

Online Appendix

Is Occupational Licensing a Barrier to Interstate Migration?

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Online Appendix B: Supplementary Tables

Appendix Table B1: Descriptive statistics by occupation, 2005-2017 ACS

A. State-specific licensed occupations																	
	All state-specific licensed individuals	Teachers	Lawyers	Barbers/cosmetologists	Real estate brokers/agents	Electricians	Insurance Agents	Pharmacists	EMTs/paramedics	Dental hygienists	Dentists	Real estate appraisers	Veterinarians	Pest control workers	Chiropractors	Optometrists	Podiatrists
Moved at all	0.126	0.116	0.129	0.151	0.130	0.136	0.132	0.130	0.197	0.112	0.108	0.107	0.148	0.161	0.136	0.104	0.102
Moved within MIGPUMA	0.078	0.070	0.073	0.107	0.088	0.090	0.084	0.067	0.126	0.067	0.053	0.072	0.061	0.109	0.074	0.060	0.056
Moved between MIGPUMA, within state	0.027	0.027	0.027	0.028	0.024	0.028	0.028	0.035	0.044	0.027	0.025	0.022	0.034	0.034	0.030	0.019	0.022
Moved between states	0.020	0.019	0.028	0.017	0.018	0.018	0.020	0.027	0.027	0.018	0.030	0.013	0.053	0.018	0.031	0.026	0.024
Moved 50+ miles, given moved at all	0.244	0.257	0.279	0.161	0.200	0.209	0.222	0.340	0.226	0.254	0.391	0.187	0.486	0.170	0.329	0.329	0.322
Moved between states, given moved 50+ miles	0.613	0.593	0.678	0.621	0.642	0.584	0.636	0.575	0.574	0.595	0.676	0.582	0.714	0.584	0.665	0.745	0.687
Living outside state of birth	0.443	0.418	0.543	0.409	0.538	0.380	0.433	0.519	0.350	0.395	0.583	0.401	0.604	0.415	0.561	0.556	0.582
Mean years of education	16.18	16.85	19.84	12.49	14.48	12.61	14.38	18.38	13.49	14.74	20.12	14.63	20.15	12.57	20.05	20.20	20.16
<i>Education</i>																	
Less than high school	1.05	0.05	0.01	4.96	0.82	6.17	0.69	0.00	0.53	0.17	0.00	0.42	0.00	7.05	0.12	0.00	0.00
High school graduate	12.82	1.30	0.47	57.23	21.20	49.51	22.76	0.39	23.89	2.74	0.07	18.85	0.10	53.95	1.08	0.28	0.00
Some college	14.76	5.21	0.83	32.62	31.60	37.80	30.54	3.48	59.24	61.46	0.15	30.18	0.12	29.56	1.32	0.10	0.08
Bachelor's degree	30.81	44.93	2.15	4.20	36.58	5.68	39.14	37.41	14.25	31.60	0.14	41.21	0.16	8.47	1.97	0.23	0.26
More than Bachelor's degree	40.56	48.50	96.53	0.99	9.79	0.84	6.87	58.71	2.09	4.04	99.64	9.33	99.62	0.98	95.52	99.40	99.66
<i>Race</i>																	
Non-Hispanic white	79.78	81.29	84.74	67.56	79.55	76.49	78.70	72.57	81.64	87.05	74.25	87.44	91.70	72.60	89.08	79.25	83.57
Non-Hispanic black	6.75	7.31	4.54	11.92	5.02	5.74	7.04	5.47	5.12	2.43	2.89	3.52	1.21	8.48	1.47	1.72	4.38
Hispanic white	5.80	5.41	3.78	8.41	6.65	9.12	6.72	2.71	6.37	3.97	4.95	3.50	2.45	9.91	2.11	2.45	2.17
Other	7.67	5.99	6.94	12.12	8.78	8.64	7.54	19.26	6.87	6.54	17.90	5.54	4.65	9.01	7.34	16.58	9.87
Female	62.80	77.84	38.81	86.87	58.13	2.25	49.32	57.08	32.35	97.48	28.96	36.42	58.20	5.20	28.33	42.51	26.57
Mean age	42.81	42.92	44.46	39.78	45.86	41.09	43.57	41.24	35.38	41.67	46.41	46.43	43.38	40.73	43.79	44.18	46.27
Mean labor income (2017\$)	62,085	44,575	153,725	23,058	67,637	48,321	73,732	102,035	41,138	45,512	193,274	61,767	103,913	35,765	91,463	119,029	154,186
<i>Marital status</i>																	
Married	69.10	71.13	71.86	57.38	68.10	63.95	68.41	70.39	54.21	74.69	82.32	70.87	72.76	62.39	75.10	79.77	80.54
Divorced	10.20	9.18	8.18	14.06	14.20	11.65	12.52	6.39	11.67	11.07	6.85	12.74	7.77	12.16	9.89	6.25	7.73
Widowed	1.22	1.38	0.68	1.61	1.54	0.75	1.22	0.82	0.64	1.12	0.57	1.18	0.61	0.73	0.85	0.50	0.27
Single	19.48	18.32	19.28	26.95	16.15	23.65	17.85	22.40	33.47	13.12	10.26	15.21	18.85	24.71	14.15	13.49	11.46
Fraction U.S. citizen	0.973	0.983	0.986	0.937	0.966	0.938	0.976	0.966	0.989	0.985	0.954	0.989	0.972	0.960	0.967	0.985	0.996
<i>Number of children</i>																	
0	48.77	47.43	50.51	47.84	53.38	51.08	49.51	51.35	54.40	41.73	43.46	52.80	54.14	52.31	42.99	45.23	43.90
1	20.27	20.67	18.66	22.65	19.16	19.32	20.86	17.73	18.49	23.35	19.45	19.36	17.87	18.74	18.80	18.60	19.49
2	21.03	21.93	21.11	19.56	18.81	18.84	20.06	21.30	17.40	24.76	24.08	19.49	18.71	18.87	23.78	24.34	22.32
3	7.53	7.65	7.48	7.37	6.42	7.82	7.21	7.44	6.88	8.22	9.14	6.34	7.17	7.10	10.40	8.54	10.24
4+	2.41	2.31	2.22	2.58	2.24	2.95	2.36	2.18	2.83	1.94	3.87	2.02	2.11	2.99	4.03	3.29	4.05
<i>Employment status</i>																	
Employed	87.63	85.71	93.77	87.00	85.81	85.91	89.81	93.69	90.15	91.23	95.74	91.55	96.43	88.33	95.22	97.44	96.10
Unemployed	2.29	1.67	1.54	2.80	2.98	6.85	3.06	0.94	2.47	1.50	0.46	2.06	0.44	4.89	1.12	0.27	0.73
Not in labor force	10.08	12.62	4.69	10.21	11.21	7.23	7.14	5.37	7.38	7.27	3.80	6.39	3.13	6.78	3.66	2.50	3.17
Observations	1,166,297	618,573	118,620	83,300	81,967	81,012	56,777	30,819	19,858	18,895	17,666	11,276	9,394	6,882	5,994	4,226	1,038

