

Supplemental Online Appendices

Do Foreigners Crowd Natives Out of STEM Degrees and Occupations? Evidence from the US Immigration Act of 1990

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Appendix A

Table A.1. List of STEM Majors and ACS Codes

<i>ACS code</i>	<i>Description</i>	<i>ACS code</i>	<i>Description</i>
1103	Animal Sciences	2504	Mechanical Engineering Related Technologies
1104	Food Science	2599	Miscellaneous Engineering Technologies
1105	Plant Science and Agronomy	3600	Biology
1106	Soil Science	3601	Biochemical Sciences
1301	Environmental Science	3602	Botany
1302	Forestry	3603	Molecular Biology
2001	Communication Technologies	3604	Ecology
2100	Computer and Information Systems	3605	Genetics
2101	Computer Programming and Data Processing	3606	Microbiology
2102	Computer Science	3607	Pharmacology
2105	Information Sciences	3608	Physiology
2106	Computer Information Management & Security	3609	Zoology
2107	Computer Networking and Telecommunications	3611	Neuroscience
2400	General Engineering	3699	Miscellaneous Biology
2401	Aerospace Engineering	3700	Mathematics
2402	Biological Engineering	3701	Applied Mathematics
2403	Architectural Engineering	3702	Statistics and Decision Science
2404	Biomedical Engineering	3801	Military Technologies
2405	Chemical Engineering	4002	Nutrition Sciences
2406	Civil Engineering	4003	Neuroscience
2407	Computer Engineering	4005	Mathematics and Computer Science
2408	Electrical Engineering	4006	Cognitive Science and Biopsychology
2409	Engineering Mechanics, Physics, & Science	5000	Physical Sciences
2410	Environmental Engineering	5001	Astronomy and Astrophysics
2411	Geological and Geophysical Engineering	5002	Atmospheric Sciences and Meteorology
2412	Industrial and Manufacturing Engineering	5003	Chemistry
2413	Materials Engineering and Materials Science	5004	Geology and Earth Science
2414	Mechanical Engineering	5005	Geosciences
2415	Metallurgical Engineering	5006	Oceanography
2416	Mining and Mineral Engineering	5007	Physics
2417	Naval Architecture and Marine Engineering	5008	Materials Science
2418	Nuclear Engineering	5098	Multi-disciplinary or General Science
2419	Petroleum Engineering	5102	Nuclear, Industrial Radiology, & Biol. Tech.
2499	Miscellaneous Engineering	5901	Transportation Sciences and Technologies
2500	Engineering Technologies	6106	Health and Medical Preparatory Programs
2501	Engineering and Industrial Management	6108	Pharmacy, Pharmaceutical Sciences, & Admin.
2502	Electrical Engineering Technology	6202	Actuarial Science
2503	Industrial Production Technologies	6212	Management Information Systems and Statistics

Table A.2. List of STEM Occupations and ACS Codes

<i>Occ1990 code</i>	<i>Description</i>	<i>Main definition</i>	<i>Expanded definition</i>
44	Aerospace engineer	Yes	Yes
45	Metallurgical and materials engineers	Yes	Yes
47	Petroleum, mining, and geological engineers	Yes	Yes
48	Chemical engineers	Yes	Yes
53	Civil engineers	Yes	Yes
55	Electrical engineers	Yes	Yes
56	Industrial engineers	Yes	Yes
57	Mechanical engineers	Yes	Yes
59	Not-elsewhere-classified engineers	Yes	Yes
64	Computer systems analysts & computer scientists	Yes	Yes
66	Actuaries	Yes	Yes
67	Statisticians	Yes	Yes
68	Mathematicians and mathematical scientists	Yes	Yes
69	Physicists and astronomers	Yes	Yes
73	Chemists	Yes	Yes
74	Atmospheric and space scientists	Yes	Yes
75	Geologists	Yes	Yes
76	Physical scientists, n.e.c.	Yes	Yes
77	Agricultural and food scientists	Yes	Yes
78	Biological scientists	Yes	Yes
79	Foresters and conservation scientists	Yes	Yes
83	Medical scientists	Yes	Yes
229	Computer software developers	Yes	Yes
84	Physicians	No	Yes
85	Dentists	No	Yes
86	Veterinarians	No	Yes
87	Optometrists	No	Yes
88	Podiatrists	No	Yes
89	Other health and therapy diagnosing occupations	No	Yes
96	Pharmacists	No	Yes
113	Earth, environmental, and marine science instructors	No	Yes
114	Biological science instructors	No	Yes
115	Chemistry instructors	No	Yes
116	Physics instructors	No	Yes
127	Engineering instructors	No	Yes
128	Math instructors	No	Yes

