Student Debt: Who Borrows?

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Abstract

This paper uses a selection model to investigate what characteristics of students affect the probability and amount of student debt. While most previous work in the area of student debt examines the effects of student debt on schooling and employment decisions, this paper looks at the demographic, financial, and psychological factors that determine whether a student uses debt to finance his education. The main findings are that increased savings does not decrease the probability or amount of student debt accrued and that increased family income decreases the probability of student debt, but increases the average amount of debt, given that the student has some debt.

Part I

Introduction

Motivated by the importance of debt to a student's future education, wages, and investment decisions, this paper will investigate the factors that affect the amount of education debt students have upon graduation, with a particular interest in how saving and income affect student debt. There is a large literature explaining that the United States college financial aid system places an implicit tax on saving in the form of reduced eligibility for financial

aid. This paper will investigate whether higher student debt is another component of the implicit tax on savings. It will also investigate whether students' attitudes about money affect borrowing. This study will use three groups of variables, demographic, financial, and psychological, to explain what types of students borrow and how much they borrow. A selection model will be used to estimate the impact of each variable on the probability of a student having education debt and the amount of student debt accrued for those with a positive amount of debt.

Previous researchers have explored the importance of student debt and its impact on future wages for students, on determining whether students stay in school to complete their degree, or on explaining how likely students are to apply to graduate school. Most of the previous studies have been empirical. There have been several studies focusing on how student debt affects schooling decisions. Cofer and Somers (1999, 2000) found that students with high debt are less likely to finish their degrees. Also, 70% of minority students who did not finish their degrees cited debt as the reason they left school. Millett (2003) studied the impact of student debt on post-college employment decision. Millet studied the effects of college debt on whether students who wish to attend graduate school actually enroll immediately after the completion of their undergraduate degree. The study finds that high indebtedness deters students from attending graduate school. This deterrence could hinder society as a whole by preventing qualified individuals from pursuing graduate school, resulting in fewer researchers. Weiler (1994) shows an increase in expected debt significantly reduces the probability that a student expects to enroll in graduate school. Kim (2004) discovered that students are more likely to attend their first-choice institution if they receive a loan. Because debt factors into the education-decision making process for students, it is important to understand what kind of students are borrowing and how debt will affect their educational decisions. There have also been studies that look at the effects of student debt on post-graduation decisions. Price (2004) finds that students with high education borrowing have lower average salaries in their careers than other students who have not borrowed.

Baum and Sanders (1998) found that 40% of students with debt delayed purchasing a home as a result of their outstanding education loans.

Thomas (2003) considers the characteristics of student borrowers, finding that students who graduate from private colleges are, on average, more likely to borrow and have borrowed more money to pay for college than students who graduate from public schools. He found also that the increased borrowing for private school graduates is partially offset by increased earnings. Thomas employs hierarchical linear modeling to estimate the contribution of institutional characteristics to individual outcomes. Johnson (2010) uses a dynamic structural model in his investigation of how borrowing constraints affect educational decisions, which is unique in the student debt literature. His main focus is on the availability of credit for students to borrow to fund their education. If a student taps all his available credit, he would be unable to continue funding his college attendance. Johnson finds only a small effect of borrowing constraints: removal of borrowing constraints results in an increased probability of degree completion of only 1.1%.

Previous researchers have researched many of the effects of student debt, but there have been fewer studies of the causes of student debt and what types of students borrow. Knowing what factors affect whether students borrow and how much they borrow can help policymakers improve the financial aid system and craft policies to decrease student debt. For example, if saving more does not decrease student debt load, policymakers might want to adjust the financial aid formula to penalize savings less.

The paper is organized as follows. Part II explains the college financial aid system and its impact on student debt. Part III details the data, model, and methodology for this paper. Part IV presents the results of the estimation of the model and discusses policy implications. Part V concludes.

