

Advanced Forecasting Techniques and Models: Nonlinear Extrapolation

Short Examples Series
using
Risk Simulator



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Forecasting – Nonlinear Extrapolation and Forecasting

File Name: *Forecasting – Nonlinear Extrapolation*

Location: *Modeling Toolkit | Forecasting | Nonlinear Extrapolation*

Brief Description: *This sample model illustrates how to forecast with a nonlinear extrapolation as well as comparing the results using more conventional time-series decomposition forecasts with trends and seasonality effects*

Requirements: *Modeling Toolkit, Risk Simulator*

This model provides some historical data on sales revenues for a firm. The goal of this exercise is to use Risk Simulator to run the Nonlinear Extrapolation tool and forecast the revenues for the next several periods. The data are located in the *Time-Series Data* worksheet and are arranged by months, from January 2004 to December 2004. As the data are time-series in nature, we can apply extrapolation to forecast the results.

Nonlinear Extrapolation

Note that the Nonlinear Extrapolation methodology involves making statistical projections by using historical trends that are projected for a specified period of time into the future. It is only used for time-series forecasts. Extrapolation is fairly reliable, relatively simple, and inexpensive. However, extrapolation, which assumes that recent and historical trends will continue, produces large forecast errors if discontinuities occur within the projected time period.

To run this model, simply:

1. Go to the *Time-Series Data* worksheet.
2. Select the *Sales Revenue* data series (cells **H11:H22**) and select **Risk Simulator | Forecasting | Nonlinear Extrapolation** (Figure 1).
3. Extrapolate for **6 Periods** using the **Automatic Selection** option.
4. Repeat the process by selecting the *Net Income* data series (cells **M11:M22**).
5. Select cells **H11:H22** again but this time run a Time-Series Analysis with forecast period of **6** with seasonality of **6** (**Risk Simulator | Forecasting | Time Series Analysis**).
6. Repeat Step 5's Time-Series Analysis on cells **M11:M22**.
7. Compare the results from Extrapolation and Time-Series Analysis.

Model Results Analysis

For your convenience, the analysis *Report* worksheets are included in the model. A fitted chart and forecast values are provided as well as the error measures and a statistical summary of the methodology. Notice that when the historical data and future expectations are such that growth rates are nonlinear and smooth, extrapolation works better. Similar to the case of the sales revenues, compare the graphs visually

and see the corresponding RMSE or root mean squared error values, where the smaller this error, the better the model fits and forecasts the data), but when seasonality occurs, time-series analysis is better (in the case of net income).

**Historical Sales Revenues
Polynomial Growth Rates**

Year	Month	Period	Sales
2004	1	1	\$1.00
2004	2	2	\$6.73
2004	3	3	\$20.52
2004	4	4	\$45.25
2004	5	5	\$83.59
2004	6	6	\$138.01
2004	7	7	\$210.87
2004	8	8	\$304.44
2004	9	9	\$420.89
2004	10	10	\$562.34
2004	11	11	\$730.85
2004	12	12	\$928.43

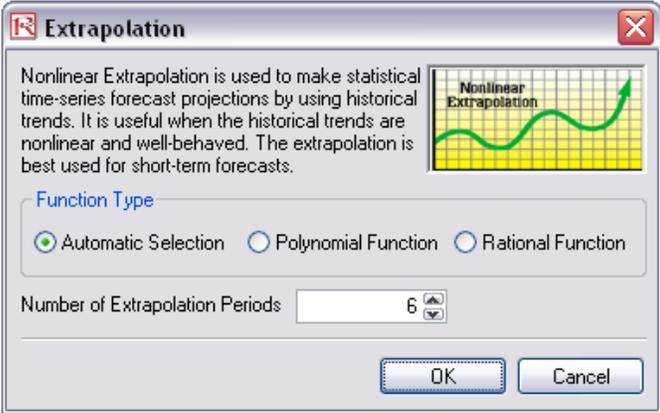


Figure 1: Nonlinear extrapolation