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by

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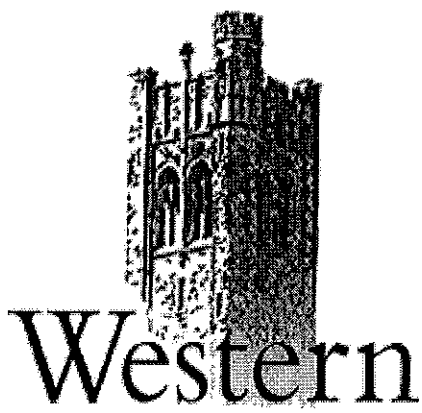

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Peer Effects Among Students From Disadvantaged Backgrounds

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Abstract: This paper complements the work of Sacerdote (1999) and Zimmerman (1999) by examining peer effects in a context where many students are from the types of disadvantaged backgrounds that are often the focus of education policy. The paper finds strong evidence of peer effects for females and suggests that a net gain is likely to result from combining students from diverse backgrounds.

Peer effects have the potential to play important roles in determining the impact of many current and potential education policies. As one prominent example, elementary and secondary school voucher programs increase in appeal if children from disadvantaged backgrounds benefit from having classmates from more privileged backgrounds and the more privileged students do not suffer from this arrangement. Similarly, the overall effect of any higher education program that influences the degree of diversity in colleges and universities depends on the nature and importance of the interaction between students of different backgrounds and abilities. Policies of current relevance that potentially influence diversity include changes in affirmative action policies and changes in the relative amounts of merit-based and need-based financial aid.

Unfortunately, determining the nature and importance of peer effects in either lower or higher education is a difficult task. The empirical difficulty stems from the reality that a given student's classmates and friends are determined by a complex set of decisions made by the student, the student's parents, and/or school administrators and teachers. This non-randomness creates problems of inference because it implies that unobservable determinants of a particular student's academic outcomes may tend to be systematically related to the observable and unobservable characteristics of his/her friends or classmates.

This empirical difficulty has been emphasized recently by Sacerdote (1999) and Zimmerman (1999) who review past literature on peer effects and propose a creative way to obtain information about the importance of peer effects.[1] Specifically, the authors recognize that a student's first year college roommate has a potentially important influence on the student's first year college experience and outcomes. Thus, if the housing assignment process is such that these peers are randomly assigned, examining the relationship between the outcomes of roommates allows one to study the prevalence of peer effects in a context that is not clouded by the problematic bias that may be present when students' peers are endogenously determined.

Sacerdote (1999) and Zimmerman (1999) implement their empirical strategies using data from

[1]The authors present a review of past theoretical and empirical work on peer effects. Given the thoroughness of the review and the complementary nature of this paper, we have chosen not to repeat it here.

Dartmouth College and Williams College, respectively. Both find intriguing but somewhat limited evidence that observable roommate academic quality influences a student's first year grade performance. Sacerdote (1999) finds no evidence that a freshman's first year grade point average is influenced by his/her roommate's score on an academic index created by the Dartmouth admissions office if this score is included in the specified grade regression in a linear fashion. However, he does find evidence that having a roommate in the top 25% of the academic score distribution may lead to some benefits. Zimmerman (2000) finds no evidence that a freshman's first year grade point average is influenced by his/her roommate's total Scholastic Aptitude Test (SAT) score but does find that first year grades are positively correlated with verbal SAT scores if controls for math SAT scores are also included in the regression specification.[2]

As will be discussed in more detail, the housing assignment processes at Dartmouth and Williams make these schools very sensible and desirable contexts in which to study peer effects. However, Dartmouth is the 6th or 7th most selective undergraduate school in the U.S. based on college entrance exam scores and high school rank, and the average combined SAT score at Williams places the average student in the top 10% of the population of test takers.[3] In short, virtually all students at both Williams and Dartmouth are of very high quality and both Sacerdote and Zimmerman recognize that this lack of heterogeneity is a limitation of studying these particular schools. The reality that virtually all entering students at Dartmouth and Williams are likely to arrive at school with strong schooling backgrounds, good study habits and strong beliefs about the importance of college may substantially mitigate the potential influence of peer effects. Further, largely due to this reason, policy interest in peer effects often arises in contexts where some of the students of interest are of low ability or are from disadvantaged backgrounds. For example, in the school choice debate, peer

[2]Roommate math SAT scores are found to enter his grade regression with a negative sign but the effect is not statistically different than zero. It is not clear whether students benefit from having roommates with higher verbal SAT scores after taking into account that, on average, these students also are likely to have higher math SAT scores.

