Student Loans: Do College Students Borrow Too Much (or Not Enough)?

Appendix: Data and Methods

A. Processing of March CPS Data

We use the March CPS from the 1964 through 2009 (1963 through 2008 earnings years). We restrict the sample to white full-time and full-year employees, including only those working more than 35 hours per week and at least 40 weeks during the prior year. We also exclude individuals who were students in the prior year as well as observations with allocated earnings values. For earnings, we use annual earnings (as reported for the prior year) inflated to 2008 constant dollars using the GDP PCE Price Index. We weight earnings using the CPS sampling weight.

B. Creation of Education and Experience Variables

Following Acemoglu and Autor (2010), we define five education categories – less than high-school grad, high-school grad, some college, college degree, and more than college – that are comparable across CPS years. Prior to 1992, we define these categories using years of completed education. We defined anyone with fewer than twelve years of completed education as less than high-school. High-school graduates have twelve years of completed schooling. Some college includes individuals with more than twelve years of schooling, but fewer than sixteen completed years. College graduates are those with sixteen or seventeen years of completed schooling. Finally, more than college includes anyone with more than seventeen years of schooling. For 1992 and after, we use the highest degree attained to define educational categories. Less than high-school is defined as anyone whose highest grade obtained is less than twelve. High-school graduates include individuals who have completed twelfth grade or obtained a high-school diploma or GED. We define some college as those who have completed some college or an associate's degree and college graduates as those with bachelor's degrees. Finally, more than college includes those with masters, professional, or doctorate degrees. In Mincer-style earnings equations in which we include potential experience, we proxy for years of education completed (for 1992 and after) using the relevant figures from Park (1994), rounded to the nearest year. We then calculate potential experience for all years as the minimum of age minus years of education minus seven and age minus seventeen.

C. Net Present Discounted Value Calculations

We calculate percentiles (and means) of the net present discounted value of each education category for each gender for each CPS year. For example, for female individuals reporting income for 1963, we calculate the tenth percentile of the net present discounted value of high-school by obtaining the tenth percentile of earnings of high-school graduates at each experience level. We then use a three percent discount factor to discount each of these values into present terms and sum over experience levels between one and thirty-eight. This provides an estimate of the expected present discounted value of a high-school education faced by an individual in 1963. To obtain an analogous value for a college education, we perform similar calculations to obtain the present discounted value of a college degree. We then discount this value using the number of years an individual will have to wait before receiving earnings (four) and subtract off the

discounted cost of four years of tuition. Explicit expressions for these calculations for each education category follow - P_i indicates the i^{th} percentile:

$$P_i(NPV_{<high}) = \sum_{exp=1}^{38} \frac{P_i(W_{exp}^{<high})}{(1.03)^{exp}}$$

$$P_i(NPV_{high}) = \sum_{exp=1}^{38} \frac{P_i(W_{exp}^{high})}{(1.03)^{exp}}$$

$$P_i(NPV_{smcollege}) = \frac{1}{(1.03)^2}\left[\sum_{exp=1}^{38} \frac{P_i(W_{exp}^{smcollege})}{(1.03)^{exp}}\right] - \sum_{i=1}^{2} \frac{Tuition}{(1.03)^{i-1}}$$

$$P_i(NPV_{college}) = \frac{1}{(1.03)^4}\left[\sum_{exp=1}^{38} \frac{P_i(W_{exp}^{college})}{(1.03)^{exp}}\right] - \sum_{i=1}^{4} \frac{Tuition}{(1.03)^{i-1}}$$

$$P_i(NPV_{>college}) = \frac{1}{(1.03)^6}\left[\sum_{exp=1}^{38} \frac{P_i(W_{exp}^{>college})}{(1.03)^{exp}}\right] - \sum_{i=1}^{6} \frac{Tuition}{(1.03)^{i-1}}$$

