

The Road to Pell is Paved with Good Intentions: The Economic Incidence of Federal Student Grant Aid

Web Appendices - Not for Publication

August 14, 2014

Appendix B: Data and Sample Construction

This appendix provides further details regarding data sources, sample construction, and variable definitions.

B.1 Data Sources

My primary data source is the National Postsecondary Student Aid Survey (NPSAS). The Department of Education's National Center for Education Statistics (NCES) collects NPSAS data on a three to four year cycle; my sample includes students in the last four NPSAS waves, which cover the 1995-96, 1999-2000, 2003-2004, and 2007-2008 (hereafter, 1996, 2000, 2004, and 2008) academic years. A stratified random sample of Title IV-eligible institutions is first drawn, and from these institutions, degree-seeking students are selected into the NPSAS. Researchers must apply for an IES/NCES restricted-use data license to access NPSAS data.¹

I also use data from the publicly available Integrated Postsecondary Education Data System (IPEDS) and the 2001 Barron's Profiles of American Colleges to classify institutions as either selective or nonselective. Specifically, from the IPEDS, I obtain information on whether the school offers associates' degree programs, is classified as "inclusive" (i.e., open admissions), and the percentage of applicants that were admitted. The Barron's guide categorizes schools (primarily four-year public and nonprofit institutions) by selectivity based on acceptance rates, college entrance exam scores, and the minimum class rank and grade point average required for admission.

¹See <http://nces.ed.gov/pubsearch/licenses.asp> for details on how to apply for a NCES restricted-use data license.

B.2 Defining Sectors of Higher Education

Sectors of higher education are defined by selectivity (nonselective and more selective) and control (public, private nonprofit, and private for-profit). Public schools are either operated by publicly elected or appointed officials or receive the majority of their funding from public sources. Private institutions receive the majority of funding from private sources and are run by privately appointed individuals. Nonprofit institutions are exempt from federal taxes but are subject to the “non-distribution constraint” which prohibits a school from distributing revenue to its controlling body in excess of regular wages and other operating expenses (Hansmann 1980); income from activities unrelated to the provision of education is subject to taxation. For-profit schools pay corporate income taxes and are allowed to distribute profits to owners or shareholders.

Nonselective public institutions are public institutions that meet one of the following criteria: 1) they classified as community colleges in the IPEDS, 2) they classified as offering associate’s degree programs in the IPEDS, 3) they are classified as “inclusive” in the IPEDS, 4) they are classified as less competitive or non-competitive by the Barron’s Guide, or 5) they are not listed in the Barron’s Guide and admit more than 75 percent of their applicants.

Selective public institutions are public schools that meet one of the following criteria: 1) classified as 4-year institutions by the IPEDS and competitive, very competitive highly competitive, or most selective by the Barron’s Guide, or 2) they are missing Barron’s Guide information, do not meet any of the above criteria for being classified as a nonselective institution, and admit less than 75 percent of their applicants.

Nonselective nonprofit institutions are private, nonprofit schools that meet one criteria used for nonselective public institutions. Selective nonprofit institutions are private, nonprofit schools that meet one of the criteria used for selective public institutions. For-profit institutions are all nonselective.

When schools switch sectors, I use the most recent sector.

B.3 Sample Selection

To create my analysis sample, I first eliminate all students attending non-degree granting institutions, as these schools are ineligible to disburse federal student aid. Likewise, I eliminate students attending schools that do not participate in Title IV, regardless of an institution’s degree-granting status. I exclude students attending institutions located outside of the 50 U.S. states (and the District of Columbia) and students enrolled in specialized health institutions and seminaries from my sample.

Furthermore, I exclude students with the following characteristics:

- Students who received institutional aid classified as an athletic scholarship.
- Students younger than 17 or older than 45.

- Students attending multiple institutions in the study year.
- Students who were not enrolled at any time during the fall semester.
- Students who were not U.S. citizens or permanent residents.
- Students classified as graduate/professional students at any point during the year.
- Undergraduate students pursuing a graduate or professional degree or enrolled in a school that only offers graduate or professional degrees.
- Students who were enrolled in school for less than 3 months or were missing enrollment length information.
- Oversampled SMART grant recipients (2008 NPSAS only).
- Students with missing information on their state of residence or listed as having a permanent address outside of the 50 U.S. states and the District of Columbia.

B.4 NPSAS Variables

This section describes all transformations of NPSAS variables.

Unless otherwise stated, all monetary values discussed in the text and included in regression specifications are adjusted for inflation (2013\$). For the small number of observations with missing institutional aid amounts, I assume these students received \$0 in institutional aid.