[3]The average combined SAT score is 1396 over the period covered by the data used by Zimmerman. The average combined SAT score of students in the lowest 15% of the Williams class is 1175 which would be at about the 75th percentile in the population.

effects receive attention in part because it seems likely that there may be plenty of scope for students from disadvantaged backgrounds to learn from the beliefs and actions of their classmates.

The goal of this paper is to complement the work of Sacerdote and Zimmerman by employing their insights using data from Berea College where the student population is very different than the student populations at Dartmouth and Williams. The data we use allow two inter-related contributions. First, due the reality that Berea operates with a mission of providing educational opportunities to individuals from less privileged backgrounds, there is a large degree of heterogeneity in the students at Berea and the students tend to be the type of students that are often the focus of current education policy. Second, the nature of the student body allows us to examine both whether peer effects influence grade performance and also whether peer effects influence the decision of whether or not to remain in school. With respect to the latter, whether having classmates with higher ability or stronger beliefs about the importance of schooling can influence the amount of educational attainment that a person obtains is an important policy question that cannot be examined using data from institutions such as Dartmouth and Williams where virtually all students graduate.

The paper proceeds as follows. Section II describes Berea College and the data used in this paper. Section III describes the roommate assignment process at Berea. Section IV examines whether a student's grade and educational attainment outcomes depend on a measure of his/her roommate's academic ability, as measured by college entrance exam scores, and on a measure of his/her roommate's family background, as measured by family income. Section IV also examines whether a roommate's high school grade point average is an important determinant of whether he/she will have a strong peer influence. Section V concludes.

Section II. Berea College and Data Description

Berea College, which is located in central Kentucky where the "Bluegrass meets the foothills of the Appalachian Mountains," was founded around the time of the civil war and operates under the mission of "providing educational opportunities to those of great promise but limited economic resources." The family income entry (INCOME) in Table 1, which shows descriptive statistics separately by sex for our sample of

1295 students who entered Berea College as freshmen between 1991 and 1996, indicates that students at Berea are on average economically disadvantaged but there is substantial variation in the background of Berea students. Twenty-five percent of the students in our sample come from families with income of less than $11,400. The wealthiest twenty-five percent of the students in our sample come from families with income of greater than $30,700 and less than approximately $70,000.

The majority of students at Berea take the American College Test (ACT) and we convert all SAT scores to ACT equivalents. In the remainder of the paper we use combined math and verbal ACT scores, but we have found essentially no difference in the results when ACT math and verbal scores are included separately in the empirical work. The 10th percentile, median, and 90th percentile for verbal ACT scores at Berea are 17, 22, and 28 respectively which correspond roughly to the 31st, 65th, and 92nd percentiles of all ACT test takers. The 10th percentile, median, and 90th percentile for math ACT scores at Berea are 16, 22, and 26 respectively which correspond roughly to the 22nd, 66st, and 85th percentiles of all ACT test takers. Thus, a large degree of heterogeneity is seen in test scores relative to the Dartmouth and Williams data used by Sacerdote and Zimmerman. Table 1 also indicates a large amount of variation in high school grade point averages (HSGPA). Given that high school grades are missing for approximately 25% of our sample, in the interest of brevity we choose to present full results for only specifications which characterize a roommate's quality on the basis of his/her family income (RINCOME) and ACT (RACT). Nonetheless, we also discuss and pay careful attention to the results we obtained when we used specifications that included roommate high school grade point average because these results are also informative from the standpoint of establishing the importance and nature of peer effects.

The grade outcome that we focus on is first semester grade point average (G). The retention outcome we examine is whether the student stays in school at least until the beginning of his/her second year (R). Table 1 shows a large degree of variation in these outcomes relative to Dartmouth and Williams. The

average first semester grade point average for all students is 2.47 with a standard deviation of .874.[4] Only .68 of all students return to Berea for their second year.

Section III. The Housing Assignment Process

The roommate assignment process at Dartmouth is random within each of a set of groups that are determined by incoming students' answers to questions about preferences towards things such as smoking, music, sleep hours, and neatness. The process at Williams also depends on answers to an incoming housing preference questionnaire, but is somewhat less random in nature. Zimmerman uses his institutional knowledge of the assignment process to argue that the process at Williams is effectively random in nature.

