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# **The Impact of the H-1B Cap Exemption on High-skilled Labor Markets**

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# The Impact of the H-1B Cap Exemption on High-skilled Labor Markets

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## INSTITUTIONAL BACKGROUND

- There are competing views among researchers and policy makers on whether the US government should assign more visas to allow foreign high-skilled workers to stay in the US labor market; or make the current immigration policy stricter with the argument that immigrants displace native US workers (Borjas and Doran 2012, Moser et al. 2014 and Kerr and Lincoln, 2010).
- For newly graduated foreign-born professionals including all academic degree holders, the H-1B visa program has become possibly the only path to legally enter into the US labor market.
- The American Competitiveness in the Twenty-first Century Act (AC 21) was signed into law in October, 2000 (Congress, 2000). It had one key provision to exempt the numerical cap for H-1B applicants who are employed by higher educational institutions, nonprofit research organizations, and government research organizations.
- As a result, AC 21 potentially affects the job preferences of non-citizen college graduates seeking to stay in the United States after graduation. Choosing a career in an uncapped H-1B qualified entity means to circumvent the risk of facing the fiercely competitive H-1B application process and possibly avoiding potential losses due to a visa rejection.

## MOTIVATION

- In the existing literature, a crucial challenge for detecting the effect of high-skilled immigrants on domestic workers relies on overcoming the endogeneity of the behavior of immigrants in the job market.
- Also, the past literature focuses on the impact of immigration policy on natives without much attention on the potential effects on high skilled foreign labors.
- An evaluation of the effect from the external policy change of AC21 on job market preferences of high-skilled immigrants not only fills the literature gap by concentrating on foreign-born individuals, but also paves the way to accurately identify the impact of foreign workers on domestic workers in the future study.

## DATA

- Licensed data from Survey of Earned Doctorate (SED)
- Repeated cross sectional data from 1995 to 2006
  - It covers the population of Ph.D. graduates who may have been affected by the implementation of AC 21.
  - The last year of analyzed data is 2006; this is done in order to construct a clean identification and to rule out potential confounding factors generated from the Great Recession which began in 2007.

	Temporary Residents			US Citizen		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Total number of graduates	82136			293386		
Graduates with definite plans	52768			211517		
<b>Demographics</b>						
Male	40382	0.724	0.447	108657	0.514	0.500
Age: 16-25	731	0.013	0.114	1224	0.006	0.076
Age: 26-40	50563	0.916	0.278	145046	0.690	0.463
Father with at least college degree	22429	0.587	0.492	120050	0.572	0.495
Mother with at least college degree	22413	0.406	0.491	97298	0.462	0.499
Single in marital status	19874	0.358	0.480	57218	0.272	0.445
White	11109	0.254	0.435	175772	0.834	0.372
Asian	37042	0.666	0.472	9883	0.047	0.211
Hispanic	2577	0.046	0.210	8922	0.042	0.202
Graduated in public school	38519	0.691	0.462	144805	0.685	0.465
<b>Broadly Classified Doctoral Fields</b>						
Agriculture	1708	0.022	0.175	4178	0.020	0.139
Biological/Biomedical Sciences	9527	0.171	0.376	31057	0.147	0.354
Health Sciences	1372	0.025	0.155	9011	0.043	0.202
Engineering	16430	0.295	0.456	17633	0.083	0.276
Computer and Information Sciences	2857	0.051	0.220	3405	0.016	0.126
Mathematics	2963	0.053	0.224	4023	0.019	0.137
Physical Sciences	9685	0.172	0.377	18797	0.089	0.285
Psychology	383	0.016	0.125	22406	0.106	0.308
Social Sciences	4073	0.073	0.260	16795	0.079	0.270
Humanities	2274	0.041	0.198	27380	0.129	0.336
Education	1106	0.020	0.139	44238	0.209	0.407
Business Management/Administration	2159	0.039	0.193	5686	0.027	0.162
Communication	370	0.007	0.081	2390	0.011	0.106
Fields Not Elsewhere Classified	401	0.007	0.084	4458	0.021	0.144
<b>Outcomes</b>						
Working in Academia	11004	0.383	0.486	80145	0.537	0.499
Working in Industry	15708	0.547	0.498	24378	0.163	0.270