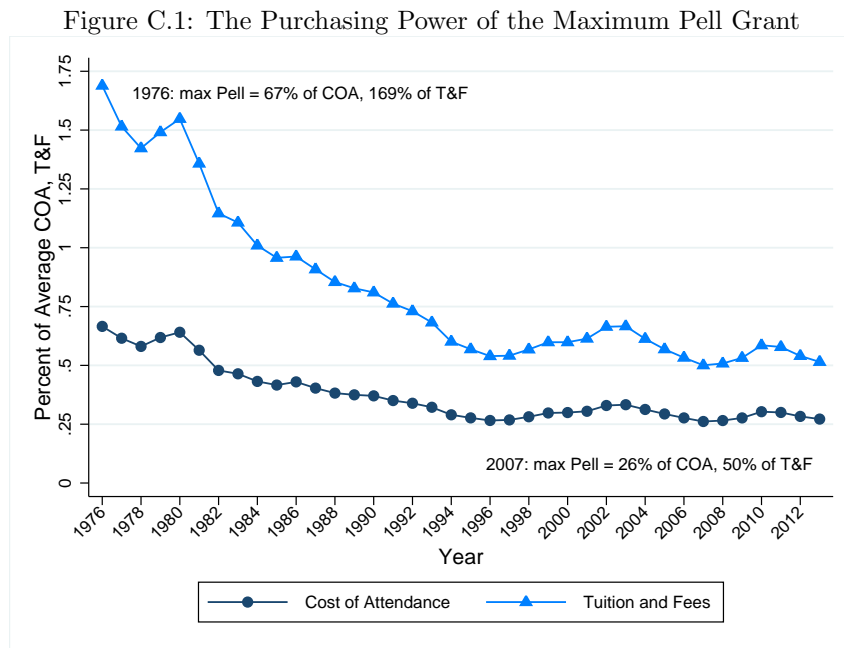
In 2008, a small number of observations are missing information on Pell Grant aid received during the school year. First, I assume these students received no Pell Grant aid during the year if they are listed as having receive \$0 in cumulative lifetime Pell Grant aid. If the first year of Pell Grant receipt is listed as 2007, missing values of Pell Grant aid are replaced by the cumulative amount of Pell Grant aid received as of 2008. Students with a missing value of Pell Grant aid after these imputations are dropped.

I classify students as “in-state” if a student’s state of legal residence is the same as the state where the school is located. Students are considered full time if they were enrolled as a full time student in any month of the fall semester (e.g., July to December). In all regressions, enrollment length is a categorical variable (3-4 months, 5-7 months, 8-9 months, 10-12 months).

In 2004, I use the cumulative math and verbal SAT scores to calculate students’ overall score; in other years, the total score is reported. I set SAT scores to be missing for upper year students or students with a score below 400 (the lowest possible score during my sample period).

To construct measures of school quality, I use information from the IPEDS linked to NPSAS institutions to measure revenue and expenditures, including tuition and total revenue per full-time equivalent (FTE) student and institutional grants, instruction-related expenditures, and expenditures on student services per FTE. I use prior-year revenue and expenditure data to create these measures. Unfortunately, the IPEDS only began collected revenue and expenditure data for the majority of schools in 2000, thus, when examining these measures of quality, my sample is limited to students attending institutions in 2004, 2008, and 2012. I use the Department of Education’s official cohort default rate, which measures the proportion of individuals defaulting on their federal loans within the two years, to measure the outcomes of former students.²

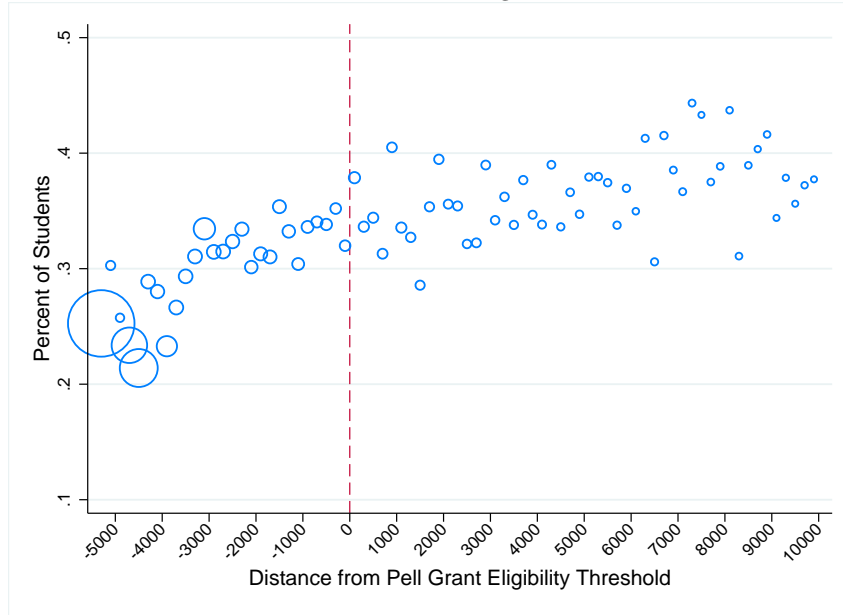
Appendix C: Additional Figures and Tables



Source: Average cost of attendance and tuition and fees from Table 330.10, 2013 Digest of Education Statistics (available at: <http://nces.ed.gov/programs/digest/d13/tables/dt13.330.10.asp>). Maximum Pell Grant from Department of Education’s 2012-13 Federal Pell Grant Program End-of-Year Report (available at: <http://www2.ed.gov/finaid/prof/resources/data/pell-2012-13/pell-eoy-2012-13.html>). Notes: Each marker represents the maximum Pell Grant as a percentage of the average cost of attendance (circles) or average tuition and fees (triangles) in a given year.