Unlike freshmen at Dartmouth and Williams, incoming freshmen at Berea are not asked to complete a housing preference questionnaire and students are simply placed in available rooms without reference to preferences, backgrounds, or academic ability.[5] By all counts the process is random.[6] Nonetheless, given the importance of the randomness in this application, it is worthwhile to provide as much indirect evidence as possible that the process is indeed random. Table 2A shows the deterministic portion of a regression of ACT on RACT and a series of year dummy variables.[7] The t-statistics associated with a test of the null hypothesis that the effect of RACT is zero are .023 and 1.07 for females and males respectively. Table 2B shows the deterministic portion of a regression of INCOME on RINCOME and a series of year dummy variables. The t-statistics associated with a test of the null hypothesis that the effect of RINCOME is zero are .667 and 1.16 for females and males respectively. Thus, Table 2 indicates no evidence that would cause us to question our belief that roommates are randomly assigned.

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[4]The mean (standard deviation) of first year GPA at Dartmouth is 3.20 (.43). The mean (standard deviation) of first semester GPA at Williams is 3.10 (.510).

[5]There seems to be a belief that housing preference questions are limited in usefulness due to misreporting.

[6]As evidence of the school's intention to randomly assign rooms, in at least one year roommates were determined by a random room assignment program on the campus computer system.

[7]Year dummies are needed to allow for the possibility that average test scores may vary somewhat by year.

IV. Results

Berea college is unique in that it offers a full tuition and large room and board subsidies to all entering students regardless of family income. Stinebrickner and Stinebrickner (1999) finds that, despite direct costs of approximately zero for all students, family income plays an important role in determining both the college grades and retention of students at Berea even after controlling for observable characteristics including college entrance exam scores and high school grades. One possible explanation for this finding is that students from low income families may arrive at college less prepared academically due to inferior formal or informal educational training (and this lack of preparation is not entirely captured by college entrance exam scores of other observable measures of student quality). This explanation suggests that low income students suffer from lower "academic ability" at the time of college entrance which may be unlikely to be overcome, at least in the short run, by good peers.[8] However, many other very plausible explanations of the important role that family background plays in determining college outcomes are unrelated to ability per se. Among these possibilities, students from low income families may possess inferior study skills when they enter college, may possess weaker beliefs about the importance of educational attainment, and may not receive the same amount of support and encouragement from their families if academic or social difficulties are encountered during college. These type of explanations suggest that having high quality peers, who potentially act as positive role models and provide advice and encouragement during difficult times, may lead to an immediate improvement in a student's outcomes and that a roommate's family background, perhaps as proxied by his/her family income, may be an important factor in determining whether the roommate is a high quality peer.

Similar arguments are appropriate for thinking about the relationship between college entrance exam scores (or high school grades) and peer effects. If individuals with low college entrance exam scores (high

[8]We use the term academic ability to mean the total effect of both a person's inherent intelligence and his/her academic preparation. It is certainly possible that students of low academic ability may benefit to some extent from having good peers who can help them understand their college course work. However, it seems likely that true deficiencies in academic ability will persist to a large extent, at least in the short run, regardless of peer effects.

school grades) simply suffer from low ability, the influence that quality peers have on the outcomes of these students may be somewhat limited, especially in the short term. On the other hand, if low college entrance exam scores (high school grades) are indicative of poor study skills or weaker beliefs about the importance of doing well in school, peer effects may have a more substantial influence. Similarly, whether students with high test scores (high school grades) will have a large peer influence (in the short run) may depend to a large extent on whether these students have better study skills and stronger beliefs about the importance of schooling which can potentially be imparted on their friends/roommates.

The random assignment of roommates allows our basic methods for examining the influence of peer effects to be straightforward. For the purpose of examining grade outcomes, our tables present results from an OLS regression of the form

(1) $G_i = \alpha_G X_i + \beta_{1G} ACT_i + \beta_{2G} INCOME_i + \beta_{3G} RACT_i + \beta_{4G} RINCOME_i + \nu_i$

where X_i is a set of observable characteristics of person i, and, as defined before, G_i is the first semester grade-point average of person i, ACT_i and $INCOME_i$ are student i's ACT score and family income, and $RACT_i$ and $RINCOME_i$ are the ACT score and the family income of i's roommate. Random assignment of roommates implies that $RACT_i$ and $RINCOME_i$ are uncorrelated with ν_i which captures unobservable determinants of grades such as motivation, study skills, and study effort.