Part II

College Financial Aid and Debt

In the United States, colleges set their tuition rates before each academic year. Most students, however, do not pay the full tuition rate, with 62.2% of full-time undergraduates receiving some type of financial aid in 2007-2008. Colleges price discriminate, attempting to figure out how much each particular student would be willing to pay, and charging that rate. College financial aid offices meet the difference between the full tuition rate and what the student is deemed able to pay with institutional loans, government-subsidized loans, and grants. This type of aid is based on financial need. Colleges also sometimes offer aid based on merit to provide an incentive for talented students to attend the institution.

When high school students apply to colleges, they fill out a government form called the Free Application for Federal Student Age (FAFSA). After the Department of Education processes the form, students receive a Student Aid Report (SAR). The SAR includes a number called the Expected Family Contribution (EFC). The Expected Family Contribution (EFC) measure a family's financial strength and ability to pay for college. The EFC is calculated according to a formula established by law. A family's taxed and untaxed income, assets, and benefits (such as unemployment or Social Security) are all considered in the formula. Other considerations are family size and the number of family members who will attend college. The EFC is the most important factor college financial aid offices use to determine how much financial aid a student receives.

Students who wish to apply for financial aid fill out a form called the Free Application for Federal Student Aid (FAFSA). The information they provide on the form is plugged into a government-mandated formula. The methodology is found in Part F of Title IV of the Higher Education Act of 1965. The result of this formula is the Expected Family Contribution (EFC).

The EFC formula takes into account a variety of factors. The most important factor is the parents' total income. Allowances for United States income tax, Social Security tax, and income protection are made based upon income and the number of parents are subtracted from the parents' total income. In addition, an expense allowance of 35% for the parent who earns the lesser income is made only if both parents work. Subtract the allowances from the total income to calculate available income and add 12% of the parents' assets (not including the family home) to calculate adjusted available income (AAI). Look up the parents' AAI value on a table to ascertain the parents' contribution. For example, if the parents' AAI is more than $28,601, the parents' EFC is $7,732 plus 47% of the AAI over $28,601. A similar calculation is used to calculate the student's contribution.

The current college financial aid system creates incentives for families to engage in behaviors that seem irrational, but in fact are a rational way of circumventing the system. For example, the current financial aid system discourages saving. When families have less cash in the bank, their EFC decreases. As a result, parents who have sacrificed to save for their child's college tuition will be expected to pay more than another student's parents who have the same income, but did not save for tuition. The government's EFC formula calls for twelve percent of the parents' and twenty percent of the student's discretionary net worth to be included in the total EFC. Reyes (2008) writes, "Thus, by awarding more aid to those with lower assets, the financial aid system creates an implicit tax on assets, as high as 29%. This tax could certainly present a substantial deterrent to saving or a powerful incentive to reallocate assets." The "powerful incentive to reallocate assets" refers to allocating savings into retirement accounts. Retirement savings is not taken into account in the EFC calculation, so parents face an incentive to put the maximum amount of income into a retirement account rather than accumulating other assets. Edlin (1993) focuses on the financial aid tax on asset accumulation. This asset tax comes from two areas: interest and dividend income from assets are directly added into available income and also the value of assets is converted at the rate of twelve percent into available income.

Part III

Data, Model, and Methodology

1 Data

The data for this study comes from the Panel Study of Income Dynamics (PSID). PSID, a nationally representative survey, began in 1968 with 5000 families that encompassed 18,000 people. One part of the PSID is the Transition into Adulthood (TA). TA serves as a data bridge between the childhood of members of PSID families (surveyed as part of the Child Development Supplement) and the first interview as a PSID head or wife. The 1204 participants in TA, aged 18-24, might still be dependent on their parents, but are making investments in education and beginning careers. The TA data was collected in 2005 and 2007. Additional information about the TA participants from the PSID in 2003 and 2009 is also used. PSID data is collected by telephone in odd years between March and December.