Appendix B

Table B.1. Remove Time Trends

<i>Effect</i>	<i>Black male STEM BA</i>	<i>White male STEM occupation</i>	<i>White female Prior year employment</i>
Panel A: Baseline result			
Foreign STEM exposure	−0.085** (0.036)	−0.058*** (0.014)	−0.037** (0.016)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	14,354	72,933	36,519
Panel B: No state trends			
Foreign STEM exposure	−0.047*** (0.017)	−0.016 (0.009)	0.005 (0.007)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	14,354	72,933	36,519
Panel C: Model selection of linear and quadratic state trends			
Foreign STEM exposure	−0.052*** (0.017)	−0.026* (0.013)	0.005 (0.010)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	14,354	72,933	36,519

Notes: Panel A reproduces the estimates from column (1) of Table 2, panel C; column (3) of Table 5, panel B; and column (4) of Table 6, panel B. Panel B presents estimates without state trends. Panel C presents estimates using the model selection method of Belloni, Chernozhukov, and Hansen (2014) and implementation by Ahrens, Hansen, and Schaffer (2018), in which the model selects among linear and quadratic state trends. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.2. Robustness of Length of Time Horizon

Effect	Black male STEM BA	White male STEM occupation	White female Prior year employment
Panel A: Five years before and after			
Foreign STEM exposure	−0.101*** (0.032)	−0.054*** (0.013)	−0.019 (0.013)
Control mean	[0.252]	[0.291]	[0.864]
N	17,752	91,515	46,043
Panel B: Six years before and after			
Foreign STEM exposure	−0.116*** (0.022)	−0.050*** (0.010)	−0.015 (0.012)
Control mean	[0.257]	[0.290]	[0.863]
N	21,293	110,192	55,794
Panel C: Five years before (including 1990) and four years after			
Foreign STEM exposure	−0.051** (0.025)	−0.034*** (0.009)	−0.039*** (0.011)
Control mean	[0.247]	[0.293]	[0.864]
N	16,204	81,872	41,203

Notes: This table presents sensitivity of our results as we change the number of birth cohorts in the sample. Panel A includes those turning 18 between 1985 and 1995 (excluding 1990). Panel B includes year-age-18 cohorts between 1994 and 1996 (excluding 1990). Panel C includes those turning 18 between 1986 and 1994, including 1990. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.3. Robustness of Exclusion or Inclusion of Various States

Effect	Black male STEM BA	White male STEM occupation	White female Prior year employment
Panel A: Excluding California			
Foreign STEM exposure	-0.087** (0.042)	-0.041*** (0.012)	-0.043** (0.018)
<i>N</i>	13,360	67,091	33,614
Panel B: Excluding Florida			
Foreign STEM exposure	-0.081** (0.037)	-0.058*** (0.014)	-0.037** (0.016)
<i>N</i>	13,632	71,027	35,590
Panel C: Excluding Illinois			
Foreign STEM exposure	-0.079* (0.040)	-0.057*** (0.016)	-0.044*** (0.015)
<i>N</i>	13,310	68,529	34,453
Panel D: Excluding New York			
Foreign STEM exposure	-0.058 (0.038)	-0.061*** (0.016)	-0.031* (0.018)
<i>N</i>	12,701	66,228	33,033
Panel E: Excluding Texas			
Foreign STEM exposure	-0.085** (0.035)	-0.058*** (0.014)	-0.038** (0.016)
<i>N</i>	13,453	69,227	34,689
Panel F: Excluding Washington			
Foreign STEM exposure	-0.085** (0.036)	-0.057*** (0.014)	-0.038** (0.016)
<i>N</i>	14,269	71,651	35,876
Panel G: Including merit states			
Foreign STEM exposure	-0.078** (0.035)	-0.053*** (0.015)	-0.036** (0.015)
<i>N</i>	15,722	77,088	38,585
Panel H: Excluding 13 smallest states			
Foreign STEM exposure	-0.087** (0.036)	-0.056*** (0.015)	-0.031* (0.016)
<i>N</i>	13,687	69,293	34,586
Panel I: Exclude NY and state trends			
Foreign STEM exposure	-0.048** (0.018)	-0.015 (0.011)	0.010 (0.007)
<i>N</i>	12,701	66,228	33,033
Panel J: Exclude NY, lengthen policy window			
Foreign STEM exposure	-0.097** (0.038)	-0.056*** (0.015)	-0.012 (0.014)
<i>N</i>	15,712	83,087	41,664

