Impact, Sorting and Inequality in the Credibility Revolution, and my 1 Million Goal

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Baylor University

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Introduction

- Scott Cunningham, professor of economics at Baylor University, author of Causal Inference: the Mixtape (Yale University Press, 2021)
- Today's talk has three goals:
  1. Tell you the history of "design" based causal inference in economics
  2. Show you some empirical results from a project showing its impact
  3. Use this to explain my "1 Million Goal"

Background I: Harvard Stats and Potential Outcomes

- Don Rubin, former chair of Harvard stats, is the main source of potential outcomes, building on Jerzy Neyman's 1923 work.
- Rubin's influential 1970s papers advocated for causal inference using contrasts of $Y(1)$ and $Y(0)$.
- Neyman's notation, initially in Polish, was translated into English in 1990, likely due to Rubin.
- Rubin expanded Neyman's ideas from experiments to observational studies, leading to developments like propensity score methods.
- Economics was slow to adopt these methods initially.

Background II: Princeton Industrial Relations Section

- Late 1970s and early 1980s: little "credibility" in empirical labor studies.
- Princeton Industrial Relations Section: older than the economics dept, rigorous, non-partisan focus on US "manpower", highly empirical.
- Key faculty are Orley Ashenfelter, David Card, Alan Krueger.
- Key students include Bob Lalonde, Josh Angrist, Steve Pischke, John Dinardo, Janet Currie, Anne Case, and many more.
- Listen to David Card: `https://youtu.be/1soLdywFb_Q?si=BCVqYeRz6jYiwHTQ&t=1580`

Background II: Princeton Industrial Relations Section

Credibility Revolution:

- Lalonde (1986) was a groundbreaking study, recently reviewed by Guido Imbens and Yiqing.
- Lalonde, a student of Card and Orley, analyzed an RCT on a job training program, finding an average treatment effect of +\$800.
- He then replaced the experimental control group with survey data, reran econometric methods, and couldn't replicate the results.
- Orley and Card emphasized randomization in their 1985 Restat article, advocating for its exploitation in studies.

IV is Especially Bad

- Instrumental variable must satisfy several stringent conditions and even under constant treatment effects, it's hard to do well
- But in the old days, it was malpractice.
- Listen to Orley Ashenfelter:
  `https://www.youtube.com/watch?v=GG627T4GbqU`

H. Gregg Lewis on IV

"After reviewing virtually every study since 1963, Lewis reached the awkward conclusion that simple OLS of union wage effects were more useful and reliable than those based on IV or endogenous selection approaches. The problem, in his view, was that researchers used arbitrary and unsupported assumptions to identify their models with little or no concern for the validity of their assumptions or the implications of their findings." – Card (2022)

Angrist goes to Harvard

- Josh Angrist writes a paper evaluating the effect of military service on career earnings using IV
- Josh is Card and Orley's student (and Card and Josh win the Nobel prize in 2021 with Imbens)
- But his instrument is decidedly different – he uses "actually randomized" instruments. He uses the draft lottery
- Finds military services *causes* reductions in career earnings, goes on the Restud tour, gets a job at Harvard

Imbens goes to Harvard

- Guido Imbens (wins the Nobel with Card and Angrist) is a Dutch econometrics student in a masters program in the UK who follows a professor to Brown for his phd
- Very interesting personality – unusually open minded which I think matters. Not terribly dogmatic.
- `https://youtu.be/cm8V65AS5iU?si=FiqecXsH0wjIk9Qc&t=540`
- He goes to Harvard and overlaps with Angrist for one year

IV Context

- Heckman (1990) and Manski (1990) wrote critical papers on IV, arguing that recovering the average treatment effect (ATE) using IV is impossible.
- Imbens was intrigued because Angrist's dissertation seemed credible despite the instrument not significantly affecting the probability of treatment.
- Some would be deterred but Imbens, as he said, was unusual for his early open mindedness, no ego, calm curiosity, and brilliance

IV Context

- Imbens and Angrist decide to go about studying IV in the reverse order – rather than try to come up with an IV estimator that will identify the ATE, they come up with an interpretation of IV leading to the LATE theorem
- Their 1994 Econometrica paper showed IV identifies the local average treatment effect (LATE), revisited in a 1996 JASA paper with Rubin.
- Imbens noted that framing IV with non-economic concepts attracted statisticians and broadened the reach of causal inference.

