ACADEMIC RISK AVERSION: AN EXPERIMENT TO INTRODUCE BUSINESS STUDENTS TO THE CONCEPTS OF RISK AND UNCERTAINTY.

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Abstract

This paper discusses an activity that may be used to introduce the concepts of risk and uncertainty to introductory or intermediate business students. The activity is an adaptation of one of Eckel and Grossman's (2003) monetary experiments to an academic setting. I tried the activity with students in a Managerial Economics class at a mid-size public university during the fall quarter of 2004. The students first completed a survey that elicited information that could help explain the students' risk taking behavior, and then faced a hypothetical gamble that involved their grade in the class. I used the results of the survey and gamble choices to demonstrate the concepts of expected value, standard deviation, and degree of risk aversion. Finally, I used the results from the activity to analyze the determinants of the students' academic risk taking behavior. I found that the student's GPA and degree of academic-risk aversion were directly related; that older (and presumably more mature) students took lower risks with their grades; and that students who thought that they had a reasonable shot at getting an A in the class took lower risks with their grades, whereas students who thought they could get an F chose riskier academic gambles.

Academic Risk Aversion: An Experiment to Introduce Business Students to the Concepts of Risk and Uncertainty.

Introduction

Students often express dissatisfaction with theoretical lectures because they fail to see their applicability or their usefulness (see for example the discussion in Marburger (2003)). To close the gap between theory and practice instructors normally respond by presenting case studies, showing videos, or performing simulations and experiments in class. Classroom games and simulations in particular are becoming very popular among instructors and there is a burgeoning wealth of such experiments in books (see e.g., Bergstrom and Miller (2000) and Anderson and Chasey (2002)), in journals (see e.g., The Journal of Economics Education and The Journal of Economics Perspectives) and on the web (see e.g., Charles Holt's website www.people.virginia.edu/~cahzk/teaching.html). For an introduction and advice on teaching with classroom experiments, see Holt (1999).

This paper discusses a classroom experiment/activity that may be used to present the concepts of risk and uncertainty, both of which run in tandem with business decisions, to introductory and intermediate business students. In this activity, students are introduced to these concepts through a survey and a hypothetical gamble concerning their grades in the class.

The risk-experimental literature is rich in experiments in which subjects face real or hypothetical gambles such as the one I describe later in the paper. Some examples include Eckel and Grossman (2003), Bosch-Domènech and Silvestre (1999 and 2002), Holt and Laury (2002), Anderhub et al. (2001), and Kachelmeir and Shehata (1992), among others. The contribution of this paper does not lie on the gambles offered to the students themselves. Instead the contributions of the paper are twofold: (1) I modify and adapt one specific experiment developed in Eckel and Grossman (2003) to a classroom setting. More particularly, I rework their experiment so that instead of dealing with money, students gamble with their own grades. (2) I study the determinants of the students' risk attitudes towards grades (or the degree of academic risk aversion), including demographic characteristics, grade expectations, and natural academic ability.

Design

I tried the experiment in a Managerial Economics class at a midsize public University in the Fall Quarter of 2004. There were 31 students registered in the class. The average student in the class was 22 years old and the average GPA was 3.01. There were 10 female students (21 males), and 25 white students (6 black students). All but three students were seniors. The class was structured as follows. There were 1,000 possible points to be awarded in the class. There were three exams, each worth 200 points (or 20 percent of their grade). Classroom participation, occasional homework problems, classroom experiments and activities, and attendance during classroom experiments and activities made up for the remaining 400 points (40 percent of the grade).

Students were told in advance that on the day of the experiment they could earn a fixed number of the class participation points by getting involved in the experiment. No points for participation had been awarded prior to this date.

The activity had three parts, one survey, a gamble, and a follow up discussion. Students were first asked to complete a survey about their attitudes towards grades. Students were awarded a fixed number of participation points for completing the survey, and were told that they could, if they chose to, gamble some of those points later on. In part 2 of the activity, students faced five hypothetical gambles each involving two equally likely outcomes. Students were asked to (hypothetically) gamble with the participation points earned by completing the survey. A description of the five gambles is presented in Table 1. This part of the activity is an adaptation of Eckel and Grossman's abstract monetary gamble (Eckel and Grossman 2003, pp. 4-5).

Table 1

Grade gamble choices

Gamble choice	Possible Outcomes	Probability of each outcome occurring	Payoff of each outcome	Expected Payoff
1	A	50 percent	10 points	10 points
	B	50 percent	10 points	
2	A	50 percent	15 points	10 points
	B	50 percent	5 points	
3	A	50 percent	18 points	10 points
	B	50 percent	2 points	
4	A	50 percent	22 points	10 points
	B	50 percent	-2 points	
5	A	50 percent	30 points	10 points
	B	50 percent	-10 points	

All five gambles pay 10 points on average (or 1 percent of the overall grade), but the spread of the possible outcomes (and hence the level of risk), increases with the gambles. For example, gamble 1 pays 10 points for sure and involves no risk. Gamble 2 also pays 10 points on average but it involves some risk (standard deviation = 5 points). The last two gambles involve possible negative outcomes and higher risk (standard deviations of 12 and 20). In the third and last part of the activity students and I discussed the experiment and results.

Procedure

The experiment was conducted in a manner similar to Eckel and Grossman (2003, pp. 5-6). The students were seated in the same room but on separate desks. Each student was given a folder containing the survey, and a gamble selection sheet. The survey is summarized in Table 2, and the gamble selection sheet (including instructions) is provided in the Appendix. Instructions were provided in writing and were also read aloud in front of the class. Students first completed the survey, which elicited background information (such as sex, age and incoming GPA) as well as information on some of the student's study habits. The information collected from the survey (and summarized in Table 2) was later used to study the determinants of the student's degree of academic risk aversion.