Notes: This table presents estimates of our three primary findings under various sample selection alternatives. We sequentially exclude the most popular immigrant destinations, as well as the 13 smallest states (each of which had population of less than 1 million in 1980). We also include the merit states and present sensitivity analyses for when New York is excluded. Because of space constraints, we exclude reports of the control group's average outcome. BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.4. Robustness of Specification of State Controls

Effect	Black male STEM BA	White male STEM occupation	White female Prior year employment
Panel A: Adding 1980 share BA working in STEM			
Foreign STEM exposure	−0.081** (0.036)	−0.055*** (0.014)	−0.038** (0.015)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	14,354	72,933	36,519
Panel B: Adding 1990 share BA working in STEM			
Foreign STEM exposure	−0.081** (0.037)	−0.058*** (0.014)	−0.037** (0.016)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	13,632	71,027	35,590
Panel C: Excluding state control variables			
Foreign STEM exposure	−0.079* (0.040)	−0.057*** (0.016)	−0.044*** (0.015)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	13,310	68,529	34,453

Notes: Panel A adds as an additional control the 1980 share of native college graduates in the state employed in STEM occupations interacted with the post-IA90 dummy. Panel B adds as an additional control the 1990 share of native college graduates in the state employed in STEM occupations interacted with the post-IA90 dummy. Panel C excludes all time-varying state control variables. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.5. Alternative Definitions for Foreign STEM Exposure

	Black male	White male	White female
Effect	STEM BA	STEM occupation	Prior year employment
Panel A: Alternate definition of STEM occupations			
Foreign STEM exposure	−0.087*** (0.028)	−0.042*** (0.013)	−0.033** (0.014)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	14,354	72,933	36,519
Panel B: 1980 share college of graduates instead of 1980 share of STEM workers			
Foreign STEM exposure	−0.132*** (0.041)	−0.068*** (0.022)	−0.053*** (0.019)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	14,354	72,933	36,519
Panel C: 1980 share of non-STEM workers instead of 1980 share of STEM workers			
Foreign non-STEM exposure	−0.137*** (0.041)	−0.068*** (0.023)	−0.055*** (0.019)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	14,354	72,933	36,519

Notes: This table presents estimates using alternative definitions of foreign STEM exposure. Panel A considers a broader set of STEM occupations (see Table A.2). Panel B considers using the 1980 share of college graduates rather than the 1980 share of college graduates working in STEM occupations. Panel C uses the 1980 share of college graduates working in non-STEM occupations. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.6. Additional Analysis for STEM Occupational Outcomes Using Broader Definition

Effect	Black men	Black women	White men	White women
Panel A: Works in STEM occupation, conditional on BA graduation				
Foreign STEM exposure	−0.001 (0.024)	−0.015 (0.014)	−0.022*** (0.007)	−0.000 (0.003)
Control mean	[0.133]	[0.053]	[0.150]	[0.049]
<i>N</i>	14,354	26,274	241,807	283,569
Panel B: Works in STEM occupation, conditional on STEM BA graduation				
Foreign STEM exposure	0.048 (0.078)	−0.130 (0.078)	−0.063*** (0.013)	−0.027 (0.019)
Control mean	[0.347]	[0.251]	[0.368]	[0.243]
<i>N</i>	3,679	3,495	72,933	36,519
Panel C: Works in STEM occupation, conditional on non-STEM BA graduation				
Foreign STEM exposure	0.004 (0.020)	0.001 (0.008)	−0.003 (0.005)	0.002 (0.003)
Control mean	[0.048]	[0.024]	[0.061]	[0.024]
<i>N</i>	10,675	22,779	168,874	247,050

Notes: This table presents results similar to Table 5, but here current STEM occupation is more broadly defined (see Table A.2). Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.7. Discrete Treatment Based on Exposure State Groups

