or overwrite an existing data source, in which case you are prompted to select the relevant table or data source.

When you append to, or overwrite, an existing database you can map the scoring fields to fields in the existing destination. [For more information, see the topic Map scoring fields on p. 92.](#)

## File destination

Scores can be output to several different file types. For each type you either browse for an existing file or create a new file to which the scoring data is added.

When you append to, or overwrite, an existing file you can map the scoring fields to fields in the existing destination. [For more information, see the topic Map scoring fields on p. 92.](#)

### Flat file

**Figure 7-6**  
Flat file destination details

**Destination**  
File

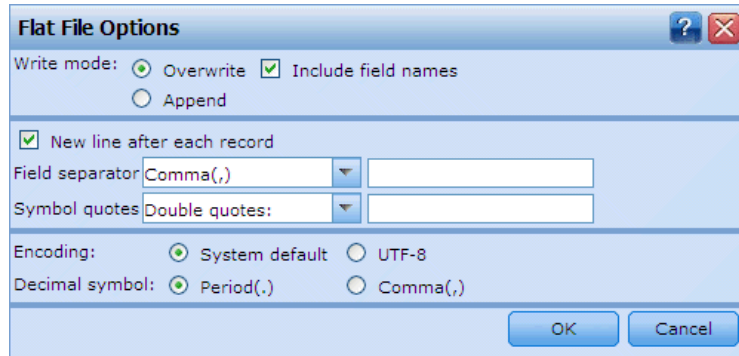
**File location**  
c:\bank\_customer\_scores.txt

**File type**  
Flat file

Map Fields

When you choose to send scoring output to a flat file you can enter further details to control the file contents.

Figure 7-7  
Flat file options



**Write mode.** If Overwrite is selected, any existing data in the specified file will be overwritten. If Append is selected, output will be added to the end of the existing file, preserving any data it contains.

- **Include field names.** If this option is selected, field names will be written to the first line of the output file. This option is available only for the Overwrite write mode.

**New line after each record.** If this option is selected, each record will be written on a new line in the output file.

**Field separator.** Specifies the character to insert between field values in the generated text file. Options are Comma, Tab, Space, and Other. If you select Other, enter the desired delimiter character(s) in the text box.

**Symbol quotes.** Specifies the type of quoting to use for values of symbolic fields. Options are None (values are not quoted), Single ('), Double ("), and Other. If you select Other, enter the desired quoting character(s) in the text box.

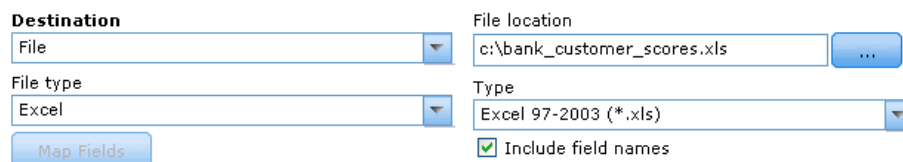
**Encoding.** Specifies the text-encoding method used. You can choose between the system default or UTF-8.

**Decimal symbol.** Specifies how decimals should be represented in the data.

- **Period (.).** The period character will be used as the decimal separator.
- **Comma (,).** The comma character will be used as the decimal separator.

### Excel files

Figure 7-8  
Excel file destination details



**Type.** Select the Excel file type that you are exporting.

**Include field names.** Specifies whether field names should be included in the first row of the worksheet.

### SAS files

Figure 7-9  
SAS file destination details

The screenshot shows a dialog box for SAS file destination details. It has two columns. The left column has a 'Destination' dropdown set to 'File', a 'File type' dropdown set to 'SAS data file', and a 'Map Fields' button. The right column has a 'File location' text box with 'c:\bank\_customer\_scores.sd2' and a browse button (...), a 'Type' dropdown set to 'SAS for Windows/OS2 (\*.sd2)', and an 'Export field names' section with two radio buttons: 'Names and variable labels' (unselected) and 'Names as variable labels' (selected).

**Type.** Select the SAS file format to be created. You can choose from three SAS file formats: SAS for Windows/OS2 (\*.sd2), SAS for UNIX (\*.ssd), or SAS Version 7/8/9 (\*sas7bdat).

**Export field names.** Select options for exporting field names and labels for use with SAS.

- **Names and variable labels.** Select to export both field names and field labels. Names are exported as SAS variable names, while labels are exported as SAS variable labels.
- **Names as variable labels.** Select to use the field names as variable labels in SAS. To prevent possibly creating invalid SAS names, select Names and variable labels instead.

### IBM SPSS Statistics files

Figure 7-10  
IBM SPSS Statistics file destination details

The screenshot shows a dialog box for IBM SPSS Statistics file destination details. It has two columns. The left column has a 'Destination' dropdown set to 'File', a 'File type' dropdown set to 'SPSS Statistics data file', and a 'Map Fields' button. The right column has a 'File location' text box with 'c:\bank\_customer\_scores.sav' and a browse button (...), and an 'Export field names' section with two radio buttons: 'Names and variable labels' (unselected) and 'Names as variable labels' (selected).