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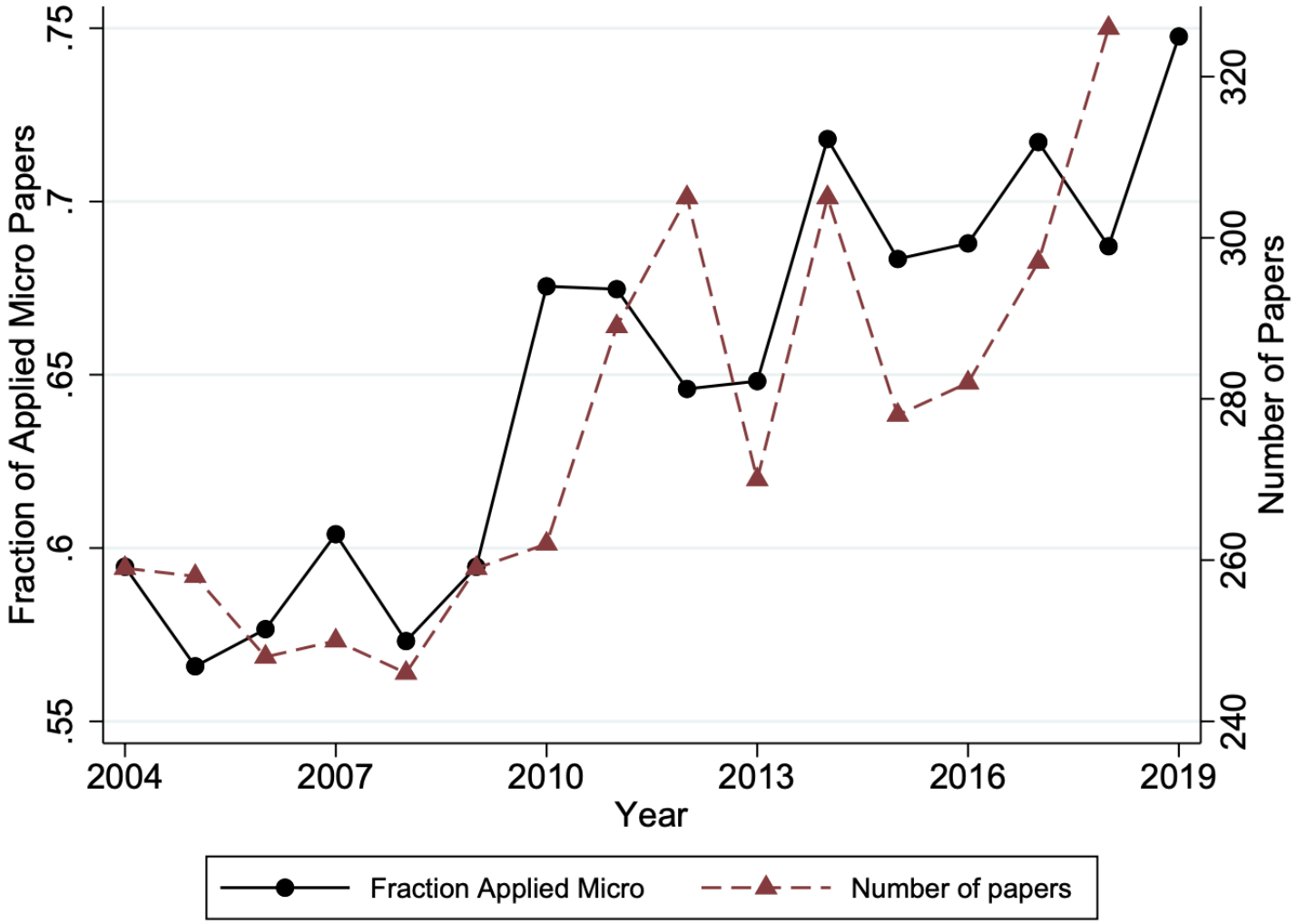
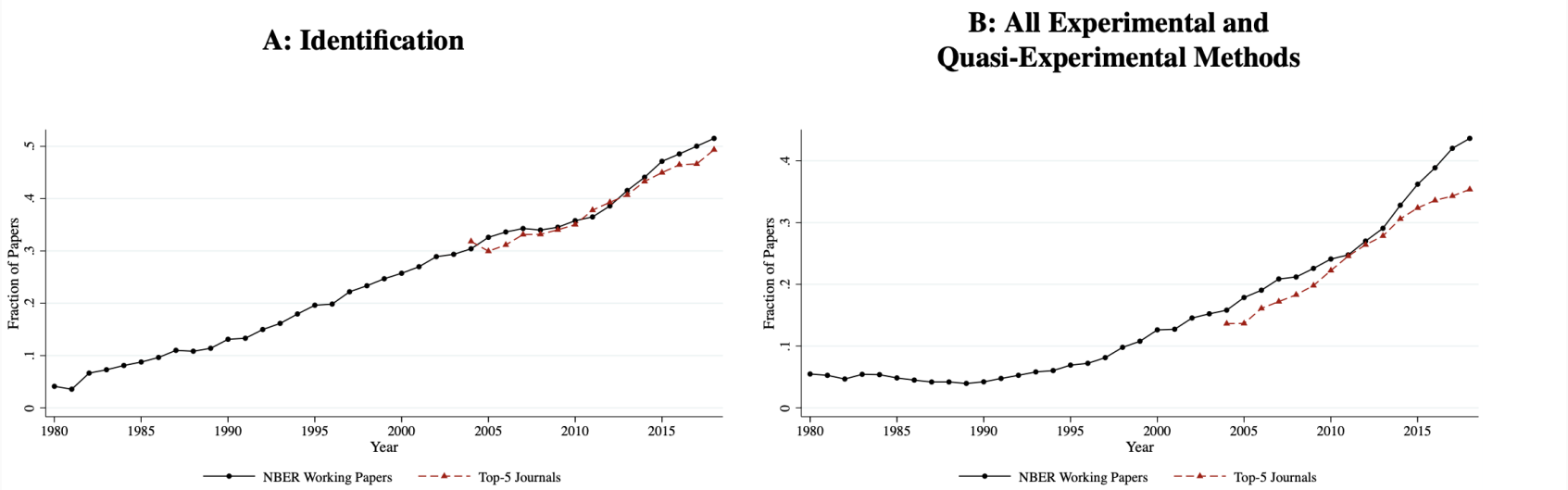
Credibility Revolution Takes Over (Currie, et al. 2020)

Figure I: Fraction of Applied Microeconomics Articles in Top-5 Journals



Credibility Revolution Takes Over (Currie, et al. 2020)

Figure II: The Credibility Revolution



Two Institutions Collide and Create One Paradigm

- **Cambridge**: MIT and Harvard
  - Key figures: Angrist and Imbens go to Harvard where Rubin is in statistics
  - Imbens and Rubin's causal inference class had a transformative effect on the economics cohort like Rajeev Dehejia, David Autor, and Bruce Sacerdote
  - Larry Katz, editor at QJE, is also a significant influence
- **Princeton's "The Section"**: Labor economists
  - Focused more on natural experiments, credible shocks, and design principles than on econometric theory
  - Historically influential in labor economics
  - Orley Ashenfelter was editor at AER for a long time

Heckman's Structural Approach

- Focuses on structural modeling and parametric solutions to selection bias
- Emphasizes understanding and applying underlying economic models and mechanisms
- Developed methods that often require strong parametric assumptions and detailed modeling
- Historically based at the University of Chicago
- Nobel Laureate (shared with McFadden), leading econometrician and labor economist

Heckman's Connection to Princeton

- Interestingly, like Card, Lalonde, and Angrist, Jim Heckman was also a student of Orley Ashenfelter at Princeton
- So the material I'm going to show could also be interpreted as "Orley's warring children"
- Reflects the diversity within Orley's influence, producing scholars with different methodological preferences, but note, they were labor economists

The Credibility Revolution: Theory, Test, and Implications

Theory:

- Fusion of Princeton and Cambridge approaches created a powerful new paradigm
- Spread through labor markets, student training, and elite placements

Testing the Theory:

- Compare student outcomes of key credibility revolution figures vs. Heckman
- Focus is on total production of students and where they went and by whom

Why It Matters:

- Created inequality in access to causal inference training
- Concentrated knowledge in specific fields and institutions

Empirical Work

- My "treatment group" is five professors associated with the credibility revolution: Josh Angrist, Guido Imbens, David Card, Alan Krueger, Larry Katz.
- My control group is Jim Heckman
- I have the universe of their students (both direct advisees and committee members) which I solicited from them, got from their websites, and used Proquest data for.
- I will focus just on a few things as this is a work in progress with three other people.