For the purpose of examining retention, our tables present estimates from a probit model of the form

(2) $R_i^* = \alpha_R X_i + \beta_{1R} ACT_i + \beta_{2R} INCOME_i + \beta_{3R} RACT_i + \beta_{4R} RINCOME_i + \epsilon_i$

where ϵ_i is N(0,1) and a student returns to Berea for the start of his second year (R_i=1) if $Ri^*>0$ and the student drops out sometime before the start of his second year (R_i=0) if $R_i^*<0$. Later we briefly discuss the estimation of a framework that allows us to examine whether the unobservable portions of roommates' outcomes are correlated due to either common shocks that influence them both or due to peer effects that cannot be directly attributed to observable characteristics associated with students' backgrounds.

In all cases we estimate models separately by sex. Column 1 of Table 3, which shows estimates of the parameters of equation (1) for females, indicates compelling evidence of peer effects in first semester

grades. No evidence is found of a relationship between grades and roommate ACT scores.[9] However, a $10,000 increase in RINCOME increases first semester grades, on average, by approximately .052 and a test of the null hypothesis that the true influence of RINCOME is zero yields a t-statistic of 2.36. The effect of RINCOME is similar in size to the effect of own INCOME. The effects of other variables are generally as expected with, for example, own ACT scores being a strong predictor of higher grades. Column 2 of Table 3 indicates no evidence that peer effects influence the grades of males. Consistent with these results, our specifications that took advantage of high school grade information indicated that roommate high school grade point average is an important predictor of first semester grades for females but has no effect on the first semester grades of males.[10]

Table 4 shows analogous results for retention. Roommate family income is positively correlated with retention with a test of the null hypothesis that the true effect of RINCOME is zero yielding a t-statistic of 2.65. This estimate implies that a $10,000 increase in RINCOME leads on average to a .037 increase in the probability of retention for a female with mean characteristics. The estimated effect of roommate family income is larger than the estimated effect of own family income but statistical tests do not reject the null hypothesis that the true effects are the equal. Consistent with the grade results, RACT is found to have no influence on female retention and no evidence is found that peer effects influence male retention. Our specifications that included high school grade information indicated that RHSGPA is not a determinant of retention for either female or male students.[11]

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[9]The estimated effect for RACT changed very little when RINCOME was removed from the specification. This was also true for all of the subsequent specifications in the paper.

[10]In a specification in which HSGPA and RHSGPA replaced INCOME and RINCOME in equation (1), the point estimates (standard errors) for females were .736 (.080)* and .174 (.076)* respectively and the point estimates (standard errors) for males were .832 (.082)* and .039 (.081) respectively.

[11]In a specification in which HSGPA and RHSGPA replaced INCOME and RINCOME in equation (2), the point estimates (standard errors) for females were .688 (.152)* and .050 (.149) respectively and the point estimates (standard errors) for males were .750 (.139)* and -.024 (.131) respectively.

Thus, for females we find strong evidence of peer effects on both grades and retention and that a student's family background and high school grade performance are important determinants of peer quality. However, we find no evidence that peer effects are important for males. Differences in the importance of peer effects by sex could arise for many reasons. One possibility is that females may be more accepting of roommates who are from different backgrounds, and, as a result, may spend more time with their assigned roommates than males. Another possibility is that males and females may spend time with their roommates in different ways and/or discuss different topics and issues when together.[12] Unfortunately, this paper cannot provide information about the reasons for the sex differences we find, and, in the remainder of the paper, we economize on discussion and tables by concentrating on the female sample. Consistent with the previous results, no evidence of peer effects for males was found when the subsequent analysis was performed with the male sample.

An important policy question is whether less gifted/less privileged students can receive large peer benefits from interacting with more gifted/more privileged students without the latter group incurring substantial costs. The discussion at the beginning of this section suggests that this could be the case. For example, it seems likely that a student with good study skills and/or strong beliefs about the importance of educational attainment would not suffer much from an arrangement in which she imparts these skills and beliefs on a roommate who came to school with poor study skill and/or weaker beliefs about the importance of educational attainment. To get a sense of whether the net gains of combining students from diverse backgrounds is positive, Table 5 shows the estimates of equation (1) separately for females below the median income in the sample (column 1) and for females above the median income in the sample (column 2). The results indicate that the null hypothesis that the effect of RINCOME is zero would be rejected at a .10 level