D. Generation of Counterfactual Net Present Discounted Values

In order to frame the return to a particular education level, we generate counterfactual net PDVs assuming an individual made a different educational choice. For example, to understand the return to college, we calculate the net return of college to individuals at various points of the college net PDV distribution under several assumptions about where they would fall in the high-school net PDV distribution. We assume:

$$E(C|H) = (1-\gamma)\bar{H} + \gamma H$$

Here γ indicates the square of the rank order correlation coefficient between high-school and college wage percentiles and C and H indicate percentiles of the college and high-school net PDV distributions, respectively. Thus, if the two are perfectly correlated (γ = 1), individuals in the 99th percentile of the high-school wage distribution will be expected to end up in the 99th percentile of the college-wage distribution (and vice-versa). If the two are uncorrelated (γ = 0), then the expected position of an individual at any percentile of the high-school wage distribution is the median of the college wage distribution. We calculate these counterfactual distribution points for correlation coefficients of 0, 0.75, and 1. We then match college wage percentiles to counterfactual high-school wage percentiles. For example, if ρ = 0.75 then if γ = 0.5625 , then the expected college wage percentile would equal (1 - 0.5625)*50 + 0.5625 H where H is the draw from the high school wage percentile. We then match the net PDVs of these two percentiles. We have used both specific levels of collegiate attainment such as “some college” or “BA degree” as the College counterfactual and we also create a composite counterfactual which is the share weighted average of the some college, BA, and post-BA distributions. It is this weighted share which is used in the text, specifically for the computations in Table 3.

E. Mincer Specifications

For Figure 2 and 3, we estimate annual log earnings specifications for each census year. We estimate a Mincer-type specification, regressing log annual income on a constant, indicator variables for education categories (omitted category is less than high-school), and a quartic in experience. We estimate this specification separately for men and women.

$$\ln W = \alpha + \beta_1 high + \beta_2 smc + \beta_3 clg + \beta_4 postba + \beta_5 exp + \beta_6 exp^2 + \beta_7 exp^3 + \beta_8 exp^4 + \varepsilon$$

Using the estimated parameters from this specification for each year and gender, we predict earnings at each level of experience and for each year. Implicitly assuming myopic expectations, we calculate the expected discounted value of lifetime earnings in each year that could be expected for an individual at the point of college entry.