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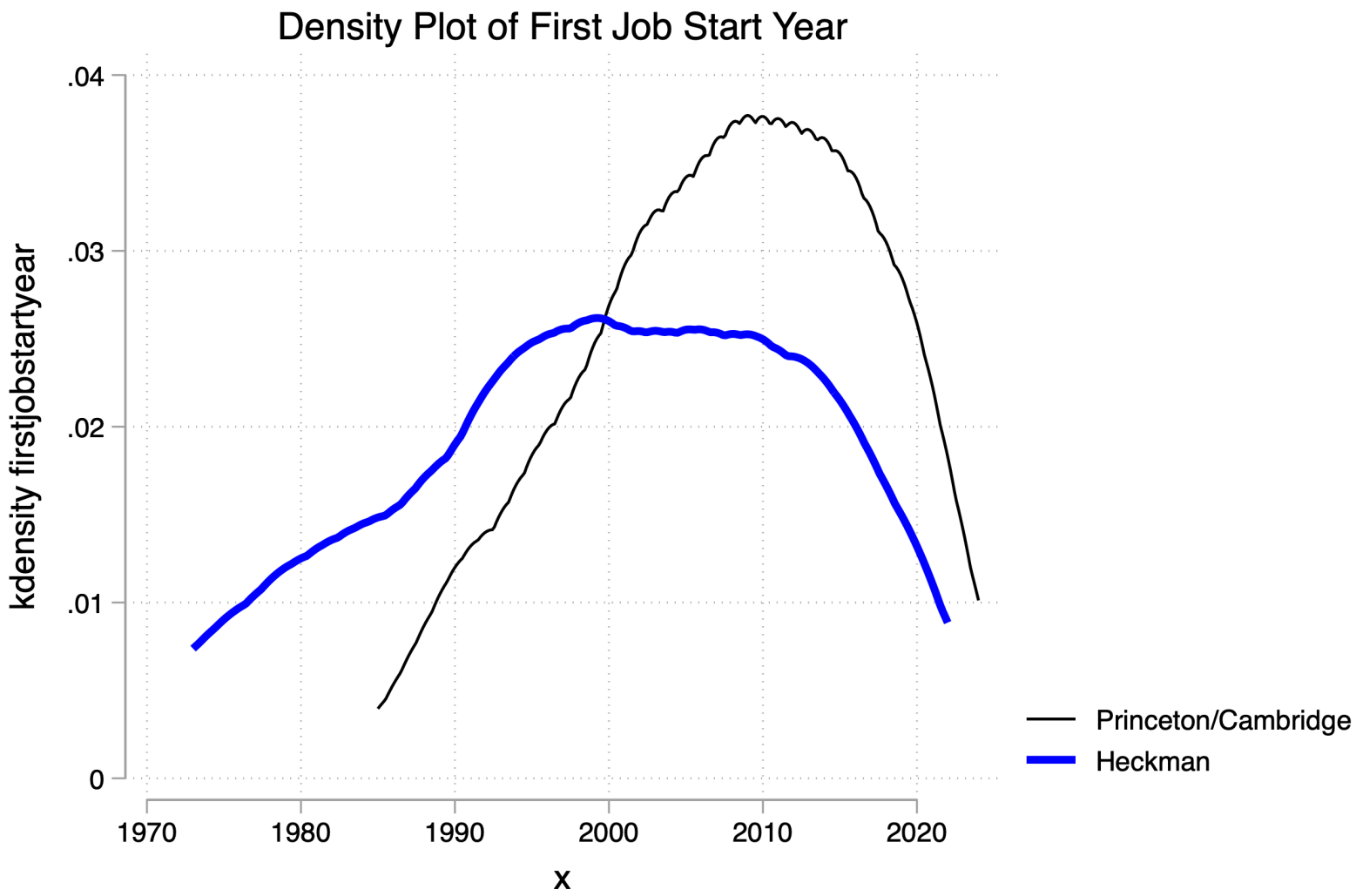
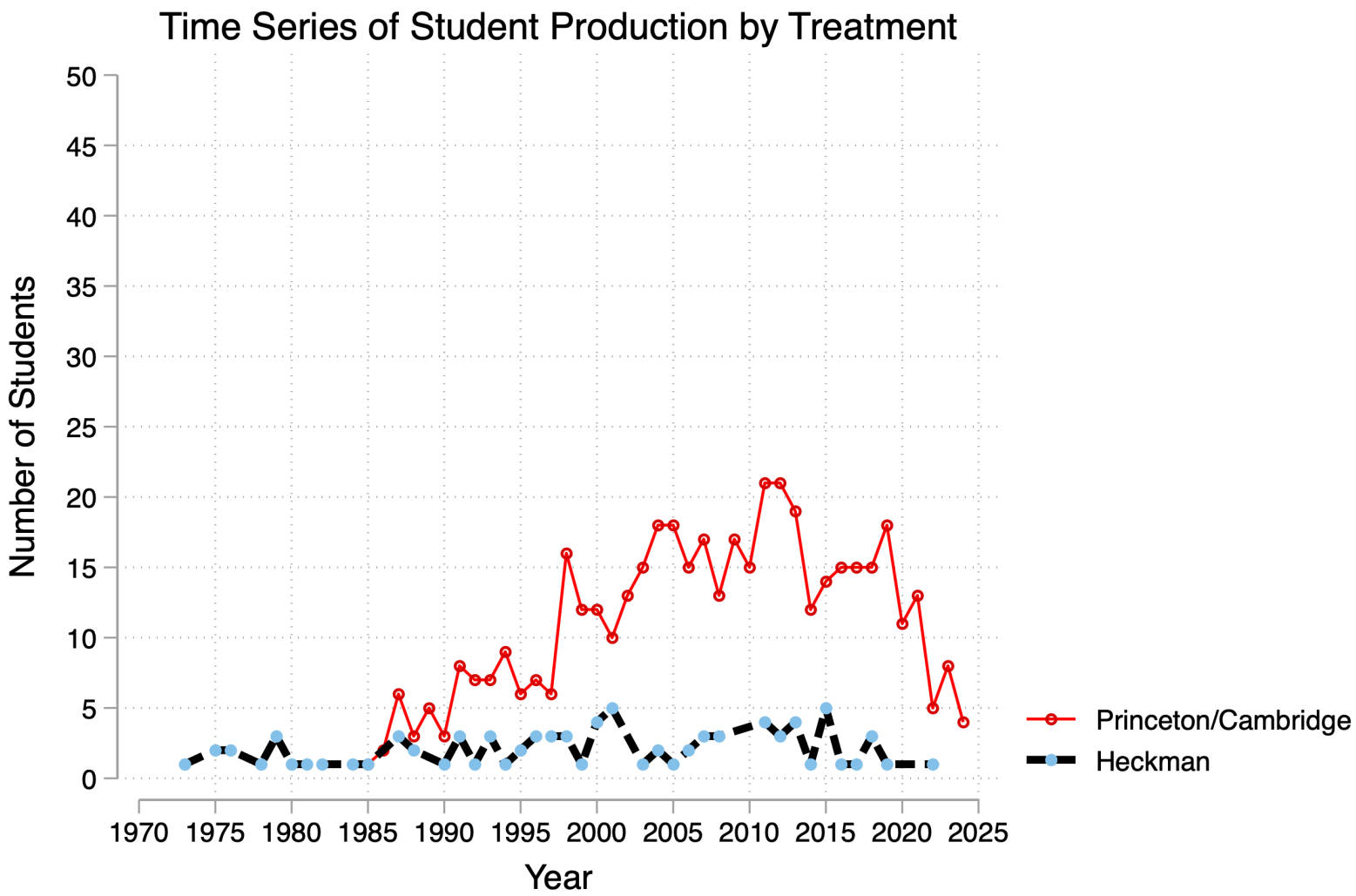
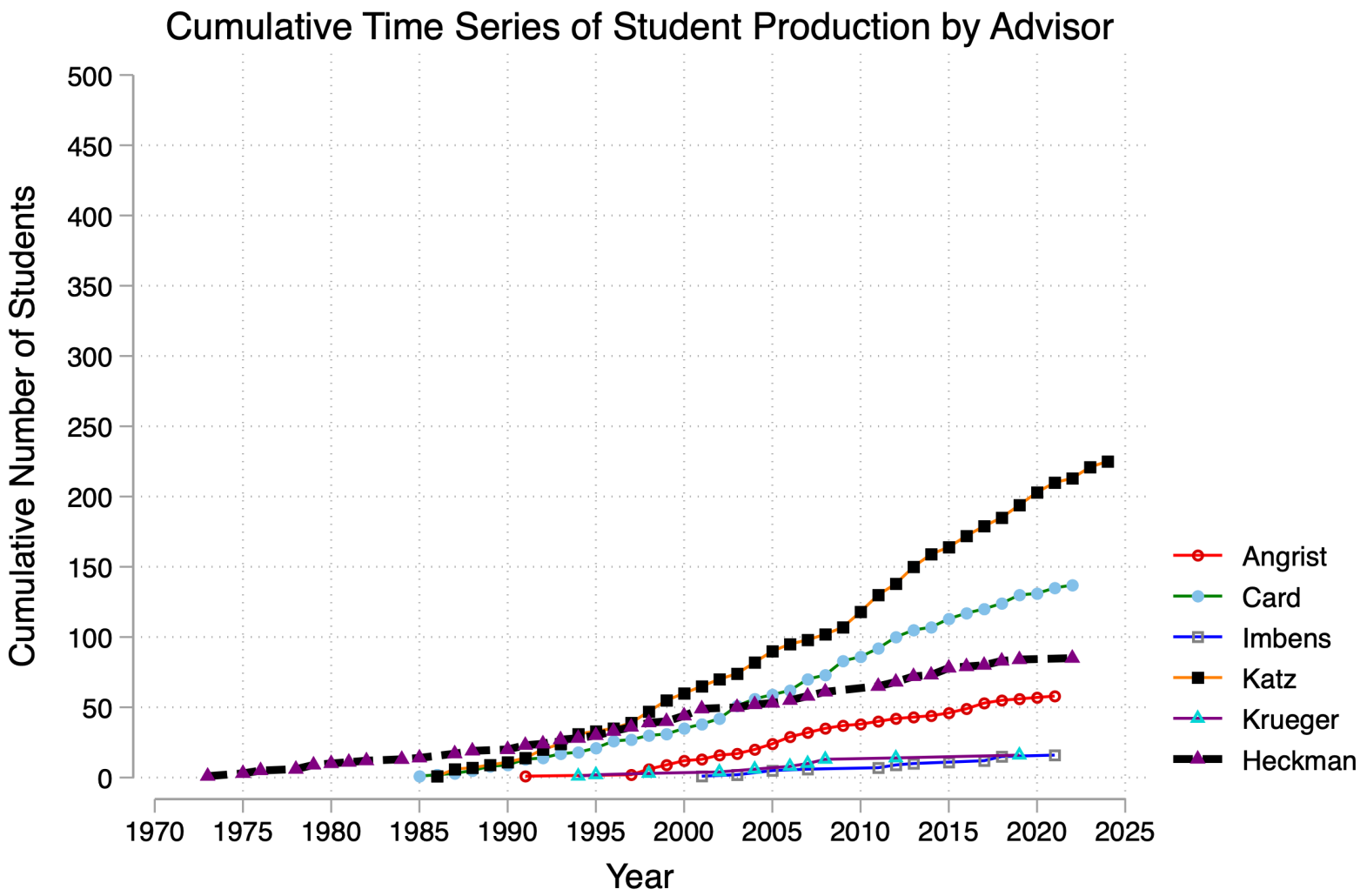
Distribution of Student Placements by Year



