

NL Education project: Key Economic questions and modeling notes

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Starting from peerquestions.md

1 Research question 1: Returns to 'being allowed to enter preferred institution' (the "treatment" and policy variable)

What are the returns (academic, early income, lifetime income, etc) to winning one's first-preferred institution, (and how do these returns differ by demographics and the characteristics of that institution?)

We firstly aim to measure the impact of a student being *admitted* to his or her preferred institution, conditional on being admitted to the course. We can consider this the treatment effect of the variable the policymaker has direct control over. While we will consider a range of outcomes, we will focus on "income in year t " for the present discussion. Consider the effect of an *exogenous shift* in the treatment from "Treatment = 0: attains permission to attend course in an institution not of first preference" to "Treatment=1: attains permission to attend course in institution of first-preference." We aim to measure the difference in hypothetical outcomes for a person with particular characteristics assigned to Treatment=1 relative to the same person assigned to Treatment=0.

We will use the familiar potential outcomes framework [REF]. Let $Y_i(A = 1, C = 1)$ denote individual i 's potential income (at some time t ; we leave off this superscript for now) if she were exogenously assigned to be *admitted* to the institution of her first choice ($A = 1$) and the course of her first choice ($C = 1$). Similarly, we can consider the potential income outcome $Y_i(A = 0, C = 1)$, where she is admitted to her first choice course but *not* her first-choice institution. If we consider 'able to attend to first-choice institution' as the treatment of interest the effect we are interested in will be simply:

$$ATE(X) = E\left(Y_i(A = 1, C = 1) | X_i = X\right) - E\left(Y_i(A = 0, C = 1) | X_i = X\right),$$

for some group with relevant covariates X , for some outcome Y . The policy relevance of this is clear: this tells us the benefit those in this group get (in terms of outcome Y) from being given the *opportunity* to attend their preferred institution and their first-preferred course, relative to having been given the

opportunity to attend their first-choice course but not their first-choice institution. If policymakers can give more individuals “like those in this group” the opportunity to attend their first choice institution, this is the benefit they may be expected to get. (This presumes that the institution is not changed in any way by the admission of more such students; i.e., the Stable Unit Treatment Value Assumption (SUTVA; Rubin, 1980,1990)).

The above objects define treatment effects and differences that may come through a variety of channels. For example, if we have $ATE(X = m) = 10$ this does not tell us that males gain 10 from *completing a particular degree* at their first-choice institution. Compliance is an issue: a student admitted to his first-choice institution and course may not actually *attend* this institution, nor even this course. Students *not* admitted to the preferred institution (in their preferred course) may choose not to attend the course at all, and may be more likely to ‘drop the course’ than the institution-winners. Even given compliance in terms of attendance, academic success and degree completion may vary by institution. Thus, the effects of winning first-choice institution may come from several channels, including the impact on entering the course, on academic outcomes conditional on entering, and possible signalling and human capital benefits conditional on completing the course.

However, no matter which channels these effects occur through, they are still of policy interest. If males gain 10 in income from getting their first-choice institution (all else equal), it is still a clear benefit to them conferred by the admissions process.

We will also be interested in the differences in this between groups with distinct observable characteristics, e.g., for males versus females:

$$ATE(X = m) - ATE(X = f)$$

There are further issues when comparing the relevant benefits between groups. If $ATE(X = m) - ATE(X = f) = 10 - 5 = 5$, this would not tell us that males gain 5 more than females from attending any particular institution (or set of institutions) relative to any other particular institution(s). While the distribution of institutional preferences should be similar between lottery winners and losers (because of the random draw), they need not be similar along other characteristics like gender. Still, the estimate of the differential benefits are relevant: they tell us which groups gain more along which dimensions from being given admissions preference.

Q1: We observe instruments $Z_A \in \{0, 1\}$ representing a (noisy in a particular way?) measure of ‘win institution through lottery’ and we also observe the above mentioned assignment A representing ‘able to attend institution after swaps’. We need to show that we can identify the above ATE’s using our IV strategy.

... (while also showing why we need to use these IV’s rather than a simple reduced form ols on the instruments or a regression of the censored sample of ‘non-swappers’).

(We also observe instruments Z_c representing a measure of ‘win course through lottery’)

Let $A(0), A(1)$ represent the values of the ‘able to attend to institution of first preference after swaps’

outcome for an individual that would be attained given the instruments $Z_A = 0$ and $Z_A = 1$ respectively. In the present context, we can assume that $A(1) = 1$; those win the institutional lottery have the opportunity to attend their first-preference university (although they may choose not to). However $A(0) \in \{0, 1\}$ as some who lose this lottery may nonetheless swap in. (Notation largely from Imbens and Rubin, 1997)

Issues to address

1. Basic identification problem above; connect with our estimator
 - (a) 'Effect for the compliers', why this identifies the effect of 'being able to attend' even though we include swappers.
2. Identification for comparisons between groups
3. Specify policy interpretation more carefully; is 'able to enter first choice relative to "some other non-first choice"' an object of general interest, or do we need to narrow this down?
4. Overall (also relevant for below): Noise in our IV
5. Overall: Specification of outcome variables/functional form to represent 'lifetime income', specification of interactions, et.

2 Research question 2: Returns to *actually attending* first choice institution (in first-preferred course)

What are the returns (academic, early income, lifetime income, etc) to entering (attending) one's first-preferred institution, (and how do these returns differ...)?

Consider the effect of an *exogenous shift* in the treatment from "E=0: enters course in an institution not of first preference" to "E=1: enters course in institution of first-preference." Difference in hypothetical outcomes for a person with particular characteristics assigned to E=1 relative to the same person assigned to E=0.

Q2: Under what conditions can we identify the impact of *entering* the institution of first preference in the course, relative to attending another institution (which 'other institution?')

3 RQ3: Mediators/channels of above effects

In particular, 'what are the returns to admission/entering first-choice institution that occur "holding academic/specialization outcome constant", and what are the returns that occur via these channels?'

4 RQ4: Returns to the particular characteristics of the institution one attends

Consider the treatment effect of an *exogenous shift* in these characteristics. Difference in hypothetical outcomes with, e.g., 'high-WOS program' vs 'low-WOS program' for a person with particular characteristics.

DR: I do not see a strong identification strategy for this at the moment, so I will not focus on it yet.

Key readings:

Imbens and Rubin, 1997

- - K & Mogstad (updated version) on meaning of treatment effect
- - Ketel et al (and citations) (a) on identifying effect of attendance from lottery instrument (b) On using early years' income to make inferences about lifetime income
- - ?Machin on using weights to impute lifetime income, considering cohort and time effects etc. (Also Bhuller et al?)
- - Deming et al; Cullen et al; interpretation of a highly comparable lottery
- - Possibly: ?Carneiro, Heckman and Vytlačil ... on policy interpretations of IV, Hastings et al on differentiating treatment effect ?by observable
- - And Pinto on 'moving to opportunity'; mediators and selection/Roy models

OLDER STUFF BELOW, POSSIBLY INTEGRATE IT IN (branch excluded)

*See also extended_litreview.md, mogstadmodeling.lyx, 0_impactofeducation_paper_Institutions_WIP_commentdoc.tex
0_impactofeducation_paper_Institutions_WIP.tex*

References

References