Appendix Table 1: The Historical Expansion of Federal Student Loans programs

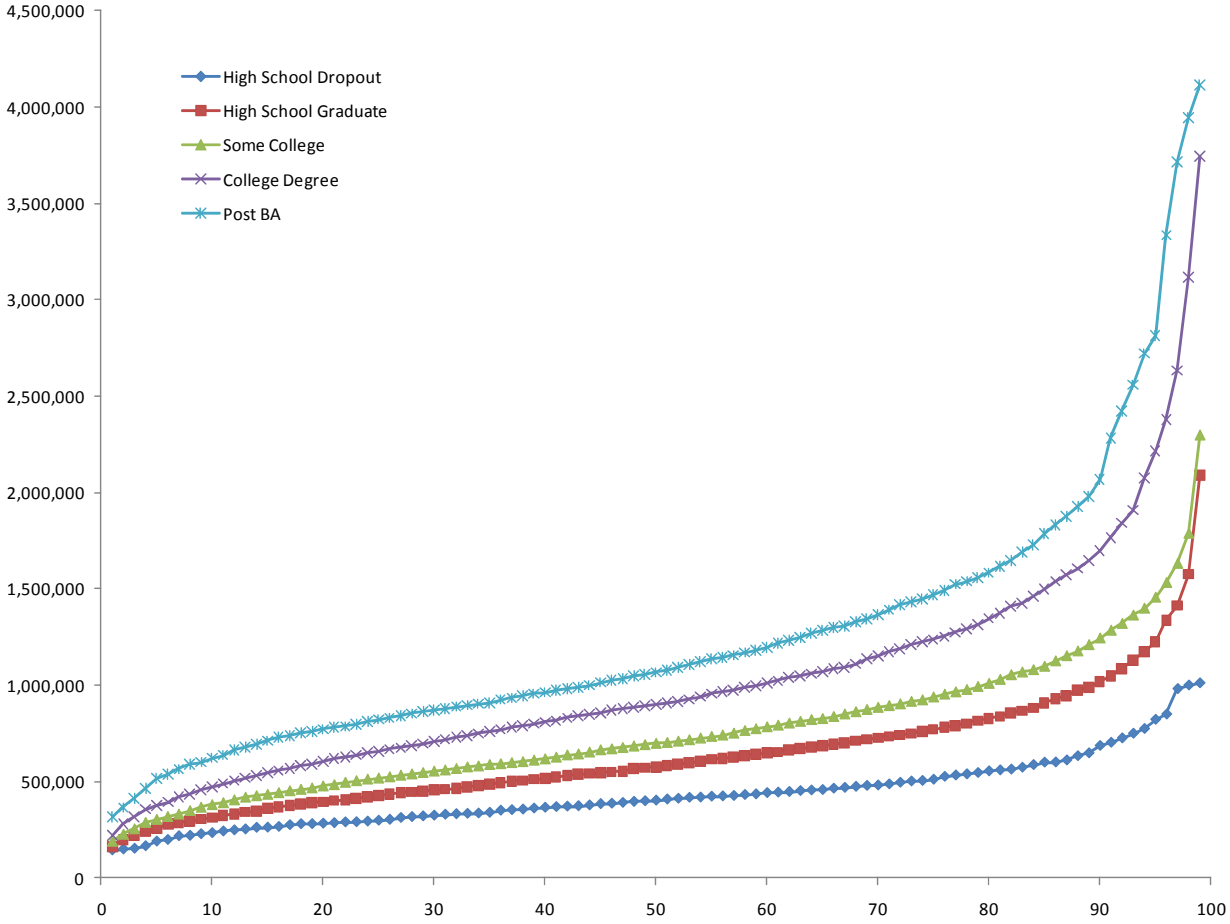
Year	Name	Description
1965	Higher Education Act	Initiates (subsidized) Stafford Loans program. Establishes the purpose of student aid as "lead[ing] to gainful employment in a recognized occupation."
1972	Reauthorization of Higher Education Act	Initiates Pell Grant program (originally "Basic Educational Opportunity Grants" Creates Sallie Mae to expand supply of capital for student loans.
1978	Middle Income Assistance Act	Expands eligibility to Stafford program to students of families above the poverty line.
1980	Reauthorization of Higher Education Act	Creates Plus loans. Creates program that allows parents to borrow to pay for college for their children.
1992	Higher Education Amendments	Increased annual Stafford loan limits for sophomores, juniors, seniors, and graduate and professional students to $3,500; $5,500; $5,000 and $8,500 in 1993–94. Creates unsubsidized Stafford Loans program for which all students are eligible.
1993	Student Loan Reform Act	Widens repayment options to standard, extended, graduated and income-contingent plans. Act establishes direct lending.
1997	Taxpayer Relief Act	Creates Hope Scholarship Credit and Lifetime Learning Credits as need-blind federal financial aid tax credits in addition to making interest payments tax deductable up to $2,500 for first five years. Also introduces income exclusion for $5,250 in employer education benefits.
1998	Reauthorization of Higher Education Act	Creates William D. Ford Direct Loan Program and reduces rates on new Stafford and Ford Loans. Increases Pell Grant limits from $3,000 to $5,800 by 2003–04. Also authorizes the US DOE to verify FAFSA income reporting with IRS and creates a loan cancellation program for teachers.
1998	Public Law 105-244	Created Extended Repayment option.
2002	Public Law 107-139	Required fixed rates for new educational loans after July 2006.
2005	Higher Education Reconciliation Act	Fixes rates at 6.8% and 8.5% for Stafford and Plus Loans respectively. Increases annual loan limits Stafford loans for freshman, sophomores, and graduate and professional students to $3,500; $4,500 and $8,500 respectively.
2007	College Cost Reduction and Access Act	• Raises the Pell Grant limit to $5,400 in 2012–13, • Increases income protection allowance, • Raises the zero EFC threshold to $30,000, • Creates the annual $4,000 Teacher Grants, • Creates income-based repayment option, and • Reduces interest rates 50% on undergraduate subsidized Stafford loans
2008	Higher Education Opportunity Act	Relaxes regulations and definitions for institutions under 90/10 enforcement. Improved disclosure requirements, including the Student Loan Sunshine Act. Created loan forgiveness programs for those serving in areas of national need, teachers employed by educational service agencies, and for civil legal assistance attorneys.
2010	Health Care and Education Reconciliation Act	Fully replaces FFELP with Direct Loan program and makes the 2009 Pell Grant maximum permanent. Also shortens loan forgiveness period to 20 years for loans after June 2014.
2011	Amendment of Student Assistance General Provisions	Establishes under Gainful-Employment Rule that programs must fail 3 out of 4 years (not a single year) to lose eligibility. Revises formulas and relaxes other policies establishing lower standards for program eligibility.