**Export field names.** Specifies a method of handling variable names and labels upon export to a IBM® SPSS® Statistics .sav file. Note that any invalid names are automatically corrected by replacing invalid characters.

- **Names and variable labels.** Select to export both field names and field labels. Names are exported as SPSS Statistics variable names, while labels are exported as SPSS Statistics variable labels.
- **Names as labels.** Select to use the field names as variable labels in SPSS Statistics. To prevent possibly creating invalid SPSS Statistics names, select Names and variable labels instead.

### Cognos BI server destination

When you choose to send scoring output to a Cognos BI server you are prompted to enter further details.

*Note:* You can export only relational data, not OLAP data.

Figure 7-11  
Cognos BI server destination details

**Data** **Modeling** **Score**

Hide Score tab from non-administrators

**▼ Score Now**

**Data source to score**  
SEB01 Data preview now available

**Select data subset ▶**

**Specify output fields ▶**

**Destination**

Cognos BI server **Connect** ✓ http://9.119.83.17:9300/p2pd/servlet/dispatch

Data source Cognos8

**Publish package**

Folder /My Folders ...

Package name package3

**Destination ODBC for data**

Database name CognosTest ...

How are scores stored?

**Map Fields**

**Scoring ▶**

**Preview** **Score**

For the first 1000 rows of data Records to score:...

To export data to Cognos BI, you need to specify the following:

- Cognos connection - the connection to the Cognos BI server.
- ODBC connection - the connection to the Cognos data server that the Cognos BI server uses.

The connections must point to the same database, and the username and password for the Cognos server to connect to ODBC must be the same as the ODBC details.

You export the actual data to the data server, and the package metadata to the Cognos BI server.

- ▶ Select the Cognos BI Server Destination and click Connect; you are prompted to enter the server connection details.



Figure 7-12  
Cognos server selection

- ▶ Type the Server URL of the Cognos server from which to import or export data. Contact your Cognos system administrator if you are not sure which URL to use.
- ▶ Select the Mode in which you will connect.
- ▶ To log in as a specific user (for example, as an administrator), select Set Credentials and enter the Cognos namespace, username, and password:
  - Specify the Cognos security authentication provider Namespace used to log on to the server. The authentication provider is used to define and maintain users, groups, and roles, and to control the authentication process.
  - Enter the Cognos User name with which to log on to the server.
  - Enter the Password associated with the specified user name.
- ▶ Alternatively, to log in with no user credentials, in which case you can not fill in the namespace, username, and password fields, select Use Anonymous connection.

**Note:** Some server connections do not allow Anonymous connections.

- ▶ Select the Data source.
- ▶ Type the path and name of the Folder on the Cognos BI server where the export package is to be created. Alternatively, you can browse for the one you require.
- ▶ Type the Package name of the package that is to contain the exported metadata. This must be a new package; you cannot export to an existing package. [For more information, see the topic Selecting Cognos package details in Chapter 4 on p. 45.](#)
- ▶ To select the ODBC Destination, enter the Database name or browse for the one you require.
- ▶ Specify how scores are to be stored. You can choose to create a new table, in which case you are prompted to enter a name for the table. Alternatively, you can either append them to an existing table or overwrite an existing data source, in which case you are prompted to select the relevant table or data source.

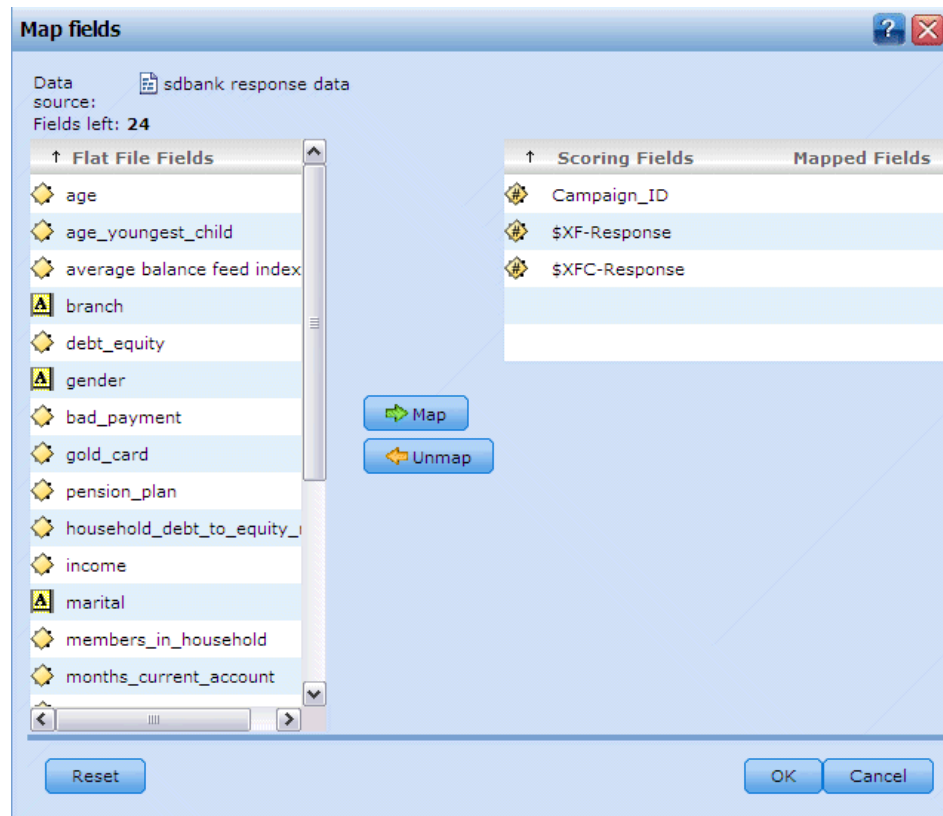
When you append to, or overwrite, an existing database you can map the scoring fields to fields in the existing destination. [For more information, see the topic Map scoring fields on p. 92.](#)

