



# SAS® GLOBAL FORUM 2016

IMAGINE. CREATE. INNOVATE.



Case Study Using SAS® Forecast Studio:  
Daily Taxi Data from New York City - 4001

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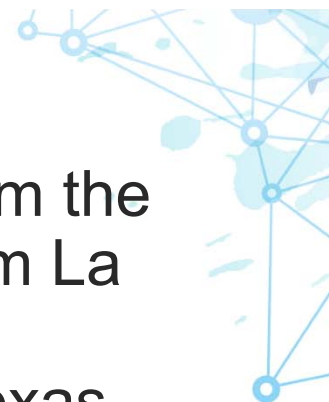
Simon Sheather  
Professor & Academic Director  
Texas A&M University

#SASGF



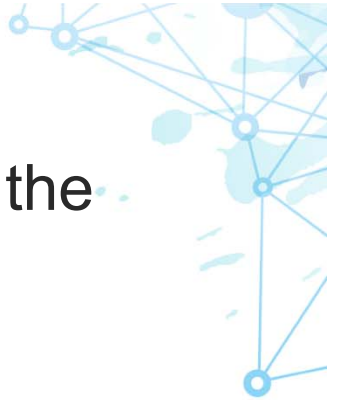
## About the presenter

Simon Sheather received his BSc (Hons) degree from the University of Melbourne and a Ph.D. in Statistics from La Trobe University. Currently Simon is Professor and Academic Director of the Statistics Department at Texas A&M University. Previously he was a faculty member at the Australian Graduate School of Management at the University of New South Wales. His research interests are in the fields of flexible regression methods for big data, and smoothing methods in nonparametric statistics. Simon works with industry developing practical predictive models for big data.



## SAS® Forecast Studio 13.2

- Automatically fits time series models which can at the same time
- Detect and allow for outliers and level shifts
- Determine which model(s) optimize the chosen fit criterion



# Outline

- Use SAS® Forecast Studio to develop times series models for New York City Yellow cabs
  1. Daily taxi fare revenue
  2. Daily taxi trips

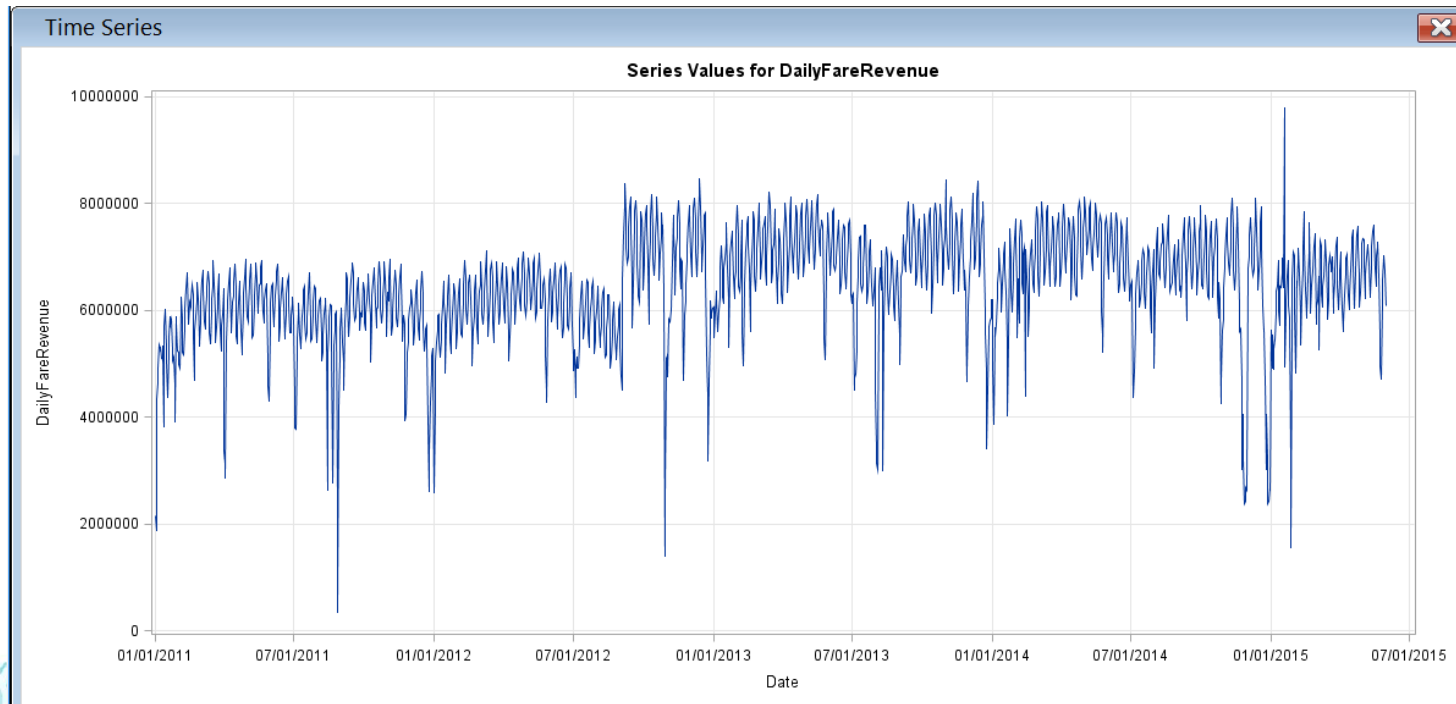


# Part 1. Daily taxi fare revenue in New York City


- We wish to develop a time series model for the daily taxi fare revenue by Yellow Cabs in New York City using publicly available data from 1/1/2011 until 5/31/2015 in order to both
- Predict daily taxi fare revenue for June 2015
- Estimate the impact of events including
  - Price increase
  - Holidays
  - One of events such as hurricanes



# Daily taxi fare revenue in New York City



# Daily taxi fare revenue and trip data in New York City



**Taxi & Limousine Commission**

Online Transactions (LARS) Printer Friendly Newsletter Sign-up Translate

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**TLC Trip Record Data**

This dataset includes trip records from all trips completed in yellow and green taxis in NYC in 2014 and select months of 2015. Records include fields capturing pick-up and drop-off dates/times, pick-up and drop-off locations, trip distances, itemized fares, rate types, payment types, and driver-reported passenger counts. The data used in the attached datasets were collected and provided to the NYC Taxi and Limousine Commission (TLC) by technology providers authorized under the Taxicab & Livery Passenger Enhancement Programs (TPEP/LPEP). The trip data was not created by the TLC, and TLC makes no representations as to the accuracy of these data.

**2015**

January	Yellow	Green
February	Yellow	Green
March	Yellow	Green
April	Yellow	Green
May	Yellow	Green
June	Yellow	Green

**2014**

January	Yellow	Green
February	Yellow	Green
March	Yellow	Green
April	Yellow	Green
May	Yellow	Green
June	Yellow	Green
July	Yellow	Green
August	Yellow	Green
September	Yellow	Green
October	Yellow	Green
November	Yellow	Green
December	Yellow	Green

Online Transactions (LARS)

Source: [http://www.nyc.gov/html/tlc/html/about/trip\\_record\\_data.shtml](http://www.nyc.gov/html/tlc/html/about/trip_record_data.shtml)



# New York City fare increase and weather events

The New York Times

## As of Tuesday, Yellow Cabs Can Charge Higher Rates

By MATT FLEGENHEIMER SEPT. 3, 2012



Email



Share



Tweet



Save

Yellow taxis may begin charging more on Tuesday, ushering in an approved fare increase for riders, whose rates have remained virtually unchanged since 2006.

The city's [Taxi and Limousine Commission](#) announced late Monday that operators of yellow taxis would be allowed to put the new fares — which increase rates by about 17 percent — into effect as of 12:01 a.m. on Tuesday, once they have recalibrated their meters and updated external markings.

## Storm Barrels Through Region, Le

By JAMES BARRON OCT. 29, 2012



Email



Share



Tweet



Save

[Hurricane Sandy](#) battered the mid-Atlantic region on Monday, its powerful gusts and storm surges causing once-in-a-generation flooding in coastal communities, knocking down trees and power lines and leaving more than five million people — including a large swath of Manhattan — in the rain-soaked dark. At least seven deaths in the New York region were tied to the storm.

## New York Today: Updates on the Winter Storm

By ANDY NEWMAN JANUARY 27, 2015 5:58 AM 25 Comments

The great blizzard of 2015 [did not turn out to be a blizzard](#) in New York City. Only 7.8 inches had fallen in Central Park [as of 7 a.m.](#) and not much more after that.

And so the region gradually stirred back to life. The travel ban was lifted in the city and across New Jersey and southern New York at 7:30 a.m. New York City's subway system resumed operating at 9 a.m.



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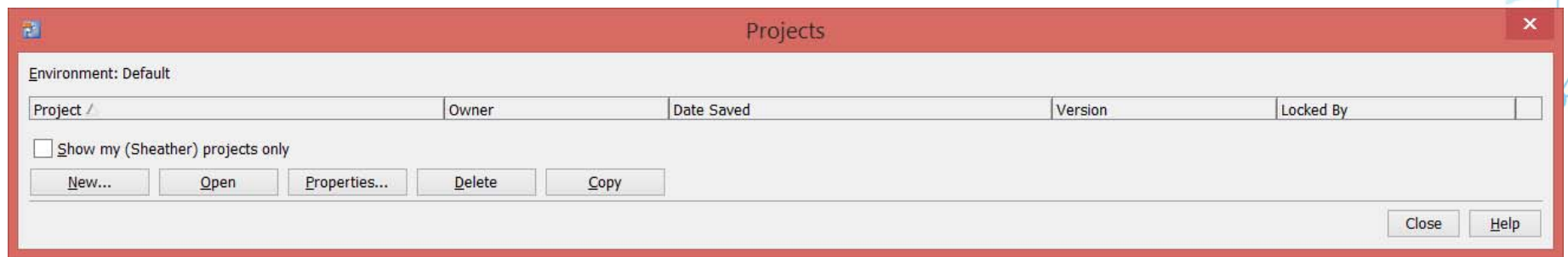
**Hurricane Irene**  
News blog

Hurricane Irene hits New York - Sunday  
28 August 2011

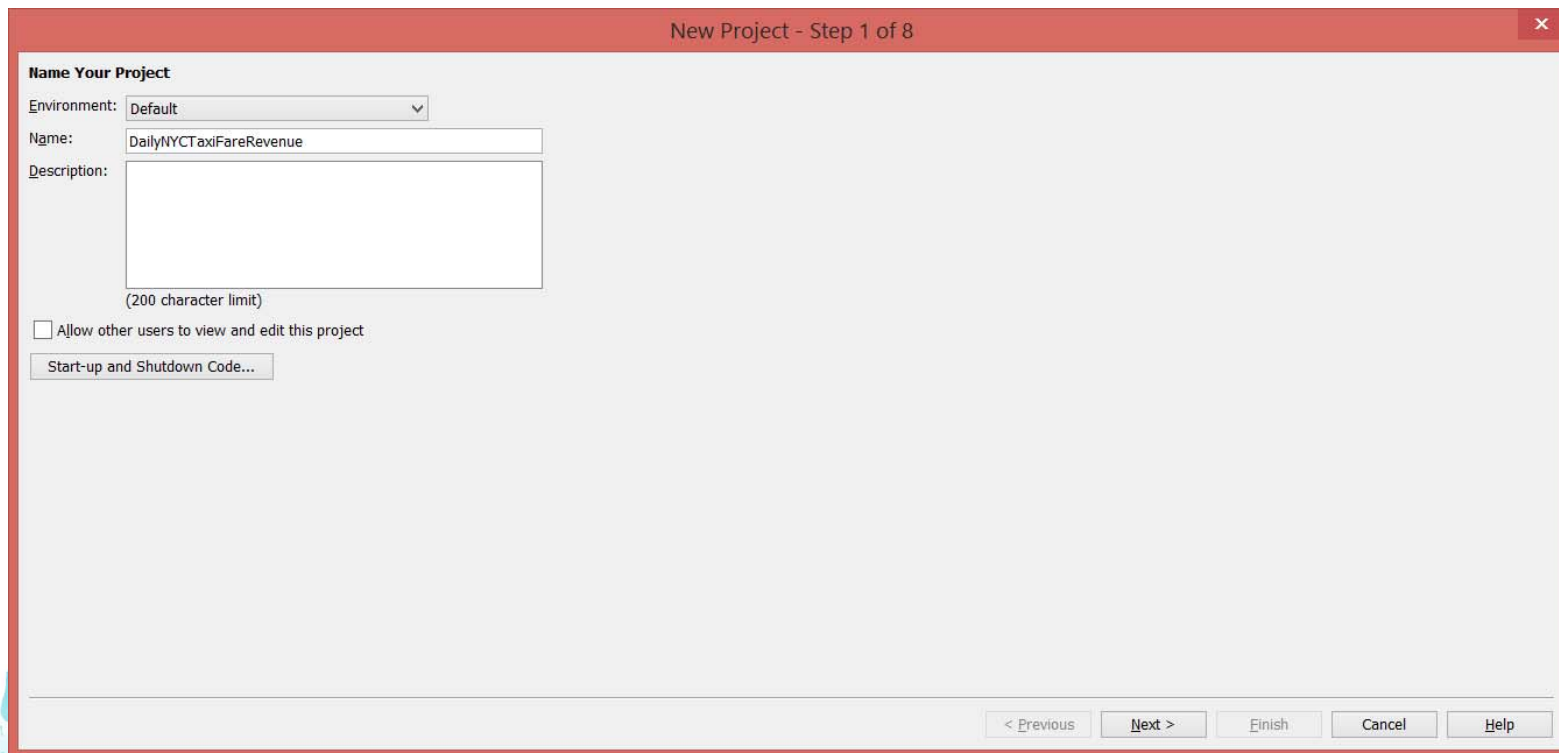




# Open SAS Forecast Studio and click on New



# Enter a name for your project and click on Next



The image shows a 'New Project - Step 1 of 8' dialog box. It has a title bar with a close button. The main area is titled 'Name Your Project'. It contains a dropdown menu for 'Environment' set to 'Default', a text field for 'Name' containing 'DailyNYCTaxiFareRevenue', and a larger text area for 'Description'. Below the description area is a checkbox labeled 'Allow other users to view and edit this project' which is unchecked. There is also a button labeled 'Start-up and Shutdown Code...'. At the bottom right, there are five buttons: '< Previous', 'Next >', 'Finish', 'Cancel', and 'Help'.