Appendix Table B1 continued: Descriptive statistics by occupation, 2005-2017 ACS

	All quasi-national licensed individuals			Occupational and physical therapists			
	Nurses (RN/LPN)	Physicians	Social workers	Psychologists	Physician assistants		
Moved at all	0.134	0.127	0.145	0.148	0.141	0.126	0.182
Moved within MIGPUMA	0.079	0.079	0.062	0.096	0.076	0.067	0.097
Moved between MIGPUMA, within state	0.026	0.025	0.025	0.030	0.029	0.028	0.041
Moved between states	0.029	0.023	0.058	0.021	0.036	0.031	0.045
Moved 50+ miles, given moved at all	0.287	0.254	0.467	0.212	0.329	0.313	0.340
Moved between states, given moved 50+ miles	0.705	0.666	0.827	0.617	0.717	0.732	0.669
Living outside state of birth	0.509	0.468	0.746	0.431	0.522	0.600	0.531
Mean years of education	16.13	15.00	20.09	16.07	17.37	19.34	16.83
<i>Education</i>							
Less than high school	0.16	0.14	0.00	0.49	0.07	0.00	0.22
High school graduate	5.15	6.35	0.03	7.54	0.89	0.01	5.36
Some college	30.33	44.59	0.13	13.49	7.10	0.26	15.31
Bachelor's degree	32.15	37.87	0.11	42.96	39.00	3.88	22.69
More than Bachelor's degree	32.20	11.06	99.72	35.52	52.94	95.85	56.41
<i>Race</i>							
Non-Hispanic white	73.25	74.88	68.08	64.31	82.43	84.77	77.98
Non-Hispanic black	10.47	10.76	4.72	19.38	3.52	4.57	6.09
Hispanic white	4.40	3.88	4.52	7.00	2.86	4.45	5.99
Other	11.88	10.48	22.68	9.30	11.19	6.21	9.93
Female	80.30	90.62	36.95	81.30	77.32	71.40	68.71
Mean age	43.41	43.71	44.45	42.10	40.38	46.19	39.19
Mean labor income (2017\$)	78,563	55,654	227,792	41,730	63,910	70,230	76,966
<i>Marital status</i>							
Married	67.34	66.79	78.54	56.78	72.24	67.98	66.50
Divorced	12.87	14.61	5.93	14.52	7.58	12.22	9.41
Widowed	1.73	2.14	0.57	1.64	0.75	1.27	0.75
Single	18.06	16.46	14.96	27.06	19.44	18.53	23.35
Fraction U.S. citizen	0.963	0.967	0.925	0.981	0.957	0.982	0.975
<i>Number of children</i>							
0	46.34	45.29	44.27	51.40	44.47	55.20	50.14
1	21.49	22.43	18.47	22.07	18.73	19.69	18.60
2	21.07	20.91	23.81	18.19	24.80	18.41	21.37
3	8.27	8.44	9.90	6.20	9.27	5.55	7.51
4+	2.83	2.93	3.56	2.13	2.72	1.15	2.38
<i>Employment status</i>							
Employed	91.70	90.91	96.84	88.93	93.93	93.03	92.41
Unemployed	1.51	1.55	0.53	2.75	0.63	1.07	1.61
Not in labor force	6.79	7.55	2.63	8.32	5.44	5.90	5.97
Observations	666,335	417,459	91,782	89,130	35,871	21,046	11,047

Note: Sample includes all individuals aged 18-64 residing in the 50 US states and DC not residing in group quarters with nonimputed values for migration status, education, income, occupation, age, sex, race, citizenship status, marital status, and employment status, excluding those who lived outside the 50 US states and DC in the previous year. Sample also excludes individuals residing in the PUMAs of migration affected by hurricane Katrina in Louisiana and those residing in PUMA of migration 51000 in Virginia in the current or previous year. Move distance calculated as distance between centroids of current and previous PUMA of migration.

Appendix Table B2: Interstate migration and occupational licensing, all licensed occupations and quasi-national licensed occupations, 2005-2017 ACS

	Moved between states (1)	Moved between states moved 50+ miles	
		All individuals (2)	Outside state of birth (3)
<i>A. All licensed occupations v. all other occupations</i>			
Licensed	-0.006 (0.0004)	-0.058 (0.006)	-0.038 (0.006)
Dep var mean	0.025	0.652	0.775
Percentage effect	-24.00	-8.90	-4.90
R ²	0.016	0.113	0.088
Observations	17,953,437	567,301	345,396
<i>B. Quasi-national licensed occupations v. all other occupations</i>			
Quasi-national licensed	0.001 (0.0005)	-0.023 (0.004)	-0.017 (0.004)
Dep var mean	0.025	0.654	0.776
Percentage effect	4.00	-3.52	-2.19
R ²	0.016	0.112	0.088
Observations	16,787,140	535,094	326,477

Note: Sample described in notes to Table 2. All specifications include last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Percentage effects calculated as coefficient/dependent variable mean*100. Sample in Panel B excludes members of state-specific licensed occupations. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B3: Interstate migration and occupational licensing, cell matching estimator, 2005-2017 ACS

	Moved between states moved 50+ miles		
	Moved between states (1)	All individuals (2)	Outside state of birth (3)
<i>A. State-specific vs. quasi-national licensed occupations</i>			
State-specific licensed	-0.013 (0.001)	-0.070 (0.009)	-0.052 (0.007)
Dep var mean	0.027	0.671	0.794
Percentage effect	-48.15	-10.43	-6.55
R ²	0.029	0.152	0.139
Observations	1,786,250	53,614	33,069
<i>B. State-specific licensed occupations vs. all other occupations</i>			
State-specific licensed	-0.009 (0.0004)	-0.084 (0.008)	-0.056 (0.008)
Dep var mean	0.025	0.669	0.789
Percentage effect	-36.00	-12.56	-7.10
R ²	0.023	0.131	0.100
Observations	16,542,856	520,052	313,363
<i>C. All licensed occupations vs. all other occupations</i>			
Licensed	-0.005 (0.0003)	-0.057 (0.005)	-0.036 (0.006)
Dep var mean	0.026	0.684	0.795
Percentage effect	-19.23	-8.33	-4.53
R ²	0.023	0.123	0.096
Observations	17,324,451	547,008	331,384
<i>D. Quasi-national licensed occupations vs. all other occupations</i>			
Quasi-national licensed	0.003 (0.0005)	-0.022 (0.004)	-0.015 (0.004)
Dep var mean	0.028	0.710	0.806
Percentage effect	10.71	-3.10	-1.86
R ²	0.027	0.125	0.112
Observations	14,599,863	469,611	283,642

Note: Sample described in notes to Table 2. All specifications include last year's state of residence * year fixed effects and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Percentage effects calculated as coefficient/dependent variable mean*100. Sample in Panel B excludes members of quasi-national licensed occupations, and panel D excludes members of state-specific licensed occupations. Matching estimator formed using cells based on all control variables and estimated using ATET weights. Estimated using sample weights. Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B4: Control sensitivity and treatment effect bounds, state-specific licensed occupations vs. all other occupations, 2005-2017 ACS

	(1)	(2)	(3)	(4)	(5)	(6)
<i>A. All 50+ mile migrants</i>						
State licensed occupation	-0.039 (0.011)	-0.096 (0.014)	-0.094 (0.012)	-0.085 (0.010)	-0.084 (0.008)	-0.084 (0.008)
Dep var mean	0.650	0.650	0.650	0.650	0.650	0.650
Percentage effect	-6.00	-14.77	-14.46	-13.08	-12.92	-12.92
Treatment effect bounds						
$R_{\max} = 0.17$						(-0.098,-0.084), $\delta = -6.66$
$R_{\max} = 0.5$						(-0.255,-0.084), $\delta = -0.71$
$R_{\max} = 0.7$						(-0.391,-0.084), $\delta = -0.46$
$R_{\max} = 1$						(-0.698,-0.084), $\delta = -0.30$
R ²	0.0003	0.024	0.032	0.107	0.113	0.132
Observations	544,140	544,140	544,140	544,140	544,140	544,140
<i>B. 50+ mile migrants residing outside state of birth last year</i>						
State licensed occupation	-0.023 (0.009)	-0.054 (0.010)	-0.060 (0.009)	-0.056 (0.009)	-0.057 (0.009)	-0.056 (0.009)
Dep var mean	0.774	0.774	0.774	0.774	0.774	0.774
Percentage effect	-2.97	-6.98	-7.75	-7.24	-7.36	-7.24
Treatment effect bounds						
$R_{\max} = 0.15$						(-0.066,-0.056), $\delta = -5.88$
$R_{\max} = 0.5$						(-0.210,-0.056), $\delta = -0.53$
$R_{\max} = 0.7$						(-0.334,-0.056), $\delta = -0.35$
$R_{\max} = 1$						(-0.631,-0.056), $\delta = -0.23$
R ²	0.0001	0.009	0.019	0.084	0.088	0.116
Observations	330,044	330,044	330,044	330,044	330,044	330,044
<i>Controls</i>						
Education, age, sex		X	X	X	X	X
Other controls			X	X	X	X
State*year fixed effects				X	X	X
State of birth fixed effects					X	X
Age interacted with fixed effects						X