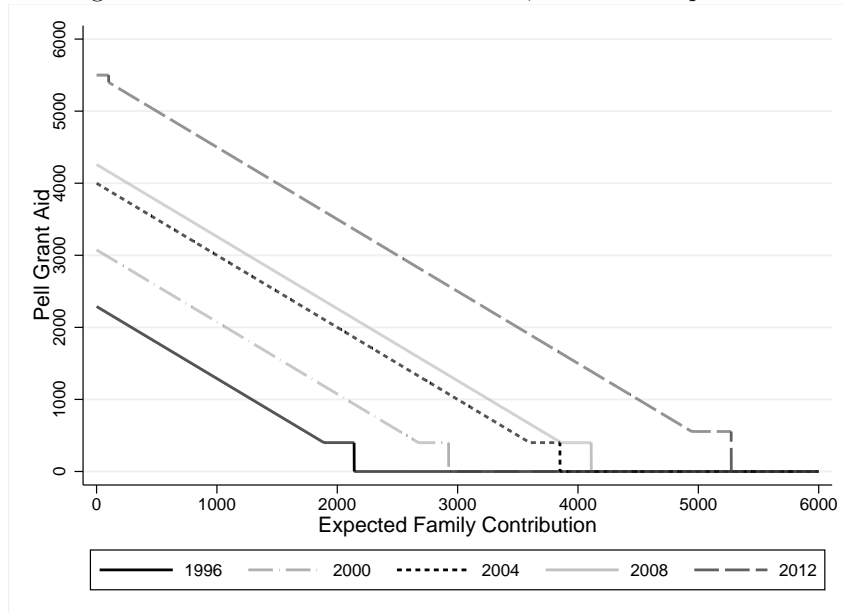
²Official two-year cohort default rates are available at: <http://www2.ed.gov/offices/OSFAP/defaultmanagement/cdr2yr.html>.

Figure C.2: Share of First-Year Students Listing more than One School on FAFSA



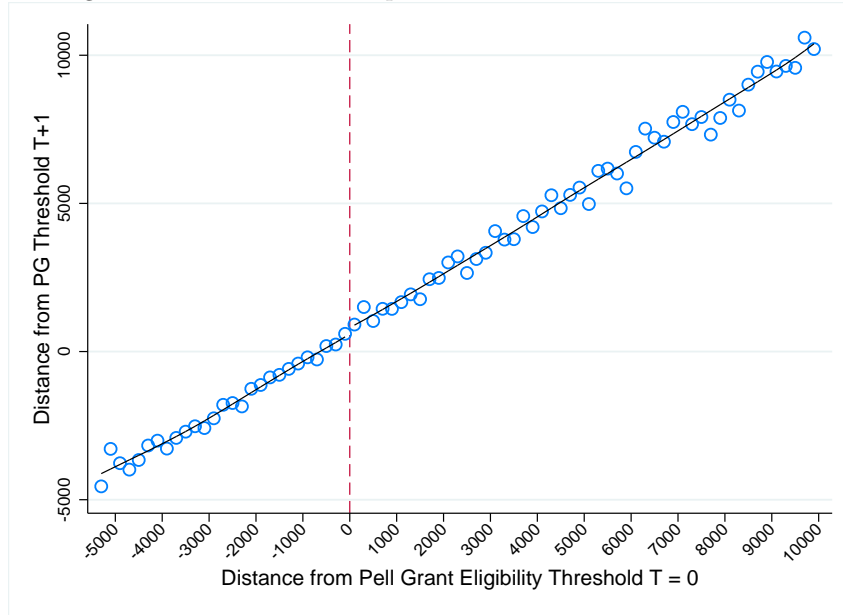
Source: 1996, 2000, 2004, and 2008 NPSAS. See Appendix B for sample construction details. Notes: Each circle represents the share of first-year students who listed more than one institution on their FAFSA within a given \$200 \widetilde{EFC} bin. Larger circles represent a larger underlying sample size.

Figure C.3: Pell Grant Award Schedule, NPSAS Sample Years



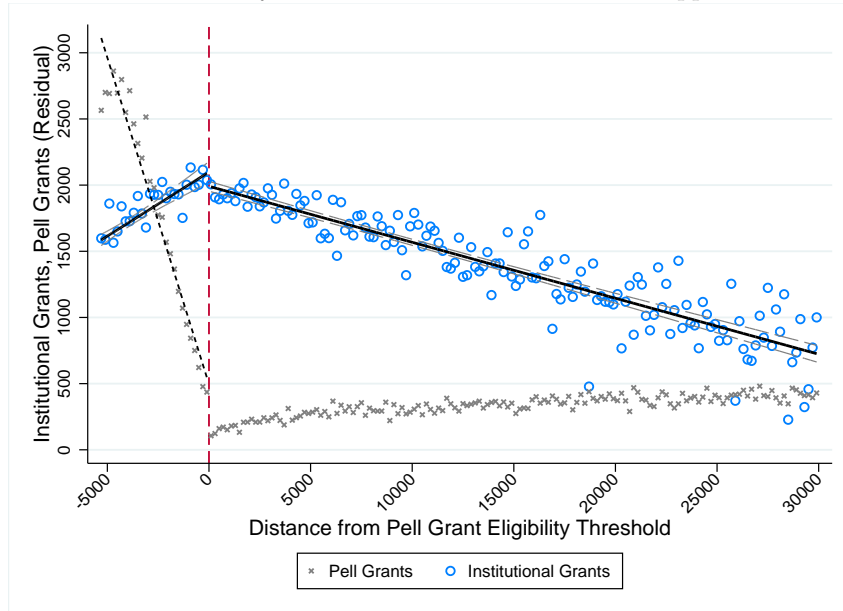
Notes: Each line represents the statutory (nominal) Pell Grant award a full-time, full-year student with a given EFC would receive in the specified year.

