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Measuring the effect of family income on undergraduate behavior

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Abstract

Educational equality has been an important and relevant issue in recent years, especially as tuition increases at colleges and universities make it increasingly difficult for low and middle-income families to afford education for their children. There are even more issues of educational equality that come into play once a student matriculates at a chosen school. This paper focuses on this area, expanding on existing literature that details family income's impact on undergraduate behavior. Academic pursuits have been a topic for prior research in this area, but this paper also models extracurricular behavior as a function of family income. Results show that income does play a role in student decision-making, but it does not seem to place lower-income students at any disadvantage to their peers.

Introduction

Colleges and universities throughout the United States have long offered financial aid to disadvantaged students. As tuition increases continue to outpace inflation, financial need has moved up the income spectrum such that middle-class families are increasingly priced out of the market. As a result, many higher education institutions have been making efforts to extend financial aid beyond low-income students. This phenomenon is especially evident at private, prestigious universities; over the past two years, many of these institutions have been racing to expand aid to cover students from middle and even upper-middle class backgrounds. Harvard, Yale, Columbia, and Stanford are among the notable selective universities in this group. The New York Times published an article at the end of 2007 titled "Harvard's Aid to Middle Class Pressures Rivals." In this extreme case, financial aid at Harvard has been expanded to include any student whose family income falls below $180,000. Harvard's decision was quickly followed by similar changes at the University of Pennsylvania, Swarthmore, and Haverford. Theoretically, providing financial aid to more than just the poorest families should attract students from all economic backgrounds, not just the extremes, increasing equity in educational accessibility.

This paper will look at one effect of these generous financial aid policies by analyzing undergraduate behavioral differences across income levels, once students have matriculated at a specific university. These extensive financial aid policies are designed to equalize the burden to pay for families across the income spectrum – or at least to lessen this difference. This implies that students' behavior should not be influenced by the need to pay off deep student loans or to contribute excessively toward their tuition bills. Are these policies effective in actually leveling

the playing field for all students? Or do students still pursue significantly different undergraduate behaviors according to their income level?

This analysis comes from data provided by a sample of fourth-year students currently enrolled at the University of Richmond. The University of Richmond is a private, selective institution of approximately 2,700 undergraduate students. The University has a need-blind admissions policy, so that students' admissions decisions are made without any consideration of their financial situation. It also meets all demonstrated financial need for each student (i.e. covers the full difference between tuition and estimated ability to pay, as calculated through the Free Application for Federal Student Aid and the University). These policies are designed to draw students across a spectrum of financial backgrounds and equalize their burden to pay, making it an ideal university at which to study this question.

Literature Review

Past research shows that a student's choice of major is generally a function of several independent variables that work in predictable ways. Coperthwaite and Knight [1995] construct a model with which they are able to explain 75% of the variation in students' choice of major. Their model analyzes student major as a function of student characteristics such as academic ability, gender, and family background, and as a function of college environment. Their model was processed against a data set of over 40,000 observations, so its predictive capabilities are quite strong. While this study does not speak specifically to the impact of family income on a student's major, it does recognize that there are strong relationships between specific student characteristics and field of study and that these characteristics often act together in a predictable way.

Porter and Umbach [2006] also look at an array of student characteristics to develop a predictive model of undergraduate major, looking specifically into the relationship between income and academic pursuit. They considered six main categories of independent variables: demographics, parental influence, academic preparation, future views of the academic career, political views, and personality/goals. They hypothesized that the combination of family influence and socioeconomic status has a strong impact on choice of major, but after controlling for a student's personality and goals, they found that this effect is relatively small as compared with the other variables. Trusty et al. [2000] reach this conclusion as well. They found that the impact of socioeconomic status on choice of major was smaller than the effects of other factors, namely gender and academic performance. The impact of SES was significant, but it played a more secondary role in the determination of a student's major.

Although family income might not be the largest single predictor of a major, these studies establish a definite relationship between the two. Siebens [2006] argues that this connection works to disadvantage lower-income students. Her supporting data come from three sources: The Beginning Postsecondary Students Longitudinal Study (1993), the Occupational Information Network (1994), and the 1993 National Survey of College Graduates. The data support the idea that students of a lower income family tend to choose less challenging majors, ceteris paribus. Siebens hypothesizes that this is because lower-class students have a greater aversion to risk and fear of failure, leading them to choose majors that are perceivably easier. This will ultimately lead them to lower-earning positions after graduation.

Several studies have set out to further explore this connection by looking at how income interacts with other factors to impact a student's curriculum choice. David Lang [2007] observes how income interacts with gender and ability to affect curriculum choice. His study is based on

the 1993-94 Baccalaureate and Beyond Longitudinal Study and includes over 3,000 observations. His review of the data showed that students from the highest income levels, holding ability and gender constant, were most likely to major in economics, social sciences, or business; students from the lowest levels of income were more likely to study engineering, education, or math and computer sciences. These results are interesting but somewhat difficult to interpret, as the connections between these majors are not neatly defined. Economics and business degrees historically yield high returns, suggesting that students from high income families are more likely to pursue lucrative majors; but at the same time, payoffs for engineering degrees are also quite high. Viewed in another way, the degrees sought by lower income students are more technical in nature, suggesting a possible connection between family income and the type of major a student pursues.

Leppel et al. [2001] looks at the combined effect of family income, gender, and parental occupation on a student's choice of major and finds that income affects men's and women's decisions differently. Her results show that socioeconomic status has a greater impact on females than males in curriculum choice. The two genders are affected differently by this phenomenon – as family income goes up, men become more likely to major in business, while women are less likely to do so. Davies and Guppy [1997] and Montgomery [1995] also examined gender differences in student curriculum choice and concluded that, holding income levels constant, men are much more likely to major in "lucrative" fields of study (based on financial returns to the major) than females.