Appendix Table 2: Types of Federal Student Loans

	Limits per year	Description
Subsidized Stafford Loans	$3,500 to $5,500	Eligibility based on family income. Repayment is deferred while student is enrolled in college. Federal government pays interest while student is in college.
Unsubsidized Stafford Loans	$2,000 if dependent $6,000 to $7,000 if independent	All U.S. citizens are eligible. Repayment is deferred while student is in college. Student pays interest accrued while in college.
PLUS Loans	Up to the total cost of education, minus any aid received.	PLUS Loans to parents are sponsored by the government but not based on need. The interest rate is fixed at 7.9 percent.
Perkins Loans	Undergraduates can borrow up to $5,500 a year, totaling not more than $27,500 overall.	Loan aid allocated by institutions to high need students. Federal government pays in-school interest and post-enrollment interest is 5%.

Supplemental Figure: Distribution of Present Discounted Value of Career Earnings, Women

1978



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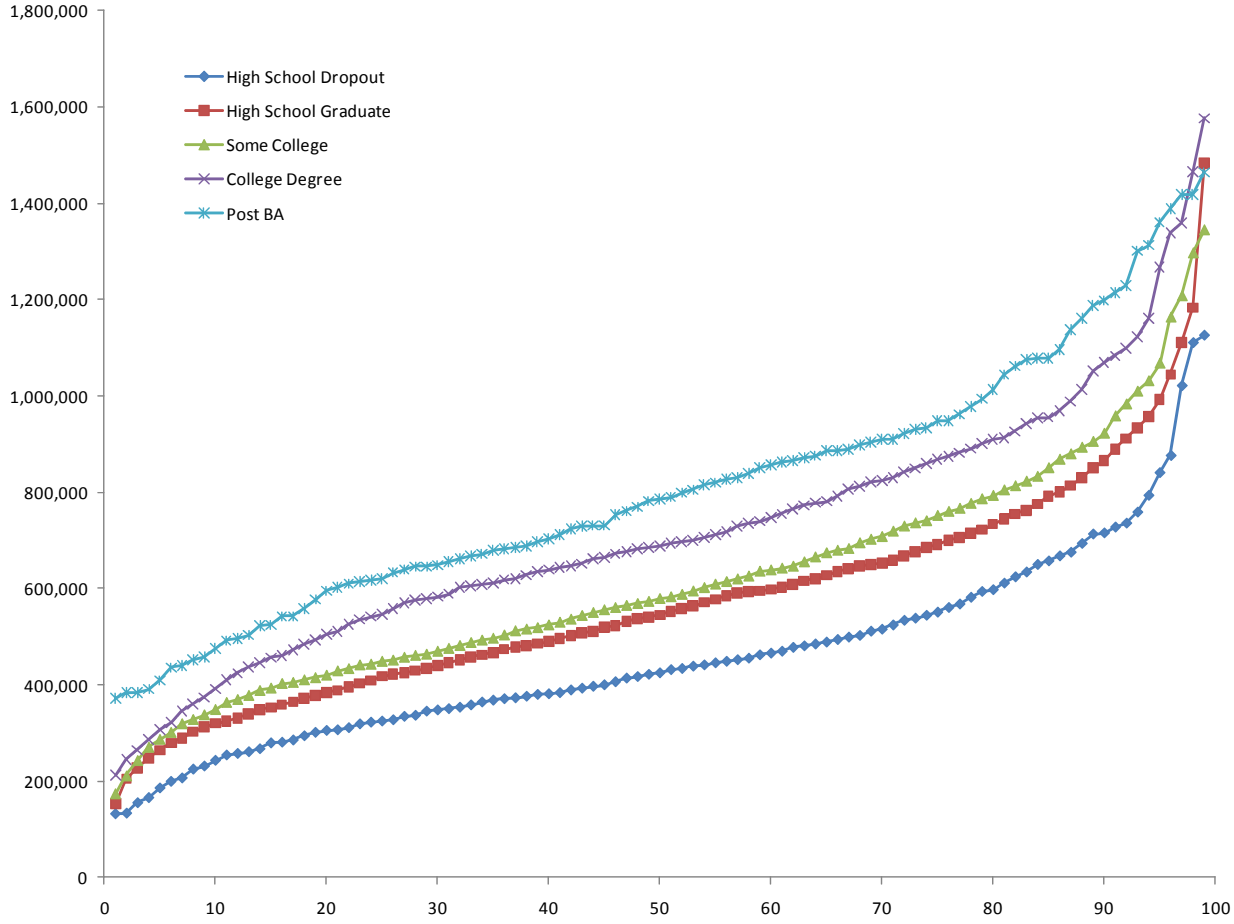
2008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10
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30
40
50
60
70
80
90
100
High School Dropout
High School Graduate
Some College
College Degree
Post BA