Figure C.4: The Relationship between Current and Future EFC



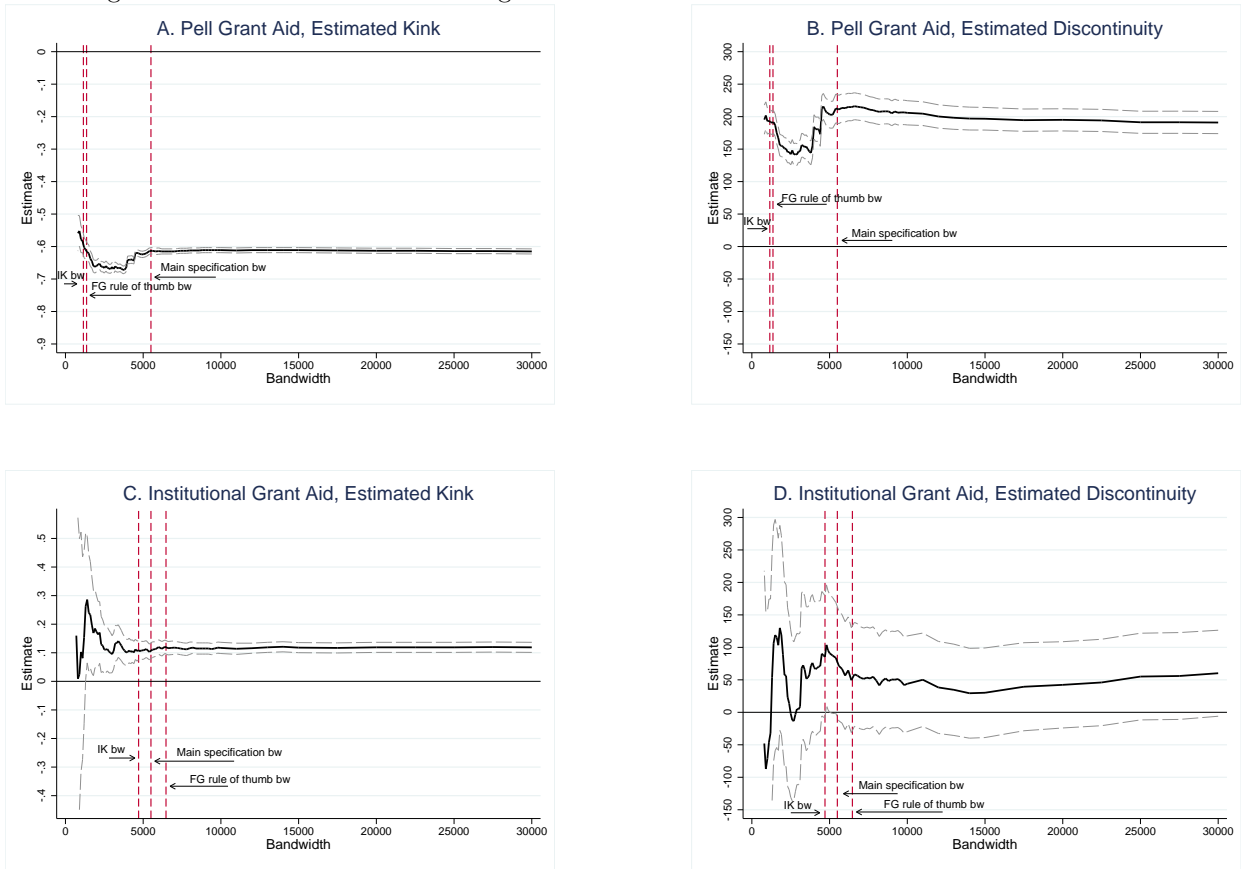
Source: 1996, 2000, 2004, and 2008 NPSAS. See Appendix B for sample construction details. Notes: Sample limited to students that submitted a FAFSA in both the survey year and the following year. Each circle represents the average distance from the Pell Grant eligibility threshold in the following year (e.g., \widetilde{EFC}_{t+1}) within a given \$200 \widetilde{EFC}_t bin. The black lines represent local linear regressions of \widetilde{EFC}_{t+1} on \widetilde{EFC}_t , estimated separately on either side of the Pell Grant eligibility threshold.

Figure C.5: Pell Grant Generosity and Institutional Aid over Full Support of Running Variable



