

**COMMENTS ON
“WHO BECOMES AN INVENTOR? THE
(IMPORTANT) ROLE OF KNOWLEDGE
ABSORPTION FROM HIGHER TECHNICAL
EDUCATION”**




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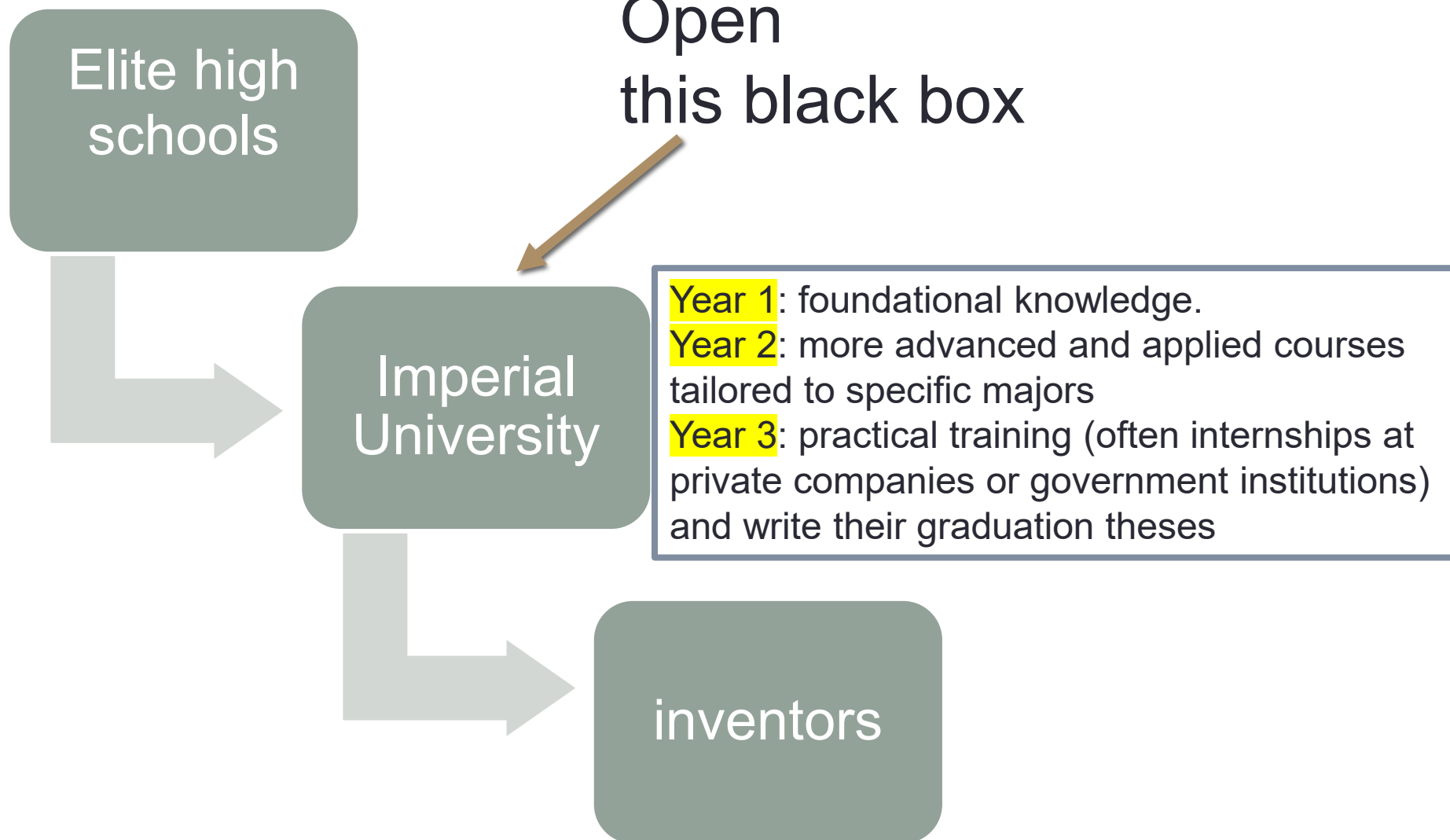
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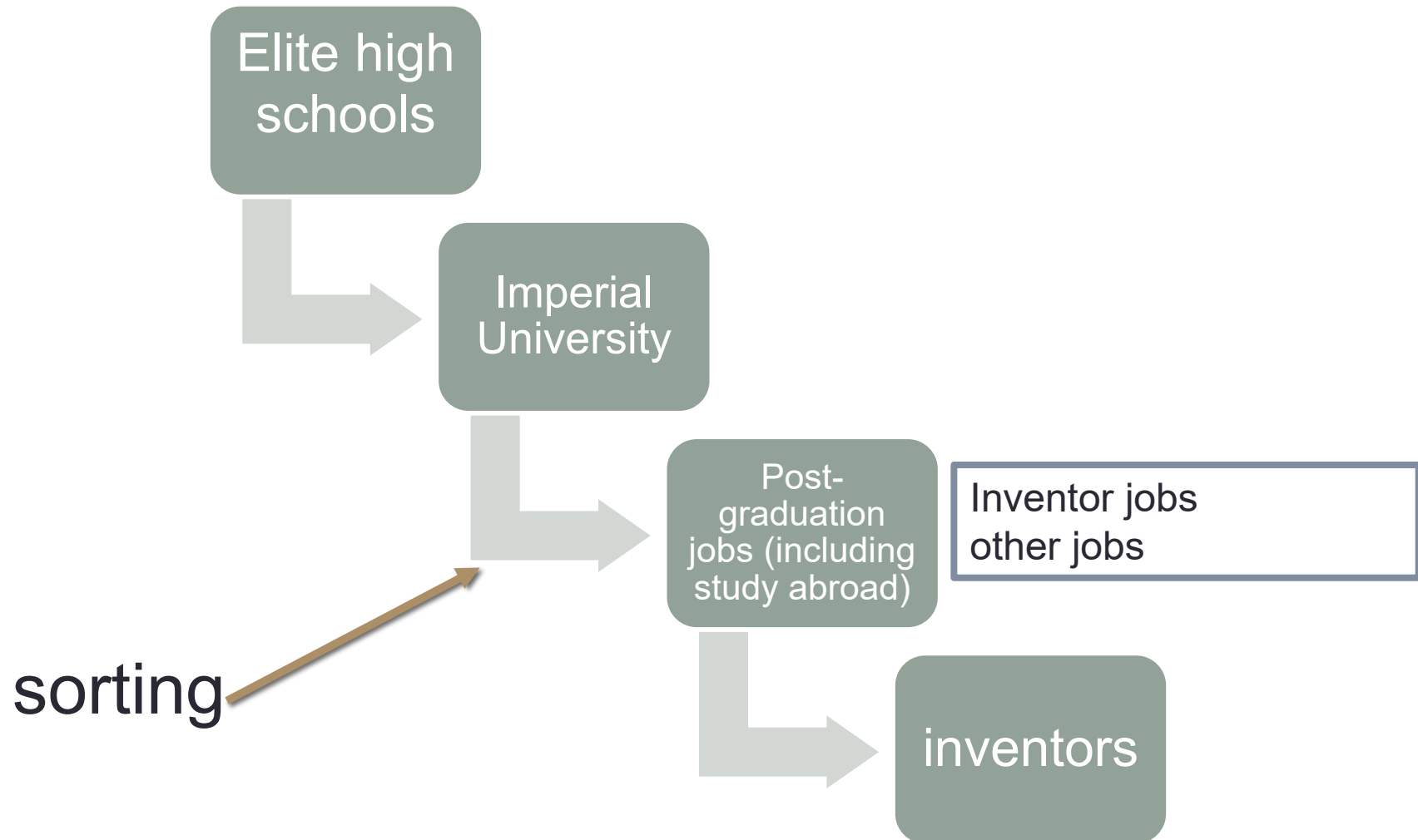
In short,