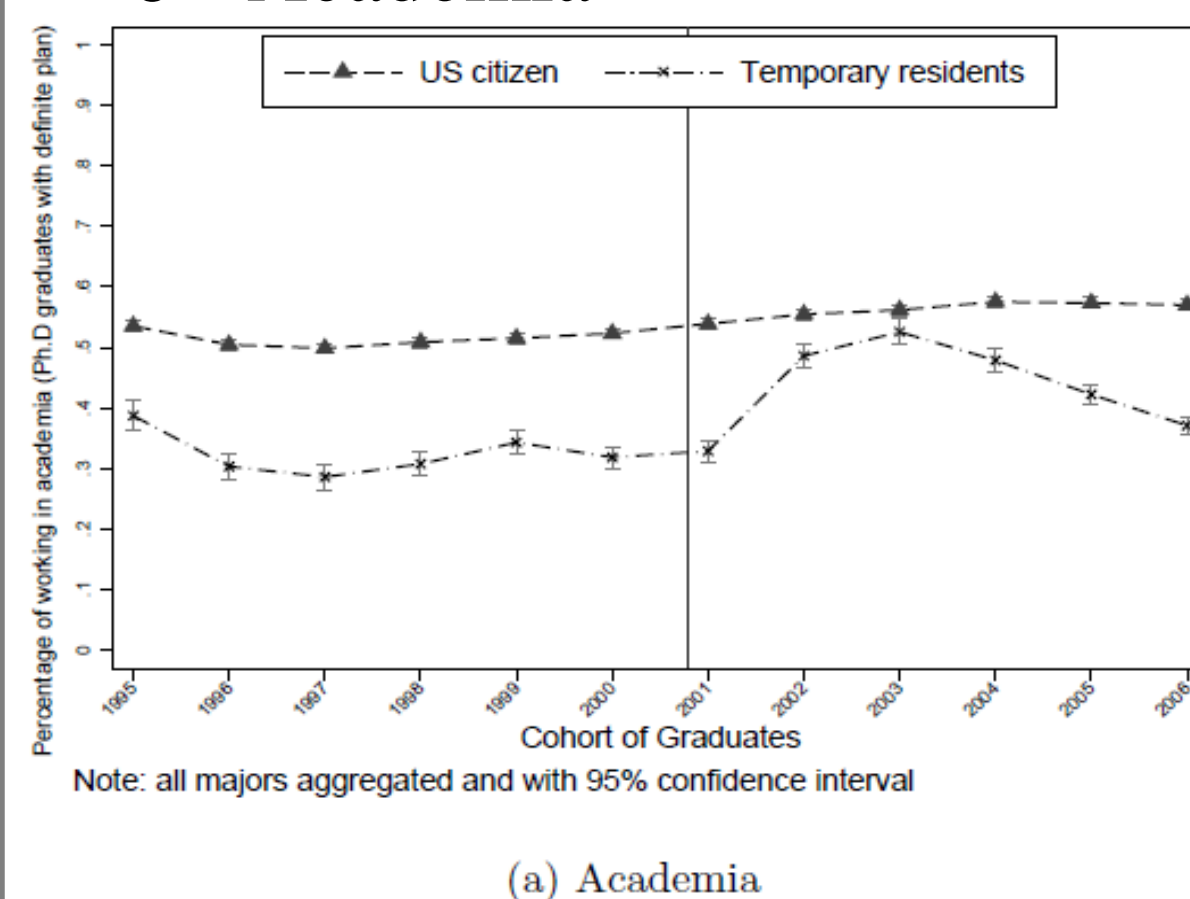
Source: Survey of Earned Doctorates, 1995 to 2006.  
 \* "Definite graduates" represents Ph.D. holders who intend to stay in the US within the next year after graduation.  
 \* "Graduates with definite plans" represents individuals with determined study or employment plans and intend to stay in the US for the following year.

## EMPIRICAL STRATEGY

- Difference-in-Difference:
  - We leverage individual level variation in the visa status to identify the effects of AC 21 on job placement.
  - $Y_{ifmt} = \gamma_f + \omega_m + \lambda_t + \delta D_{ft} + X_{ift}\beta + \epsilon_{ifmt}$ 
    - where  $Y_{ifmt}$  is a binary indicator equal to 1 if individual  $i$  with foreign nationality  $f$  obtained his Ph.D. degree in year  $t$  and worked in academia after graduation.
    - The parameters  $\gamma_f$ ,  $\omega_m$  and  $\lambda_t$  are nationality, major and year fixed effects, capturing all the unobserved variation in the outcome variable over citizenship, major and year.
    - And  $D_{ft}$  is our primary measure for the treatment variable, and it is equal to 1 for foreign PhDs who graduated after the adoption of AC 21.
  - Baseline model is also extended to various specifications including the major-specific linear trends, field-by-year fixed effects and individual characteristics.

