The Payoff to Attending a More Selective College

Dale and Krueger

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Mid-career annual earnings (Payscale.com)

• Princeton (6)	$121,000
• Stanford (8)	$119,000
• MIT (11)	$118,000
• Yale (12)	$117,000
• Notre Dame (24)	$110,000
• Cornell (33)	$107,000
• Duke (44)	$102,000
• Wake Forest (77)	$ 95,300
• Purdue (133)	$ 89,000
• Indiana (378)	$ 76,700
• Valparaiso (395)	$ 76,200
• WVU (409)	$ 75,800
• IUSB (975)	$ 53,100
• Shaw (1016)	$ 41,900

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Three steps in admission process

- Students decide where to apply
- School decides whom to accept
- Given acceptances, students decides where to attend

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What enters in the school's decision

- Characteristics observed by researcher
  - SAT/GPA/AP classes/clubs
- Characteristics unobserved by researcher
  - Motivation, maturity, ambition, special skills
  - Revealed in letters of recommendation, personal statement

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- Let: x_{1i} be measurable characteristics
  x_{2i} be unmeasured characteristics
  w_i be wages
  Q_i be the measure of school quality (like SAT)
- Model we would like to estimate

$$\ln(w_i) = \beta_0 + x_{1i}\beta_1 + x_{2i}\beta_2 + Q_i\beta_3 + \varepsilon_i$$

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Problem

- Can find lots of data sets with x_1 and Q
  - Can measure SAT, GPA and school quality
- Few if any will have x_2.
- When trying to estimate the impact of schools on outcomes, will have a major omitted variables bias
- Model we end up estimating

$$\ln(w_i) = \beta_0 + x_{1i}\beta_1 + Q_i\beta_3 + \varepsilon_i$$

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- Does the realization of ε_i convey information about Q_i?
- Suppose that the skills schools find attractive (drive, ambition, enthusiasm) are the same things that are rewarded in the job market
- What is the bias in the coefficient on β_3 in the traditional model?

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College and Beyond (C&B)

- 23,573 Students that graduated from 34 college in 1951/76/89
  - Data from institutional/college board records
  - Survey conducted in 1995-1997 that includes
    - What schools applied & accepted
    - Annual earnings in 1995
- Final sample
  - 1976 cohort
  - Exclude HBCU
  - Include full time workers

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Some schools in the sample

- Public
  - Penn State, Miami (Ohio), Michigan, UNC
- Liberal arts
  - Oberlin, Kenyon, Denison
- Exclusive liberal arts
  - Swarthmore, Williams, Wellesley
- Top 20
  - Stanford, Penn, Northwestern, Duke, Georgetown

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- Students were asked
  - Where they applied?
  - Where were they accepted?
- This allows the authors to groups students based on where they applied/admitted
- Too may possible combinations – so group into equivalence classes based on SAT
  - Same "school" if average SAT in in the same 25 point range

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Controlling for unobservables

- Consider students that applied and were accepted to the same two schools (A&B)
  - One went to A – the other went to B
- Schools view these students as somewhat equivalent along unobserved and observed dimensions
- What key assumption does the author have to make about why one went to A and the other went to B?

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TABLE I
ILLUSTRATION OF HOW MATCHED-APPLICANT GROUPS WERE CONSTRUCTED

		Student applications to college							
		Application 1		Application 2		Application 3		Application 4	
Student	Matched-applicant group	School average SAT	School admissions decision	School average SAT	School admissions decision	School average SAT	School admissions decision	School average SAT	School admissions decision
Student A	1	1280	Reject	1226	Accept*	1215	Accept	na	na
Student B	1	1280	Reject	1226	Accept	1215	Accept*	na	na
Student C	2	1360	Accept	1310	Reject	1270	Accept*	1155	Accept
Student D	2	1355	Accept	1316	Reject	1270	Accept*	1160	Accept
Student E	2	1370	Accept*	1316	Reject	1260	Accept	1150	Accept
Student F	Excluded	1180	Accept*	na	na	na	na	na	na
Student G	Excluded	1180	Accept*	na	na	na	na	na	na
Student H	3	1360	Accept	1308	Accept*	1260	Accept	1160	Accept
Student I	3	1370	Accept*	1311	Accept	1255	Accept	1155	Accept
Student J	3	1350	Accept	1316	Accept*	1265	Accept	1155	Accept
Student K	4	1245	Reject	1217	Reject	1180	Accept*	na	na
Student L	4	1235	Reject	1209	Reject	1180	Accept*	na	na
Student M	5	1140	Accept	1055	Accept*	na	na	na	na
Student N	5	1145	Accept*	1060	Accept	na	na	na	na
Student O	No match	1370	Reject	1038	Accept*	na	na	na	na

