

## Pedagogy that Appeals to Good Students

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### Abstract

We examine the effectiveness of different teaching techniques utilizing a unique data set that allows us to match up student and instructor characteristics to assess their impact on students' interest in economics. We find that two techniques that are effective for all types of students are devoting a smaller portion of class time to lecture and a larger portion to discussion. However, the magnitude of the effects of these two techniques varies considerably by type of student. We also find that the impact of several other teaching techniques varies by type of student. We conclude that using a variety of teaching techniques is the most successful strategy to appeal to the broad range of learning styles adopted by "good" students.

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## 1 Introduction

A review of recently published articles on teaching economics to undergraduates reveals some consistent advice: use teaching methods that actively engage students in class. For example, Gremmen and Potters (1997) argue that students who participate in experimental games learn more, Marks and Rukstad (1996) advocate the use of the case method in teaching macroeconomics, Johnston, James, Lye and McDonald (2000) find positive effects of collaborative learning techniques that involve group problem solving, and Frank (1998) suggests that economics can become more exciting when in-class debate is used. After conducting an overall review of the undergraduate economics major, Siegfried, Bartlett, Hansen, Kelley, McCloskey, and Tietenberg (1991) also give strong support to pedagogy that requires active learning.

In spite of this overwhelming advocacy of more interactive teaching techniques, economics instructors have been slow to abandon the mostly lecture/exam format. Becker and Watts (1996) find that the median economics instructor spends 83 percent of class time lecturing and uses multiple choice exams at least half of the time. Benzing and Christ (1997) reach a similar conclusion, with 86 percent of their respondents reporting that they lectured all the time or very often.<sup>1</sup> Goldin (1991) suggests that a heavy emphasis on publications in tenure and promotion decisions is one of the reasons why economics instructors have been unwilling to abandon the less-engaging lecture format. However, our data show that teaching methods do not vary substantially from these norms even at liberal arts colleges in which teaching quality is often an

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<sup>1</sup>While 56 percent of the Benzing and Christ respondents indicated that they had changed their teaching methods within the past 5 years to include more participatory activities, these survey averages suggest that the changes were not substantial.

important determinant of tenure and promotion.<sup>2</sup> One can think of several possible explanations for this. Perhaps research expectations are high enough at the schools in our sample that Goldin's suggestion applies to our sample as well. Perhaps instructors do not rely extensively on interactive teaching techniques because of inexperience with these techniques. Finally, it may be possible that economics instructors do not believe that the quality of their courses would be improved by adopting different teaching methods.

This paper offers a comprehensive look at this last concern. It examines the effectiveness of different teaching techniques, utilizing a unique data set from 34 different liberal arts colleges that allows us to match up student and instructor characteristics to assess their impact on students' interest in economics. In particular, we evaluate specific teaching methods by determining how they affected the probability that students would change their minds about economics during the course of the semester. Successful techniques are ones that encouraged students (caused students who initially did not think they would take more economics to change their mind) and unsuccessful ones are associated with a higher probability of discouraged students (students who initially thought they would take economics but later decided not to do so.) Recognizing that students learn in many different ways, we evaluate these techniques for several different types of students, all of whom might be considered by some criteria to be "good students," as well as for all students. Overall, we are interested in answering two basic questions. First, are the teaching methods commonly employed by economists discouraging students, particularly "good" students, from continuing to study economics? And second, which teaching

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<sup>2</sup>In our sample of instructors at liberal arts colleges, the average instructor in the introductory class lectures the majority of class time and relies heavily on exams for determining final grades. Table 2, discussed below, presents some summary statistics from our sample.

methods are successful in encouraging students to continue in economics, particularly those students who may already be motivated to learn?

We find that two techniques that are effective for all types of students are less lecture and more discussion. The magnitude of the effects of these techniques, however, varies across types of students, even among various types of "good" students. Furthermore, while our results convincingly argue that introductory economics instructors should lecture less often, they do not identify a set of techniques that are an optimal replacement. In fact, our results suggest that different types of students respond differently to many pedagogical techniques. Using a variety of techniques is likely to give an instructor the best chance of reaching the broadest range of students.

These results are developed in the following three sections. Section 2 discusses what we mean by "good students" and how we identify them in our sample. Section 3 presents our main estimation results, and section 4 concludes.

## **2 What is a good student?**

A preliminary step in our analysis is to define what we mean by "good student." In fact, different students may have different strengths, each of which may enhance their ability to learn, but choosing only one or two criteria for identifying them may not capture all strengths.<sup>3</sup> For this reason, we use alternative means of identifying good students and compare and contrast the

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<sup>3</sup>Almost all of the students in our data set attend fairly selective liberal arts colleges and might be considered to be "good students" for this reason alone. This fact makes it less likely that we would find differences between the subgroup that we identify as good students and the remainder of the sample.

results we obtain. Although in many cases, this prevents us from making an overarching claim about the effectiveness of various pedagogical techniques, we believe this approach is valuable because it allows us to assess their impact on several different kinds of students.

This study uses a unique data set that contains information about student characteristics, attitudes and opinions, as well as those of their instructor and their instructor's methods. We use our data to create five different measures of good students.<sup>4</sup> The first is a gauge of a student's past success in college, relative to his or her classmates. We calculate the ratio of each student's self-reported GPA to the average GPA of all students in the class. We then classify any student for whom this ratio is greater than one to be a good student and set the dummy variable, HIGHGPA, equal to one. This measure identifies students who have performed above average in a variety of classes. Since even the first year students in our sample would have had several classes during their first semester, this measure of success reflects input from different instructors, and, most likely, different disciplines. A drawback to this measure, however, is that these are students who have succeeded, given current teaching practices. If students have not been exposed to a variety of teaching methods, using this measure of good student will not allow us to shed light on the effectiveness of less popular measures. In particular, our findings may only tell us that students who have done well in the past will continue to do well if we perpetuate current practice.

Our second means of identifying good students also relies on past success—in this case,

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<sup>4</sup>The data we utilize contains 1,776 observations from students surveyed while taking their first college-level economics class at one of 34 different liberal arts colleges in the Spring of 1999. See Jensen and Owen (2000) for a more detailed description of the survey methodology and an overview of the data. The data are available at <http://academics.hamilton.edu/economics/aowen/annowen.html>.

student performance on a standardized test. For this measure we calculate the ratio of each student's self-reported total SAT score to the average total SAT score of all the students in the class. We set the dummy variable, HIGHSAT, equal to one for students for whom this ratio is greater than one. As with our first measure, a disadvantage of focusing on this group of students is that they are also students who have demonstrated their ability to do well under current teaching practices and a very specific evaluation method: timed multiple choice exams.

Our last three measures of good student rely more on self-reported student characteristics rather than past academic performance. In addition to examining influences on students who have done well in classes and on SATs, we are interested in what affects students who like to think about problems and students who enjoy expressing their ideas and opinions. For students who agreed strongly (responded with the maximum rating of 5) with the statement "I like to think about problems that don't have clear cut solutions", we set the dummy variable, SOLVER, equal to one. We also consider a subset of these students: those who have higher than average GPAs compared to others in their class. Thus, PROBGPA equal to one corresponds to those students for whom both SOLVER equals one and HIGHGPA equals one.

Finally, the last dimension of student quality that we considered was the desire to participate in class discussions. For students with above average GPAs (HIGHGPA=1) who responded with the maximum rating of 5 to the statement, "I like classes in which there is an opportunity to express my ideas and opinions," we set the dummy variable EXPGPA equal to one. Therefore, these students are ones who like to contribute to the class and who also have

performed well in previous classes.<sup>5</sup>

We should point out that four out of the five ways we identify good students in our sample is by comparing them to other students at their college. We do this even though, in absolute terms, by some measures, the students at the bottom of the distribution at the most selective college would compare favorably to the students at the top of the distribution at the least selective college.<sup>6</sup> We do this because we are interested in determining what instructors can do to encourage the best students that are in the classes they have, not in determining what appeals to students at the top ten liberal arts colleges. Implicitly, our methodology assumes that the best students at the most selective college have something in common with the best students at less selective schools. If our assumption is incorrect and we have identified “good” students in a way that is not meaningful, then our results would be statistically insignificant.

In considering the appropriate way to identify good students, it is also important to recognize that three out of our five measures use student GPA in some way. Because grade inflation varies across colleges, it is difficult to pool students from all colleges with these measures. Furthermore, the C student at a more selective college might earn an A at a less selective college so, by using GPA in our measures, we are already making an implicit relative comparison. Explicitly making the comparison relative provides us with a measure that is easier to

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<sup>5</sup>We also asked students to rate the extent to which they agreed/disagreed with the statement “I do not like to speak in class.” While it is possible that some students may like classes in which there is an opportunity to express ideas and opinions but like to do so in written assignments rather than through class participation, the strong negative correlation between the responses to the two questions suggest that many of the students who like to express their ideas and opinions like to do so in class.

<sup>6</sup>For example, students with the lowest SAT scores at the most selective college might have higher SAT scores than those with the best SAT scores at less selective institutions.

interpret.

Table 1 presents the raw correlations of our five different measures of good student as well as three different measures of success in appealing to these students. Possible measures of success include whether or not students taking their first economics class want to continue in economics, (CONTINUE=1), whether they become encouraged (ENCOURAGED=1) during the semester, or whether they become discouraged (DISCOURAGED=1) during the semester. Encouraged students are those who did not intend to take more economics when they signed up for their first class but later decided they would, and discouraged students are those who did intend to take more economics classes when they signed up for introductory economics, but no longer think they will.<sup>7</sup> Because using CONTINUE as a measure of success is obfuscated by the fact that some students will take a second economics course to satisfy major requirements, we will focus our analysis on those students who actually changed their minds during the course of the semester and became either encouraged or discouraged.