Note: Sample described in notes to Table 2 and excludes members of quasi-national licensed occupations listed in Table 1. Other control variables include income, race, marital status, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Treatment effect bounds calculated assuming $\delta = 1$ and stated R_{\max} . Deltas calculated assuming treatment effect of 0 and stated R_{\max} . Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B5: Interstate migration and occupational licensing, conditional on 100-mile move, 2005-2017 ACS

	Moved between states (1)	Moved between states moved 100+ miles	
		All individuals (2)	Outside state of birth (3)
<i>A. State-specific vs. quasi-national licensed occupations</i>			
State-specific licensed	-0.014 (0.001)	-0.054 (0.009)	-0.037 (0.007)
Dep var mean	0.024	0.767	0.855
Percentage effect	-58.33	-7.04	-4.33
R ²	0.025	0.160	0.123
Observations	1,832,632	44,303	29,455
<i>B. State-specific licensed occupations vs. all other occupations</i>			
State-specific licensed	-0.011 (0.0005)	-0.068 (0.010)	-0.045 (0.009)
Dep var mean	0.024	0.772	0.858
Percentage effect	-45.83	-8.81	-5.24
R ²	0.016	0.122	0.089
Observations	17,287,102	433,417	283,709
<i>C. All licensed occupations vs. all other occupations</i>			
Licensed	-0.006 (0.0004)	-0.049 (0.007)	-0.031 (0.006)
Dep var mean	0.025	0.773	0.859
Percentage effect	-24.00	-6.34	-3.61
R ²	0.016	0.121	0.089
Observations	17,953,437	452,399	297,078
<i>D. Quasi-national licensed occupations vs. all other occupations</i>			
Quasi-national licensed	0.001 (0.0005)	-0.024 (0.004)	-0.016 (0.004)
Dep var mean	0.025	0.775	0.860
Percentage effect	4.00	-3.10	-1.86
R ²	0.016	0.121	0.089
Observations	16,787,140	427,078	280,992

Note: Sample described in notes to Table 2. All specifications include last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Percentage effects calculated as coefficient/dependent variable mean*100. Sample in Panel B excludes members of quasi-national licensed occupations. Sample in Panel D excludes members of state-specific licensed occupations. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B6: Migration and occupational licensing, 2005-2011 vs. 2012-2017 ACS

	2005-2011			2012-2017		
	Moved between states	Moved between states moved 50+ miles		Moved between states	Moved between states moved 50+ miles	
		All individuals	Outside state of birth		All individuals	Outside state of birth
(1)	(2)	(3)	(4)	(5)	(6)	
<i>A. State-specific vs. quasi-national licensed occupations</i>						
State-specific licensed	-0.014 (0.001)	-0.068 (0.011)	-0.052 (0.010)	-0.014 (0.001)	-0.078 (0.009)	-0.050 (0.008)
Dep var mean	0.023	0.649	0.768	0.024	0.655	0.781
Percentage effect	-60.87	-10.48	-6.77	-58.33	-11.91	-6.40
R ²	0.025	0.146	0.126	0.026	0.151	0.131
Observations	1,003,254	30,051	18,649	829,378	25,317	15,622
<i>B. State-specific licensed occupations vs. all other occupations</i>						
State-specific licensed	-0.011 (0.0005)	-0.079 (0.010)	-0.055 (0.010)	-0.011 (0.001)	-0.091 (0.008)	-0.059 (0.009)
Dep var mean	0.025	0.644	0.767	0.024	0.658	0.782
Percentage effect	-44.00	-12.27	-7.17	-45.83	-13.83	-7.54
R ²	0.017	0.112	0.089	0.016	0.114	0.088
Observations	9,604,904	238,492	185,561	7,682,198	238,492	144,483
<i>C. All licensed occupations vs. all other occupations</i>						
Licensed	-0.006 (0.0004)	-0.054 (0.006)	-0.036 (0.007)	-0.007 (0.0004)	-0.062 (0.006)	-0.041 (0.007)
Dep var mean	0.025	0.646	0.768	0.024	0.660	0.783
Percentage effect	-24.00	-8.36	-4.69	-29.17	-9.39	-5.24
R ²	0.017	0.111	0.089	0.016	0.115	0.088
Observations	9,956,424	317,654	193,622	7,997,013	249,647	151,774
<i>D. Quasi-national licensed occupations vs. all other occupations</i>						
Quasi-national licensed	0.001 (0.0006)	-0.020 (0.006)	-0.013 (0.004)	0.0004 (0.0004)	-0.027 (0.005)	-0.022 (0.006)
Dep var mean	0.025	0.648	0.769	0.024	0.663	0.785
Percentage effect	4.00	-3.09	-1.69	1.67	-4.07	-2.80
R ²	0.017	0.111	0.089	0.016	0.115	0.088
Observations	9,304,690	299,609	183,034	7,482,450	235,485	143,443

Note: Sample described in notes to Table 2. All specifications include last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Percentage effects calculated as coefficient/dependent variable mean*100. Sample in Panel B excludes members of quasi-national licensed occupations. Sample in Panel D excludes members of state-specific licensed occupations. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B7: Migration and occupational licensing, state specific-licensed occupations v. quasi-national licensed occupations, excluding teachers and nurses, 2005-2017 ACS

	Moved between states	Moved between states moved 50+ miles	
		All individuals	Outside state of birth
<i>A. Excluding nurses</i>			
State-specific licensed	-0.017 (0.001)	-0.082 (0.012)	-0.060 (0.010)
Dep var mean	0.024	0.647	0.775
Percentage effect	-70.83	-12.67	-7.74
R ²	0.027	0.160	0.138
Observations	1,415,173	43,516	27,011
<i>B. Excluding teachers</i>			
State-specific licensed	-0.010 (0.001)	-0.056 (0.007)	-0.044 (0.009)
Dep var mean	0.026	0.675	0.782
Percentage effect	-38.46	-8.30	-5.63
R ²	0.027	0.142	0.142
Observations	1,214,059	38,696	25,097
<i>C. Excluding nurses and teachers</i>			
State-specific licensed	-0.011 (0.001)	-0.063 (0.011)	-0.050 (0.011)
Dep var mean	0.027	0.679	0.786
Percentage effect	-40.74	-9.28	-6.36
R ²	0.032	0.163	0.167
Observations	796,600	26,844	17,837

Note: Sample described in notes to Table 2. All specifications include last year's state of residence * year fixed effects and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Percentage effects calculated as coefficient/dependent variable mean*100. Comparison group in all specifications is quasi-national licensed occupations. Sample in Panel A excludes nurses, sample in Panel B excludes teachers, and sample in Panel C excludes teachers and nurses. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B8: Interstate migration and occupational licensing, individuals who moved 50 or more miles in the past year, alternative standard error specifications, 2005-2017 ACS

	State-specific v. quasi- national licensed (1)	State-specific licensed v. all other occupations (2)
<i>A. All 50+ mile movers</i>		
Coefficient value	-0.073	-0.084
<i>"Traditional" standard errors</i>		
Clustered on last year's state of residence	(0.009) pval = 0.000	(0.008) pval = 0.000
Clustered on occupation	(0.021) pval = 0.002	(0.014) pval = 0.000
Two-way clustered	(0.027) pval = 0.013	(0.016) pval = 0.000
Randomization inference <i>p</i> -value	0.000	0.000
Dep var mean	0.652	0.650
Percentage effect	-11.20	-12.92
R ²	0.146	0.113
Observations	55,368	544,140
<i>B. 50+ mile movers residing outside state of birth last year</i>		
Coefficient value	-0.051	-0.057
<i>"Traditional" standard errors</i>		
Clustered on last year's state of residence	(0.007) pval = 0.000	(0.009) pval = 0.000
Clustered on occupation	(0.016) pval = 0.003	(0.008) pval = 0.000
Two-way clustered	(0.018) pval = 0.009	(0.012) pval = 0.000
Randomization inference <i>p</i> -value	0.000	0.000
Dep var mean	0.774	0.774
Percentage effect	-6.59	-7.36
R ²	0.126	0.088
Observations	34,271	330,044

Note: Sample described in notes to Table 2 and limited to those who moved 50 or more miles in the last year. Dependent variable is indicator for moving between states. Coefficient value reported is coefficient on state-specific licensed indicator. All specifications include last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Percentage effects calculated as coefficient/dependent variable mean*100. Sample in column (1) includes only members of licensed occupations, sample in column (2) excludes members of quasi-national licensed occupations. Panel B includes only individuals residing outside their state of birth last year. Estimated using OLS and sample weights. "Traditional" standard errors and *p*-values estimated using Stata's "cluster(<var>)" option after regress or "vce(cluster <varlist>)" after reghdfe (for two-way clustering on last year's state of residence and occupation). Randomization inference *p*-values obtained by permuting state-specific licensed status across occupation clusters within state of residence and year strata over 1000 replications, using "ritest" in Stata.