[12]It is possible that our finding that RINCOME has no effect on the grades and retention of males is related to the fact that males in our sample from poor backgrounds do not seem to suffer the same type of grade disadvantage as females from poor backgrounds (although family income plays an important role in determining male retention). However, even if this is the case, our additional finding that RHSGPA influences first semester grades for women but not men would seem to suggest that the nature and/or amount of interactions with roommates may be different for the males and females because own HSGPA has an important effect on the grades of both males and females.

of significance for the low income subsample but not for the high income subsample. However, the null hypothesis that the effect of RINCOME is the same for the high and low subsamples cannot be rejected. Similarly, when we used the median HSGPA to subdivide the group of females for which high school grades are not missing we found that the null hypothesis that the effect of RHSGPA is zero would be rejected at a .10 level of significance for the low HSGPA subsample but not for the high HSGPA sample.[13]

Table 6 presents another look at this issue by using the entire sample of females and replacing the $INCOME_i$ and $RINCOME_i$ variables in equation (1) with an indicator of whether student i is from a high income background and is paired with roommate from a high income background (HH_i), an indicator of whether student i is from a high income background and is paired with a roommate from a low income background (HL_i), and an indicator of whether student i is from a low income background and is paired with a roommate from a high income background (LH_i). The estimated effects are relative to an omitted category in which student i is from a low income family and is paired with a roommate from a low income family. Not surprisingly, the results indicate that a high income student who is assigned a high income roommate (HH_i) performs better than a low income student who is assigned a low income roommate. What is of more interest are the estimates associated with the LH and HL pairs. The statistically significant coefficient (pvalue=.069) associated with the former implies that a low income student who is paired with a high income roommate performs significantly better than a low income student who is paired with another low income student. Similarly, the statistically significant coefficient (pvalue=.082) associated with the latter implies that a high income student who is paired with a low income roommate performs significantly better than a low income student who is paired with another low income student and statistical tests do not reject the null hypothesis that the effect of HH and HL are equal. Thus, the results suggest that low income students may be helped in a non-trivial fashion by being paired with higher income peers without the higher income peers incurring substantial costs. This finding of a net gain to diversification was even more clearly apparent when

[13]For the low HSGPA subsample, the estimated effect (standard error) of RHSGPA was .227 (.117)*. For the high HSGPA subsample, the estimated effect (standard error) of RHSGPA was .095 (.099).

the HH, HL, LH, and LL indicators were constructed on the basis of the high school grades of a student and her roommate.[14]

The female retention results which are analogous to Tables 5 and 6 are shown in Tables 7 and 8. Similar to Table 5, Table 7 shows that the effect of RINCOME is statistically significant (pvalue=.018) for low income females (column 1) but is not statistically significant (pvalue=.151) for high income females (column 2). The estimated effect of the HH pair in Table 8 indicates that the HH effect is statistically larger than the LL effect. The estimated effects of HL and LH are positive but not statistically different than zero. There is some evidence that a high income student who is paired with a low income student may be less likely to remain in school than the high income student who is paired with a high income student even though Table 6 showed that the high income student does not suffer a significant reduction in grades from this situation.[15] It is possible that this effect may be due to the high income student being more likely to transfer to a different school if she is placed with someone who does not have a common background or common interests.[16]

Although Sacerdote does not find overly strong evidence of a relationship between a student's grades and the observable background characteristics of his roommate, he does find strong evidence that a student's grades (and social outcomes) are related to the grades (social outcomes) of his roommate. This relationship could be caused by peer effects if students who are "better" than predicted by their observable characteristics provide positive spillovers to their roommates. This correlation could also be caused by shocks that

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[14]In this case, the estimated effect (standard error) of HH (HSGPA high, RHSGPA high), HL (HSGPA high, RHSGPA low), and LH (HSGPA low, RHSGPA high) were .654 (.099)*, .610 (.098)*, and .186 (.098)* respectively. The latter reflects the grade benefit for the low HSGPA person of being assigned a roommate with high RHSGPA relative to being assigned a roommate with low RHSGPA. The difference between the first two estimates is an estimate of the harm that is incurred by a high HSGPA person who is assigned a roommate with a low RHSGPA.

[15]A test of the null hypothesis that the effect of HH and HL are equal has a pvalue of .10.