The strength of the PSID is its large sample size, although the sample size for TA is only 1204. Young people are linked to their parents, so the researcher is able to ascertain information such as the parents' income and levels of education. PSID also provides specific details about the financial position, dependent status, aspirations, and worries of young adults. The observations from PSID are more recent than those from studies from the National Center for Education Statistics (NCES), which is often used in the related literature.

The weakness of PSID is its lack of specific data on student financial aid. NCES collects data about a student's EFC and merit scholarships. In addition, NCES includes information about the student's school such as location and institutional control (public or private). Having this type of information about the institution would allow the researcher to account for the differences in financial aid schemes between different types of schools. Another weakness is that only TA data from 2005 and 2007 is available. Most students in the sample

have not yet graduated from college, so their amount of student debt in 2007 may not be final debt. Additionally, PSID does not provide individual-level income. It provides only income for the head and wife, so if a subject of TA is not yet the family head in 2009 there is no information about his future income. Finally, the people in TA are between the ages of 18 and 24, so they have completed different numbers of years of college. Thus their student loan burdens might not be comparable.

Table 1 provides summary statistics for continuous variables, while Table 2 show summary statistics for categorical variables for respondents in the TA study. The sample for this study consists of people in the TA study who have attended college. Summary statistics for the sample of interest in this study may be found in Table 3 and Table 4. Because this study is interested in the student debt, it would not make sense to include students who did not attend any college in the sample. Using only students who have attended some college could introduce selection bias for which the model must correct. Responses in which the subject declined to answer or did not know were recoded to missing for the purpose of analyzing the data.

The main variable of interest in this study is the amount of student loans a respondent has. One problem with the measurement of the value of student loans is that students might not remember the precise amount of loans they have accrued. There is bunching in the data after every \$5000 at levels of debt above $\$10,000$ and at every \$1000 increment below $\$10,000$. Summary statistics for respondents who have attended college and have student debt are located in Table 5 and Table 6. Also, as noted before, the respondents have completed differing amounts of college, so their loan amounts might not be comparable.

Table 7 shows the results of a t-test for mean difference between students with and without student debt who have attended college. The mean values for mother's and father's education, dependent status, student's earnings from work, and whether the student receives tuition help from parents are not significantly different between the two groups of college attendees. On average, students without debt are significantly younger than students with

debt. A possible explanation for this finding is that younger students have attended fewer years of college, so they have not yet exhausted their savings and needed to borrow to pay tuition. Students who have no debt come from families who have more valuable stock portfolios, more cash savings, and higher taxable incomes than students with debt. Students with debt worry more about money than students without debt. Students with debt are more likely to expect a high-paying job in the future than students without debt.

This study attempts to use three groups of variables, demographic, financial, and psychological, to explain student debt. Demographic information included is whether or not the student is a dependent, whether the student has attended college, the student's race, and the student's regional location. See Appendix A for a detailed explanation of the demographic information in use.

The financial variables include also the levels of assets accrued by both the students and the parents (when the student is a dependent) and income for the student and the parents (when the student is a dependent). The education of the parents is also included. See Appendix B for a detailed explanation of the financial information considered.

The psychological variables include the student's degree aspiration, how often he worries about money, and his expectations about getting a high-paying job in the future. These variables help investigate whether students who are worried about money are willing to borrow more money to finance their education and whether students who are confident they will be able to secure a lucrative job are willing to borrow more. See Appendix C for descriptions about the psychological variables.

In the TA population, 67% of respondents have attended college, while 75% of them are dependents in 2007. The average age is about 20 years. The large outliers in family income, savings, and stocks are cause for some concern. The large range in wages for the respondent is a product of the range of ages found in the TA study. Some people in the study had graduated college by 2007 and begun their career, while others were still in school. Only data from 2007 is considered in this study because too few students had attended college by

Table 1: Summary Statistics for Continuous Variables, TA Population

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Student Loan Amount	1105	3,612.038	11018.52	0	140,000
Age	1195	20.093	1.607	17	23
Mother's Education	1011	12.984	2.503	0	17
Father's Education	826	13.052	2.626	0	17
Stocks	1157	45,193.36	623,463.7	0	20,000,000
Family Cash Savings	1098	14,156.09	57,171.57	0	800,000
Family Taxable Income	1195	65,054.32	117,866.1	0	2,131,500
Student's Earnings from Work	1033	8832.145	10195.53	0	82,480

The table shows the mean, standard deviation, minimum, and maximum values for each continuous variable. Each variable is from the 2007 TA study.