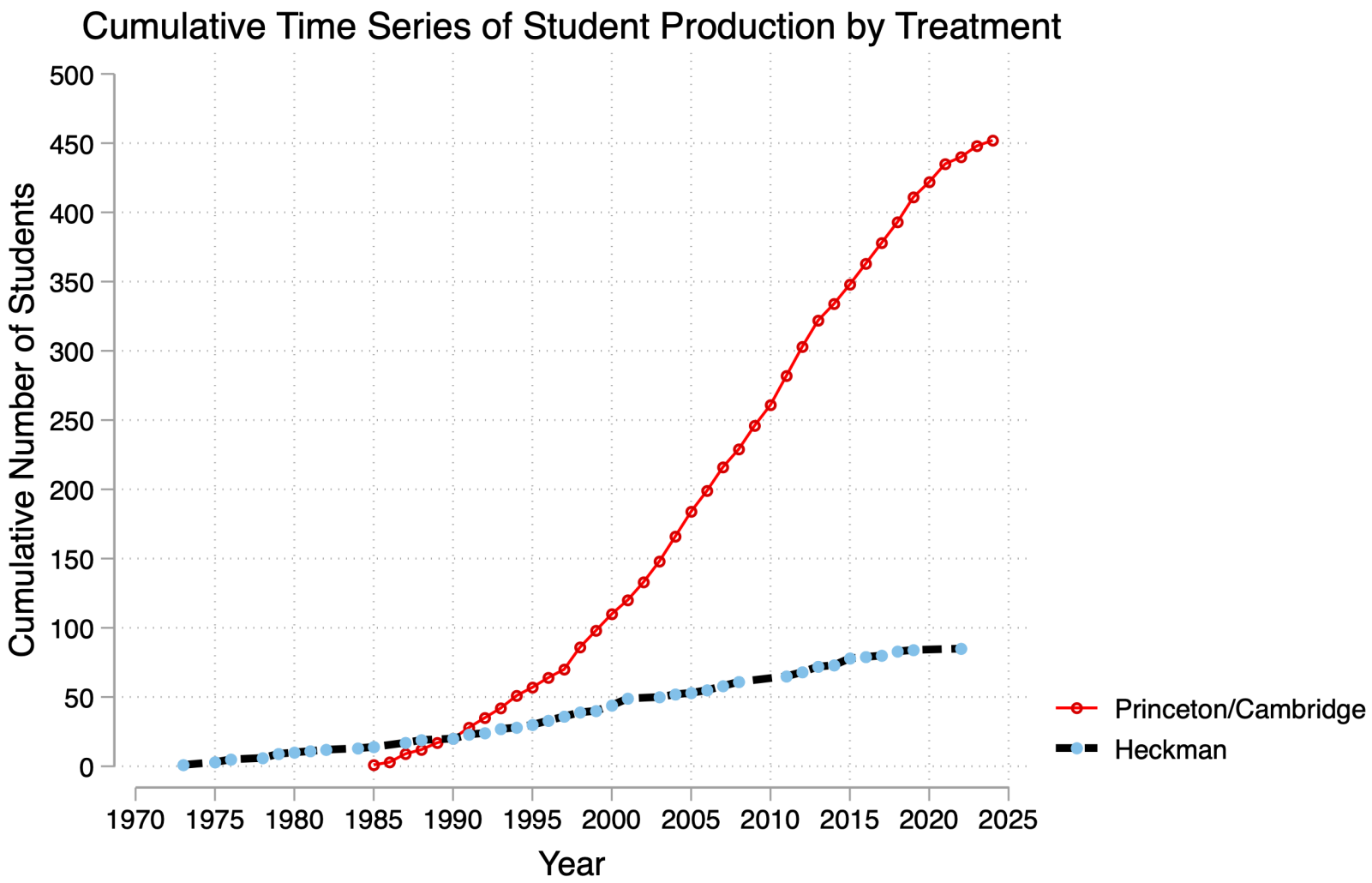
Flow of New Students by Princeton/Cambridge vs Heckman