### Map scoring fields

When you append or overwrite scores to an existing database table or file, you may need to map the scoring fields to fields in the existing table or file. Note that the output and associated mapped field must have the same data type.

- When writing scores to an existing database table, all fields must be mapped to existing fields in order for scoring to proceed, whether overwriting or appending the new scores. If necessary, click Map Fields to specify outputs for any fields that remain.
- When writing to an existing file, mapping is only necessary if Append is selected under output file options. If overwriting an existing file, mapping is not required as the new file will simply replace the old one.

Figure 7-13  
Map scoring fields



- ▶ Click Map Fields. A dialog opens, and the system makes a best guess at mapping fields for you. At any point, you can return to the system's best guess by clicking Reset.
- ▶ Select from the available output destinations and click Map to map them to the required scoring fields.
- ▶ When finished, click Save.

## Selecting records to be scored

For models that return propensity scores, you can use these values to select the records to be scored. For example you could score the 30% of customers with the highest propensity to respond, and use these to produce a mailing list. Propensity scores indicate the likelihood of the “true” value for the target, and are available for automated models with flag targets, as well as interactive models. (In the case of interactive models, the selected response is the “true” value and all others are false. For other types of models, these options are not available.

Figure 7-14  
Selecting records based on propensity

**Scoring** ▼

Score all records

Score records based on propensity

**Propensity options**

Top  %

Top  records

Min/Max propensity    Min     Max

There are three ways you can choose to select records based on propensity:

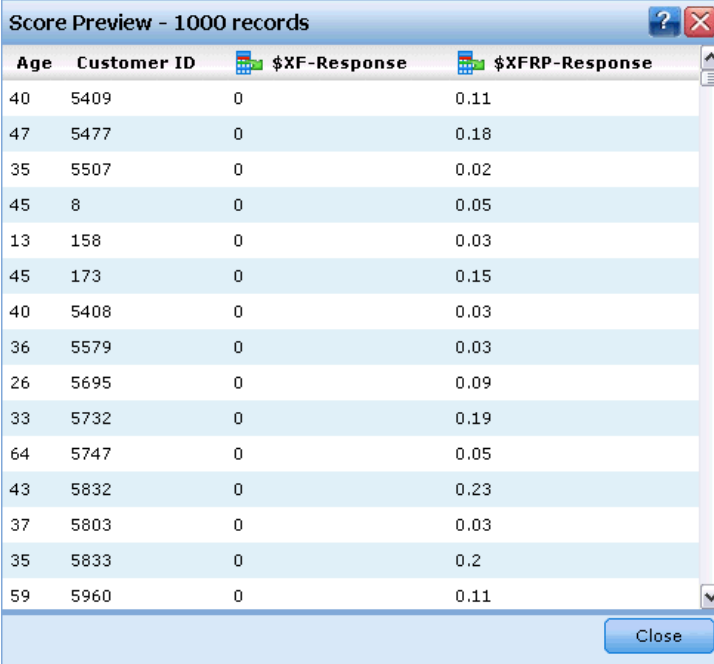
- **The top percentage.** By default this selects the top ten percent. This option enables you to simulate your scoring results based on profit. [For more information, see the topic Simulating maximum profit in Chapter 6 on p. 76.](#)
- **The top number of records.** By default this selects the top 1000 records, where available.
- **By specifying minimum and maximum propensity values.** For example, all records that have a propensity to respond between 75 and 100%.

## Scoring models

Once you have specified your scoring details, you can preview a sample of the model scores. This is especially useful when you have a large dataset since it enables you to quickly check that the scoring results appear as you expect, without having to wait for the entire dataset to be scored.

*Note:* If the data is found to be invalid or incomplete, a warning is displayed when you attempt to preview it.

Figure 7-15  
Data preview



Age	Customer ID	\$XF-Response	\$XFRP-Response
40	5409	0	0.11
47	5477	0	0.18
35	5507	0	0.02
45	8	0	0.05
13	158	0	0.03
45	173	0	0.15
40	5408	0	0.03
36	5579	0	0.03
26	5695	0	0.09
33	5732	0	0.19
64	5747	0	0.05
43	5832	0	0.23
37	5803	0	0.03
35	5833	0	0.2
59	5960	0	0.11

The preview shows data as a table that displays records by row and variables by columns.