Effect	Black male STEM BA	White male STEM occupation	White female Prior year employment
Medium foreign STEM exposure	0.049 (0.044)	−0.015 (0.019)	−0.045* (0.025)
High foreign STEM exposure	−0.105** (0.045)	−0.068*** (0.023)	−0.052* (0.026)
Control mean	[0.249]	[0.292]	[0.863]
<i>N</i>	14,354	72,933	36,519

Notes: This table estimates our main regression model using a discretized version of exposure. States are classified as low-, medium-, or high-exposure based on terciles of the exposure distribution. The coefficients reported represent the change in the outcome variable by moving across exposure terciles (either from low to medium or from low to high). Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.8. Detailed STEM Occupation Employment for STEM Graduates

	Engineering	Computers	Math & Science
Panel A: White men			
Foreign STEM exposure	−0.026** (0.011)	−0.037*** (0.011)	0.002 (0.006)
Control mean	[0.123]	[0.137]	[0.034]
<i>N</i>	72,933	72,933	72,933
Panel B: White women			
Foreign STEM exposure	−0.012 (0.010)	−0.014 (0.010)	−0.012 (0.013)
Control mean	[0.036]	[0.060]	[0.038]
<i>N</i>	36,519	36,519	36,519

Notes: This table decomposes the effects reported in panel B of Table 5 for white men and women. Here, each dependent variable is a dummy for being employed in a specific STEM occupation (rather than any STEM occupation as considered in Table 5). The sum of the coefficients across columns equals the coefficient reported in panel B of Table 5. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.9. Employment Outcomes, Conditional on Graduation in a STEM Field

Effect	Black men	Black women	White men	White women
Panel A: Unemployment, conditional on STEM BA graduation				
Foreign STEM exposure	0.002 (0.036)	−0.039 (0.025)	0.009 (0.006)	0.001 (0.008)
Control mean	[0.035]	[0.042]	[0.022]	[0.024]
<i>N</i>	3,679	3,495	72,933	36,519
Panel B: Not in labor force, conditional on STEM BA graduation				
Foreign STEM exposure	−0.065** (0.031)	0.072 (0.069)	0.003 (0.007)	0.027* (0.016)
Control mean	[0.049]	[0.106]	[0.030]	[0.152]
<i>N</i>	3,679	3,495	72,933	36,519
Panel C: Worked at all in last five years, conditional on STEM BA				
Foreign STEM exposure	0.039 (0.028)	0.045 (0.033)	0.000 (0.005)	−0.041*** (0.012)
Control mean	[0.976]	[0.937]	[0.987]	[0.911]
<i>N</i>	3,679	3,495	72,933	36,519

Notes: Dependent variable is an indicator for 1) unemployment; 2) not participating in labor force; or 3) working at all in the previous five years. All samples are conditional on graduation in a STEM field. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.10. Placebo Results

Effect	Black male STEM BA	White male STEM occupation	White female Prior year employment
Foreign STEM exposure	0.062 (0.047)	−0.005 (0.011)	0.010 (0.023)
Control mean	[0.261]	[0.284]	[0.863]
<i>N</i>	15,393	83,917	38,585

Notes: This table presents results from a placebo setting in which we consider individuals who turn 18 years old in 1981–1989, and in which we consider 1985 as the year the policy was instituted. Individuals turning 18 in 1986–1989 are considered to be treated, and those turning 18 in 1981–1984 serve as controls. The reported estimates should be compared with those reported in the first column of Table 2, panel C, the third column of Table 5, panel B, and the last column of Table 6, panel B. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor’s degree.

Table B.11. Treatment of pre-1990 Cohorts

Effect	Black male STEM BA	White male STEM occupation	White female Prior year employment
Foreign STEM exposure, 86–89 cohorts	0.021 (0.035)	−0.009 (0.010)	−0.026** (0.012)
Foreign STEM exposure, 91–94 cohorts	−0.023 (0.060)	−0.037* (0.022)	−0.053** (0.022)
Control mean	[0.268]	[0.285]	[0.861]
<i>N</i>	21,865	115,843	56,205

Notes: This table presents results from a setting in which we consider individuals who turn 18 years old in 1982–1994, with 1990 as the year the policy was instituted. Individuals turning 18 in 1986–1989 are considered to be one treatment group, those turning 18 in 1991–1994 as a different treatment group, and those turning 18 in 1982–1985 serve as controls. The reported estimates should be compared with those reported in the first column of Table 2, panel C, the third column of Table 5, panel B, and the last column of Table 6, panel B. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses. BA, bachelor’s degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.12. Birth-State Foreign STEM Exposure and Recently Holding a STEM Occupation