The raw correlations in Table 1 suggest that the five indicators of good students are related but that they measure distinctive traits. The lowest correlations are between students who have above average GPAs or above average SAT scores and those who like to solve open-ended problems, suggesting that the desire to tackle complex problems is not an important trait of students who earn good grades or high test scores. The results in Table 1 also indicate that, on average, good students are not more or less likely to continue in economics or to become

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<sup>7</sup>Students who intended to take more economics when they signed up for the class are not eligible to be encouraged and are not used in any of the ENCOURAGED estimations. Likewise, students who initially did not intend to take more could not become even more discouraged and are omitted from the DISCOURAGED estimation.

encouraged or discouraged during the semester. In the next section, we examine the determinants of ENCOURAGED and DISCOURAGED more thoroughly and investigate teaching practices which affect these student outcomes.

### **3 Methodology and Results**

#### **3.1 Methodology**

As mentioned above, in order to gauge the impact of various teaching techniques, we focus on those techniques that increase the probability that students change their minds about their desire to study economics further during the course of the semester.<sup>8</sup> Specifically, in our initial investigation, we estimate binary probit models using ENCOURAGED and DISCOURAGED as the dependent variables and student, instructor, and class characteristics as the independent variables. Because some of the independent variables we use in the probit estimations may also be influenced by events in the classroom, we later investigate further the impact of teaching techniques on some of the student characteristics.

In determining the appropriate specification for our estimations, we need to recognize that our data set contains a number of highly related variables, each of which could arguably affect student choices. Because we have no strong theoretical grounds for selecting independent variables, we start with a very general model that includes student characteristics, instructor characteristics, and class and college characteristics. (See Table 2 for a list of the variables in the initial specification.) We also interact each independent variable with the good student measure to

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<sup>8</sup>Students were able to respond “yes”, “no,” or “not sure” to the questions “Did you intend to take more economics when you initially signed up for the class?” and “Do you intend to take more economics?” Any change in those responses would classify a student as either discouraged or encouraged. (For example, a student who responded “no” to the first question but “not sure” to the second question would have been considered an encouraged student.)

determine whether the effect of these variables differs for the group we have identified as “good students.” We then eliminated independent variables one at a time from each regression, removing variables that did not enter at the 5% significance level for at least one specification.<sup>9</sup>

### **3.2 Initial Results**

We turn first to results from the ENCOURAGED and DISCOURAGED estimations. While the full set of coefficients resulting from this procedure is detailed in the tables in the appendix, Tables 3 and 4 focus on a subset of the coefficients. These results show that both student and instructor characteristics influence student choice. Students who are more confident in their ability to understand economics (CONFIDENCE), who entered the course with a strong predisposition to major in economics (POSMAJOR), who think economics studies the ideas and issues in which they are interested (RELEVANT), and who expect to do well in the course relative to their other classes (RELGRADE) are more likely to be encouraged and less likely to be discouraged. In general, the results reported in columns 2 through 6 of Tables 3 and 4 do not support the hypotheses that CONFIDENCE, POSMAJOR, and RELGRADE have differential effects for good students compared to all students, but they do indicate that the relevance of economics can be particularly important for good students. Its effect, however, depends on our definition of good student. The positive sign on the interaction term of good student and relevant in column 2 of Table 4 suggests that the relevance of economics is less important for students with high GPAs, but the coefficients in columns 3 and 4 suggest it is more important for students

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<sup>9</sup>We simultaneously parsed down the specifications for the ENCOURAGED and DISCOURAGED estimations. Because we have six specifications each in the ENCOURAGED and DISCOURAGED equations, we eliminated only those variables that did not have a significant coefficient (at the 5% level) in one of 12 estimations.

with high SAT scores or those who like to solve problems. This latter result is also reinforced by the coefficients in columns 3 and 4 in Table 3.

The results in Tables 3 and 4 also suggest that pedagogical choices impact students and that they may have differential effects on different kinds of students. For example, while counting exams as a larger percentage of the grade (EXAM) does not affect students overall, Table 4 shows that it is associated with a lower probability of becoming discouraged for problem solvers and problem solvers with high GPAs. Similarly, problem solvers with high GPAs are more likely to be encouraged when exams count for a larger percentage of the grade. Column 1 of Table 3 indicates that spending a greater percentage of class time lecturing (LECTURE) is associated with a lower probability of encouraged students, and the results in columns 2, 4, 5, and 6 suggest that it is the better students who are less likely to become encouraged when classes are taught with more lecture. Interestingly, LECTURE has less effect on the probability of becoming discouraged, although column 2 of Table 4 shows that high GPA students are more likely to become discouraged when classes contain more lecture.

Spending a larger percentage of class time in group problem solving (GRPPROB) is associated with a lower overall probability of students becoming discouraged, but the results in column 3 of Table 4 suggest that this conclusion does not hold for students with high SAT scores. Column 6, however, indicates that high GPA students who like to solve problems are less likely to become discouraged when this technique takes up a greater portion of class time. Group problem solving does not, however, affect the probability of becoming encouraged in most cases.

Increasing the percent of the grade determined by participation does not affect either the probability of becoming encouraged or the probability of becoming discouraged overall. It does,

however, increase the probability that students with high SATs become encouraged and decrease the probability that these students become discouraged. Increasing the weight on participation decreases the probability that students who like to solve problems become encouraged, as shown by columns 4 and 6 in Table 3.

### 3.3 Further Results

While the results presented in Tables 3 and 4 support for the hypothesis that teaching techniques influence student choice about studying economics, they are incomplete. Some of the student characteristics we use as explanatory variables in the probit estimations can themselves be influenced by events in the classroom. In this section, we explore the determinants of three student characteristics that were consistently found to be important in our ENCOURAGED and DISCOURAGED estimations: RELEVANT, RELGRADE, and CONFIDENCE.<sup>10</sup>

Table 5 presents selected results from estimating the determinants of RELEVANT.<sup>11</sup> Once again, we find that students' characteristics matter. Students who initially were interested in current events, finance, or public policy or who thought economics would be important to their career were all more likely to think economics was relevant. Also, students who were not

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<sup>10</sup>Because RELEVANT, CONFIDENCE, and RELGRADE are not predetermined, the probit results reported in Tables 3 and 4 may be affected by endogeneity. However, when we utilize the test for exogeneity in a simultaneous probit model described in Rivers and Vuong (1988), we do not reject exogeneity in any of the probit estimations reported.

<sup>11</sup>The results for the full specification are available in the appendix tables. We followed the same parsing down procedure for determining the specification for the equations discussed in this section that we used with the equations reported earlier. The results reported for RELEVANT and CONFIDENCE are from OLS regressions. However, because these variables are student responses measured on a scale of one to five, they can also be estimated as ordered probits. Doing so does not change any of the qualitative conclusions we draw above.

comfortable with graphs were less likely to think that economics discussed the ideas and issues in which they were interested. The influence of the discomfort with graphs was particularly strong for good students who like to solve problems, high GPA students who like to express themselves in class, and high GPA students who like to solve problems.

In addition to student characteristics, instructor choices about pedagogy also influenced students' perception of relevance. Two teaching techniques that had a particularly noteworthy effect on student's perception of relevance were the amount of class time devoted to lecture and to discussion. While devoting more time to discussions in class did not generally affect students' judgement that economics studies the ideas and issues in which they were interested, it was an effective technique for several subgroups of students. Students with high GPAs, students with high SAT scores, students with high GPAs who like to express their ideas and opinions in class, and problem solvers with high GPAs all were more likely to think that economics was relevant when the class incorporated more discussion. This does not necessarily lead to the conclusion, however, that less lecture time also leads these same groups of students to think economics is more relevant. While the negative coefficients on the lecture variable in columns 2 through 6 of Table 5 indicate that devoting more class time to lecture leads students to conclude that economics is less relevant, adding back the interaction term for high GPA students, high SAT students and problem solvers with high GPAs suggests that, for these students, more time spent lecturing does not have this effect. Perhaps, for these students, learning through lecture is a practiced and comfortable way of learning. It is noteworthy, however, that high GPA students who like to express themselves in class do not have this positive interaction.

Table 6, the determinants of students' relative grades, shows some effects similar to those

above: students who enter the class with a predisposition to major in economics or an interest in finance and those who are more comfortable with graphs are more likely to have higher relative grades. Interestingly, high GPA and high SAT students who have an interest in public policy are more likely to have lower relative grades.

Examining the effects of various pedagogical choices made by the instructor reveals several interesting results. Counting exams as a larger percentage of the grade is associated with lower relative grades, except for students who have identified themselves as problem solvers. Spending a larger percentage of class time in group problem solving activities improves the relative grades of all students and devoting more class time to lecture also tends to increase students' relative grade. Our results suggests that high GPA students, in particular, do well in classes in which the instructor spends more time lecturing. This is consistent with our earlier suggestion that for these students, learning through lecture is a skill that they have learned well. Counting participation as a larger share of the grade is associated with lower relative grades in two out of the six specifications in Table 6, but slightly higher relative grades for high SAT students and problem solvers. Finally, doing a warm-up activity at the beginning of the semester results in higher relative grades for most students, and this effect is particularly strong for high GPA students.

Table 7 examines the determinants of students' confidence in their ability to understand economics. Many of the same student characteristics that influenced students' perception of relevance and their relative grade matter here as well (e.g., interest in finance and public policy or discomfort with graphs), but students' overall self-confidence, measured by the variable FREEZEUP, is also important. High GPA students are more likely to be confident when the

instructor devotes more class time to discussion, and problem solvers, high GPA students who like to express themselves in class, and high GPA students who like to solve problems are more confident when a larger percentage of the grade is determined by exams. As was the case in the relative grade estimations, the CONFIDENCE estimations reveal that all students benefit when more class time is devoted to group problem solving. Also similar to earlier conclusions, high GPA and high SAT students are more confident when more time is devoted to lecture. On the other hand, two of the six estimations presented in Table 7 suggest that counting participation as a larger percentage of the grade tends to decrease the confidence of all students.

### **3.4 The net effect**

The results presented in the previous two sections about the effectiveness of various teaching techniques often suggest opposite conclusions when viewed in isolation. Also, the sheer number of these results makes it difficult to identify important factors. In this section, therefore, we focus on a few variables under the instructor's control and calculate their net effect on student interest in economics.

