

STUDENT PROJECT: OBJECTIVES AND DATA

Updated: December 26, 2006

(The attached PDF file has better formatting.)

Jacob: What is the objective of the independent student project? How does it differ from the final exam and homework assignments? Do we use regression analysis to test hypotheses? Do we apply the regression concepts to actuarial scenarios?

Rachel: The final exam tests if you understand how to use the regression techniques. The final exam may ask you to calculate t statistics or F statistics or Durbin-Watson statistic or use them to evaluate regression results. The homework assignments apply the concepts to insurance and actuarial scenarios.

Practical regression analyses are more complex. Classical regression analysis assumes the regression parameters (the α and the β 's) are constant and the error term is normally distributed with a constant variance. The time series chapters assume an ARIMA process works well, though we may have to take first or second differences.

The student project addresses real problems. One project template uses regression analysis to estimate loss reserve. If the regression parameters are stable, anyone could do reserve analysis; we would not need actuaries. We show how to analyze scenarios where parameters are not constant.

Another project template uses an F test to compare sports teams. The student project has no correct answer. The results depend on the sport, teams, years, and hypotheses you choose.

The project template on interest rates uses actual inflation and interest rate series. The proper ARIMA process depends on the series, time period, and adjustments you make.

Our faculty reviewing your student project is not looking for a specific result. They check if you apply the statistical techniques reasonably well to actual or simulated data. Two candidates may examine the same issue but use different data and come to opposite conclusions.

DATA

Jacob: Do we choose the topic for the student project, or do we work on assigned data?

Rachel: Ideally, candidates work on topics that interest them. An auto actuary may do a project on territorial rate relativities and a life insurance actuary may do a project on mortality differences by sex. You can design your own project.

Many candidates prefer more structured projects. To ensure the projects are independent, we use one of two methods:

We supply extensive data. For the project template on interest rates, we supply many time series over the past hundred years, and we show how to form combinations of these. You can choose any of the time series on the NEAS web site, and you can form others, such as real interest rates from nominal interest rates and inflation rates. You choose the time periods and the questions to examine. You can use similar time series from dozens of public web sites, and we provide suggestions in many postings.

For the project template on sports won-loss records, we supply statistics for all the teams in four sports: baseball, basketball, hockey, and football. We suggest numerous analysis that you can perform. You select the sport, teams, years, and hypotheses.

For the project template on loss reserving, we suggest two analyses you can do. You simulate data, so every candidate uses different figures. We provide illustrative spread-sheets and a step-by-step guide to all parts of the project template.

The project template gives you a format: the type of data, the type of question, and the type of analysis. You perform the regression analysis to answer the questions.

Jacob: With all this material, it takes hours just to examine the data.

Rachel: Some candidates can not start a project until they see all the possibilities. The project is open-ended: you choose data, hypotheses, and statistical techniques. You show that you can apply statistical techniques to real (or simulated) data to test hypotheses.

The project templates are suggestions; the data on the NEAS web site eliminates time wasted gathering data on your own. The illustrative spread-sheets give you Excel code for the common statistical techniques.

Some candidates ignore all this and submit their own projects. That is perfect. Other candidates want more structured assignments, and they use the project templates. Don't examine all the data; that takes too much time. If you are a basketball fan, do a student project on basketball statistics. Use your home team and replicate the illustrative spread-sheet on the NEAS web site.