### Scoring

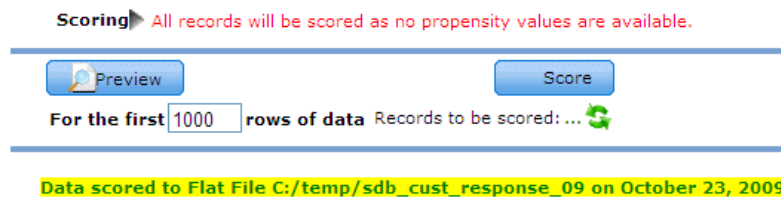
To establish how many records will be scored, click the Refresh icon in the bottom-right corner. This provides a count of the number of records that will be used to build the model, taking into account the total number of records in the data source and any optional settings you specify.

When you press *Score*, a progress bar is displayed across the bottom of the tab; you can stop the scoring at any time whilst this is displayed.

*Note:* If the data is found to be invalid or incomplete, a warning is displayed when you attempt to score it.

Once the data is successfully scored a message informs you where the results have been stored - either in the database or file you specified.

Figure 7-16  
Score location information



# Administering applications

Administrators can control the way business users interact with IBM® SPSS® Decision Management applications. This level of control makes business users' jobs easier so they can more quickly and efficiently use the application to help solve business problems. It also enables administrators to restrict access to certain functionality.

Use IBM® SPSS® Collaboration and Deployment Services Deployment Manager to grant administrative authority to specific users or groups as needed. Only users who are granted the *Decision Management Administration* action have access to the features described in this section.

- ▶ Open Deployment Manager.
- ▶ From the Tools menu, select Server Administration.
- ▶ On the Server Administration tab, connect to your server.
- ▶ Under Users and Groups, select Local User Repository.
- ▶ Click New Group to create a new group for administrators and a new group for business users. For example:
  - Decision Management Administrators.
  - Decision Management Users.

You can also create new users at this time, if desired. While creating the groups, add the appropriate users to each group. For example, members of the administrators group will be granted authority to administer SPSS Decision Management applications at your organization.
- ▶ Go to Roles and click New Role to create a new administrative role and a new business user role. For example:
  - SPSS Decision Management administrator.
  - SPSS Decision Management user.

While creating the new roles, assign them the following actions, at a minimum.

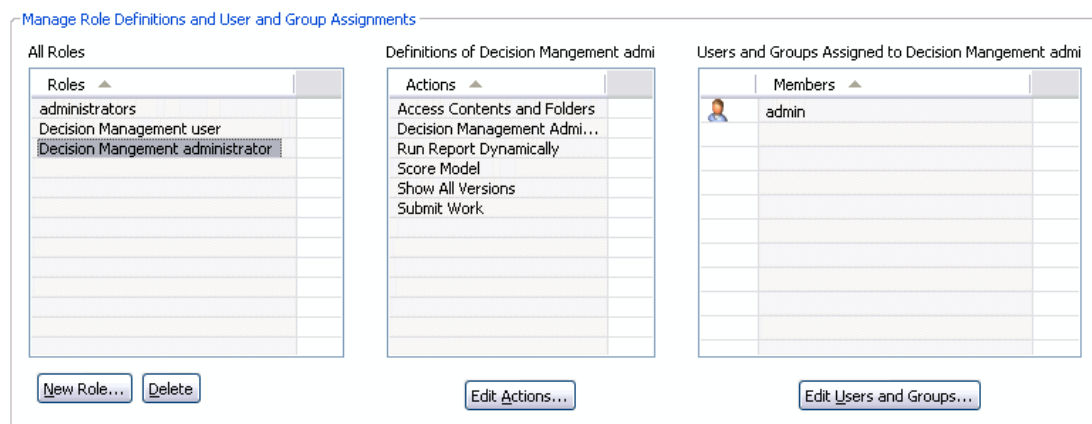
Role	Actions Required
Decision Management administrator	Access Contents and Folders Decision Management Administration Run Report Dynamically Score Model Submit Work Show All Versions
Decision Management user	Access Contents and Folders Run Report Dynamically Score Model Submit Work Show latest* OR Show All Versions*

*\*Note:* Either the Show latest or Show All Versions action is required if users need access to project versions they did not create. Otherwise projects will open in read-only mode if the current user does not have access to the latest version.

- ▶ Select the Decision Management administrator role and click Edit Users and Groups. Add the Decision Management Administrators group you just created.
- ▶ Select the Decision Management user role and click Edit Users and Groups. Add the Decision Management Users group you just created.

**Figure 8-1**

*Decision Management Administration action in IBM SPSS Collaboration and Deployment Services Deployment Manager*



## General options

Certain general options are available to administrators on all tabs of the IBM® SPSS® Decision Management user interface. These options allow administrators to hide or lock tabs from business users.

