

The Effect of the H-1B Quota on Employment and Selection of Foreign-Born Labor

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Background

- There is a strong belief that skilled immigrants can greatly benefit the economy, through their contribution in terms of very high levels of technical skills (for example in STEM occupations), of innovation (through the development of patents) and of entrepreneurship.
- U.S. businessmen vocally favor an increase in the number of visas for skilled workers and complaint about the constraints imposed by the limited number on their ability to innovate and grow.
- The H-1B program provides a pathway for foreign-born skilled professionals to work in the United States.
- Very active recent research agenda trying to assess systematically the impact of H-1B workers.
- See for example: Kerr and Lincoln (2010), Doran, Gelben and Isen (2014), Peri, Shih and Sparber (2015), Ghosh, Mayda and Ortega (2016).
- These papers use variation in the number of skilled foreign workers driven by changes in the H-1B visa policy.

Background (cont.)

- In fiscal year (FY) 2004 the annual quota (or cap) on H-1B visas available for new H-1B workers of for-profit firms fell drastically from 195,000 to 65,000 per year.
- Previous work assumes that the quota reduction decreased employment. Is this what happened?
- **What were the intended and unintended effects, on employment of H-1B workers, of the quota reduction?**
- After this policy change, the quota became binding, which suggests employment of new H-1B workers (in for-profit firms) decreased overall. By how much?
- What about specific subgroups of workers and/or firms?

What we do in this paper

We investigate how the large reduction in the number of H-1B visas in FY 2004 affected:

- the employment of new H-1B workers in for-profit firms (in the aggregate);
- the employment of similar natives in for-profit firms (in the aggregate) (falsification exercise);
- the employment of new H-1B workers in for-profit firms for specific subgroups of workers and firms;
- selection effects of the quota reduction:
 - in terms of workers' characteristics (which part of the wage distribution, nationality, occupation);
 - the types of firms that hired the new H-1B workers.

What we do in this paper (cont.)

- The quota reduction in 2004 generated a quasi-experiment.
- H-1B visas can be “new” (newly hired) or “experienced” (renewals).
- The quota reduction created a sudden discontinuity in the maximum supply of H-1B visas for the **“treated” group** of new H-1B workers of for-profit firms, relative to those in the **“control” group** of H-1B workers of non-profit firms (new vs. experienced) and experienced H-1B workers of for-profit firms.
- Hence, we compare the hiring of new relative to experienced H-1B workers, across for-profit and non-profit sectors, before and after 2004.

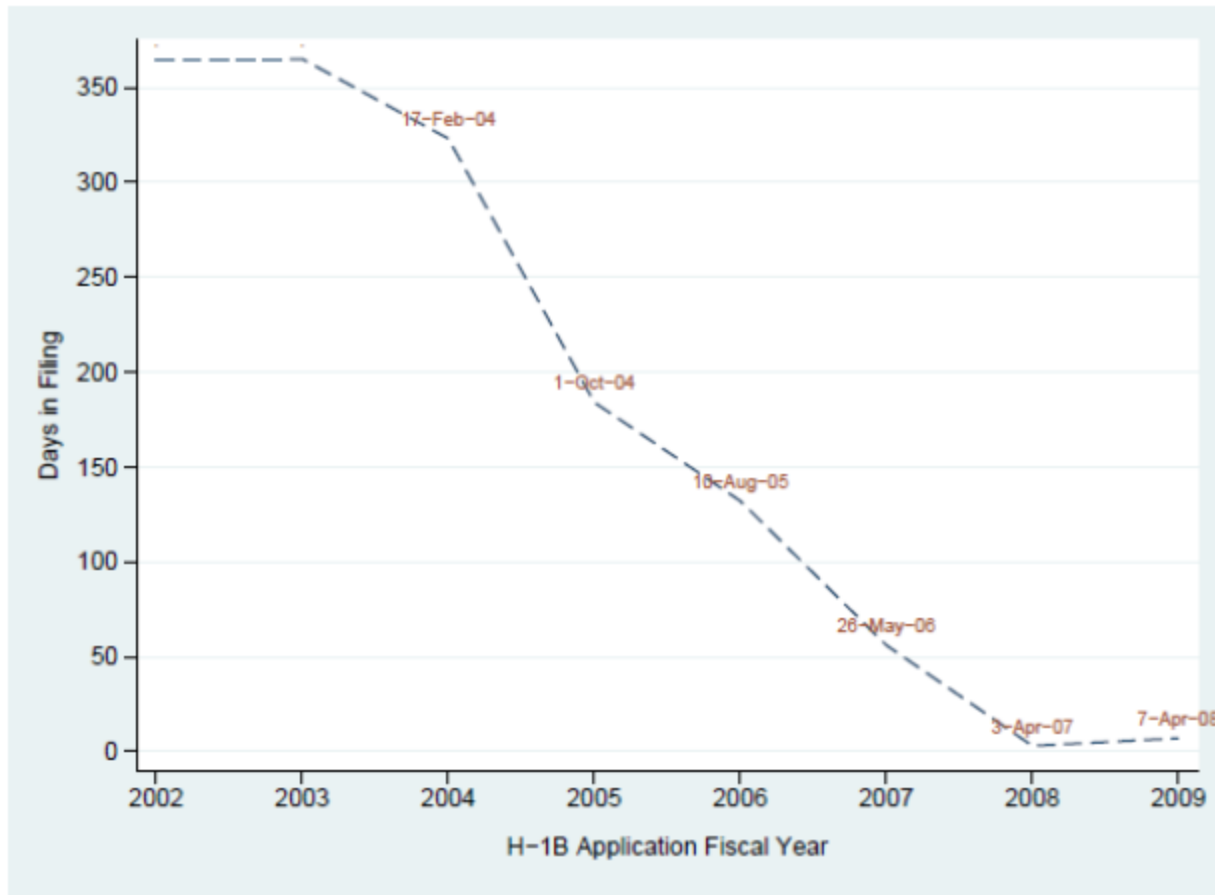
What we do in this paper (cont.)

- This represents a triple difference estimation strategy.
- We utilize variation in the number of hired H-1B workers within national-level skill cells from FYs 2002 through 2009.
- Skill cells are defined according to education, occupation and labor-market experience.
- The individual-level and firm-level information on H-1B visas allows us to create, for each skill cell and year, four different groups:
 - new and experienced H-1B visas in for-profit sector;
 - new and experienced H-1B visas in non-profit sector.

What we do in this paper (cont.)

- We analyze the large reduction in the quota in 2004.
- We also account for the fact that demand for H-1B visas increased so much in FY 2008-2009 that the quota became binding within the first week of submission of applications (and the H-1B visas were allocated through a lottery).

Figure 1: Application Period for H-1B filings in each fiscal year 2002-2009



Note: The vertical axis indicates the Application Period in days for H-1B applications in each fiscal year. Before 2004, the period equaled 365 days, as H-1B visas were not exhausted and an application could be processed each day of the year. A decline in the application period implies an increase in applications relative to total available visas. Starting in 2008 all H-1B visas were requested in the first week of the fiscal year and allocated via a lottery.

What we find

- Cap restrictions significantly reduced the aggregate employment of new H-1B workers in for-profit firms relative to what would have occurred in an unconstrained environment. Consistent with the quota being binding at the aggregate level.
- The quota was not binding for some groups of workers and firms.
- We quantify the magnitude of the effects.
- We investigate selection effects.