- A well-thought-out and careful analysis of painstakingly constructed new historical data.

- rigorous new evidence on an important yet relatively underexplored question, ***“Can higher education produce inventors? If so, how?”***

- Deepen our understanding of inventor production function

- Help policymakers design effective innovation policies.

Task 1: Estimating Inventor production function



Task 2: To account for sorting in post-graduation jobs, estimating 2-stage Inventor production function



Construction of amazing new linked data

- Use a unique longitudinal data for the first 40 cohorts of all graduates from the Tokyo Imperial University College of Engineering (TIUCE) at the turn of the last century.
- Linking individual student's performance (ranking) at each of the three years of their time at the University to their post-graduation career data including their patent applications and awards.

Comments: Performance measures

Key results from Task 1:

- ranking at the graduation is the most powerful predictor of who will end up getting at least one patent within 20 years after graduation.
- The top ranked graduate: twice as likely to produce at least one patent than the bottom ranked graduate.

Comments: Performance measures

Question/suggestion:

- Relative performance measures such as ranking is often used for tournament settings=a group of contestants competing for a prize (e.g., promotion tournament for CEO).
- Relative performance makes sense if the number of patents granted per year is fixed for each cohort of TIUCE.

Otherwise,

- it seems to make more sense to consider absolute performance (achievement test scores) as a predictor of being granted at least one patent within 20 years after graduation.

Comments: Performance measures

Question/suggestion:

However,

- Tournament may be a good way to characterize their post-graduation placements.
- For each cohort of TIUCE there may be a fixed number of desirable inventor jobs with ample resources and excellent senior inventors and peers.
- Only a small number of highly ranked students are placed in such jobs, resulting in higher odds of such top-ranked students getting at least one patent within 20 years after graduation.
- A similar practice has been used for placements of those who pass civil service exams in Japan.

Comments: Trajectory may matter

Key results from Task 1:

- ranking at the graduation is the most powerful predictor of who will end up getting at least one patent within 20 years after graduation.
- The top ranked graduate: twice as likely to produce at least one patent than the bottom ranked graduate.

Question/suggestion:

Trajectory may matter.

- Consider two students, Always star (top ranked for High School, Y1, Y2, and Graduation) and Rising star (low ranked for High School but rose to top ranked at graduation).
- Will Rising Star end up performing better than Always Star in their post-graduation career as an inventor?

Comments: Trajectory may matter

Question/suggestion:

Trajectory may matter.

- It is plausible that Rising star may continue to improve after graduation, and eventually show higher odds of getting a patent within 20 years after graduation than Always star.
- Rising star: higher learning ability than Always star.
- Use level as well as growth of ranking.

Comments: Repeated wins

Question/suggestion: one win vs. multiple wins

- We may want to distinguish inventors with only one patent within 20 years after graduation and inventors with multiple patents.
- The latter is less likely to be a lucky draw.

Comments:

Do instructors/mentors/advisors matter?

- Growing evidence in economics of higher education: instructors/mentors/advisors matter for student performance.
- In the context of investor production function, instructors/mentors/advisors may matter for their students in direct and indirect ways even after graduation.
- Direct: instructor quality matters for knowledge absorption and thereby the odds of being granted patents within 20 years after graduation.
- Indirect: mentor/advisor quality matters for post-graduation placement quality and thereby the odds of being granted patents within 20 years after graduation

Comments: Peer effects?

- Peer effects in patent production function?

Two kinds of peers

1. Peers in the workplace which is time-variant
2. Peers at TIUCE (close network of classmates at TIUCE which can be time-variant)

The quantity and quality of peers in the workplace and close classmates at TIUCE can be valuable factors of patent production function.

Comments: Selection

Division selection:

- division selection process needs to be clarified and analyzed.
- **When:** Division selected at the time of entering the University? Or after the first year or second year?
- **Who:** Students get to select or their teachers/advisors formally or informally assign their students to specific divisions.
- If certain divisions are inherently more (or less) apt to produce inventors with at least one patent within 20 years after graduation, division selection matters and warrants investigation.

Comments: Selection

Likewise,

Selection in Theme of Graduation Thesis

- Thesis selection process needs to be clarified and analyzed.
- **Who:** Students get to select or their teachers/advisors formally or informally assign their students to specific theses.
- If certain thesis topics are inherently more (or less) apt to produce inventors with at least one patent within 20 years after graduation, thesis selection matters and warrants investigation
- Are high-performers more likely to be allowed or encouraged by their mentors/advisers to pursue theses that are more apt to result in future patents

Comments: Placebo test

- I really appreciate the authors' serious attempt to perform a placebo test.

But

- the nature of ability/skills required for top executives may differ significantly from that for inventors.
- For top executive promotion tournament, as shown in Lazear's 2005 JOLE and 2012 LE and Frederiksen and Kato's 2018 EJ, the tournament winners tend to be generalists who may lack specific expertise but possess a broad set of knowledge/skill and an extensive network of people within the firm.
- Ranking at TIUCE may not be a good proxy for innate ability that matters for executives.

Comments: Sorting

- Estimating a 2-stage inventor production function: a serious and promising attempt to account for sorting in post-graduation placements.

A couple of questions:

1. When estimating the individual fixed effects in the first stage, don't we want to consider possible synergy between ability to invent and the nature of jobs (inventor-friendly jobs vs. other jobs)?
2. The outcome variable is a dummy variable taking a value of one if graduate i in year t **applies for a patent**, zero otherwise.

Why patent application instead of patent granted?

The bulk of the paper's analysis uses granted patent not patent application.

If most applications are successful, this difference is inconsequential.