Table 8 shows the results of increasing the value of specific variables by one standard deviation from the average on the probabilities of students becoming encouraged and discouraged.<sup>12</sup> In general, we find that teaching techniques have a greater impact on encouraging students than on discouraging them. Possibly, students are evaluating economics relative to other classes. If other introductory classes are not particularly interactive, then having a non-interactive economics class may not be discouraging. If the economics class is interactive, however, it may be

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<sup>12</sup>For some variables, a one standard deviation increase represents a considerably larger percentage increase than for others. For example, lecture is increased by 21.5 percent while group problem solving is increased by only 7.04 percent.

more likely to gain student interest because it is different from other introductory classes.

The calculations in Table 8 show that more lecturing reduces the probability of becoming encouraged across all groups of students, with the largest impacts on students who report that they like to solve problems, particularly high GPA problem solvers, and students with high GPAs who like to express themselves in class.

While allotting more time to discussion results in moderate increases in the probability of becoming encouraged for all groups of students, the effects of other pedagogical techniques vary across the groups. For example, problem solvers (both SOLVERS and PROBGPA) respond positively to group problem solving, but this technique lowers the probability of being encouraged for other students, particularly for high GPA students who like to express their ideas and opinions in class. Similarly, some groups of students respond positively to having participation count for a larger percentage of their grade, while this is associated with lower levels of interest among other students. It is interesting that problem solving students who had the strongest positive response to devoting more class time to discussion also had the strongest negative reaction to counting participation as a larger share of the grade—perhaps these students benefit from active discussion in the classroom even if they may not contribute to it themselves. The large increase in the probability of high GPA students becoming discouraged when participation is counted as part of the grade is also noteworthy, suggesting that some of these high performers have a strong dislike for participation that is encouraged by grades.<sup>13</sup> Finally, counting exams as a larger percentage of

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<sup>13</sup>This could occur either because 1) the students themselves do not like to participate, 2) like to participate but want their performance to be evaluated in other ways, or 3) because these students do not like the classroom environment when many students in the class participate for the purpose of getting a better grade. There is a modest negative correlation between being a “good student” and the response to the statement “I do not like to speak in class,” suggesting that the

the grade also affects students differentially, with problem solvers, particularly high GPA problem solvers, and high GPA students who like to express their ideas in class responding positively.

The results in Table 8 measure the success of a particular teaching technique by its ability to impact student interest in taking additional economics courses. Arguably, one might want to evaluate teaching techniques by other standards, such as measures of how much material students absorbed or to what degree their analytical abilities were sharpened as a result of the teaching methods used. While our study does not include direct objective measures of the knowledge that students gained, the estimations of relevant, confidence, and relgrade that appear in Tables 5 through 7 allow us to comment on this aspect of success. Confidence and relgrade are noisy measures of student performance, with the former being students' assessments of what they have learned and the latter being the instructors' assessments. Finally, the relevant estimation also provides some indirect evidence as to what techniques allow students to learn more because students who perceive the material to be relevant will be more likely to gain a deeper understanding of the material and to retain it.

Focusing only on these supplementary estimations yields an interesting result. High GPA students find the introductory economics courses more relevant, earn higher relative grades, and are more confident in their ability to learn economics when teachers lecture for a larger portion of class time. While this same result is not evident for our other subgroups of good students, it does suggest an interesting answer to the question we posed at the beginning of the paper: In the face of all the evidence in support of techniques that promote active learning, why do economics instructors rely so much on lecture? Perhaps, as former HIGHGPA students themselves,

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first explanation, a dislike of participating, is not the primary reason for this result.

economics instructors found lecture to be an efficient way of learning. Thus, reducing reliance on this technique would be inconsistent with their own personal experience.

#### **4 Conclusion**

This paper examines factors that influence students who change their minds about continuing in economics sometime during their first semester of economics. These groups of students are of particular interest to teachers of economics: something that happened during the semester "mattered" to these students. We are particularly interested in examining whether pedagogical choices made by instructors affect students' decisions about continuing in economics.

We find that pedagogical choices do matter, although we also find that our results differ across different types of students. Interestingly, things that happen in the classroom tend to have a larger effect on encouraging students who did not initially intend to take more economics to change their mind than on discouraging students who planned from the beginning of the first course to continue. Overall, our results suggest that students prefer classes that contain less lecture and more discussion. However, our results also suggest that students--even among various subsamples of "good" students--respond differently to techniques such as group problem solving, participation, and the use of exams as a means of evaluation. Using a variety of teaching techniques may be the most successful way of appealing to the broad range of learning styles adopted by good students.

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Table 1: Correlation Matrix

	Mean	SD	Encouraged	Discouraged	Continue	Highgpa	Highsat	Solver	Expgpa
Encouraged	.423	.494							
Discouraged	.205	.404	-.433**						
Continue	.515	.499	.754**	-.669**					
Highgpa	.521	.500	-.026	.025	-.034				
Highsat	.512	.500	.027	-.042	.013	.250**			
Solver	.226	.418	.013	-.018	.023	.061**	.064**		
Expgpa	.222	.416	.030	.032	.003	.511**	.170**	.290**	
Probgpa	.130	.337	.030	-.039	.037	.371**	.147**	.717**	.511**

\*\*indicates correlation is significant at the 5% level.

Table 2: Independent Variables used in Initial Specifications

	Mean	SD	Min	Max	Definition
<b>Student Characteristics</b>					
ADVICE‡	2.82	1.32	1	5	reason for taking class, advice of family or friends
CAREER‡	3.54	1.26	1	5	reason for taking class, importance to career
CONFIDENCE‡	3.68	1.01	1	5	student attitude—I understand the material as well as most of the other people in the class
CUREVENT‡	3.37	1.16	1	5	reason for taking class, interest in current events
FINANCE‡	3.65	1.12	1	5	reason for taking class, interest in finance
FREEZEUP‡	2.81	1.30	1	5	student attitude—often afraid will freeze-up on exams
GRADSCHOOL‡	2.95	1.07	1	5	student opinion—economics helps get into grad school
GRAPHS	2.332	0.80	1	4	Discomfort with graphs
JUNIOR	.090	0.29	0	1	1 if junior
POSMAJOR‡	2.58	1.53	1	5	reason for taking class, considering econ as a major
PUBPOL‡	3.27	1.15	1	5	reason for taking class, interest in public policy
RELEVANT‡	3.48	1.01	1	5	student attitude—economics helps me understand issues in which I am interested
RELGRADE	1.00	.064	0.6	1.24	expected grade/GPA
REQD‡	2.72	1.58	1	5	reason for taking class, required
SOPHOMORE	0.25	0.44	0	1	1 if sophomore
<b>Instructor Characteristics</b>					
COLLAB	10.66	12.29	0	60	% of grade for which collaborative work accepted
CURVE	0.68	0.47	0	1	1 if grade on a curve
DISCUSSION	13.50	11.52	0	60	% of class time spent in discussion
EXAM	71.97	13.39	30	100	exams—% of grade
GRPPROB	4.50	7.04	0	30	% of class time spent in group problem solving
LECTURE	65.05	21.57	15	95	% of class time spent lecturing
PARTICIPATION	2.89	4.42	0	15	participation—% of grade
TCHEXP	13.76	10.73	1	40	years teaching experience
TCHEXP2	304.3	397.4	1	1600	years teaching experience squared
WARMUP	0.35	0.48	0	1	1 if do warm-up
<b>Class/College Characteristics</b>					
BUSINESS	0.12	.33	0	1	1 if college has business major
CALCULUS	0.44	0.50	0	1	1 if major requires calculus
CLASSIZE	34.91	17.52	5	93	class size
COMBINED	0.47	0.50	0	1	1 if course covers both micro & macro topics
ECONBUS	0.14	0.35	0	0	1 if econ major can count 3 or more “business” courses towards major
MACRO	0.21	0.41	0	1	1 if intro macro

Total number of observations is 1,776 (excludes seniors and those not taking first college level economics course). Note that characteristics of smaller classes receive less weight in the calculation of average instructor and class characteristics because averages are weighted by student respondents. ‡ indicates variables measured on a scale of 1 to 5, with 5 being “strongly agree” or “very important”.

