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PETER KENNEDY, Section Editor

Crime in the Classroom: An Economic Analysis of Undergraduate Student Cheating Behavior

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Alfred Marshall described economics as being the study of man in the ordinary business of life. Unfortunately, for some students, cheating has become an ordinary part of life. Economic models can be used to describe and explain cheating behavior. The purpose of this article is to develop such a model and use it to analyze reported student cheating behavior. We also discuss the similarities and differences between cheating and the crime of theft. Information about the incidence of cheating and student attitudes toward cheating were obtained from a survey. The results of the survey indicate that a surprisingly large percentage of students admit to some form of cheating during college. An analysis of the survey also indicates that the propensity to cheat declines as grade point average increases.

CRIME AND CHEATING

Studies into the economics of crime date to Edwin Chadwick (1829). Chadwick found criminals to be rational individuals, who considered the

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benefits and the costs of their actions. Since 1968, the economics of crime has gained much attention. The works of Becker (1968), Ehrlich (1973), Reynolds (1980), Stigler (1970), and others have supported Chadwick's findings and developed formal economic models of criminal behavior. Interesting extensions of the work of Becker include the work of McCormick and Tollison (1984).

Crime is easily described in terms of the agents and agencies involved. First, some legal authority or law establishes property rights. Some "police" force is charged with enforcing the law. Some criminal violates the property rights of unconsenting parties for personal gain. The police protect private property rights and apprehend criminals.

In the economic approach developed by Becker (1968) and others, crime can be viewed as a rational act. The supply of criminal acts is a function of the expected costs and benefits of committing those acts. The benefits from crime are relatively straightforward—a criminal steals a good to enjoy the benefits the good provides. The greater the expected benefits from committing criminal acts, the greater the expected frequency of those acts.

The costs of crime are more complicated because the offender must be caught to be punished. The higher the probability of capture, other things equal, the lower the expected incidence of crime. However, even after apprehension, a suspect is assumed to be innocent until proven guilty. A court system or judge must determine guilt. *Ceteris paribus*, a higher probability of conviction will lead to a lower incidence of crime. Once guilt has been determined, the offender is punished, and, other things equal, the more severe the punishment, the lower the incidence of crime. Higher probabilities of capture and conviction, as well as more severe penalties, are expected to have a deterrent effect on crime. The rational criminal weighs the benefits and costs of crime.

It is easy to draw an analogy between cheating in the classroom and the crime of theft. There are laws governing cheating that usually take the form of an honor code.¹ To some degree, the type and extent of precautions that professors take to deter cheating is influenced by the nature of the honor code system at their university. A strictly enforced honor code can act as a substitute for strong measures on the part of instructors. Clotfelter (1977) makes this point in relation to the demand for protection against crime in general, noting a large degree of substitutability between publicly provided police forces and privately provided security measures. In the classroom, the professor, proctors, and fellow students act much like policemen, ready to apprehend violators. The cheating student is the criminal, taking information from illegal sources.

The benefit to the student of cheating is a higher exam score, a higher subsequent course grade, a higher subsequent grade point average, and possibly a better job offer upon graduation. In order to be punished, the offending student must be caught cheating. The suspected cheater must be found guilty by the honor court, and some punishment imposed. Higher

probabilities of apprehension and conviction as well as higher penalties are expected to deter cheating, because they raise the expected costs of cheating.

Despite the similarities between cheating and the crime of theft, cheating is different in at least two important respects. A professor has a great deal more scope to affect the costs of cheating than a mayor or policeman. For example, Reynolds (1980) found that increased population density increased the incidence of crime by lowering the costs of search to the criminal. A professor can, in many cases, disperse the class during examinations, reducing density and increasing the costs of cheating. In addition, making several versions of an exam can effectively reduce the density of good "targets" and raise the costs of cheating. Malinowski and Smith (1985) found that even students high in moral judgment are more inclined to cheat when the temptation is strong. Professors can reduce this temptation by taking the above measures. Unlike professors, mayors cannot order citizens to disperse themselves or move their property to increase search costs for the criminal and thereby make crime more expensive.