Table 2

Description of variables and summary statistics from survey

Name	Description	Mean	St. Dev.	Sum
GPA	Student's cumulative grade point average	3.01	0.53	93.20
Age	Student's age in years	22.19	6.24	688
Gender	Dummy variable =1 if student gender is female =0 otherwise	0.32	0.46	10
Race	Dummy variable =1 if student race is white =0 otherwise	0.81	0.40	25
Classification	Categorical variable =1 if student is a freshman =2 if sophomore =3 if junior =4 if senior	3.90	0.30	121
StudyHours	Number of weekly hours devoted to study during the typical quarter	10.63	17.39	329.5
Preparation	Categorical variable =1 if student never prepares for lectures in advance =2 if sometimes =3 if usually =4 if always	2.97	0.60	92
ExtraCredit	Categorical variable =1 if student never completes extra credit assignments =2 if sometimes =3 if usually =4 if always	3.23	0.72	100
PA	Student's perceived chances of getting an A in this class	0.42	0.29	13.05
PB	Student's perceived chances of getting an B in this class	0.34	0.19	10.64
PC	Student's perceived chances of getting an C in this class	0.19	0.16	5.88
PD	Student's perceived chances of getting an D in this class	0.04	0.05	1.11
PF	Student's perceived chances of getting an F in this class	0.01	0.03	0.40

After completing the survey, students put the completed survey back on the folder and took out the gamble selection sheet. They then chose one of the five gambles listed on the sheet. Before making a choice they were told that no matter which gamble they chose to play, each of the possible outcomes had a 50/50 chance of occurring, and that the outcome of the gamble (either event A or B) would be determined with the roll of a die. More specifically, they were told that a student would be selected at random from the class to roll the die. If the student rolled a one, two or three, the outcome of the gamble would be event A (the most favorable of the two possible outcomes). If the student rolled a four, five or six, outcome B would result.

Excluding the follow-up discussion/lecture, the entire experiment took approximately 15 minutes to perform.

Results

The frequency of gamble choices is summarized in Table 3. Four students chose gamble number 1. These students are considered risk neutral with respect to their grades, or academically risk neutral. Most students exhibited risk seeking behavior when it came to their grades by choosing gambles 3 or 4, but only two students chose the riskiest gamble (gamble 5).

Table 3

Gamble choices

Gamble Choice	Frequency
1	4 (12.9%)
2	4 (12.9%)
3	11 (35.5%)
4	10 (32.3%)
5	2 (6.5%)

To study the determinants of academic risk aversion, I calculated correlation coefficients between the gamble choice and the variables constructed from the survey. As can be seen in Table 4, GPA and academic risk aversion were directly related: the higher the student's GPA, the smaller the risk taken. It also turned out that older students took lower risks with their grades; and that students who thought they had a reasonable shot at getting an A in the class took lower risks, whereas students who thought they could earn an F chose riskier gambles.

Concluding Remarks

In this paper I discuss an activity or experiment (based on Eckel and Grossman (2003)) that can be used to introduce the concepts of risk, uncertainty, and risk aversion in a fun, practical way. Since the activity is designed using their grades, students are naturally interested in participating. The data collected from the experiment can also be used to discuss basic statistical concepts and regression analysis.

In the activity students are asked to hypothetically gamble with their grades. Results of the experiment in a Managerial Economics class in the Fall of 2004 revealed that GPA and academic-risk aversion were directly related; that older students took lower risks with their grades; and that students who thought that they had a reasonable shot at getting an A in the class took lower risks with their grades, whereas students who thought they could get an F chose riskier gambles.

Table 4

Grade Gamble Correlates

	Correlation coefficient between gamble choice and	
GPA	-0.33	*
Age	-0.32	*
Gender	-0.10	
Race	-0.05	
Classification	0.12	
StudyHours	-0.17	
Preparation	0.05	
ExtraCredit	0.02	
PA	-0.34	*
PB	0.15	
PC	0.29	
PD	0.24	
PF	0.38	**
Significance level: * 10%, ** 5%		

During the discussion of the experiment, students claimed that the hypothetical nature of the gamble did not influence their choices. They did argue however that if the number of points at stake (or the percent of the overall grade in the class at stake) had been higher, their choices would have been different. An immediate extension of this work is to design a more comprehensive experiment in which students are offered gambles with different expected payoffs.

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Appendix: Gamble Instructions and Form

This Appendix contains the instructions and gamble selection sheet. Both of these are modeled after Eckel and Grossman (2003).

Gamble Selection Instructions: Consider the five gambles listed in your Gamble Selection Sheet. <u>Pick the gamble you would like to play, by writing an **X** next to it under the "your selection" column</u>. After you have chosen which gamble you want to play, I will collect this sheet from you. After I have collected the gamble selection sheets from all students, I will randomly select a student from the class to roll a die to determine the outcome of the gambles. If the die lands on one, two or three, the outcome will be event A. If the die lands on four, five or six, then outcome will be event B.

When choosing the gamble, I want you to think that you are gambling with the participation points you earned by completing the survey. If you choose either gamble 4 or 5, and outcome B occurs, your total participation points would be reduced by 10 or 20 points respectively. By choosing gambles 1, 2 or 3 however you would earn extra points with certainty.

Gamble Selection Sheet

Gamble choice	Possible outcomes	Probability of each outcome occurring	Payoff of each outcome	Your selection
1	A	50 percent	10 points	
	B	50 percent	10 points	
2	A	50 percent	15 points	
	B	50 percent	5 points	

3	A	50 percent	18 points
	B	50 percent	2 points
4	A	50 percent	30 points
	B	50 percent	-10 points
5	A	50 percent	40 points
	B	50 percent	-20 points