Table 3: Selected Probit Results; Dependent Variable: Encouraged

	Good Student Measures					
	(1)	(2)	(3)	(4)	(5)	(6)
		Highgpa	Highsat	Solver	Expgpa	Probgpa
Confidence	0.1470 (2.15)**	0.2411 (2.32)**	0.1719 (1.53)	0.1237 (1.54)	0.1628 (2.10)**	0.1479 (1.97)**
Goodstudent* Confidence		-0.1422 (1.00)	0.0392 (0.26)	0.0271 (0.18)	-0.1275 (0.74)	-0.2897 (1.37)
Posmajor	0.2605 (6.67)**	0.2434 (4.23)**	0.1999 (3.20)**	0.2350 (5.34)**	0.2758 (6.21)**	0.2574 (6.15)**
Goodstudent* Posmajor		0.0538 (0.69)	0.1110 (1.32)	0.3522 (2.97)**	-0.0103 (0.10)	0.4380 (2.20)**
Relevant	0.2101 (3.61)**	0.1792 (2.03)**	0.0500 (0.55)	0.2319 (3.55)**	0.2205 (3.33)**	0.2358 (3.80)**
Goodstudent* Relevant		0.0751 (0.66)	0.2601 (2.20)**	0.3624 (2.10)**	0.0898 (0.62)	0.3752 (1.63)
Relgrade	3.8121 (3.82)**	3.9802 (2.79)**	5.4479 (3.56)**	4.3508 (3.65)**	3.4962 (3.08)**	3.7913 (3.48)**
Goodstudent* Relgrade		-0.2695 (0.12)	-1.3640 (0.63)	-2.2917 (0.99)	4.3572 (1.52)	4.1519 (1.11)
Curve	0.1137 (0.91)	0.2481 (1.37)	0.2014 (1.03)	0.0459 (0.33)	0.2386 (1.71)*	0.1363 (1.04)
Goodstudent* Curve		-0.2142 (0.84)	-0.2524 (0.92)	0.2372 (0.61)	-0.7992 (2.17)**	-0.9349 (1.40)
Exam	0.0007 (0.15)	-0.0054 (0.78)	0.0104 (1.34)	-0.0010 (0.18)	-0.0010 (0.19)	-0.0023 (0.45)
Goodstudent* Exam		0.0098 (1.04)	-0.0115 (1.15)	0.0161 (1.29)	0.0105 (0.91)	0.0424 (2.61)**
Grpprob	-0.0128 (1.21)	-0.0085 (0.58)	-0.0246 (1.54)	-0.0178 (1.55)	-0.0052 (0.45)	-0.0137 (1.22)
Goodstudent* Grpprob		-0.0083 (0.39)	0.0108 (0.45)	0.0396 (1.29)	-0.0544 (1.55)	0.0689 (1.72)*
Lecture	-0.0065 (2.08)**	0.0006 (0.14)	-0.0129 (2.45)**	-0.0055 (1.55)	-0.0032 (0.91)	-0.0041 (1.20)
Goodstudent* Lecture		-0.0123 (1.91)*	0.0047 (0.68)	-0.0156 (1.82)*	-0.0191 (2.39)**	-0.0226 (1.76)*
Participation	0.0022 (0.15)	-0.0030 (0.15)	-0.0270 (1.20)	0.0062 (0.37)	0.0083 (0.53)	0.0100 (0.65)
Goodstudent* Participation		0.0140 (0.49)	0.0500 (1.65)*	-0.0941 (2.23)**	-0.0055 (0.14)	-0.1151 (2.32)**
Warmup	-0.4205 (3.23)**	-0.2836 (1.50)	-0.0969 (0.45)	-0.5012 (3.40)**	-0.4285 (2.89)**	-0.4391 (3.15)**
Goodstudent* Warmup		-0.3315 (1.22)	-0.6000 (2.04)**	0.4702 (1.21)	0.0130 (0.04)	0.6287 (0.94)
Observations	821	821	740	821	821	821

Robust z-statistics in parentheses. See Table A-1 for full set of coefficients.

\*\* significant at 5% level; \* significant at 10% level

Table 4: Selected Probit Results; Dependent Variable: Discouraged

	Good Student Measures					
	(1)	(2)	(3)	(4)	(5)	(6)
		Highgpa	Highsat	Solver	Expgpa	Probgpa
Confidence	-0.2571 (4.28)**	-0.3382 (3.48)**	-0.3029 (3.20)**	-0.2795 (4.06)**	-0.2121 (3.02)**	-0.2679 (4.17)**
Goodstudent* Confidence		0.0833 (0.65)	0.1673 (1.23)	-0.0163 (0.09)	-0.3030 (2.05)**	0.1739 (0.63)
Posmajor	0.0404 (1.13)	0.0777 (1.40)	-0.0156 (0.28)	0.0277 (0.69)	0.0307 (0.74)	0.0491 (1.29)
Goodstudent* Posmajor		-0.0705 (0.98)	0.1085 (1.41)	0.0009 (0.01)	0.0589 (0.68)	-0.1317 (0.86)
Relevant	-0.4014 (6.65)**	-0.5530 (5.69)**	-0.2658 (2.82)**	-0.3630 (5.31)**	-0.4894 (6.64)**	-0.4263 (6.54)**
Goodstudent* Relevant		0.2296 (1.96)**	-0.3020 (2.51)**	-0.2753 (1.80)*	0.2100 (1.65)*	-0.0327 (0.15)
Relgrade	-4.4856 (5.10)**	-4.2931 (3.14)**	-6.0190 (4.45)**	-4.5451 (4.44)**	-4.4434 (4.24)**	-4.3858 (4.66)**
Goodstudent* Relgrade		0.4879 (0.24)	0.6774 (0.36)	-2.7753 (1.07)	-0.1315 (0.05)	-16.0282 (1.99)**
Curve	-0.0454 (0.36)	0.1408 (0.74)	-0.0614 (0.30)	-0.1054 (0.76)	0.0266 (0.19)	-0.0687 (0.52)
Goodstudent* Curve		-0.2862 (1.11)	0.0298 (0.11)	0.8743 (2.21)**	-0.3366 (0.97)	-0.0564 (0.08)
Exam	-0.0035 (0.80)	-0.0058 (0.82)	-0.0142 (2.00)**	-0.0009 (0.18)	-0.0021 (0.42)	-0.0017 (0.35)
Goodstudent* Exam		0.0046 (0.51)	0.0127 (1.30)	-0.0224 (2.02)**	-0.0089 (0.76)	-0.0447 (2.52)**
Grpprob	-0.0172 (1.69)*	-0.0322 (2.32)**	-0.0406 (2.83)**	-0.0186 (1.70)*	-0.0136 (1.22)	-0.0153 (1.49)
Goodstudent* Grpprob		0.0300 (1.48)	0.0459 (2.20)**	-0.0105 (0.30)	-0.0336 (1.14)	-0.1845 (2.06)**
Lecture	0.0019 (0.62)	-0.0029 (0.62)	0.0038 (0.85)	0.0001 (0.02)	-0.0003 (0.08)	0.0004 (0.13)
Goodstudent* Lecture		0.0106 (1.71)*	-0.0031 (0.46)	0.0110 (1.41)	0.0065 (0.84)	-0.0043 (0.30)
Participation	0.0037 (0.28)	-0.0269 (1.26)	0.0296 (1.52)	-0.0063 (0.41)	-0.0052 (0.33)	-0.0010 (0.07)
Goodstudent* Participation		0.0464 (1.65)*	-0.0581 (1.93)*	0.0468 (1.20)	0.0181 (0.56)	0.0912 (1.36)
Warmup	0.3984 (3.21)**	0.2516 (1.39)	0.0311 (0.15)	0.5630 (4.04)**	0.3588 (2.53)**	0.4365 (3.36)**
Goodstudent* Warmup		0.2982 (1.19)	0.6383 (2.25)**	-1.0705 (2.98)**	0.2844 (0.85)	-0.4635 (0.76)
Observations	1116	1116	998	1116	1115	1116

Robust z-statistics in parentheses. See Table A-2 for a full set of coefficients  
 \*\*significant at 5% level; \* significant at 10% level

Table 5: Selected OLS Results; Dependent Variable: Relevant

	(1)	(2)	(3)	(4)	(5)	(6)
	Good Student Measure					
		Highgpa	Highsat	Solver	Expgpa	Probgpa
Career	0.1021 (4.32)**	0.1054 (4.47)**	0.1071 (4.25)**	0.0982 (4.12)**	0.1001 (4.26)**	0.0997 (4.22)**
Curevent	0.1613 (6.61)**	0.1650 (6.69)**	0.1543 (5.96)**	0.1635 (6.67)**	0.1678 (6.85)**	0.1715 (6.94)**
Finance	0.1211 (4.71)**	0.1147 (4.48)**	0.1121 (4.04)**	0.1190 (4.64)**	0.1128 (4.43)**	0.1165 (4.52)**
Graphs	-0.1502 (5.10)**	-0.1324 (3.19)**	-0.1456 (3.41)**	-0.0984 (2.97)**	-0.1116 (3.40)**	-0.1335 (4.26)**
Goodstudent* Graphs		-0.0632 (1.06)	-0.0472 (0.75)	-0.1900 (2.76)**	-0.1841 (2.56)**	-0.1910 (2.11)**
Posmajor	0.0422 (2.34)**	0.0406 (2.26)**	0.0244 (1.24)	0.0461 (2.55)**	0.0415 (2.30)**	0.0449 (2.50)**
Pubpol	0.1423 (5.97)**	0.1430 (5.86)**	0.1558 (6.07)**	0.1310 (5.45)**	0.1432 (5.94)**	0.1367 (5.65)**
Collab	-0.0032 (1.59)	-0.0044 (1.53)	-0.0093 (2.85)**	-0.0017 (0.75)	-0.0032 (1.42)	-0.0027 (1.27)
Goodstudent* Collab		0.0031 (0.76)	0.0097 (2.17)**	-0.0065 (1.24)	-0.0005 (0.08)	-0.0018 (0.27)
Disc	0.0018 (0.52)	-0.0073 (1.55)	-0.0105 (2.14)**	0.0002 (0.06)	-0.0027 (0.72)	-0.0004 (0.10)
Goodstudent* Disc		0.0181 (2.72)**	0.0211 (2.99)**	0.0135 (1.40)	0.0210 (2.47)**	0.0300 (2.42)**
Lecture	-0.0025 (1.49)	-0.0067 (2.97)**	-0.0081 (3.27)**	-0.0030 (1.67)*	-0.0037 (2.06)**	-0.0034 (2.00)**
Goodstudent* Lecture		0.0088 (2.77)**	0.0096 (2.78)**	0.0048 (1.06)	0.0053 (1.28)	0.0120 (2.07)**
Tchexp	0.0233 (2.62)**	0.0233 (2.60)**	0.0237 (2.50)**	0.0251 (2.84)**	0.0225 (2.52)**	0.0219 (2.47)**
Tchexp2	-0.0006 (2.50)**	-0.0006 (2.42)**	-0.0007 (2.56)**	-0.0007 (2.68)**	-0.0006 (2.31)**	-0.0006 (2.28)**
Observations	1535	1494	1357	1535	1493	1494
Adjusted R-squared	0.29	0.31	0.29	0.30	0.32	0.32

Robust t-statistics in parentheses. See table A-3 for a full set of coefficients.