There is another important distinction between cheating and the crime of theft that arises because of the public good dimension of exam answers. Unlike the watch stolen from its owner, answers on exams are not taken from the owner, but only copied. The "victim" still has the answers. The cheating student is free-riding on the answers of others. Cheating students could be excluded from copying by their "victims" because the victims could move to another seat or cover their answers. This may not occur because the victims may not be victims at all, but conspirators, working in concert with the cheaters. Helping a friend pass an exam may bring pleasure. Consistent with this thesis, Houston (1986) finds that answer copying is positively related to the degree of acquaintanceship. Helping others cheat costs very little because only answers are transferred, not points on the exam.²

From the professor's point of view, the free-riding being done by the cheater is a serious problem. The professor's goal is to produce knowledge, but knowledge will be underproduced in the presence of free-riding. Students who successfully cheat can enjoy the benefits of high grades without actually studying and learning the material. Measures to prevent cheating reduce this free-riding behavior.

SURVEY AND SURVEY RESULTS

The objective of our survey was to investigate student attitudes toward cheating, student perceptions of the incidence of cheating, and student perceptions of the penalties imposed for cheating. The survey was administered to 476 students in two principles of microeconomics courses. A copy of the questionnaire, including the raw response data, is given in Table 1.

Over 80 percent of the students responding indicated that they had observed another student cheating on an exam or a written assignment. Fifty percent of the students responding said that they had seen another student get caught cheating.

TABLE 1
Survey Questions and Frequency of Responses

1. Have you ever observed another student cheating on an exam or on a written assignment?					
A. Yes	383	(272)			
B. No	93	(65)			
NR	0	(0)			
2. Have you ever seen another student get caught cheating?					
A. Yes	238	(156)			
B. No	238	(181)			
NR	0	(0)			
3. Based on your experience in large sections where multiple-choice testing is used, what percentage of students do you think cheat on a typical exam?					
A. No more than 1%.	37	(27)	D. Between 20% and 30%.	53	(45)
B. Between 1% and 10%.	235	(148)	E. More than 30%.	27	(16)
C. Between 10% and 20%.	123	(100)	NR	1	(1)
4. Have you ever cheated on a test or written assignment?					
A. Yes	239	(179)			
B. No	237	(158)			
NR	0	(0)			
5. If you answered yes to question 4, have you ever been caught?					
A. Yes	17	(14)			
B. No	288	(209)			
NR	171	(114)			
6. Do you know anyone who routinely cheats on exams?					
A. Yes	135	(98)			
B. No	341	(239)			
NR	0	(0)			
7. If you are caught copying another student's answers on an exam what would you expect to happen to you?					
A. Nothing more than a reprimand.				16	(12)
B. Be forced to retake the exam.				127	(90)
C. Have your course grade be lowered by a letter or more.				86	(63)
D. Receive an F in the course.				186	(132)
E. Be suspended from the University for at least one quarter.				59	(39)
NR				2	(1)
8. Of the cheating you've observed, do you think it generally is "panic" cheating or "premeditated" cheating?					
A. Panic	358	(249)			
B. Premeditated	110	(82)			
C. NR	8	(6)			
9. In your opinion, cheating at Auburn is:					
A. not a problem.			102	(65)	
B. a trivial problem.			242	(177)	
C. a problem deserving some concern.			123	(89)	
D. a serious problem.			7	(5)	
NR			2	(1)	
10. My current classification is:					
A. Freshman	7	(7)	D. Senior	30	(0)
B. Sophomore	329	(329)	E. Other	0	(0)
C. Junior	109	(0)	NR	1	(1)
11. My current grade point average is:					
A. 3.5-4.0	50	(36)	D. 2.0-2.5	127	(87)
B. 3.0-3.49	110	(77)	E. Less than 2.0	23	(19)
C. 2.5-2.99	159	(113)	NR	7	(5)

Notes: The first number is the total response. The numbers in parentheses refer to freshmen and sophomores only. NR refers to no response.

Forty-three percent of the students indicated that they believed at least 10 percent of their classmates cheated on a typical exam. The survey further indicated that fully 28 percent of the respondents knew someone who routinely cheated on exams. When asked if they had ever cheated on an exam or written assignment, a surprising 50 percent admitted to having cheated.³ Although this percentage may seem to be alarmingly high, it is typical of the results reported by others. For example, in a study of engineering students, Singhal (1982) found that over 56 percent of the students admitted to cheating, whereas less than 4 percent were caught. In a similar study, Haines, Diekhoff, LaBeff, and Clark (1986) found that 54 percent of students admitted to cheating in some form. In a controlled experimental study of student reporting of grading errors, Cloninger and Hodgin (1986) found that over 85 percent of students who received erroneously high grades failed to report them, while 93 percent of the students who got mistakenly low grades did report them to their professor.⁴

When asked what they expected would happen to them if they were caught cheating on an exam, 65 percent of the students said they expected they would retake the exam or receive an F for the course. If a student is already failing the course, these penalties may not be much of a deterrent. This result is consistent with the findings of Houston (1983), who examined the deterrent effect of various penalties on classroom cheating behavior. He found that only the strongest penalty had a deterrent effect, and then only for those students who had done well on previous exams.