Appendix Table B9: Migration rates and fraction continuing occupation members by migration status, 2005-2018 CPS ASEC

	Full sample	State-specific licensed occupations	Quasi-national licensed occupations	All other occupations
Moved at all	0.120	0.100	0.104	0.122
Moved within county	0.082	0.066	0.065	0.084
Moved between county, within state	0.021	0.022	0.020	0.021
Moved between states	0.016	0.012	0.019	0.016
<i>Fraction continuing members of occupation</i>				
Non-movers	0.894	0.942	0.957	0.887
Movers within county	0.843	0.911	0.921	0.837
Movers between county, within state	0.779	0.867	0.903	0.768
Movers between states	0.686	0.825	0.872	0.669
Observations	1,407,567	71,617	43,310	1,292,640

Note: Sample includes all individuals aged 18-64 residing in the 50 US states and DC not residing in group quarters with nonimputed values for migration status, education, occupation, age, sex, race, marital status, and employment status, excluding those who lived outside the 50 US states and DC in the previous year and non-civilians (i.e., those outside of the universe of the CPS labor force status question). Continuing members of occupation defined as individuals reporting same CPS occupation code for last year's and current occupation. Sample excludes individuals out of the labor force in current year. Licensing categories based on the same occupations listed in Table 1. Unweighted observation counts and weighted percentages reported, calculated using sample weights.

Appendix Table B10: Interstate migration and occupational licensing, 2005-2018 CPS ASEC

	All individuals		Continuing members of occupation	
	Moved between states moved		Moved between states moved	
	Moved between states	between counties	Moved between states	between counties
	(1)	(2)	(3)	(4)
<i>A. State-specific vs. quasi-national licensed occupations</i>				
Licensed	-0.010 (0.001)	-0.111 (0.031)	-0.009 (0.001)	-0.115 (0.034)
Dep var mean	0.015	0.410	0.013	0.401
Percentage effect	-66.67	-27.07	-69.23	-28.68
R ²	0.032	0.303	0.033	0.333
Observations	114,927	3,579	108,734	3,084
<i>B. State-specific licensed occupations vs. all other occupations</i>				
State-specific licensed	-0.008 (0.001)	-0.106 (0.016)	-0.005 (0.001)	-0.085 (0.017)
Dep var mean	0.016	0.427	0.012	0.397
Percentage effect	-50.00	-24.82	-40.98	-21.41
R ²	0.013	0.102	0.011	0.115
Observations	1,364,257	44,360	1,194,428	32,035
<i>C. All licensed occupations v. all other occupations</i>				
Licensed	-0.005 (0.001)	-0.066 (0.010)	-0.002 (0.001)	-0.041 (0.012)
Dep var mean	0.016	0.429	0.013	0.400
Percentage effect	-31.45	-15.38	-16.00	-10.25
R ²	0.013	0.100	0.011	0.113
Observations	1,407,567	45,818	1,235,800	33,324
<i>D. Quasi-national licensed occupations v. all other occupations</i>				
Quasi-national licensed	-0.0006 (0.001)	-0.008 (0.017)	0.002 (0.001)	0.019 (0.019)
Dep var mean	0.016	0.432	0.013	0.402
Percentage effect	-3.73	-1.85	16.00	4.73
R ²	0.013	0.102	0.011	0.116
Observations	1,335,950	43,697	1,168,438	31,529

Note: Sample described in notes to Appendix Table B8. All specifications include last year's state of residence * year fixed effects and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Continuing members of occupation report same occupation in the current and previous year. Percentage effects calculated as coefficient/dependent variable mean*100. Sample in panel B excludes members of quasi-national licensed occupations, and sample in panel D excludes members of state-specific licensed occupations. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B11: Control sensitivity and treatment effect bounds, state-specific licensed occupations vs. all other occupations, 2005-2018 CPS ASEC

	(1)	(2)	(3)	(4)	(5)
<i>A. All migrants between counties</i>					
State licensed occupation	-0.067 (0.016)	-0.130 (0.015)	-0.108 (0.016)	-0.106 (0.016)	-0.104 (0.018)
Dep var mean	0.427	0.427	0.427	0.427	0.427
Percentage effect	-15.69	-30.44	-25.29	-24.82	-24.36
Treatment effect bounds					
$R_{\max} = 0.33$					(-0.118,-0.104), $\delta = -13.58$
$R_{\max} = 0.7$					(-0.220,-0.104), $\delta = -2.40$
$R_{\max} = 1$					(-0.394,-0.104), $\delta = -1.44$
R^2	0.001	0.022	0.034	0.102	0.252
Observations	44,360	44,360	44,360	44,360	44,360
<i>B. Migrants between counties, continuing members of occupation</i>					
State licensed occupation	-0.048 (0.017)	-0.110 (0.017)	-0.084 (0.018)	-0.085 (0.017)	-0.083 (0.019)
Dep var mean	0.397	0.397	0.397	0.397	0.397
Percentage effect	-12.09	-27.71	-21.16	-21.41	-20.91
Treatment effect bounds					
$R_{\max} = 0.4$					(-0.099,-0.083), $\delta = -10.70$
$R_{\max} = 0.7$					(-0.173,-0.083), $\delta = -2.67$
$R_{\max} = 1$					(-0.338,-0.083), $\delta = -1.52$
R^2	0.0005	0.022	0.040	0.115	0.302
Observations	32,035	32,035	32,035	32,035	32,035
<i>Controls</i>					
Education, age, sex		X	X	X	X
Other controls			X	X	X
State*year fixed effects				X	X
Age interacted with fixed effects					X

Note: Sample described in notes to Appendix Table B8. Continuing members of occupation defined as individuals reporting same CPS occupation code for last year's and current occupation. Sample excludes members of quasi-national licensed occupations. Other control variables include income, race, marital status, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Treatment effect bounds calculated assuming $\delta = 1$ and stated R_{\max} . Deltas calculated assuming treatment effect of 0 and stated R_{\max} . Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B12: Interstate migration and occupational licensing, occupation-specific results, state-specific licensed occupations vs. quasi-national licensed occupations, 2005-2017 ACS

	Moved between states (1)	Moved between states moved 50+ miles	
		All individuals (2)	Outside state of birth (3)
Barbers/Cosmetologists	-0.015 (0.001)	-0.030 (0.016)	0.002 (0.021)
Chiropractors	-0.007 (0.004)	-0.044 (0.036)	-0.062 (0.050)
Dental Hygienists	-0.008 (0.001)	-0.068 (0.025)	-0.033 (0.031)
Dentists	-0.003 (0.002)	-0.060 (0.026)	-0.024 (0.025)
Electricians	-0.012 (0.001)	-0.042 (0.013)	-0.057 (0.015)
EMTs/Paramedics	-0.011 (0.002)	-0.046 (0.022)	-0.030 (0.033)
Insurance Agents	-0.007 (0.001)	-0.010 (0.015)	0.003 (0.020)
Lawyers	-0.010 (0.001)	-0.078 (0.013)	-0.060 (0.012)
Optometrists	-0.010 (0.004)	0.010 (0.041)	0.007 (0.030)
Pest Control Workers	-0.013 (0.002)	-0.051 (0.040)	-0.109 (0.043)
Pharmacists	-0.011 (0.002)	-0.147 (0.018)	-0.125 (0.023)
Podiatrists	-0.009 (0.006)	-0.026 (0.129)	-0.011 (0.144)
Real Estate Appraisers	-0.012 (0.002)	-0.072 (0.035)	0.007 (0.048)
Real Estate Brokers	-0.010 (0.001)	-0.018 (0.023)	-0.037 (0.021)
Teachers	-0.018 (0.001)	-0.092 (0.012)	-0.057 (0.010)
Veterinarians	0.015 (0.004)	-0.033 (0.030)	-0.055 (0.034)
Dep var mean	0.024	0.652	0.774
R ²	0.026	0.148	0.127
Observations	1,832,632	55,368	34,271