- The top of each tab has the option Hide <tab name> within the Application, where <tab name> is the name of a tab. This hides the entire tab from the business user. For example, if you don't want users to see the Data tab for an application, log on to the application, go to the Data tab, and select Hide Data tab within the Application.
- The top of each tab has the option Lock all <tab name> options, where <tab name> is the name of the tab. This locks all controls on the tab so they're read-only for the business user. For example, if you want business users to be able to view current data settings but not change them, you can set this option on the Data tab of an application. This setting is also very useful for situations when you want to set certain things up in advance for the business user to simplify their job.
- Administrators can also lock and unlock individual settings on each tab by clicking the padlock icon when available. Clicking the icon locks or unlocks its associated control. Business users will see the locked padlock icon for controls the administrator locks, but will never see an unlocked padlock icon.

Individual items that are locked may also be displayed with a grayed-out background or muted colors to indicate that they are unavailable for selection; an error message is displayed if a user attempts to select them. When an entire tab is locked a message to that effect is displayed at the top of the tab.



## Controlling application shortcuts

The Applications Launch Page provides an easy way for business users to open applications and add custom shortcuts to specific, labeled versions of applications. Administrators can specify which application shortcuts will show up on the launch page for all users. After logging on with administrator authority:

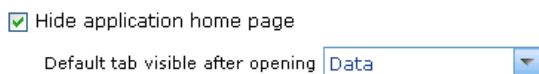
- ▶ Select In default launcher for applications you want all users to see on their launch page.
- ▶ If desired, click the padlock icon on an application shortcut so business users cannot remove it from their launch page. Note that business users can still add and remove other applications shortcuts. Users will see the locked padlock icon instead of the close icon for shortcuts that are locked. [For more information, see the topic Launching applications in Chapter 3 on p. 21.](#)

## Hiding the Home page

Each application provides a step-by-step workflow, as represented by the graphics on the Home page. Clicking a graphic jumps to that section of the user interface. However, business users may not always need access to every step in an application's workflow.

Administrators can hide the Home page from business users. For example, in a certain application business users might only use the Reports tab. In this case an administrator could hide the Home page and all other tabs from business users. So when the business user logs on he is taken directly to the Reports tab and never sees any other tabs.

Figure 8-2  
*Hiding an application home page*



- ▶ On the Home page, select Hide Application home page.
- ▶ In the drop-down, specify which tab to display when users first open the application.

Note that if you subsequently hide this selected tab, the next unhidden tab in the application is displayed.

## Locking data options

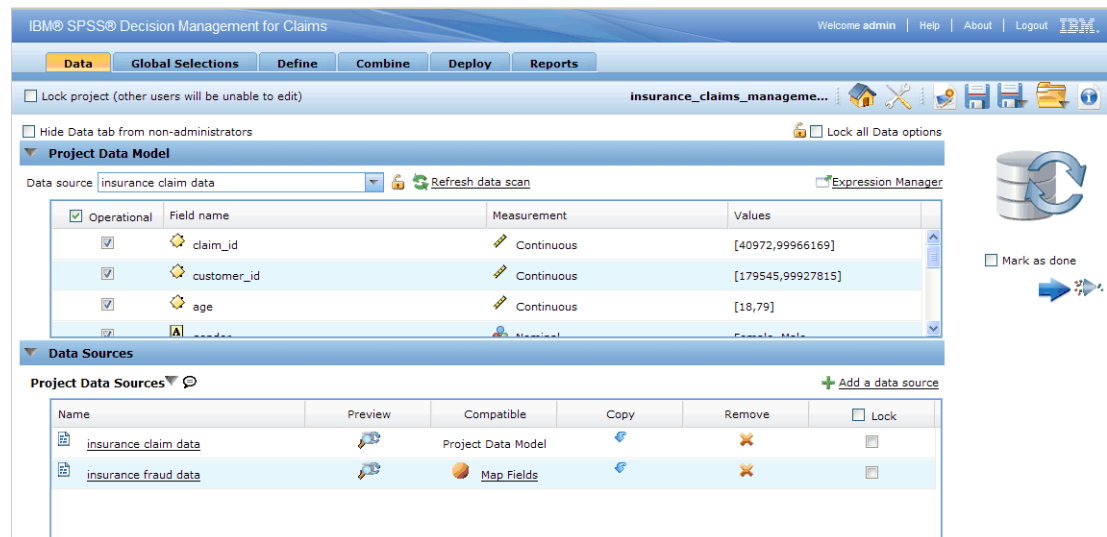
### Data

The Data tab defines the data sets the application uses for analysis, simulation and testing, scoring, or other operational use. These data sources are defined relative to your server installation; hence all paths to data files, odbc sources, and so on are all relative to the server.

As an administrator, you may want to set up some or all data before business users start using their applications. Administrators can:

- Select Lock Datasource when creating a new data source to lock it after it's created.
- Lock and unlock individual data sources by clicking the padlock icon next to a data source in the table, or in the Data Source Editor dialog.
- Set and lock the data model used in the application by selecting a data model in the Project Data Model drop-down and clicking the padlock icon.