Table 2: Summary Statistics for Discrete Variables, TA Population

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Dependent	1195	.757	.429	0	1
Attend College	1113	.675	.469	0	1
Tuition Help From Parents	1115	.274	.274	0	1
Money Worries	1115	3.770	1.942	1	7
Likelihood of a Good Job	1113	6.014	1.110	1	7

The table shows the mean, standard deviation, minimum, and maximum values for each continuous variable. Each variable is from the 2007 TA study. A dependent value of 1 means the respondent is a dependent, which means his parents' financial situation is taken into account for financial aid purposes. A value of 1 for attending college and tuition help from parents means the respondent has attended college and his parents have helped with tuition respectively.

Table 3: Summary Statistics for Continuous Variables, College Attendees

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Student Loan Amount	741	5,280.735	13,096.79	0	140,000
Age	751	20.049	1.605	17	23
Mother's Education	688	13.406	2.640	0	17
Father's Education	603	13.449	2.736	0	17
Stocks	723	42,100.88	262,287	0	4,000,000
Family Cash Savings	692	20,098.77	70,415.59	0	800,000
Family Taxable Income	751	80,834.52	137,866.9	0	2,131,500
Student's Earnings from Work	696	8,762.455	10,204.96	0	78,000

The table shows the mean, standard deviation, minimum, and maximum values for each continuous variable for respondents who has attended some college. Each variable is from the 2007 TA study.

Table 4: Summary Statistics for Discrete Variables, College Attendees

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Dependent	751	.803	.398	0	1
Attend College	751	1	0	1	1
Tuition Help From Parents	751	.391	.488	0	1
Money Worries	751	3.613	1.867	1	7
Likelihood of a Good Job	750	6.023	1.036	1	7

The table shows the mean, standard deviation, minimum, and maximum values for each continuous variable for respondents who have attended college. Each variable is from the 2007 TA study. A dependent value of 1 means the respondent is a dependent, which means his parents' financial situation is taken into account for financial aid purposes. A value of 1 for attending college and tuition help from parents means the respondent has attended college and his parents have helped with tuition respectively.

Table 5: Summary Statistics for Continuous Variables, College Attendees with Student Debt

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Student Loan Amount	287	13,634.23	18,152.59	0	140,000
Age	297	20.370	1.535	17	23
Mother's Education	275	13.475	2.429	0	17
Father's Education	237	13.549	2.479	3	17
Stocks	288	13,320.83	63,458.44	0	600,000
Family Cash Savings	280	12,251.93	52,773.13	0	750,000
Family Taxable Income	297	62,457.98	56,358.23	0	303,500
Student's Earnings from Work	276	8,417.547	9,411.219	0	55,001

The table shows the mean, standard deviation, minimum, and maximum values for each continuous variable for respondents who has attended some college and has student debt. Each variable is from the 2007 TA study.

Table 6: Summary Statistics for Discrete Variables, College Attendees with Student Debt

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Dependent	297	.781	.414	0	1
Attend College	297	1	0	1	1
Tuition Help From Parents	297	.377	.485	0	1
Money Worries	297	3.798	1.869	1	7
Likelihood of a Good Job	297	6.128	1.019	1	7

The table shows the mean, standard deviation, minimum, and maximum values for each continuous variable for respondents who have attended college and have student debt. Each variable is from the 2007 TA study. A dependent value of 1 means the respondent is a dependent, which means his parents' financial situation is taken into account for financial aid purposes. A value of 1 for attending college and tuition help from parents means the respondent has attended college and his parents have helped with tuition respectively.