\*\* significant at 5% level; \* significant at 10% level

Table 6: Selected OLS Results; Dependent Variable: Relgrade

	(1)	(2)	(3)	(4)	(5)	(6)
	Good Student Measure					
		Highgpa	Hightsat	Solver	Expjpga	Probgpa
Curevent	-0.0007 (0.49)	-0.0064 (2.86)**	0.0003 (0.13)	-0.0007 (0.42)	-0.0019 (1.10)	-0.0013 (0.81)
Goodstudent* Curevent		0.0108 (3.80)**	-0.0022 (0.69)	0.0006 (0.16)	0.0057 (1.78)*	0.0061 (1.44)
Finance	0.0054 (3.54)**	0.0061 (2.72)**	0.0048 (1.88)*	0.0057 (3.18)**	0.0038 (2.19)**	0.0052 (3.04)**
Goodstudent* Finance		-0.0022 (0.76)	0.0008 (0.25)	-0.0028 (0.89)	0.0063 (1.92)*	-0.0018 (0.52)
Graphs	-0.0228 (11.36)**	-0.0242 (12.42)**	-0.0229 (10.56)**	-0.0233 (11.62)**	-0.0229 (11.53)**	-0.0235 (11.71)**
Posmajor	0.0073 (6.29)**	0.0058 (5.14)**	0.0071 (5.67)**	0.0074 (6.33)**	0.0068 (5.88)**	0.0072 (6.14)**
Pubpol	-0.0018 (1.18)	0.0012 (0.51)	0.0017 (0.74)	-0.0022 (1.27)	-0.0004 (0.25)	-0.0005 (0.32)
Goodstudent* Pubpol		-0.0052 (1.75)*	-0.0062 (1.94)*	0.0030 (0.77)	-0.0031 (0.93)	-0.0025 (0.58)
Exam	-0.0003 (2.32)**	-0.0005 (2.36)**	-0.0002 (1.17)	-0.0004 (2.88)**	-0.0003 (2.23)**	-0.0003 (2.04)**
Goodstudent* Exam		0.0002 (0.88)	-0.0001 (0.38)	0.0005 (1.67)*	0.0002 (0.78)	0.0001 (0.45)
Grpprob	0.0008 (2.78)**	0.0007 (2.56)**	0.0010 (3.16)**	0.0008 (2.61)**	0.0007 (2.41)**	0.0008 (2.55)**
Lecture	0.0002 (2.37)**	0.0000 (0.41)	0.0003 (2.27)**	0.0002 (2.24)**	0.0001 (1.23)	0.0002 (2.01)**
Goodstudent* Lecture		0.0004 (2.96)**	-0.0001 (0.58)	-0.0001 (0.50)	0.0001 (0.82)	-0.0001 (0.65)
Part	-0.0004 (1.19)	0.0000 (0.00)	-0.0011 (2.10)**	-0.0007 (1.86)*	-0.0005 (1.20)	-0.0005 (1.19)
Goodstudent* Part		-0.0006 (0.85)	0.0015 (1.98)**	0.0015 (1.71)*	0.0006 (0.86)	0.0006 (0.67)
Warmup	0.0100 (2.98)**	0.0033 (0.66)	0.0155 (2.91)**	0.0117 (3.13)**	0.0073 (1.90)*	0.0080 (2.21)**
Goodstudent* Warmup		0.0115 (1.88)*	-0.0093 (1.34)	-0.0087 (1.07)	0.0081 (1.22)	0.0107 (1.23)
Observations	1562	1562	1399	1562	1561	1562
Adjusted R-squared	0.20	0.26	0.20	0.20	0.22	0.21

Robust t-statistics in parentheses. See Table A-4 for a full set of coefficients.

\*\*significant at 5% level; \* significant at 10% level

Table 7: Selected OLS Results; Dependent Variable: Confidence

	(1)	(2)	(3)	(4)	(5)	(6)
	Good Student Measure					
		Highgpa	Higsat	Solver	Expgpa	Probgpa
Finance	0.0899 (4.09)**	0.0893 (4.07)**	0.0864 (3.68)**	0.0866 (3.94)**	0.0872 (3.93)**	0.0873 (3.92)**
Freezeup	-0.1675 (9.82)**	-0.1196 (4.74)**	-0.1273 (4.87)**	-0.1651 (8.71)**	-0.1556 (7.85)**	-0.1629 (8.57)**
Goodstudent* Freezeup		-0.0773 (2.32)**	-0.0375 (1.04)	-0.0086 (0.22)	-0.0545 (1.42)	-0.0207 (0.44)
Graphs	-0.5010 (17.86)**	-0.4944 (17.35)**	-0.4761 (15.82)**	-0.4974 (17.74)**	-0.4975 (17.29)**	-0.4977 (17.13)**
Pubpol	0.0373 (1.78)*	0.0268 (1.27)	0.0411 (1.83)*	0.0276 (1.29)	0.0303 (1.42)	0.0347 (1.59)
Disc	0.0026 (0.92)	-0.0047 (1.22)	-0.0003 (0.08)	0.0007 (0.21)	0.0010 (0.30)	0.0017 (0.53)
Goodstudent* Discussion		0.0141 (2.80)**	0.0050 (0.91)	0.0070 (1.11)	0.0057 (0.92)	0.0081 (1.23)
Exam	-0.0021 (1.22)	-0.0033 (1.27)	-0.0028 (0.95)	-0.0049 (2.49)**	-0.0040 (2.02)**	-0.0036 (1.85)*
Goodstudent* Exam		0.0025 (0.76)	0.0012 (0.35)	0.0087 (2.12)**	0.0072 (1.78)*	0.0088 (1.95)*
Grpprob	0.0067 (1.99)**	0.0072 (2.09)**	0.0088 (2.39)**	0.0064 (1.90)*	0.0069 (2.02)**	0.0079 (2.15)**
Lecture	0.0018 (1.23)	-0.0029 (1.40)	-0.0018 (0.84)	0.0018 (1.11)	0.0007 (0.41)	0.0016 (0.94)
Goodstudent* Lecture		0.0087 (3.29)**	0.0081 (2.81)**	0.0004 (0.12)	0.0049 (1.60)	0.0046 (1.19)
Part	-0.0087 (1.59)	-0.0091 (1.61)	-0.0071 (1.24)	-0.0080 (1.46)	-0.0100 (1.78)*	-0.0103 (1.72)*
Observations	1682	1635	1492	1682	1634	1605
Adjusted R-squared	0.32	0.34	0.32	0.32	0.33	0.33

Robust t-statistics in parentheses. See Table A-5 for a full set of coefficients.

\*\* significant at 5% level; \* significant at 10% level

Table 8: The Net Effect

Impact on Probability of Becoming Encouraged						
	All Students	Highgpa	Highsat	Solver	Expgpa	Probgpa
Lecture	-5.16	-7.78	-4.78	-16.68	-16.92	-17.12
Grpprob	-2.46	-3.80	-2.23	6.58	-14.91	12.10
Disc	0.35	1.68	1.96	4.14	2.70	5.99
Exam	-0.41	1.69	-1.43	8.10	4.71	13.92
Participation	0.11	1.38	4.08	-15.53	0.58	-16.74
Impact on Probability of Becoming Discouraged						
	All Students	Highgpa	Highsat	Solver	Expgpa	Probgpa
Lecture	0.79	2.34	-0.91	2.96	1.14	-0.26
Grpprob	-3.50	-1.20	-0.19	-3.02	-7.97	-0.54
Disc	-0.38	-1.71	-1.56	-1.63	-2.39	-0.21
Exam	-0.53	0.08	0.11	-3.70	-3.84	-0.45
Participation	0.59	35.61	-2.57	2.77	2.05	1.02

Changes are in percentage points. Changes are the difference between predicted probabilities associated with a one standard deviation increase from the average in the selected variable and a baseline specification in which all variables are held at their mean.

APPENDIX

Table A-1: Encouraged Probit Estimations, full set of results

	Good Student Measures					
	(1)	(2)	(3)	(4)	(5)	(6)
		Highgpa	Higsat	Solver	Expgpa	Probgpa
Advice	-0.1014 (2.53)**	-0.1136 (2.75)**	-0.1142 (2.57)**	-0.0881 (2.14)**	-0.1108 (2.72)**	-0.1060 (2.57)**
Career	0.1611 (3.33)**	0.1576 (3.26)**	0.1692 (3.25)**	0.1607 (3.22)**	0.1703 (3.45)**	0.1478 (2.96)**
Confidence	0.1470 (2.15)**	0.2411 (2.32)**	0.1719 (1.53)	0.1237 (1.54)	0.1628 (2.10)**	0.1479 (1.97)**
Goodstudent* Confidence		-0.1422 (1.00)	0.0392 (0.26)	0.0271 (0.18)	-0.1275 (0.74)	-0.2897 (1.37)
Curevent	0.0319 (0.65)	0.0227 (0.45)	0.0798 (1.51)	0.0161 (0.32)	0.0137 (0.27)	0.0221 (0.43)
Gradschool	0.2026 (3.57)**	0.0847 (1.01)	0.2448 (2.93)**	0.1572 (2.37)**	0.1166 (1.76)*	0.1716 (2.75)**
Goodstudent* Gradschool		0.2363 (2.14)**	-0.0602 (0.53)	0.3616 (2.41)**	0.4267 (3.21)**	0.7933 (3.54)**
Graphs	-0.0192 (0.25)	-0.1288 (1.14)	0.0208 (0.16)	-0.1174 (1.29)	-0.0633 (0.72)	-0.0825 (0.97)
Goodstudent* Graphs		0.2474 (1.58)	-0.0116 (0.07)	0.7835 (3.51)**	0.3096 (1.57)	1.3853 (4.26)**
Posmajor	0.2605 (6.67)**	0.2434 (4.23)**	0.1999 (3.20)**	0.2350 (5.34)**	0.2758 (6.21)**	0.2574 (6.15)**
Goodstudent* Posmajor		0.0538 (0.69)	0.1110 (1.32)	0.3522 (2.97)**	-0.0103 (0.10)	0.4380 (2.20)**
Relevant	0.2101 (3.61)**	0.1792 (2.03)**	0.0500 (0.55)	0.2319 (3.55)**	0.2205 (3.33)**	0.2358 (3.80)**
Goodstudent* Relevant		0.0751 (0.66)	0.2601 (2.20)**	0.3624 (2.10)**	0.0898 (0.62)	0.3752 (1.63)
Relgrade	3.8121 (3.82)**	3.9802 (2.79)**	5.4479 (3.56)**	4.3508 (3.65)**	3.4962 (3.08)**	3.7913 (3.48)**
Goodstudent* Relgrade		-0.2695 (0.12)	-1.3640 (0.63)	-2.2917 (0.99)	4.3572 (1.52)	4.1519 (1.11)
Reqd	0.0201 (0.57)	0.0171 (0.48)	0.0303 (0.79)	0.0175 (0.48)	0.0139 (0.38)	0.0180 (0.49)
Curve	0.1137 (0.91)	0.2481 (1.37)	0.2014 (1.03)	0.0459 (0.33)	0.2386 (1.71)*	0.1363 (1.04)
Goodstudent* Curve		-0.2142 (0.84)	-0.2524 (0.92)	0.2372 (0.61)	-0.7992 (2.17)**	-0.9349 (1.40)
Exam	0.0007 (0.15)	-0.0054 (0.78)	0.0104 (1.34)	-0.0010 (0.18)	-0.0010 (0.19)	-0.0023 (0.45)
Goodstudent* Exam		0.0098 (1.04)	-0.0115 (1.15)	0.0161 (1.29)	0.0105 (0.91)	0.0424 (2.61)**