Effect	Black men	Black women	White men	White women
Panel A: Conditional on college graduation in any field				
Foreign STEM exposure	−0.001 (0.029)	0.001 (0.016)	−0.021*** (0.005)	−0.001 (0.003)
Control mean	[0.096]	[0.037]	[0.124]	[0.032]
<i>N</i>	14,354	26,274	241,807	283,569
Panel B: Conditional on college graduation in a STEM field				
Foreign STEM exposure	0.042 (0.075)	−0.064 (0.087)	−0.060*** (0.014)	−0.039** (0.015)
Control mean	[0.274]	[0.176]	[0.301]	[0.142]
<i>N</i>	3,679	3,495	72,933	36,519
Panel C: Conditional on college graduation in a non-STEM field				
Foreign STEM exposure	0.005 (0.019)	0.007 (0.006)	−0.004 (0.004)	0.003 (0.002)
Control mean	[0.037]	[0.018]	[0.052]	[0.018]
<i>N</i>	10,675	22,779	168,874	247,050

Notes: Dependent variable is an indicator for recently holding a STEM occupation, conditional on various educational outcomes. Compare with Table 5. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses.

Statistically significant at the .05 level; * at the .01 level.

Table B.13. Birth-State Foreign STEM Exposure and Current Employment Probability

Effect	Black men	Black women	White men	White women
Panel A: Conditional on college graduation in any field				
Foreign STEM exposure	0.008 (0.023)	0.000 (0.020)	0.002 (0.003)	−0.013 (0.008)
Control mean	[0.894]	[0.873]	[0.938]	[0.808]
<i>N</i>	14,354	26,274	241,807	283,569
Panel B: Conditional on college graduation in a STEM field				
Foreign STEM exposure	0.063 (0.055)	−0.033 (0.062)	−0.012 (0.008)	−0.028 (0.019)
Control mean	[0.895]	[0.878]	[0.947]	[0.824]
<i>N</i>	3,679	3,495	72,933	36,519
Panel C: Conditional on college graduation in a non-STEM field				
Foreign STEM exposure	−0.014 (0.025)	0.006 (0.021)	0.009 (0.005)	−0.011 (0.008)
Control mean	[0.893]	[0.873]	[0.934]	[0.806]
<i>N</i>	10,675	22,779	168,874	247,050

Notes: Dependent variable is an indicator for being currently employed, conditional on various educational outcomes. Compare with Table 6. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses.

Table B.14. Birth-State Foreign STEM Exposure and Log Earnings

Effect	Black men	Black women	White men	White women
Panel A: Conditional on college graduation in any field				
Foreign STEM exposure	−0.101 (0.083)	0.001 (0.050)	−0.016 (0.023)	0.013 (0.022)
Control mean	[10.923]	[10.679]	[11.272]	[10.620]
<i>N</i>	13,278	24,096	234,168	242,328
Panel B: Conditional on college graduation in a STEM field				
Foreign STEM exposure	−0.039 (0.137)	−0.057 (0.118)	−0.053 (0.032)	−0.030 (0.063)
Control mean	[11.096]	[10.893]	[11.406]	[10.865]
<i>N</i>	3,407	3,218	70,972	31,794
Panel C: Conditional on college graduation in a non-STEM field				
Foreign STEM exposure	−0.102 (0.094)	0.015 (0.064)	0.004 (0.023)	0.019 (0.024)
Control mean	[10.865]	[10.650]	[11.217]	[10.588]
<i>N</i>	9,871	20,878	163,196	210,534

Notes: Dependent variable is the log of total earned income from the year prior to the survey, conditional on various educational outcomes. See notes in Table 2 for further details. Foreign STEM exposure denotes the effect of a 10-percentage-point increase in the share of foreign STEM workers on the dependent variable. Each coefficient is estimated from a separate linear probability model. The mean of the dependent variable for the control group is reported in brackets. Standard errors in parentheses.