Table 7: t-Test for Mean Difference for College Attendees with and without Student Debt

Variable	Degrees of Freedom	t statistic	p-value
Age	748	-4.533	$< .0001$
Mother's Education	685	-0.469	.639
Father's Education	600	-0.698	.485
Stocks	720	2.413	.016
Family Cash Savings	690	2.425	.016
Family Taxable Income	748	2.970	.003
Student's Earnings from Work	693	0.706	.481
Dependent	748	1.199	.231
Tuition Help From Parents	748	0.676	.4993
Money Worries	748	-2.168	.031
Likelihood of a Good Job	747	-2.257	.024

The table shows the results of a t-test for whether there is a significant difference between means for college attendees without student debt and college attendees with student debt.

2005.

The summary statistics highlight some interesting aspects of the data. The mean level of parents' education is lower for the TA population than the sample of students who have attended college. The mean level of parents' education is similar for all students who have attended college, regardless of whether they have student debt. Out of the students who have attended college, the students with education debt have much lower mean values for their family savings, taxable family incomes, and stock portfolios than the students who have not borrowed money to finance their education.

2 Model

This paper will estimate a selection model, using the ideas developed in Heckman (1979). The first equation will estimate the probability that a student has incurred any debts associated with financing his education. The second equation will estimate the amount of debt that a student has undertaken. Let L denote the amount of loans a student who has attended

college. Then the selection model is

$$D_i^* = Z_i'\gamma + \epsilon_{1i} \tag{1}$$

where $D_i^*$is a latent variable. Only an indicator variable for a positive amount of debt, $D = 1$ if $D_i^* > 0$ and $D = 0$ otherwise, is observed. The identifying restriction for equation (1) is described in Section 3. The regression model if $D = 1$ (the respondent has student debt) is

$$L_i = X_i'\beta + \epsilon_{2i}. \tag{2}$$

We assume $E(\epsilon_{1i}) = E(\epsilon_{2i}) = 0$ and $E(\epsilon_{1i}\epsilon_{2i}) = \sigma_{12}$. The selection-corrected model is

$$Y_i = X_i'\beta + \sigma_{12}\frac{\phi(Z_i'\gamma)}{\Phi(Z_i'\gamma)}. \tag{3}$$

This model can be estimated using the procedure discussed in Heckman (1979). Estimate equation (1) with a probit. Use the predicted probabilities to estimate the inverse Mills ratio, $\frac{\phi(Z_i'\gamma)}{\Phi(Z_i'\gamma)}$. Next, use the estimated inverse Mills ratio as a regressor in estimation of equation (2), which is equivalent to estimating equation (3).

3 Methodology

The model first estimates a probit for whether a student has any education debt in 2007, given that he has attended some college in the past. The independent variables are family savings, taxable income, dummies for money worries, a dummy for whether the student receives tuition support from his parents, dummies for the likelihood of a high-paying job in the future, dummies for geographic region, dummies for mother's education level, and a dummy for dependent status. Appendices A, B, and C contain a description for each variable.

Intuitively, higher levels of family savings and taxable income should decrease the amount

of debt students have. On the other hand, students with higher family incomes are eligible for less financial aid, so students with upper-middle incomes who go to an expensive school could have a high debt burden. The dummies for money worries pick up the effect of whether students who are worried about their financial situation take on debt to finance their education. Students who are dependents generally are expected to contribute more money to finance their education than students who are not dependent on their parents, so perhaps dependents are more likely to use debt to finance their education. Students who are expecting to hold high-paying jobs in the future might be more likely to use debt to finance their education because they believe they will have little difficulty paying back the loan. The dummies for geographic region are used as the exclusion restrictions. Geographical location has an effect on whether students take out student loans, but not the value of the loans. The results of the χ^2-test shown in Table 8 B show that the coefficients on the region dummies are jointly significantly different from zero, so they are strong instruments.

