Extended Thesis Abstracts

The Unknown Profession: Spreading the News about Actuarial Science

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What is actuarial science? Is it the science of actual things? Is everyone in the actuarial field a dull, nerdy, number cruncher? These are common responses we received when we asked people what they knew about actuarial science. Thus we realized that to many people, especially students, actuarial science is an unknown profession. With this in mind we decided to make the goal of our project to address this perception by making more students aware of what actuarial science is. We began in the fall of 2005, when we went into local high schools in the Muncie and surrounding areas and presented a vision of actuarial science to six different mathematics classes. We shared with the students what opportunities are available in the field of actuarial science and tested our own assumption that students are unaware of the field by administering written sur-

veys to the students. These were completed before and after our presentation. To demonstrate the mathematics involved and to create interaction with the audience, we also incorporated an activity to simulate a practical application of actuarial work.

The Activity

After receiving input from a variety of actuarial science and risk management insurance professors, we decided that an activity based on automobile insurance might be the most applicable to high school students. Once we focused on automobile insurance, we chose a variety of cars to use in the activity. For each of the automobiles, we assigned a description of the driver and his risk category—low, medium, or high. Using Geico's online insurance pricing tool, we determined realistic six-month premiums for each car and for each type of driver. We then detailed their driving record according to the risk level that we had assigned them. For instance, we made the low-risk drivers have no recent accidents or tickets, while the high-risk drivers had several. We then put all of the data onto cards that we could hand out to the students. Each group of students would receive one card. Below is a sample.

Car:	BMW Z-4
Car Year:	2006
Sex:	Male
Age:	30
Occupation:	Lawyer
Marital Status:	Single
Risk Level:	**High**
Insurance:	**$1000**

Once each group of students was assigned a risk level, we needed a way for the students to "drive" and determine whether or not they would have an automobile accident or some other source of damage. We decided that the easiest way to do this would be to draw a numbered ball out of a bucket, where the numbers on the balls corresponded to the possible scenarios in each risk level. We constructed three lists of scenarios that could happen to the driver, one for the low-risk drivers, one for the medium-risk drivers, and a third for the high-risk drivers. To illustrate, Scenario #1 for the low-risk drivers was, "Congratulations, you were a safe driver this period and have incurred no

additional costs." Scenario #2 for the low-risk drivers was, "Your car has taken a beating by a baseball bat. After breaking the windshield, the attacker continued to smash the headlights and dent your hood fairly significantly. You have incurred $750 in damages. You must pay a deductible of $250 and the insurance will cover the remaining $500."

For each risk level, we calculated the expected value of the insurance losses and then assigned this value to be the insurance premium. With loss distributions and credibility theory there are more sophisticated methods of determining expected losses with deductibles, but we wanted to keep the mathematics simple so that all of the students could understand and perform the calculations. For this reason, we did not go into great detail about the deductibles in our presentation. We explained to the students how actuaries compute the expected loss amounts for each risk category in order to compute the six-month premium payments. We were also able to use the different risk categories to discuss with students how actuaries try to find relationships among gender, age, marital status, car type, and driving records to categorize different individuals into different risk categories. As we had hoped, the activity served as a convenient discussion starter for the presentation of our vision of the work of actuarial science in every day life.

Furthering the Effort

Though our primary goal was to introduce actuarial science to high school students through our presentation, we did not want the effort to stop there. With the help and donations of Ball State University's Department of Mathematical Sciences, we were able to provide each classroom of high school students with a video and pamphlet created by the Society of Actuaries and the Casualty Actuarial Society providing more information about actuarial science. The Department of Mathematical Sciences also equipped us with brochures that provide students with more information about the unique opportunities at Ball State University's Center for Actuarial Science. Because these materials were distributed to teachers as well, we also hope that teachers will be able to continue sharing information about actuarial science with their future students so that the goal of making actuarial science known can be achieved.