This literature all addresses how family income specifically affects a student's academic decisions. There is little existing research that explains how a student's behavior is affected on the whole by his family's background. This paper will first consider the link between family

income and major, but it will also work to fill the gap in current research by considering income's effect on several other behaviors. The focus will be on extracurricular participation through involvement in the Greek system, job and internship experience, and experience studying abroad. By wholly considering all of the aforementioned variables, this paper will determine whether or not any significant differences exist for students from different income levels, and whether these differences work to disadvantage certain students. The significance of these results could have policy implications for universities to further equalize opportunities for all undergraduates.

Empirical Model

The data used for the following analysis are self-reported from University of Richmond students with senior standing. A randomly selected group of 500 senior students was asked to complete an electronic survey regarding their background before coming to school and undergraduate experience over the past three years. The survey was administered through a third-party website and respondents were guaranteed anonymity. Observations were limited to seniors because these students have had full, equal opportunity to pursue any activities of interest by this point in their undergraduate studies.

The response rate was almost 50%, yielding a full sample of 243 responses. All respondents who had not fully completed the survey or who did not report their family's income or any of the dependent variables were removed from the sample (18 observations). Additionally, all international students were removed from the sample (10 observations). These students are a self-selected group that has made an unusual decision to earn their degree in a foreign country; this means that they probably share certain characteristics that may not have

been captured in the survey, skewing results. International students are also likely to have different backgrounds and opportunities from those of U.S. students, making comparisons among the groups difficult. After removing these respondents from the sample, 215 observations remain in the group used for the analysis[1].

The data set contains variables related to students' background and activity (both academic and extracurricular) at the University of Richmond. The independent variable of interest is family income. Since students cannot be expected to accurately know their families' incomes to the dollar, they were asked to indicate the range that best represents it. These ranges are constructed at intervals of $25,000 up to $100,000, intervals of $50,000 up to $200,000, and intervals of $100,000 at anything in excess of that level. Given the larger marginal impact that a dollar has at lower levels of income, smaller intervals at this end of the income spectrum are useful in capturing these differences. The precision of these ranges is not as important as income goes up. In all following analysis, these income ranges are evaluated at their midpoints.

It should be noted that income tends to be a misrepresented variable, one which is difficult to accurately measure through self-reporting. Although some students may have had trouble determining which group they fall into, the range that they choose is a good approximation for actual income. Students should be able to reasonably guess this number, at least to the extent that family income is lower or higher than average. Also, the level of income that a student perceives his family to have will affect his behavior much the same as if he knew his parents' exact income. If a student feels his parents earn a certain amount of money, his actions should reflect this perception, regardless of how true or false it may be.

[1] Students who completed the majority of the survey but skipped questions related to control variables were kept in the sample. Sample averages were filled in for these missing variables so as not to change the essential make-up of the group.

In following with previous literature on the subject, the relationship between gender and income is also of interest. The relationship will be analyzed in this study by interacting family income with the female binary to create an additional independent variable. The resulting coefficient on this variable will indicate whether or not income seems to have a stronger impact on males or females' behavior.

Additional X-variables used as control are: student's gender, race, home state, and type of high school attended; academic achievement measured by standardized test scores and UR GPA; and areas of academic interest. Academic interest is measured with a binary variable for each curriculum group indicating whether or not a respondent indicated high interest in a subject, valued at 1 for interest and 0 for no interest.

Y-variables are the following: major field of study, involvement in Greek life, study abroad experience, and work and internship experience. All models employ logit functions and are constructed according to the following generalized format:

$$\text{Participation} = \beta_0 + \beta_1 \text{Family Income}/1000 + (\beta_2 \text{Female*Income}) + \beta_3 \text{Female} + \beta_4 \text{Race} + \beta_i \text{Control}_i + \varepsilon$$

in which the additional control variables included in each model will be different depending on the variable in question[2]. The gender-income interaction term is indicated in parentheses because it will only be used as appropriate. It will be included in the curriculum choice models because of its place in previous literature, but for other regressions in which the term is insignificant, it may be removed. The female binary will be included in all regressions, and still works to capture basic differences between the genders.

[2] Some of the dependent variables listed above will also act as control variables in regressions on other measures (for example, major field of study is used as a control factor in regression on study abroad participation).

Since the results from logit analysis cannot be easily interpreted, for any significant regressions I will calculate the predicted probabilities associated with each income level. The predicted probability follows from the following formula: $\hat{P}_i = 1/(1+e^{-zi})$, where $z_i = \beta_0 + \beta_{ik}X_{ik}$. This formula shows that the probability is dependent upon all unique characteristics exhibited by each respondent. As a result, probability cannot be calculated for all students that fall into one given income category. This paper will calculate predicted probability at the sample mean for all variables except income, which will provide the point of comparison.

Summary statistics for all variables are provided in Table 1. All values fall within expected ranges, thus no observations were dropped from the sample based on questionable data. SAT scores hit a low of 450 for verbal and 500 for math; while this seems surprising for a university with a competitive admissions policy, admissions standards will often be altered for students with special circumstances or special talent to bring to the university in other areas (e.g., athletes). Other continuous variables take on plausible values, with ranges from 0-40 work hours each week and 0-50 hours per week dedicated to extracurricular activities. Binary variables clearly take on a value of either 0 or 1, and the means for each fall in line with expected values.

Since this data comes from a population that we have a lot of information about, we can evaluate how accurately this sample portrays the population as a whole. Table 2 demonstrates the representativeness of the sample as compared to the population. The sample of 215 students represents roughly 30% of the senior class. Though not all data captured on the survey is reported by the University, or is not available in aggregate form, those statistics that are available imply that the sample does a fair job of representing the population[3].