One of the limitations of PSID's TA data is that not all students in the sample have finished college at the time of the survey. Therefore the debt burden for each student depends heavily on how many years of college the student has attended. Students who are in their first year of college do not have as much debt on average as students who are in their fourth year of college. In order to correct for this dependence on years of college in the debt data, a debt burden adjusted for years of school is calculated for students who have non-zero debt burdens. In order to calculate the adjusted amount of debt, regress the amount of student debt (given that the amount of student debt is non-zero and the student has attended college) on dummies for years of education. The residual from this regression is the education-adjusted debt level.

The second equation is a linear regression of the education-adjusted debt on family savings, taxable income, dummies for money worries, a dummy for whether the student receives tuition support from his parents, dummies for the likelihood of a high-paying job in the future, dummies for mother's education level, and a dummy for dependent status. This

equation includes a term to correct for selection by unobservables into positive levels of student debt.

There are a few methodological weaknesses in this paper, most of which stem from weaknesses of the data. One such weakness is the small sample size. There are only 302 students who have debt in the TA sample. I suspect that the effects of income and savings would be different for students at different levels of income, but it is impossible to test this hypothesis because of the small number of students with debt at each level of income. Because of the way need-based financial aid is calculated, I suspect that at middle income levels, perhaps between $90,000 and $180,000, higher levels of income and saving would result in higher levels of student debt. Having more information about the specific colleges each student attended also could have been used to control for the effects of tuition level and institutional control (public or private).

Part IV

Results

Estimation results are presented in Table 8 and Table 9. Table 8 presents the results from the first equation in the selection model. Taxable income of the family and all the dummies for money worries, expectation of a good job, region, and mother's education are significant in the probit estimation. The sign on family income is negative, so students who come from families with higher income levels are less likely to use debt to finance their education. The coefficient on each dummy for expectation of a good job is negative, but increasing as the student's expectations get more lofty. Therefore someone who believes he is very likely to get a job that pays well is more likely to take out college loans than someone who believes he is unlikely to get a high-paying job. The dummies for mother's years of education are all highly significant, but there is no discernible pattern in their magnitudes. There does not

Table 8: Estimates of Probit Model for Participation

Table 8 A	Coefficient	Standard Error
Family Savings	-6.22×10^{-7}	(1.33×10^{-6})
Taxable Income of Family	-2.86×10^{-6}	(9.06×10^{-7})
Tuition Help from Parents	$-.082$	$(.120)$
Dependent Status	$-.085$	$(.142)$

Table 8 B	χ^2 statistic	p-value	Degrees of Freedom
Money Worry Dummies	14.44	0.025	6
Good Job Dummies	233.37	$< .0001$	4
Region Dummies	19.30	.0007	4
Mother's Education Dummies	366.21	$< .0001$	11

Table 8 A shows the coefficient on each continuous or binary variable, along with the associated standard error. Table 8 B shows the results of a χ^2 test for joint significance for each of the variables represented by dummies. There are 613 observations used to estimate this probit model.

appear to be a relationship between whether the mother has only a high school degree or has a college degree and whether her child has student debt. The coefficients on the region dummies suggest that students from the northeast of the United States are the most likely to have student debt, followed by north central, south, and west.

Table 9 shows the results of the second equation in the selection mode, a linear regression for the adjusted amount of student debt, given that the student has some debt. Taxable income has a significant effect on the amount of student debt. On average, an increase of \$1 in the family's taxable income results in an increase in education debt of \$0.08 for the student. This result is interesting because increasing taxable income decreases the probability of having student debt (as shown in the Table 8), but increases the amount of debt if the student has some debt. It is intuitive that students with higher family incomes would be less likely to take out college loans because their family would have more resources to pay for college without the need to borrow money. But given that the student must take out some loans, having a higher family income makes the student eligible for less money in need-based grants from their institution, which leads to the student paying a higher price. The student must borrow money to pay this higher price. The coefficient on the inverse Mills ratio is negative and significant at the 10% level, meaning that the correlation between unobservable