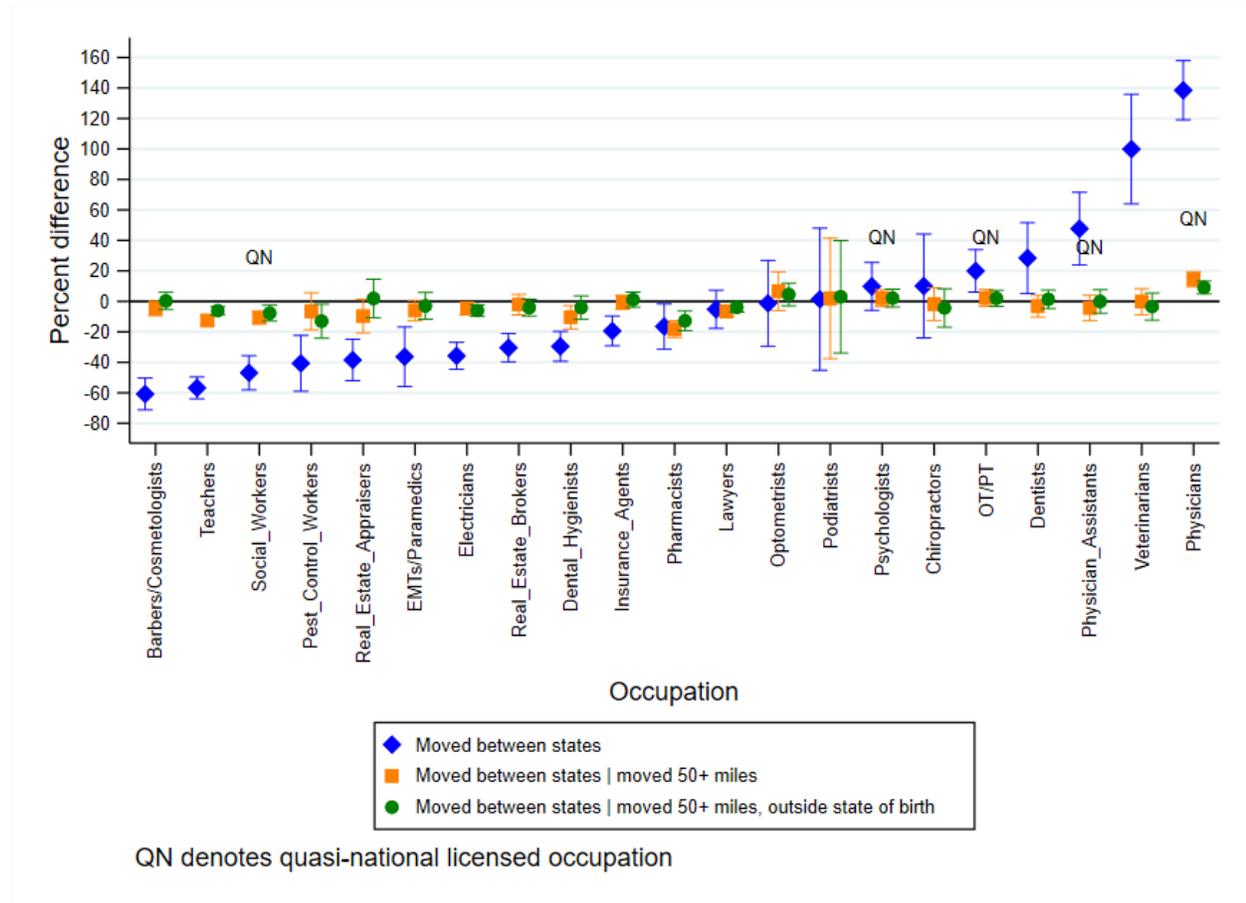
Note: Sample described in notes to Table 2. Excluded group is quasi-national licensed occupations. All specifications include last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence in parentheses.

Appendix Table B13: Interstate migration and occupational licensing, occupation-specific results, licensed occupations vs. occupational and physical therapists, 2005-2017 ACS

	Moved between states moved 50+ miles		
	Moved between states	Outside state of birth	
		All individuals	
	(1)	(2)	(3)
Barbers/Cosmetologists	-0.019 (0.002)	-0.045 (0.020)	-0.014 (0.027)
Chiropractors	-0.002 (0.004)	-0.027 (0.038)	-0.049 (0.050)
Dental Hygienists	-0.012 (0.002)	-0.083 (0.026)	-0.048 (0.026)
Dentists	0.002 (0.003)	-0.036 (0.035)	-0.005 (0.037)
Electricians	-0.013 (0.002)	-0.046 (0.022)	-0.062 (0.025)
EMTs/Paramedics	-0.013 (0.003)	-0.054 (0.032)	-0.038 (0.049)
Insurance Agents	-0.009 (0.002)	-0.019 (0.025)	-0.007 (0.029)
Lawyers	-0.006 (0.002)	-0.058 (0.024)	-0.046 (0.025)
Nurses	-0.005 (0.002)	-0.015 (0.018)	-0.016 (0.021)
Optometrists	-0.005 (0.004)	0.029 (0.045)	0.019 (0.040)
Pest Control Workers	-0.014 (0.003)	-0.058 (0.050)	-0.116 (0.056)
Pharmacists	-0.009 (0.003)	-0.133 (0.027)	-0.115 (0.033)
Physician Assistants	0.007 (0.004)	-0.043 (0.035)	-0.016 (0.041)
Physicians	0.028 (0.003)	0.080 (0.025)	0.055 (0.029)
Podiatrists	-0.004 (0.006)	-0.002 (0.130)	0.008 (0.149)
Psychologists	-0.002 (0.003)	-0.001 (0.024)	0.001 (0.027)
Real Estate Appraisers	-0.014 (0.002)	-0.078 (0.041)	-0.001 (0.062)
Real Estate Brokers	-0.012 (0.002)	-0.029 (0.030)	-0.047 (0.031)
Social Workers	-0.016 (0.002)	-0.085 (0.023)	-0.076 (0.027)
Teachers	-0.018 (0.002)	-0.097 (0.019)	-0.063 (0.021)
Veterinarians	0.019 (0.004)	-0.016 (0.034)	-0.042 (0.041)
Dep var mean	0.024	0.652	0.774
R ²	0.028	0.151	0.130
Observations	1,832,632	55,368	34,271