What we find (cont.)

- We find that cap-subject skill cells experienced an approximate 16-26% decline in new H-1B employment in for-profit firms relative to what it would have been if firm demand – rather than a legislative limit – determined hiring outcomes.
- New H-1B employment in for profit-firms fell by an additional 7-10% relative to its demand-driven level during fiscal years 2008 and 2009.
- We perform a falsification exercise to rule out the possibility that other contemporaneous shocks generated our results.
 - Using the same triple difference framework, we find that employment of newly-hired native workers in for profit firms, in occupations similar to those of H-1B workers, did not change.

What we find (cont.)

- There was **no change in employment** of:
 - H-1B workers in computer-related occupations;
 - Indian H-1B workers;
 - H-1B workers in firms that employ more than ten H-1B workers.
- Hence the quota reduction redistributed H-1B visas to computer-related occupations and Indian workers. It also shifted the composition of H-1B workers towards firms that employ more than ten H-1B workers.
- Finally, the reduced cap implied a decline in H-1B recipients at the tails of the wage distribution.

Why do we care?

- Policies do not always have the intended effects. For example, firms may try to find a way to go around the policy.
- The impact of the reduction of the H-1B quota has been used in several papers to analyze the effect of changes in the number of foreign skilled workers.
- We may need to revisit some of the results if such number was not affected for some firms/workers.

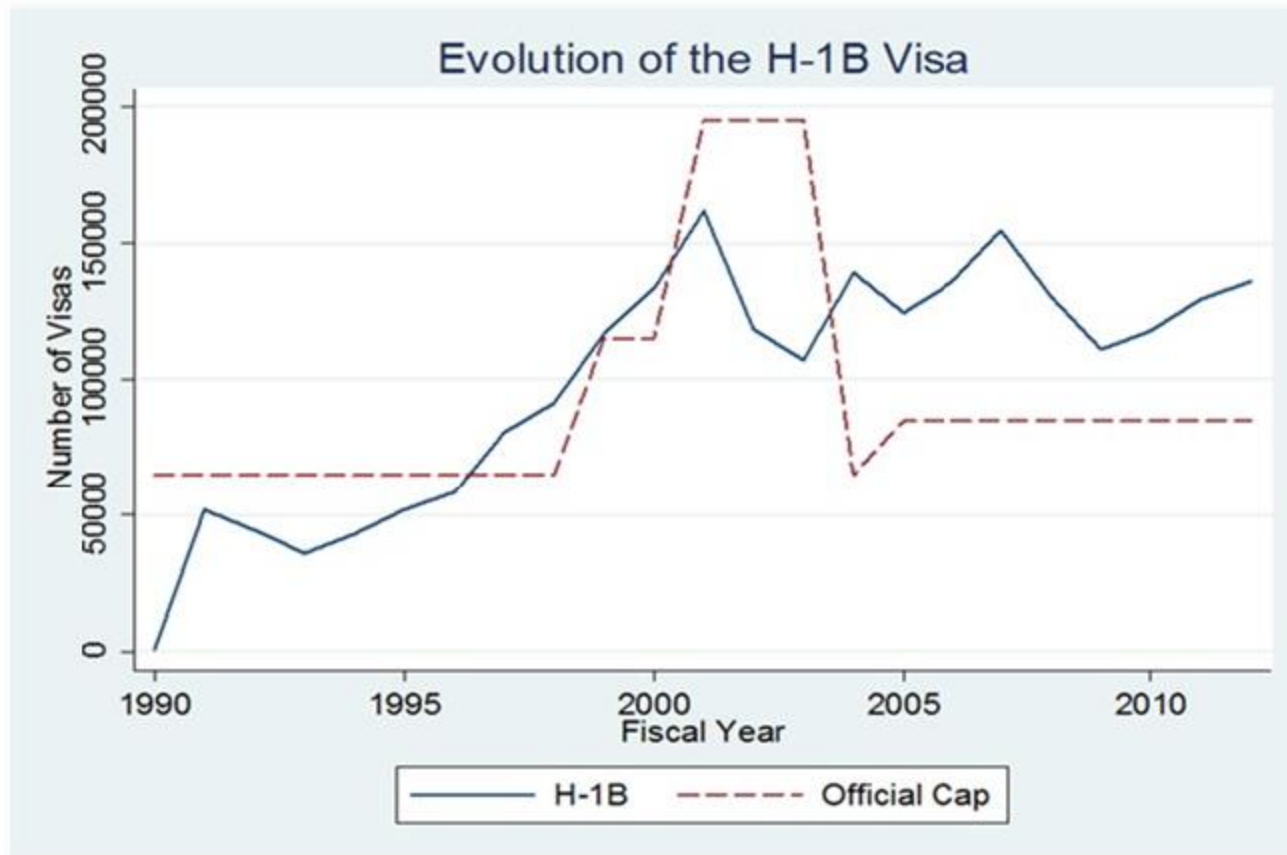
H1-B visas

- H1-B visas are the main channel of entry of skilled foreign workers into the U.S. labor market.
- H1-B visas are used to employ a foreign worker in a **“specialty occupation”** which, in general, **requires the applicant to hold at least a bachelor's degree.**
- The visa is issued for three years and can be renewed once, up to six years of total employment.
- An employer who intends to hire a foreign worker under the H1-B program must follow three steps:
 - First, he needs to submit a labor condition application (LCA) to the US Department of Labor. Importantly, the employer must document that the prospective H1-B visa holder will receive a wage that is no lower than the prevailing wage for the same position.
 - Once the LCA has been certified, the employer files a petition (I-129) to the United States Citizenship and Immigration Services (USCIS). Here H-1B quota applies.
 - Finally, once the USCIS has approved the petition, a visa will be issued by the State Department if the individual lives abroad. If instead the individual is already living in the United States, the USCIS will convert the visa status to H1-B.

The H1-B cap

- There is a cap on the number of H-1B visas that are granted by the U.S. every year.
- Some institutions, such as universities, research institutes (“non-profit” firms), are exempt from the H1-B cap.
- The H1-B cap imposed by Congress was 115,000 in 2000, 195,000 in 2001 through 2003, and then 65,000 in 2004. In fiscal year 2005, an additional 20,000 visas were made available through the H1-B program for those individuals who had a Master’s degree or higher from a US institution. Effectively, this increased the cap from 65,000 to 85,000 from 2005 onwards.
- Figure in the next slide shows the H1B cap for the years 1990 on.

The H-1B Policy Cap and Numbers



Data

- Individual-level information from I-129 forms of processed H-1B applications between fiscal years 2002 and 2009, obtained through a Freedom of Information Act (FOIA) request.
- Data from the American Community Surveys (to estimate the impact on native employment).

Broad patterns in the H-1B visas data

- The heaviest for-profit users of the H-1B program during this period were:
 - Infosys Technology Limited, Microsoft Corporation, Cognizant Technology Solutions US Corporation, Wipro Limited and Intel Corporation.
- The heaviest non-profit users were:
 - Yale University, University of Michigan, Stanford University, and Columbia University.
 - Hospitals and medical clinics are among the most significant non-educational cap-exempt H-1B employers.

Broad patterns in the H-1B visas data (cont.)