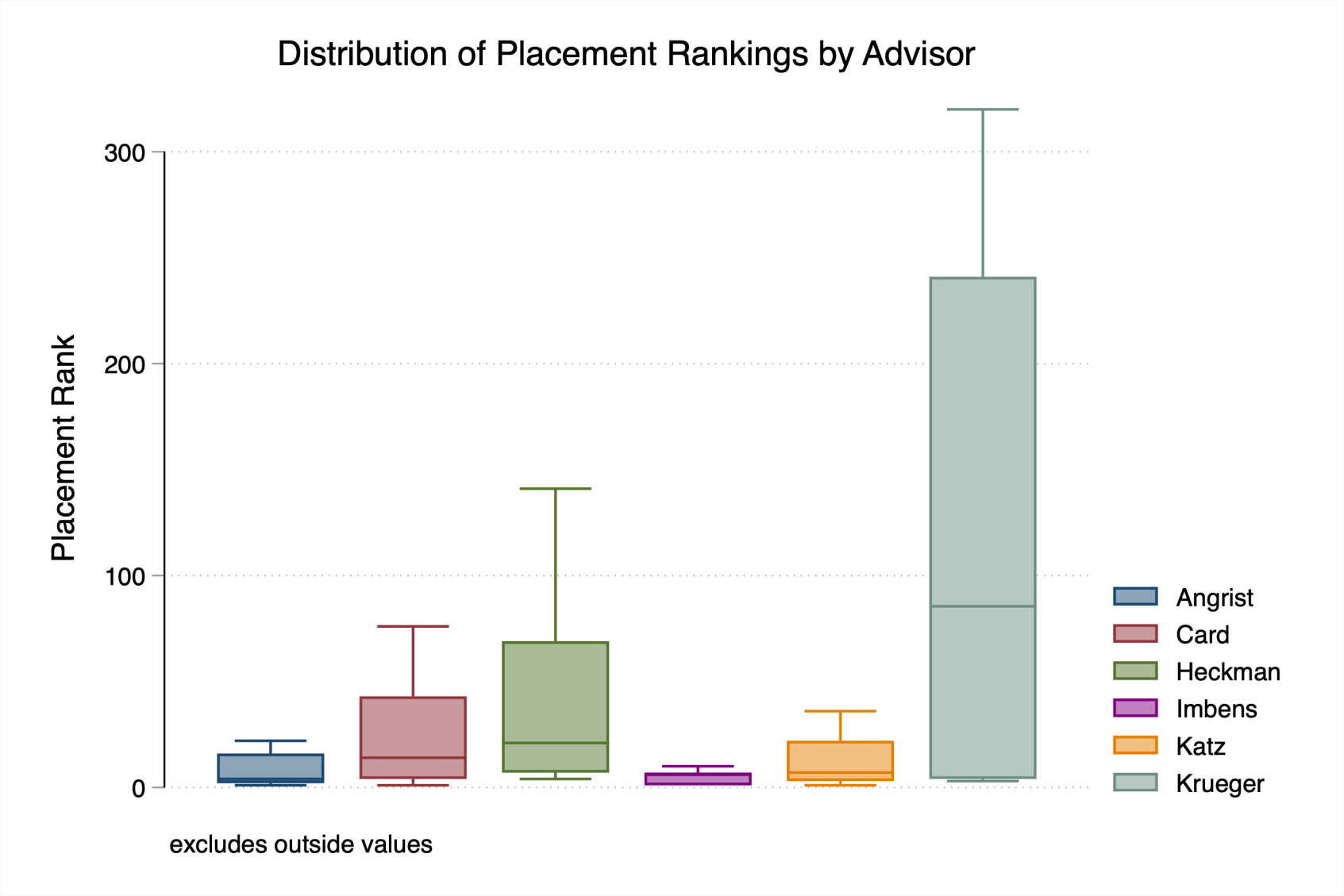
Stock of Students by Advisor



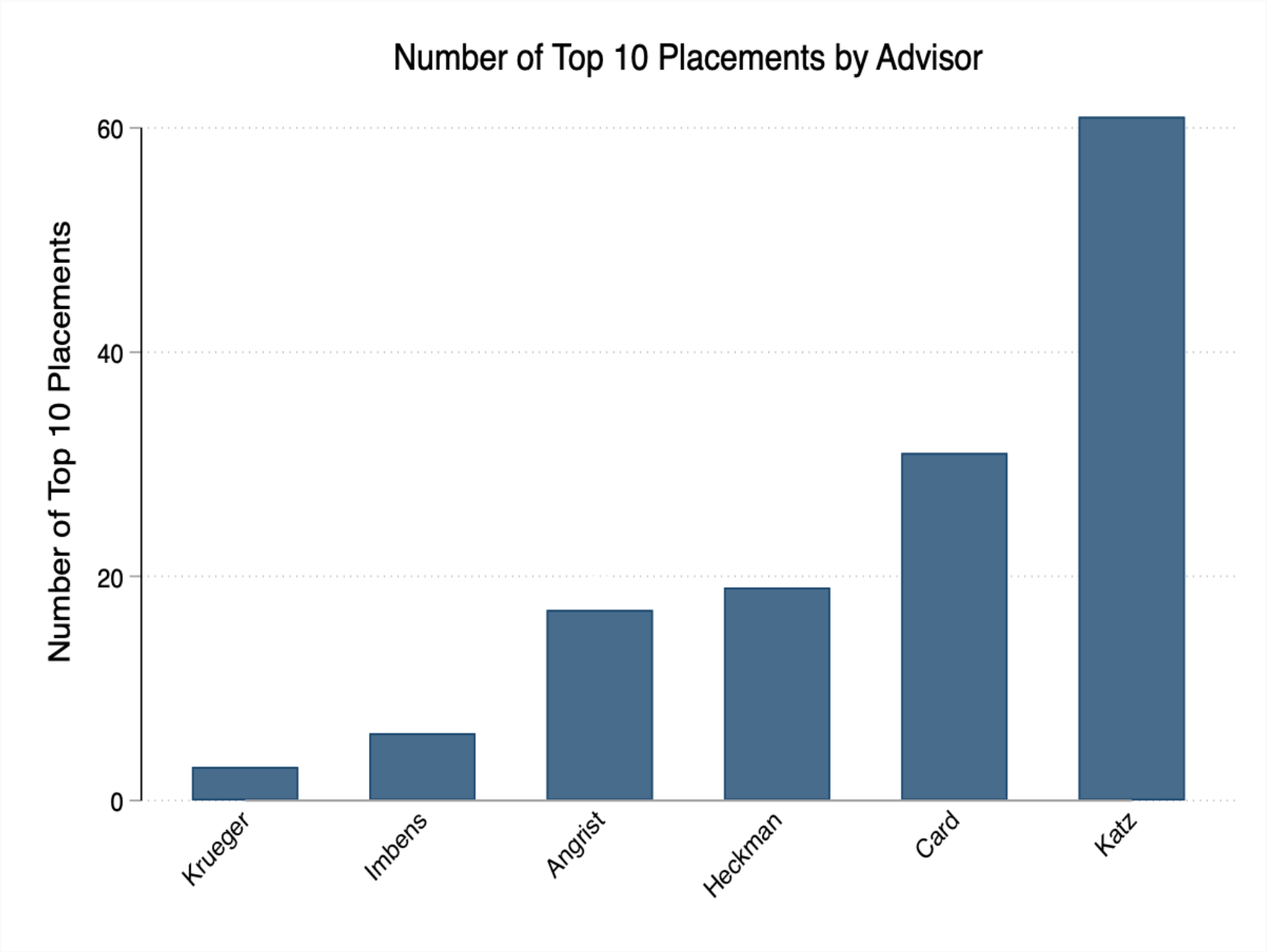
Stock of Students by Princeton/Cambridge vs Heckman