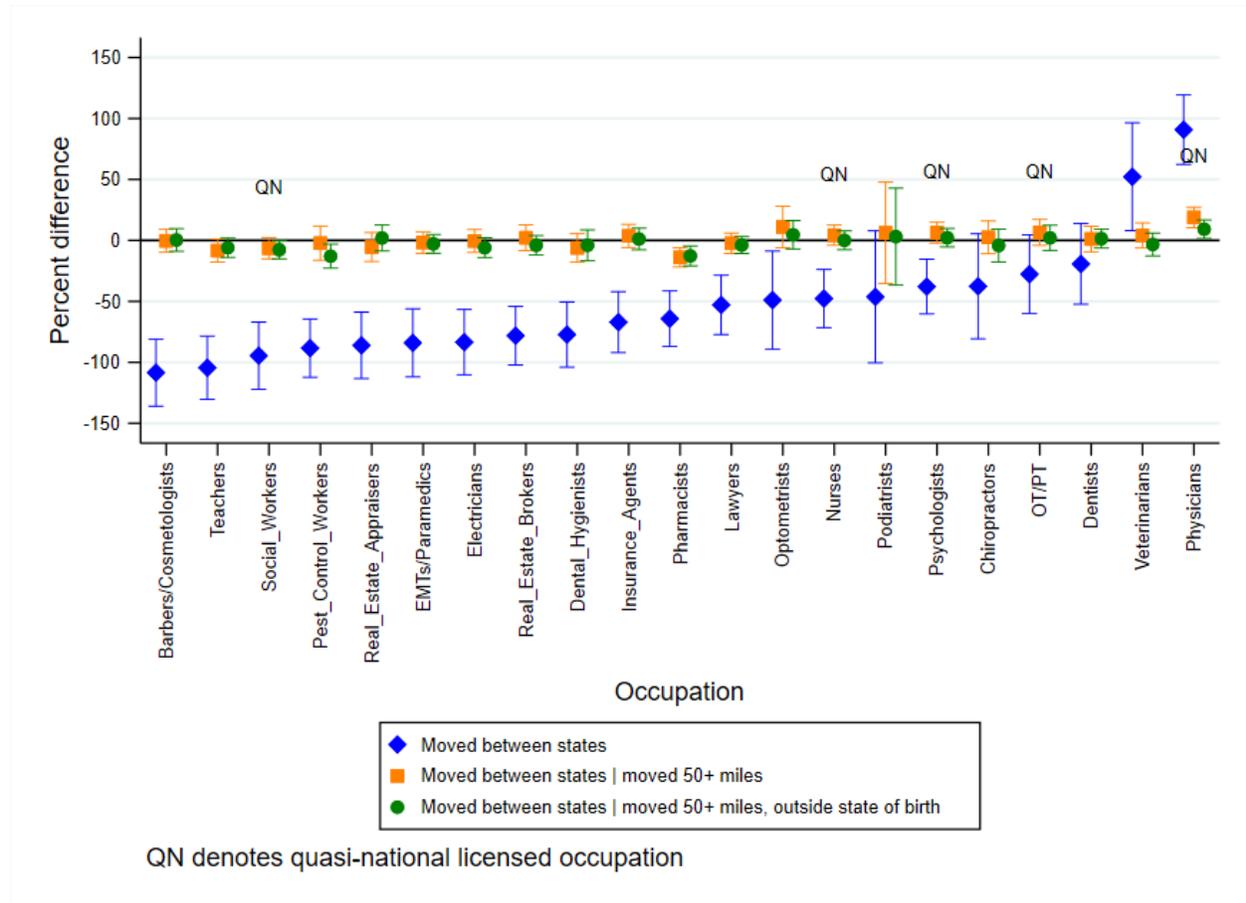
Note: Sample described in notes to Table 2. Excluded group is occupational and physical therapists. All specifications include last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence in parentheses.

Appendix Figure B1: Interstate migration and occupational licensing, occupation-specific results, licensed occupations relative to nurses, 2005-2017 ACS



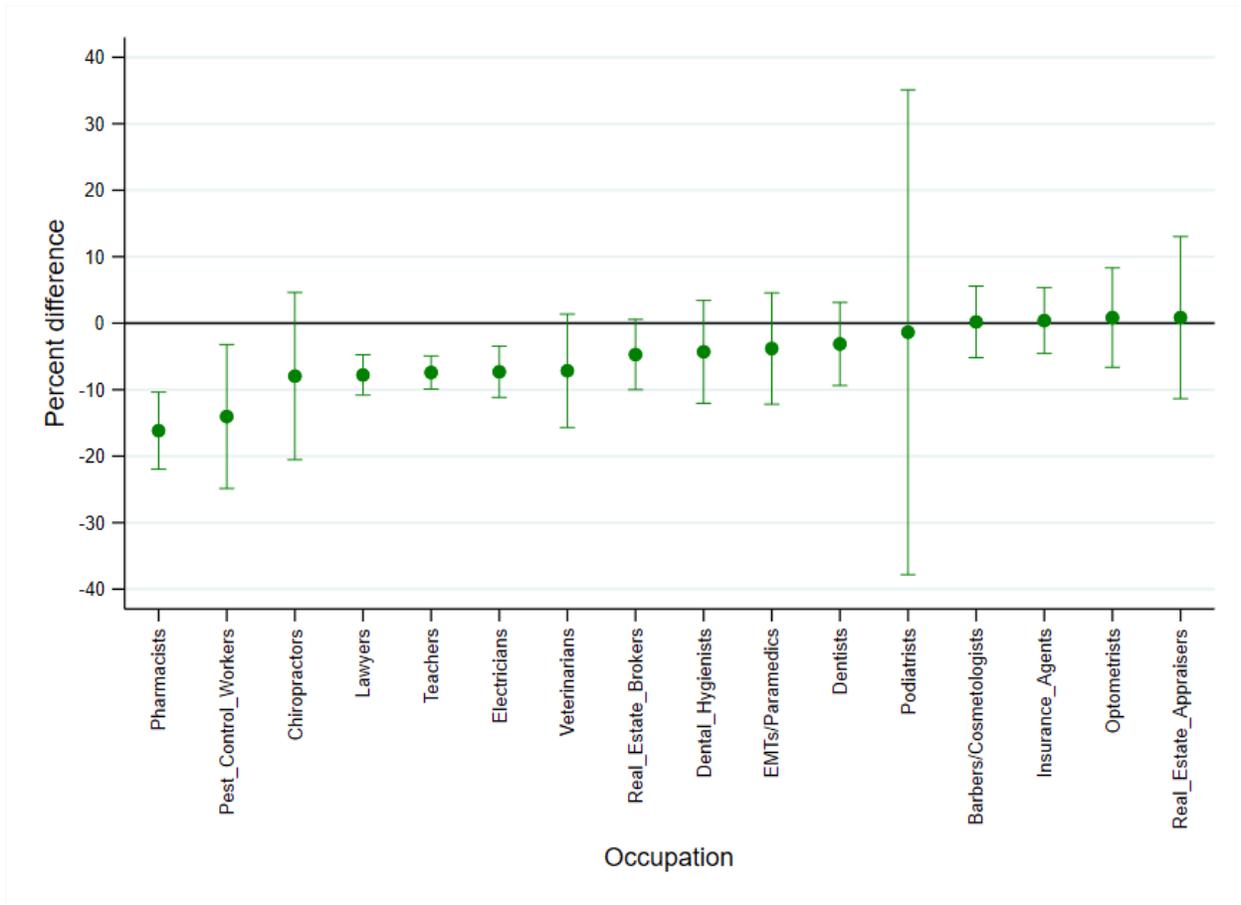
Note: Sample described in notes to Table 2. Percent difference in interstate migration likelihood relative to quasi-national licensed occupations and 95 percent confidence intervals shown. Excluded group is nurses. Regression using only 50+ mile migrants who lived outside their state of birth in the previous year comparing interstate migration of nurses to that of all other occupations produces coefficient of -0.021 with standard error 0.006. Percentage effects calculated as coefficient/dependent variable mean*100. All specifications include last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence.

Appendix Figure B2: Interstate migration and occupational licensing, occupation-specific results, licensed occupations relative to physician assistants, 2005-2017 ACS



