Comment on Three Statistical Business Simulations

Jimmy Doi
Editorial Assistant, *Journal of Statistics Education*
Graduate Student, North Carolina State University

Journal of Statistics Education v.7, n.1 (1999)

---

1. Norgas Distributing Company

This simulation package generates data over a one to ten year period (range of years chosen by the user) and stores the information in a text file which is saved on a floppy disk. It is understood that the cost of obtaining one year's worth of data is $1,500. The student must tackle the problem of obtaining an adequate amount of data yet at the same time controlling the budget of the analysis. There is no clear indication by the author as to how much information would be appropriate which seems to be left as an open question for the student.

Based on the variables available (forecast of the day's temperature and day's wind by two competing agencies, the actual day's temperature and wind speed, and the gas demanded for that day), it seems that some type of multiple regression and/or time series analysis would be appropriate, but again this analysis is completely left open.

This simulation would be ideal for students well equipped with some basic regression/time series tools. The data are stored in a clearly delimited text file, which is easily accessible to packages like Excel, SAS, and S-Plus. In addition, several nice features make the package especially useful to instructors:

- Students can only run the program once.
  After submitting the user's password, the program automatically updates the password list indicating that the user has already used the simulation. Due to the $1,500/year analysis cost and the possibility of the student learning how the simulation machine works after repeated trials, the one-time-only simulation is a very nice safeguard feature.

- Instructors can reproduce students' simulations.
  For every simulation, the program generates a file accessible to the instructor that reports the random seed (and sample size) used for that particular run. This is another safeguard feature that instructors can rely upon in case they would like to check the students' work.

- Sample assignments and technical notes are provided.
  The author provides a list of questions that would be useful for instructors as a guideline. In addition, the author provides a supplemental document for instructors containing technical notes, including how to set up the program and how to make use of the password file.

2. Tenderdent Toothpaste

This simulation package contains three stages: a survey stage, a test marketing stage, and a full marketing stage. At each stage the student is given the chance to obtain practice sessions, although there is no guarantee that such observations will be close to what will be seen in the "real" simulation. Again, once the "real" simulation is carried out, the student is not allowed to perform it again. As in the Norgas case, instructors can replicate any of the "real" simulations, as they will have access to the corresponding random seeds and sample size values.

An interesting feature of this package is that, in addition to regression, it contains sampling issues including simple vs. stratified sampling, a two-stage sampling scheme, and various choices of stratification variables. Students face the problem of selecting the optimal sampling method only in the first stage. During the second and third stages, students need to determine optimal advertising/marketing strategies. Also, students must adequately control the costs associated with these three stages. With so many things to consider, it seems reasonable to have access to practice sessions, whereas in the other two packages the user has only one attempt.

One point that distinguishes this package from the other two is clearly the three-stage sequence. It allows students to examine a large study in a stepwise manner and determine whether it would be in the client's best interest to move forward at the completion of each stage.

3. Superior Insurance Inc.

This package contains two components. The first simulation generates a simple random sample (with replacement) from the Insurance Advisory Bureau (IAB) database, which contains automobile driver data. The variables available for each database entry include (among others) driver's gender, age, driving experience, marital status, and the number of liability claims made in a five-year period (1990-94). Similar to the Norgas package, students need to decide on the appropriate sample size (the simulation can generate 1 to 20,000 entries), where each record costs $20. This part must be approached with great care as the data can be obtained only once. Based upon these data, the task of the student is to determine a method of calculating insurance premium quotations to maximize Superior Insurance's gross profit from liability insurance in 1999. Again, the responsibility is left to the students on how to best obtain and analyze the data.

To determine how well a premium formulation fares, instructors can utilize the second simulation in the package. After the instructor supplies the premium bid formulations for all competing companies, the simulation can determine each company's gross profit and thereby determine individual performance. An appealing feature of this package is it allows student groups within a class to compete against one another. In the case where students work in groups, instructors can establish in-class competition by letting the student groups represent all insurance companies in the region.

All three bulleted items under the Norgas summary apply here as well. Unlike the Norgas and Tenderdent packages, the instructor will need to utilize a C or C++ compiler in order to carry out the second Superior Insurance simulation. However, all necessary modification steps are clearly detailed in the author's Technical Notes and are easy to implement.

4. Summary

These are all excellent simulations that are easy to use and provide a resource of great projects. They are applicable not only to business statistics classes but also to many applied statistics courses (including a course in sampling). After reading the Technical Notes, one will find that Dr. Tryfos has gone to great lengths to ensure that the simulated data are as realistic as possible.

What I like most about all three packages is that Dr. Tryfos incorporates the safeguard feature of allowing only one real run and that he encourages students to draw their own conclusions. As he best states:

"This type of open-ended project reflects the way real world studies are conducted and discourages the view that for every problem there is a unique solution."

Jimmy Doi
Department of Statistics
Campus Box 8203
North Carolina State University
Raleigh, NC 27695-8203

jadoi@unity.ncsu.edu

Return to Tryfos Paper

JSE Homepage | Subscription Information | Current Issue | JSE Archive (1993-1998) | Data Archive | Index | Search JSE | JSE Information Service | Editorial Board | Information for Authors | Contact JSE | ASA Publications