[3] It should be noted that not all population data reported is specific to the senior class, due to reporting restrictions. Private high school and Greek membership percentages are for all UR students, while study abroad percentages come from the class of 2008. These numbers are assumed to be comparable across all years.

The only significant discrepancy between the sample and population statistics is the slightly higher proportion of females in the sample. The break-down within the population is split almost equally between men and women, while close to 65% of the respondents in the sample were women. Given the differences in behavior between the genders indicated in past research, this could prove to slightly bias results toward behavior that women are more likely to exhibit. It also may prove more difficult to reach conclusions about differences between the genders, considering only about 35% of the sample is men. This does not offer a large number of males for comparative purposes, making it more difficult to arrive at statistically significant results.

Table 2 suggests that responses should be fairly sound, making the results relevant and meaningful; however, the data set does have some limitations that should be recognized before moving forward to analysis. Though student response to the survey was high, the sample size is still limited. For this reason, the simplest possible models will be used so as to retain as many degrees of freedom as possible. Also, the reporting methods used for some variables were not as precise as desired – namely, the large ranges used to report family income. These ranges are evaluated at their midpoints in all following analysis, so that any variation within a range is eliminated. As stated previously, though, ranges were constructed so that the differences within these groups are not as important as the differences among them.

Results

Field of Study

Student's curriculum is analyzed in two distinct ways. First, students' majors were grouped according to which general curriculum they fall under, of the following: business, social

sciences, physical sciences, or humanities. By looking at majors in this light, we can determine whether students from certain backgrounds are drawn more to certain fields of study than others, as prior research has indicated. A social sciences curriculum is viewed as the base major because it encompasses approximately 54% of the sample, the majority of students by far. Business majors make up 25% of the sample, humanities 12%, and science majors represent the final 8% of students.

Field of study was analyzed using logit regressions on each curriculum binary. Hypotheses can be drawn based on the previous literature: family income should have a positive impact on a student choosing a business major, while the effect on other majors is either negative or unknown. I predict that the effect on majors in the humanities is negative, because these areas do not generally lead to high return career paths. For the other two areas, the social and physical sciences, I merely predict the coefficient as not equal to zero.

For the regression on business curriculum, the coefficient on family income was positive, as expected, significant at the 1% level. This falls in line with prior research on the subject, in which students from high-income backgrounds are more likely to pursue an undergraduate business curriculum. Majors that fall into the business category often obtain some of the higher paying jobs upon graduation, and their curriculum is more career-driven and specific than liberal arts majors.

Unlike the literature, however, this regression shows no significant difference in behavior between males and females, neither in the female binary nor in the female*income interaction term. The coefficients have the signs expected, negative on each, but are not significant at the 10% level. The insignificant coefficient on the female binary makes these results questionable – based on the sample, approximately 40% of males are business majors, while only about 17% of

women are. While the regression controls for other factors, this difference is quite large and assumedly significant. This insignificance could potentially be a result of the gender composition of the sample, which includes significantly more female observations than male (136 to 79). For this reason, it becomes more difficult to find significant results when comparing behavior between the two genders.

Otherwise, results are as expected, matching up with the predicted signs assigned to each variable. Student background characteristics are included in the regression in order to hold constant factors that are typically though to impact curriculum choice, such as gender and race. SAT scores are also included as a measure of academic ability (given that GPA is assumed to have a strong bi-causal relationship with choice of major). Interest variables are binaries representing whether or not a student indicated the subject as an area of high interest.

Predicted probabilities have been calculated in order to see specifically how these magnitudes might vary over the observed range of income. These probabilities are separated by gender and are evaluated at the sample means for all other variables[4]. In Figure 1, we see that the probability of a student majoring in business increases over the range at an increasing rate. The probability graph for males is shifted higher than females, and it also increases at a quicker rate, indicated by the steepness of the function. The graph demonstrates how probability would change beyond the range of observed values, showing that the function eventually flattens off at higher levels of income.

Table 4 indicates the exact numbers associated with these graphs – for women, higher income increases the probability of majoring in business from a low of 6% to a high of 27% in the range of observed values. For men, this increase is much sharper, raising probability from

[4] Though gender was not significant in the above regression, in keeping with the literature it is interesting to note the potential differences between males and females. The function for females should be viewed as the standard case.

11% to a high of 60%. For both genders the magnitude of this effect is quite large, demonstrating the important role that income can play in students' choice of curriculum.

The other curriculum clusters (social sciences, physical sciences, humanities) did not yield significant coefficients on the income variable (Table 5). There could be several reasons behind this. Taking the social sciences into account, this group represents the majority of students at the University of Richmond, and really comprises a wide variety of majors. As a result, many of the concentrations do not have strong ties with one another, implying that students who pursue these various majors might not really take great interest in the same areas of study, nor have similar career plans.

The other areas of concentration suffer from a different problem, because they represent so few majors and so few individuals. It is quite possible that the humanities and physical sciences did not have high enough participation to yield significant results. These majors only comprised 12% and 8% of the sample, respectively, which means that the small number of students in each group did not provide a great deal of data upon which to base regressions.

While these curriculum clusters provide some interesting observations, they offer imperfect generalizations of a student's area of study. For this reason, student curriculum was also evaluated in terms of the average income that can be expected by a graduate with said degree[5]. Expected income is useful in determining whether money seems to be a motivating factor for a student to pursue a given major. By looking at majors in this light, we can determine whether or not students from certain backgrounds seem to systematically seek out higher return majors. These differences are not captured by the curriculum analysis that was performed above – as previously mentioned, the social sciences group in particular covers a wide variety of majors, and grouping these together detracts from some of the differences that really

[5] This information was obtained at www.payscale.com, a comprehensive public database for salary information.

exist among the available choices[6]. Associating each major individually with its expected salary provides a more exact measure of the type of major that each student is pursuing.