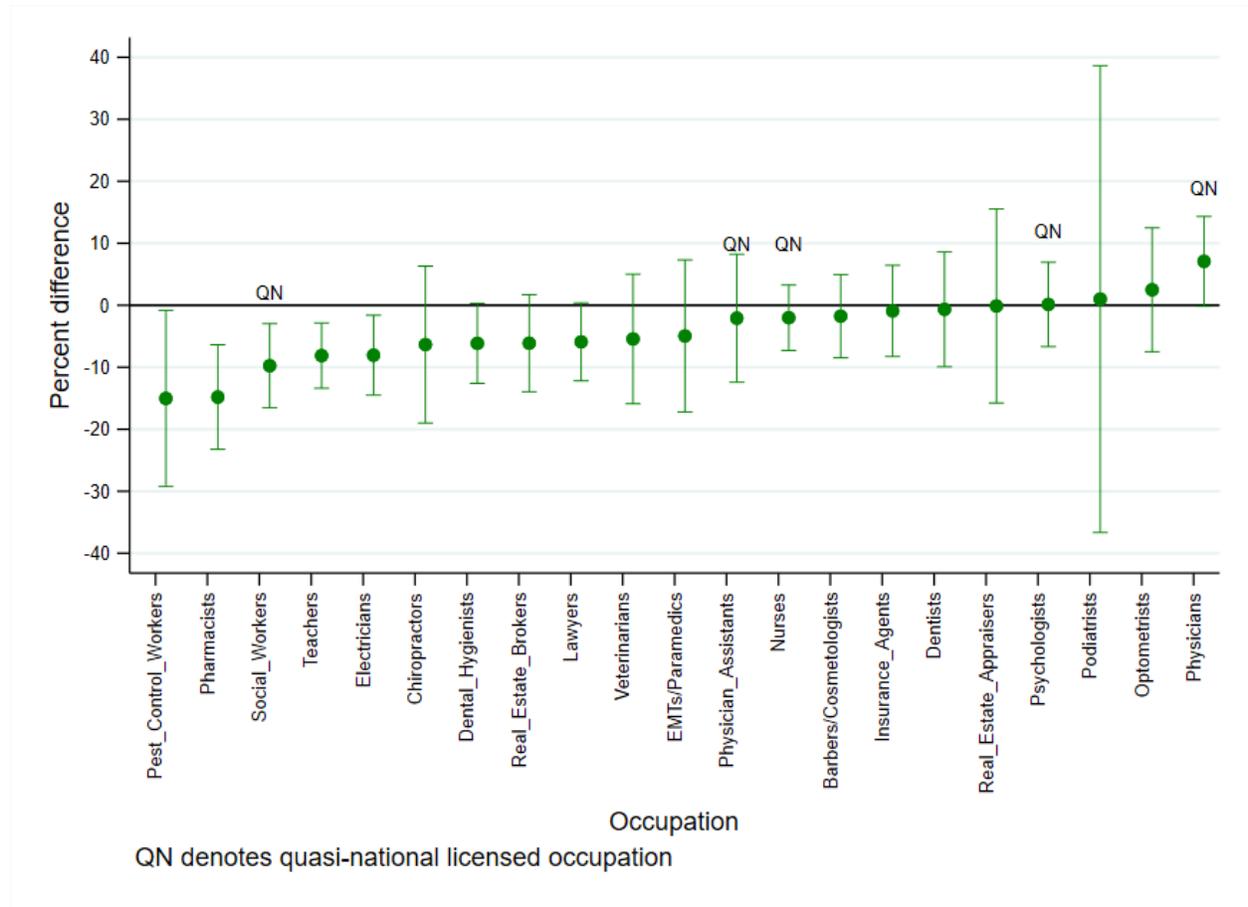
Note: Sample described in notes to Table 2. Percent difference in interstate migration likelihood relative to quasi-national licensed occupations and 95 percent confidence intervals shown. Excluded group is physician assistants. Regression using only 50+ mile migrants who lived outside their state of birth in the previous year comparing interstate migration of nurses to that of all other occupations produces coefficient of -0.034 with standard error 0.028. Hollow markers denote quasi-national licensed occupation, solid state-specific licensed occupation. Percentage effects calculated as coefficient/dependent variable mean*100. All specifications include last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence.

Appendix Figure B3: Interstate migration and occupational licensing, occupation-specific results, state-specific licensed occupations, conditional on 50+ mile move and residing outside state of birth last year, 2005-2017 ACS



Note: Sample described in notes to Table 2 and further limited to individuals who moved 50 or more miles in the previous year and resided outside their state of birth last year. Percent difference in interstate migration likelihood relative to quasi-national licensed occupations and 95 percent confidence intervals shown. Excluded group is quasi-national licensed occupations. Percentage effects calculated as coefficient/dependent variable mean*100. Specification includes last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence. Results shown in tabular form in Online Appendix Table B11.

Appendix Figure B4: Interstate migration and occupational licensing, occupation-specific results, licensed occupations relative to occupational and physical therapists, conditional on 50+ mile move and residing outside state of birth last year, 2005-2017 ACS



Note: Sample described in notes to Table 2 and further limited to individuals who moved 50 or more miles in the previous year and resided outside their state of birth last year. Percent difference in interstate migration likelihood relative to quasi-national licensed occupations and 95 percent confidence intervals shown. Excluded group is occupational and physical therapists. Regression using same sample comparing interstate migration of occupational and physical therapists to that of all other occupations produces coefficient of -0.025 with standard error 0.021. Hollow markers denote quasi-national licensed occupation, solid state-specific licensed occupation. Percentage effects calculated as coefficient/dependent variable mean*100. Specification includes last year's state of residence * year fixed effects, state of birth fixed effects, and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence. Results shown in tabular form in Online Appendix Table B12.

Online Appendix C: Lawyers

Ideally, we would have information on historical changes in state requirements for re-licensure for all of our licensed occupations—information that would enable a causal analysis. Unfortunately, this information is not available. States have broad discretion to set their own licensing requirements for each occupation, and often the specifics are delegated to a licensing board, making collection of reliable data, particularly on historical licensing requirements, impossible.

One exception is lawyers. Unlike many other occupations, lawyers have a large national association, the American Bar Association (ABA), and a national organization, the National Conference of Bar Examiners (NCBE), both of which oversee a major component of lawyer licensure: the bar exam. The websites for these two entities provide current information on state licensing requirements and a listing of ABA-accredited law schools, as well as historic information for the last 5–15 years.

One aspect of lawyer licensure for which we have information is the presence of reciprocity agreements. Entering into reciprocity agreements, which accept individuals holding licenses in specific other states as qualified to practice with few or no additional requirements, is one way that states can lower the barriers to re-licensure. The licensing guides published by the NCBE provide the year in which states entered into reciprocity agreements for the first time for lawyers. Importantly, we do not have information on the specific states covered by reciprocity agreements—we only know the first year a state adopted a reciprocity agreement with any state. We use this information to attempt to draw a more concrete link between the limited between-state migration of lawyers and the presence of reciprocity agreements.

Ten states adopted reciprocity agreements for lawyers between 2001 and 2015. As of 2015, 7 states had no such agreement, and the remaining 34 states already had reciprocity agreements in place in 2001. The introduction of reciprocity potentially increases the ability of lawyers to migrate to a state, as the barriers to re-licensure are much lower. We test whether this is the case using an event study framework:

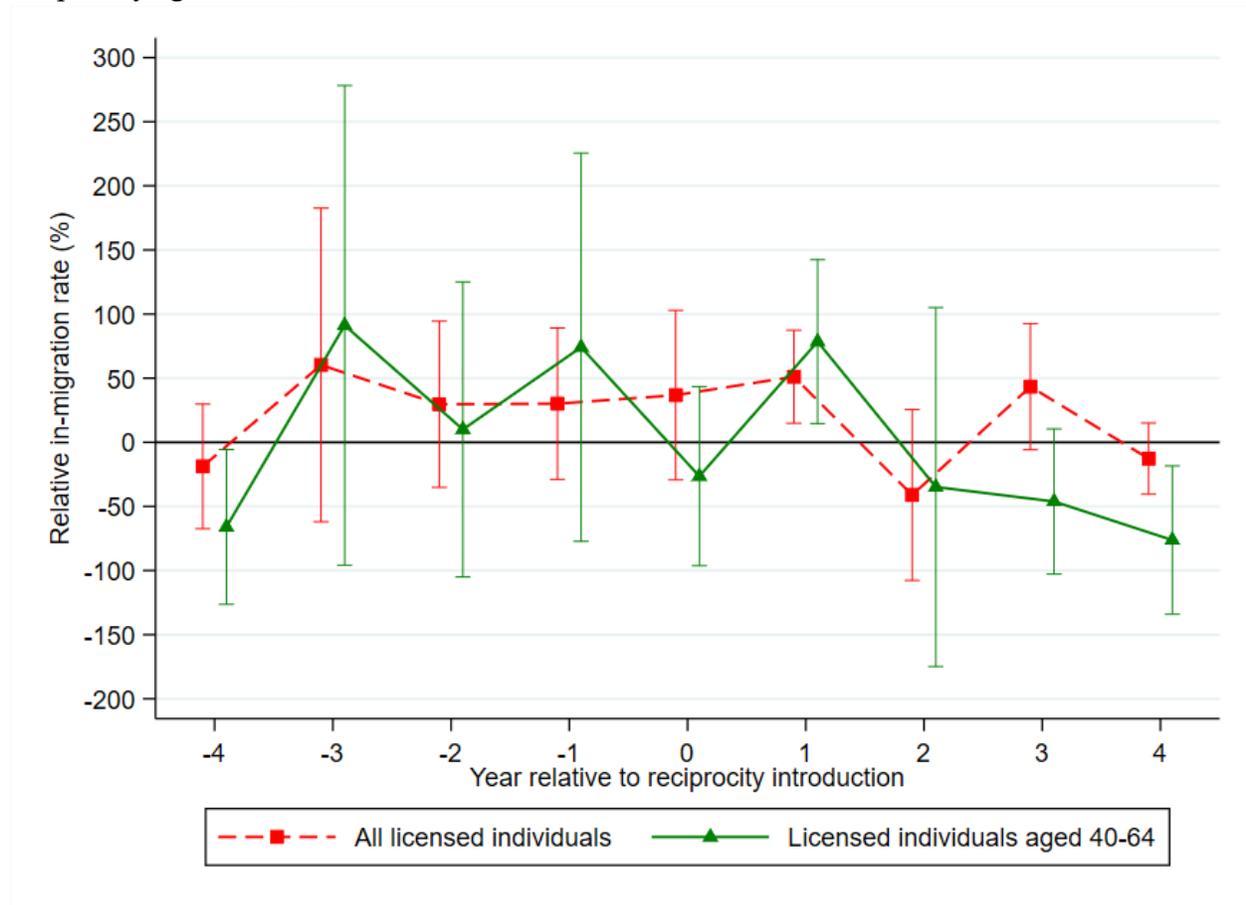
$$Y_{ist} = \gamma_1 lawyer_{ist} + \gamma_2 reciprocity_{st} + \sum_{t=-4}^4 \delta_t lawyer_{ist} \times reciprocity_{st} + X_{ist}\beta + \alpha_s \times t + \varepsilon_{ist} \quad (C1)$$