Placement of Students by Rank by Advisor



Top 10 Placements by Advisor



Victory and Conjecture Mechanisms

- **Noncontroversial tak**e: Credibility revolution "won"
- Conjecture: Credibility revolution "won" by crowding out the competition due to luck, timing, high volume advising, high quality student placement
- Also saturation of market with educational material (e.g., Imbens many review articles, continuous education classes) and serving as editor (Katz at QJE, Orley at AER, Imbens at Econometrica)
- Outnumbering opponents partly responsible for the paradigm shift, but because it moved through labor markets and elite placements, inequality in training by institution and geography was the equilibrium

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Inequality in Access

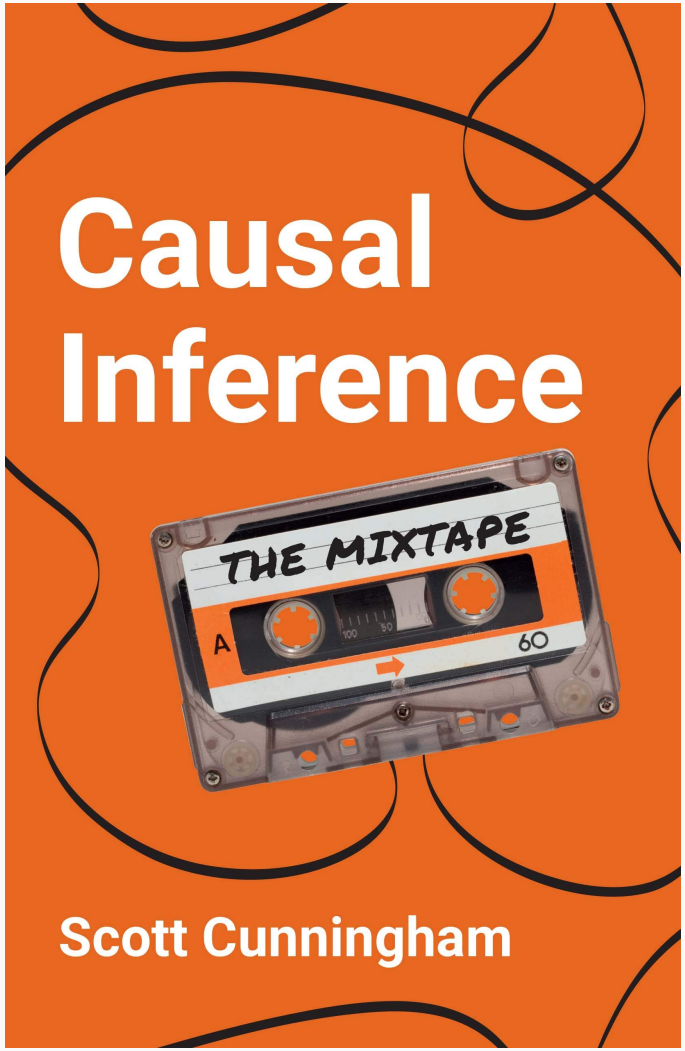
- Driving belief has been that causal inference is important and beautiful and true, but segmented because of:
  1. Concentrated in economics (who are silo'd)
  2. Applied micro fields within economics
  3. Academia, elite departments and the United States
- But this has created inequality within economics and across fields – many people historically, even with a strong econometrics/methods background never learn any of this
- Continuing education workshops have grown to help fill this gap (like Northwestern)

My goal

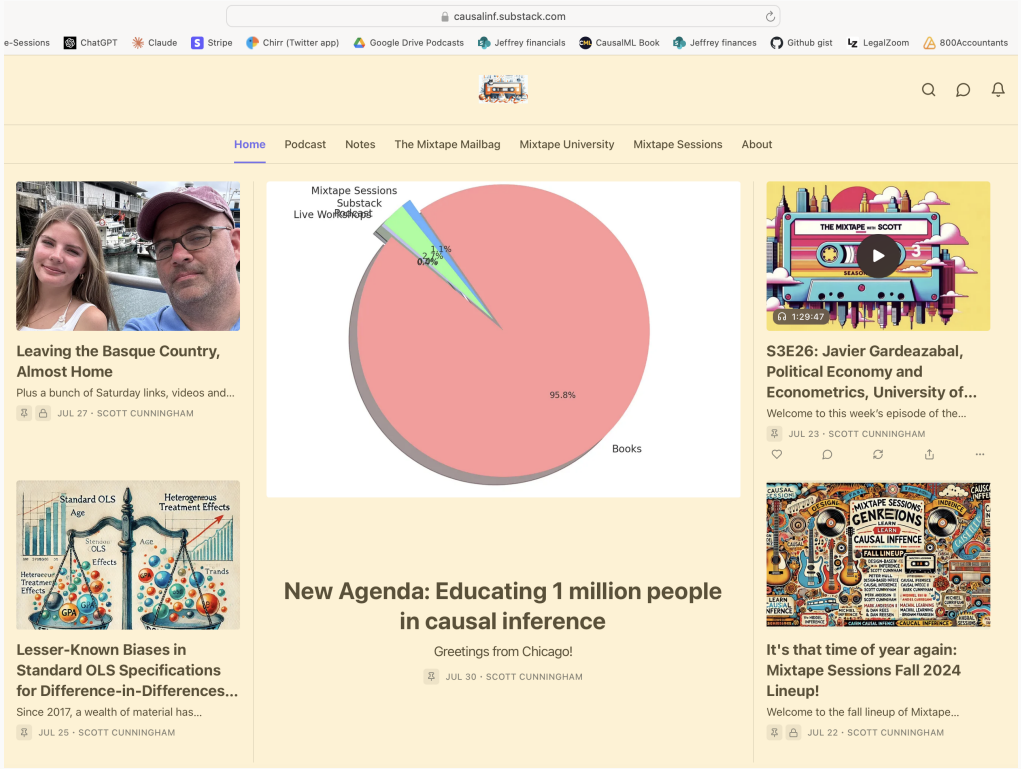
- My goal: **to reach 1 million people about causal inference**
- I have a several strategies:
  1. My Book – Causal Inference: The Mixtape
  2. The Substack
  3. Mixtape Sessions
  4. The Podcast
  5. Personalized workshops
  6. Coming soon: Mixtape University
- Here's how it's going: 554,559 out of 1,000,000 goal (55.46%)