Expected earnings were analyzed with a standard ordinary least squares regression, in which the dependent variable was average salary for graduates with this degree (for results see Table 6). The predictive capabilities of the model are limited, yielding an R^2 of only 0.2717. The model limitations are also evident by the large standard errors for many of these variables, indicated in parentheses. According to this regression, family income does not help determine a student's expected earnings after graduation.

Although the results show that higher income students pursue more lucrative majors such as business, these students do not seem to systematically seek out those majors that anticipate the highest income. This suggests that it may be other characteristics of these majors that are appealing to the higher income students, such as their career-focused orientation. There is likely some characteristic these individuals share that make them more interested in pursuing these goals; drawing on successful parents' experiences could likely drive them to be more focused on an eventual career path than their peers. These OLS results suggest that low-income students are not disadvantaged by their background, as students still pursue lucrative majors across curriculum groups at fairly equal rates. The absence of low-income students pursuing business degrees is compensated through other areas of concentration.

Extracurricular Experience

[6] It should be noted that the highest and lowest-return majors spanned different curriculum clusters: the highest return majors in the sample were computer science, physics, and economics; the lowest return concentrations were foreign languages, religion, and criminal justice.

While student's academic life is of particular concern to this study, experience outside of the classroom is also considered by most students and educators to be an integral part of the college experience. There are many activities that contribute to a student's learning and development that are offered outside of a student's academic concentration. This paper will not address the matter of general extracurricular participation at the University of Richmond, given that over 90% of survey respondents participated in at least one extracurricular activity. This makes the issue of little interest, and does not leave much variation within the sample to be analyzed. Instead, this paper will consider participation rates in specific activities: membership in a Greek organization, study abroad experience, work experience during the school year, and internship attainment.

Greek life is a dominant social system at the University of Richmond in which approximately 43% of all students participate (breaking down into 50% of females and 35% of males). Although participation rates are so high, there are explicit monetary costs involved in joining a fraternity or a sorority. Dues vary depending on the organization, but typically range somewhere in the hundreds of dollars per school year, suggesting that lower-income students might be dissuaded from joining. For this reason, I hypothesize that family income has a positive impact on Greek life, implying higher rates of participation for students at the higher range of the income spectrum.

Participation in a fraternity or sorority is evaluated with a logit function in which membership is set equal to 1. Results show that income does have a positive, significant impact on participation in the Greek system (Table 7). Demographic and academic characteristics were included as control variables for the study: notably, home region was added as a control in this regression. This comes from the fact that participation in Greek life often results from family

legacy, heavily influenced by one's parents and where the parents went to college. A test of joint significance on the region binaries shows the variables to be significant, so they are included in this regression. Holding constant these characteristics, an increase in family income increases the probability that a given student will become a member of a Greek fraternity or sorority (significant at the 5% level).

We see that the gender binary is not significant in this regression either. While the literature does not speak specifically to this dependent variable, the fact that 50% of women are members of sororities while only 35% of men join fraternities suggests that this binary would be significant at some level. Again, this could be due to the gender makeup of the sample. The interaction effect was not included in this regression as it was insignificant and its exclusion did not notably change the coefficient on any other variables.

The predicted probabilities for an individual exhibiting mean values for all variables are highlighted in Table 8 and in Figure 2. These numbers are only representative of females, since women comprised the majority of the sample, and male participation would be the same function with a shift down in the intercept term (given that there is no gender-income interaction effect in this regression). For an individual with these characteristics, a change in family income would eventually move the probability of "going Greek" from 33% to 65% for the range of $0 - $400,000. Probability continues to increase beyond this point, at a slightly decreasing rate, although the function is only extrapolated beyond the range of observation and cannot be taken as exact. These changes in probability are not as drastic as the ones associated with business majors, but are still considerable.

It is difficult to pinpoint the reason for the difference in participation across income levels. One could attribute it to the explicit financial obligations of these organizations;

however, there are likely some characteristics shared by students from certain family backgrounds that affect one's motivation to join Greek life and could not be captured by this survey. There tend to be strong family influences on whether or not a student opts to join one of these groups. This rationale is also suggested by the positive, significant coefficient on private high school attendance. Since this was highly significant even after controlling for income, it suggests that there is some unobservable characteristic shared by those students that attended private high school that is motivating them to join Greek organizations – a possible "snob effect." These unobservable characteristics have much to do with the culture and mindset of students from these schools, and it would not be picked up by other responses to the survey. Overall, it is sufficient to say that lower-income students are less likely to participate in Greek life, holding all else constant. We cannot arrive at a conclusive reason behind this observation, though these two hypotheses probably explain much of it.

Another highly pursued activity at the University of Richmond that involves substantial costs is studying abroad. The University attempts to lower the costs of studying in another country by transferring all need-based financial aid toward the cost of attendance, providing additional scholarships to students studying abroad, and by granting stipends to each student to offset the cost of travel. Although these measures certainly help to make the experience more attractive, a semester spent abroad will still be arguably more expensive than a semester remaining on-campus at Richmond, given the same base tuition[7]. This implies that students from lower income backgrounds may not be as likely to study abroad during their time at Richmond.

Approximately 60% of students in this sample spent at least some time abroad (either through a summer, semester, or year-long program). Study abroad was analyzed with a logistic

[7] It should be noted that the University also offers a summer study abroad option, but this can be assumed an even larger financial burden, given that the student would not otherwise be paying any type of tuition during the summer months.

model, in which any experience abroad is set equal to 1. The regression includes several control variables in addition to income and gender. The binaries for student major are included, because it is more difficult for students within some majors to study abroad and still graduate on-schedule. Extracurricular participation (measured in hours per week) is also included in this regression, aiming to control for those individuals who may have been too involved in other activities to abandon their responsibilities for a semester or a year. Holding these variables constant, the heightened cost of a summer or semester abroad implies that the coefficient on the income variable would be positive, increasing participation rates for students as their income increases.