[16]In general, most students who leave Berea do not tend to transfer to other four year institutions (Stinebrickner and Stinebrickner, 1999). Consistent with earlier results, roommate grade point average was not found to influence retention when the models in Tables 7 and 8 were estimated using high school grade information rather than family income.

influence both roommates jointly but are unrelated to peer effects. Examples of this possibility include a noisy neighbor or health problems that influence both roommates. While it is difficult to distinguish between the possible causes of a correlation between the outcomes of roommates, we were able to examine its overall importance by re-estimating equations (1) and (2) explicitly allowing for a correlation between the unobservables of each pair of roommates.[17] We found some evidence that roommates' unobservables are correlated.[18]

V. Conclusion

In the short run, a particular student's "academic ability," which throughout the paper has been used to reflect both inherent intelligence and his/her educational training before college, is likely to a large extent to be fixed. However, first year grade outcomes and drop-out decisions also depend on the amount of effort a student puts into studying, the quality of his/her study time, and his/her beliefs about the importance of educational attainment. These factors may be influenced in the short run by the actions and beliefs of peers. Thus, it seems very possible that this is the avenue that causes the first year college outcomes of females from less privileged backgrounds to improve if these students are assigned roommates from more privileged backgrounds who, for example, are more likely to have parents who have attended college.[19] Similarly, it seems likely that females with good high school grades have positive effects on their roommates because, holding college entrance exam scores constant, these individuals may have better study habits or stronger

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[17]Sacerdote provides some evidence that the correlation between the grades outcomes of a student and his roommate are not entirely driven by joint shocks that are unrelated to peer effects.

[18]For female roommates i and j, the grade correlation between ν_i and ν_j is .148 and a test of independence is rejected at levels of significance greater than .01. For males the correlation is .059 and a test of independence is rejected at traditional levels of significance. The retention correlation (standard error) between ϵ_i and ϵ_j is .115 (.097) and -.040 (.094) for females and males respectively.

In this specification, we found very similar effects for the included observable characteristics as those described earlier in the paper. We choose not to present the results as our main results because this approach required removing some individuals from the analysis due to the requirement that all characteristics and outcomes for **both** roommates have to be present. Particularly unappealing was the loss of observations where a student's roommate left school during the first semester and did not receive first semester grades.

[19]Many students At Berea are first generation college attendees.

beliefs about the importance of educational attainment than other individuals.

Although this paper finds no evidence that students with high ACT scores influence the first-year outcomes of their roommates, it is necessary to be cautious when interpreting this result. If there do not remain large differences in study skills and beliefs about the importance of educational attainment between students with different ACT scores after controlling for a person's family background, then the benefits of peers with higher academic ability may tend to only reveal themselves over a longer horizon. For example, suppose an elementary student is placed in a classroom with students who have the same study habits and beliefs about the importance of schooling but higher academic ability (perhaps these students have simply received better training in the past). In this scenario, there would not seem to be an avenue that would generate an immediate effect on, for example, the student's standardized test scores or grades. However, improvement in test scores or grades could occur in the longer term if interactions with the higher ability classmates lead to an increase in the student's stock of academic knowledge/ability.

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Table 1 descriptive statistics

	female n=676 mean standard deviation	male n=619 mean standard deviation
Observable Characteristics		
black	.10	.10
home is within 2 hours of Berea	.44	.44
ACT own ACT	43.27 6.60	41.67 7.06
INCOME own income/10000	2.02 1.28	2.27 1.37
RACT roommate ACT	43.24 6.64	41.61 6.98
RINCOME roommate family income/10000	2.02 1.29	2.27 1.37
HSGA own high school GPA	3.35 .45 (n=474)	3.07 .51 (n=464)
RHSGPA roommate high school GPA	3.34 .45 (n=474)	3.07 .51 (n=464)
Student Outcomes		
first semester grades - G	2.62 .79 (n=638)	2.31 .94 (n=585)
retention -returned for second year - R	.72	.64

Table 2a - Evidence of randomness. OLS regressions of ACT on RACT and time dummy variables.
note: g1(year) and g2(year) are linear functions of year dummies (time dummy coefficients not shown).
Standard errors in parentheses below the points estimates.

Females n=676
$E(ACT_i)=42.42 + .0009\ RACT_i + g1(year)$
(1.74) (.038)

Males n=622
$E(ACT_i)=39.51 + .044\ RACT_i + g2(year)$
(1.82) (.041)

Table 2b - Evidence of randomness. OLS regressions of INCOME on RINCOME and time dummy variables.
note: g3(year) and g4(year) are linear functions of year dummies (time dummy coefficients not shown).
Standard errors in parentheses below the point estimates.