New Project - Step 1 of 8

**Name Your Project**

Environment: Default

Name: DailyNYCTaxiFareRevenue

Description:

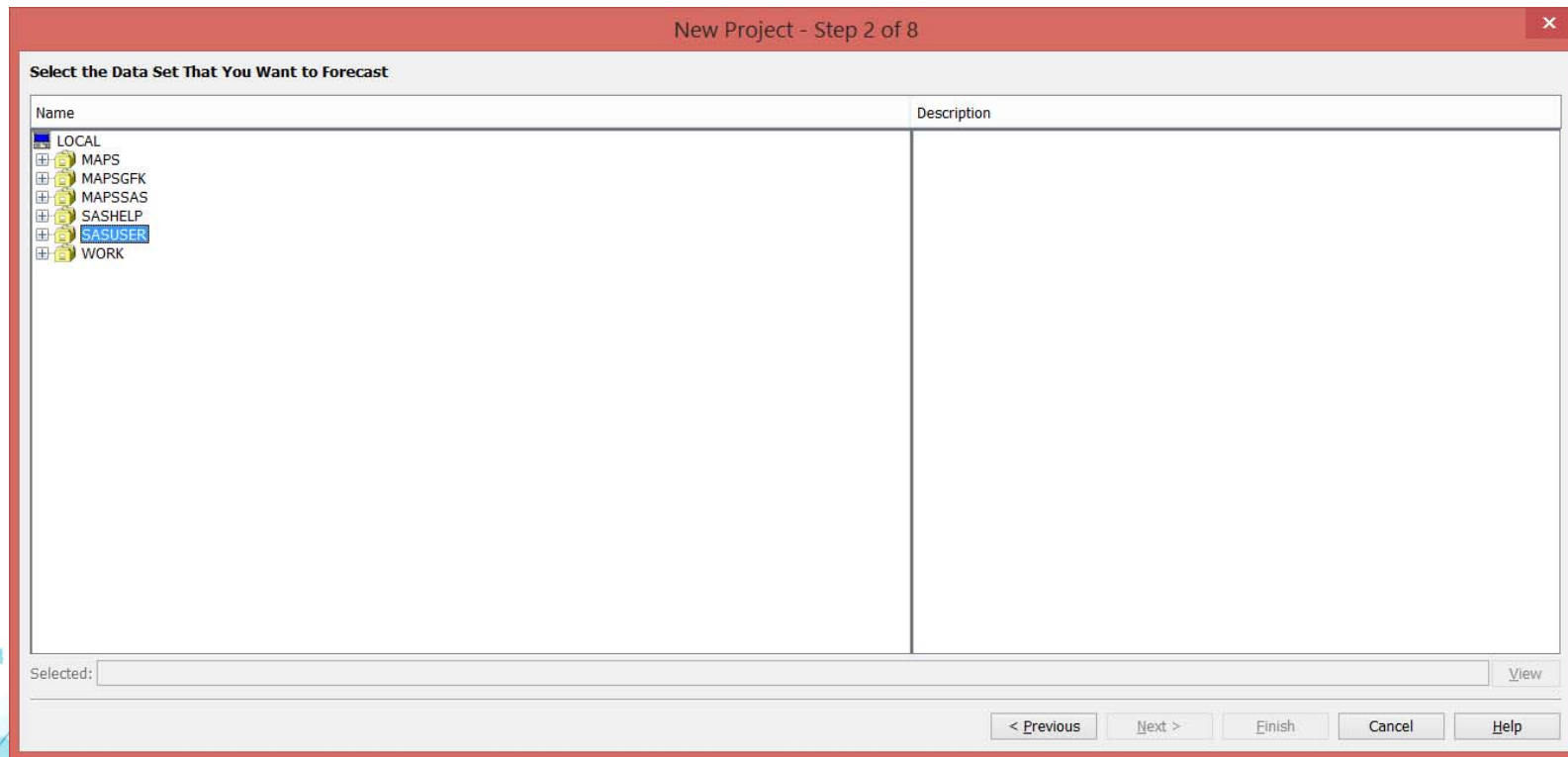
(200 character limit)

☐ Allow other users to view and edit this project

Start-up and Shutdown Code...

< Previous Next > Finish Cancel Help

# Double click on SASUSER



# Select the SAS data set and click on Next

New Project - Step 2 of 8

Select the Data Set That You Want to Forecast

Name	Description
SASUSER	Library Name: SASUSER
AIRLINE_PASSENGERS_FROM_2002	Dataset Label:
AMAZONQUARTERLYNETSALES	Creation Date: Mar 21, 2016 10:26:51 AM
APPLEQUARTERLYNETSALES	Modified Date: Mar 21, 2016 10:26:51 AM
APPLEQUARTERLYNETSALESTHRU2015	Number of observations: 1,612
APPLE_SALES_FROM_1994	Number of variables: 3
APPLE_SALES_FROM_1994_LOGS	Size: 131,072 KB
ARIMAPDQ	
AUDUSD\$INCE2005	
AUSTINAIRLINEPASSENGERS	
AUSTINAIRPORTAIRLINEPASSENGERSFR	
CHARGEOFFDELINQUENCYRATES	
CHIPOTLEARNINGSSTORES	
CHIPOTLE_QUARTERLY_EARNINGS	
CHUCK_NORRIS_PROJECT_PROPOSAL_V2	
CO2_MONTHLY_TEMPERATURE_ANOMALY_	
COSTCONETSALESTILL2015Q4	
CRUDE_OIL_AND_GAS_PRICES_SINCE_2	
DAILYNYCTAXIFAREVENUE	
DAILYTAXITRIPSFROM2011THRMAY15	
DAILYTAXITRIPSFROM2011TIMEORDER	
DAILYTAXITRIPSTHRUMAY15_EVENTS	
DAILYTAXITRIPSTHRUMAY15_EVENTS2	
EUROUSD\$INCE2005	
GOLDENGATEMONTHLYRECREATIONALVIS	
GOLDMANSACHSEARNINGS	
GOLD_DAILY_USD	
GRANDCANYONMONTHLYRECREATIONALVI	

Selected: SASUSER::DAILYNYCTAXIFAREVENUE [View](#)

< Previous Next > Finish Cancel Help

Click on Next since there are no Classification (BY) variables

New Project - Step 3 of 8

**Specify Classification (BY) Variables and Whether to Forecast a Hierarchy**

Available variables:

- Date
- DailyFareRevenue
- TaxiTrips

Classification (BY) variables selected:

☐ Forecast a hierarchy using the above classification (BY) variables:

☐ Reconcile the hierarchy

< Previous   Next >   Finish   Cancel   Help

Select the Time ID variable (in this case Date)  
and click on Next

New Project - Step 4 of 8

**Specify the Properties of the Time Dimension of Your Data**

Time ID variable:

Interval:

Multiplier:

Shift:

Seasonal cycle length:

Format: MMDDYY10. (e.g. 03/21/2016)

< Previous   Next >   Finish   Cancel   Help

Select the Y variable (in this case DailyFareRevenue) and choose Dependent for its role then click on Next

New Project - Step 5 of 8

**Assign Roles to Variables in Your Data**

You must specify at least one dependent variable.

Variable	Role	Accumulation	Usage in System-Generated Models
DailyFareRevenue	Dependent	Sum of values	
TaxiTrips	None		

Adjustments...

< Previous   Next >   Finish   Cancel   Help



Click on Next (since there are no missing values)

New Project - Step 6 of 8

**Specify How to Prepare the Data for Each Forecast**

Select how to interpret embedded missing values: Missing

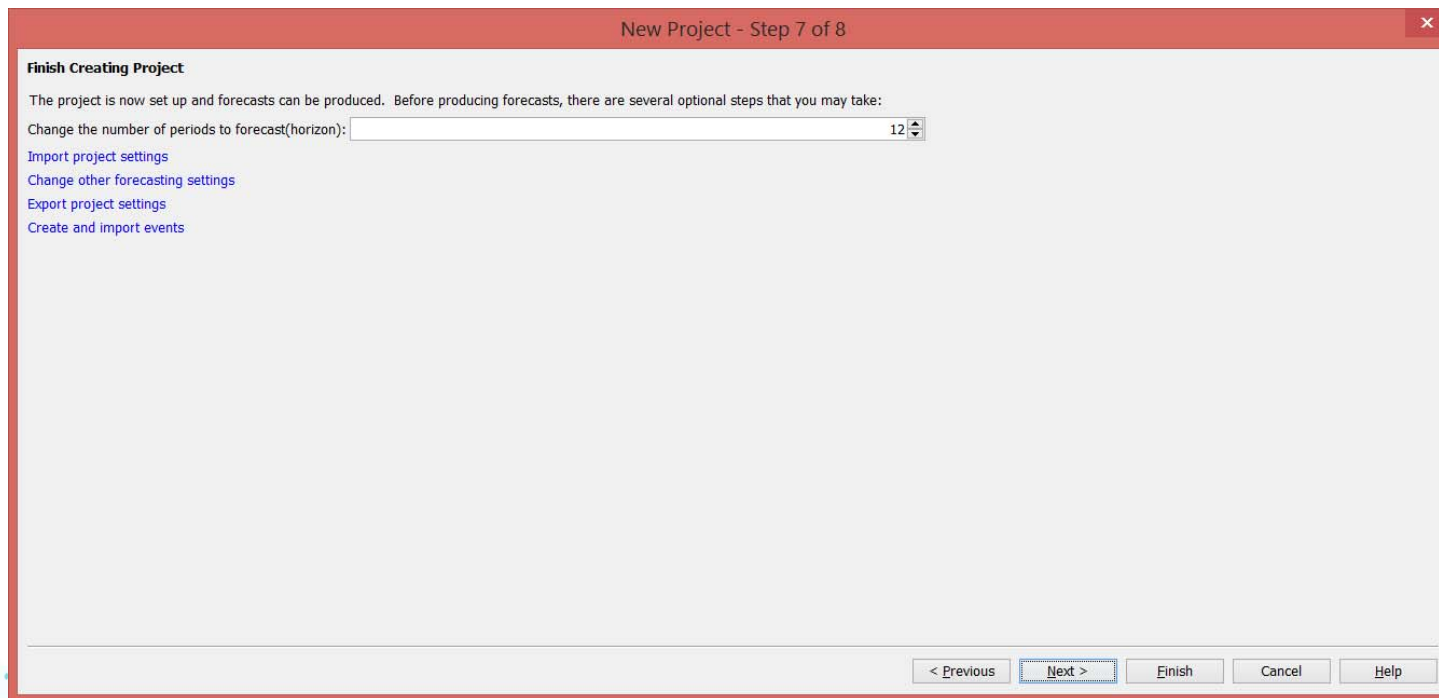
Select which leading/trailing missing values to remove: None

