Estimating the Perceived Returns to College

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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

Model (Simplified)

- Unobserved perceived returns Y_i can be written in terms of observed characteristics, X_i, perceived tuition, $\widetilde{Tuition}_i$, and an error term, ϵ_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:

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

- 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 $\implies$ compensating variation (absorbs risk aversion, discounting, etc)

Identification

- 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

Data: NLSY79

- 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

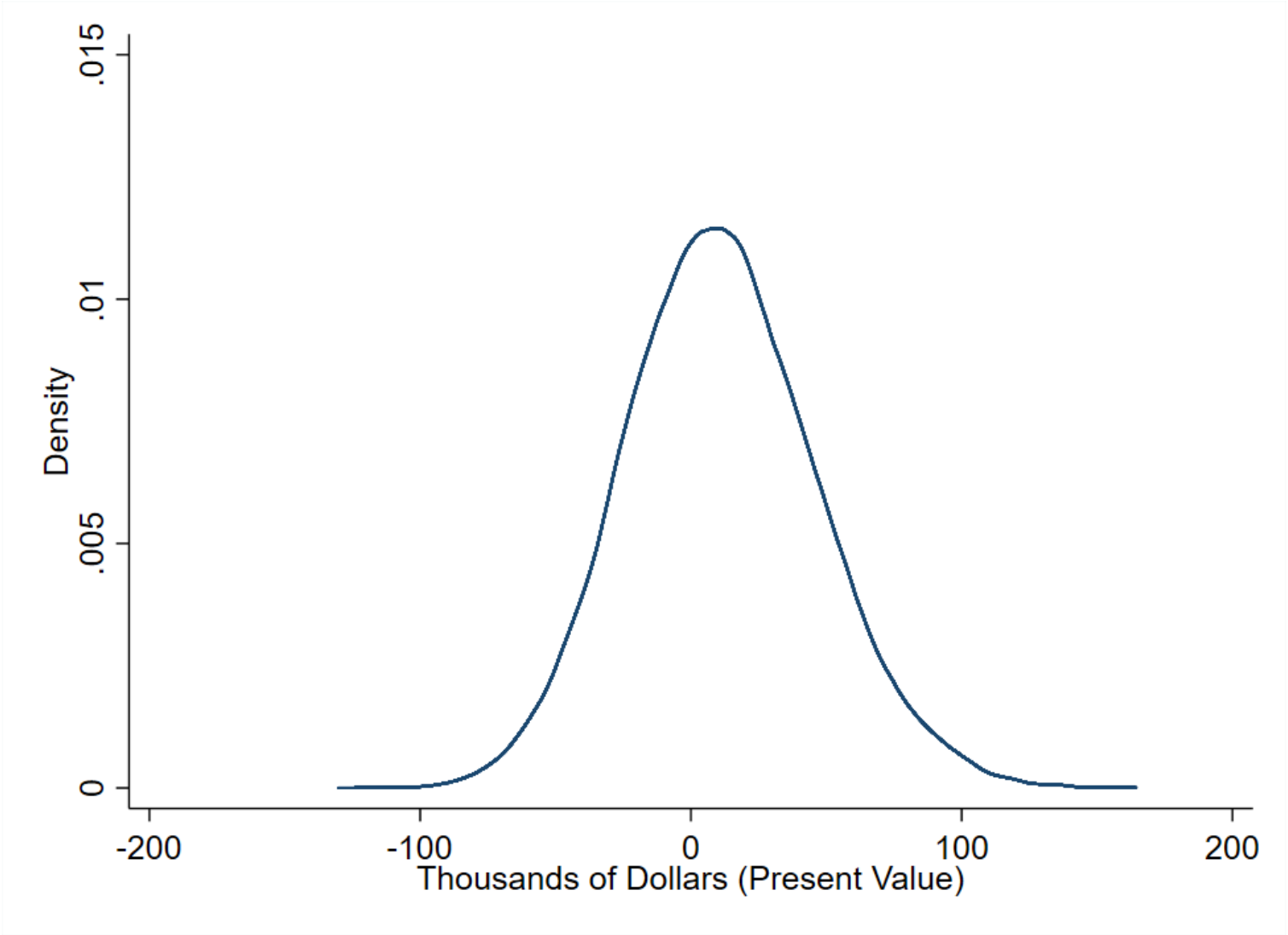
Parameter Estimates: Sample

Table: Perceived Returns Estimates, Thousands of 2018 Dollars

	(1) Probit	Std. Error	(2) IV Probit	Std. Error
Constant	10.191	4.432	9.280	3.688
Black	32.483	3.569	21.632	2.403
Hispanic	23.878	3.906	15.715	2.639
Female	5.974	3.103	3.859	2.088
High School GPA	37.385	6.893	26.667	4.828
High School GPA Squared	-0.698	1.533	-0.717	1.052
σ	58.274	26.795	39.138	16.689
Observations	5492	5492	5492	5492

Selected variables. Noncategorical are mean-zero.