Grpprob	-0.0128 (1.21)	-0.0085 (0.58)	-0.0246 (1.54)	-0.0178 (1.55)	-0.0052 (0.45)	-0.0137 (1.22)
Goodstudent* Grpprob		-0.0083 (0.39)	0.0108 (0.45)	0.0396 (1.29)	-0.0544 (1.55)	0.0689 (1.72)*
Lecture	-0.0065 (2.08)**	0.0006 (0.14)	-0.0129 (2.45)**	-0.0055 (1.55)	-0.0032 (0.91)	-0.0041 (1.20)
Goodstudent* Lecture		-0.0123 (1.91)*	0.0047 (0.68)	-0.0156 (1.82)*	-0.0191 (2.39)**	-0.0226 (1.76)*
Participation	0.0022 (0.15)	-0.0030 (0.15)	-0.0270 (1.20)	0.0062 (0.37)	0.0083 (0.53)	0.0100 (0.65)
Goodstudent* Participation		0.0140 (0.49)	0.0500 (1.65)*	-0.0941 (2.23)**	-0.0055 (0.14)	-0.1151 (2.32)**
Warmup	-0.4205 (3.23)**	-0.2836 (1.50)	-0.0969 (0.45)	-0.5012 (3.40)**	-0.4285 (2.89)**	-0.4391 (3.15)**
Goodstudent* Warmup		-0.3315 (1.22)	-0.6000 (2.04)**	0.4702 (1.21)	0.0130 (0.04)	0.6287 (0.94)
Calculus	0.2069 (1.66)*	0.2812 (1.50)	0.4671 (2.40)**	0.2166 (1.53)	0.1927 (1.40)	0.1908 (1.44)
Goodstudent* Calculus		-0.0369 (0.15)	-0.4180 (1.59)	0.3468 (0.96)	0.1563 (0.49)	1.3785 (2.45)**
Classize	0.0078 (1.95)*	0.0073 (1.26)	0.0191 (2.80)**	0.0104 (2.17)**	0.0080 (1.77)*	0.0090 (2.06)**
Goodstudent* Classize		0.0004 (0.05)	-0.0177 (2.00)**	-0.0092 (0.91)	0.0019 (0.19)	-0.0142 (0.80)
Combined	0.1367 (0.84)	0.2518 (1.06)	0.7442 (2.85)**	0.2869 (1.53)	0.2165 (1.15)	0.1908 (1.08)
Goodstudent* Combined		-0.2836 (0.87)	-0.8721 (2.45)**	-0.8481 (1.81)*	-0.2502 (0.60)	0.1006 (0.14)
Econbus	-0.5772 (3.16)**	-0.6682 (2.25)**	-0.1654 (0.58)	-0.5302 (2.53)**	-0.6100 (2.80)**	-0.6169 (2.99)**
Goodstudent* Econbus		0.1202 (0.31)	-0.6648 (1.54)	-0.0249 (0.06)	0.2039 (0.47)	0.3966 (0.70)
Macro	0.0585 (0.30)	0.1607 (0.57)	0.6137 (2.02)**	0.2715 (1.18)	0.1496 (0.68)	0.1431 (0.67)
Goodstudent* Macro		-0.3115 (0.81)	-0.8679 (2.05)**	-1.6471 (3.33)**	-0.8689 (1.67)*	-2.1661 (3.43)**
Goodstudent		-0.2410 (0.10)	2.5053 (1.05)	-2.0668 (0.68)	-4.5857 (1.42)	-11.3068 (2.38)**
Constant	-6.6176 (5.87)**	-6.5720 (4.01)**	-9.3596 (5.53)**	-6.8002 (5.14)**	-6.3353 (5.00)**	-6.4207 (5.30)**
Observations	821	821	740	821	821	821

Robust z-statistics in parentheses

\*\* significant at 5% level; \* significant at 10% level

Table A-2: Discouraged, full set of results

	Good Student Measures					
	(1)	(2)	(3)	(4)	(5)	(6)
		Highgpa	Highsat	Solver	Expjpga	Probgpa
Advice	0.0840 (2.14)**	0.0955 (2.36)**	0.0993 (2.32)**	0.0783 (1.94)*	0.0976 (2.42)**	0.0784 (1.93)*
Career	-0.1161 (2.49)**	-0.1328 (2.78)**	-0.1270 (2.56)**	-0.1140 (2.41)**	-0.1141 (2.42)**	-0.1137 (2.32)**
Confidence	-0.2571 (4.28)**	-0.3382 (3.48)**	-0.3029 (3.20)**	-0.2795 (4.06)**	-0.2121 (3.02)**	-0.2679 (4.17)**
Goodstudent* Confidence		0.0833 (0.65)	0.1673 (1.23)	-0.0163 (0.09)	-0.3030 (2.05)**	0.1739 (0.63)
Curevent	0.1626 (3.23)**	0.1758 (3.49)**	0.1722 (3.17)**	0.1706 (3.28)**	0.1752 (3.51)**	0.1714 (3.35)**
Gradschoool	-0.2631 (4.78)**	-0.2473 (2.94)**	-0.2077 (2.58)**	-0.2183 (3.55)**	-0.2221 (3.49)**	-0.2150 (3.70)**
Goodstudent* Gradschool		-0.0383 (0.35)	-0.1667 (1.47)	-0.2906 (1.81)*	-0.1995 (1.44)	-0.7664 (2.57)**
Graphs	0.0260 (0.36)	0.1788 (1.74)*	-0.0197 (0.18)	0.0533 (0.66)	0.1955 (2.44)**	0.0942 (1.24)
Goodstudent* Graphs		-0.2254 (1.53)	0.0403 (0.25)	-0.2051 (0.98)	-0.6506 (3.78)**	-0.7634 (2.28)**
Posmajor	0.0404 (1.13)	0.0777 (1.40)	-0.0156 (0.28)	0.0277 (0.69)	0.0307 (0.74)	0.0491 (1.29)
Goodstudent* Posmajor		-0.0705 (0.98)	0.1085 (1.41)	0.0009 (0.01)	0.0589 (0.68)	-0.1317 (0.86)
Relevant	-0.4014 (6.65)**	-0.5530 (5.69)**	-0.2658 (2.82)**	-0.3630 (5.31)**	-0.4894 (6.64)**	-0.4263 (6.54)**
Goodstudent* Relevant		0.2296 (1.96)**	-0.3020 (2.51)**	-0.2753 (1.80)*	0.2100 (1.65)*	-0.0327 (0.15)
Relgrade	-4.4856 (5.10)**	-4.2931 (3.14)**	-6.0190 (4.45)**	-4.5451 (4.44)**	-4.4434 (4.24)**	-4.3858 (4.66)**
Goodstudent* Relgrade		0.4879 (0.24)	0.6774 (0.36)	-2.7753 (1.07)	-0.1315 (0.05)	-16.0282 (1.99)**
Reqd	-0.1201 (3.43)**	-0.1244 (3.51)**	-0.1181 (3.04)**	-0.1209 (3.42)**	-0.1245 (3.50)**	-0.1236 (3.49)**
Curve	-0.0454 (0.36)	0.1408 (0.74)	-0.0614 (0.30)	-0.1054 (0.76)	0.0266 (0.19)	-0.0687 (0.52)
Goodstudent* Curve		-0.2862 (1.11)	0.0298 (0.11)	0.8743 (2.21)**	-0.3366 (0.97)	-0.0564 (0.08)
Exam	-0.0035 (0.80)	-0.0058 (0.82)	-0.0142 (2.00)**	-0.0009 (0.18)	-0.0021 (0.42)	-0.0017 (0.35)
Goodstudent* Exam		0.0046 (0.51)	0.0127 (1.30)	-0.0224 (2.02)**	-0.0089 (0.76)	-0.0447 (2.52)**
Grpprob	-0.0172 (1.69)*	-0.0322 (2.32)**	-0.0406 (2.83)**	-0.0186 (1.70)*	-0.0136 (1.22)	-0.0153 (1.49)
Goodstudent*		0.0300	0.0459	-0.0105	-0.0336	-0.1845