The results (Table 9) show that the coefficient on income, though positive, is insignificant at the 10% level. Other variables have plausible signs. The curriculum binary suggests that science majors are significantly less likely to spend time abroad (not surprising given their rigorous academic schedule and necessity to take specific, tracked courses). Also as expected is the significant, negative coefficient on extracurricular participation. This suggests that those students who are more involved on-campus are less likely to abandon these positions for an experience abroad.

The insignificance of income is surprising given the aforementioned costs. It is possible that the University of Richmond provides a sufficient amount of financial assistance to lower-income students, effectively covering the increased cost of attending an institution abroad. Regardless of reasoning, these results should be seen in a positive light. Lower-income students do not seem to be at a disadvantage to their peers, as they are just as likely to take advantage of opportunities available to study abroad and do not appear to be constrained by their financial situations.

Work Experience

A different type of student involvement is employment during the school year. Such jobs can be time-consuming, keeping students from participating in other more desirable activities and drawing time away from academic work. This implies that students are less likely to pursue employment opportunities if they do not need access to the money. This model will employ logit function on the dependent variable of job attainment, where holding school-year employment is set equal to 1. The hypothesis for this regression is that lower-income students would be more likely to pursue employment during the school year in order to keep up a continuous source of income. This implies a negative coefficient on the family income variable.

This regression (results shown in Table 10) concluded with a significantly negative coefficient on family income, as predicted. Gender and race are held constant, while GPA and extracurricular hours are also controlled for, assuming that involvement in other activities may impact a student holding a job. Student's GPA is highly significant and of larger magnitude than other variables in the regression. This is probably due to a related, unobservable characteristic, such as high motivation or effective time management.

Attached are the associated probabilities of holding a job during the school year (Table 11). Again, the observed range only runs from $0 - $400,000, but the results have been further extrapolated onto data beyond that, covering up to $1 million in Figure 3. Holding other variables constant, we see how the probability of holding a job during the school year decreases across the graph. Over the range of observed values, this is the activity that appears to be least affected by income. Probability of holding a job drops from 83% to 66% over observed data, so students from higher-income families are still fairly likely to hold a job during the semester.

While these results are significant, they are mainly descriptive. Although lower-income students are more likely to hold school year employment, this should not really be seen as a positive or negative thing, especially given the high participation of their peers.

It is difficult to determine the principal cause of this difference. A large part can probably be attributed to the lower-income students' need to earn more money. It must be noted, though, that a number of these students may receive federal work-study as part of their financial aid package. These individuals will be much more likely to pursue employment in the form of an on-campus job in order to fulfill this component of their aid. This makes jobs more accessible to these individuals, and could result in them holding employment even if that does not really fit into their goals and wants. While each likely contributes to the overall effect, the two cannot be distinguished from one another, so we have no real way of determining which is primarily responsible for this effect.

Another form of student work experience comes in the form of internships, which are often an important part of a student's career plans. Many students use these short-term jobs to explore a given field, and their completion often makes a student a more attractive candidate for future job opportunities. Many internship opportunities, however, do not compensate students to the same extent that even a minimum wage job would. A large number of positions are unpaid or only include small stipends designed to offset the costs of travel and lunch. Since the opportunity cost of participating in one of these internships is high, lower-income students may be at a disadvantage to their peers, needing to spend their summers working for pay instead.

Two regressions were used to capture the effect that income has on internships: one on completion of an internship program in general, and one on completion of an intern position that was not for pay. Students who take positions without any pay face the highest opportunity cost,

assuming they could pursue other work in that time that pays at least the minimum hourly wage. Results from this regression are thus expected to be more significantly related to income than those in overall internship attainment. Differences between the results on these dependent variables are of interest because they showcase how students respond to different monetary incentives.

Regression results on internship completion are attached (Table 12) and are surprisingly insignificant in both cases. Other variables have plausible, intuitive interpretations. Student major plays an important role in whether or not a student holds an internship. Business majors have the highest rates of participation, while humanities majors exhibit the lowest rates. Also as predicted, higher GPAs are associated with higher probability of holding an internship.

When comparing the two regressions, we see that the coefficient on family income switches signs, from negative for internships overall to positive for internships without compensation. This suggests that, relatively, students of high income are more likely to accept unpaid internships, but again this coefficient was insignificant. The insignificance of these results suggests that opportunities to students are relatively equal. Lower-income students pursue the same career-related activities as their peers, regardless of any financial strain that this might involve. This could mean that the implications for a student's financial situation are not strong, or that students pursue these opportunities regardless, given the importance that most students place upon internships.

Conclusion

The results from this study clearly demonstrate that income makes a difference in undergraduate experience, impacting student behavior in several ways. Unfortunately, the nature of the results makes it difficult to pull out any sort of general trend or rule that defines these

differences. The behaviors which I have determined are significantly impacted by a student's financial situation could be so because they impose financial restrictions on students (i.e. Greek life) or because family income is an inherent and significant part of students' background, implicitly causing them to pursue different goals. This makes it impossible to theoretically determine whether or not behavior could be altered by lowering these financial barriers.

The significant impact that income has on business majors fits in with previous literature on the subject. Taken together with the regression on students' expected earnings, we can conclude that characteristics besides future earnings affect students' pursuit of an undergraduate business curriculum. The expansion of previous literature to issues outside of the classroom shows that these issues also fall under the influence of family income and background, to some extent.

The results from this paper are more heavily descriptive than prescriptive. While we see that students pursue different activities according to their income levels, this does not necessarily warrant any policies to change this behavior. Overall, students do not seem to be limited by their family backgrounds given that they equally pursue activities that have high costs. We can thus conclude that, overall, lower-income students are not at any observable disadvantage to their peers.