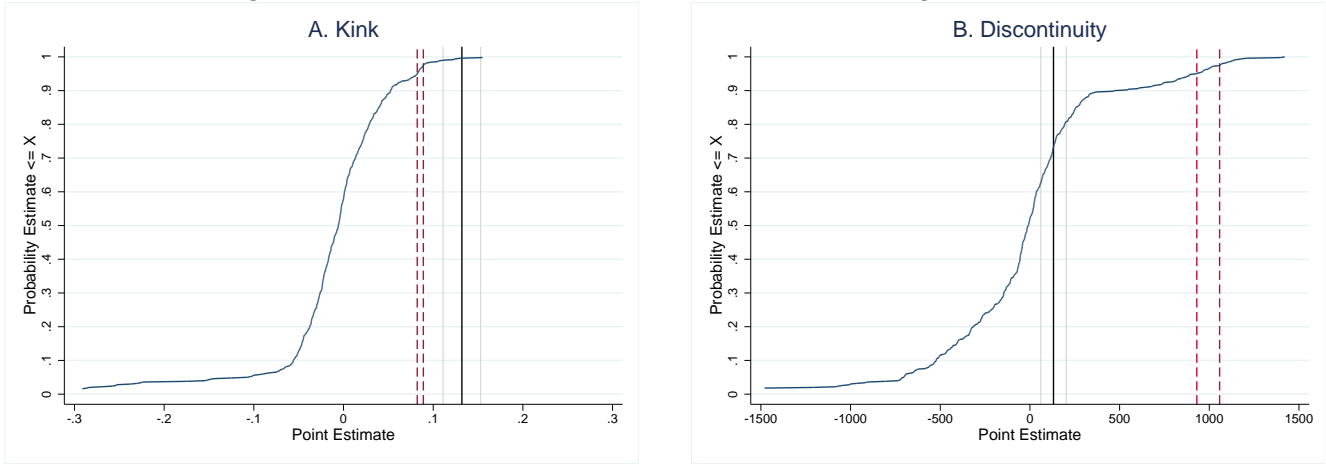
Source: 1996, 2000, 2004, and 2008 NPSAS. See Appendix B for sample construction details. Notes: See Figure 5 notes. Students with an expected family contribution more than 30,000 above the Pell Grant eligibility threshold are excluded (approximately 7 percent of observations).

Figure C.6: Robustness of First Stage and Reduced Form Estimates to Choice of Bandwidth



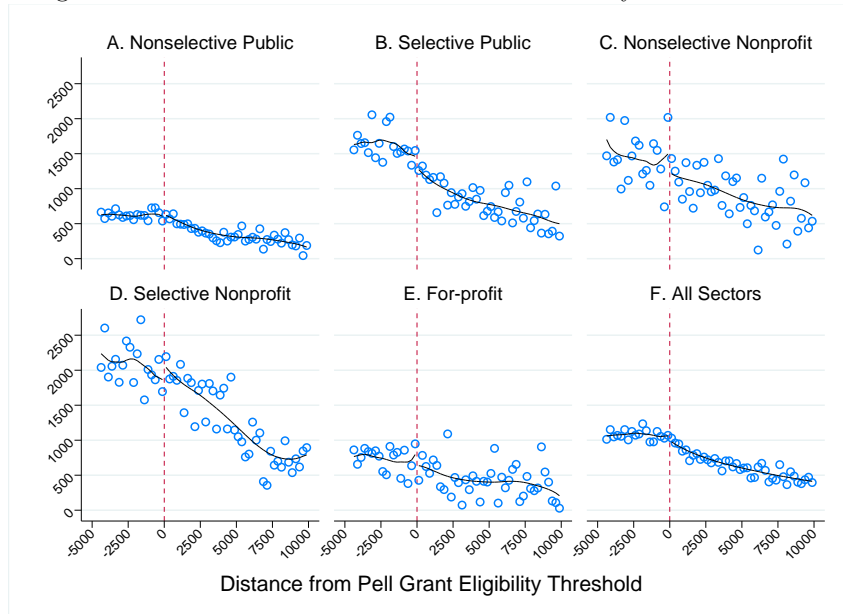
Source: 1996, 2000, 2004, 2008, and 2012 NPSAS. See Appendix B for sample construction details. Notes: See Figure 7 notes for details.

Figure C.7: The Distribution Reduced Form Estimates using Placebo Kinks



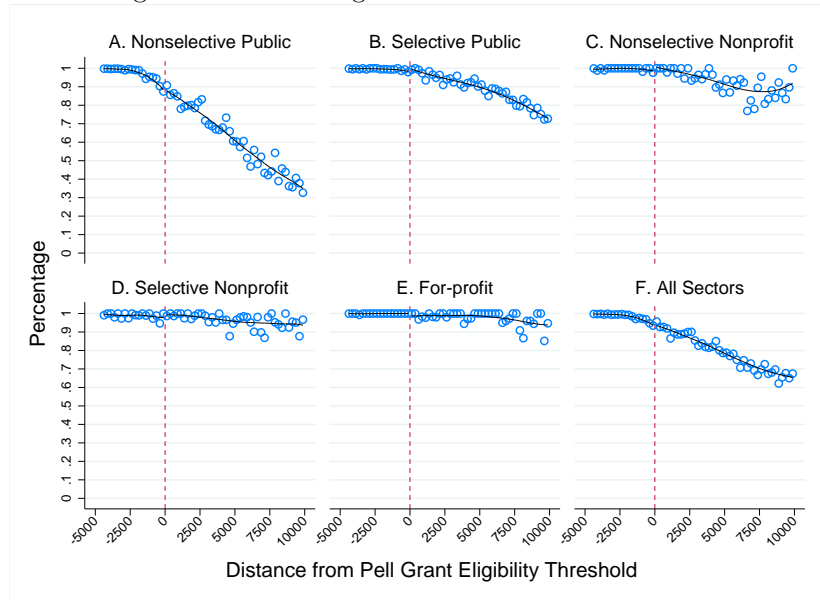
Source: 1996, 2000, 2004, 2008, and 2012 NPSAS. See Appendix B for sample construction details. Notes: Distribution of estimated kink and discontinuity from 500 regressions of institutional grant aid on \widehat{EFC} and school by year fixed effects using randomly drawn placebo thresholds. See Section 5 for details. All dollar amounts adjusted for inflation using the CPI-U and reported in 2013 dollars. Dashed lines correspond to the 95th and 97.5th percentiles of placebo estimates. Solid black line represents point estimate using the actual Pell Grant threshold and thin gray lines represent the corresponding 95 percent confidence interval (from Table 3, Panel B). All dollar amounts adjusted for inflation using the CPI-U and reported in 2013 dollars.