Grpprob		(1.48)	(2.20)**	(0.30)	(1.14)	(2.06)**
Lecture	0.0019 (0.62)	-0.0029 (0.62)	0.0038 (0.85)	0.0001 (0.02)	-0.0003 (0.08)	0.0004 (0.13)
Goodstudent* Lecture		0.0106 (1.71)*	-0.0031 (0.46)	0.0110 (1.41)	0.0065 (0.84)	-0.0043 (0.30)
Participation	0.0037 (0.28)	-0.0269 (1.26)	0.0296 (1.52)	-0.0063 (0.41)	-0.0052 (0.33)	-0.0010 (0.07)
Goodstudent* Participation		0.0464 (1.65)*	-0.0581 (1.93)*	0.0468 (1.20)	0.0181 (0.56)	0.0912 (1.36)
Warmup	0.3984 (3.21)**	0.2516 (1.39)	0.0311 (0.15)	0.5630 (4.04)**	0.3588 (2.53)**	0.4365 (3.36)**
Goodstudent* Warmup		0.2982 (1.19)	0.6383 (2.25)**	-1.0705 (2.98)**	0.2844 (0.85)	-0.4635 (0.76)
Calculus	-0.0553 (0.48)	0.0876 (0.49)	-0.2611 (1.47)	-0.0536 (0.41)	0.0150 (0.11)	-0.0506 (0.42)
Goodstudent* Calculus		-0.2769 (1.15)	0.2502 (0.97)	-0.0809 (0.25)	-0.2620 (0.88)	-0.7575 (1.14)
Classize	0.0065 (1.69)*	0.0032 (0.58)	0.0025 (0.40)	0.0130 (2.92)**	0.0064 (1.48)	0.0087 (2.11)**
Goodstudent* Classize		0.0052 (0.68)	0.0107 (1.28)	-0.0344 (2.91)**	-0.0044 (0.47)	-0.0283 (1.24)
Combined	0.0002 (0.00)	-0.0130 (0.06)	-0.4572 (2.07)**	0.1575 (0.96)	0.0666 (0.39)	0.0155 (0.10)
Goodstudent* Combined		-0.0377 (0.13)	0.7543 (2.27)**	-1.0149 (2.55)**	-0.3108 (0.84)	-0.7199 (0.99)
Econbus	0.1629 (0.99)	-0.1468 (0.60)	-0.0910 (0.39)	0.2703 (1.48)	-0.0436 (0.23)	0.1107 (0.62)
Goodstudent* Econbus		0.6292 (1.87)*	0.6108 (1.56)	-0.8157 (1.78)*	0.8141 (1.92)*	-0.0341 (0.04)
Macro	-0.2972 (1.66)*	-0.3951 (1.52)	-0.7293 (2.70)**	-0.1172 (0.60)	-0.2067 (1.06)	-0.1940 (1.04)
Goodstudent* Macro		0.1213 (0.33)	0.8086 (2.03)**	-1.1292 (2.20)**	-0.2345 (0.47)	-2.1093 (2.11)**
Goodstudent		-1.8026 (0.80)	-2.2555 (1.01)	7.3461 (2.25)**	3.4024 (1.13)	24.6890 (2.69)**
Constant	6.2991 (5.96)**	6.8598 (4.35)**	8.8627 (5.89)**	5.7324 (4.70)**	5.7201 (4.80)**	5.8544 (5.26)**
Observations	1116	1116	998	1116	1115	1116

Robust z-statistics in parentheses

\*\* significant at 5% level; \* significant at 10% level

Table A-3: Relevant Estimations

	(1)	(2)	(3)	(4)	(5)	(6)
	Good Student Measure					
		Highgpa	Highsat	Solver	Expgpa	Probgpa
Advice	-0.0539 (3.13)**	-0.0925 (3.79)**	-0.0593 (2.29)**	-0.0512 (2.55)**	-0.0653 (3.35)**	-0.0611 (3.26)**
Goodstudent* Advice		0.0709 (2.07)**	0.0161 (0.44)	-0.0282 (0.69)	0.0351 (0.85)	-0.0171 (0.34)
Career	0.1021 (4.32)**	0.1054 (4.47)**	0.1071 (4.25)**	0.0982 (4.12)**	0.1001 (4.26)**	0.0997 (4.22)**
Curevent	0.1613 (6.61)**	0.1650 (6.69)**	0.1543 (5.96)**	0.1635 (6.67)**	0.1678 (6.85)**	0.1715 (6.94)**
Finance	0.1211 (4.71)**	0.1147 (4.48)**	0.1121 (4.04)**	0.1190 (4.64)**	0.1128 (4.43)**	0.1165 (4.52)**
Freezeup	-0.0532 (2.88)**	-0.0882 (3.36)**	-0.0761 (2.83)**	-0.0604 (2.88)**	-0.0773 (3.80)**	-0.0563 (2.83)**
Goodstudent* Freezeup		0.0819 (2.21)**	0.0456 (1.15)	0.0359 (0.83)	0.1195 (2.66)**	0.0592 (1.12)
Gradschoool	0.1035 (4.21)**	0.1085 (4.39)**	0.0863 (3.25)**	0.1014 (4.12)**	0.1148 (4.69)**	0.1082 (4.44)**
Graphs	-0.1502 (5.10)**	-0.1324 (3.19)**	-0.1456 (3.41)**	-0.0984 (2.97)**	-0.1116 (3.40)**	-0.1335 (4.26)**
Goodstudent* Graphs		-0.0632 (1.06)	-0.0472 (0.75)	-0.1900 (2.76)**	-0.1841 (2.56)**	-0.1910 (2.11)**
Junior	0.2444 (2.91)**	0.2416 (2.87)**	0.1509 (1.69)*	0.2195 (2.63)**	0.2478 (2.95)**	0.2224 (2.69)**
Posmajor	0.0422 (2.34)**	0.0406 (2.26)**	0.0244 (1.24)	0.0461 (2.55)**	0.0415 (2.30)**	0.0449 (2.50)**
Pubpol	0.1423 (5.97)**	0.1430 (5.86)**	0.1558 (6.07)**	0.1310 (5.45)**	0.1432 (5.94)**	0.1367 (5.65)**
Sophomore	0.2068 (3.81)**	0.1958 (3.59)**	0.1636 (2.70)**	0.2106 (3.89)**	0.1957 (3.65)**	0.2039 (3.78)**
Collab	-0.0032 (1.59)	-0.0044 (1.53)	-0.0093 (2.85)**	-0.0017 (0.75)	-0.0032 (1.42)	-0.0027 (1.27)
Goodstudent* Collab		0.0031 (0.76)	0.0097 (2.17)**	-0.0065 (1.24)	-0.0005 (0.08)	-0.0018 (0.27)
Disc	0.0018 (0.52)	-0.0073 (1.55)	-0.0105 (2.14)**	0.0002 (0.06)	-0.0027 (0.72)	-0.0004 (0.10)
Goodstudent* Disc		0.0181 (2.72)**	0.0211 (2.99)**	0.0135 (1.40)	0.0210 (2.47)**	0.0300 (2.42)**
Lecture	-0.0025 (1.49)	-0.0067 (2.97)**	-0.0081 (3.27)**	-0.0030 (1.67)*	-0.0037 (2.06)**	-0.0034 (2.00)**
Goodstudent* Lecture		0.0088 (2.77)**	0.0096 (2.78)**	0.0048 (1.06)	0.0053 (1.28)	0.0120 (2.07)**
Tchexp	0.0233 (2.62)**	0.0233 (2.60)**	0.0237 (2.50)**	0.0251 (2.84)**	0.0225 (2.52)**	0.0219 (2.47)**

Tchexp2	-0.0006 (2.50)**	-0.0006 (2.42)**	-0.0007 (2.56)**	-0.0007 (2.68)**	-0.0006 (2.31)**	-0.0006 (2.28)**
Business	0.0256 (0.27)	0.0193 (0.16)	0.0455 (0.32)	-0.0429 (0.42)	-0.0526 (0.52)	-0.0895 (0.90)
Goodstudent* Business		-0.0166 (0.09)	-0.0632 (0.29)	0.3375 (1.34)	0.3813 (1.58)	0.8820 (3.06)**
Calculus	0.0956 (1.65)*	0.1647 (2.00)**	0.2543 (2.92)**	0.0612 (0.94)	0.1180 (1.81)*	0.0416 (0.68)
Goodstudent* Calculus		-0.1888 (1.66)*	-0.2945 (2.41)**	0.1058 (0.75)	-0.1816 (1.32)	0.0298 (0.16)
Combined	0.0104 (0.14)	0.0729 (0.74)	0.1600 (1.50)	-0.0620 (0.76)	-0.0162 (0.20)	-0.0705 (0.90)
Goodstudent* Combined		-0.1494 (1.04)	-0.2404 (1.59)	0.2527 (1.42)	0.0390 (0.21)	0.3543 (1.56)
Econbus	-0.0492 (0.76)	-0.1638 (1.76)*	-0.0904 (1.02)	-0.1008 (1.33)	-0.1278 (1.71)	-0.1028 (1.43)
Goodstudent* Econbus		0.2175 (1.66)*	0.1363 (0.94)	0.2063 (1.37)	0.2544 (1.62)	0.3345 (1.96)*
Macro	0.0637 (0.90)	0.0554 (0.58)	0.0307 (0.30)	-0.0214 (0.27)	0.0895 (1.14)	0.0007 (0.01)
Goodstudent* Macro		0.0674 (0.48)	0.0625 (0.42)	0.4282 (2.52)**	-0.0432 (0.23)	0.7420 (3.33)**
Goodstudent		-0.9878 (3.00)**	-0.916 (2.51)**	-0.234 (0.53)	-0.6126 (1.50)	-1.2323 (2.48)**
Constant	1.8089 (9.10)**	2.3210 (8.71)**	2.4871 (8.35)**	1.8392 (8.71)**	1.9628 (9.14)**	1.9724 (9.50)**
Observations	1535	1494	1357	1535	1493	1494
Adjusted R-squared	0.29	0.31	0.29	0.30	0.32	0.32