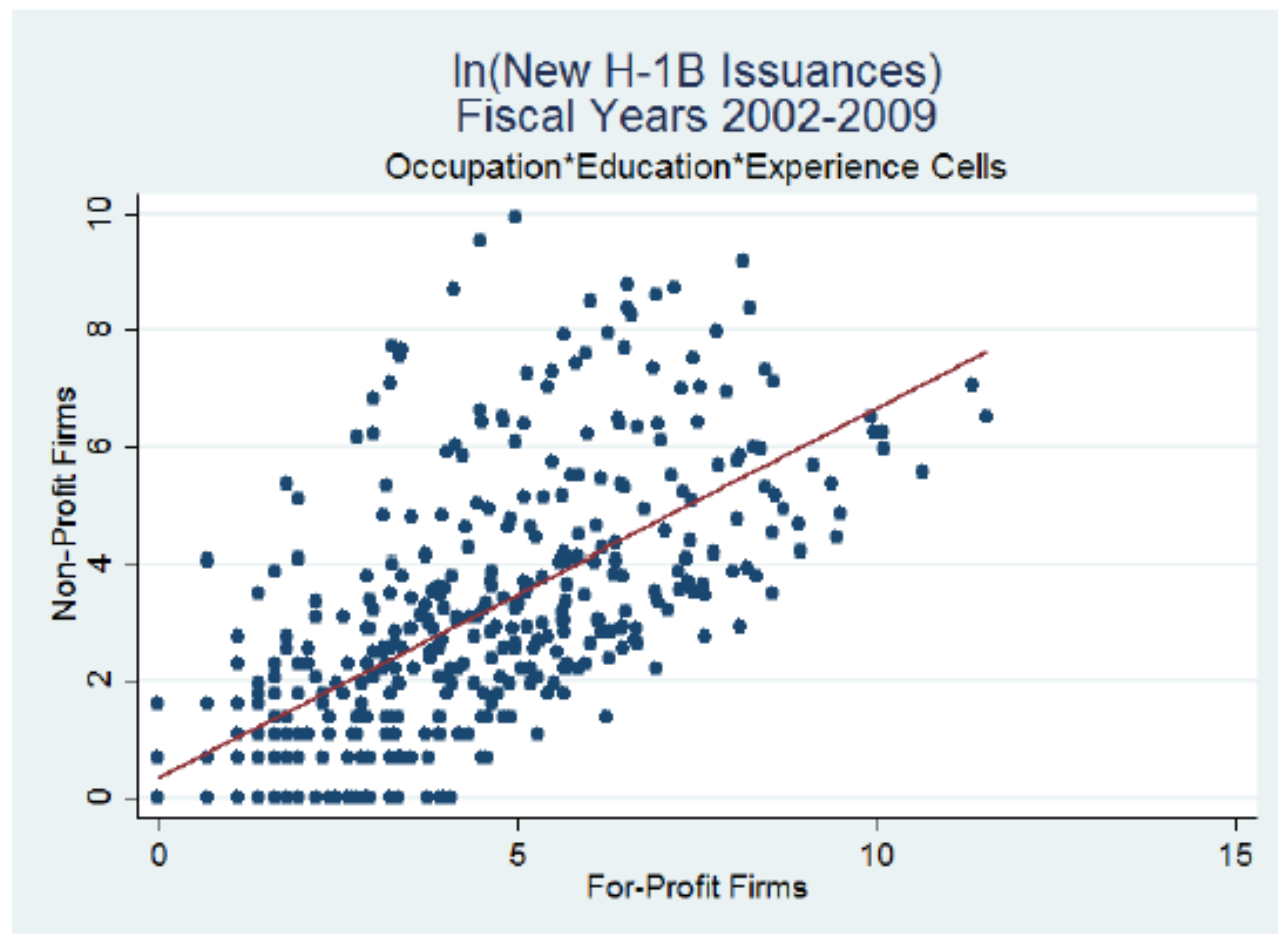
- Among skill-intensive sectors, the H-1B program has mostly affected science, technology, engineering, and mathematics (STEM) occupations: roughly 50% of the growth in the college-educated STEM workforce since 1990 is attributable to H-1B workers (Peri, Shih, and Sparber 2015).

Broad patterns in the H-1B visas data (cont.)

- The largest, Computer-Related Occupations, accounts for 40% of new H-1B issuances.
- Occupational composition varies across the for-profit and non-profit sectors, but there is substantial overlap.
- Computer occupations represent 50% of new issuances among for-profit firms and 2.5% of new non-profit employment (they rank among the top five occupations among new hires in each sector). Occupations in education account for over half of new non-profit H-1B employment and 1% of new for-profit employment.
- Other for-profit occupations for new hires include Managers and Administrative Officials (17%), Engineers (14%), Medical and Health Professionals (4.6%), and Social Scientists (2.9%).
- Important non-profit occupations include Medical and Health Professionals (18%), Life Scientists (12%), and Mathematicians and Physical Scientists (4.2%).

Figure 1: Aggregate New H-1B Issuances by Skill-Cell

Panel (a)



Empirical specification

- We estimate the following empirical specification:

$$\begin{aligned} & \left[\ln \left(H1B_{PR,kt}^{New} \right) - \ln \left(H1B_{PR,kt}^{Est} \right) \right] \\ & - \left[\ln \left(H1B_{NP,kt}^{New} \right) - \ln \left(H1B_{NP,kt}^{Est} \right) \right] \\ & = \alpha + \beta_1 \cdot t_{\geq 2004} + \beta_2 \cdot t_{\geq 2008} + D_k + \varepsilon_{kt} \end{aligned}$$

- The dependent variable represents the difference in the natural log of H-1B permits awarded to new workers relative to those awarded to experienced workers, in the for-profit sector relative to the non-profit sector, for skill group (k) and year (t).
- Skill is defined according to four education categories, 19 occupations and 5-year experience groups, and $t=2002$ to 2009); years from 2004 on: “cap years”; years from 2008 on: “lottery years.”

Empirical specification (cont.)

Causal inference in the triple-difference framework requires several assumptions.

1. First, the policy must not have been endogenous, specifically the policy must not have been a response to differentially changing conditions in the labor market for new foreign workers at for-profit firms. Unlikely: H-1B cap in 2004 was not a new policy, rather a reversion to a pre-existing policy.
2. Second, the triple difference should not exhibit a trend pre-2004. Though the period with a non-binding cap is short, the data suggest no pre trend. Also various fixed effects.
3. Third, the estimated impacts must not be attributed to any other confounding shocks that differentially affected hiring of new relative to experienced H-1B workers at for-profit versus non-profit firms. To this end, we perform a test by examining native-born workers, who are not subject to the quota.