Figure C.8: The Distribution of State Grant Aid by EFC and Sector



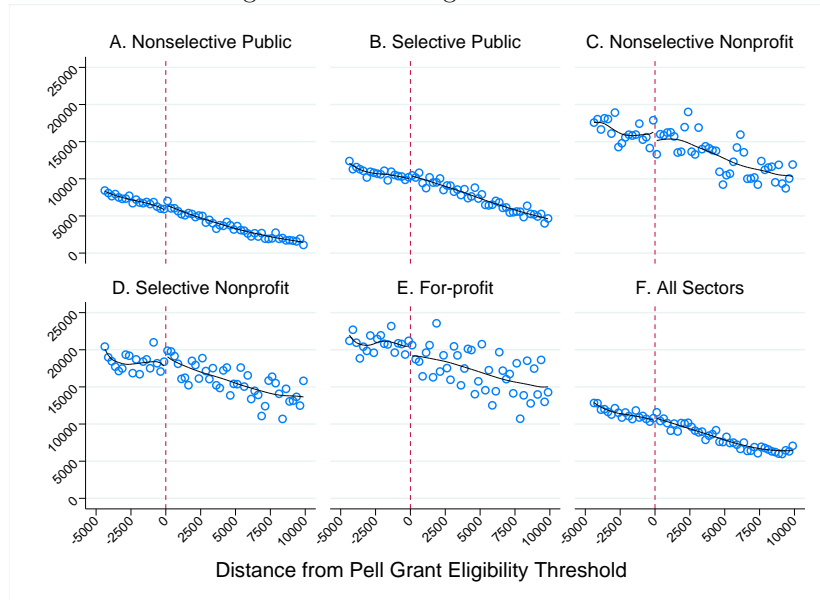
Source: 1996, 2000, 2004, and 2008 NPSAS. See Appendix B for sample construction details. Notes: Each circle represents average state grant aid received by students within a given \$200 \widehat{EFC} bin. The black line represents predicted state grant aid from a local linear regression of the average state grant aid received by students in a given bin on \widehat{EFC} , allowed to vary on either side of the Pell Grant eligibility threshold. All dollar amounts adjusted for inflation using the CPI-U and reported in 2013 dollars.

Figure C.9: Percentage of Students with Unmet Need



Source: 1996, 2000, 2004, and 2008 NPSAS. See Appendix B for sample construction details. Notes: Unmet need equals a student's cost of attendance minus her EFC, Pell Grant and other federal grant aid, and state grant aid. Cost of attendance includes tuition and fees, room and board, books and supplies, transportation, and other living expenses. Each circle represents the share of students within a given \$200 \widetilde{EFC} bin that had unmet need. The black line represents the predicted probability of having unmet need from a local linear regression of the share of students in a bin with unmet need on EFC, allowed to vary on either side of the Pell Grant eligibility threshold. All dollar amounts adjusted for inflation using the CPI-U and reported in 2013 dollars.

Figure C.10: Average Unmet Need



Source: 1996, 2000, 2004, and 2008 NPSAS. See Appendix B for sample construction details. *Notes:* See Figure C.4 notes for description of unmet need. Each circle represents average unmet need for students within a given \$200 \widetilde{EFC} bin. The black line represents predicted unmet need from a local linear regression of the average unmet need of students in a bin on \widetilde{EFC} , allowed to vary on either side of the Pell Grant eligibility threshold. All dollar amounts adjusted for inflation using the CPI-U and reported in 2013 dollars.

Table C.1: Characteristics of Schools and Students by Pell Grant Receipt and Sector

A. Public Institutions				
	<u>Nonselective</u>		<u>More Selective</u>	
	(1) Pell	(2) No Pell	(3) Pell	(4) No Pell
<i>A. Cost of Attendance and Financial Aid</i>				
Expected family contribution	\$694	\$3,669	\$951	\$4,190
Cost of attendance	\$12,233	\$10,007	\$17,930	\$15,572
Pell Grant aid	\$3,129	\$0	\$3,198	\$0
State grant aid	\$680	\$230	\$1,690	\$567
Other federal grant aid	\$119	\$9	\$313	\$21
Institutional grant aid	\$221	\$192	\$1,285	\$788
Percent receiving institutional aid	0.13	0.10	0.37	0.22
Unmet need	\$7,155	\$5,733	\$10,002	\$9,648
Percent with unmet need	0.98	0.83	0.99	0.94
<i>B. Student Demographic Characteristics</i>				
White	0.48	0.63	0.58	0.75
Male	0.37	0.45	0.43	0.47
Dependent student	0.47	0.48	0.63	0.69
Age	24	25	23	22
In-state	0.96	0.95	0.93	0.91
Adjusted gross income	\$18,792	\$34,261	\$21,222	\$40,365
<i>C. Student Attendance Status</i>				
Full-time	0.68	0.52	0.89	0.82
Months of enrollment	11	10	11	11
Number of students	39,650	28,600	15,300	14,660