Perceived Returns Distribution



External Validity

- 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

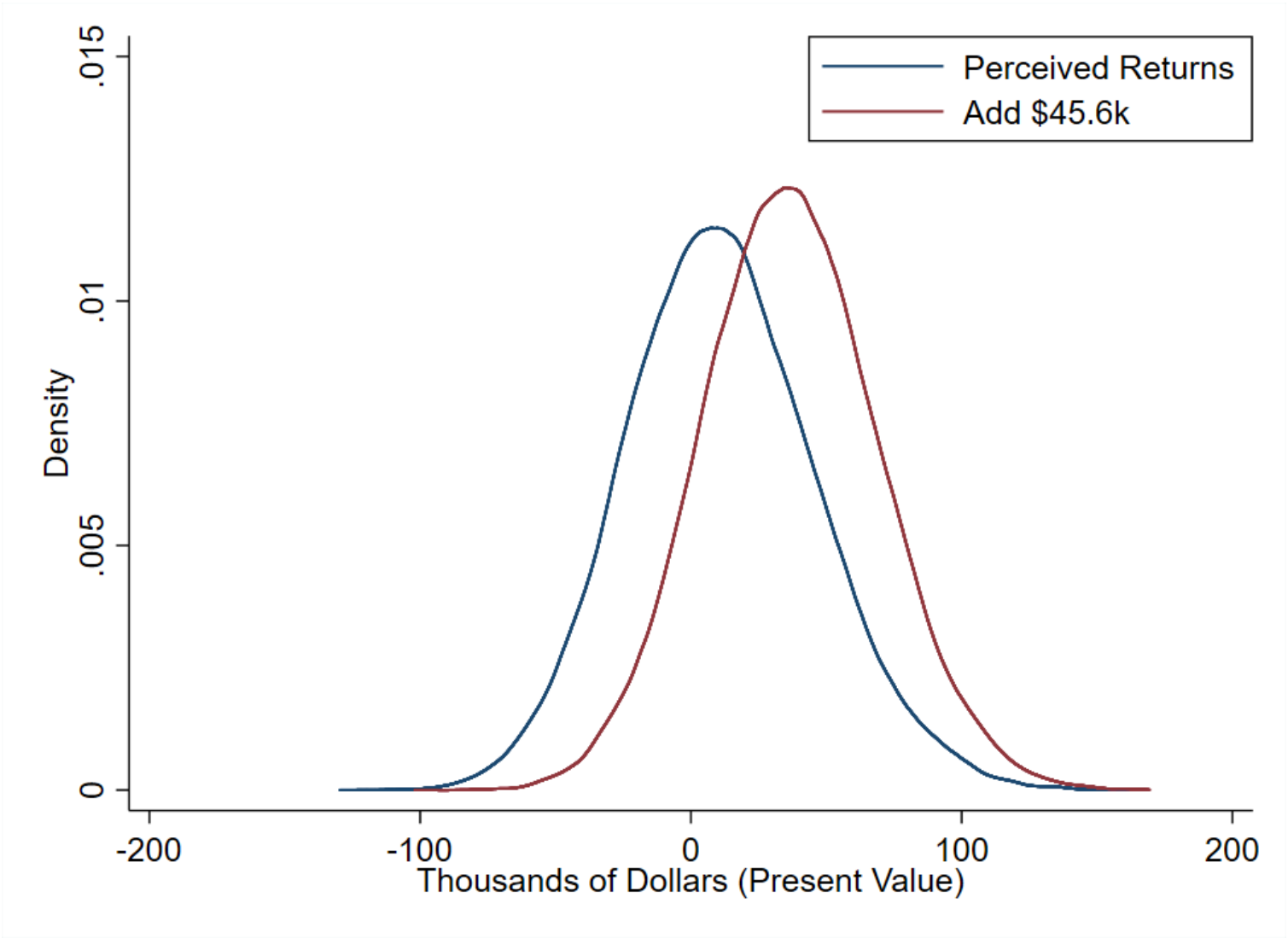


Figure: Average aid cost: \$39,800; Attendance: 61.3% $\rightarrow$ 87.3%

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