Select which leading/trailing zero values to interpret as missing: None

☐ Ignore data points earlier than the following date: 01/01/2011

< Previous Next > Finish Cancel Help

# Click on Change other forecasting settings



New Project - Step 7 of 8

**Finish Creating Project**

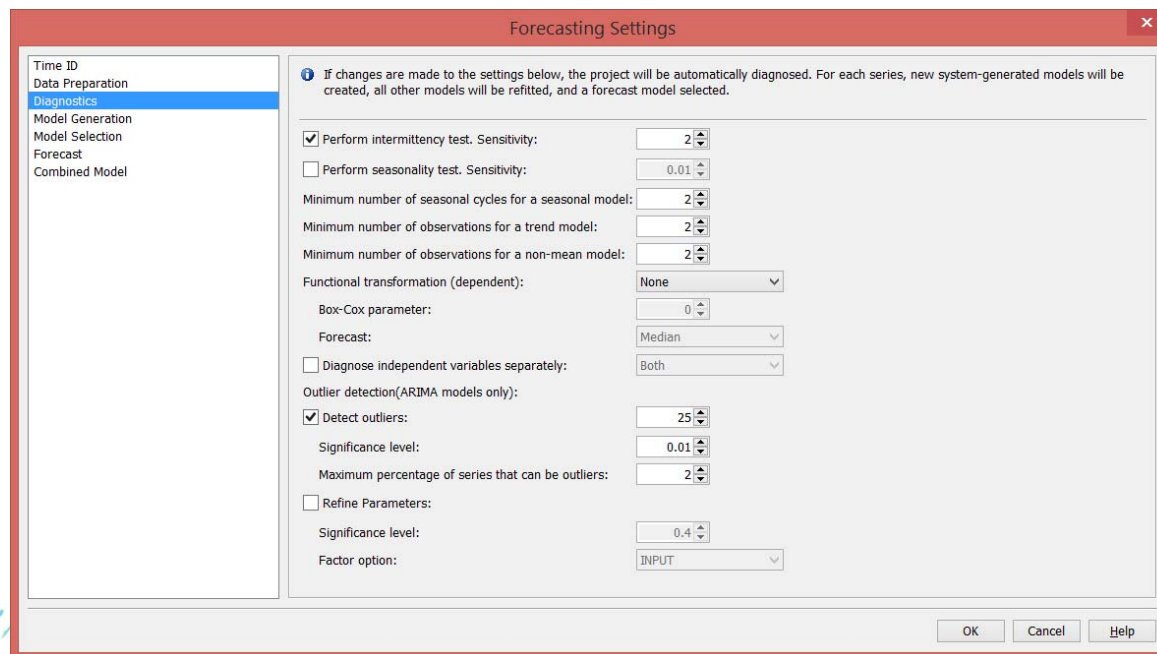
The project is now set up and forecasts can be produced. Before producing forecasts, there are several optional steps that you may take:

Change the number of periods to forecast(horizon):

[Import project settings](#)  
[Change other forecasting settings](#)  
[Export project settings](#)  
[Create and import events](#)

< Previous   **Next >**   Finish   Cancel   Help

Click on Diagnostics, then click on the box next to Detect outliers change the settings to those below and then click on Model Generation

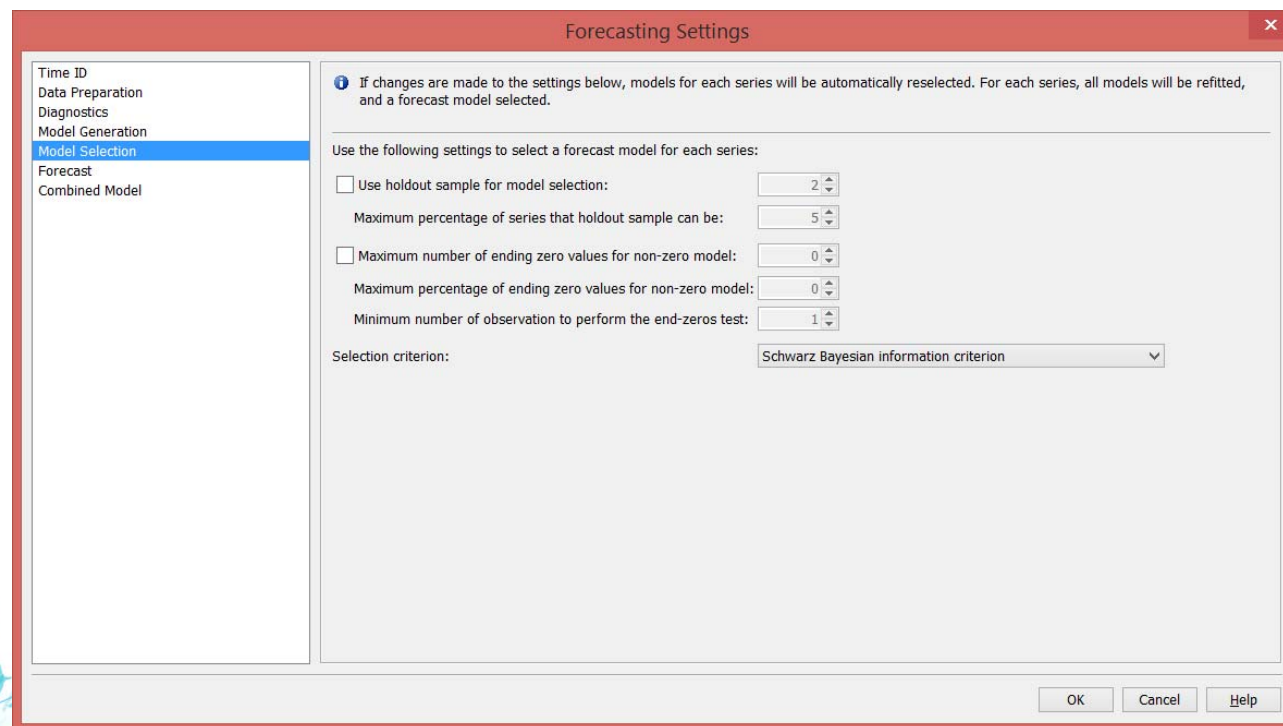


The image shows a 'Forecasting Settings' dialog box with a sidebar on the left and a main settings area on the right. The sidebar contains the following items: Time ID, Data Preparation, Diagnostics (highlighted with a blue bar), Model Generation, Model Selection, Forecast, and Combined Model. The main area has a title bar 'Forecasting Settings' with a close button (X). Below the title bar is an information icon and a note: 'If changes are made to the settings below, the project will be automatically diagnosed. For each series, new system-generated models will be created, all other models will be refitted, and a forecast model selected.' The settings are organized into several sections:

- ☒ Perform intermittency test. Sensitivity: 2
- ☐ Perform seasonality test. Sensitivity: 0.01
- Minimum number of seasonal cycles for a seasonal model: 2
- Minimum number of observations for a trend model: 2
- Minimum number of observations for a non-mean model: 2
- Functional transformation (dependent): None
- Box-Cox parameter: 0
- Forecast: Median
- ☐ Diagnose independent variables separately: Both
- Outlier detection (ARIMA models only):
  - ☒ Detect outliers: 25
  - Significance level: 0.01
  - Maximum percentage of series that can be outliers: 2
- ☐ Refine Parameters:
  - Significance level: 0.4
  - Factor option: INPUT

At the bottom right are three buttons: OK, Cancel, and Help.

Click on Model Generation, then choose Schwarz Bayesian information criterion as the Selection criterion (since we are seeking a parsimonious model) and then click on Forecast



The image shows a 'Forecasting Settings' dialog box with a sidebar on the left and a main settings area on the right. The sidebar contains a list of options: 'Time ID', 'Data Preparation', 'Diagnostics', 'Model Generation', 'Model Selection' (which is highlighted with a blue background), 'Forecast', and 'Combined Model'. The main area contains an information icon and a text block stating: 'If changes are made to the settings below, models for each series will be automatically reselected. For each series, all models will be refitted, and a forecast model selected.' Below this, there is a section titled 'Use the following settings to select a forecast model for each series:' followed by several settings with checkboxes and spinners. The 'Selection criterion' is set to 'Schwarz Bayesian information criterion' via a dropdown menu. At the bottom right are 'OK', 'Cancel', and 'Help' buttons.

Forecasting Settings

Time ID  
Data Preparation  
Diagnostics  
Model Generation  
Model Selection  
Forecast  
Combined Model

**i** If changes are made to the settings below, models for each series will be automatically reselected. For each series, all models will be refitted, and a forecast model selected.

Use the following settings to select a forecast model for each series:

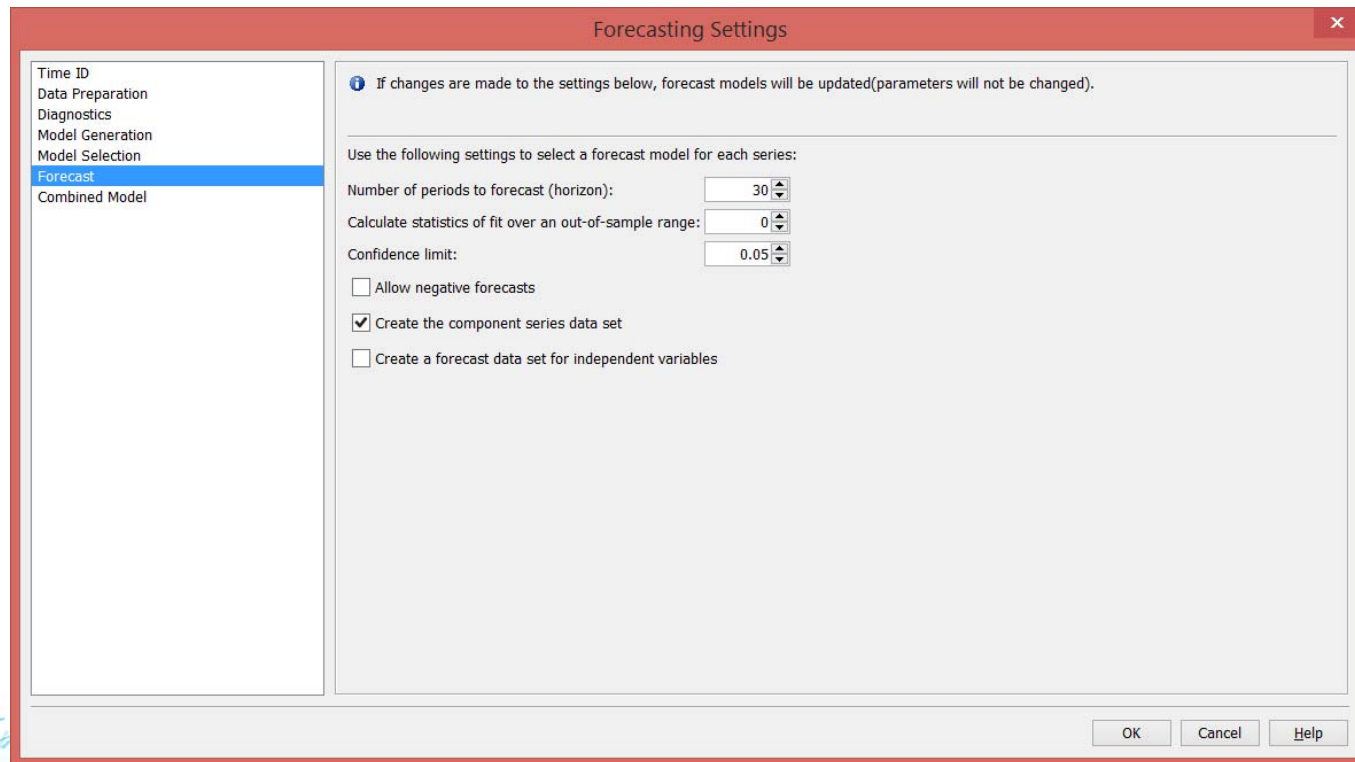
☐ Use holdout sample for model selection: 2  
Maximum percentage of series that holdout sample can be: 5

☐ Maximum number of ending zero values for non-zero model: 0  
Maximum percentage of ending zero values for non-zero model: 0  
Minimum number of observation to perform the end-zeros test: 1

Selection criterion: Schwarz Bayesian information criterion

OK Cancel Help

Click on Forecast, then change the Number of periods to forecast to 30 and then click on OK



The image shows a 'Forecasting Settings' dialog box with a red title bar and a close button (X) in the top right corner. On the left is a vertical list of options: 'Time ID', 'Data Preparation', 'Diagnostics', 'Model Generation', 'Model Selection', 'Forecast' (which is highlighted with a blue background), and 'Combined Model'. The main area of the dialog contains an information icon (i) followed by the text: 'If changes are made to the settings below, forecast models will be updated(parameters will not be changed)'. Below this, a section titled 'Use the following settings to select a forecast model for each series:' contains four settings: 'Number of periods to forecast (horizon):' with a spinner box set to 30, 'Calculate statistics of fit over an out-of-sample range:' with a spinner box set to 0, 'Confidence limit:' with a spinner box set to 0.05, and three checkboxes: 'Allow negative forecasts' (unchecked), 'Create the component series data set' (checked), and 'Create a forecast data set for independent variables' (unchecked). At the bottom right of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

Forecasting Settings

Time ID  
Data Preparation  
Diagnostics  
Model Generation  
Model Selection  
**Forecast**  
Combined Model

*i* If changes are made to the settings below, forecast models will be updated(parameters will not be changed).