Table 1, continued

B. Private Institutions

	<u>Nonselective NP</u>		<u>More Selective NP</u>		<u>For-profit</u>	
	(1) Pell	(2) No Pell	(3) Pell	(4) No Pell	(5) Pell	(6) No Pell
<i>A. Cost of Attendance and Financial Aid</i>						
Expected family contribution	\$751	\$4,056	\$1,040	\$4,401	\$561	\$4,381
Cost of attendance	\$23,899	\$21,510	\$34,141	\$32,072	\$24,934	\$22,678
Pell Grant aid	\$3,241	\$0	\$3,153	\$0	\$3,583	\$0
State grant aid	\$1,557	\$724	\$2,280	\$1,052	\$497	\$255
Other federal grant aid	\$408	\$27	\$947	\$49	\$166	\$14
Institutional grant aid	\$2,763	\$2,839	\$9,144	\$7,611	\$147	\$222
Percent receiving institutional aid	0.45	0.41	0.76	0.63	0.05	0.06
Unmet need	\$14,310	\$13,025	\$16,684	\$17,928	\$19,740	\$17,360
Percent with unmet need	0.99	0.95	0.99	0.97	1.00	0.98
<i>B. Student Demographic Characteristics</i>						
White	0.47	0.65	0.61	0.77	0.42	0.55
Male	0.34	0.43	0.39	0.42	0.42	0.51
Dependent student	0.50	0.51	0.72	0.76	0.35	0.36
Age	24	25	22	22	25	26
In-state	0.83	0.74	0.74	0.65	0.78	0.74
Adjusted gross income	\$19,609	\$37,127	\$23,565	\$44,436	\$17,327	\$35,501
<i>C. Student Attendance Status</i>						
Full-time	0.85	0.76	0.93	0.87	0.77	0.74
Months of enrollment	10	10	11	10	10	9
Number of Students	7,540	4,470	8,070	7,420	21,070	5,750

Source: 1996, 2000, 2004, and 2008 NPSAS. *Notes:* Number of observations rounded to nearest 10. See Section 3 for definitions of selectivity and control. Sample excludes graduate and professional students, students attending multiple institutions during the academic year, students not enrolled in the fall semester, athletic scholarship recipients, noncitizens, and students attending nondegree granting institutions, theological seminaries, or other faith-based institutions. See Online Appendix B for further details. Cost of attendance equals tuition and fees, books and supplies, and room and board, transportation, and other living expenses. Total need equals $\max\{(COA - EFC), 0\}$. Unmet need equals total need minus EFC, state, federal, and institutional grants. All dollar amounts adjusted for inflation using the CPI-U and reported in 2013 dollars.

Table C.2: RK and RD Estimates: Heterogeneity by Sector

	(1) IV (RK)	(2) IV (RD)
Nonselective Public		
× Pell Grant Aid	-0.058 (0.012)**	0.290 (0.248)
More Selective Public		
× Pell Grant Aid	-0.097 (0.030)**	0.746 (0.266)**
Nonselective Nonprofit		
× Pell Grant Aid	-0.221 (0.086)*	-0.633 (1.006)
More Selective Nonprofit		
× Pell Grant Aid	-0.756 (0.136)**	1.331 (0.806)+
For-profit		
× Pell Grant Aid	-0.060 (0.028)*	-0.121 (0.183)
Observations	152,500	152,500

Source: 1996, 2000, 2004, 2008, and 2012 NPSAS. See Appendix B for sample construction details. *Notes:* Each column represents a separate regression. Number of observations rounded to nearest 10. Standard errors clustered at institution by year level in parentheses; ** p<0.01, * p<0.05, + p<0.1. All regressions include school by year fixed effects, linear and quadratic terms in age, and indicators for gender, race, fall attendance status, enrollment length, level, dependency status, out-of-state student, and a linear term in student expected family contribution ($\widehat{EFC}_{it} = EFC_{it} - efc_{0t}$, where efc_{0t} is the threshold for Pell Grant eligibility in year t), allowed to vary by year and sector, interactions between sector and an indicator for Pell Grant eligibility ($\mathbf{1}[\widehat{EFC}_{it} < 0]$), and the interaction between Pell Grant eligibility and distance from the eligibility threshold ($\widehat{EFC}_{it} \times \mathbf{1}[\widehat{EFC}_{it} < 0]$), also interacted with sector. In column 3, the interaction between $\mathbf{1}[\widehat{EFC}_{it} < 0]$ and a full set of sector dummies serve as excluded instruments for the interaction between Pell Grant Aid and sector. In column 4, the interaction between $\widehat{EFC}_{it} \times \mathbf{1}[\widehat{EFC}_{it} < 0]$ and a full set of sector dummies serve as excluded instrument for the interaction between Pell Grant Aid and sector.

Table C.3: Heterogeneity in the Impact of Pell Grant Aid on Institutional Aid by Year

	1996	2000	2004	2008	2012	Test of equality (p-value)
Public						
Pass-through	-0.065 (0.054)	-0.019 (0.035)	-0.086 (0.034)*	-0.115 (0.028)**	-0.087 (0.029)**	0.372
Willingness to pay	698.67 (378.17)+	132.26 (150.56)	398.57 (447.32)	465.09 (146.65)**	19.06 (184.55)	0.203
Private Nonselective						
Pass-through	-0.225 (0.133)+	-0.056 (0.073)	-0.187 (0.104)+	-0.064 (0.094)	-0.118 (0.057)*	0.808
Willingness to pay	30.84 (429.08)	-456.93 (927.14)	-794.09 (665.63)	198.87 (401.08)	-57.81 (133.84)	0.755
Nonprofit Selective						
Pass-through	-1.867 (0.569)**	-0.960 (0.323)**	-0.535 (0.231)*	-0.739 (0.221)**	0.059 (0.313)	0.030
Willingness to pay	1703.89 (964.33)+	1178.19 (788.54)	1024.15 (1059.24)	980.85 (597.25)	3058.35 (3369.36)	0.947
Observations	15,380	16,590	30,510	43,240	46,780	
Test of equality (p-value)						
Pass-through	0.005	0.015	0.115	0.016	0.790	
Willingness to pay	0.228	0.352	0.222	0.546	0.620	

Source: 1996, 2000, 2004, 2008, and 2012 NPSAS. See Appendix B for sample construction details. Notes: See Table 5 notes for additional details on controls and treatment dimensions.