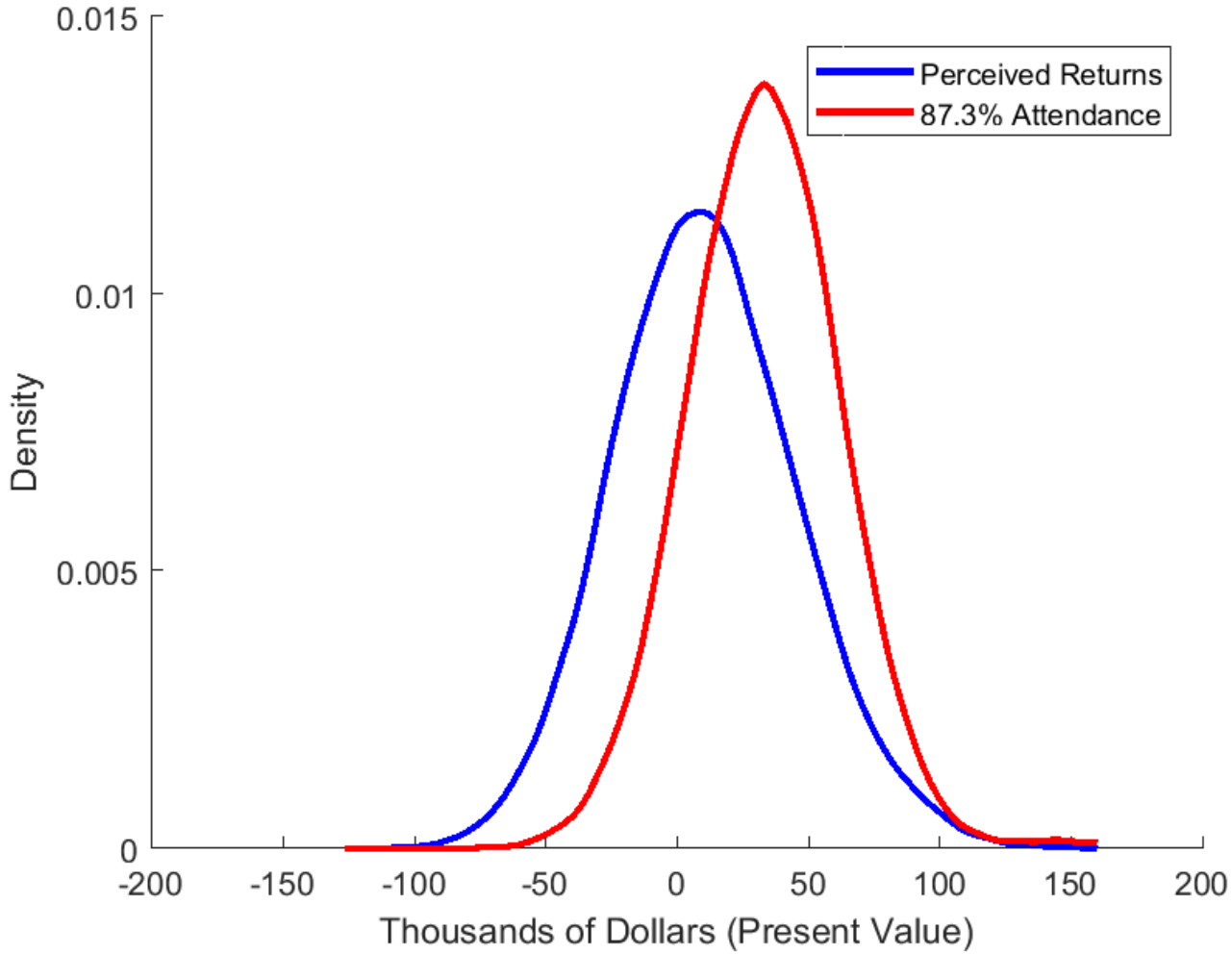


Figure: Average aid cost: \$29,400; Attendance: 61.3% $\rightarrow$ 87.3%

Conclusions

- 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)

Conclusion: Future Work

- 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)