Figure 8-3  
Administrator options on the Data tab



Note that business users can copy a locked data source from Project Data Sets to their My Data Sets section, but it remains locked in both sets. [For more information, see the topic Managing data sources in Chapter 4 on p. 33.](#)

## Locking scoring destination options

For applications configured to use the Score Now section (Deploy or Score tab), there is a section that allows business users to specify the destination for storing score data (to database or file). For example, if storing scores in a database, you specify the database name and the method for storing the scores (such as creating a new table in the database).



As an administrator, you can lock the destination options for scoring. For example, you may want scores to only be appended to an existing table in a certain database—instead of giving business users the option to overwrite existing data, append new data to an existing table, create a new table, or store data in a file.

- ▶ To lock all scoring destination options, click the padlock icon next to the Destination drop-down on the Deploy tab. Business users will be able to see the destination options, but not edit them.

## Downloading project metadata for use in creating external rules

Rules created in a Business Rules Management System such as ILOG can be referenced and used in IBM® SPSS® Decision Management applications, provided they have been developed to support the same data model used in the current SPSS Decision Management project, and can be deployed as a Web service for use the application. To accomplish this, the SPSS Decision Management administrator can download a .ZIP file with metadata for the current project. The downloaded file is saved locally on the system used by the administrator to trigger the download.

Figure 8-4  
Download metadata icon



The following files are included in the .ZIP file:

- **XML schema definition (\*.XSD).** Contains definitions of the field types in the data model for the current SPSS Decision Management project. This file can be imported into an external development tool such as ILOG Rules Studio in order to develop rules for use with the current project.
- **Web service description language template (\*.WSDL).** Included to assist in development of Web services that use the data model. The .WSDL file is provided as a template that can be used to build Web services responsible for mediating messages between the SPSS Decision Management application and an external rule service. Details on the mediating Web service can be manually supplied by the integrator.

For information on creating external rules for use in SPSS Decision Management, see the *Application Designers Guide*.

## Sample files

Many IBM® SPSS® Decision Management applications ship with data and other sample files that can be used to replicate the examples shown in the user guides.

### Data

During installation, a number of sample data files are installed under the IBM® SPSS® Modeler Server \Demos directory (for example, C:\Program Files\IBM\SPSS\Modeler\14.2\Demos). These files may be used with prebuilt sample applications, and include:

- *insurance\_claim\_data.txt*

- *insurance\_fraud\_data.txt*
- *bank\_customer\_data.txt*
- *bank\_response\_data.txt*

Sample application files, models, and rules that use these data files assume the default location indicated above. If data files are installed to a different drive or location, the data source paths will need to be updated accordingly.

## **Samples**

A number of sample application files, models, and rules are provided for use with prebuilt IBM® SPSS® Decision Management applications. The samples are packaged in the *Demo* directory on the application DVD, or provided in separate files available for download. Complete the following steps to import sample files for one or more prebuilt applications into IBM® SPSS® Collaboration and Deployment Services Repository.

- ▶ **DVD.** Copy the files from the *\Demo* folder on the DVD to a temporary location, for example *c:\temp\ClaimsManagement\*. If samples are packaged in a *.zip* file, be sure to extract all files before proceeding.

*or*

- ▶ **Downloaded file.** Download the desired sample file for the application, for example *SPSS\_Decision\_Mgmt\_61\_Claims\_demo.zip*. Extract all files before proceeding.
- ▶ Open IBM® SPSS® Collaboration and Deployment Services Deployment Manager and log on to your Content Server connection.
- ▶ In Deployment Manager, create a new folder for the application, for example *ClaimsManagement*.
- ▶ In Deployment Manager, right-click on the folder you created in the previous step and select **Add File to Repository**.
- ▶ Browse to the temporary location where you copied the sample files, for example *c:\temp\ClaimsManagement\*. Select all files in the folder, and then click **Open**. The files will be added to the folder in IBM SPSS Collaboration and Deployment Services Repository. (If demo files were packaged in a *.zip* file, be sure to extract all files before uploading.)

Note that all sample application files, models, and rules assume that data files are installed under the IBM® SPSS® Modeler Server *\Demos* directory (for example, *C:\Program Files\IBM\SPSS\Modeler\14.2\Demos*). If data files are installed to a different drive or location, the data source paths will need to be updated for the local configuration.

# Help and accessibility

## Getting help

Three levels of user-assistance are provided:

- Custom help is provided for each application packaged with IBM® SPSS® Decision Management. To launch the help, click the help icon on any screen or dialog:



- Coach text, which is displayed in a small pop-up window, providing details on the current application or business problem. Coach text provides an additional layer of customized, context-sensitive help that can be easily configured for a specific site or application. Coach text appears throughout the user interface when you click the small coach text icon:



- Standard tool tips, which are provided for individual controls within a page or dialog. To display a tool tip, hover the button, link, or other control.

## Accessibility

Because IBM® SPSS® Decision Management is a browser-based application accessibility options for disabled users, such as those who are visually impaired, are controlled from your browser settings. For details about user interface actions, including keyboard shortcuts, screen readers, and so on, please refer to your browser's help or user guide.