Table B.15. Detailed Separate Cross-Section Regressions for Pre- and Post-1990 Cohorts

Effect	Black men	Black women	White men	White women
Panel A: STEM major, 1986–1989 cohorts				
Foreign STEM exposure	–0.001 (0.013)	–0.006 (0.007)	–0.017*** (0.006)	–0.001 (0.003)
Control mean	[0.249]	[0.119]	[0.291]	[0.116]
<i>N</i>	7,694	13,652	131,919	151,652
Panel B: STEM major, 1991–1994 cohorts				
Foreign STEM exposure	–0.032* (0.017)	–0.003 (0.008)	–0.031** (0.014)	–0.005 (0.005)
Control mean	[0.253]	[0.135]	[0.306]	[0.138]
<i>N</i>	6,660	12,622	109,888	131,917
Panel C: STEM occupation given STEM BA, 1986–1989 cohorts				
Foreign STEM exposure	–0.013 (0.027)	–0.008 (0.026)	0.000 (0.010)	–0.002 (0.008)
Control mean	[0.260]	[0.159]	[0.292]	[0.131]
<i>N</i>	1,938	1,693	38,791	17,856
Panel D: STEM occupation given STEM BA, 1991–1994 cohorts				
Foreign STEM exposure	0.016 (0.031)	–0.047* (0.028)	–0.030** (0.011)	–0.026** (0.011)
Control mean	[0.239]	[0.151]	[0.300]	[0.130]
<i>N</i>	1,741	1,802	34,142	18,663
Panel E: Worked last year given STEM BA, 1986–1989 cohorts				
Foreign STEM exposure	0.001 (0.013)	0.024 (0.016)	–0.007* (0.004)	–0.007 (0.006)
Control mean	[0.927]	[0.922]	[0.968]	[0.863]
<i>N</i>	1,938	1,693	38,791	17,856
Panel F: Worked last year given STEM BA, 1991–1994 cohorts				
Foreign STEM exposure	–0.013 (0.018)	–0.051** (0.023)	–0.002 (0.004)	0.003 (0.009)
Control mean	[0.928]	[0.915]	[0.975]	[0.875]
<i>N</i>	1,741	1,802	34,142	18,663

Notes: This table is a more detailed version of Table 7. See Table 7 for other details.
BA, bachelor's degree.

*Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Table B.16. Instrumental Variable Effects of Birth-State Foreign STEM Exposure on STEM Degree Completion

Effect	Black men	Black women	White men	White women
Panel A: STEM graduation, unconditional of education level				
Foreign STEM exposure	−0.034* (0.018)	0.000 (0.010)	−0.002 (0.010)	0.007 (0.005)
Control mean	[0.041]	[0.029]	[0.101]	[0.045]
<i>N</i>	93,505	102,128	685,261	687,311
Panel B: BA graduation				
Foreign STEM exposure	−0.007 (0.026)	−0.003 (0.028)	0.001 (0.011)	−0.009 (0.011)
Control mean	[0.164]	[0.241]	[0.348]	[0.391]
<i>N</i>	93,505	102,128	685,261	687,311
Panel C: STEM graduation, conditional on BA graduation				
Foreign STEM exposure	−0.174* (0.089)	−0.003 (0.046)	−0.014 (0.030)	0.016 (0.012)
Control mean	[0.249]	[0.119]	[0.291]	[0.116]
<i>N</i>	14,354	26,273	241,807	283,569

Notes: Dependent variable is an indicator for 1) graduating in a STEM field, unconditional on education level; 2) graduating with a bachelor's degree in any field; or 3) graduating with a bachelor's degree in a STEM field. Each coefficient is estimated from a different linear probability model using two-stage least squares, where 1990–2000 foreign STEM growth is instrumented by 1980 foreign STEM exposure.

*Statistically significant at the .10 level.

Table B.17. IV Effects of Birth-State Foreign STEM Exposure on Current Employment in a STEM Occupation

Effect	Black men	Black women	White men	White women
Panel A: Conditional on college graduation in any field				
Foreign STEM exposure	0.016 (0.057)	0.003 (0.030)	−0.041*** (0.012)	−0.001 (0.005)
Control mean	[0.090]	[0.034]	[0.120]	[0.030]
<i>N</i>	14,354	26,273	241,807	283,569
Panel B: Conditional on college graduation in a STEM field				
Foreign STEM exposure	0.130 (0.154)	−0.103 (0.170)	−0.115*** (0.025)	−0.073* (0.040)
Control mean	[0.260]	[0.159]	[0.292]	[0.131]
<i>N</i>	3,676	3,492	72,933	36,519
Panel C: Conditional on college graduation in a non-STEM field				
Foreign STEM exposure	0.014 (0.036)	0.013 (0.012)	−0.007 (0.009)	0.007 (0.005)
Control mean	[0.033]	[0.017]	[0.050]	[0.016]
<i>N</i>	10,673	22,778	168,874	247,050

Notes: Dependent variable is an indicator for current employment in a STEM occupation, conditional on various educational outcomes. See notes in Tables 2 and 5 for further details.