Figure A1: Pre-Trends at a Monthly Frequency

Panel (a)

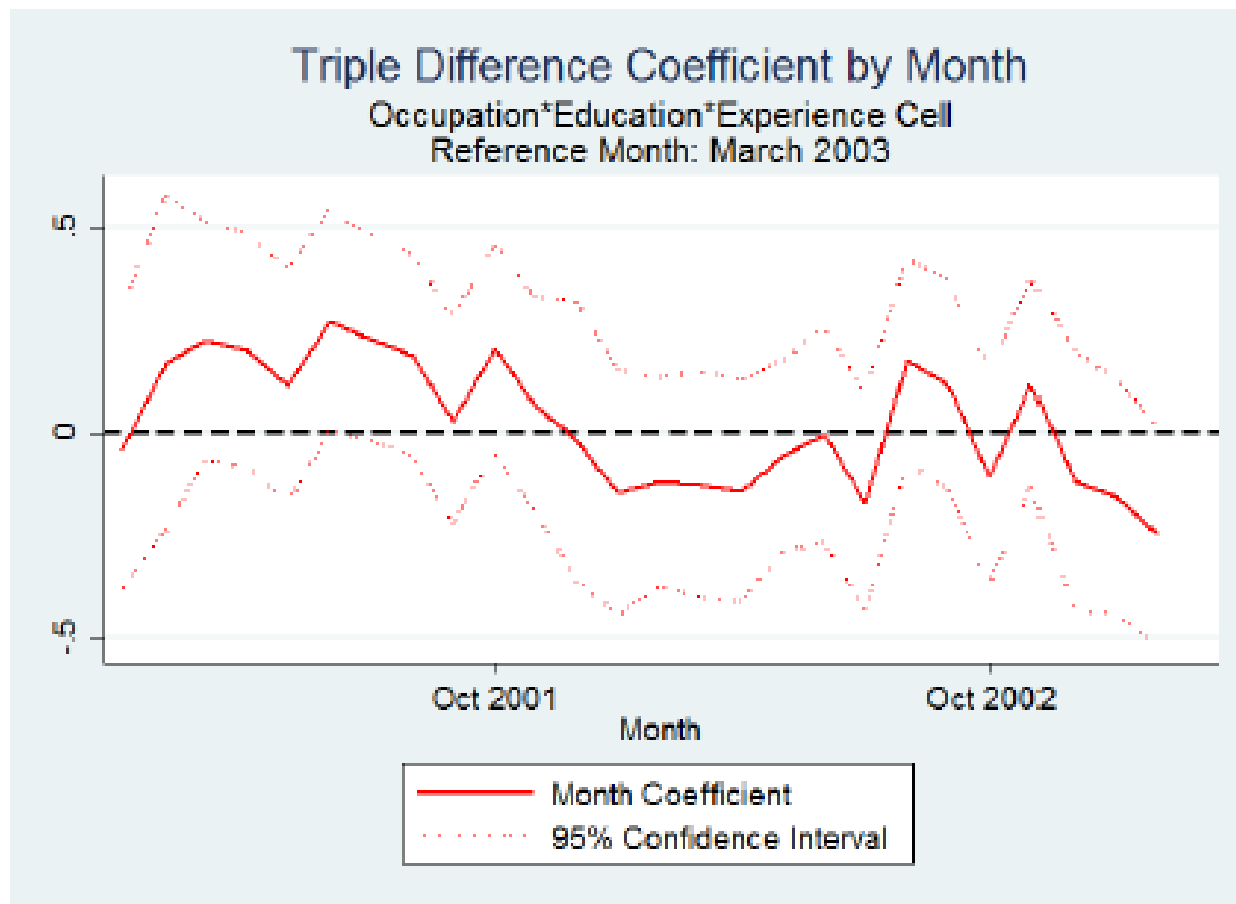


Table 1: Triple Difference Decomposition

Cell Definition:		OCC*ED*EXP			OCC*ED		
		New	Established	Difference	New	Established	Difference
For-Profit	Cap-Years	-0.454*** (0.031)	0.490*** (0.025)	-0.944*** (0.042)	-0.362*** (0.050)	0.433*** (0.032)	-0.794*** (0.057)
	Lottery-Years	-0.374*** (0.027)	-0.180*** (0.025)	-0.194*** (0.030)	-0.320*** (0.047)	-0.221*** (0.037)	-0.099** (0.039)
Non-Profit	Cap-Years	-0.205*** (0.030)	0.440*** (0.031)	-0.646*** (0.043)	-0.200*** (0.048)	0.416*** (0.045)	-0.616*** (0.051)
	Lottery-Years	-0.041 (0.032)	0.053* (0.029)	-0.094** (0.038)	0.016 (0.057)	0.040 (0.040)	-0.024 (0.062)
Difference	Cap-Years	-0.248*** (0.037)	0.050 (0.031)	-0.298*** (0.049)	-0.162*** (0.052)	0.017 (0.056)	-0.179** (0.070)
	Lottery-Years	-0.334*** (0.040)	-0.234*** (0.038)	-0.100** (0.049)	-0.336*** (0.066)	-0.261*** (0.052)	-0.075 (0.068)
Number of Skill-Cells*Years:		1,761			446		

Figure 2: Event-Study Differences in For-Profit vs. Non-Profit Log-H-1B Issuances.

Panel (a)