## Help accessibility

An alternate version of the user help system is available to provide additional support for screen readers. To switch to the alternate version you will need to run a batch file to convert the existing help system into a format more efficiently read by a screen reader. In the alternate version the table of contents is on the right and help topics display on the left.

### To enable support for screen readers

- ▶ Navigate to the root directory of the help on the server (for example, *C:\Program Files\IBM\SPSS\Collaboration and Deployment Services\4.2\help\en\DecisionManagement\ClaimsManagment\userhelp*).
- ▶ To switch to the screen reader-friendly format double-click the batch file *format-for-screen-readers.bat* to run it.

To switch back to the default format run the batch file *restore-default-format.bat*.

# ***Sharing streams between IBM SPSS Decision Management and IBM SPSS Modeler***

Models and projects created in IBM® SPSS® Decision Management are saved as stream files, and can be modified and used in IBM® SPSS® Modeler if available. For example, you may want to create a model or project stream using IBM® SPSS® Modeler Advantage or another SPSS Decision Management application, then customize the stream in SPSS Modeler before deploying through SPSS Decision Management. Alternatively, streams created in SPSS Modeler can be opened in SPSS Decision Management, provided deployment settings have been specified as described below.

## ***Opening streams in IBM SPSS Decision Management***

When opening streams in SPSS Decision Management or IBM SPSS Modeler Advantage:

- If deployment type is not specified (none), the stream can be opened but only the Data tab is available.
- If deployment type is Scoring Only, the Score tab may also be available, provided the scoring branch starts with a single data source node of a type supported by IBM SPSS Modeler Advantage or SPSS Decision Management (no merged data sets).
- If deployment type is Model Refresh, the Modeling tab may also be available, provided the modeling branch starts with a single data source node of a type supported by IBM SPSS Modeler Advantage or SPSS Decision Management, and the selected modeling node is either an automated modeling node (supported for automated modeling) or a Decision List node (supported for interactive model building). In addition, a Type node must be present that defines the target field as well as other information used in modeling.

## ***Specifying deployment settings in IBM SPSS Modeler***

In SPSS Modeler, deployment settings are specified in the Stream Properties dialog box, as follows:

- ▶ From the SPSS Modeler menus, choose:  
Tools > Stream Properties > Deployment
- ▶ From the Deployment type list, choose Scoring Only or Model Refresh as appropriate.
- ▶ Select a Scoring node, Modeling node, and Model node as needed.

Select Check to confirm that all required options have been specified, or select Store to store the stream in IBM® SPSS® Collaboration and Deployment Services Repository.

For streams created in IBM SPSS Modeler Advantage or SPSS Decision Management, deployment information is set automatically.

***Tips for using IBM SPSS Modeler streams in IBM SPSS Decision Management***

- It may be easier to create streams using IBM SPSS Modeler Advantage or SPSS Decision Management and then modify in SPSS Modeler, rather than building from scratch using SPSS Modeler. Streams created in this manner will be structured in a manner that allows them to be fully functional in SPSS Decision Management.
- For all streams created in IBM SPSS Modeler Advantage, supernodes are included at certain locations within the branch that can be customized by an expert user. It is strongly recommended that any customizations or additions to the stream be added within these supernodes to ensure they are preserved in the stream and recognized by IBM SPSS Modeler Advantage.
- Any local rules nodes containing an expression rule immediately downstream of each source node will have their fields included in the Expression Manager. Note that local rules can only be created within SPSS Decision Management or IBM SPSS Modeler Advantage and not by SPSS Modeler.
- If there is a Partition node upstream of the modeling node (and downstream of the Type node) then Automatically partition data to enable model evaluation on build data source for evaluation and testing is enabled in IBM SPSS Modeler Advantage, and the check box state is set depending on whether the partition node is enabled or not.
- If there is an Automated Data Preparation (ADP) node downstream of the Type node, then Automatically clean up and prepare data for reliable model building is enabled and the check box state is set depending on whether the ADP node is enabled or not.
- If Rule or Select nodes are present upstream of the modeling node, these are used to populate the Specify selections to use section.
- If stream parameters have been defined (Parameters tab in the Stream Properties dialog box), a Parameters link will be displayed on the Modeling and Score tabs in IBM SPSS Modeler Advantage. The user can click this link to specify these values.

***Launching IBM SPSS Modeler Advantage from IBM SPSS Modeler***

From the SPSS Modeler splash screen, you can choose to create a model with IBM SPSS Modeler Advantage.