The student attitudes toward cheating were also surprising. Over 70 percent of the students surveyed either considered cheating not a problem, or a trivial problem. In light of the high incidence of cheating, this result may suggest that students do not consider cheating a serious offense.

THE MODEL

A number of recent studies have examined the frequency of, and motivation for, cheating behavior among college students. Most of these studies have simply reported descriptive statistics of survey responses or calculated simple correlations between variables (e.g., Barnett and Dalton 1981; Haines et al. 1986; Tom and Borin 1988; Singhal 1982; and Stevens and Stevens 1987). Cloninger and Hodgin (1986) applied the economic approach to criminal behavior in their study of student reporting of grading errors and found that the students behaved in accordance with predictions derived from economic theory. Building upon this work, we applied the economics of crime to the analysis of survey data we obtained from students in two large principles of economics classes.

Although our survey results provided some insight into the incidence of cheating, the analysis was incomplete because other important factors in the decision to cheat had not been held constant. To further investigate the incidence of cheating, we developed a regression model. The dependent variable was a latent variable measuring the student's propensity to cheat. This

variable was not observed, but what was observed was the student's response to the cheating question on the survey.⁵ This variable, called UCHEAT, took the value 1 if the individual cheated in college and 0 otherwise. Because the dependent variable was a dichotomous variable, logit models were estimated.⁶ The model explained the propensity to cheat. The propensity to cheat was modeled as a function of the following variables that were used as proxies for the perceived benefits and costs of cheating:

$$\text{UCHEAT} = f(\text{GPA}, \text{SEECHEAT}, \text{CCAUGHT}, \text{SEVERE}, \text{PERCENT}, \text{OPINION}, \text{ROUTINE}, \text{SEEC})$$

Grade point average, GPA, should be negatively related to the propensity to cheat. An individual with a high GPA would have, on average, less to gain from cheating than a student with a low GPA. On the other hand, a student with a high GPA might have more to lose if caught cheating than a student with a low GPA. For example, a student with a high GPA who is caught cheating may be excluded from various clubs and honorary organizations normally accessible to those with high GPAs. Also, a failing grade assigned for cheating would cause a high GPA to fall more than a low GPA, other things equal. Inclusion of this variable was also consistent with the previous findings that GPA is inversely related to the probability of cheating (Houston 1983; Haines et al. 1986; Gardner, Roper, and Gonzalez 1988).

The independent variable SEECHEAT was a dummy variable that took the value 1 if the student had seen another student cheat on an exam. This variable was expected to be positively related to the propensity to cheat. Students seeing classmates cheat might feel that cheating was not really that bad, especially if the cheaters were not caught. As a result, students may have felt that the probability of detection was low or that there was less of a stigma attached to cheating.

The independent variable CCAUGHT was a dummy variable that took the value 1 if the student observed another student caught cheating and 0 otherwise. This variable was expected to be negatively related to the propensity to cheat. Seeing another student caught cheating should provide a significant deterrent effect. Observing the apprehension of another student might indicate that the probability of capture was high.

The variable SEVERE was a measure of the student's perception of the penalty if he or she were caught and convicted of cheating on an exam. As the student's perception of the severity of the punishment increased, the propensity to cheat was expected to decline. If the student expected only to be reprimanded or be forced to retake the exam, the punishment was very light, and SEVERE = 0. If the student expected to have the course grade lowered by a letter or more, to fail the course, or to be suspended, the punishment was stronger, and SEVERE = 1. This variable was expected to be negatively related to the propensity to cheat. Alternatively, one could consider the lowered course grade or failing the course as not severe punish-

ments if the student expected to do poorly enough without cheating that he or she expect to have a low grade or fail anyway.⁷

An indicator of the climate for cheating was given by the variable PERCENT. This variable measured the student's perception of the percentage of students who cheated on exams. A student's perception that a large percentage of students cheat on exams was consistent with the belief that the probability of capture was low and that cheating was not perceived to be much of a crime because many are cheating. As with the variable SEECHEAT, PERCENT was expected to be positively related to the propensity to cheat. Whereas the variable SEECHEAT was a dummy variable indicating whether or not the individual had ever observed someone else cheating, PERCENT asked for further detail on what perceptions were regarding the percentage of students that cheated.