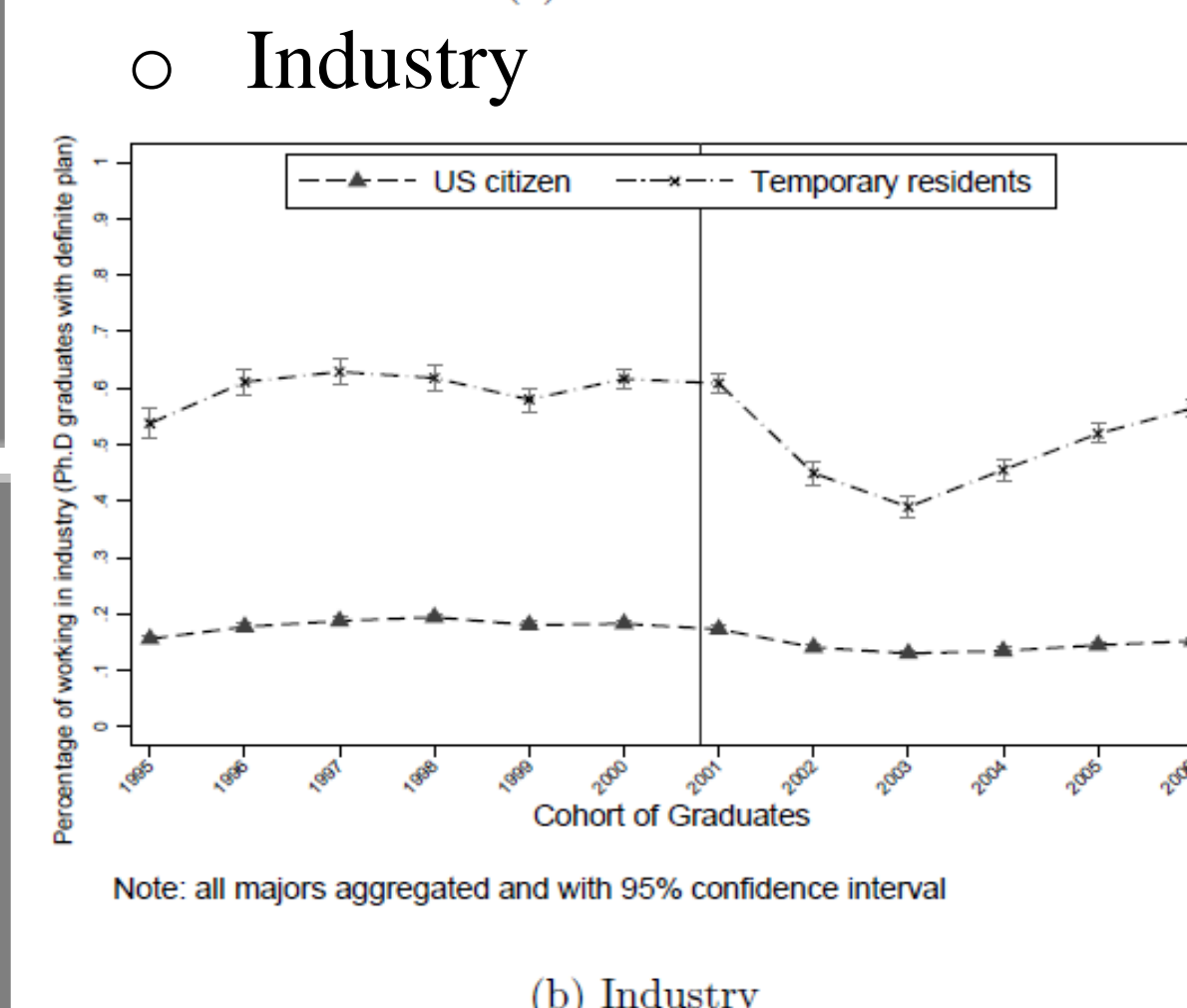
## RESULTS

- Empirical Results:
  - Academia



Variable	(1)	(2)	(3)	(4)
<b>A. Linear Difference in Difference Estimation</b>				
Noncitizen Ph.Ds Graduated after AC 21	0.047 (0.002)***	0.057 (0.012)***	0.047 (0.011)***	0.047 (0.011)***
Observations	177883	177883	173409	173409
<b>B. Probit Difference in Difference Estimation</b>				
Observations	0.076 (0.014)***	0.083 (0.016)***	0.073 (0.015)***	0.073 (0.015)***
Year and Major Fixed Effects	Yes	Yes	Yes	Yes
Field-Year Fixed Effects	No	Yes	Yes	Yes
Major-Specific Linear Time Trends	No	No	No	Yes
Demographic Variables	No	No	Yes	Yes

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01



Variable	(1)	(2)	(3)	(4)
<b>A. Linear Difference in Difference Estimation</b>				
Noncitizen Ph.Ds Graduated after AC 21	-0.054 (0.010)***	-0.047 (0.011)***	-0.041 (0.011)***	-0.038 (0.011)***
Observations	177883	177883	173409	173409
<b>B. Probit Difference in Difference Estimation</b>				
Observations	-0.032 (0.007)***	-0.031 (0.007)***	-0.028 (0.007)***	-0.025 (0.007)***
Year and Major Fixed Effects	Yes	Yes	Yes	Yes
Field-Year Fixed Effects	No	Yes	Yes	Yes
Major-Specific Linear Time Trends	No	No	No	Yes
Demographic Variables	No	No	Yes	Yes

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

- Dynamic Difference-in-Difference Estimation (Cheng and Hoekstra, 2013):

$$Y_{ifmt} = \gamma_f + \omega_m + \lambda_t + \sum_{k=t-3}^{t+3} \delta_k D_{ft} + X_{ift}\beta + \epsilon_{ifmt}$$