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# Index

- accessibility, 101
- administration
  - application shortcuts, 97
  - data options, 98
  - general options, 96
  - home page, 97
  - overview, 95
  - scoring destination options, 98
- administration overview, 95
- annotations
  - adding to rules, 57
- application home page, 24
- application launch page, 97
  - adding applications, 22
  - customizing, 22
- application shortcuts, 21, 97
- application URL, 21
- applications
  - launching, 3
  - testing, 80
- applications launch page, 21
- artifacts for sample applications, 99
- automated models, 62
  
- bank\_customer\_data.txt, 4
- bank\_response\_data.txt, 4
- building models
  - target field, 8
- business rules, 50
  
- categorical data, 36
- charts in models, 63
- coach text, 101
- Cognos BI server destination in models, 89
- Cognos BI sources, 44
- comma, 39
- continuous data, 36
- controlling
  - general options, 96
- controlling application shortcuts, 97
- currency formats, 26
- customer data, 4
  
- data files, 99
- data for sample applications, 99
- data options, 98
- data selection in models, 85
- data sources
  - Cognos BI, 44
  - database, 42
  - defining, 4, 33, 37
  - Excel, 40
  - expression manager, 27
  - file sources, 38
  - IBM SPSS Collaboration and Deployment Services
    - Enterprise View, 43
  - IBM SPSS Statistics, 41
  - input fields, 47
  - mapping fields, 49
  - measurement levels, 36
  - previewing, 35
  - text-based, 38
- data types, 36
- database destination in models, 86
- database sources, 42
- date formats, 26
- decimal symbol, 39
- delimiters, 39
- demo artifacts, 99
- direct mail example, 3
- distribution chart, 63
- distribution charts, 71
  
- evaluating models, 10
- evaluation of models, 70
- Excel data files, 40
- exclude rules, 53
- exporting rules, 54
- expression manager, 47
- external rules
  - downloading project metadata, 99
  - using in applications, 57
  
- fields
  - defining, 4
  - delimiters, 39
  - deriving, 47
  - mapping, 49
  - target, 4
- file destination in models, 87
- files for sample applications, 99
- flag data, 36
  
- gains charts, 10, 71
- gallery
  - long-running jobs, 24
  - unfinished work, 24
- general options, 96
- getting help, 101
  
- help, 101
  - accessibility, 101
  - alternate system, 101
  - for screen readers, 101
  - hiding the home page, 97
  - home page, 24, 97



- IBM SPSS Collaboration and Deployment Services
  - Enterprise View data sources, 43
- IBM SPSS Collaboration and Deployment Services Repository
  - saving to, 28, 30
- IBM SPSS Modeler Advantage
  - example, 3
- IBM SPSS Statistics data files, 41
- ILOG rules
  - downloading project metadata, 99
  - using in applications, 57
- include rules, 53
- input fields, 4
  - defining, 47
  - mapping, 49
- interactive models, 65, 69
  
- keywords, 28
  
- labeling versions, 30
- launch page, 3, 21, 97
  - adding applications, 22
  - customizing, 22
- legal notices, 104
- lift charts, 72
- locking data options, 98
- locking projects, 32
- locking scoring destination options, 98
  
- map fields, 92
- map scoring fields, 92
- mapping fields, 49
- measurement levels, 36
- models
  - automated, 62
  - building, 8, 61
  - charts, 63
  - Cognos BI server destination selection, 89
  - data selection, 85
  - database destination selection, 86
  - evaluating, 10, 70
  - file destination selection, 87
  - interactive, 65
  - map scoring fields, 92
  - optional settings, 68–69
  - output field selection, 85
  - predictive, 61
  - record selection, 93
  - restrict time building, 27
  - results, 63
  - score destination selection, 86
  - scoring, 18, 84, 93
  - setting preferences, 27
  - simulating profit, 76
  - target field, 8, 61
  - testing, 17, 81
  - using in rules, 50
  - my data sources, 33
- nominal data, 37
  
- online help, 101
  - accessibility, 101
  - alternate system, 101
  - for screen readers, 101
- ordinal data, 37
- output fields in models, 85
- overview
  - administration, 95
  
- predictive models, 61
- predictor importance chart, 63
- preferences, 25
- previewing data, 35
- profit
  - maximizing, 3
  - simulating, 10
- profit charts, 10, 74
- profit simulation in models, 76
- project data model, 4, 33
- project data sources, 33
  
- record selection in models, 93
- response charts, 73
- response data, 4
- ROI charts, 75
- rules, 50
  - annotations, 57
  - creating, 50
  - exporting, 54
  - external, 57, 99
  - ILOG, 57, 99
  - reusing, 54, 57, 99
  - segment, 50
  - selection, 53
  - selection logic, 53
  - shared, 54, 57, 99
  - using models with, 50
  
- sample applications, 100
- sample data, 99
- sample files, 99
- saving files, 28, 30
- score destination in models, 86
- scoring destination options, 98
- scoring models, 18, 84, 93
  - Cognos BI server destination, 89
  - database destination, 86
  - file destination, 87
  - map fields, 92
  - selecting data, 85

*Index*

- selecting output fields, 85
- selecting scoring destination, 86
- screen readers, 101
- segment rules
  - using models with, 50
- selection rules, 53
- shared rules, 54
- shortcuts
  - application, 21
- simulation
  - default date, 27
- simulation date, 27
- simulation of profit in models, 76
  
- target field, 4
  - building models, 8, 61
- testing a model, 81
- testing an application, 80
- testing models, 17
- text-based data files, 38
- time formats, 26
- tool tips, 101
- trademarks, 105
- typeless data, 37
  
- unfinished items
  - gallery, 24
- URL
  - application, 21
- user preferences, 25
  
- variable importance chart, 63
- version labels, 30
  
- zip files for sample applications, 100