Since all results from this study are specific to characteristics observed at this university, further analysis would be necessary to see how fitting these results are for students at other colleges across the United States. Nevertheless, the results could be applicable to universities with similar characteristics to the University of Richmond (small, private, liberal arts) and with a similar financial aid structure. There are a number of such institutions across the country, and this analysis likely has some degree of relevance for these colleges and universities. There are,

of course, areas of this study that could be expanded through further research. It would be interesting to increase the data set across a series of universities in order to see if these results hold true at schools with other characteristics, particularly the structure of financial aid. By comparing the results from this school to other schools, we could better assess the effectiveness of the extensive financial aid system in place at the University of Richmond.

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Appendix

Table 1: Summary Statistics (n=215)

Variable	Mean	Standard Deviation	Minimum	Maximum
Family Income*	$178,953.488	114,935	$12,500	$400,000
Female	0.633	0.483	0	1
Nonwhite	0.093	0.291	0	1
Private HS	0.358	0.481	0	1
SAT Verbal	663.704	63.858	450	800
SAT Math	660.957	62.621	500	800
GPA	3.269	0.407	2.0	4.0
Business Major	0.256	0.437	0	1
Science Major	0.084	0.278	0	1
Social Science Major	0.540	0.500	0	1
Humanities Major	0.121	0.327	0	1
Greek	0.409	0.493	0	1
Study Abroad	0.605	0.490	0	1
XC Participation	0.902	0.298	0	1
XC Hours/Week	11.249	9.500	0	50
Internship	0.698	0.460	0	1
Job	0.712	0.454	0	1
Work Hours/Week	7.100	6.489	0	40

*Since income was reported in ranges, it would also be helpful to note that the median reported range was $100,000-$150,000; the mode of the sample lies there as well.

Table 2: Sample Representativeness

Variable	Sample Mean	Population Mean
Female	0.633	0.517
Nonwhite	0.093	0.119
Private High School	0.358	0.390
SAT Verbal	664	640
SAT Math	661	651
Business Majors	0.256	0.251
Science Majors	0.084	0.102
Social Science Majors	0.540	0.508
Humanities Majors	0.121	0.138
Greek	0.409	0.428
Study Abroad	0.605	0.583

Table 3: Logit Regression, Dependent Variable = Business Major

Variable	Expected Sign	Coefficient	Standard Error
Intercept	?	-5.0381*	(2.6596)
Family Income/1000	**> 0**	**0.00619*** **	**(0.00236)**
Female	< 0	-0.7305	(0.7617)
Female*Income	< 0	-0.00171	(0.00317)
Nonwhite	?	-0.526	(0.8656)
Private High School	?	-0.6358**	(0.4193)
SAT Verbal	?	-0.00541	(0.00343)
SAT Math	> 0	0.00993***	(0.00355)
Business Interest	> 0	1.6498***	(0.4055)
Humanities Interest	< 0	-0.8500**	(0.4217)
Concordance	83.5		
Pseudo R^2	0.786		

*10%, **5%, ***1% significance levels; 1 or 2-tailed tests as indicated by H_A

Table 4: Predicted Probabilities of Choosing Business Major

Family Income	Predicted Probability - Female	Predicted Probability - Male
0	6%	11%
$50,000	7%	15%
$100,000	9%	19%
$150,000	11%	24%
$200,000	13%	30%
$250,000	16%	37%
$300,000	19%	45%
$350,000	23%	52%
$400,000	27%	60%