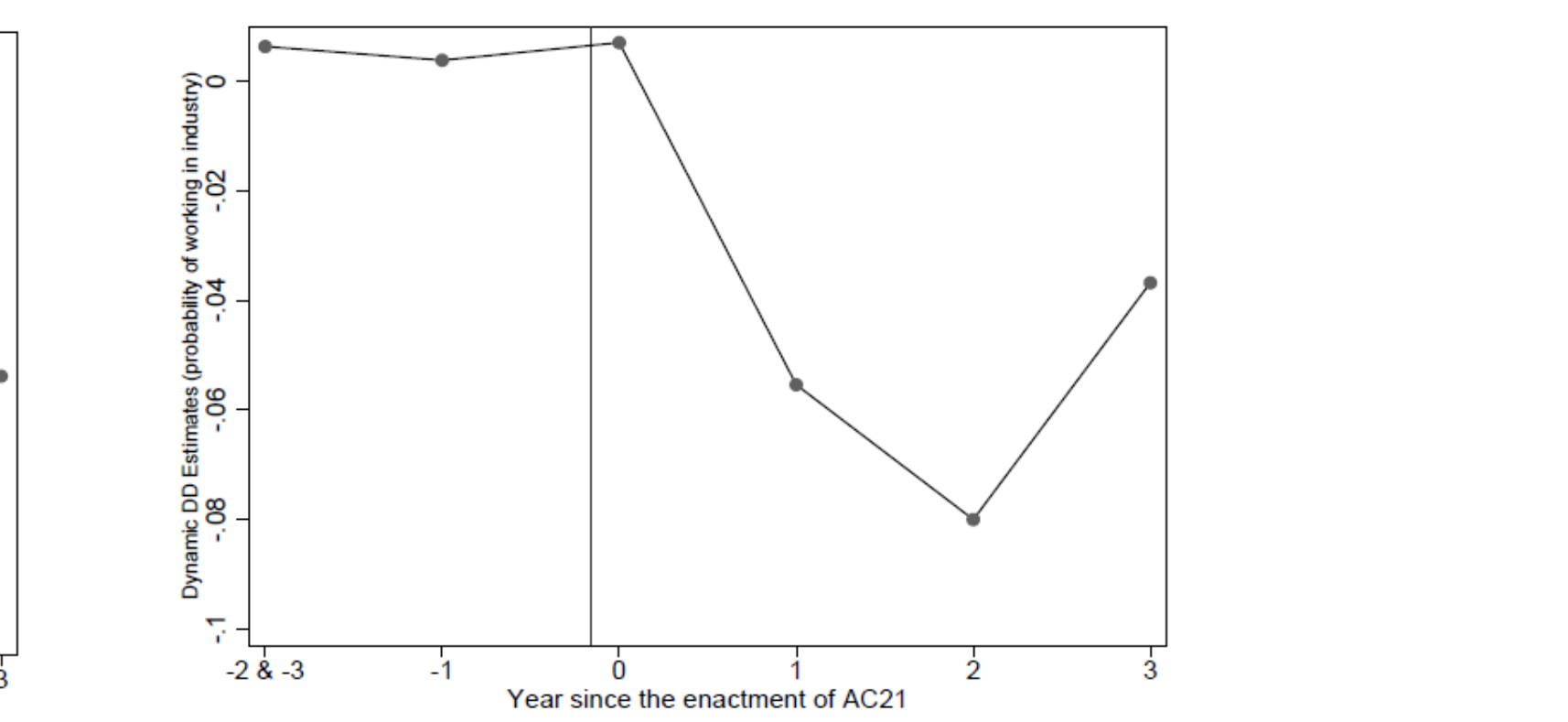
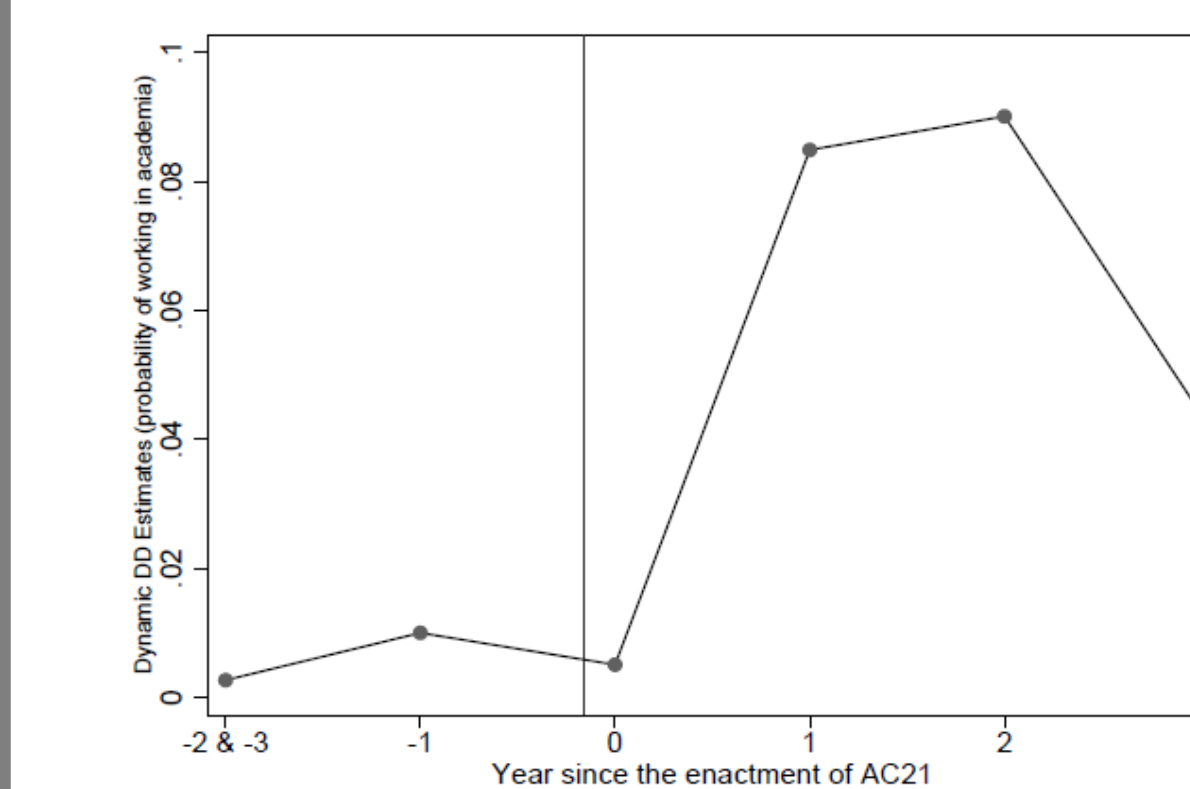


Figure 4: Change in the Share of Graduates Working in Academia, Relative to the Difference in Four or More Years Before AC 21. Figure 5: Change in the Share of Graduates Working in Industry, Relative to the Difference in Four or More Years Before AC 21.