Reaching 1 million: The Mixtape Book (523,913)

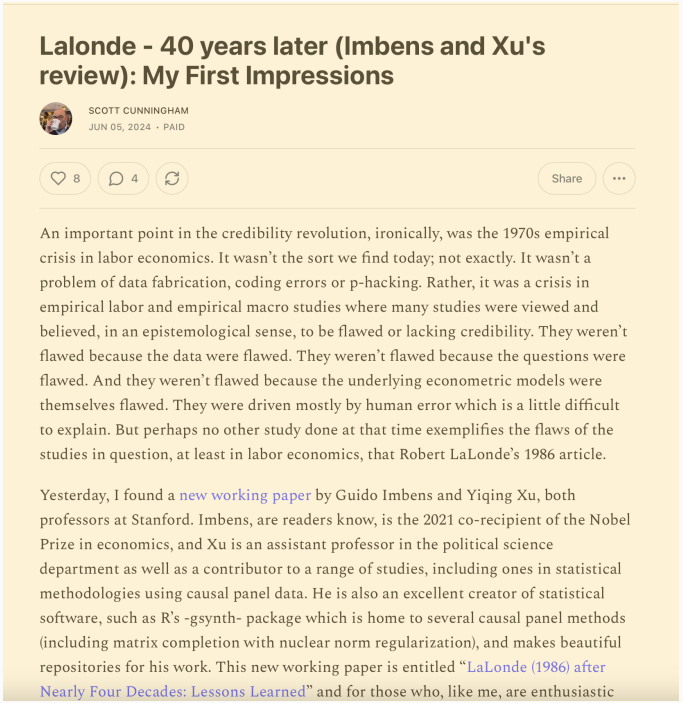
- **Physical book**: 32,500 sold copies in four languages since 2021
- **Free book**: 492,966 users at `https://mixtape.scunning.com`
- Emphasis on intuition, "explainer", application, practical while trying to maintain technical accuracy
- R and Stata and python code, copy and paste, runs data from github



Reaching 1 million: Scott's Mixtape Substack (15,000)



Post deep dives explainers about causal inference 2-4 days a week



Lalonde - 40 years later (Imbens and Xu's review): My First Impressions

SCOTT CUNNINGHAM
JUN 05, 2024 · PAID

8 4 Share

An important point in the credibility revolution, ironically, was the 1970s empirical crisis in labor economics. It wasn't the sort we find today; not exactly. It wasn't a problem of data fabrication, coding errors or p-hacking. Rather, it was a crisis in empirical labor and empirical macro studies where many studies were viewed and believed, in an epistemological sense, to be flawed or lacking credibility. They weren't flawed because the data were flawed. They weren't flawed because the questions were flawed. And they weren't flawed because the underlying econometric models were themselves flawed. They were driven mostly by human error which is a little difficult to explain. But perhaps no other study done at that time exemplifies the flaws of the studies in question, at least in labor economics, that Robert LaLonde's 1986 article.

Yesterday, I found a new working paper by Guido Imbens and Yiqing Xu, both professors at Stanford. Imbens, are readers know, is the 2021 co-recipient of the Nobel Prize in economics, and Xu is an assistant professor in the political science department as well as a contributor to a range of studies, including ones in statistical methodologies using causal panel data. He is also an excellent creator of statistical software, such as R's -gsynth- package which is home to several causal panel methods (including matrix completion with nuclear norm regularization), and makes beautiful repositories for his work. This new working paper is entitled "LaLonde (1986) after Nearly Four Decades: Lessons Learned" and for those who, like me, are enthusiastic

Ex: Explainer of Yiqing's recent paper with Imbens

Reaching 1 million: Mixtape Sessions (6,046)

- Workshop platform started in Jan 2022 with Kyle Butts hosts live workshops on causal inference at `https://www.mixtapesessions.io`
- My three workshops cover potential outcomes, randomization, selection bias, causal graphs, unconfoundedness, IV, RDD, diff-in-diff, and synth
- Invites professors from elite schools or trained by Nobel Laureates, 15-18 workshops per year total

Reaching 1 million: Mixtape Sessions (6,046)

- Low prices
  - $1 for low income countries,
  - $50 for students, predocs, postdocs, residents of middle income countries, unemployed,
  - $95 for non-tenure track or high teaching loads, and
  - $595 for others; negotiable for non-profits)
- Next workshops are Causal Inference I (starts Sept 21) and Design-based Inference by Peter Hull (starts Sept 9)

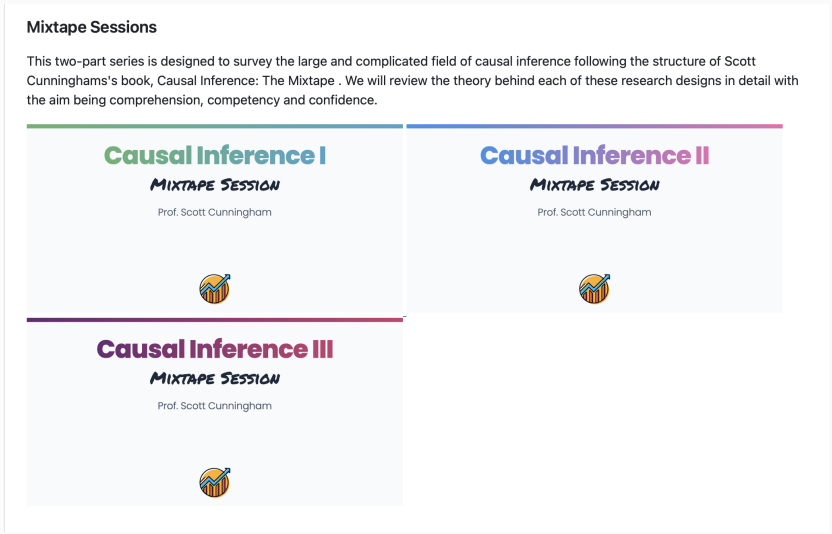
Reaching 1 million: Github

- Think of Mixtape Sessions as a mixture of public goods (free to all) and club goods (accessible only to paying guests).
- Public Goods are Free. All workshops are stored on Github which includes (1) slides (.tex and .pdf), (2) assignments, (3) code and solutions, (4) readings
- Club Goods are Not Free. Include (1) old recordings, (2) Discord channel, (3) live experience, (4) my playlists!
- Recordings belong to the attendees **forever**. All stored on Vimeo password protected. No plan to create a store