Robust t-statistics in parentheses

\*\* significant at 5% level; \* significant at 10% level

Table A-4: relgrade

	(1)	(2)	(3)	(4)	(5)	(6)
	Good Student Measure					
		Highgpa	Highsat	Solver	Expgpa	Probgpa
Curevent	-0.0007 (0.49)	-0.0064 (2.86)**	0.0003 (0.13)	-0.0007 (0.42)	-0.0019 (1.10)	-0.0013 (0.81)
Goodstudent* Curevent		0.0108 (3.80)**	-0.0022 (0.69)	0.0006 (0.16)	0.0057 (1.78)*	0.0061 (1.44)
Finance	0.0054 (3.54)**	0.0061 (2.72)**	0.0048 (1.88)*	0.0057 (3.18)**	0.0038 (2.19)**	0.0052 (3.04)**
Goodstudent* Finance		-0.0022 (0.76)	0.0008 (0.25)	-0.0028 (0.89)	0.0063 (1.92)*	-0.0018 (0.52)
Freezeup	-0.0041 (3.28)**	-0.0037 (1.96)*	-0.0026 (1.35)	-0.0041 (3.01)**	-0.0038 (2.66)**	-0.0038 (2.84)**
Goodstudent* Freezeup		-0.0034 (1.47)	-0.0025 (0.95)	-0.0005 (0.16)	-0.0030 (1.13)	-0.0061 (1.93)*
Gradschool	0.0038 (2.40)**	0.0057 (2.27)**	0.0027 (1.20)	0.0061 (3.27)**	0.0047 (2.49)**	0.0047 (2.68)**
Goodstudent* Gradschool		0.0004 (0.13)	0.0008 (0.25)	-0.0086 (2.68)**	0.0002 (0.07)	-0.0032 (0.92)
Graphs	-0.0228 (11.36)**	-0.0242 (12.42)**	-0.0229 (10.56)**	-0.0233 (11.62)**	-0.0229 (11.53)**	-0.0235 (11.71)**
Junior	0.0139 (2.64)**	0.0117 (2.20)**	0.0147 (2.59)**	0.0150 (2.83)**	0.0131 (2.54)**	0.0145 (2.76)**
Posmajor	0.0073 (6.29)**	0.0058 (5.14)**	0.0071 (5.67)**	0.0074 (6.33)**	0.0068 (5.88)**	0.0072 (6.14)**
Pubpol	-0.0018 (1.18)	0.0012 (0.51)	0.0017 (0.74)	-0.0022 (1.27)	-0.0004 (0.25)	-0.0005 (0.32)
Goodstudent* Pubpol		-0.0052 (1.75)*	-0.0062 (1.94)*	0.0030 (0.77)	-0.0031 (0.93)	-0.0025 (0.58)
Reqd	-0.0013 (1.36)	-0.0029 (1.96)*	0.0004 (0.26)	-0.0002 (0.23)	-0.0009 (0.77)	-0.0012 (1.17)
Goodstudent* Reqd		0.0028 (1.52)	-0.0033 (1.62)	-0.0041 (1.81)*	-0.0006 (0.31)	0.0002 (0.09)
Sophomore	0.0197 (5.37)**	0.0181 (5.11)**	0.0173 (4.32)**	0.0195 (5.34)**	0.0199 (5.47)**	0.0198 (5.43)**
Exam	-0.0003 (2.32)**	-0.0005 (2.36)**	-0.0002 (1.17)	-0.0004 (2.88)**	-0.0003 (2.23)**	-0.0003 (2.04)**
Goodstudent* Exam		0.0002 (0.88)	-0.0001 (0.38)	0.0005 (1.67)*	0.0002 (0.78)	0.0001 (0.45)
Grpprob	0.0008 (2.78)**	0.0007 (2.56)**	0.0010 (3.16)**	0.0008 (2.61)**	0.0007 (2.41)**	0.0008 (2.55)**
Lecture	0.0002 (2.37)**	0.0000 (0.41)	0.0003 (2.27)**	0.0002 (2.24)**	0.0001 (1.23)	0.0002 (2.01)**
Goodstudent* Lecture		0.0004 (2.96)**	-0.0001 (0.58)	-0.0001 (0.50)	0.0001 (0.82)	-0.0001 (0.65)
Part	-0.0004 (1.19)	0.0000 (0.00)	-0.0011 (2.10)**	-0.0007 (1.86)*	-0.0005 (1.20)	-0.0005 (1.19)

Goodstudent* Part		-0.0006 (0.85)	0.0015 (1.98)**	0.0015 (1.71)*	0.0006 (0.86)	0.0006 (0.67)
Warmup	0.0100 (2.98)**	0.0033 (0.66)	0.0155 (2.91)**	0.0117 (3.13)**	0.0073 (1.90)*	0.0080 (2.21)**
Goodstudent* Warmup		0.0115 (1.88)*	-0.0093 (1.34)	-0.0087 (1.07)	0.0081 (1.22)	0.0107 (1.23)
Calculus	-0.0108 (3.62)**	-0.0182 (3.92)**	-0.0063 (1.33)	-0.0130 (3.89)**	-0.0113 (3.24)**	-0.0118 (3.63)**
Goodstudent* Calculus		0.0136 (2.31)**	-0.0058 (0.91)	0.0106 (1.43)	0.0019 (0.30)	0.0137 (1.75)*
Classize	0.0002 (2.08)**	0.0002 (2.11)**	0.0002 (2.20)**	0.0002 (2.00)**	0.0002 (1.83)*	0.0002 (2.05)**
Goodstudent		-0.0896 (3.90)**	0.0532 (2.12)**	-0.0058 (0.20)**	-0.0733 (2.85)**	-0.0170 (0.59)
Constant	1.0170 (77.45)**	1.0763 (56.23)**	0.9872 (49.46)**	1.0193 (68.11)**	1.0340 (69.75)**	1.0187 (70.87)**
Observations	1562	1562	1399	1562	1561	1562
Adjusted R-squared	0.20	0.26	0.20	0.20	0.22	0.21

Robust t-statistics in parentheses

\*\* significant at 5% level; \* significant at 10% level

Table A-5: Confidence

	(1)	(2)	(3)	(4)	(5)	(6)
	Good Student Measure					
		Highgpa	Hightsat	Solver	Expgpa	Probgpa
Finance	0.0899 (4.09)**	0.0893 (4.07)**	0.0864 (3.68)**	0.0866 (3.94)**	0.0872 (3.93)**	0.0873 (3.92)**
Freezeup	-0.1675 (9.82)**	-0.1196 (4.74)**	-0.1273 (4.87)**	-0.1651 (8.71)**	-0.1556 (7.85)**	-0.1629 (8.57)**
Goodstudent* Freezeup		-0.0773 (2.32)**	-0.0375 (1.04)	-0.0086 (0.22)	-0.0545 (1.42)	-0.0207 (0.44)
Gradschool	0.1170 (5.35)**	0.1159 (5.26)**	0.1045 (4.50)**	0.1197 (5.50)**	0.1192 (5.38)**	0.1204 (5.38)**
Graphs	-0.5010 (17.86)**	-0.4944 (17.35)**	-0.4761 (15.82)**	-0.4974 (17.74)**	-0.4975 (17.29)**	-0.4977 (17.13)**
Junior	0.0251 (0.31)	0.0548 (0.69)	0.0463 (0.52)	0.0284 (0.35)	0.0606 (0.75)	0.0558 (0.69)
Posmajor	0.0493 (3.15)**	0.0569 (2.54)**	0.0610 (2.59)**	0.0508 (2.91)**	0.0382 (2.16)**	0.0570 (3.32)**
Goodstudent* Posmajor		0.0049 (0.18)	-0.0179 (0.62)	0.0166 (0.52)	0.0754 (2.42)**	-0.0056 (0.15)
Pubpol	0.0373 (1.78)*	0.0268 (1.27)	0.0411 (1.83)*	0.0276 (1.29)	0.0303 (1.42)	0.0347 (1.59)
Sophomore	0.0804 (1.57)	0.1192 (2.29)**	0.0771 (1.37)	0.0839 (1.64)	0.1107 (2.13)**	0.1037 (1.98)**
Disc	0.0026 (0.92)	-0.0047 (1.22)	-0.0003 (0.08)	0.0007 (0.21)	0.0010 (0.30)	0.0017 (0.53)
Goodstudent* Discussion		0.0141 (2.80)**	0.0050 (0.91)	0.0070 (1.11)	0.0057 (0.92)	0.0081 (1.23)
Exam	-0.0021 (1.22)	-0.0033 (1.27)	-0.0028 (0.95)	-0.0049 (2.49)**	-0.0040 (2.02)**	-0.0036 (1.85)*
Goodstudent* Exam		0.0025 (0.76)	0.0012 (0.35)	0.0087 (2.12)**	0.0072 (1.78)*	0.0088 (1.95)*
Grpprob	0.0067 (1.99)**	0.0072 (2.09)**	0.0088 (2.39)**	0.0064 (1.90)*	0.0069 (2.02)**	0.0079 (2.15)**
Lecture	0.0018 (1.23)	-0.0029 (1.40)	-0.0018 (0.84)	0.0018 (1.11)	0.0007 (0.41)	0.0016 (0.94)
Goodstudent* Lecture		0.0087 (3.29)**	0.0081 (2.81)**	0.0004 (0.12)	0.0049 (1.60)	0.0046 (1.19)
Part	-0.0087 (1.59)	-0.0091 (1.61)	-0.0071 (1.24)	-0.0080 (1.46)	-0.0100 (1.78)*	-0.0103 (1.72)*
Calculus	-0.0351 (0.76)	0.0408 (0.60)	0.0972 (1.39)	-0.1067 (2.04)**	-0.0033 (0.06)	-0.0345 (0.68)
Goodstudent* Calculus		-0.1251 (1.35)	-0.2261 (2.32)**	0.2834 (2.65)**	-0.1016 (0.94)	0.0798 (0.63)
Econbus	-0.0530 (0.87)	-0.1466 (1.49)	-0.1699 (1.98)**	-0.0709 (1.05)	-0.1211 (1.67)*	-0.1217 (1.73)*
Goodstudent* Econbus		0.1189 (0.95)	0.2808 (2.12)**	0.0784 (0.53)	0.1503 (1.09)	0.4065 (2.32)**

Goodstudent		-0.5265 (1.52)	-0.2881 (0.76)	-0.7839 (1.82)*	-0.8731 (2.05)**	-0.9240 (1.89)*
Constant	4.3940 (19.32)**	4.6251 (15.54)**	4.4099 (14.00)**	4.6321 (18.80)**	4.6060 (18.15)**	4.4636 (17.36)**
Observations	1682	1635	1492	1682	1634	1605
Adjusted R-squared	0.32	0.34	0.32	0.32	0.33	0.33

Robust t-statistics in parentheses

\*\* significant at 5% level; \* significant at 10% level