Table C.4: Estimates of the Impact of Pell Grant Aid on Institutional Quality

	(1) Tuition/FTE		(2) Revenue/FTE		Institutional Expenditures/FTE on:						(6) Cohort Default Rate	
	RK	RD	RK	RD	(3) Grants		(4) Instruction		(5) Student Services		RK	RD
					RK	RD	RK	RD	RK	RD		
<i>A. All Sectors</i>												
Pell Grant Aid	0.037 (0.064)	1.218 (0.609)*	-0.133 (0.074)+	1.393 (0.991)	0.005 (0.004)	0.062 (0.057)	-0.059 (0.021)**	0.607 (0.280)*	-0.022 (0.031)	1.089 (0.388)**	0.0003 (0.0001)*	0.001 (0.000)+
Mean of depvar	\$8,990		\$12,257		\$543		\$3,596		\$3,884		6.6	
Observations	40,680		56,850		50,060		65,890		69,690		101,960	
<i>B. By Sector</i>												
Nonselective Public												
* Pell Grant Aid	0.002 (0.047)	-0.798 (0.931)	-0.094 (0.075)	-1.273 (3.847)	0.006 (0.005)	-0.270 (0.275)	-0.042 (0.019)*	-0.416 (1.321)	-0.028 (0.018)	1.406 (1.393)	0.00004 (0.00007)	0.004 (0.002)**
Mean of depvar	\$4,588		\$8,685		\$493		\$2,656		\$2,047		8.1	
More Selective Public												
* Pell Grant Aid	0.092 (0.055)+	0.563 (0.391)	0.118 (0.138)	0.442 (1.305)	0.001 (0.007)	0.132 (0.059)*	0.060 (0.038)	0.236 (0.318)	0.104 (0.034)**	0.223 (0.321)	-0.0003 (0.00004)**	0.001 (0.0003)**
Mean of depvar	\$6,287		\$17,788		\$683		\$5,638		\$4,229		4.2	
Nonselective Nonprofit												
* Pell Grant Aid	-0.196 (0.189)	1.922 (1.702)	-0.253 (0.256)	1.870 (2.120)	-0.023 (0.029)	-0.220 (0.479)	-0.054 (0.078)	0.131 (0.710)	-0.046 (0.134)	1.105 (1.217)	0.0003 (0.0002)	0.001 (0.002)
Mean of depvar	\$10,611		\$13,328		\$387		\$4,148		\$5,977		7.4	
More Selective Nonprofit												
* Pell Grant Aid	-0.058 (0.141)	0.321 (1.283)	0.036 (0.186)	-1.131 (1.760)	0.009 (0.029)	0.201 (0.202)	0.002 (0.057)	-0.063 (0.531)	-0.052 (0.094)	0.098 (0.846)	-0.0003 (0.00005)**	0.001 (0.0003)**
Mean of depvar	\$16,365		\$19,528		\$547		\$6,059		\$8,264		3.1	
For-profit												
* Pell Grant Aid	-0.108 (0.116)	1.245 (0.771)	-0.028 (0.132)	1.516 (0.904)+	0.037 (0.027)	0.203 (0.161)	0.013 (0.040)	0.183 (0.275)	-0.024 (0.098)	1.843 (0.792)*	0.0002 (0.0002)	0.003 (0.001)*
Mean of depvar	\$9,921		\$10,656		\$480		\$2,448		\$5,782		10.1	
Observations	40,680		56,850		50,060		65,890		69,690		101,960	

Source: Columns 1 through 6 include NPSAS students attending institutions in 2004, 2008, and 2012 with revenue or expenditure information available in prior year IPEDS. Column 6 includes NPSAS students attending institutions in all years with information on two-year cohort default rates. *Notes:* Each column within a panel represents a separate regression. Standard errors clustered at the institution by year level in parentheses; ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$. Number of observations rounded to nearest 10. Regressions include state and year fixed effects, a linear term in \widetilde{EFC}_{it} allowed to vary by year, an indicator for Pell Grant eligibility, and the interaction between Pell Grant eligibility and distance from the eligibility threshold. In Panel B, the latter three terms are interacted with a full set of sector dummies. RK estimates instrument for Pell Grant aid with $\widetilde{EFC}_{it} \times \mathbf{1}[\widetilde{EFC}_{it} < 0]$ (interacted with sector in Panel B). RD estimates instrument for Pell Grant aid with $\mathbf{1}[\widetilde{EFC}_{it} < 0]$ (interacted sectors in Panel B). Students with EFC greater than 5,500 from Pell Grant eligibility threshold are excluded. All dollar amounts adjusted for inflation using the CPI-U and reported in 2013 dollars.