Use the following settings to select a forecast model for each series:

Number of periods to forecast (horizon): 30

Calculate statistics of fit over an out-of-sample range: 0

Confidence limit: 0.05

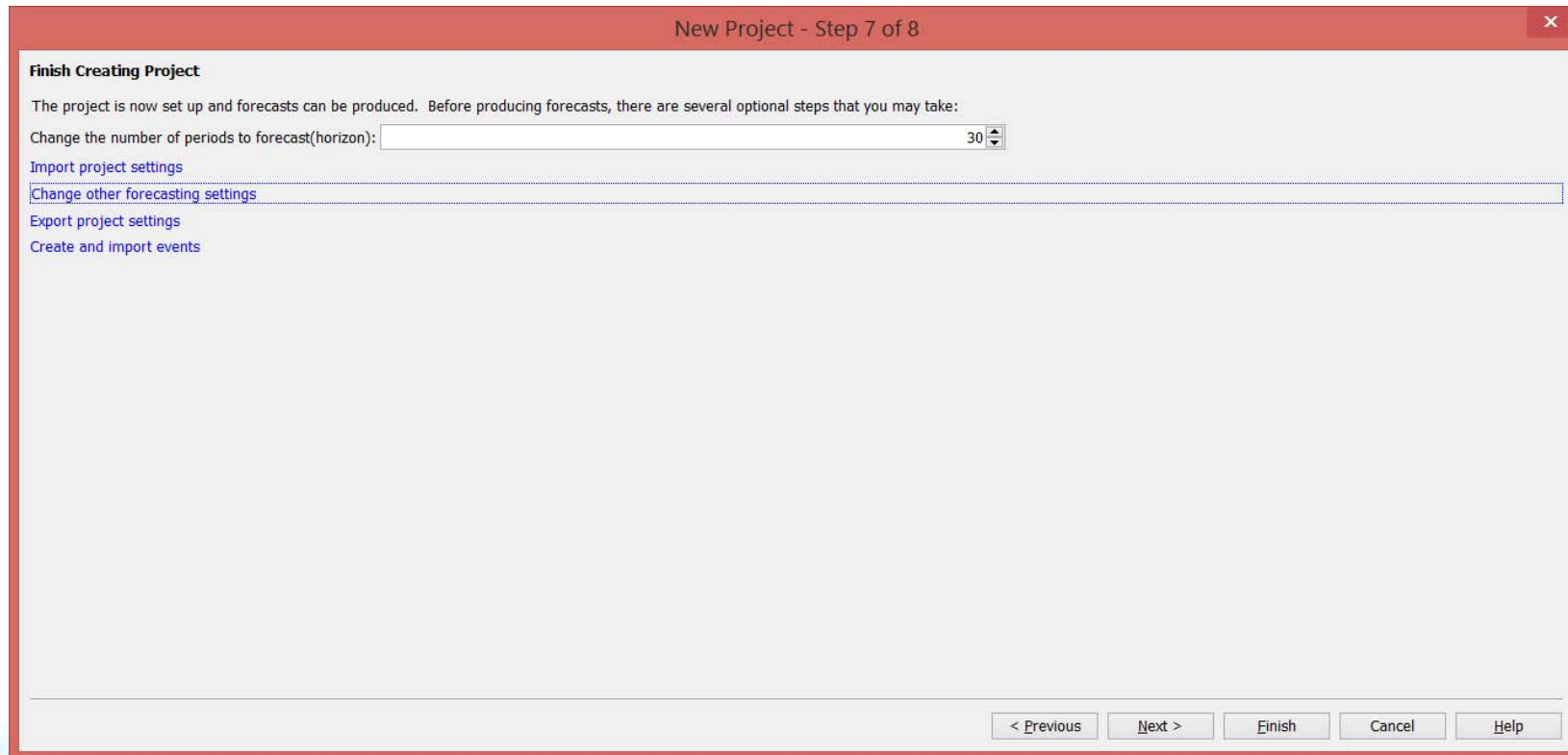
☐ Allow negative forecasts

☒ Create the component series data set

☐ Create a forecast data set for independent variables

OK Cancel Help

# Click on Create and import events



New Project - Step 7 of 8

**Finish Creating Project**

The project is now set up and forecasts can be produced. Before producing forecasts, there are several optional steps that you may take:

Change the number of periods to forecast(horizon):

[Import project settings](#)

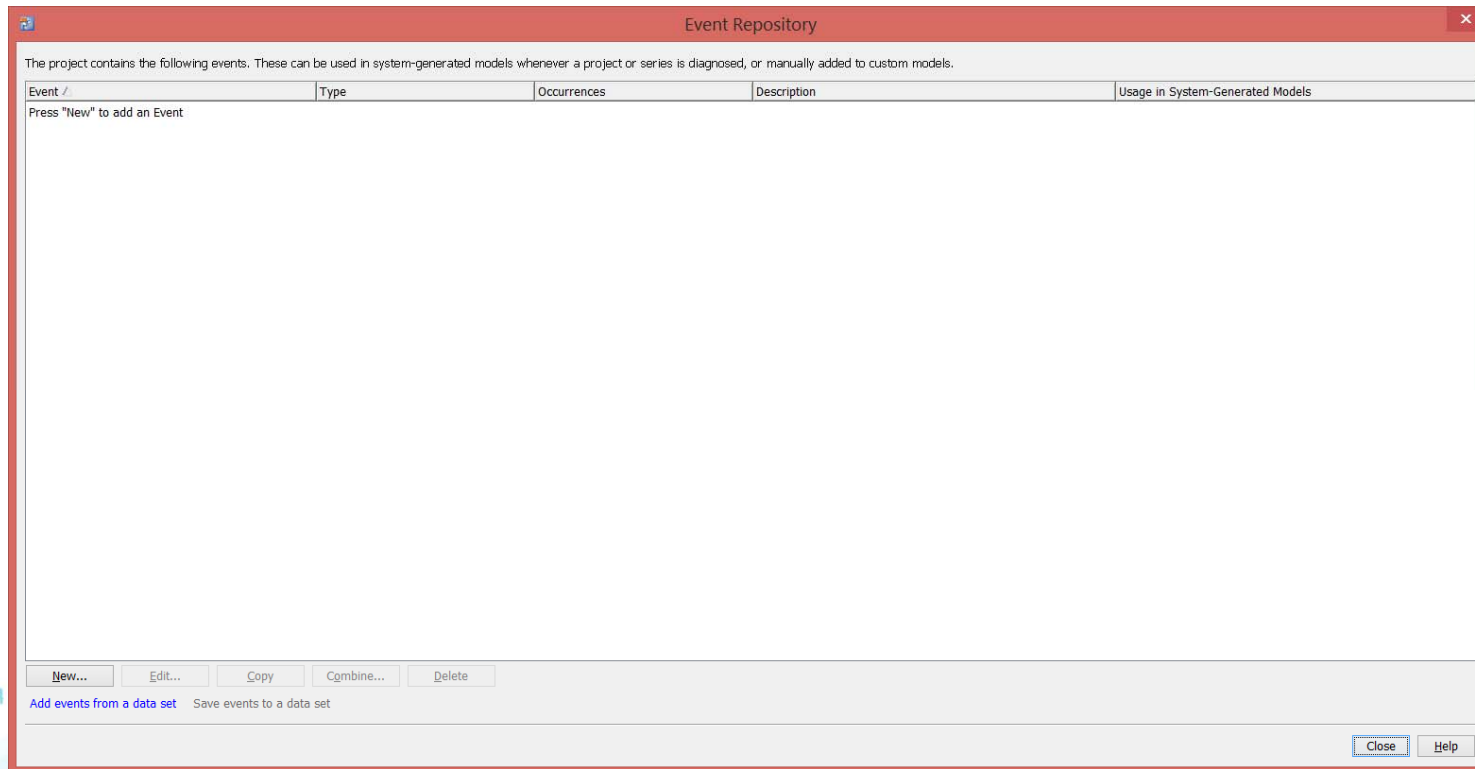
[Change other forecasting settings](#)

[Export project settings](#)

[Create and import events](#)

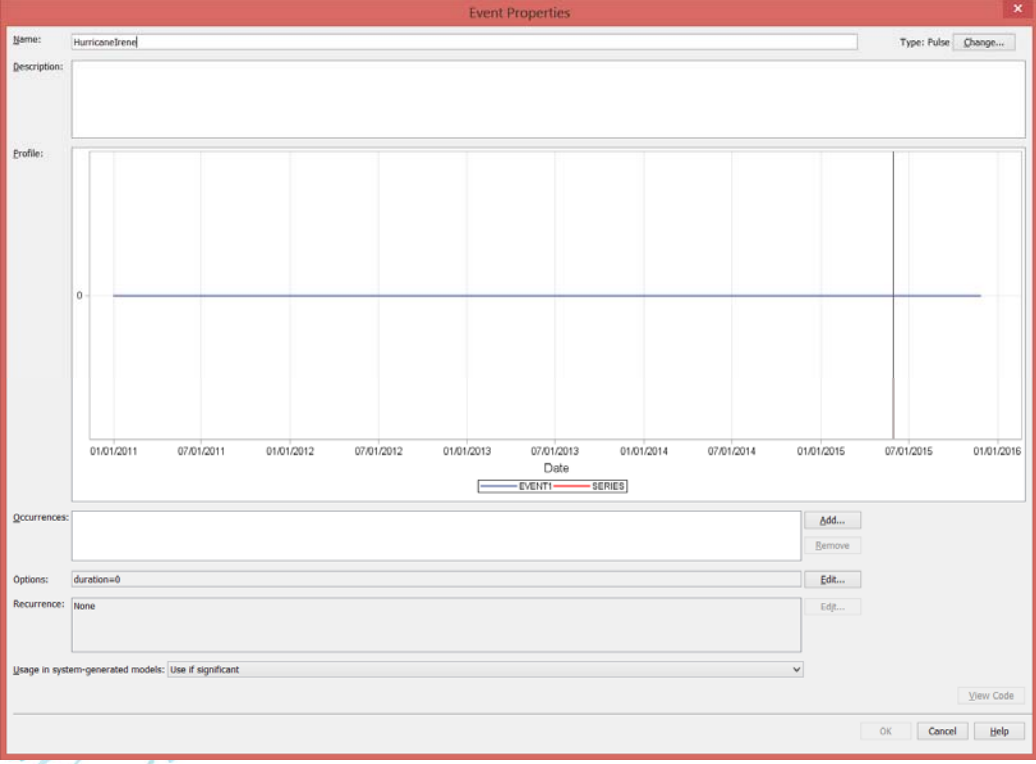
< Previous   Next >   Finish   Cancel   Help

# Click on New





Enter the Name of the event (HurricaneIrene) and click on Add



The image shows a software window titled "Event Properties". It contains several input fields and a chart. The "Name" field is filled with "HurricaneIrene". The "Type" is set to "Pulse" with a "Change..." button. The "Description" field is empty. The "Profile" section features a line graph with a horizontal line at 0, spanning from 01/01/2011 to 01/01/2016. The x-axis is labeled "Date" and has a legend for "EVENT1" (blue line) and "SERIES" (red line). Below the graph, there are fields for "Occurrences:", "Options:" (with "duration=0"), and "Recurrence:" (set to "None"). Each of these fields has an "Add...", "Remove", "Edit...", and "Edit..." button respectively. At the bottom, there is a dropdown for "Usage in system-generated models:" set to "Use if significant", a "View Code" button, and "OK", "Cancel", and "Help" buttons.

Name: HurricaneIrene Type: Pulse Change...

Description:

Profile:

0

01/01/2011 07/01/2011 01/01/2012 07/01/2012 01/01/2013 07/01/2013 01/01/2014 07/01/2014 01/01/2015 07/01/2015 01/01/2016

Date

EVENT1 SERIES

Occurrences: Add... Remove

Options: duration=0 Edit...

Recurrence: None Edit...