Table 9: Estimates of Debt Equation

Table 9 A	Coefficient	Standard Error
Family Savings	.015	(.023)
Taxable Income of Family	.076	(.033)
Tuition Help from Parents	−4608.13	(2989.559)
Dependent Status	5748.236	(3105.487)
Selection (Inverse Mills Ratio)	−17,713.27	(9,236.205)

Table 9 B	F statistic	p-value	Degrees of Freedom
Money Worry Dummies	1.53	.1705	6
Good Job Dummies	0.67	.7139	4
Mother's Education Dummies	.50	.8857	10

Table 9 A shows the coefficient on each continuous or binary variable, along with the associated standard error. Table 9 B shows the results of a F test for joint significance for each of the variables represented by dummies. There are 182 observations used to estimate this regression.

determinants of the probability of having student debt and unobservable determinants of the amount of student debt is negative.

No other variables are significant at the 5% level, but the dummy for dependent status is significant at the 10% level (p-value of 0.066). The coefficient on the dependency dummy is 5748.235, so on average dependents have $5748.24 more in loans than independent students. This coefficient is positive because dependent students must include their parents' financial information on their applications for student aid. If the student is independent, he needs only to include his own financial information. Thus dependents are generally eligible for less financial aid, so the price they pay is potentially higher than independent students, especially if the dependent student's parents do not contribute financially to his education. A student from a high-income family whose parents do not contribute money for tuition may expected to pay a higher price for a college than a student from a low-income income family whose parents do contribute money for tuition.

The main problem with these results is the small sample size. The model was limited in which variables it could utilize because including variables like father's education and degree aspiration would have eliminated too many observations from a sample that is already small. The small sample size also made it more difficult to find significant variables because of the

Table 10: Estimates of Probit Model for Participation

Table 10 A	Coefficient	Standard Error
Log Family Savings	−0.58	(.039)
Log Taxable Income of Family	−180	(.071)
Tuition Help from Parents	−.131	(.131)
Dependent Status	−.004	(.142)

Table 10 B	χ^2 statistic	p-value	Degrees of Freedom
Money Worry Dummies	9.04	.1713	6
Good Job Dummies	335.90	$< .0001$	4
Region Dummies	19.70	.0002	3
Mother's Education Dummies	302.56	$< .0001$	10

Table 10 A shows the coefficient on each continuous or binary variable, along with the associated standard error. Table 10 B shows the results of a χ^2 test for joint significance for each of the variables represented by dummies. There are 491 observations used to estimate this probit model.

large standard errors.

Table 10 and Table 11 re-estimate the model using the same specification as above except the logarithms of family savings and taxable income are used in place of family savings and taxable income. In this case, log of taxable income and the dummies for good job, region, and mother's education are significant in the probit. The dummies for money worries were significant in the previous specification, but are not significant here. None of the variables are significant in the second equation that estimates log of adjusted debt for students with positive debt are significant in this specification.

4 Policy Implications

The results from this study can be applied to financial aid policy in the United States. First, family savings is not a significant determinant of whether a student uses debt to finance his college education or in how much debt the student accrues. This result is surprising because many parents are eager to begin saving for their child's college education. The results of this paper show that this saving does not result in less debt for the student. These results, paired with the implicit tax on savings discussed in Dick and Edlin (1997), create a disincentive

Table 11: Estimates of Log Debt Equation

Table 11 A	Coefficient	Standard Error
Log Family Savings	517.769	(1033.687)
Log Taxable Income of Family	1378.033	(1778.986)
Tuition Help from Parents	−3845.96	(3761.016)
Dependent Status	6698.797	(4410.017)
Selection (Inverse Mills Ratio)	−15,173.74	(11,163.4)

Table 11 B	F statistic	p-value	Degrees of Freedom
Money Worry Dummies	1.12	.3558	6
Good Job Dummies	0.27	.899	4
Mother's Education Dummies	.36	.9502	9