Females n=676
$E(INCOME_i)=2.10 + .026\ RINCOME_i + g3(year)$
(.148) (.039)

Males n=622
$E(INCOME_i)=2.451 + .050\ RINCOME_i + g4(year)$
(1.82) (.043)

Table 3 first semester grades and peer effects

	female n=638 mean (standard deviation)	male n=585 mean (standard deviation)
constant	.598 (.273)*	.682 (.310)*
black	-.249 (.097)	-.300 (.125)*
home is within 2 hours of Berea	.008 (.057)	-.079 (.074)
ACT own ACT	.041 (.004)*	.039 (.005)*
INCOME family income/10000	.056 (.022)*	.014 (.027)
RACT roommate ACT	.001 (.004)	.002 (.005)
RINCOME roommate family income/10000	.052 (.022)*	-.019 (.027)
	R^2=.174	R^2=.119

* represents statistical significance at a .10 level.
Table 3 shows OLS regressions of first semester grades on characteristics of students and their roommates.

Table 4 retention and peer effects

	female n=676 mean (standard deviation)	male n=619 mean (standard deviation)
constant	-.924 (.499)*	-.147 (.443)*
black	.002 (.176)	.231 (.182)
home is within 2 hours of Berea	.045 (.105)	-.117 (.105)
ACT own ACT	.023 (.008)*	.015 (.007)*
INCOME family income/10000	.067 (.039)*	.087 (.038)*
RACT roommate ACT	.002 (.007)	-.004 (.007)
RINCOME roommate family income/10000	.109 (.041)*	-.033 (.038)
	Log Likelihood -393.10	Log Likelihood -398.47

* represents statistical significance at a .10 level.

Table 4 shows estimates of a probit model where dependent variable is 1 if student returned for his/her second year at Berea and is 0 otherwise.

Table 5 first semester grades- females separately above and below median income

	females below median mean (standard deviation)	females above median mean (standard deviation)
constant	.711 (.417)*	.457 (.373)
black	-.286 (.143)*	-.246 (.133)*
home is within 2 hours of Berea	-.056 (.087)	.073 (.076)
ACT own ACT	.034 (.007)*	.045 (.006)*
INCOME own family income/10000	.111 (.063)*	.058 (.046)
RACT roommate ACT	.004 (.006)	-.008 (.005)
RINCOME roommate family income/10000	.057 (.033)*	.041 (.029)
	R^2=.131	R^2=.222

* represents statistical significance at a .10 level for OLS regressions involving first semester grades.

Table 6 first semester grades- females with income categories

	females mean (standard deviation)
constant	.664 (.275)*
black	-.254 (.097)*
home is within 2 hours of Berea	.007 (.058)
ACT own ACT	.041 (.004)*
RACT roommate ACT	.002 (.006)
HH student high income, roommate high income	.189 (.081)*
LH student low income, roommate high income	.145 (.080)*
HL student high income, roommate low income	.139 (.079)*
	R^2=.165

* represents statistical significance at a .10 level for OLS regression of first semester grades.

Table 7 retention- females separately above and below median income

	females below median mean (standard deviation)	females above median mean (standard deviation)
constant	-.934 (.703)	-.917 (.755)
black	.111 (.240)	-.150 (.264)
home is within 2 hours of Berea	-.144 (.145)	.277 (.158)*
ACT own ACT	.030 (.012)*	.018 (.011)
INCOME own family income/10000	.044 (.106)	.067 (.099)
RACT roommate ACT	-.002 (.109)	.007 (.011)
RINCOME roommate family income/10000	.134 (.056)*	.087 (.061)
	Log likelihood -208.58	Log likelihood -181.71

* represents statistical significance at a .10 level for probit models of retention.

Table 8 retention- females with income categories

	females mean (standard deviation)
constant	-.764 (.497)
black	-.006 (.176)
home is within 2 hours of Berea	.040 (.105)
ACT own ACT	.023 (.008)*
RACT roommate ACT	.003 (.008)
HH student high income, roommate high income	.377 (.152)*
LH student low income, roommate high income	.194 (.142)
HL student high income, roommate low income	.114 (.140)
	Log likelihood -395.05

* represents statistical significance at a .10 level for probit model of retention.