Choosing Skilled Foreign-Born Workers: Evaluating Alternative Methods for Allocating H-1B Work Permits

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ABSTRACT

The H-1B program allows highly-educated foreign-born labor to temporarily work in the United States. Quotas restrict the number of H-1B recipients. In many years, all available work permits were allocated by random lottery. This paper argues that an alternative distribution method based upon ability would increase output, output per worker, and wages paid to less-educated workers. Baseline estimates suggest that a change in allocation policy could result in a $26.5 billion gain for the economy over a six year period. This estimate grows when H-1B demand rises.
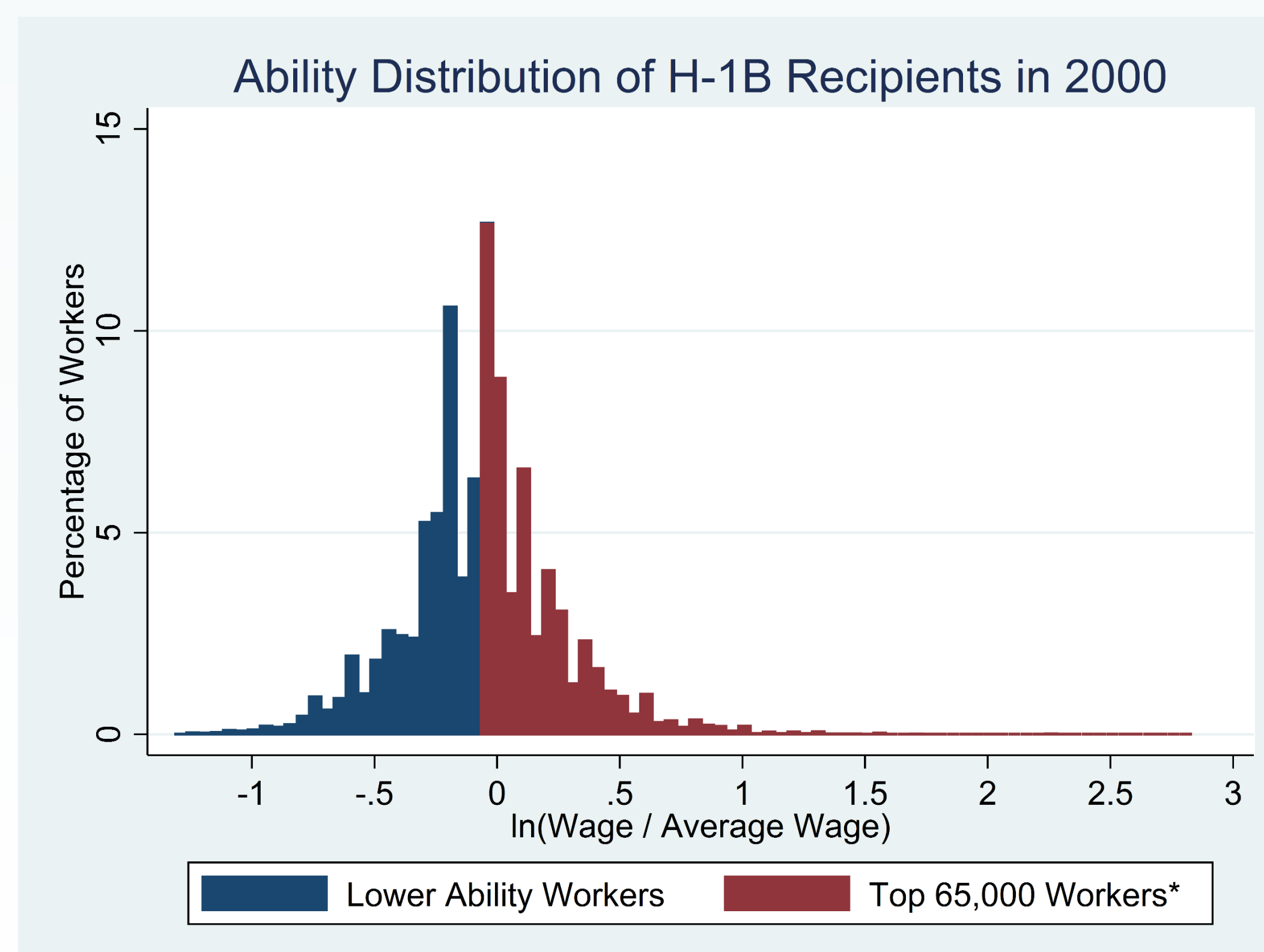
THE H-1B PROGRAM

- Allows highly-educated foreign-born labor in specialty occupations to temporarily work in the United States.
- The annual cap (quota) on issuances to new H-1B employees of most firms has varied over time.
  - 2001-2003: 195,000. Never reached.
  - 2004: 65,000. Reached 8 months prior to end of fiscal year.
  - 2005-Today: 65,000, plus 20,000 for advanced degree recipients from US colleges and universities. Reached every year.
- H-1B renewals and employees of colleges, universities, and non-profit research institutions are exempt from the cap.
- Cap-bound H-1B applications in 2008, 2009, and 2014 through 2017 exceeded the number of available permits during the first week of eligibility.
  - All cap-bound H-1Bs were allocated by random lottery in those years.