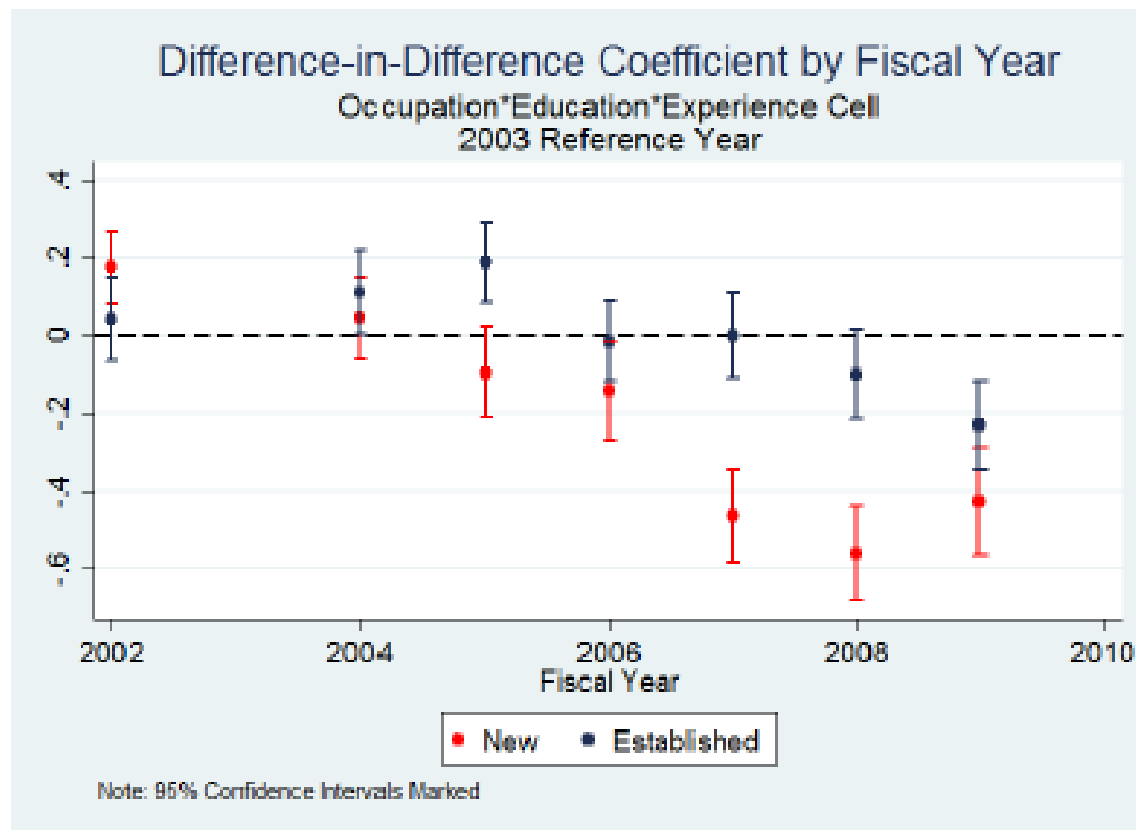


Table 2: Robustness of Triple-Difference Estimates

	(1)	(2)	(3)	(4)	(5)
Specification:	Baseline	Short Panel: 2002-2005	Remove Extreme Values of For-Profit and Non-Profit Difference in $\ln(\text{Issuances in 2002 \& 03})$	Remove Extreme Values of For-Profit and Non-Profit Difference in $\ln(\text{Issuances in 2002 \& 03})$	Remove Extreme Values of The Dependent Variable
<i>Cell Definition:</i>	<i>OCC*ED*EXP</i>				
Cap Years	-0.298*** (0.049)	-0.201*** (0.060)	-0.320*** (0.048)	-0.312*** (0.050)	-0.202*** (0.044)
Lottery Years	-0.100** (0.049)		-0.110** (0.049)	-0.119** (0.050)	-0.075* (0.044)
Observations	1,761	886	1,694	1,684	1,666
R-squared	0.366	0.501	0.368	0.370	0.335
<i>Specification:</i>	<i>OCC*ED</i>				
Cap Years	-0.179** (0.070)	-0.154* (0.081)	-0.205*** (0.063)	-0.176** (0.073)	-0.190*** (0.061)
Lottery Years	-0.075 (0.068)		-0.080 (0.069)	-0.087 (0.070)	-0.063 (0.057)
Observations	446	225	426	430	422
R-squared	0.343	0.486	0.331	0.346	0.306

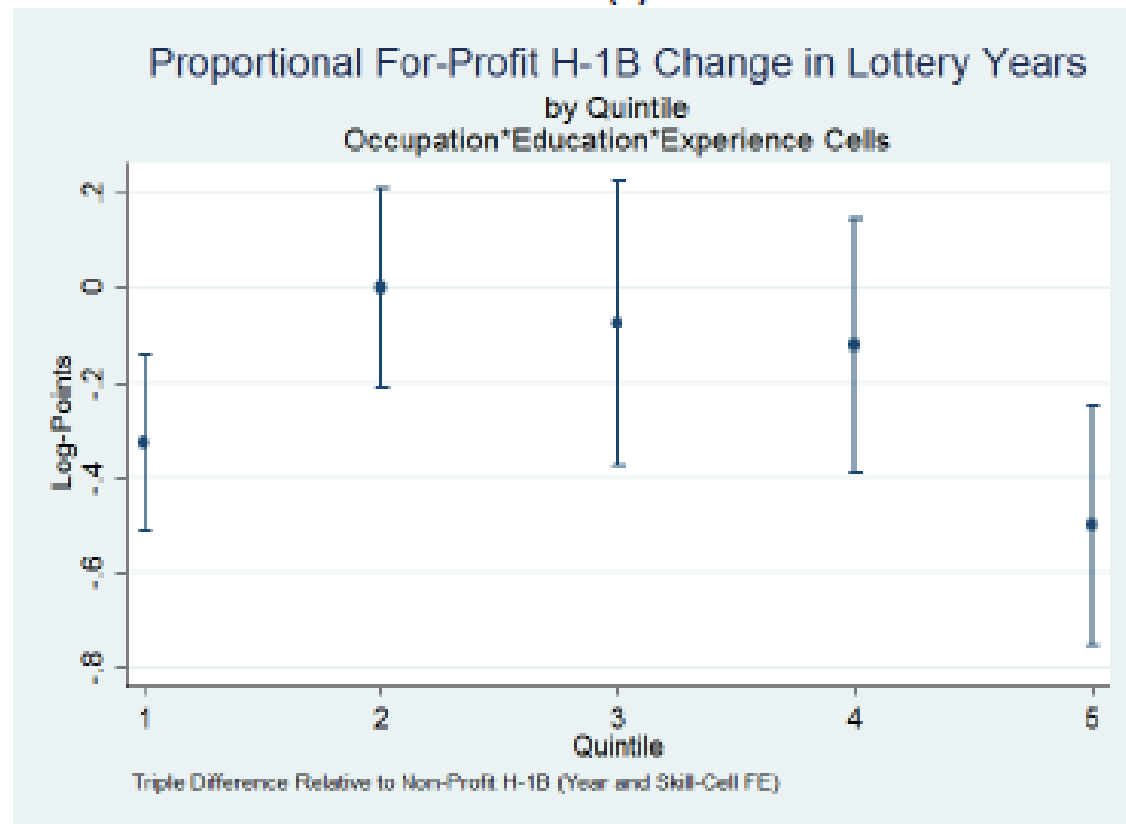
Table 3: Alternative Triple-Difference Outcomes

	(1)	(2)	(3)	(4)
Specification:	ln(Total Issuances)	ln(Native Employment): New vs. 4-6 Years Experience	ln(Native Employment): New vs. >3Years Experience	ln(Wage)
<i>Cell Definition:</i>	<i>OCC*ED*EXP</i>			
Cap Years	-0.029 (0.024)			0.003 (0.024)
Lottery Years	-0.259*** (0.030)			-0.081*** (0.024)
Observations	1,761			1,761
R-squared	0.975			0.270
<i>Specification:</i>	<i>OCC*ED</i>			
Cap Years	-0.019 (0.038)	0.059 (0.113)	-0.105 (0.097)	-0.004 (0.035)
Lottery Years	-0.300*** (0.048)	-0.096 (0.100)	-0.075 (0.060)	-0.040 (0.042)
Observations	446	354	374	446
R-squared	0.980	0.196	0.371	0.255

Selection effects

- New, for-profit H-1B employment from the middle of the wage distribution exhibits no statistically significant change arising from the restrictive H-1B quota.
- In contrast, employment losses are concentrated at the tails of the distribution, indicating that **H-1B restrictions most strongly reduced the number of workers coming from the top and bottom 20% of the H-1B wage distribution.**
- **Employment reductions were particularly large among H-1B workers with the highest wage offers – likely the most productive and innovative foreign workers.**

Figure 3: Change in For-Profit H-1B Hiring at Different Quintiles of the Wage Distribution
Sum of coefficients on the Cap-Year and Lottery-Year
Panel (a)



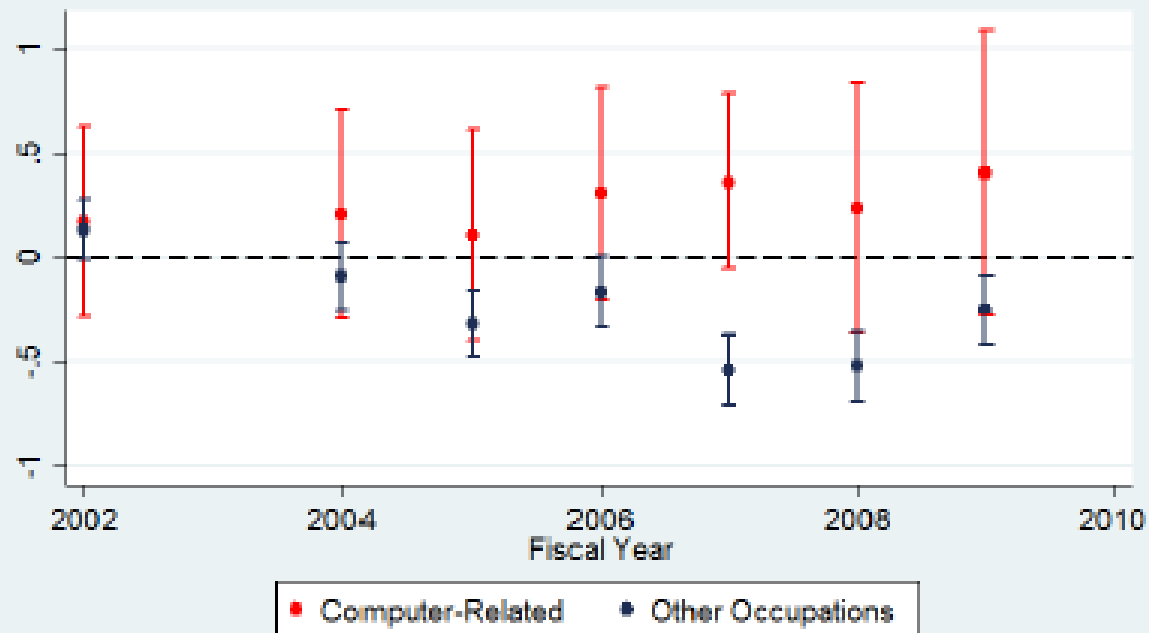
Selection effects (cont.)