Also included as explanatory variables in the regression model were OPINION and ROUTINE. OPINION was equal to 1 if the student believed that cheating was either not a problem or a trivial problem, and 0 otherwise. ROUTINE was equal to 1 if the student knew someone who regularly cheated on exams. Both of these variables could be expected to be positively related to the propensity to cheat. OPINION measured the stigma attached to cheating, and ROUTINE might indicate something about the character of the student's friends and associates.

As a final explanatory variable, we constructed an interaction variable SEEC between SEECHEAT and CCAUGHT. The variable should be negatively related to the propensity to cheat because it provided information about the likelihood of capture.

RESULTS

The results of the logit estimation are contained in Table 2. To make the sample more homogeneous with respect to the amount of time the students had spent in college and thus the opportunities they had had to cheat, we excluded from our econometric analyses all upper-class students.⁸ Our new sample contained only 7 freshmen and 329 sophomores. Because the survey was administered during the fall and winter quarters, nearly all students would have been in school either four or five academic quarters, assuming they made normal academic progress. We thus limited our analyses to those students who had cheated within, roughly, the previous year.

Four versions of the model were estimated. The chi-square statistics indicated the overall significance of the regression in each case, and most of the coefficients had the expected signs. The statistically significant coefficients included GPA, which bore the expected inverse relationship to the propensity to cheat. The estimated coefficient was fairly stable across the four specifications, always being between $-.78$ and $-.96$. When evaluated at the sample means, this logit coefficient translated into a decline in the probability of having cheated in college of .23 for each one-point increase in GPA.

TABLE 2
Logit Results for the Probability of Cheating

	1	2	3	4
GPA	-.7765* (3.44)	-.9304* (3.86)	-.9488* (3.87)	-.9600* (3.88)
SEECHEAT	—	1.8386* (3.97)	1.7561* (3.71)	1.8061* (3.79)
CCAUGHT	—	.2777 (0.44)	.4004 (0.62)	.4355 (0.67)
SEVERE	.3160 (1.29)	.3011 (1.15)	.3603 (1.35)	.3702 (1.38)
PERCENT	—	—	.0380* (2.54)	.0393* (2.50)
OPINION	—	—	—	.3653 (1.37)
SEEC	—	.0977 (0.14)	-.0108 (0.01)	-.0606 (0.09)
ROUTINE	—	—	—	.1976 (0.71)
INTERCEPT	2.0802* (3.25)	.8413 (1.11)	.4514 (0.57)	.2991 (0.37)
CHI-SQUARE	13.1*	52.1*	59.4*	61.0*
NOBS	332	332	331	331

Note: Absolute value of asymptotic *t* ratios is given in parentheses.

*Indicates significance at the .05 level.

The estimated coefficient of SEECHEAT was large and statistically significant. The estimate was also stable across specifications, being near 1.8. When evaluated at the sample mean, this indicated that those students who saw others cheat had an increase in the probability of having cheated in college of .41.

The remaining statistically significant coefficient was PERCENT.⁹ This variable measured the student's impression of the percentage of the other students who cheated. The positive sign on this coefficient indicated that students had a higher propensity to cheat, the higher the percentage of others they perceived to be cheating. When evaluated at the sample means, this coefficient meant that a 10 percentage point increase in one's expectation about other students cheating was associated with an increase in the probability of having cheated in college of .10.

The relative magnitude of SEECHEAT and PERCENT might reflect the idea that actually observing other students cheat had a stronger influence on cheating behavior because it brought cheating closer to that individual's experience. This result was similar to evidence reported by Block, Nold, and Sidak (1981) and Feinberg (1980), who reported larger deterrent effects for antitrust enforcement measures which are closer, in some ways, to the individual firms studied.¹⁰

The OPINION, ROUTINE, and SEEC variables were included in different combinations in the four models estimated. ROUTINE and SEEC

had the expected signs, with the negative sign on SEECC indicating that those students who had observed both other students cheating and getting caught might have been deterred from cheating themselves. However, neither SEECC nor the other two variables were statistically significant in any of the three regressions in which they appeared.

The variable SEVERE had a positive sign, contrary to what was expected. However, it was not statistically significant in this specification or in the other specifications discussed earlier. Perhaps the expected punishments were not having a deterrent effect. The question asked students about the punishment *if caught*, and this result may reflect the belief among students that they were not likely to get caught.