CENTRAL QUESTION

Would H-1B allocation based upon ability – as measured by the wage and marginal product of labor – improve productivity and wages?

H-1B ABILITY DISTRIBUTION

Ability Distribution of H-1B Recipients in 2000

Ability (q) is measured by the wage offer paid to foreign workers, normalized by average wages. Figure shows the distribution of q from H-1B applications received in the calendar year 2000 when caps were not binding. If a cap of 65,000 permits had been implemented in 2000 with permits distributed to the highest ability workers, the log-ability distribution would have been represented by the maroon shading.

METHOD

- Build a simple model of production.
- Calibrate model using observed data.

MODEL

Production (Y) is a function of contributions from Low (Y_L) and High (Y_H) education labor.

$$Y = \left(\beta_Y \cdot Y_L^{\frac{\sigma-1}{\sigma}} + (1-\beta_Y) \cdot Y_H^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

Contributions from High education labor are a function of Native (N) and Foreign (F) college-educated workers. A highly-educated foreign worker (i) is associated with a quality adjuster $q_i \in (0,\infty)$ of mean value equal to one.

$$Y_H = \left(\beta_H \cdot N^{\frac{\theta-1}{\theta}} + (1-\beta_H) \cdot \left(\sum_{i=1}^{F} q_i \right)^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}}$$

H-1B ALLOCATION ALTERNATIVES

- Let ρ = the proportion of foreign individuals seeking an H-1B who successfully acquire one.
- Compare outcomes when H-1Bs are allocated to a random ρ% of foreign workers versus top ρ% of foreign workers (based upon wages).
- Aggregate skill supply is always lower with random allocation.
- 233,000 cap-bound applications submitted in the first week of eligibility for fiscal year 2016; 141,178 for all of 2000.
- Probability (ρ) of receiving an H-1B
  - ≤ 36% in 2016 given 85,000 cap.
  - ≡ 46% in 2000 if hypothetical 65,000 cap.
  - ≡ 77% in 2001 if hypothetical 65,000 cap.

GDP Difference between H-1B Allocation Methods As a Function of ρ — Highest Ability vs. Random Allocation
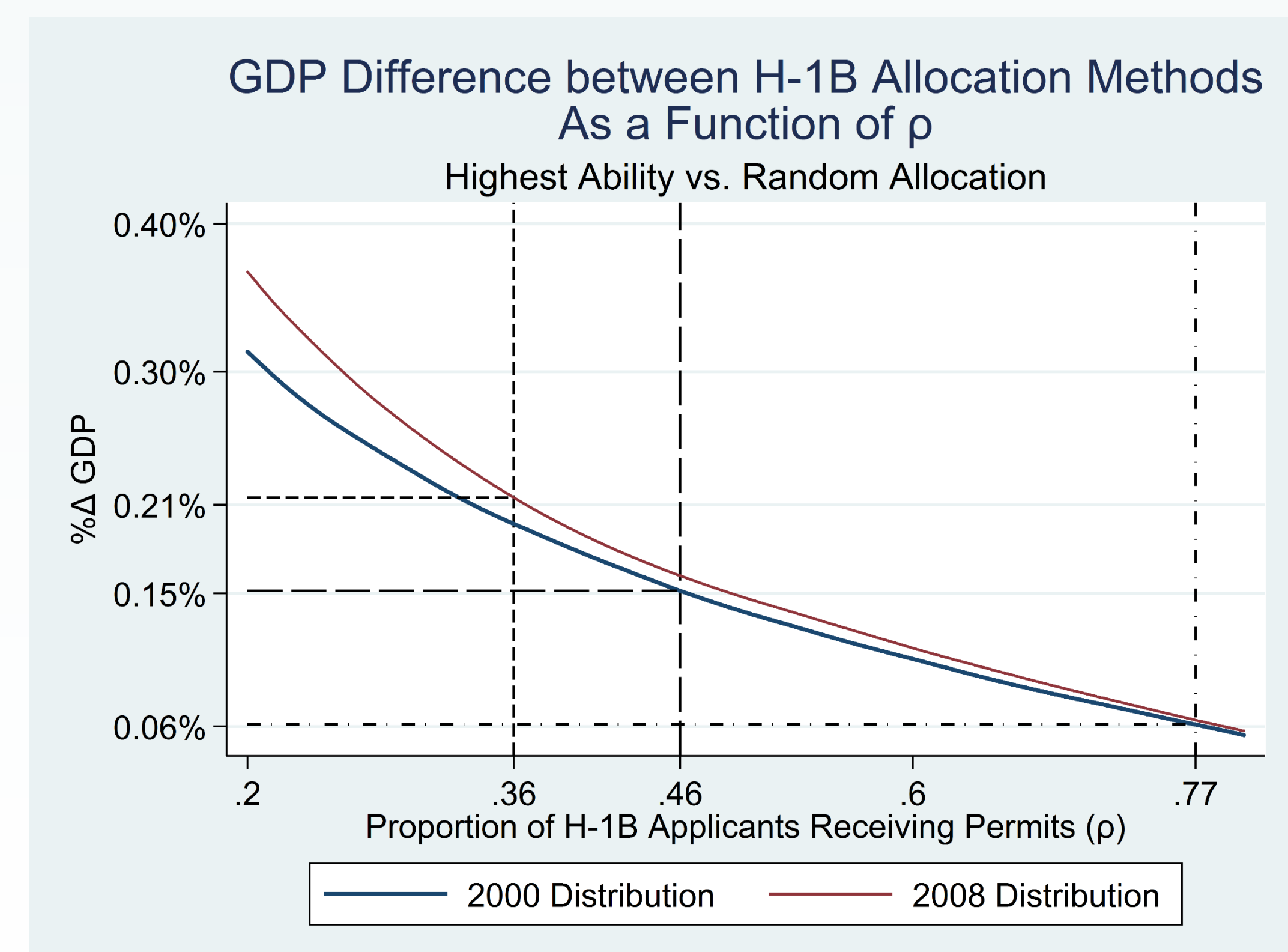
Figure represents the difference in GDP achievable under ability-based versus random allocation of H-1B permits, assuming the 2000 (blue) or 2008 (maroon) distribution of skills. With a fixed number of available work permits, an increase in H-1B demand reduces the proportion of applicants who receive permits (ρ). ρ=0.46 and ρ=0.77 represent hypothetical values if a 65,000 cap had been imposed in fiscal years 2001 and 2002, respectively. ρ=0.36 is the maximum value for fiscal year 2016 possible.