Figure 1: Probability of Business Major vs. Income

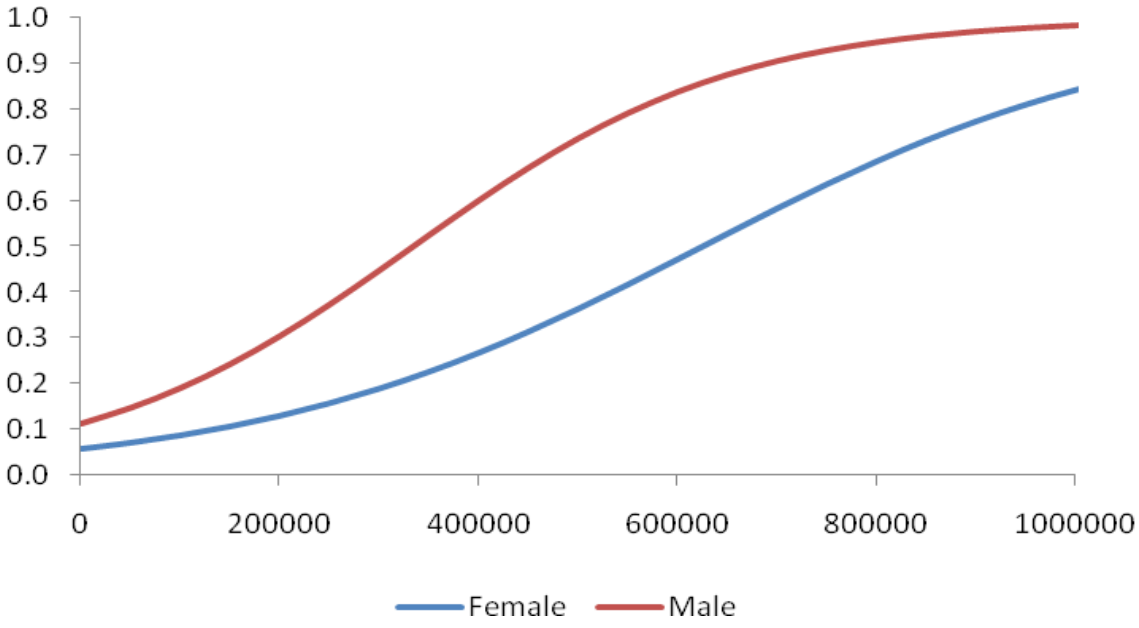

Table 5: Logit Regressions, Dependent Variable = Curriculum Choice

Variable	Humanities	Science	Social Sciences
Intercept	-4.9756	-21.0374***	8.7403***
	(3.1624)	(5.0017)	(2.3524)
Family Income/1000	**-0.00392**	**0.000945**	**-0.00342**
	(0.00479)	**(0.00411)**	**(0.00225)**
Female	0.1211	1.2213	-0.1392
	(1.0634)	(1.2379)	(0.6222)
Female*Income	0.00481	-0.00286	0.00217
	(0.00535)	(0.00541)	(0.00283)
Nonwhite	-1.3281	1.4370*	0.2829
	(1.0992)	(0.8333)	(0.5783)
Private High School	0.1586	0.3461	0.2113
	(0.4791)	(0.5711)	(0.3251)
SAT Verbal	0.0108**	0.0138**	-0.00477*
	(0.00424)	(0.0056)	(0.00272)
SAT Math	-0.00739**	0.0113**	-0.00701**
	(0.00425)	(0.00578)	(0.00288)
Business Interest	--------	--------	-1.0720***
			(0.3243)
Humanities Interest	0.7624**	--------	--------
	(0.4808)		
Arts Interest	0.295	--------	-0.5444*
	(0.4608)		(0.325)
Science Interest	--------	1.2754**	--------
		(0.6003)	
Social Sciences Interest	--------	--------	0.4617*
			(0.3217)
Concordance	79.7	79.6	73.2
Pseudo R^2	0.879	0.926	0.707

*10%, **5%, ***1% significance levels; 1 or 2-tailed tests as indicated by H_A

Table 6: OLS Regression, Dependent Variable = Expected Earnings

Variable	Expected Sign	Coefficient	Standard Error
Intercept	?	39498***	(3986.49612)
Family Income	> 0	0.00178	(0.00273)
Female	< 0	-2807.90743***	(635.18559)
Nonwhite	< 0	-701.5359	(1051.97233)
Private High School	?	-678.18023	(619.67643)
SAT Verbal	> 0	-9.35385*	(5.12754)
SAT Math	> 0	15.53991***	(5.30296)
Business Interest	> 0	1544.06242**	(644.33492)
Arts Interest	< 0	-98.47057	(624.14148)
Humanities Interest	?	-2427.59380***	(680.3654)
Science Interest	?	-767.83244	(702.68398)
Social Science Interest	?	1069.11479	(683.8495)
R^2	0.2717		
Adj R^2	0.2322		

*Majors with highest predicted earnings: Computer Science, Physics, Economics

*Majors with lowest predicted earnings: Foreign Language, Religion, Criminal Justice

Table 7: Logit Regression, Dependent Variable = Greek Membership

Variable	Expected Sign	Coefficient	Standard Error
Intercept	?	-1.297	(1.2921)
Family Income/1000	> 0	0.00299**	(0.00133)
Female	> 0	0.2744	(0.3185)
Nonwhite	< 0	-1.3648**	(0.6887)
Private High School	> 0	0.8738***	(0.322)
GPA	> 0	0.0968	(0.3824)
Midwest	?	0.1003	(0.5342)
West	?	-1.3799	(0.8554)
South	?	-0.7722**	(0.3334)
Concordance	69.9		
Pseudo R^2	0.647		

*10%, **5%, ***1% significance levels; 1 or 2-tailed tests as indicated by H_A

Table 8: Predicted Probabilities of Joining a Greek Organization

Family Income	Predicted Probability
0	33%
$50,000	36%
$100,000	40%
$150,000	44%
$200,000	47%
$250,000	51%
$300,000	55%
$350,000	58%
$400,000	62%