Students A&B K&L applied and were accepted to same set of schools

Students F&G only applied to one school – were excluded

Student O applied to a unique set of schools and had no match

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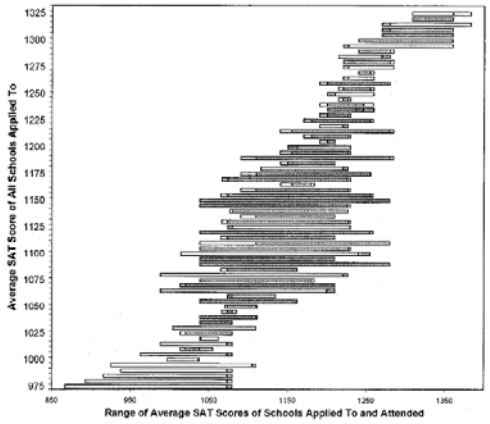

FIGURE I
Range of Schools Applied to and Attended by Most Common Sets of Matched Applicants

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Model

- Construct dummy variable for each "group"
- Add all but one to the model
- These dummy variables capture the fact that some students are observationally similar
  - "hold constant" the characteristics that lead one to apply/get accepted at a group of schools

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New model

- $\ln(\text{earnings}_i) = \beta_0 + x_{1i}\beta_1 + Q_i\beta_3 + \Sigma_j D(j)_i\alpha_j + \varepsilon_i$
- Let $D(j)_i$ be a dummy variable that equals 1 if person i belongs to group j
- α_j represents the relative earnings for the group compared to the omitted category

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Some facts

- 70% listed another school they applied to other than the one they attended
- 62% attended the most selective school to which they were admitted
- 44% had at least one other student to whch they were matched
- Final sample: 14,238
- 1,233 different applicant groups

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TABLE II
MEANS AND STANDARD DEVIATIONS OF THE C&B DATA SET

	Unweighted		Weighted*			
	Full sample		Full sample		Matched applicants	
Variable	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Log(earnings)	11.121	0.757	11.096	0.747	11.148	0.737
Annual earnings (1995 dollars)	86,768	62,504	84,219	60,841	88,276	62,598
Female	0.391	0.488	0.392	0.488	0.385	0.487
Black	0.059	0.235	0.050	0.218	0.050	0.219
Hispanic	0.016	0.124	0.013	0.115	0.014	0.117
Asian	0.027	0.162	0.023	0.150	0.027	0.163
Other race	0.003	0.059	0.003	0.059	0.003	0.057
Own SAT/100	11.820	1.661	11.672	1.634	11.875	1.632
School average SAT/100	11.949	0.928	11.655	0.943	11.812	0.943

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TABLE III
LOG EARNINGS REGRESSIONS USING COLLEGE AND BEYOND SURVEY, SAMPLE OF MALE AND FEMALE FULL-TIME WORKERS

	Basic model: no selection controls		Matched-applicant model
	Full sample	Restricted sample	Similar school-SAT matches*
Variable	1	2	3
School-average SAT score/100	0.076	0.082	−0.016
	(0.016)	(0.014)	(0.022)
Predicted log(parental income)	0.187	0.190	0.163
	(0.024)	(0.033)	(0.033)
Own SAT score/100	0.018	0.006	−0.011
	(0.006)	(0.007)	(0.007)
Female	−0.403	−0.410	−0.395
	(0.015)	(0.018)	(0.024)
Adjusted R^2	0.107	0.110	0.112
N	14,238	6,335	6,335

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