VALUES USED IN CALIBRATION

- Labor Income Shares in 2000 (Results robust to 2014 Income Shares):
  - Less-Educated Workers: 56%
  - Highly-Educated Natives: 39%
  - Highly-Educated Immigrants: 5%
- Elasticity of substitution across education groups: σ = 1.75
  - From literature.
- Elasticity of Substitution between native and foreign labor: θ = 30
  - A limiting view of potential complementarities estimated in the literature.
- Estimate effects over a six-year period (limit of H-1B eligibility).

INSIGHTS AND CONCLUSIONS

Implications of switching from random lottery to ability-based H-1B allocation:

1. The skill level of H-1B recipients could rise 20-30% annually, implying a 2.5-4.5% increase in the stock of foreign skills over a six year period.
2. Output and output per capita would rise. Baseline estimates suggest a 0.15% ($26.5 billion) GDP increase over a six year period.
3. Less-educated workers would see wage gains.
4. In the absence of technological spillovers, native-born workers with a bachelor's degree would experience small wage losses if the elasticity of demand for highly-educated workers is less than the elasticity of substitution between educated native and foreign-born workers. Baseline estimates suggest a wage loss of 0.10% over six years.
5. Consequences are highly sensitive to the level of H-1B demand: As H-1B demand rises and scarcity becomes more acute, the output gap between allocation methods grows.
6. The elasticity of substitution across nativity groups -- a contested parameter estimate in the literature -- plays no role in driving the average macroeconomic effects of the model. Instead, it affects the distribution of income between low and high education labor.

	(1)	(2)	(3)	(4)	(5)	(6)
Proportion (ρ) of Year	2000	2001	2016	2000	2001	2016
Skill Distribution of Year	2000	2000	2000	2008	2008	2008
			Assumed Values			
Assumed Quota	65000	65000	85000	65000	65000	85000
Highest Skill Alternative	82270	71940	114470	81126	71385	113074
ρ	0.46	0.77	0.36	0.46	0.77	0.36
			Simulated Values			
%Δ Foreign Skill, 1 Year	23.56%	10.14%	29.77%	22.16%	9.37%	28.54%
%Δ Foreign Skill, Total	2.89%	1.17%	4.72%	2.70%	1.08%	4.50%
%Δ GDP	0.15%	0.06%	0.25%	0.14%	0.06%	0.24%
%Δ Wage, Less-Educated	0.09%	0.04%	0.14%	0.08%	0.03%	0.14%
%Δ W, High-Ed Natives	-0.10%	-0.04%	-0.16%	-0.09%	-0.04%	-0.15%
GDP Gain ($Bln, 2014)	26.49	10.74	43.32	24.76	9.88	41.32

Table reports simulated effects of moving from a lottery to an ability-based H-1B permit allocation method on the supply of foreign skills, output, wages paid to workers without a bachelor's degree, and native-born workers with a bachelor's degree or more education. The final row presents the implied gain in GDP given real GDP in 2014 equal to $17.46 trillion. Columns are differentiated by different assumptions regarding the probability of winning an H-1B and the underlying skill distribution.