where Y_{ist} is an indicator for moving between states in the last year for individual i residing in state s in year t , $lawyer_{ist}$ is an indicator for being a lawyer, $reciprocity_{st}$ is an indicator for having a reciprocity agreement in place, $\alpha_s \times t$ are state-specific linear trends, and X_{ist} and ε_{ist} are as in equation (4). The vector δ_t captures the difference in migration rates for lawyers relative to others in the year state s adopted its first lawyer reciprocity agreement ($t = 0$) and the four years before and after. We use this event study framework to examine both in-migration and out-migration of lawyers to and from states that adopt reciprocity agreements. In-migration specifications define the reciprocity variable using the current state of residence, and out-migration uses last year's state of residence. We repeat the analysis using two different samples: all licensed individuals with at least a some college education (defined using members of the 22 occupations in Table 1) and all licensed individuals with this minimum education level aged 40–64. As all reciprocity agreements only apply to lawyers meeting a minimum years of practice

(usually 3 of the last 5 or 5 of the last 7 years), individuals aged 40 and older are more likely to meet this requirement and be covered by the reciprocity agreement.

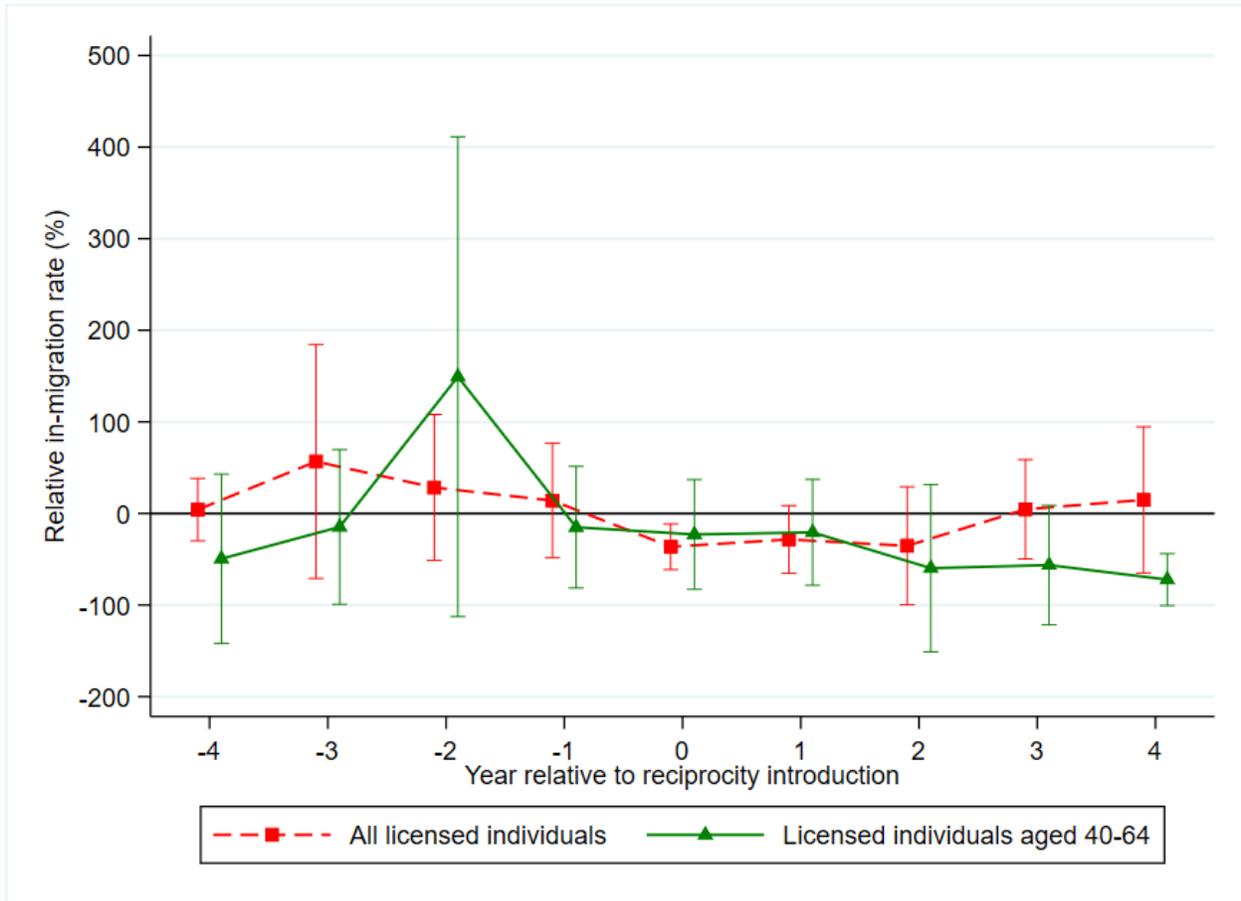
Figure C1 shows the results for interstate in-migration of lawyers. There is some evidence of an increase in in-migration of lawyers in the year after the adoption of a first reciprocity agreement, but overall results are noisy. The results for out-migration in Figure C2 show no evidence that a state adopting its first reciprocity agreement experiences increased out-migration of lawyers relative to members of other licensed occupations, but again, the point estimates are noisy and the confidence intervals wide.

Figure C1: Event study of interstate in-migration of lawyers relative to year of adoption of first reciprocity agreement, 2001-2015 ACS



Note: Sample described in notes to Table 2 and further limited to either all licensed individuals or all licensed individuals aged 40-64. Point estimates of percentage differences between lawyers and the comparison group (coefficient/dependent variable mean*100) and 95 percent confidence intervals shown. All specifications include state-specific linear trends (defined using current state of residence) and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Standard errors clustered on current state of residence. Full results available upon request.

Figure C2: Event study of interstate out-migration of lawyers relative to year of adoption of first reciprocity agreement, 2001-2015 ACS



Note: Sample described in notes to Table 2 and further limited to either all licensed individuals or all licensed individuals aged 40-64. Point estimates of percentage differences between lawyers and the comparison group (coefficient/dependent variable mean*100) and 95 percent confidence intervals shown. All specifications include state-specific linear trends (defined using last year's state of residence) and controls for income, race, sex, education, marital status, age, employment status, citizenship status, and number of children. Estimated using OLS and sample weights. Standard errors clustered on last year's state of residence. Full results available upon request.