*Statistically significant at the .10 level; *** at the .01 level.

Table B.18. IV Effects of Birth-State Foreign STEM Exposure on Prior Year Employment Probability

Effect	Black men	Black women	White men	White women
Panel A: Conditional on college graduation in any field				
Foreign STEM exposure	0.058 (0.037)	0.032 (0.037)	0.019*** (0.006)	−0.016 (0.011)
Control mean	[0.929]	[0.913]	[0.965]	[0.854]
<i>N</i>	14,354	26,273	241,807	283,569
Panel B: Conditional on college graduation in a STEM field				
Foreign STEM exposure	0.098 (0.109)	−0.045 (0.084)	−0.001 (0.009)	−0.075** (0.034)
Control mean	[0.927]	[0.922]	[0.968]	[0.863]
<i>N</i>	3,676	3,492	72,933	36,519
Panel C: Conditional on college graduation in a non-STEM field				
Foreign STEM exposure	0.040 (0.042)	0.046 (0.044)	0.029*** (0.009)	−0.009 (0.012)
Control mean	[0.930]	[0.912]	[0.963]	[0.852]
<i>N</i>	10,673	22,778	168,874	247,050

Notes: Dependent variable is an indicator for being employed in the prior year, conditional on various educational outcomes. See notes in Tables 2 and 6 for further details.

** Statistically significant at the .05 level; *** at the .01 level.

Table B.19. Back-of-the-Envelope Calculations

	Coefficient estimate	1990–2010 Change in treatment variable	Group effect	Population weight	Weighted average wage effect
Current study's negative effects					
Wage of black male college graduates	−0.101	1.487	−0.150	0.015	−0.002
Wage effect from non-employment of female STEM graduates	−0.037	1.487	−0.055	0.050	−0.003
Wage of other STEM graduates	−0.053	1.487	−0.079	0.092	−0.007
					−0.012
Peri et al. (2015) net positive effects					
Wage of college-educated	0.080	0.530	0.043	0.3	0.013
Wage of non-college	0.038	0.530	0.020	0.7	0.014
					0.027
					0.039

Notes: Population weights for negative effects are chosen somewhat as upper bounds since STEM education by women and minorities may be historically below the steady-state that would occur in the absence of discrimination and other barriers.

Specifically, the population weights are computed from a number of simplifying assumptions as follows:

- Black male college graduates: 6% of population is black men; 25% of this group graduate from college. ($.06 \times .25 = .015$)
- Female STEM graduates: 10% of population is STEM graduates; 50% of this group (should be) women. ($.10 \times .50 = .05$)
- Other STEM graduates: 10% of the population is STEM graduates; do not double count black men (6%) or women who left the labor force (3.7% of 50%). ($[1 - 0.06 - 0.037 \times 0.50] \times 0.10 = .092$)

Coefficient estimates for the current study respectively come from the following sources:

- Table B.14, panel A
- Table 6, panel B
- Table B.14, panel B

Coefficient estimates for Peri et al. (2015) come from table 5, row 1 of that study.

Change in treatment variable for the current study is computed by the authors. Change in treatment variable for Peri et al. (2015) is taken from tables 2 and 3 of that study.

Online Appendix References

Ahrens, Achim, Christian B. Hansen, and Mark E. Schaffer. 2018. pdsslasso and ivlasso:

Programs for post-selection and post-regularization OLS or IV estimation and inference.

Accessed at <http://ideas.repec.org/c/boc/bocode/s458459.html> (January 5, 2019).

- Belloni, Alexandre, Victor Chernozhukov, and Christian Hansen. 2014. Inference on treatment effects after selection among high-dimensional controls. *Review of Economic Studies* 81(2): 608–50.
- Peri, Giovanni, Kevin Shih, and Chad Sparber. 2015. STEM workers, H-1B visas, and productivity in US Cities. *Journal of Labor Economics* 33(S1): S225–S255.