Estimating the Perceived Returns to College

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November 17, 2018
Motivation

- What do people think college is worth and how do these perceptions vary across the population?
- Perceived returns matter because they determine attendance decisions and attendance responses to financial aid.
- Actual income returns do a good job of predicting attendance (Cunha & Heckman, 2007).
- They don’t explain responses to financial aid (Deming & Dynarski, 2010).
- I am the first to estimate perceived returns to college without assuming rational expectations on actual returns.
- My predictions of attendance responses to financial aid are consistent with those found in the quasi-experimental literature.
Unobserved perceived returns $Y_i$ can be written in terms of observed characteristics, $X_i$, perceived tuition, $\widetilde{Tuition}_i$, and an error term, $\epsilon_i$

\[ Y_i = X_i\beta - \widetilde{Tuition}_i\gamma + \epsilon_i \]

By revealed preference, individual $i$ will attend college, $S_i = 1$, if their perceived return is positive

\[ S_i = \begin{cases} 
1 & \text{if } X_i\beta - \widetilde{Tuition}_i\gamma + \epsilon_i \geq 0 \\
0 & \text{otherwise.} 
\end{cases} \]

Assuming $\epsilon_i \sim \mathcal{N}(0, \sigma^2)$ allows me to estimate the unobserved perceived return from the observed college attendance decision.
Model (Simplified)

- With data on $S_i$ but not $Y_i$, we can essentially estimate the RHS of:

$$\frac{Y_i}{\sigma} = \frac{X_i \beta - \text{Tuition}_i \gamma + \epsilon_i}{\sigma}$$

- Standard practice normalizes $\sigma = 1$ and obtains estimates $\hat{Y}_i^*, \hat{\beta}^*$, and $\hat{\gamma}^*$ that are in error term standard deviation units.

- I normalize $\gamma = 1$ to obtain estimates $\hat{Y}_i$, $\hat{\beta}$, and $\hat{\sigma}$ that are in tuition units (dollars).

- Perceived returns are scaled to dollars and are linear in dollars $\Rightarrow$ compensating variation (absorbs risk aversion, discounting, etc).
My assumption that perceived tuition affects perceived returns at a 1-to-1 rate is based on causal intuition, so I will require a causal estimate of the effect of perceived tuition on attendance to use it.

Problem 1: Tuition costs may be correlated with unobserved characteristics that predict perceived returns.

Problem 2: Individuals may not perfectly forecast their college tuition (attenuation bias).

Solution: Instrument for tuition using local tuition at age 17.

Valid if (1) geographic controls soak up correlation between local tuition and error and if (2) individuals know their tuition insofar as it is predicted by local tuition.
Main goal of paper is to establish validity of method

Used in past financial aid quasi-experimental study (Dynarski, 2003)

Used in past research ex ante and ex post returns to college (CHN, 2005)

Rich set of controls and instruments (local tuition, distance to college)

Data on tuition paid by parents allows me to adjust perceived tuition accordingly
### Table: Perceived Returns Estimates, Thousands of 2018 Dollars

<table>
<thead>
<tr>
<th></th>
<th>(1) Probit</th>
<th>Std. Error</th>
<th>(2) IV Probit</th>
<th>Std. Error</th>
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<td>σ</td>
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</table>

Selected variables. Noncategorical are mean-zero.
Perceived returns suggest that 2.6% would be induced to attend college from a $1,000 tuition subsidy

This fits broadly with results from quasi-experimental studies of tuition aid

I also investigate the effect of an $11,400 annual subsidy because such a subsidy (Social Security Student Benefit) has been studied using my data (Dynarski, 2003)

I find a predicted effect of a 26.0pp increase in college attendance, while Dynarski found an effect of 24.3pp

Because my results match past findings, I feel confident that I can forecast the effects of a variety of tuition aid policies
Universal Social Security Student Benefit Equivalent

Figure: Average aid cost: $39,800; Attendance: 61.3% → 87.3%

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Policy 2: Attendance Target of 87.3% (baseline 61.3%)

Figure: Average aid cost: $29,400; Attendance: 61.3% → 87.3%
I find that perceived returns have much less variance than past estimates.

Using these results I can perform counterfactual policy experiments related to financial aid.

I closely match the results from the Social Security Student Benefit.

I also show cost-minimizing subsidy with the same effect on attendance.

Average cost of subsidy: $29,000, average return to college for marginal individuals: $593,000 (CHN, 2005)
Joint estimation of actual returns and perceived returns

This will allow testing of agent knowledge of returns and implies tax/subsidy necessary to induce selection on gains

Perceived returns to years of schooling (ordered choice)

Perceived returns to college major (multinomial choice)

General discrete choice applications, especially with information frictions in pricing (transportation choices, medical procedures, fertility, home ownership)