CONCLUSION

This article has adapted the simple Becker crime model to obtain parameter estimates in a model of cheating behavior. The regression results suggest that cheating behavior is inversely related to GPA, directly related to observing others cheating, and directly related to the perception of the number of students who routinely cheat. The expected punishments did not have a statistically significant deterrent effect in the model. Student attitudes indicate that students apparently do not consider cheating a serious crime, which no doubt contributes to the high incidence of cheating.

NOTES

1. The Student Academic Honesty Code governs student behavior at Auburn University. Violations of this code may be reported by either students or faculty, although most are reported by faculty. The students are not charged with a responsibility to report violations, as is sometimes the case in universities with strict honor codes. All charges are heard by the Academic Honesty Committee, which is made up of four faculty members and three students of junior or senior standing. After hearing the charges and other evidence and any witnesses, the committee makes a recommendation to the vice president for Academic Affairs, who has the responsibility of making a judgment and imposing sanctions. These sanctions range from assigning a failing grade in the course to expulsion from the university. Appeals are heard by the president of the university, who has the final authority in the matter.
2. It is possible that allowing a friend to copy could result in a cost in points due to a curved grading scheme. Helping others do better may lower the curve and render the victim worse off. This cost may be zero or small and heavily outweighed by the benefits of helping a friend. It is also true that the potential costs, if caught in a cheating conspiracy, can be very high. We are making a distinction here between the direct costs of providing answers to a friend, which are certain to occur, with the potential costs from being caught, which are not certain.
3. The believability of survey results on cheating has, itself, been the subject of much research. Nelson and Schaeffer (1986) found that surveys tend to overestimate the incidence of cheating. Gardner, Roper, and Gonzalez (1988) found exactly the opposite, because the bias in reporting stems primarily from cheaters claiming not to cheat and not from non-cheaters claiming that they do cheat. Although survey data may suffer from shortcomings, surveys remain the predominant way data are gathered on cheating behavior.
4. Failure to report grading errors that result in erroneously high scores can be considered to be a form of cheating. However, this is somewhat different behavior from copying answers from another student, using unauthorized notes, giving or getting assistance during an exam, submitting someone else's work as one's own, or altering assigned grades on offi-

cial records, all of which are specifically enumerated violations of the Academic Honesty Code. Although it is undoubtedly true that different students have somewhat different personal notions about exactly what constitutes cheating, we assumed here that the students' notions of cheating were influenced in large measure by the Academic Honesty code, about which every student was informed at required incoming student orientation sessions. When students were asked informally about what kinds of actions they considered to represent cheating, their responses were all included in the specific behaviors enumerated in the Academic Honesty Code.

5. Our dependent variable indicated whether students had cheated in the past. We interpret this as an indication of the underlying propensity to cheat and discussed changes in this propensity as changes in the probability of cheating. Because we limited our analyses to those students who had not been in college for much over one year, we limited the problems from interpretation of reported cheating in the (recent) past as evidence of the probability of cheating at present. We caution the reader that our results should be viewed in this light.

Although our survey question did not specifically ask, we treated the response as representative of the student's experience at Auburn University. Because our survey was sponsored by the Student Government Association as part of their publicized inquiry into cheating behavior at Auburn University, we believe that our subjects were aware that the cheating question referred to their college careers. We also note that our sample average cheating percentages was very near that of Singhal (1982), whose cheating question referred specifically to the students' college careers.

6. Cloninger and Hodgins (1986) reported estimates of OLS, weighted least squares, and logit models, as well as the results of chi-square analysis. In the logit model estimate, the only explanatory variable included in their model was a score variable. We estimated a more fully specified econometric model that allowed us to draw conclusions about a wider range of factors that affected cheating behavior. See Maddala (1983, 15-16, 22-27) for a critique of OLS in this circumstance and for a discussion of logit models.
7. We estimated equations with SEVERE = 1 only for those students who reported expecting to fail or be suspended. The parameter estimate was negative but not statistically significant in each of the four models estimated. Other estimations were conducted with the expected punishments coded as separate dummy variables. Each of those variables by themselves was not statistically significant.
8. We also conducted logit analyses similar to those reported in Table 2 using all students together, including variables to represent their year in school. Those results were qualitatively similar to the results reported in Table 2.
9. The midpoint of the indicated range was used in the logit analyses.
10. In these studies, results were obtained allowing comparison of the relative importance of general antitrust efforts, industry specific efforts, and location specific efforts. Thus the term "closer" is used to reflect either geographic separation or product line separation. We thank an anonymous referee for making this point.

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