Usage in system-generated models: Use if significant

View Code

OK Cancel Help

Select the Date of the Event, click on the top arrow and then click on OK

**Select Occurrences**

Month: August ▼

Year: 2011 ▲▼

Day:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3

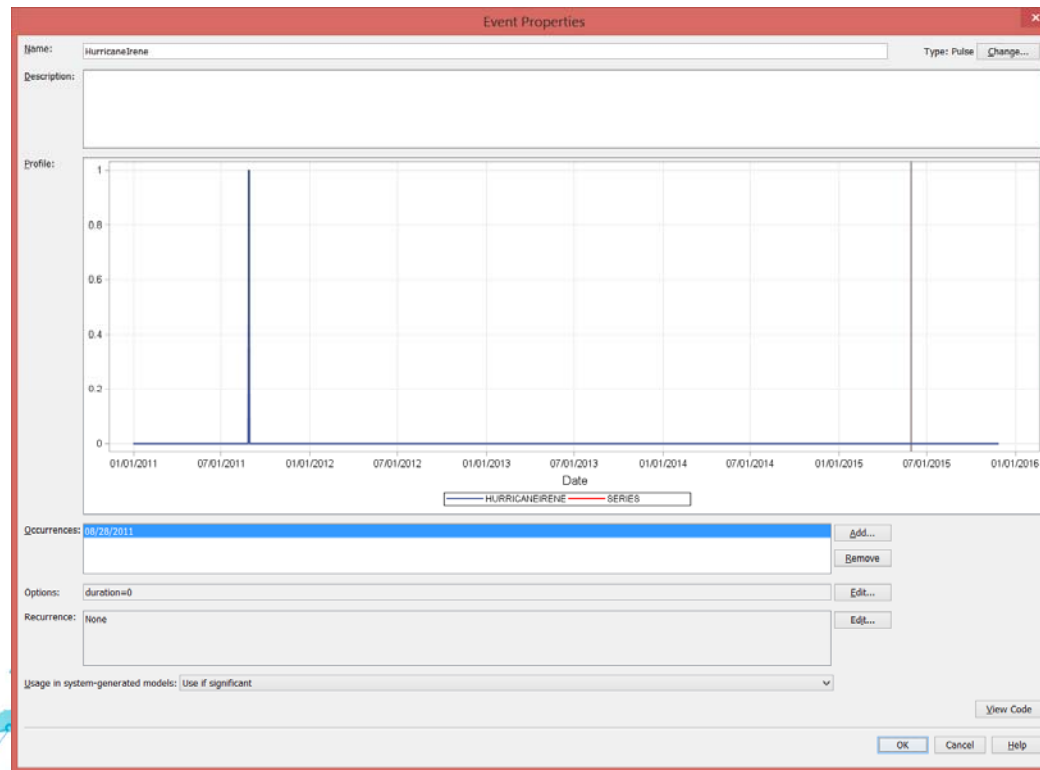
Holiday:

- Abraham Lincoln's and George Washington's birthdays observed
- Boxing Day
- Canada Day
- Canada Observed Day
- Christmas Day
- Columbus Day
- Easter Day
- Fathers Day

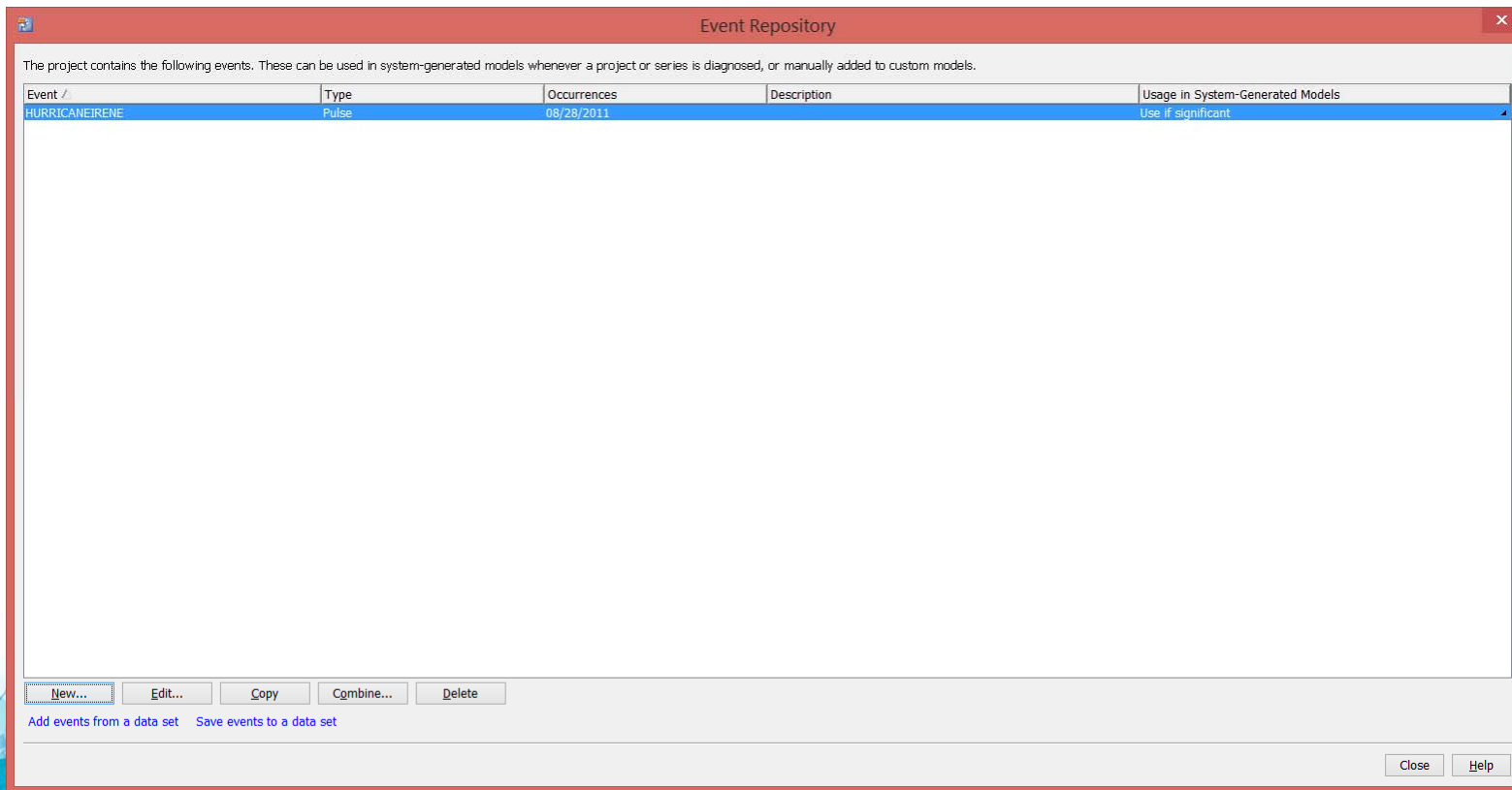
Selected: 08/28/2011

OK Cancel

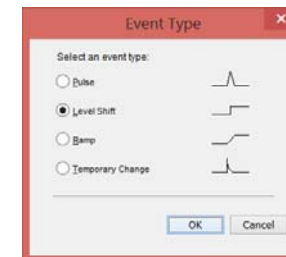
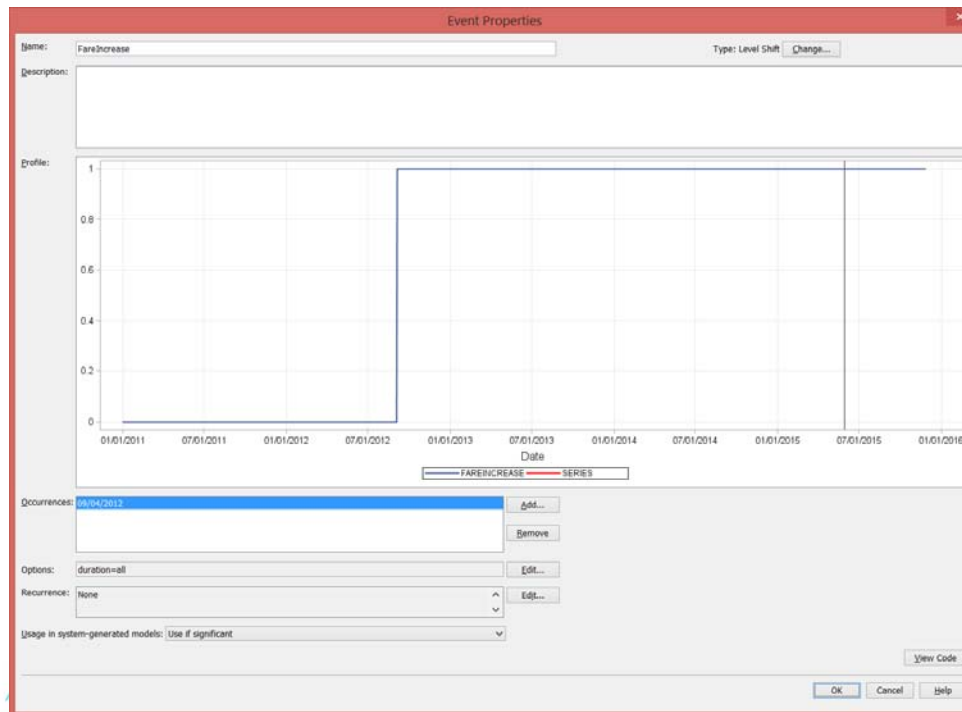
Click on OK



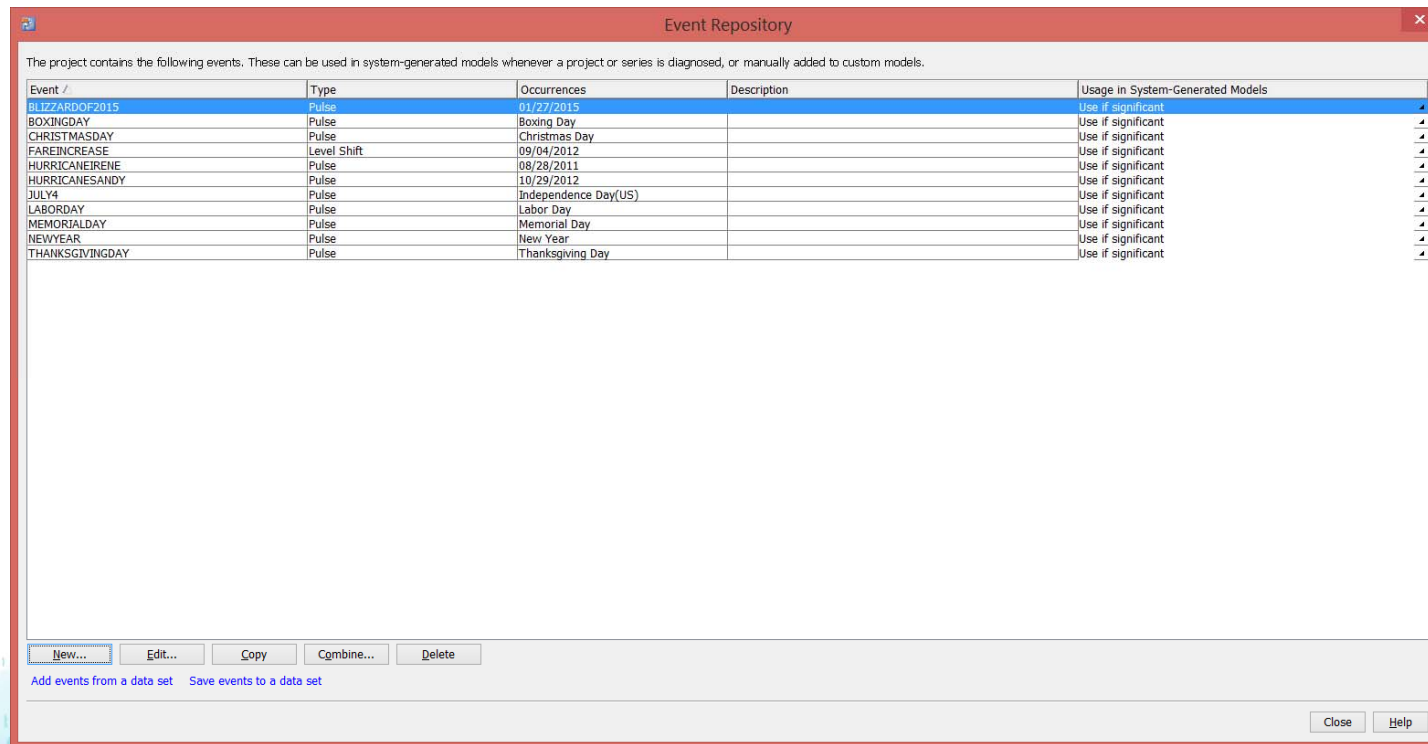
Click on New add a level shift associated with the fare increase