## ROBUSTNESS

- Inference: Besides clustering the standard errors at the doctoral field level, we implement two additional strategies.
  - One is multi-way clustering at the year and field level in the spirit of Cameron et al. (2011), which are shown in the brackets of Table 2 and 3.
  - The other is constructing p-values using the bootstrap t-procedure suggested by Cameron et al. (2008). The p-values with 999 replications are in Table A1.

Linear Difference in Difference Estimation	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Academia	Academia	Academia	Academia	Industry	Industry	Industry	Industry
Parameter estimates	0.047***	0.057***	0.047***	0.047***	-0.054***	-0.047***	-0.041***	-0.038***
<b>P-value</b>								
Cluster-robust	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Wild cluster bootstrap-t	0.002	0.000	0.004	0.000	0.000	0.002	0.006	0.008
Year and Major Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Field-Year Fixed Effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Major-Specific Linear Time Trends	No	No	No	Yes	No	No	No	Yes
Demographic Variables	No	No	Yes	Yes	No	No	Yes	Yes

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

- Placebo Experiments

Placebo intervention happened at:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Academia	Academia	Academia	Academia	Industry	Industry	Industry	Industry
1995	-0.023 (0.022)	-0.016 (0.020)	-0.019 (0.020)	-0.018 (0.020)	0.026 (0.022)	0.021 (0.021)	0.022 (0.023)	0.022 (0.021)
1996	-0.004 (0.015)	-0.001 (0.013)	-0.003 (0.012)	-0.003 (0.012)	0.015 (0.020)	0.016 (0.017)	0.018 (0.017)	0.019 (0.015)
1997	0.008 (0.011)	-0.009 (0.012)	0.006 (0.011)	0.006 (0.012)	-0.009 (0.014)	0.003 (0.012)	0.006 (0.010)	0.006 (0.010)
1998	0.019* (0.009)	0.017* (0.009)	0.012* (0.007)	0.012* (0.007)	-0.013 (0.014)	-0.011 (0.011)	-0.004 (0.009)	-0.005 (0.007)
1999	0.008 (0.009)	0.011 (0.010)	0.009 (0.010)	0.009 (0.010)	-0.002 (0.013)	-0.001 (0.013)	0.001 (0.012)	0.002 (0.009)
Observations	89188	89188	87187	87187	89188	89188	87187	87187
Year and Major Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Field-Year Fixed Effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Major-Specific Linear Time Trends	No	No	No	Yes	No	No	No	Yes
Demographic Variables	No	No	Yes	Yes	No	No	Yes	Yes

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

- Falsification Test

- We further check whether PhD graduates who are exogenous to this policy intervention also change their job type preference after its implementation.

Variable	(1)	(2)	(3)	(4)
<b>A. Linear Difference in Difference Estimation</b>				
Noncitizen Ph.Ds Graduated after AC 21	0.009 (0.013)	-0.002 (0.008)	-0.003 (0.008)	0.002 (0.007)
Observations	264636	264636	258042	258042
<b>B. Probit Difference in Difference Estimation</b>				
Observations	-0.002 (0.000)	-0.006 (0.007)	-0.007 (0.007)	-0.004 (0.006)
Year and Major Fixed Effects	Yes	Yes	Yes	Yes
Field-Year Fixed Effects	No	Yes	Yes	Yes
Major-Specific Linear Time Trends	No	No	No	Yes
Demographic Variables	No	No	Yes	Yes

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

## CONCLUSION

- Our findings indicate that by reducing the potential risk in the process of the H-1B petition, AC 21 causes foreign PhD graduates to be 5% more likely to start a career in academia and 4% less likely to work in industry.
- Our point estimates are robust to the inclusion of various controls including individual level characteristics, differing trends in majors and idiosyncratic shocks on academic fields over time.
- A falsification test on post-doctoral participation and placebo experiments based on pre-period data further support the estimated results, excluding other possible external changes in the labor market.

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