Table 11 A shows the coefficient on each continuous or binary variable, along with the associated standard error. Table 11 B shows the results of a F test for joint significance for each of the variables represented by dummies. There are 182 observations used to estimate this regression.

for saving, which reduces asset holdings economy-wide. Saving decreases the eligibility for need-based financial aid, which could increase the tuition price a family faces. The results of this paper might suggest the ending of programs like state-run 529 savings plans. States are offering tax incentives for parents to save for their child's college education, even though this saving does not result in a lower probability of debt or a lower amount of debt. A solution to this problem would need further investigation into the specific income levels at which saving does not decrease debt.

The other important finding of this paper from a policy perspective is that, on average, an increase in family income decreases the probability of having education debt, but, on average an increase in family income increases the amount of debt a student accumulates, given that he has some debt. The first result is caused by the decreased need for wealthier students to take out loans to pay for college. The second result stems from decreased eligibility for need-based student aid for wealthier students. The second result is some cause for concern because it represents a disincentive for parents to work. Dick and Edlin (1997) also find that there are large income ranges over which the financial aid system imposes regressive implicit taxation.

Part V

Conclusion

There are two main findings of this paper. First, family savings does not decrease either the probability or the amount of education debt students accumulate. This finding contradicts the widely held belief that parents should start saving for their child's college expenses soon after the child's birth. The second finding is that increasing levels of family income lead to decreasing probabilities of having student debt, but increasing values of student debt if the student has loans. This finding is paradoxical, but is not unexpected because of decreasing eligibility for need-based financial aid as income rises.

This study puts forth a few questions for future study. A richer data set would allow a researcher to study the effects on student debt of increasing taxable income at various levels of income. In addition, a data set allowing the researcher to control for public and private institutions and those with different need-based financial aid policies would allow for more accurate estimation of the implicit tax on earnings and savings.

Appendices

A Demographics

- Dependent Status
  - This dummy variable was generated based upon the respondent's relationship to the head of the family. The variable takes on the value 0 if the respondent is independent (a head, a spouse of a head). The variable takes on the value 1 if the respondent is a dependent (child of a head, stepchild of a head).

- Age: "Age at the Time of the 2007 Interview"
- College Attendance: "Have you ever attended college?"
  - This variable is preferred to measures of degree completion because many of the people in the TA study are still in the process of finishing their education.
- Parent Education: "Completed Education Of Mother" and "Completed Education of Father"
- Region: People were assigned to the following regions: northeast, north central, south, and west.
  - The weakness of this variable is its generality. There might be differences between families located in different towns or states that are located in the same region.
- Race: "What is your race? Are you white, black, American Indian, Alaska Native, Asian, Native Hawaiian or Other Pacific Islander?"
  - Use the first mention variable.

B Financial Information

- Stock: "If you sold all [stocks] and paid off everything you owed on it, how much would you have?"
  - This variable captures the total value of stocks for the household.
- Cash Savings: "If you added up all such accounts (for all of your family living there) about how much would they amount to right now?"
  - This variable captures the total value of cash savings for the family.

- Taxable Income: "Head's and Wife's Total Taxable Income"
  - This measure of income is preferable to labor income because it takes into account both the head and wife, not only the head.
- Tuition support from parents: "Did your parents or other relatives pay for tuition?"
- Earnings from Work Last Year: This variable captures the work earnings of the young person in the TA group. No values were imputed for this variable.

C Psychological Factors

- Money Worries: "(On a scale of 1 to 7, where 1 means "Never" and 7 means "Daily,") how often do you worry that you may not have enough money to pay for things?"
- Likelihood of High-Paying job: "Using any number from 1 to 7, where 1 means "Very Unlikely" and 7 means "Very Likely," in the future, how likely is it that you will have a job that pays well?"
- Degree Aspiration: "What type of degree do you want?"

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