13 Previous Workshops are on Github

All Mixtape Sessions content is free on Github:

`https://github.com/Mixtape-Sessions`



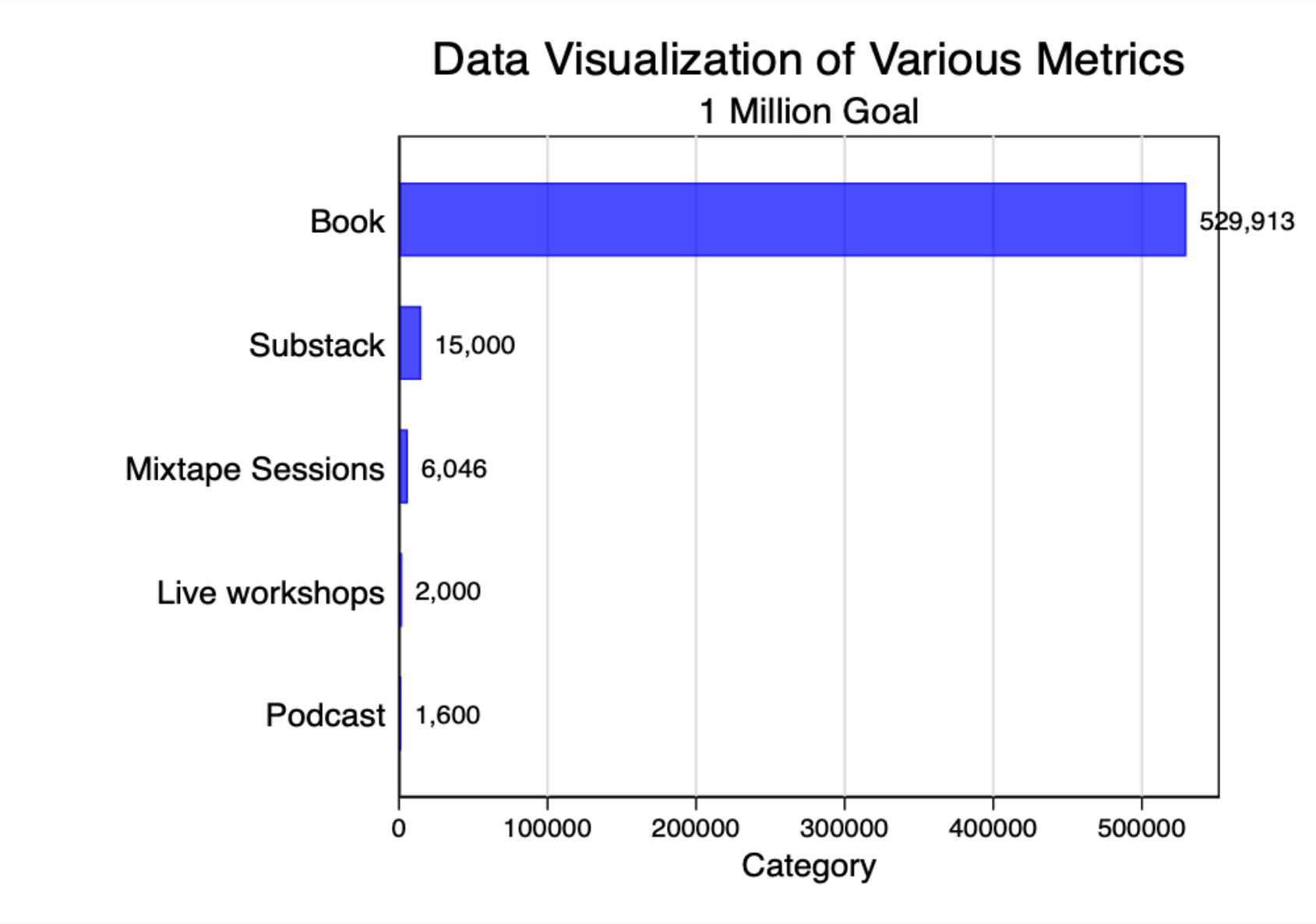
Reaching 1 million: The Mixtape with Scott podcast (1,600)

- Podcast: in-depth interviews with living economists about their personal stories and oral history of the profession
- 100+ episodes so far, includes a series on causal inference, interviewed all the laureates, many of their students, and others in economics,
- Has been downloaded 180,000 since it started, three seasons, average download is 1200 first 7 days, 1400 within a month, 1600 within 90 days, 4.9 out of 5 over 83 reviews
- Focus is on the stories, listening to the speaker, hearing their life journey, being present, listening, treating people like real people with real stories, share the stories, hope it helps others too

Reaching 1 million: Personalized workshops: (2,000)

- Probably have done 50 live workshops all over the world since 2019
- Introduced this year CodeChella Madrid (annually) held in Madrid with low prices (90 tickets, all sold)
- Strong focus on Europe and soon Asia as my conjecture is those places need "bridges" given the strong sorting into elite American academia

55.46% of the way to the goal!



Reaching 1 million: Mixtape University

- Going forward, I'll be producing video content that's asynchronous given demand for old recordings
- Name will be Mixtape University
- These will be accessible to paying subscribers of my substack ($5/month)
- I'll be producing things that are "classics" and newer material which I don't think can fit into my three Mixtape Sessions workshops (e.g., marginal treatment effects, continuous treatment diff-in-diff, various unconfoundedness)

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Key Takeaways

1. The "credibility revolution" in economics emerged from the fusion of Cambridge's potential outcomes model and Princeton's natural experiment methodologies.
2. This revolution spread rapidly through labor markets and elite academic placements, significantly impacting empirical economics.
3. However, it also led to concentration of this knowledge in specific fields and institutions creating inequalities in causal inference training.

Implications and Future Directions

- The uneven dissemination of causal inference methods presents both challenges and opportunities for the field.
- There's a growing need to bridge the gap and democratize access to these powerful analytical tools.
- The "1 Million Goal" initiative aims to address this inequality through various educational efforts.
- Explore resources like the Mixtape book, Substack, workshops, the podcast and upcoming Mixtape University and see what you think

Final Thought

By broadening access to causal inference methods, we not only advance the field of economics but also empower researchers across disciplines but also across the world to tackle complex real-world problems with greater rigor and insight.