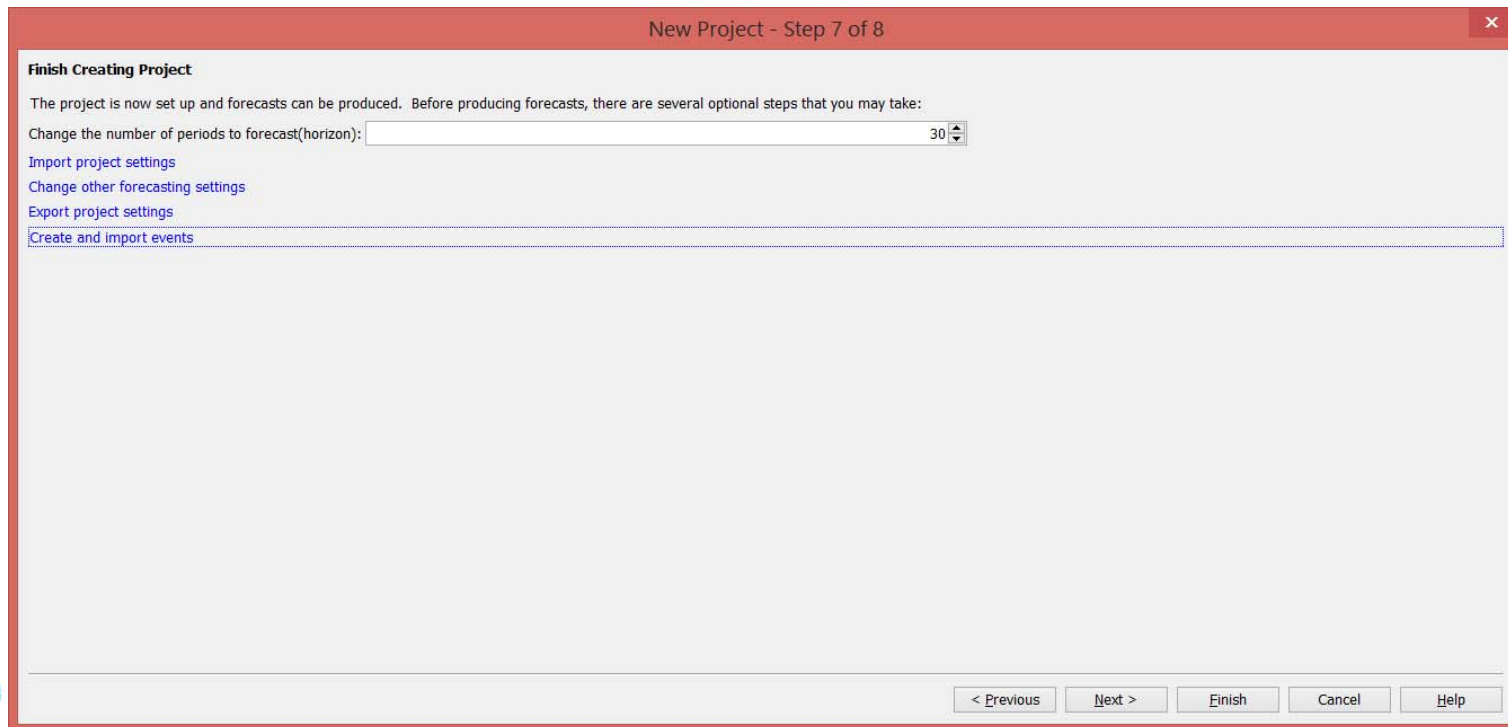
Click on New add a level shift associated with the fare increase on 9/04/2012



# Adding the other events and holidays and then click on Close



# Click on Finish



New Project - Step 7 of 8

**Finish Creating Project**

The project is now set up and forecasts can be produced. Before producing forecasts, there are several optional steps that you may take:

Change the number of periods to forecast(horizon):

[Import project settings](#)

[Change other forecasting settings](#)

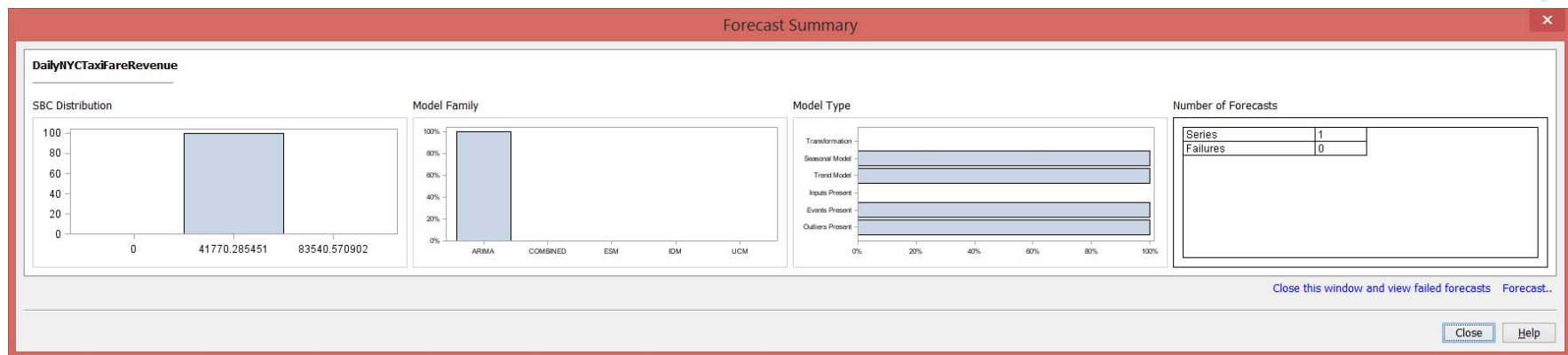
[Export project settings](#)

[Create and import events](#)

< Previous   Next >   Finish   Cancel   Help



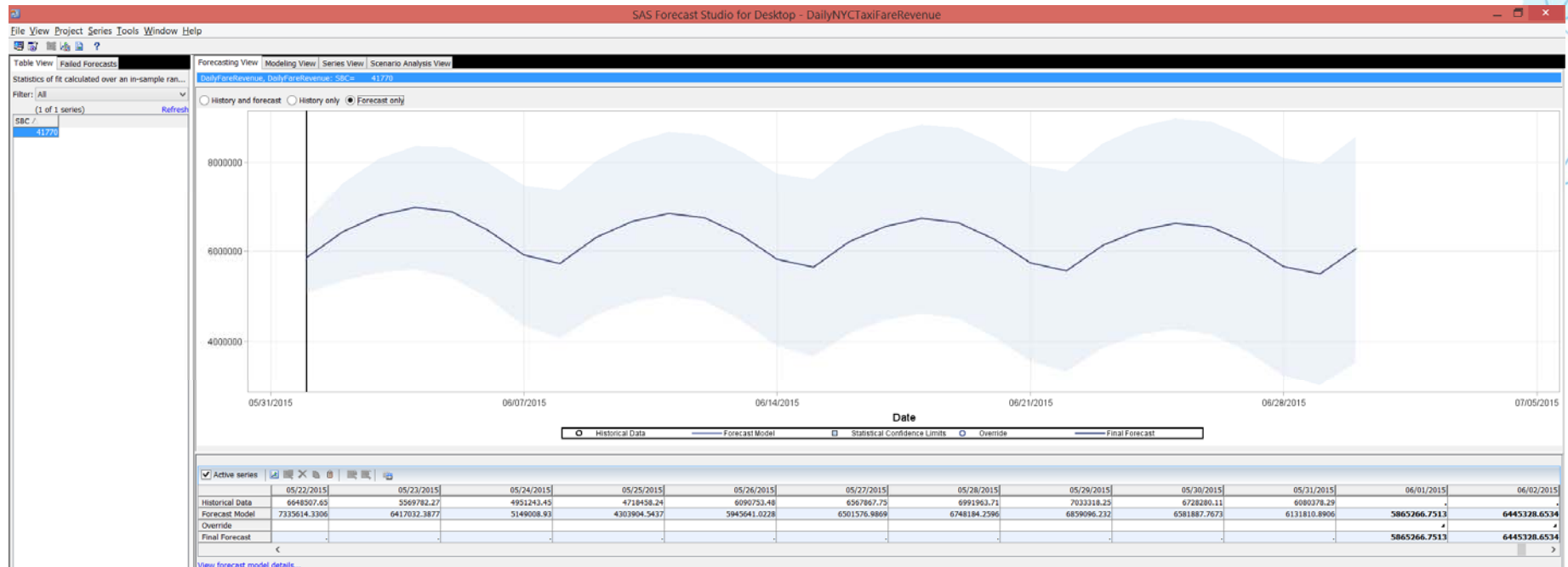
# Daily taxi fare revenue in New York City – Forecast Summary



# Daily taxi fare revenue in New York City – Forecasting View



# Daily taxi fare revenue in New York City – Forecasting View



# Daily taxi fare revenue in New York City – Forecasting View

Click on the right most icon in line with "Active series"

Copy To Clipboard

Select data from the table that you want to copy to the clipboard:

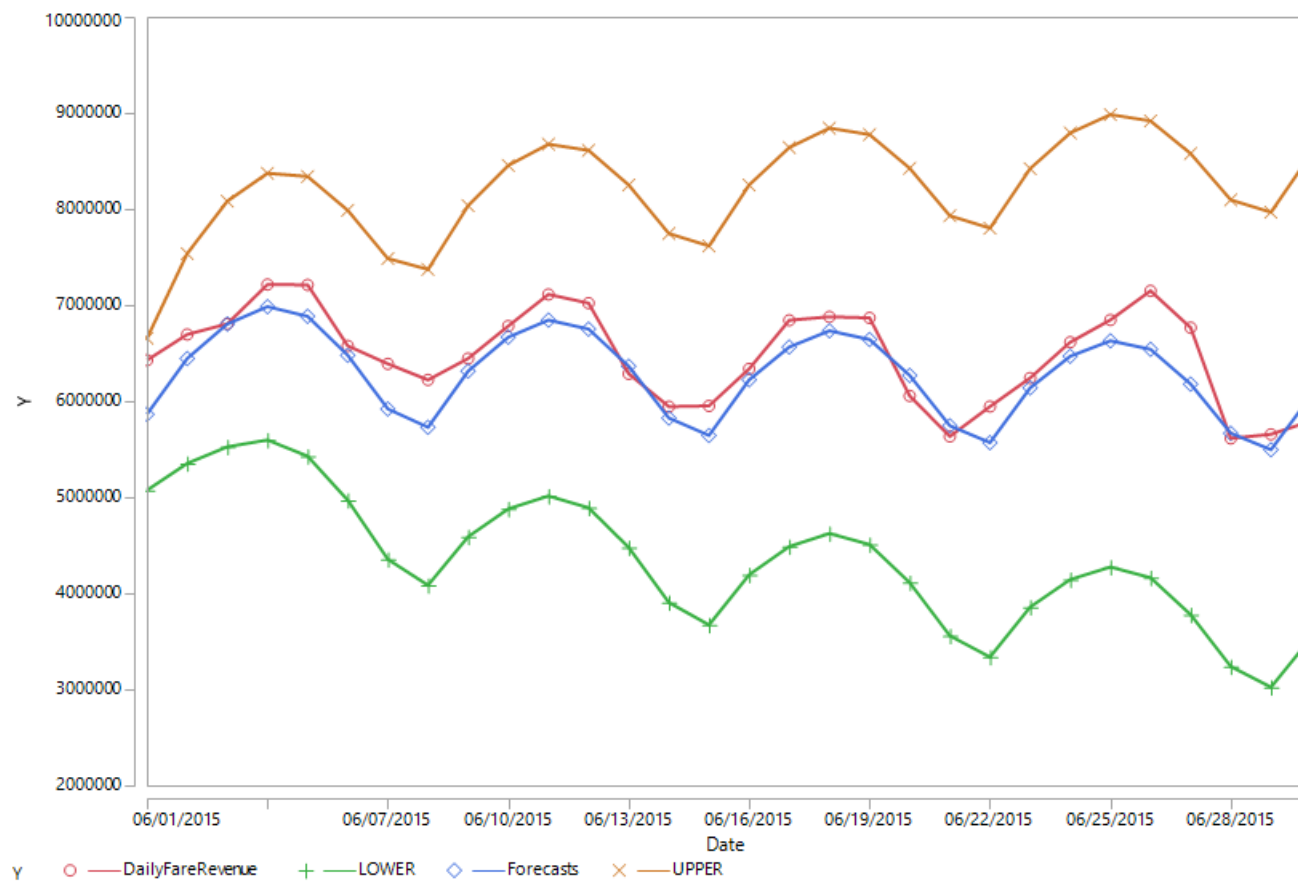
☐ History and forecast

☐ History only

☒ Forecast only

OK Cancel

## Daily taxi fare revenue in New York City – Actuals and Forecasts



# Daily taxi fare revenue in New York City – Modeling View



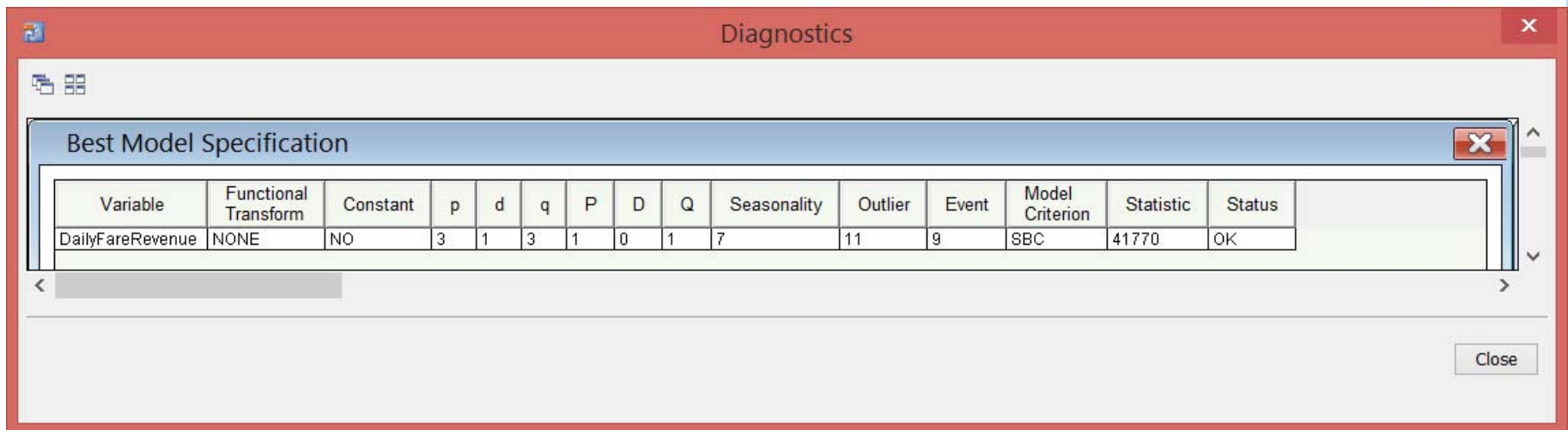
Under the Modeling View, click on the right most icon to “View Diagnostics”

The screenshot displays the software's Modeling View. The interface includes a menu bar (File, View, Project, Series, Tools, Window, Help) and a toolbar. The 'Modeling View' tab is active, showing a list of models. The 'DailyFareRevenue, DailyFareRevenue: SBC=' model is selected, with an SBC value of 41770. The 'Active series Forecast Model: LEAF\_0(automatic selection)' is checked. The 'View Diagnostics' button is highlighted in the bottom right corner of the model list.

Model
<b>Generated ARIMA Model (LEAF_0)</b>
Generated ARIMA Model (LEAF_1)
Generated Smoothing Model (LEAF_2)



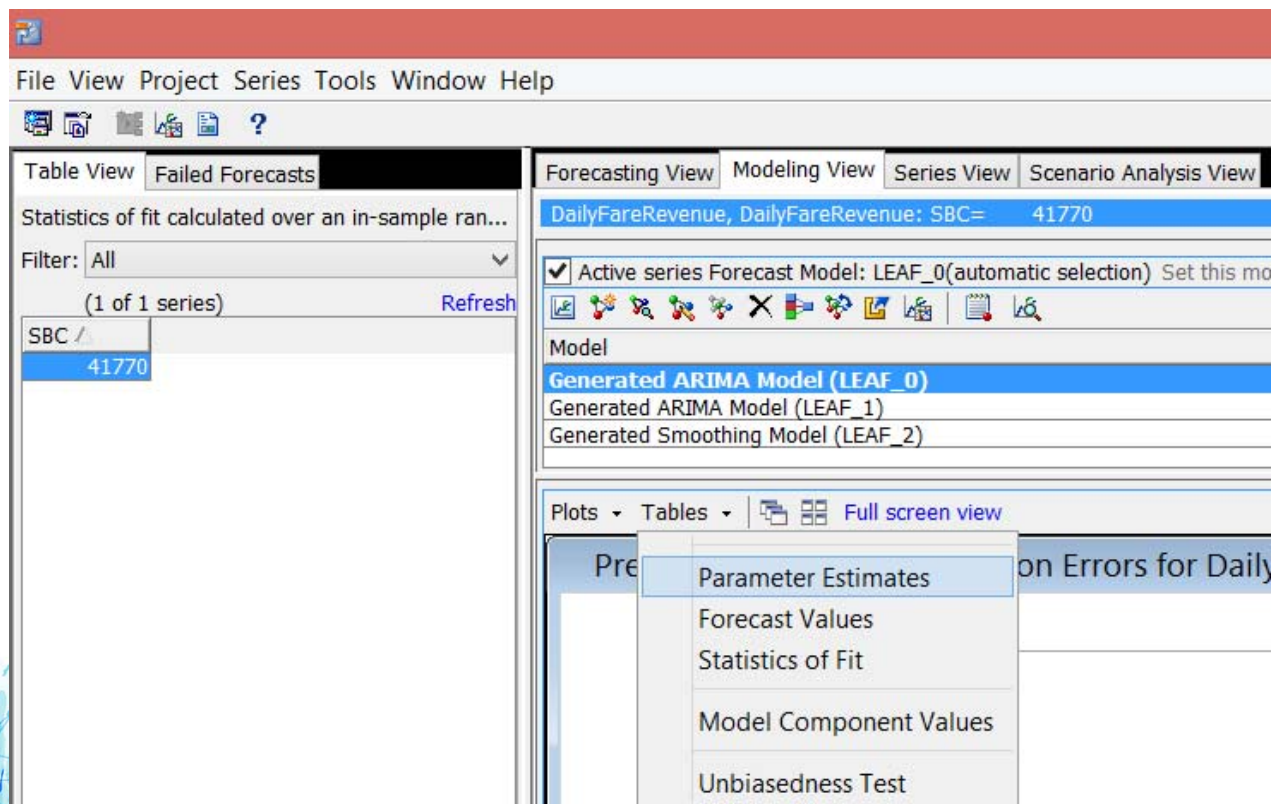
# Daily taxi fare revenue in New York City – Diagnostics (partial output)



The screenshot shows a software window titled "Diagnostics" with a red title bar. Inside, there is a sub-window titled "Best Model Specification" with a blue header and a red close button. The sub-window contains a table with 16 columns: Variable, Functional Transform, Constant, p, d, q, P, D, Q, Seasonality, Outlier, Event, Model Criterion, Statistic, and Status. The table has one data row for "DailyFareRevenue". Below the table is a horizontal scrollbar. At the bottom right of the "Diagnostics" window is a "Close" button.

Variable	Functional Transform	Constant	p	d	q	P	D	Q	Seasonality	Outlier	Event	Model Criterion	Statistic	Status
DailyFareRevenue	NONE	NO	3	1	3	1	0	1	7	11	9	SBC	41770	OK

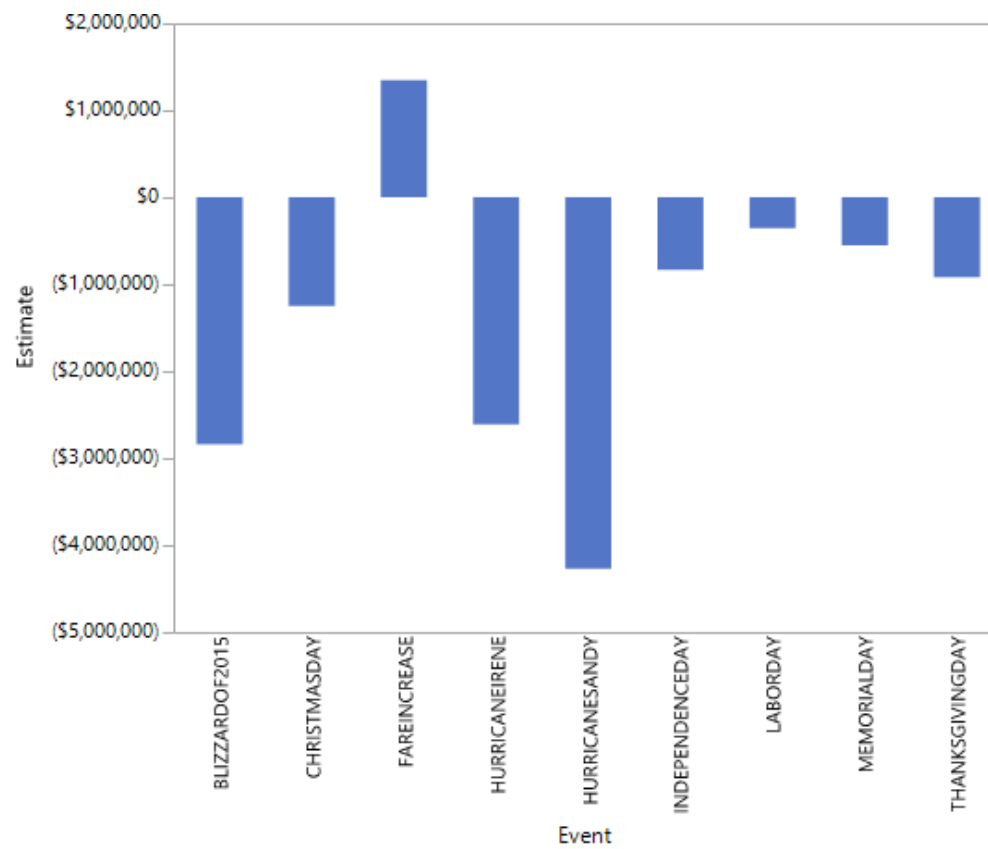
Under the Modeling View, click on Tables and then click on Parameter Estimates



## Daily taxi fare revenue in New York City – Parameter Estimates

Component	Parameter	Estimate	Standard Error	t Value	Approx Pr >  t
DailyFareRevenue	MA1_1	2.06587	0.03711	55.67	<.0001
DailyFareRevenue	MA1_2	-1.93025	0.04888	-39.49	<.0001
DailyFareRevenue	MA1_3	0.79967	0.03001	26.65	<.0001
DailyFareRevenue	MA2_7	0.95528	0.01129	84.64	<.0001
DailyFareRevenue	AR1_1	2.01692	0.04306	46.84	<.0001
DailyFareRevenue	AR1_2	-1.94354	0.05280	-36.81	<.0001
DailyFareRevenue	AR1_3	0.77606	0.04019	19.31	<.0001
DailyFareRevenue	AR2_7	0.99561	0.0040845	243.76	<.0001
HURRICANEIRENE	SCALE	-2607042.8	290485.7	-8.97	<.0001
FAREINCREASE	SCALE	1350446.9	401937.7	3.36	0.0008
HURRICANESANDY	SCALE	-4268159.6	335583.5	-12.72	<.0001
BLIZZARDOF2015	SCALE	-2838596.2	288736.6	-9.83	<.0001
CHRISTMASDAY	SCALE	-1245637.5	143927.1	-8.65	<.0001
JULY4	SCALE	-833331.5	143795.7	-5.80	<.0001
LABORDAY	SCALE	-351219.0	153208.0	-2.29	0.0220
MEMORIALDAY	SCALE	-552486.0	129617.8	-4.26	<.0001
THANKSGIVINGDAY	SCALE	-915862.3	144265.6	-6.35	<.0001
LS01JAN2015D	SCALE	2498994.8	390279.1	6.40	<.0001
AO13FEB2014D	SCALE	-2890060.9	287751.8	-10.04	<.0001
LS05AUG2013D	SCALE	2537055.4	384968.4	6.59	<.0001
AO11AUG2013D	SCALE	-2921294.4	287877.6	-10.15	<.0001
LS27AUG2011D	SCALE	-2379733.4	380531.1	-6.25	<.0001
LS04APR2011D	SCALE	2673861.4	385258.8	6.94	<.0001
LS01APR2011D	SCALE	-3183052.7	385269.2	-8.26	<.0001
AO18JAN2015D	SCALE	4211287.5	288236.3	14.61	<.0001
LS01DEC2014D	SCALE	3668954.9	386812.7	9.49	<.0001
AO30OCT2012D	SCALE	-3015633.0	335561.0	-8.99	<.0001
AO01JAN2012D	SCALE	-1774041.6	287781.6	-6.16	<.0001