- Restrictions also redistributed H-1Bs toward computer-related occupations, Indian-born workers, and firms using the H-1B program extensively.
- Rising concentration of H-1B employment among for-profit firms.
- **These results are fascinating, in part, due to their irony: many opponents of the H-1B program who advocate stricter limits lament the number of issuances to Indian-born computer-related workers. But those same limits have led to a compositional shift favoring those workers.**

Panel (b)

Triple-Difference Coefficient by Fiscal Year

Occupation*Education*Experience Cell
2003 Reference Year



Note: 95% Confidence Intervals Marked

Figure 4: Event Studies for Indian-Born Workers and Computer-Related Occupations

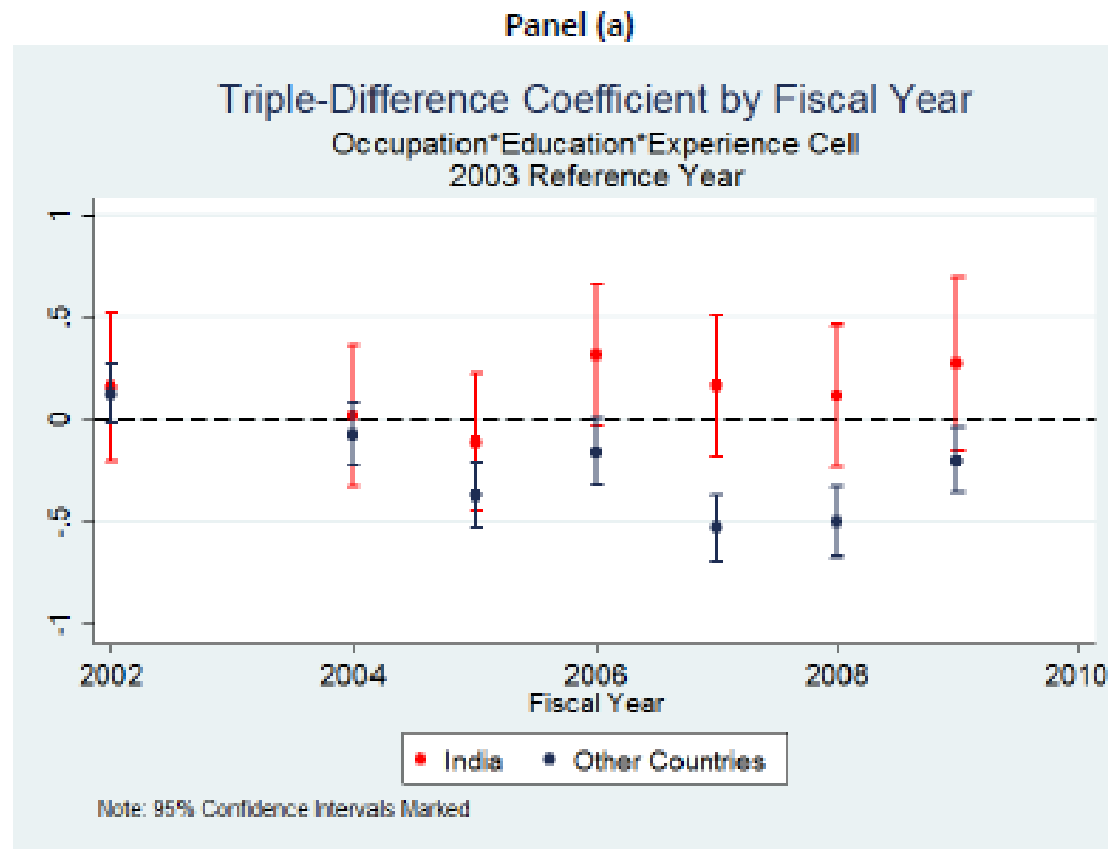


Figure 7: Change in For-Profit H-1B Hiring by Firms' H-1B Intensity

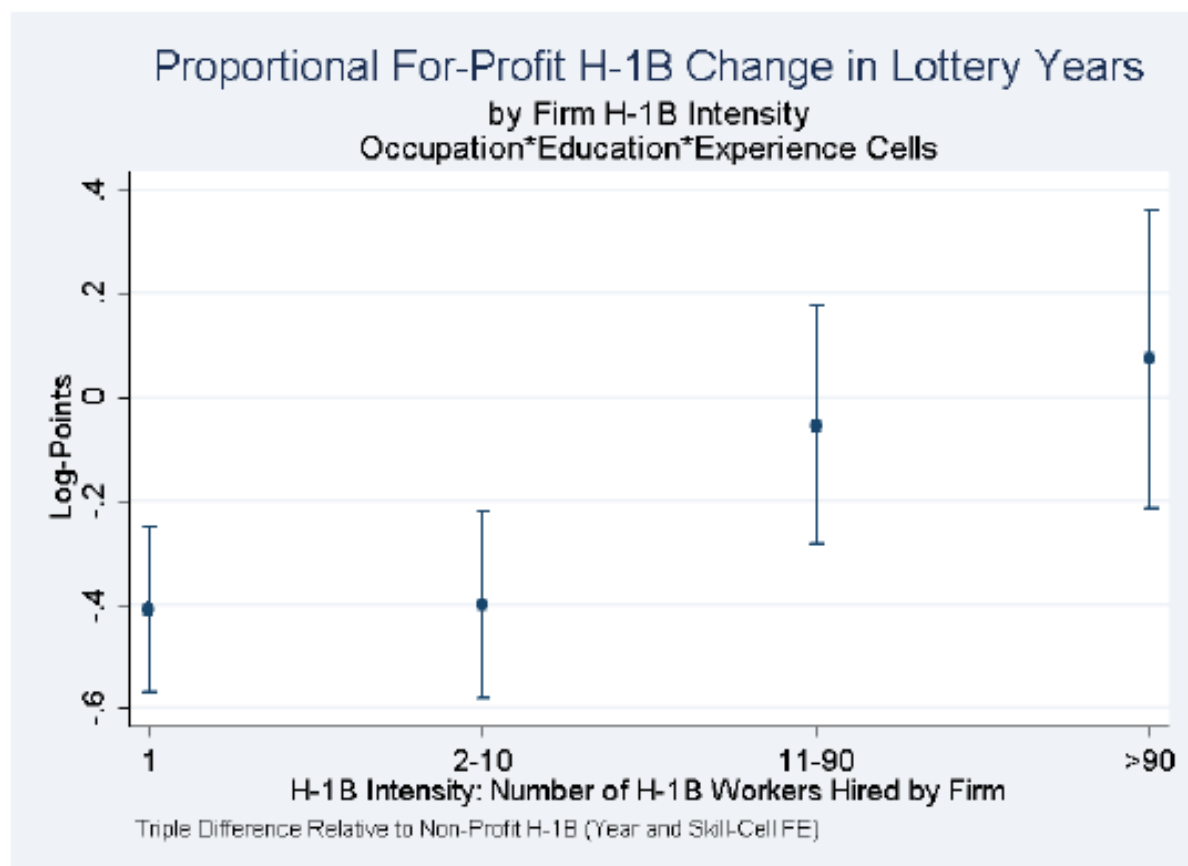
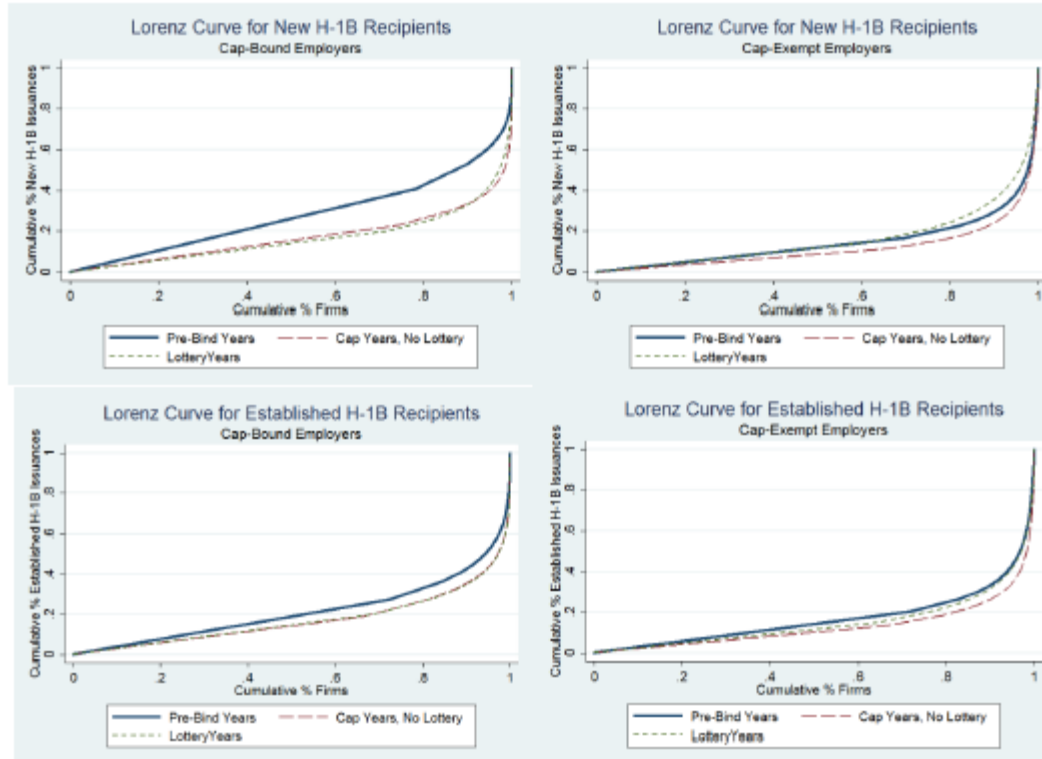


Figure 5: H-1B Concentration in Firms
Lorenz Curves for the Inequality of H-1B Issuances across Firms



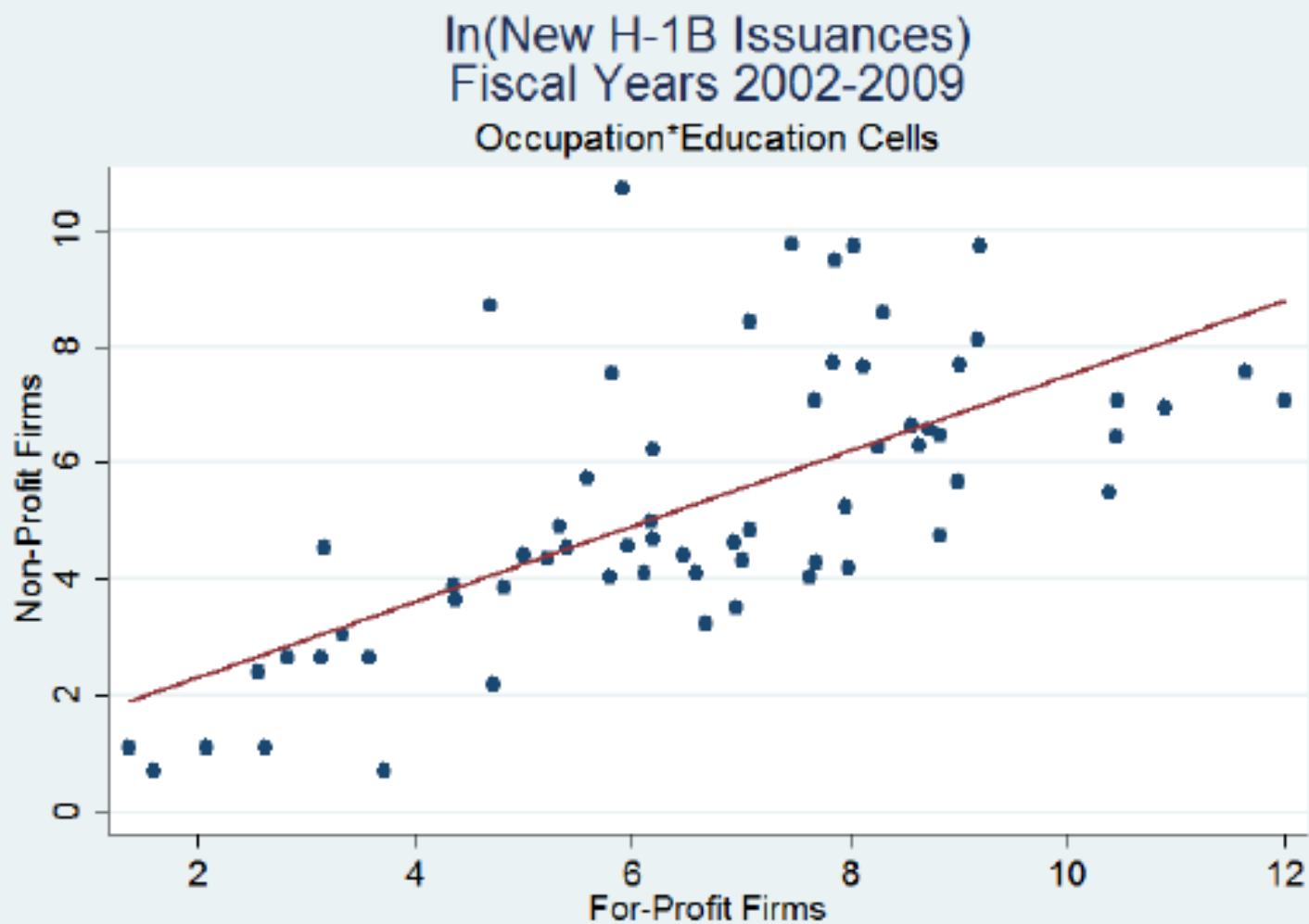
Selection effects (cont.)