Figure 2: Probability of Greek Membership vs. Income

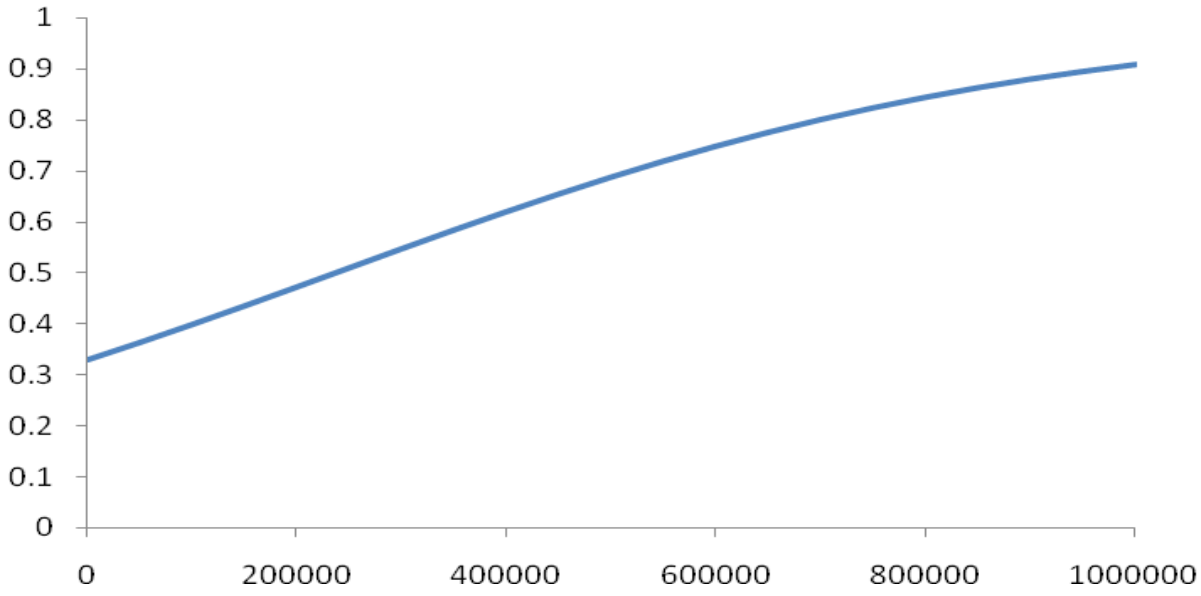

Table 9: Logit Regression, Dependent Variable = Study Abroad Participation

Variable	Expected Sign	Coefficient	Standard Error
Intercept	?	-5.7861***	(1.4919)
Family Income/1000	> 0	0.000783	(0.00145)
Female	?	0.4172	(0.3411)
Nonwhite	?	-0.00825	(0.5708)
Private High School	?	-0.3785	(0.3421)
GPA	> 0	2.0215***	(0.4447)
Business Major	< 0	-0.2426	(0.3915)
Science Major	< 0	-2.4749***	(0.6526)
Humanities Major	?	0.0946	(0.5487)
XC Hours/Week	< 0	-0.0316**	(0.0176)
Concordance	75.2		
Pseudo R^2	0.498		

*10%, **5%, ***1% significance levels; 1 or 2-tailed tests as indicated by H_A

Table 10: Logit Regression, Dependent Variable = School Year Employment

Variable	Expected Sign	Coefficient	Standard Error
Intercept	?	-2.8163**	(1.3205)
Family Income/1000	**< 0**	**-0.00236****	**(0.00138)**
Female	?	0.5204*	(0.3291)
Nonwhite	?	-0.0207	(0.5606)
GPA	?	1.2318***	(0.3998)
XC Hours/Week	< 0	-0.0116	(0.0165)
Concordance	68.5		
Pseudo R^2	0.321		

*10%, **5%, 1% significance levels; 1 or 2-tailed tests as indicated by H_A

Table 11: Predicted Probability of Holding School Year Employment

Family Income	Predicted Probability
0	83%
$50,000	81%
$100,000	80'%
$150,000	78%
$200,000	76%
$250,000	73%
$300,000	71%
$350,000	68%
$400,000	66%

Figure 3: Probability of School Year Employment vs. Income

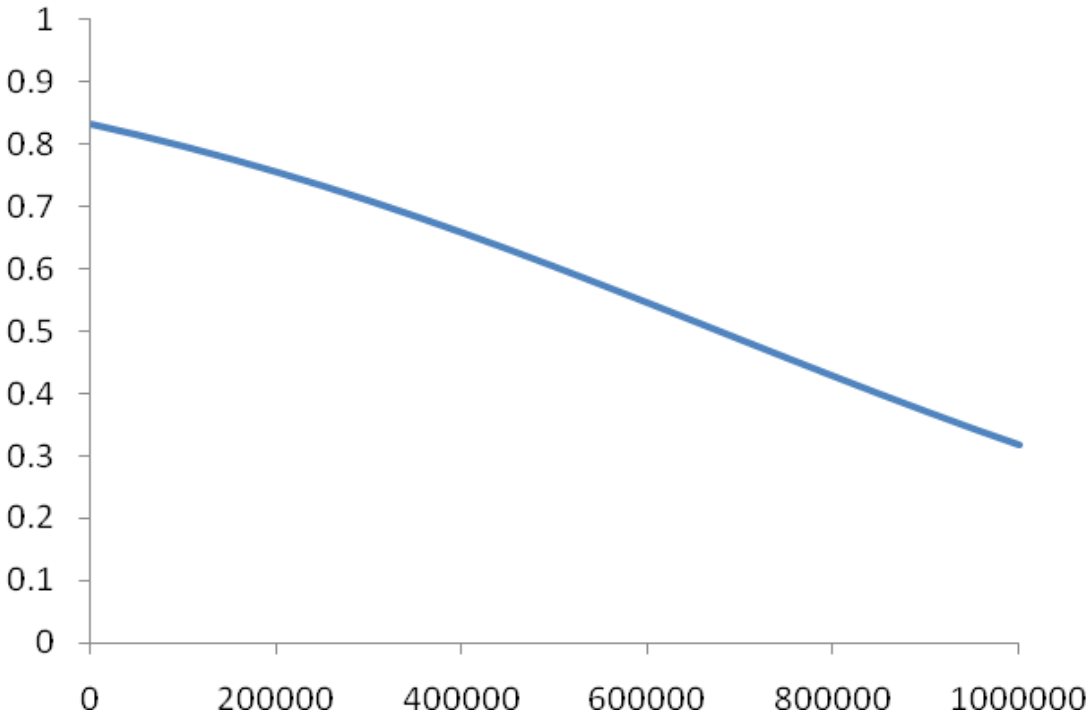

Table 12: Logit Regression on Internship Experience

Variable	Internship = 1		Unpaid Internship = 1	
Intercept	-1.4006	(1.3784)	-1.9472	(1.6172)
Family Income/1000	-0.00256	(0.00235)	0.00154	(0.00163)
Gender*Income	0.00553*	(0.00308)	----------	
Female	-1.1466*	(0.6732)	0.9572**	(0.4534)
Nonwhite	0.4539	(0.5771)	-0.7889	(0.6993)
GPA	0.6567**	(0.4026)	-0.0715	(0.4824)
Business Major	1.3717***	(0.5001)	-3.0271**	(1.0394)
Science Major	-0.4867	(0.5364)	-1.2577	(0.7902)
Humanities Major	-0.9144**	(0.4695)	-0.1318	(0.4914)
Greek	0.7279**	(0.3508)	----------	
XC Hours/Week	0.0279**	(0.0178)	----------	
Job	----------		0.574	(0.4574)
Concordance	72.6		77.2	
Pseudo R^2	0.433		0.684	

*10%, **5%, ***1% levels of significance
Standard errors in parentheses