## Daily taxi fare revenue in New York City – Parameter Estimates

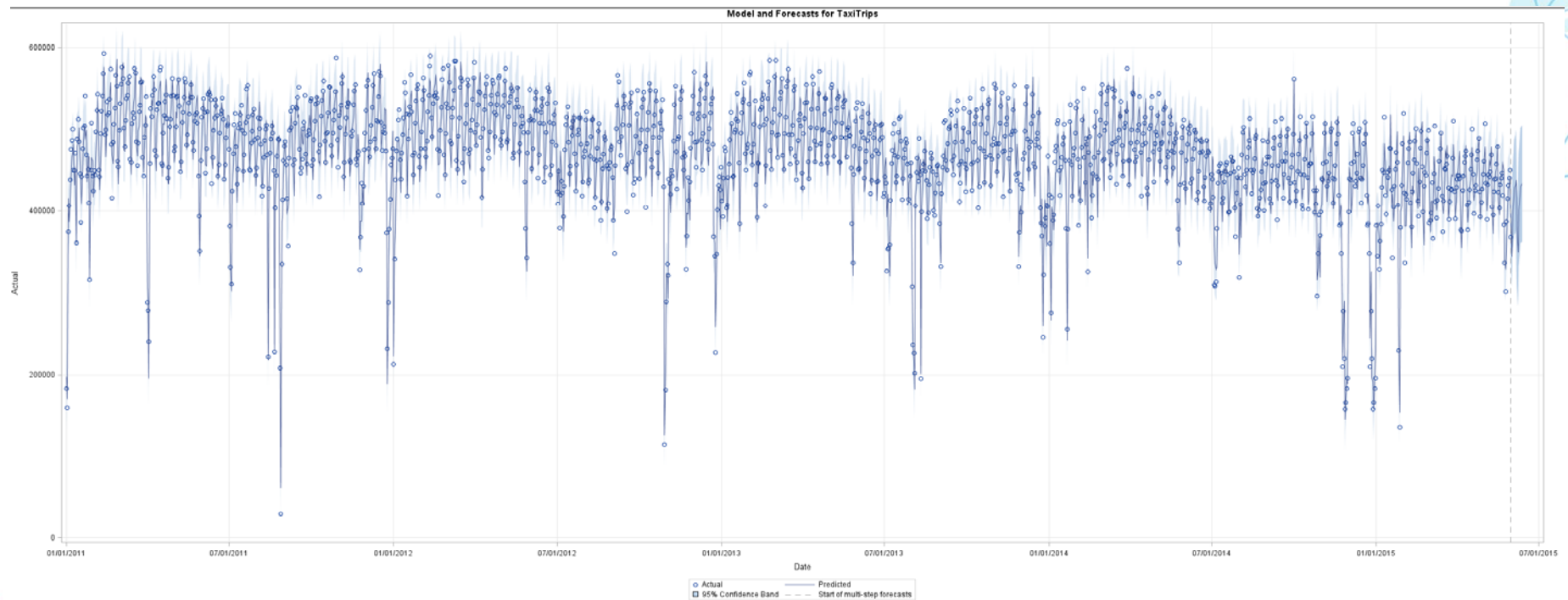


## Part 2. Daily taxi trips in New York City

- We wish to develop a time series model for the daily number of taxi trips by Yellow Cabs in New York City using publicly available data from 1/1/2011 until 5/31/2015 in order to both
- Predict daily taxi trips for June 2015
- Estimate the impact of events including
  - Price increase
  - Holidays
  - One of events such as hurricanes



# Daily taxi trips in New York City – Forecasting View



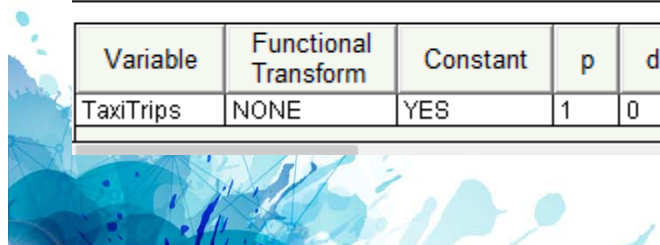
## Daily taxi trips in New York City – Modeling View



Component	Parameter	Estimate	Standard Error	t Value	Approx Pr >  t
TaxiTrips	CONSTANT	193950.5	20145.4	9.63	<.0001
TaxiTrips	MA1_7	0.66573	0.02049	32.50	<.0001
TaxiTrips	AR1_1	0.83603	0.01454	57.49	<.0001
TaxiTrips	AR2_7	0.98939	0.0046384	213.31	<.0001
HURRICANEIRENE	SCALE	-334459.4	17734.8	-18.86	<.0001
HURRICANESANDY	SCALE	-239077.6	17394.9	-13.74	<.0001
BLIZZARDOF2015	SCALE	-184863.2	15136.8	-12.21	<.0001
BOXINGDAY	SCALE	-44047.0	9367.8	-4.70	<.0001
CHRISTMASDAY	SCALE	-125750.3	8953.2	-14.05	<.0001
INDEPENDENCEDAY	SCALE	-61274.3	7569.2	-8.10	<.0001
LABORDAY	SCALE	-40070.9	7582.9	-5.28	<.0001
MEMORIALDAY	SCALE	-57867.3	6879.1	-8.41	<.0001
NEWYEAR	SCALE	1421.8	8514.0	0.17	0.8674
THANKSGIVINGDAY	SCALE	-52018.4	8391.1	-6.20	<.0001

### Best Model Specification

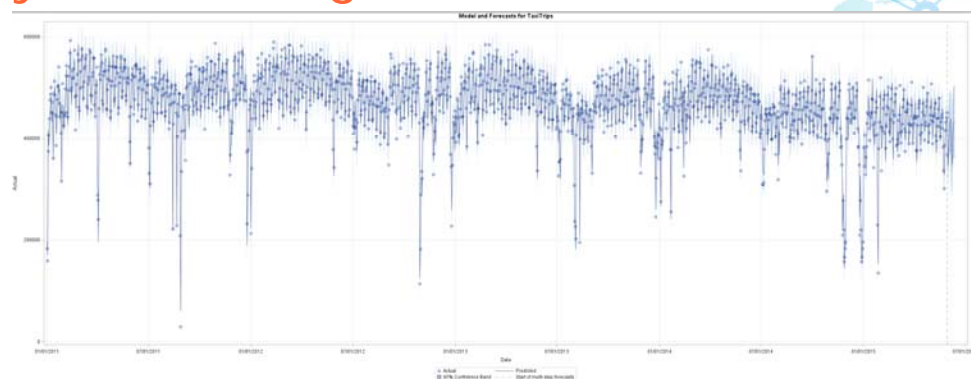
Variable	Functional Transform	Constant	p	d	q	P	D	Q	Seasonality	Outlier	Event	Model Criterion	Statistic	Status
TaxiTrips	NONE	YES	1	0	0	1	0	1	7	32	10	SBC	32454	OK





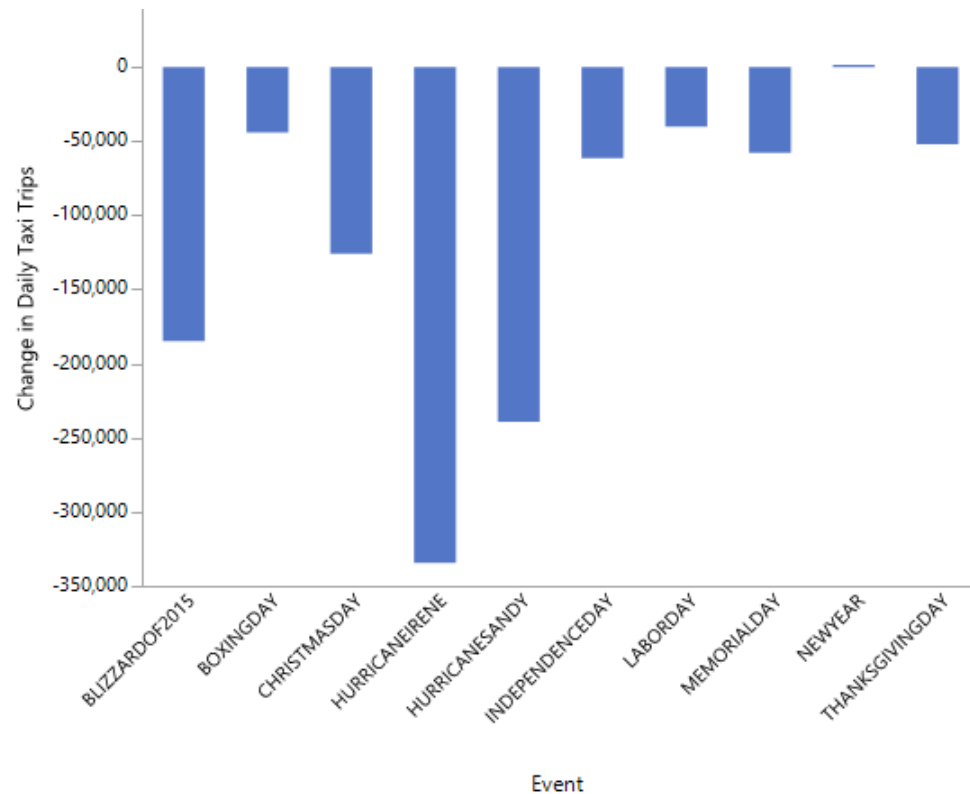
# Daily taxi trips in New York City – Modeling View

Component	Parameter	Estimate	Standard Error	t Value	Approx Pr >  t
AO17FEB2013D	SCALE	67374.5	15201.2	4.43	<.0001
LS24NOV2011D	SCALE	-81926.9	19574.7	-4.19	<.0001
AO27JAN2011D	SCALE	-118600.7	15150.4	-7.83	<.0001
LS01APR2011D	SCALE	-261725.4	18989.1	-13.78	<.0001
LS04NOV2012D	SCALE	75519.6	18724.9	4.03	<.0001
LS27DEC2014D	SCALE	-138905.3	20623.9	-6.74	<.0001
LS05AUG2013D	SCALE	209675.5	19432.7	10.79	<.0001
AO05MAR2015D	SCALE	-77884.7	15127.3	-5.15	<.0001
LS24DEC2011D	SCALE	-79525.7	18588.7	-4.28	<.0001
AO01JAN2012D	SCALE	-185341.6	17332.3	-10.69	<.0001
LS01AUG2013D	SCALE	-150976.6	19421.5	-7.77	<.0001
AO11AUG2013D	SCALE	-204879.4	15229.3	-13.45	<.0001
AO08FEB2013D	SCALE	-119024.0	17396.2	-6.84	<.0001
LS01JAN2015D	SCALE	170144.1	20114.2	8.46	<.0001
AO09FEB2013D	SCALE	-160075.2	17454.5	-9.17	<.0001
AO14AUG2011D	SCALE	-196215.0	15508.8	-12.65	<.0001
AO13FEB2014D	SCALE	-152227.5	15134.5	-10.06	<.0001
LS03JAN2011D	SCALE	248948.7	19097.1	13.04	<.0001
LS02AUG2013D	SCALE	-71066.4	19475.4	-3.65	0.0003
LS04APR2011D	SCALE	245610.4	18997.8	12.93	<.0001
AO21JAN2013D	SCALE	-73075.4	15137.7	-4.83	<.0001
LS22NOV2012D	SCALE	-83898.7	19697.0	-4.26	<.0001
LS27OCT2014D	SCALE	-112633.7	18593.3	-6.06	<.0001
AO30OCT2012D	SCALE	-156026.7	17391.5	-8.97	<.0001
AO21JAN2014D	SCALE	-145163.4	15131.8	-9.59	<.0001
AO03JAN2014D	SCALE	-123591.6	15149.8	-8.16	<.0001
AO21AUG2011D	SCALE	-169790.8	15637.6	-10.86	<.0001
LS24NOV2014D	SCALE	-149887.9	18693.5	-8.02	<.0001
AO27AUG2011D	SCALE	-237780.3	17394.2	-13.67	<.0001
AO12JAN2011D	SCALE	-113624.4	15149.7	-7.50	<.0001
LS01DEC2014D	SCALE	205424.4	18672.3	11.00	<.0001
AO01AUG2014D	SCALE	-104115.9	15137.4	-6.88	<.0001





## Daily taxi trips in New York City – Modeling View



## SAS® Forecast Studio 13.2

- Automatically fits time series models which can at the same time
- Detect and allow for outliers and level shifts
- Determine which model(s) optimize the chosen fit criterion





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