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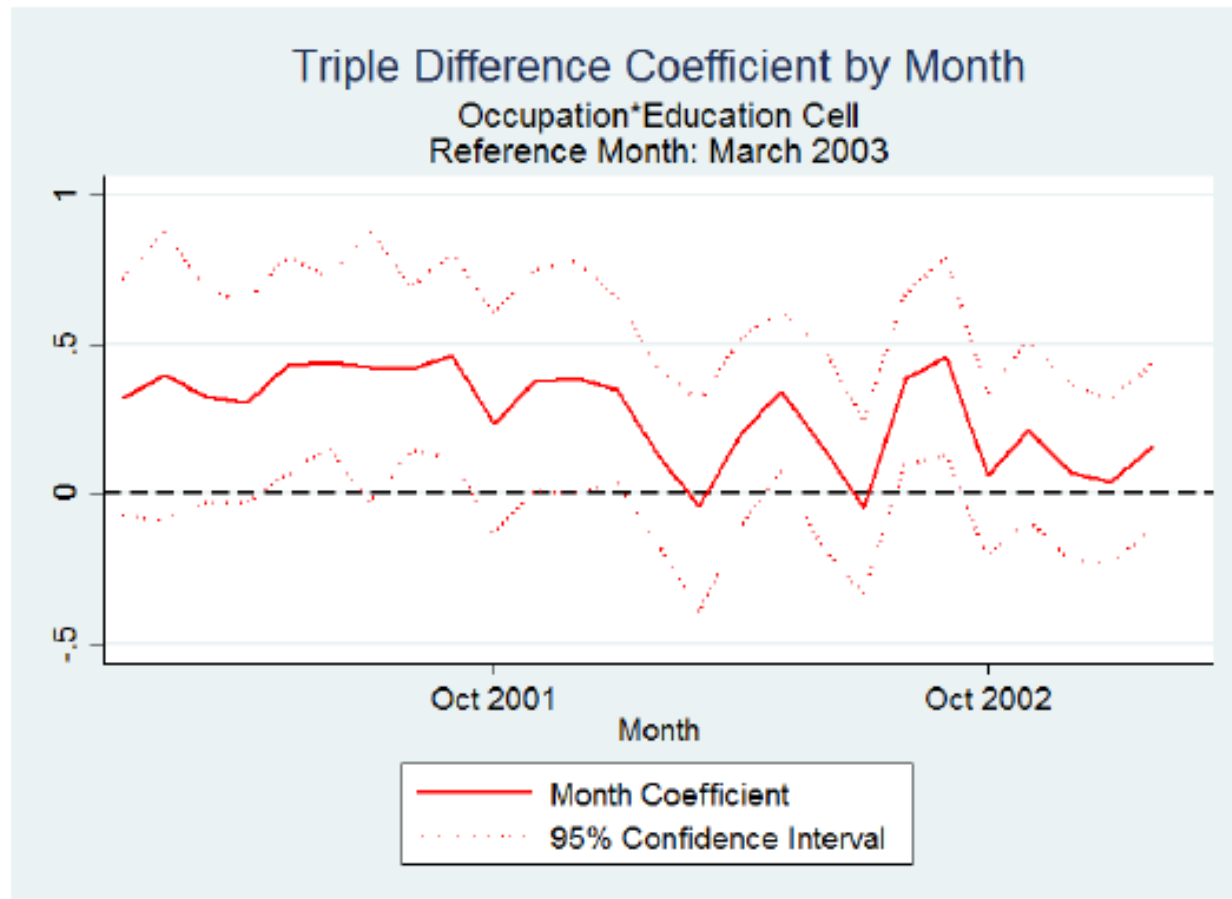
Conclusions

- Cap restrictions significantly reduced the aggregate employment of new H-1B workers in for-profit firms relative to what would have occurred in an unconstrained environment.
- We quantify the magnitude of the effects.
- We investigate selection effects.

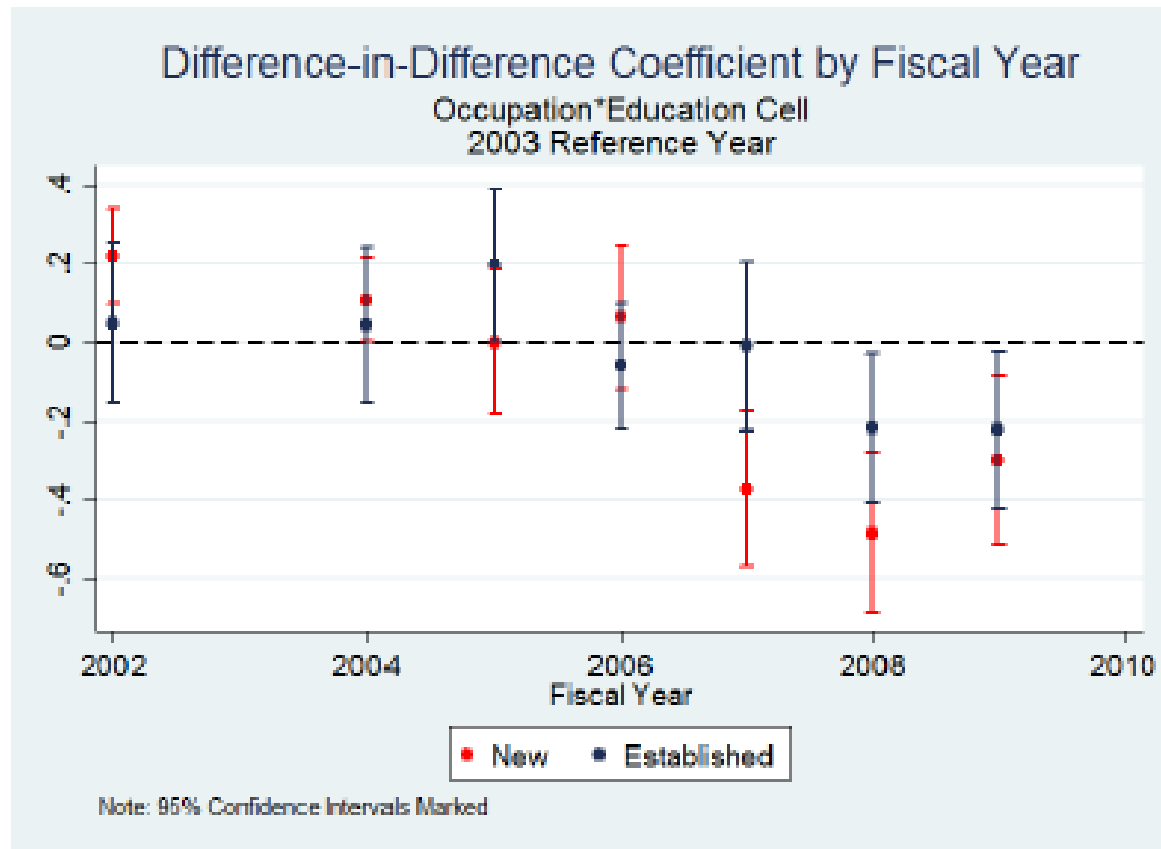
Panel (b)



Panel (b)



Panel (b)



Panel (b)

